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## A comparative analysis of the sources of America's relative economic decline

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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 here 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 workforce.

### INTRODUCTION

The main argument of this chapter and the larger research project from which it springs<sup>1</sup> is that variation in state–societal arrangements is a key

1 Jeffrey A. Hart, *Rival Capitalists: International Competitiveness in the United States, Japan, and Western Europe* (Ithaca, N.Y.: Cornell University Press, 1992).

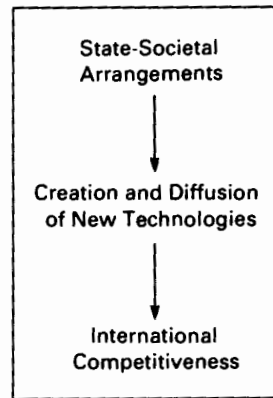


Figure 6.1. The main argument.

to explaining changes in the relative international competitiveness of the five largest capitalist countries since World War II. The reason that state-societal arrangements matter is that they can accelerate or impede the development and diffusion of technological innovations that are crucial for competitiveness (see Figure 6.1). This impact is felt most strongly during technological transitions such as the one we are currently experiencing.<sup>2</sup>

Because state-societal arrangements vary significantly among the major industrialized capitalist countries, there is likely to be 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>3</sup>

- 2 The idea of technological transition is taken from a variety of sources including: James Kurth, "The Political Consequences of the Product Cycle: Industrial History and Political Outcomes," *International Organization*, 33 (Winter 1979): 1-34; Michael J. Piore and Charles F. Sabel, *The Second Industrial Divide* (New York: Basic Books, 1984).
- 3 The key original works on hegemonial decline are: Charles Kindleberger, *The World in Depression, 1929-1939* (Berkeley: University of California Press, 1973); Stephen D. Krasner, "State Power and the Structure of International Trade," *World Politics*, 28 (April 1976): 317-47; Robert Gilpin, *U.S. Power and the Multinational Corporation* (New York: Basic Books, 1975). More recent discussions of the theory can be found in Robert Gilpin, *The Political Economy of International Relations* (Princeton, N.J.: Princeton University

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.

All countries favor international economic regimes that are congenial to their internal state-societal arrangements. They would rather fight over international economic regimes than change their domestic arrangements. Economic hegemony permits one economically powerful country (e.g., Britain in the nineteenth century and the United States after World War II) to establish regimes that are highly consistent with its domestic arrangements. However, winning the consent of other countries to the establishment of these regimes requires compromises, and a certain amount of variation in state-societal arrangements will be tolerated as a result.<sup>4</sup>

As other countries grow in relative economic strength, and especially if the hegemony declines relative to one or more challengers, there will be increasing conflict over the content of preestablished regimes. There will also be debates over domestic arrangements in the major industrial countries, especially those suffering a relative decline (e.g., Britain and the United States), but also in those whose competitiveness has increased (e.g., Germany and Japan). Unless there is a major economic crisis or some other cataclysmic event (like a major war or revolution), these debates will result only in gradual changes in state-societal arrangements.

Press, 1987); and Michael C. Webb and Stephen D. Krasner, "Hegemonic Stability Theory: An Empirical Assessment," *Review of International Studies*, 15 (April 1989): 183-98.

4 I am taking, as a point of departure, the work on hegemonic stability by scholars like Robert Gilpin, Stephen Krasner, Charles Kindleberger, and Robert Keohane. The idea that variation in state-societal arrangements is tolerated is consistent with John Ruggie's idea of "embedded liberalism." See his "International Regimes, Transactions, and Change: Embedded Liberalism in the Post-War Economic Order," *International Organization*, 36 (Spring 1982): 379-415.

## 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 in the five largest industrial capitalist countries – the United States, Japan, the Federal Republic of Germany, France, and Britain – in three industries – steel, automobiles, and semiconductors – since World War II. 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 (e.g., 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 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 President's Commission on Industrial Competitiveness 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.”<sup>5</sup> This definition has three main elements which deserve some elaboration.

