

## COMMENTARY

# America's Economic Decline: Evidence and Explanations

Jeffrey A. Hart

Changes in international competitiveness since World War II have favored Germany and Japan over France, the United States, and Britain. This applies to competitiveness in general, but is examined in three specific industries: steel, automobiles, and semiconductors. Explanations of changes in competitiveness often focus on economic and cultural variables, but an examination of the three industries shows that a better explanation can be found in the way in which each country organizes its state and society. State-societal arrangements influence competitiveness mainly through their impact on the speed of diffusion of new technologies. The disparate cases of Germany (strong business and labor, weak government) and Japan (strong business and government, weak labor) suggest that there is more than one path to competitiveness. The literature on competitiveness has focused too much on Japan, and therefore on state industrial policies, as the key to increasing competitiveness. The German case shows that increased competitiveness is possible with a relatively weak state, but only if there is a major commitment to upgrading the skill levels of the work force. © 1994 John Wiley & Sons, Inc.

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# The Main Argument

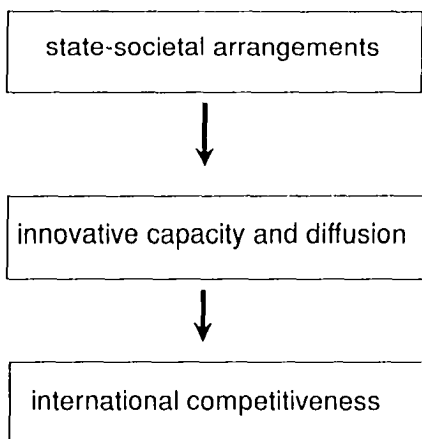


Figure 1. The main argument

## INTRODUCTION

The main argument of this article and the larger research project from which it springs (Hart, 1992) is that variation in state-societal arrangements is a key to explaining changes in the relative international competitiveness of the five largest capitalist countries since World War II. State-societal arrangements matter because they can accelerate or impede the development and diffusion of technological innovations that are crucial for competitiveness (see Fig. 1). This impact is felt most strongly during technological transitions such as the one we are currently experiencing (Kurth, 1979; Piore and Sabel, 1984).

Because state-societal arrangements vary significantly among the major industrialized capitalist countries, there is likely to be a very uneven growth during periods of technological transition. This uneven growth is the most important source of changes in the

distribution of economic power, and therefore of military/strategic power.<sup>1</sup>

State-societal arrangements are deeply rooted in the history of each country. Major upheavals connected with intense domestic social turmoil, the fighting of global wars, or drastic shifts in international competitiveness can result in changes in those arrangements. Despite some change in state-societal arrangements over time, there is little evidence that variance in arrangements has decreased. The decline in U.S. competitiveness and the rise in Japanese and German competitiveness has resulted in increasing conflict over international economic regimes in the last two decades.

## RESULTS OF EMPIRICAL ANALYSIS

These propositions were examined in the context of a comparative analysis of the role played by state-societal arrangements in changes in international competitiveness since World War II in the five largest industrial capitalist countries: the United States, Japan, Germany, France, and Britain; and in three industries: steel, automobiles, and semiconductors. These three industries were chosen to represent three distinct waves of innovation in industrial technology and to test the proposition that there is more consistency in state-societal arrangements within nations across industries than there is within industries across nations.

One of the key findings was that international competitiveness in steel, autos, and semiconductors has been strongly dependent on the diffusion of new technologies. In the case of steel, the new technologies were basic, oxygen processing and continuous casting. In the case of autos, the new technologies were just-in-time (or *kanban*) production systems and, later, new forms of factory automation. In the case of semiconductors, the new technologies were the product and process technologies necessary to move from one generation of semiconductors to another (for example, from transistors to integrated circuits and from integrated circuits to large-scale integrated circuits).

Those countries that were successful in innovating and diffusing these technologies earliest were most likely to increase their share of world production, to experience high rates of productivity growth, to maintain or increase employment, and to experience fewer financial crises. Overall, innovation was not as important as diffusion. Even if

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<sup>1</sup>The key original works on hegemonial decline are Kindleberger (1973), Krasner (1976), and Gilpin (1975). More recent discussions of the theory can be found in Gilpin (1987) and Webb and Krasner (1989).

domestic firms were not first in commercializing a new technology, the national industries that widely adopted new technologies in a timely manner had a distinct competitive advantage over those that did not, independently of other presumably important variables like average wages.

## DEFINING INTERNATIONAL COMPETITIVENESS

The definition of international competitiveness has proven to be controversial, but one proposed by the Report of the President's Commission on Industrial Competitiveness (*Global Competition: The New Reality*, 1985: 6) seems to satisfy many experts: ". . . the degree to which a nation can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously maintaining or expanding the real income of its citizens." This definition has three main elements that deserve elaboration.

First, meeting the test of international markets means the ability to design, produce, and distribute goods and services at costs that are globally competitive. Factor costs and the application of leading-edge technologies enter in here most centrally. If the factor costs are high or rising, application of technologies that increase the productivity of factors will be crucial for maintaining or increasing competitiveness (Porter, 1990: Chap. 3).

Second, there is the question of whether market conditions are free or fair. If they are not, then some countries will appear to be competitive internationally when they are not, because their domestic markets are sheltered or their firms are receiving large subsidies. Any country can have a simulacrum of competitiveness by adopting illiberal policies. Similarly, truly competitive countries will appear not to be competitive, because their unsubsidized and unprotected industries are forced to compete with subsidized or sheltered firms from other lands.

Third, there is the question of real incomes. If a country is experiencing a large increase in exports, but real incomes are declining, it may be inferred that workers and other citizens are subsidizing the nation's competitiveness. Any country can adopt labor market policies that reduce real wages in order to improve its position in world trade. This practice, however, should not be identified with genuine competitiveness (Cohen and Zysman, 1987: 61).