First, meeting the test of international markets means the ability to design, produce, and distribute goods and services at costs which are globally competitive. Factor costs and the application of leading-edge technologies enter in here most centrally. If factor costs are high or rising, application of technologies which increase the productivity of factors will be crucial for maintaining or increasing competitiveness. If a country's factor costs are low, the application of productivity-enhancing technologies can give an extra boost to its competitiveness.<sup>6</sup>

Second, there is the question of whether market conditions are free or fair. If they are not, then some countries will appear to be internationally competitive 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 which reduce real wages in order to improve its position in world trade. This practice, however, should not be identified with genuine competitiveness.<sup>7</sup>

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

5 *Global Competition: The New Reality*, Report of the President's Commission on Industrial Competitiveness, Vol. II (Washington, D.C.: U.S. Government Printing Office, 1985), p. 6; see also *The Cuomo Commission Report: A New American Formula for a Strong Economy* (New York: Simon & Schuster, 1988), p. 19; and Stephen S. Cohen and John Zysman, *Manufacturing Matters: The Myth of the Post-Industrial Economy* (New York: Basic Books, 1987), p. 60.

6 For a much lengthier discussion of the variables which explain competitiveness, see Michael Porter, *The Competitive Advantage of Nations* (New York: Free Press, 1990), chap. 3.

7 “Competitiveness is associated with rising living standards, and an upgrading of employment.” Cohen and Zysman, *Manufacturing Matters*, p. 61.

gies 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 which 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.<sup>8</sup>

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 which 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 which 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.<sup>9</sup>

#### MEASURING INTERNATIONAL COMPETITIVENESS

There are two basic levels at which to measure national competitiveness: 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

- 8 This issue is discussed in Jeffrey A. Hart and Laura Tyson, "Responding to the Challenge of HDTV," *California Management Review*, 31 (Summer 1989): 132-45; Robert B. Reich, "Who is Us?" *Harvard Business Review*, January-February 1990: 53-64; and Laura Tyson, "They Are Not Us: Why American Ownership Still Matters," *American Prospect*, Winter 1991: 37-49.
- 9 See Hart and Tyson, "Responding to the Challenge," pp. 37-39. For a contrasting view, see Porter, *Competitive Advantage*, pp. 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.

technological innovation and diffusion is an important mediating variable, as hypothesized above (see Figure 6.1), it will be impossible to test this without looking at industry-specific data, since 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.

*Competitiveness at the level of the whole economy*

International competitiveness can be measured on an economy-wide basis using such indicators as: (1) trade balances, (2) world export shares, (3) rates of productivity growth, (4) growth in real wages, and (5) price elasticities of imports.<sup>10</sup> Increasing trade balances and world export shares, high rates of productivity growth, rapidly growing real wages, and decreasing 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.<sup>11</sup>

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 which experiences growth in productivity, world export shares, *and* real wages

10 The logic behind this last measure is that quality differentials between domestic products and imports will be indicated by low price elasticities of imports. See *Global Competition: The New Reality*, p. 8; and Cohen and Zysman, *Manufacturing Matters*, pp. 61 and 68.

11 Porter, *Competitive Advantage*, p. 6.

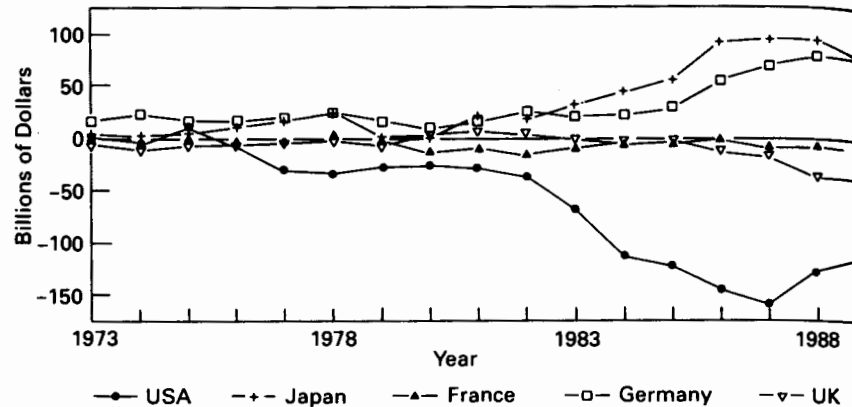


Figure 6.2. Balance of trade of the five countries. *Source:* International Monetary Fund, *International Financial Statistics Yearbook* (Washington, D.C.: 1990), p. 140.