National competitiveness is not the same as the competitiveness of nationally owned firms. Firms that are multinational in operations frequently put large amounts of their productivity-enhancing tech-

technologies in foreign locations. Thus, it is possible for them to be internationally competitive without having much impact on the competitiveness of the home country. Indeed, encouraging the local presence of foreign firms that use state-of-the-art design, production, and distribution technologies can conceivably be a more effective way of enhancing national competitiveness than supporting domestic firms (Hart and Tyson, 1989; Reich, 1990: 53–64; Tyson, 1991: 37–39).

It is not necessary to be competitive in all industries in order for a country to be competitive overall, but it *is* necessary to be competitive in a variety of industries. Countries that become overly specialized in the production of a small number of industrial goods tend to become overly vulnerable to external economic shocks, such as disruptions in the supply of vital inputs, sudden changes in the demand for specialized products, and predatory behavior on the part of foreign producers in upstream or downstream markets. More importantly, there are industries that are economically strategic in the sense that a failure to be competitive in those industries makes it impossible for a country to be competitive in a range of others, because participation in those industries is necessary to obtain access to generic technologies (Hart and Tyson, 1989: 37–39).<sup>2</sup>

## MEASURING INTERNATIONAL COMPETITIVENESS

The two basic levels to measure national competitiveness are economy-wide and industry-specific. Here the stress is on the latter, although there appears to be sufficient consistency across industries to suggest that an economy-wide approach is possible. The main reason to measure competitiveness at the level of specific industries is that data on specific industries is easier to interpret than data on the economy as a whole. Interpreting economy-wide data on competitiveness is complicated by a number of problems to be discussed below. In addition, if technological innovation and diffusion is an important mediating variable, as hypothesized above (see Fig. 1), it will be impossible to test this without looking at industry-specific data, because technologies vary widely from industry to industry. The competitiveness of an entire country cannot be measured by focusing on a small set of specific industries, however. A judicious combination of industry-specific and economy-wide indicators is the best way to measure national competitiveness.

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<sup>2</sup>For a contrasting view, see Porter (1990: 6–11). Here Porter argues that national competitiveness is either meaningless or simply a proxy for productivity. Porter does not accept the idea that some industries may be economically strategic. He notes, however, the tendency of firms in any given nation to be competitive in clusters of related industries.

## Competitiveness at Whole Economy Level

International competitiveness can be measured on an economy-wide basis using such indicators as: trade balances; world export shares; rates of productivity growth; growth in real wages; and price elasticities of imports. The logic behind this last measure is that quality differentials favoring domestic products over imports will be indicated by high price elasticities of imports (*Global Competition*, 1985: 8; Cohen and Zysman, 1987: 61, 68). Increasing trade balances and world export shares, high rates of productivity growth, rapidly growing real wages, and increasing price elasticities of imports are all indicative of growing international competitiveness. Because productivity growth tends to be strongly correlated with growth in real income, and because sustained growth in productivity requires constant upgrading of production techniques, productivity growth is the most fundamental and reliable way of measuring national competitiveness (Porter, 1990: 6).

All of the economy-wide indicators are imperfect in some respect. Markets are often not free or fair. Trade balances and world export shares are subject to governmental manipulation of exchange rates and trade barriers. National production and export statistics usually do not reflect the ability of multinational firms to penetrate foreign markets through local production and licensing of technologies. Labor productivity grows rapidly during periods of massive layoffs; both labor and capital productivity increase sharply whenever aggregate demand surges. Nevertheless, the indicators listed above do a reasonably good job of measuring shifts in competitiveness over time.

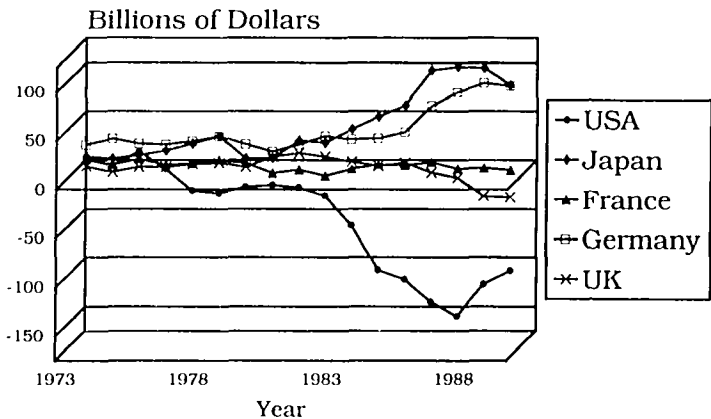
A more accurate view of competitiveness is obtained by combining the separate indicators into a composite view. For example, a country that experiences growth in productivity, world export shares, and real wages (e.g., Japan) is clearly more competitive than one experiencing declining productivity, world export shares, and real wages (e.g., Britain).

## Trade Balances and World Export Shares

Between 1980 and 1987, Japan and Germany experienced increasing global trade surpluses, while the United States and Britain suffered increasing deficits (see Fig. 2).<sup>3</sup> France suffered from chronic but relatively smaller trade deficits than either the United States or Britain in the 1980s.

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<sup>3</sup>The trade surplus from exports of petroleum in Britain (which ended in 1983) complicates using the trade surplus as a measure of the competitiveness of Britain.



**Figure 2.** Balance of trade of the five countries. *Source:* International Monetary Fund (1990) *International Financial Statistics Yearbook* (p. 140), Washington, DC.

World export shares in manufactured goods provide a similar picture. The United States and Britain both lost considerably in their shares of world manufactured exports between 1960 and 1982, although the United States started from a higher level. Japan rose rapidly, from around 6 percent of world exports to around 14 percent during the same period. Germany held steady at around 20 percent; France did the same at around 10 percent (Scott, 1985: 27).

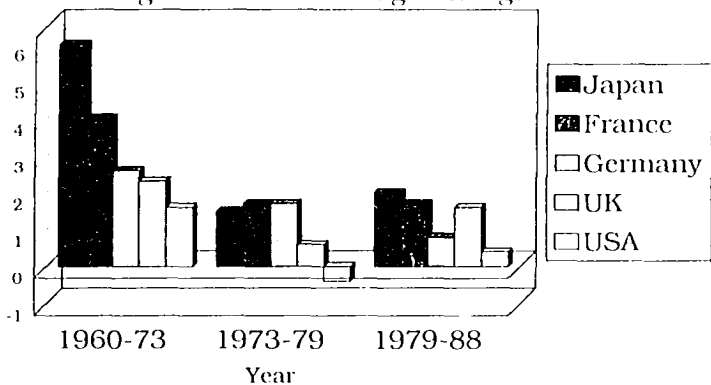
## Productivity

Growth in productivity has been most rapid in Japan and least rapid in the United States since 1960. From 1966 to 1973, Japanese total factor productivity grew at 6.3 percent per year. U.S. total factor productivity grew at 1.5 percent per year from 1960 to 1973. French productivity growth has been somewhat more rapid than that of both Germany and Britain, but all three have experienced more rapid productivity growth than the United States (see Fig. 3).

Prior to the late 1960s, labor productivity in manufacturing in the United States grew at around 3 percent annually. Between 1973 and 1979, it grew at only 1 percent annually. Labor productivity growth increased to 3 percent between 1979 and 1986. But the authors of the MIT study, *Made in America*, warn against interpreting this as a return to economic health (Dertouzos et al., 1989: 31):

A significant fraction of the productivity gains in manufacturing were achieved by shutting down inefficient plants and by permanently lay-

## Average Annual Percentage Change



**Figure 3.** Growth in productivity in the five countries. *Source:* Organization for Economic Cooperation and Development (December 1990) *OECD Economic Output*, 48, 120.

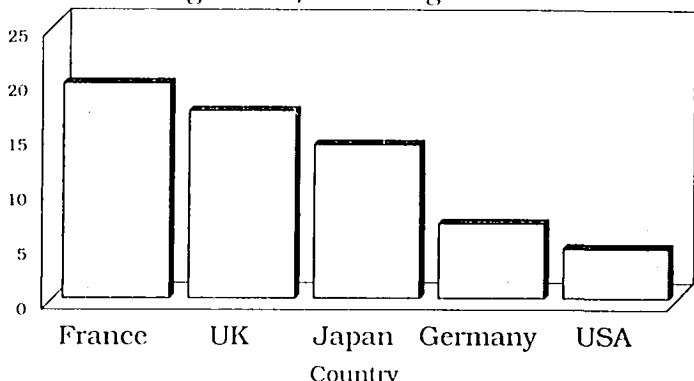
ing off workers at others. Employment in the U.S. manufacturing industry declined by 10 percent between 1979 and 1986, and that loss of jobs accounted for about 36 percent of the recorded improvement in labor productivity. Another reason for caution is that the productivity recovery spanned a deep recession; productivity growth always accelerates following a recession as factories increase their output and take up the slack in the economy.

## Growth in Real Wages

Real wages rose steadily in all five countries between 1960 and 1989. The largest increases in real wages during that period were in France and Britain (see Fig. 4). The smallest increases were in Germany and the United States, which started the period with higher absolute wages than the other three. The fact that real wages in Japan and Germany grew slower than those in France and Britain, while the former two countries outperformed the others in trade and productivity, suggests strongly that wage restraint was an important factor in their increased overall competitiveness. The slow growth of U.S. real wages combined with its poor trade, profits, and productivity performance suggests a general decline in competitiveness. The British pattern, as usual, is the worst: bad trade and productivity performances and rapidly increasing real wages.



1989 Wage Index/1960 Wage Index



**Figure 4.** Growth in real wages in the five countries, 1960–1989. *Source:* International Monetary Fund (1990) *International Financial Statistics Yearbook* (p. 112–13). Washington, DC.

### Price Elasticity of Imports

The price elasticity of imports in the United States increased in the 1970s and 1980s, as U.S. buyers no longer were willing to pay a premium for U.S.-made products because of perceived differences in quality (Cohen and Zysman, 1987: 67).<sup>4</sup> Price elasticity of imports has never been particularly high in Japan because of a generally low propensity to import (which has a lot to do with the Japanese distribution system). Nevertheless, Japanese consumers began to buy consumer products from abroad as their affluence rose in the 1980s, especially luxury goods from Europe and low-end standardized products from Asian developing countries. The increased imports from Asia were partly the result of perceptions of decreasing quality differentials, while the imports from Europe were the result of continued perceptions of quality differentials in favor of European goods. In producer goods, with a few exceptions, Japanese buyers remained convinced of the superiority of Japanese products. Consumers in Britain and France have behaved more like those in the United States in recent years, consumers in Germany more like those in Japan.

To summarize, competitiveness increased across the board in Ja-

<sup>4</sup>Cohen and Zysman (1987) cite the following source: Kremp, Elizabeth and Mistral, Jacques (1985) "Commerce extérieur américain: d'où vient, où va le déficit?" *Economie Prospective Internationale*, 22, 5–41.

pan and Germany, decreased in the United States and Britain, and France was somewhere in the middle. Japan did particularly well in trade and productivity, but Germany remained a close second. The United States and Britain both suffered a decline in competitiveness, but the United States started from a much better initial position. The French did remarkably well until the 1980s, when they began to experience chronic trade deficits and decreased productivity growth, while wages remained on a steep upward trajectory.