(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 Figure 6.2).<sup>12</sup> France suffered from chronic but relatively smaller trade deficits than both the United States and Britain in the 1980s.

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.<sup>13</sup>

- 12 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.
- 13 Bruce R. Scott, "National Strategies: Key to International Competition," in Bruce R. Scott and George C. Lodge, eds., *U.S. Competitiveness in the World Economy* (Boston: Harvard Business School Press, 1985), p. 27.



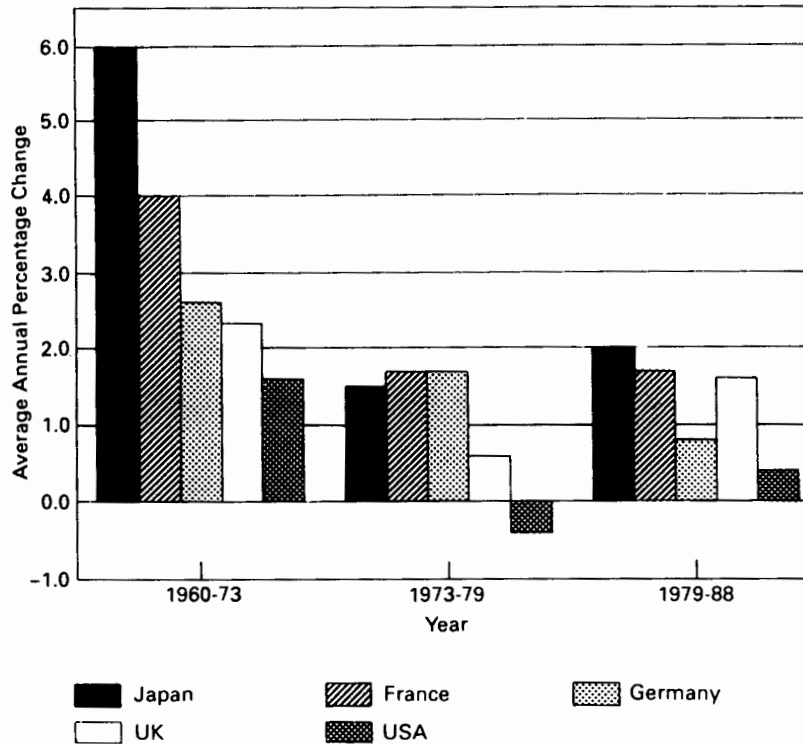


Figure 6.3. Growth in productivity in the five countries. *Source: Organization for Economic Cooperation and Development, OECD Economic Outlook, No. 48 (December 1990), p. 120.*

### 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 Figure 6.3).

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:

A significant fraction of the productivity gains in manufacturing were achieved by shutting down inefficient plants and by permanently laying off workers at others. Employment in 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.<sup>14</sup>

#### *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 Figure 6.4). 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.

#### *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.<sup>15</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 Japa-

14 Michael L. Dertouzos, Richard K. Lester, Robert M. Solow, and the MIT Commission on Industrial Productivity, *Made in America: Regaining the Productive Edge* (Cambridge, Mass.: MIT Press, 1989), p. 31.

15 Cohen and Zysman, *Manufacturing Matters*, p. 67. Cohen and Zysman cite the following source: Elizabeth Kremp and Jacques Mistral, "Commerce extérieur américain: d'où vient, où va le déficit?" *Economie prospective internationale*, 22 (1985): 5-41.

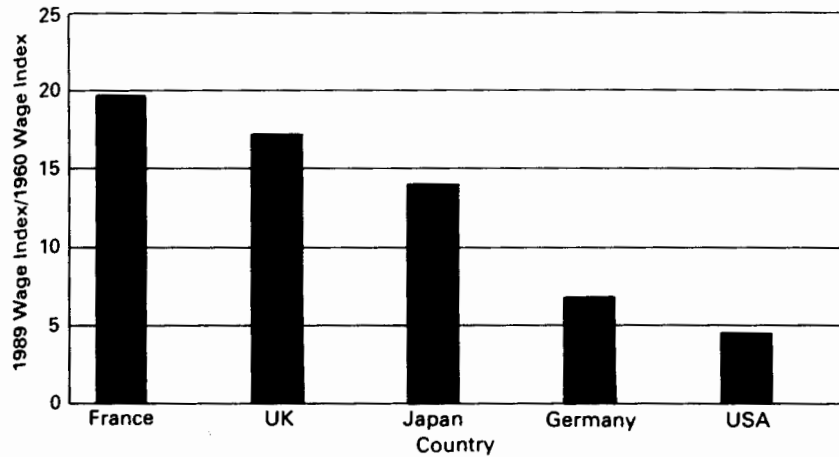


Figure 6.4. Growth in real wages in the five countries, 1960–89. *Source:* International Monetary Fund, *International Financial Statistics Yearbook* (Washington, D.C.: 1990), pp. 112–13.

nese 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.