## COMPETITIVENESS IN SPECIFIC INDUSTRIES

Useful indicators for national competitiveness in specific industries are: growth in national shares of global production; growth in employment of production workers; growth in revenues and profits of firms in the industry; and the frequency of industrial crises. It is impossible to review the data on changes in competitiveness in specific industries here, so the reader is referred to the original work. In that work, industry-specific measures of competitiveness provided evidence for the increased competitiveness of Japan and Germany and the decreased competitiveness of Britain and the United States. French industry-specific competitiveness rose until the late 1970s, and then declined in the 1980s. While some anomalies exist in specific indicators, the general pattern is clear and is highly consistent with that suggested by the economy-wide indicators discussed above.

## STATE-SOCIETAL ARRANGEMENTS

State-societal arrangements are defined as the manner in which state and civil society are organized and how state and society are institutionally linked. The state consists of a set of institutions mostly associated with the government but also including such actors as tripartite (government-business-labor) boards and commissions, state-owned business enterprises, and the other parastatal organizations. Civil society is the domestic social environment in which the state operates. In contemporary advanced industrial countries, it makes sense to focus on only two groups in civil society, business and organized labor, especially when the issue to be examined is competitiveness in manufacturing industries (Rogowski, 1989).<sup>5</sup>

The state-societal dichotomy, which has deep roots in liberal polit-

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<sup>5</sup>For a convincing argument that agricultural groups need to be included in descriptions of social dynamics in earlier historical periods, see Rogowski (1989).

ical philosophy, is premised on the notion that the power of the state should be and will be limited to prevent undue interference in the actions of individuals and selected collectivities.<sup>6</sup> In an ideal, free-enterprise economy, all business corporations would be private and relatively autonomous from state agencies, and therefore would be part of civil society. All private individuals would also be members of civil society, except when they are holders of state offices. All capitalist countries fall short of the liberal ideal, using state-owned enterprises to perform certain functions of government and limiting the autonomy of private firms through a variety of regulations.

The liberal ideal is not the only one that has been defined for state-society relations. The communist ideal subordinates the state to the interests of one class in society, the proletariat, so that the state may eventually wither away in a classless society. The social democratic ideal gives the state sufficient power to reduce the inequities between classes that is created over time by capitalism but tries to keep it accountable by maintaining a representative form of government (Held and Krieger, 1984). The fascist ideal gives the head of state extraordinary powers and organizes societal interests from above, while at the same time prohibiting the formation of autonomous groupings that might resist state leadership.<sup>7</sup> The neo-corporatist ideal is the concentration of the state and privileged groups, especially business and labor, to determine national policies (Streeck and Schmitter, 1985: 10; Lehmbruch, 1982).

None of these ideals has ever been fully realized. Yet their very existence has obviously had a major impact on national and international politics in the twentieth century. National debates over state-societal relations tend to be defined in terms of the alternative ideals discussed above. Not only do these debates become an important element of partisan politics, they become highly salient during and after major international wars, domestic social conflicts, and deep economic crises. At key moments in a nation's history, changes in state-societal arrangements may be embodied in new political, social, and economic institutions that are designed to settle, for a time, the domestic debates (Ikenberry, 1988: 223-225; Krasner, 1984: 234).

The way state and society are organized and how state and society are linked will therefore vary significantly from country to country. The key reasons for these variations are historical and contextual. Different institutions are inherited from the past. Some states have

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<sup>6</sup>The discussion of the concepts of state and civil society in this work must, by necessity, be brief to the point of caricature for those who are familiar with the vast literature on this subject. For more lengthy discussions see Badie and Birnbaum (1979), Carnoy (1984), Nordlinger (1981), Bendix (1968), Tilly (1975), Hall and Ikenberry (1989), and Stepan (1978).

<sup>7</sup>I owe this formulation of the fascist ideal to Gregory Kasza (to appear).

more centralized bureaucratic systems than others, often combined with a pattern of recruitment from elite colleges and universities. Some states are more inclined to structure civil society than others through the exercise of state authority and, at times, direct intervention in the economy (Schonfield, 1965; Katzenstein, 1978; Zysman, 1983; Hall, 1986).

## SYSTEMATIC OBSERVATION OF STATE-SOCIETAL ARRANGEMENTS

State-societal arrangements vary across countries and across time. They may even vary across specific industries, although the empirical cases presented here suggest that this type of variation is not very important. The following approach was adopted to observe state-societal arrangements in the area of industrial competitiveness: for each country examined in this study, the following questions were asked:

1. **How is the government organized?** Specifically, how centralized and influential are the bureaucracies dealing with industry-specific policy making? What sorts of policy instruments are available to the government for the making of industrial policies? How inclined is the government to use these instruments? How successful is the government in getting its way with business or labor in conflicts over industrial policies?
2. **How is the business sector organized?** How powerful are business peak associations?<sup>8</sup> Do individual firms or subgroups have the ability to lobby successfully for policy changes outside of business associations? Is there a system of "industrial families" (loose horizontal groupings) in the business sector? What is the role of the financial sector in underpinning these arrangements? Are the articulated interests of business in the country so diverse that there is insufficient unity to influence governmental policies or legal regimes that affect business-labor relations?
3. **How is labor organized?** How powerful are labor peak associations? What percentage of the work force is unionized? Are unions organized on an enterprise or industrial basis? Can

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<sup>8</sup>A peak association is an association that aspires to represent all organizations of a certain type (e.g., businesses or labor unions) in a given society. Examples of business peak associations are the U.S. Chamber of Commerce, the Japanese Keidanren, and the German Bundesverein der Deutschen Industrie. Examples of labor peak associations are the U.S. AFL-CIO and the German Deutsche Gewerkschaftsbund.

unions successfully undesired governmental policies or managerial decisions?