#### *Summary of economy-wide indicators of competitiveness*

In summary, the economy-wide data on competitiveness indicate increased competitiveness across the board in Japan and Germany, decreased competitiveness in the United States and Britain, with France somewhere in the middle. Japan does particularly well in trade and productivity; but Germany remains a close second. The United States and Britain both suffer a decline in competitiveness, but the United States starts from a much better initial position. The French do remarkably well

until the 1980s, when they begin to experience chronic trade deficits and decreased productivity growth, while wages remain on a steep upward trajectory.

#### COMPETITIVENESS IN SPECIFIC INDUSTRIES

Useful indicators for national competitiveness in specific industries are: (1) growth in national shares of global production; (2) growth in employment of production workers; (3) growth in revenues and profits of firms in the industry; and (4) the frequency of industrial crises. In a specific industry, if a country is increasing its share of global production, increasing (or decreasing relatively slowly) its level of employment, increasing its revenues and profits, and experiencing very few industrial crises relative to other countries, then that country has increased its international competitiveness. Although it will be impossible to present statistical evidence for all these indicators here, it will still be possible to show that the available industry-specific data reinforce the message conveyed by the economy-wide data: that is, that Japan and Germany have increased their international competitiveness relative to the United States and Britain, while France lies somewhere in between.

#### *Production shares*

Global production of steel was 313 million metric tons in 1956. By 1985, this had increased to 793 million metric tons. The average annual growth of steel production by volume during that period was 3.4 percent. The share of U.S. production in this total dropped from 37 percent to 11 percent (see Figure 6.5). The absolute level of U.S. production remained near the 1956 level through the beginning of the 1980s – averaging around 120 million metric tons. The mid-1950s were a relatively high point in the U.S. share of global production because of the sales of iron and steel to a Europe not fully recovered from the damages of World War II, and because of a defense industry that had grown enormously during the Korean War.

The European share of global steel production rose substantially from the mid-1950s to the early 1970s, finally overtaking U.S. production in 1968, and then dropped off to a plateau of 130–140 million metric tons. The Japanese, also recovering from World War II, increased their share of global production from 4 percent in 1956 to around 15 percent in the late