4. **What sorts of institutions link state and society?** In particular, are individuals recruited for top positions in the governmental bureaucracy from elite colleges and universities? What role does the state play in financing those institutions? Does the government own major business enterprises or does it closely supervise the operations of "private" firms? Does the government help to organize and fund consortia of businesses for the purpose of advancing industrial technology? Are there special institutions for transmitting abstract knowledge from universities to the business sector? What role do the state and business sectors play in providing training for workers? What sorts of parastatal institutions exist (especially those involving neo-corporatist concertative mechanisms) and how important are they in specific policy realms?

Some state-societal arrangements are conducive to the creation and diffusion of new technologies and others are not. The distribution of power among government, business, and labor is the simplest way of summarizing the differences in the state-societal arrangements among the five major industrial countries selected for examination here. The distribution of power among those three social actors is the basic underpinning of state-societal arrangements.

## **ROLE OF TECHNOLOGICAL INNOVATION AND DIFFUSION IN COMPETITIVENESS IN THE THREE INDUSTRIES**

Technological innovation played a pivotal role in all three industries in determining which firms and which countries would come out on top in international competition. State-societal arrangements strongly influenced the creation and diffusion of new technologies. Therefore, state-societal arrangements had a major effect on international competitiveness through their effects on innovation. Although these rather bold statements need to be qualified somewhat in specific cases, nevertheless they provide a better explanation of changes in international competitiveness than alternative explanations. Let us start by making the case for the crucial role of technological innovation and consider afterward the claims of competing explanations.

## Steel Industry

In the steel industry, the most important technologies introduced after World War II were basic oxygen furnaces and continuous casting. The replacement of other types of furnaces with basic oxygen furnaces on a major scale occurred first in Japan, spread quickly to Germany, and diffused more slowly to the rest of Europe and the United States. In 1960, 11.9 percent of Japanese production was basic oxygen, compared with 3.4 percent in the United States. In 1970, 79.1 percent of Japanese production was basic oxygen, while U.S. production was still only 48.2 percent basic oxygen (Lynn, 1982: 23). The larger German companies were also quicker to adopt basic oxygen furnaces than most U.S., French, and British firms.

The basic oxygen technology was invented in Austria; the Japanese licensed the necessary patents from Canadian firms. The Japanese government played a key role in encouraging the major Japanese firms to adopt this technology. One of the more important reasons why the government encouraged the firms to adopt the technology was to lower their dependence on imported scrap iron and steel, a dependence that figured importantly in U.S.–Japanese relations in the years prior to the attack on Pearl Harbor (Kennedy, 1987: 303).<sup>9</sup> But the firms themselves had an interest in lowering their dependence on imported scrap because scrap prices had been controlled by the large U.S. firms and had been set just high enough to discourage competition.

The basic oxygen technology was risky because it was unproven. No one had “scaled up” the technology to the size required for realizing production cost advantages over the Bessemer technology. The U.S. producers might have converted their plants to basic oxygen furnaces in the 1950s when they made major investments to upgrade their facilities. Instead, they passed up the opportunity, either because they did not see the future of the basic oxygen technology or because their major investors were unwilling to assume the risks involved in adopting the new technology.<sup>10</sup>

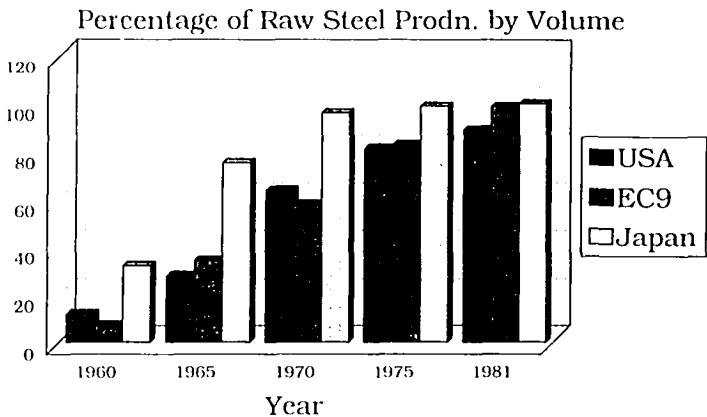
Although bad management or risk-averse financial institutions may have been to blame in slowing the adoption of basic oxygen technology in France, Britain, and the United States, one needs to consider other explanations for the slowness with which the technology was adopted after it became clear that it was the more efficient technology. One important source of slow diffusion in the United States was the problem of amortizing investments made in the 1950s

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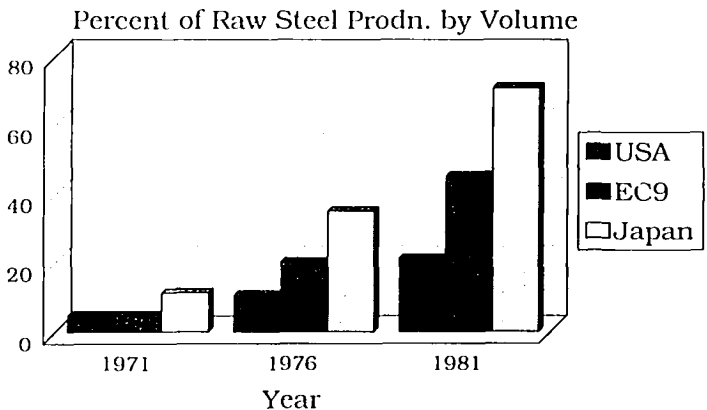
<sup>9</sup>Together with Britain and the Netherlands, the United States imposed an embargo of iron ore and scrap exports to Japan in July 1941 after the takeover of Indochina.

<sup>10</sup>From interview materials.

### A. Diffusion of Oxygen Furnaces



### B. Diffusion of Continuous Casting



**Figure 5.** Diffusion of new production technologies. *Source:* Barnett, Donald and Schorsch, Louis (1983) *Steel: Upheaval in a Basic Industry* (p. 55), Cambridge, MA: Ballinger.

on the now obsolete older technologies. The mistakes of the 1950s, in essence, haunted the U.S. steel industry for the next three decades. Nevertheless, by the mid 1970s, the U.S. industry had caught up with the rest of the world in the diffusion of oxygen furnaces (see Fig. 5).

U.S. industry remained far behind Japan and Europe in the adop-

tion of another technology: continuous casting. Prior to the introduction of continuous casting, steel ingots or slabs were cast in separate plants and then reheated in another location so that they could be formed or rolled into their final shapes. With continuous casting, the molten steel is poured from the steel-making furnace directly onto a processing line which produces the required shapes. The savings in the energy required to reheat the cooled steel ingot and slabs are substantial, as are the savings in processing time and handling. Continuous casting requires relatively sophisticated scheduling, however, that has become easier with the introduction of computer-controlled production lines.

Having the opportunity to build new plants on large sites was an important advantage held by the Japanese in adopting continuous casting. Many of the plants built in the 1960s in Japan were "greenfield" plants as opposed to the "brownfield" plants of the United States and Europe.<sup>11</sup> Nevertheless, some new integrated plants were built in the United States and Europe with continuous casters. The steel plants of Britain, France, the Saar Valley in Germany, and the United States, however, were predominantly in traditional steel-producing regions where there was little room for plant expansion or where the costs of building greenfield plants were so high as to discourage the required investment. Higher labor costs and environmental restrictions played a minor role in this regard, in comparison with the factors militating against upgrading production technologies.

Major mistakes were made in France, Britain, and the United States in delaying the phasing out of obsolete production facilities. In Britain, the major expansion of steel production in the 1970s in modern plants should have been accompanied by the shutting down of obsolete plants, especially in light of the weakening of demand for both domestic production and steel exports. The British paid a high price for this error. Similar errors were made in France and the United States.

It should be noted that no national steel industry had strong financial results in the absence of growth in steel demand that followed the oil price increases of 1973. By the early 1980s, even the traditionally strong firms of the Ruhr Valley in Germany were experiencing financial losses because of depressed prices in a European market glutted with excess production. Nippon Steel also experienced lower than average rates of profitability and began to redeploy its

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<sup>11</sup>"Greenfield" means that no previous facility was on the site. "Brownfield" means that a previous facility was modernized or renovated. Magaziner and Reich discuss this issue (1983: Chap. 13).



idle work force by loaning them to other firms. The point to remember, however, is that the German and Japanese firms weathered the recessions better than the firms of the other three countries; steel employment decreased in Germany and Japan, but not as much as in the other three countries.

## **Auto Industry**

In the automobile industry, technology played a vital role in the rise of the Japanese industry as well. Both product and process innovations were important. In the 1950s and 1960s, the Japanese firms played the game of catching up to the product and process technologies of the U.S. and European industries. Initially, the Japanese firms imported new product technologies through licensing and coproduction agreements with Western firms. By the mid 1960s, however, they began to produce their own car models and to compete intensively with one another for domestic market shares.

Toyota invented an entirely new way to produce motor vehicles. Toyota redesigned the assembly process to reduce the total man-hours required for producing a single unit. Part of this redesign was the shift to kanban, or just-in-time production, under which inventories of components and parts were kept to a minimum, and suppliers were required to make early morning deliveries of only those parts needed for the day's production schedule. Suppliers had to locate quite close to the main factory for this system to be feasible, in marked contrast with the wide distribution of suppliers in both the U.S. and European systems (Magaziner and Reich, 1983).

By the 1970s, the Japanese auto firms began to respond to increasing domestic wage rates by automating production and assembly with an increased use of robots, computer-controlled machine tools, and computerized assembly lines. The new process technologies adopted by Japanese firms allowed them to increase worker productivity in the face of increased wages, while at the same time improving the quality of vehicles produced. Products were redesigned around the new processes, both to make the new processes work more efficiently and to improve the reliability of the products. The new generation of Japanese models that resulted were able to compete overseas with the generally higher quality vehicles produced in the United States and Europe. Computerized automation reduced retooling "downtime," the amount of time production had to stop for the retooling that accompanied the annual changes in models, resulting in major efficiency gains for Japanese firms.

It needs to be acknowledged that the product and process innova-

tions pioneered by the Japanese might not have resulted in such dramatic increases in exports, had it not been for the added effect of the increased oil prices on the demand for small cars, especially in the huge North American market. Had the U.S. producers been able to match Japanese innovations in small car production, the opportunities for Japan in that market would have been greatly diminished.

While U.S. product and process technology lagged seriously behind that of Japan, especially in small cars, European technology followed at a somewhat shorter lag. European production was more similar to that of Japan in servicing demand for small cars; and many of the product innovations introduced in Japanese models either originated in Europe or were quickly copied by European producers. Some European firms were slower than others in this regard, of course. British Leyland (now called the Rover Group) suffered the most from its inability to match Japanese product and process innovations, a suffering accentuated by its overmanning with high-wage labor. French and Italian producers were lulled into a false sense of security by traditional tariff and nontariff barriers and, in the case of France, by the availability of less expensive North African and Turkish workers. Even Volkswagen suffered diminished export demand as a result of more intense competition from Japan and problems in making the transition to multimodel production in the mid-1970s.

One consequence of the increased challenge from Japan in Europe was the accelerated diffusion of computerized automation in the major firms. Firms like Volkswagen, Renault, and Fiat rapidly introduced new flexible manufacturing systems that allowed them to produce more than one model on a single production line. Automation was used also as a tool of management to ensure reduced worker militancy by eliminating workers from processes that were particularly vulnerable to work stoppages (Streeck and Hoff, 1981). Both European and U.S. manufacturers also responded to the Japanese challenge by moving some production to lower-wage countries.

The issue of offshoring of production comes up again in the case of semiconductors. The Japanese firms in both autos and semiconductors acted as if they did not have the option to locate labor-intensive production processes overseas, thus forcing the use of automation to compensate for increasing wages. In marked contrast, U.S. and European firms used a combination of offshoring and less expensive foreign workers to compete with Japanese firms. Even after Japanese wage rates began to increase in the 1960s and 1970s, U.S. and European firms, with few exceptions, continued to believe that differences in wage rates were the most important reason for the lower prices of Japanese cars. Only when those firms began to perceive

that Japanese innovations in process technology were compensating for rising labor costs did they make the necessary investments in production technology. By and large, the Europeans and the European subsidiaries of U.S. firms were faster in doing this than the U.S. firms in their North American operations.

## **Semiconductor Industry**

Very rapid rates of technological innovation, in both product and process technologies characterized the semiconductor industry from the invention of the transistor in the late 1940s. The jump from integrated circuits to large-scale integrated (LSI) circuits in the mid-1970s. The jump from integrated circuits to large-scale integrated (LSI) circuits in the mid-1970s was made possible by the invention of a new process involving the use of photographically produced masks to create an electronic circuit of thousands of transistors, resistors, and capacitors on a small portion (chip) of a wafer of silicon. This new process made possible a series of product innovations, including the calculator chips that were responsible for the rapid rise in the fortunes of companies like Texas Instruments and National Semiconductors. The next generation of products, very-large-scale integrated (VLSI) products, in the late 1970s was made possible by another process innovation, the wafer stepper. Wafer steppers allowed manufacturers to accurately etch hundreds of copies of a single circuit design on a silicon wafer.

Photolithography and wafer steppers alone were not sufficient to make it possible to move from one generation of integrated circuits to another. They had to be supplemented with a variety of new technologies that made it possible to produce wafers with fewer and fewer impurities and with very smooth surfaces, so that smaller and smaller line widths could be etched on the silicon. A variety of chemical baths evolved to make the etching process cheaper and more reliable. Clean-room technology had to evolve also to make the chip yields per wafer high enough to allow new generation products to compete with older generation products in price. Finally, the processes by which circuit designs were converted into masks had to be improved as line widths got smaller. But the transition from generation to generation would have been impossible without advances in photolithography and the introduction of wafer steppers (Braun and Macdonald, 1982; Borrus, 1988; Gilder, 1989).

Japanese firms were not competitive with U.S. firms in integrated circuits until the transition from LSI to VLSI circuits. In previous generations, by the time the Japanese firms began to get manufacturing costs down to U.S. levels, the U.S. firms had begun to produce

the next generation of circuits. U.S. firms were driven to innovate in semiconductors at first by the rapid growth of demand from the military and space programs, and later by the enormous growth of the computer industry. Japanese firms were limited in their innovative potential by having no focus on supplying the demand for consumer electronics circuitry.

In the transition to VLSI, however, it became the policy of both the major firms and the Japanese government to beat the Americans in process technology so as not to be dealt out of the competition in VLSI products. The government committed itself to this enterprise not just because it was concerned about semiconductors, but also because it believed that overtaking the United States in semiconductors was the key to improving Japanese competitiveness in all major downstream industries such as consumer electronics, computers, and telecommunications equipment. Thus, in the transition from LSI to VLSI in semiconductors, the connection between state-societal arrangements and technological innovation was extremely clear.

Technological innovations were very important, in some cases crucial, factors explaining the rise in the international competitiveness of Japanese firms in steel, automobiles, and semiconductors and the continued or enhanced competitiveness of German steel and automobile firms. Almost every decline in competitiveness in the three industries can be traced back to a failure either to invent or to incorporate a new product or process technology. The technological explanation is not always sufficient to explain all individual cases of rises and declines in competitiveness, of course. But as a general explanation it is superior to its main competitors.

## VARIATION IN STATE-SOCIETAL ARRANGEMENTS

Figure 6 summarizes information concerning the organization of state, business, and labor in the five industrial countries. It places the five countries on the faces or vertices of a triangle that represents the influence of the government, business, and labor embodied in state-societal arrangements. A country on the labor vertex has strong labor, weak government, and weak business. A country on the business vertex has strong business, weak labor, and weak government. A country between the labor and business vertices has strong labor and business, and weak government. Each country has a distinctive pattern. That is, Japan has a pattern of high influence for the state and business but low influence for labor; Germany has a pattern of high influence for business and labor but low influence for the state (although here the qualification has to be made that the

## State-Societal Arrangements in the Five Countries

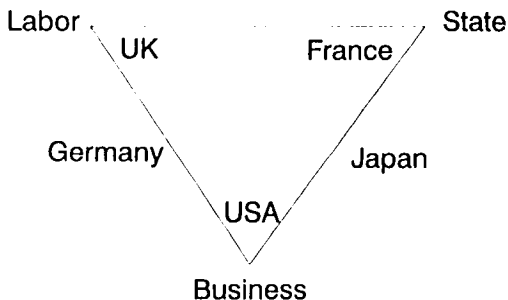


Figure 6. State-societal arrangements in the five countries

federal government is in a weaker position than the provincial governments in matters dealing with specific industries).

Some of the judgments implicit in Figure 6 need to be qualified because of important changes that have occurred since World War II. For example, the influence of labor in Britain was greatly reduced during the Thatcher administration from 1979 to 1990, and the state became more assertive if only to carry out its program of privatization. Similarly, labor in Germany had somewhat less influence under the Kohl administration than it had in previous SPD governments. Labor may have gained some influence in Japan with the unification of the *Sohyo* and *Domei*. Labor was temporarily influential in France immediately after the strike in 1968 and had greater say in French politics during the Mitterrand presidency than under previous presidents.

In Britain, both the degree of centralization and the influence of the state increased markedly after the institutional changes introduced by the Conservatives in 1972, but both remained low in comparison with that of France and Japan. In the United States, the trend toward greater use of governmental resources to support civilian industries in the late 1980s is not reflected in Figure 6, nor is the move away from the use of state enterprises in France and Britain under the Thatcher and Chirac governments.

The influence of business increased in Japan during the period in question, but it has been high relative to the other industrialized countries for the entire period thanks to the *keiretsu* form of organization. The influence of business has fluctuated substantially over time in both the United States and Germany, but again relative to

other countries it must be considered to be high throughout the period. In Britain, the influence of services and financial interests has always been substantial, while manufacturing has had its ups and downs. Thus, the influence of business as a whole has been weakened by its diversity and lack of a single voice.

Business in Britain and the United States has fewer incentives to create centralized peak associations because of the fragmented nature of the state. It is not necessary to centralize in order to influence public policies, and may even be counterproductive. In Germany, business is centralized primarily as a counterweight to centralized labor, but is also partially a consequence of the large role played by the "big three" universal banks in the financing of industrial activities. The centralization of German business organization stems also from a legal environment that creates national forums for tripartite bargaining among government, business, and labor for wages and other labor market issues.

France like Britain scores low on business influence because of the high dependency of French firms on governmental policies. Because most French firms never achieved the global competitiveness enjoyed by Japanese firms, they were not able to rival the influence of the state. Although France has industrial families, they have never played the role of the keiretsu in Japan in creating high levels of domestic competition. The high centralization of French business reflects the high concentration of ownership in most industries and their need to deal with the government in a relatively unified way: it stems from their relative weakness and is not (as in Japan and Germany) a source of strength.

In short, the relative influence of government, business, and labor in the five countries creates a distinctive pattern for each country which has a certain logic of its own. The least successful pattern was that of Britain: that is, low government and business influence combined with highly influential labor. Japan and Germany, with very different state-societal arrangements, both increased their international competitiveness. The state-dominant pattern of France performed well until the late 1970s, which suggests that this pattern is not well suited for the technological transition connected with innovations in microelectronics. The business-dominant pattern of the United States also does poorly when compared with all the other large industrial countries except Britain.

## SUMMARY

How can we explain changes in international competitiveness among the major industrial nations in the last 20 years or so? The answer

lies in the political and social institutions that establish the fundamental relationships among government, business, and labor in each society. These state-societal arrangements vary substantially from country to country. Variations in state-societal arrangements affect competitiveness mainly through their impact on the creation and diffusion of new technologies.

It is ironic that systems with only one major dominant social actor in the realm of industrial policy (Britain, France, and the United States) have tended to do worse in postwar international competition than systems with two (Germany and Japan). A coalition of either the state and business (Japan) or business and labor (Germany) seems to be more conducive to the diffusion of new technologies than one-actor dominance. One might think that a business-dominant systems like that of the United States would be ideal for maintaining competitiveness, but that is not so. In a technological age, when the weakness of labor is the result of a low societal commitment in raising the level of skills in the work force, there will be extensive resistance to the introduction of new technologies in factories and offices. Similarly, one might think that systems with state-dominance, such as France, would do well in international competition. But a strong state acting alone without strong allies in the private sector will be quite limited in its ability to anticipate shifts in markets and to respond correctly to them.

Thus, we are left with a choice between two "models," currently embodied in the German and Japanese systems. I have argued here that the United States and Britain should opt for a German-style system, while France might pursue a Japanese-style approach. The United States seems to be torn between the Japanese and the German models. Illinois Republican Senator Adlai Stevenson III was the first to explicitly propose a U.S. version of MITI. This proposal was not well received by either political party. The Reagan and Bush Administrations leaned very tentatively toward the Japanese approach, but the Bush Administration later denied itself the right to pursue explicit industrial policies even in the Pentagon. President Bush lost the support of important segments of the business community by taking a dogmatic stand on this issue. The Clinton Administration harbors a number of individuals, like Secretary of Labor Robert Reich, who favor the German model. Their advisers from Silicon Valley sometimes appear to favor the Japanese approach. But the prevailing mentality is one of confusion about what the options really are. In light of this, one cannot be very optimistic about the prospects for major institutional changes in the United States.

I have indicated that certain problematic features remain in both the German and Japanese approaches. Neither Germany nor Japan are standing still in their state-societal arrangements. The unifica-

tion of Germany in 1991 and the defeat of the Japanese Liberal Democratic party in 1993 by a coalition of smaller parties have created opportunities for change. Unification has created economic pressures that have led to the rise of new right-wing political forces and violent demonstrations against German immigrants. Germany seems now more willing to accept higher levels of inflation in order to create jobs for the workers displaced by unification. This, combined with increasing problems of competing with the United States and Japan in high technology, has shaken many people's confidence in the robustness of the German model. The new coalition government in Japan began by attacking the elite bureaucracy and pledged itself to rapidly reduce Japan's trade surplus. Whether these were temporary aberrations remains to be seen.

In any case, state-societal arrangements in the big five industrialized countries should remain reasonably close to the pattern illustrated in Figure 6 for the foreseeable future. If that is so, we should continue to see Germany and Japan outperform the other three countries in overall productivity growth and in world trade performance. There are really only three ways to diffuse the tensions among the industrialized countries that will result:

1. extensive institutional change in the three weaker countries;
2. a shift in international arrangements to reflect the growing economic leadership of Germany and Japan including, among other things, further moves toward European unity, the creation of a stronger North American trading block through NAFTA, the building of an Asian trading bloc through APEC, and a seat on the U.N. Security Council for the two countries; and
3. growing levels of overt conflict among the industrialized countries with economic disputes spilling over into military/strategic issues.

The first of these is probably the most desirable and the last is certainly the least. The second is a sort of multilateral muddling through, not very pretty but better than open conflict and easier than domestic change.

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