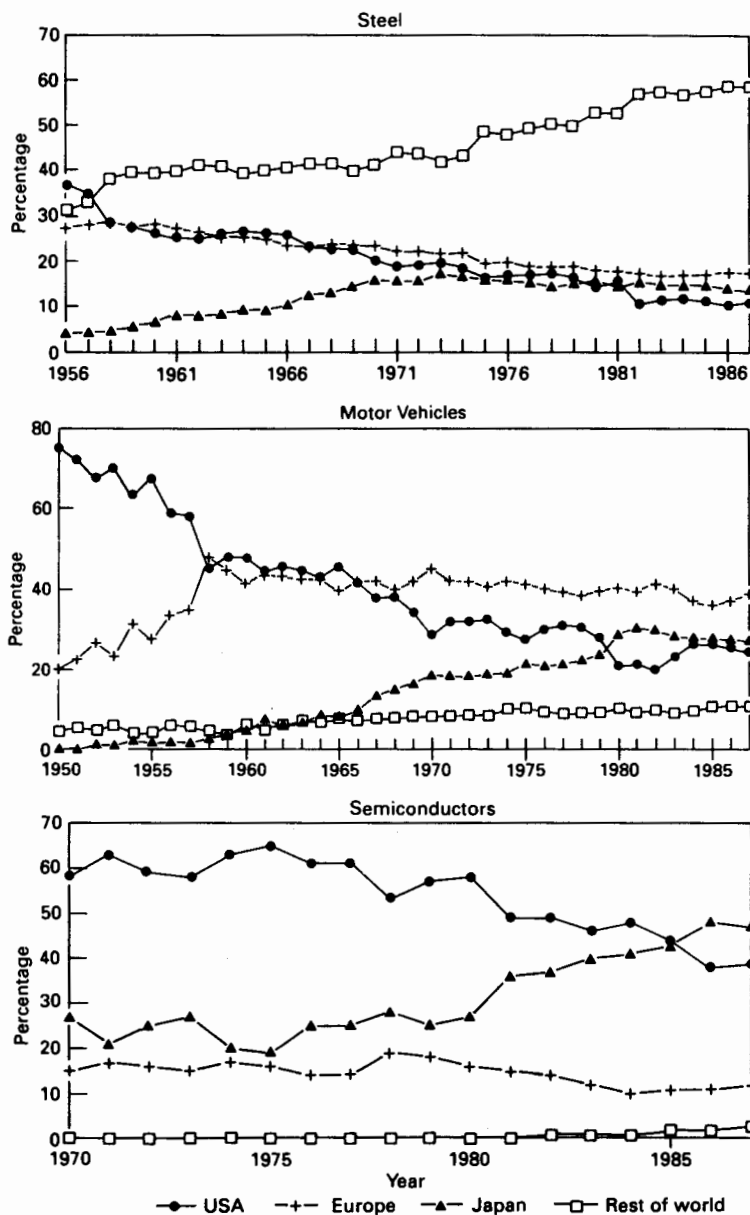


Figure 6.5. World production shares in steel, motor vehicles, and semiconductors. Dataquest statistics for semiconductor production include estimates of captive production of semiconductors by large firms like IBM and AT&T. Sources: American Iron and Steel Institute, *Annual Statistical Report* (Washington, D.C.: various years); Motor Vehicle Manufacturers Association, *Motor Vehicle Facts and Figures* (Detroit: various years); and Dataquest.

1970s. Japanese steel production only surpassed that of the United States in 1980, but it should be recalled that the gross national product (GNP) of Japan was about half the GNP of the United States at that time. Japanese production levels hovered around 115 million metric tons after 1975. U.S. production, in contrast, never regained its high point of 151 million metric tons (in 1973), but rather sank lower and lower to below 90 million metric tons by the mid-1980s.

Global motor vehicle production grew rapidly after the 1950s. The number of motor vehicles manufactured worldwide grew at an average annual rate of 5.1 percent between 1956 and 1985. Global production of motor vehicles doubled from 10 million in the early 1950s to 20 million in the mid-1960s and doubled again to 40 million in the late 1970s. The U.S. share of global production dropped from 75 percent in 1950 to 26 percent in 1985. Europe increased its share of global production from about 20 percent in 1950 to almost 50 percent in the late 1960s, but fell back to less than 40 percent by the end of the 1970s. Japan increased its share of world production from virtually zero in 1950 to more than 30 percent by 1981. Even though Europe remained the largest producing region, Japan became the largest producing country – Japan took the lead away from the United States in 1980. From a peak of 12.9 million motor vehicles produced in 1978, U.S. production declined to 7.0 million in 1982 (lower than the production level of 1962), recovering to 11.7 million in 1985. In 1987, world production of semiconductors was around \$39 billion and of integrated circuits (semiconductor devices that contain entire electronic circuits on a single chip) around \$29 billion. Between 1970 and 1987, world production of semiconductors grew at an average annual rate of 18.8 percent. The share of discrete devices (devices which are *not* integrated circuits) in the overall market for semiconductors has been declining steadily since the invention of integrated circuits in 1958. Integrated circuits were slightly over 30 percent of world production of semiconductors in 1970; by the 1980s, this figure was over 70 percent.

In 1975, the United States accounted for 65 percent of world production of semiconductors and 76 percent of integrated circuits. The corresponding figures for 1987 dropped to 39 and 41 percent, respectively. Japan's share of world semiconductor production increased from less than 20 percent in 1975 to 47 percent in 1987. Its share of world integrated circuit production increased from 14 percent in 1975 to 48 percent in 1987. It was in 1986 that Japanese production surpassed that of the United States in both semiconductors and integrated circuits.

The increase in the Japanese share of world production is remarkable, but perhaps more important is its domination of markets for the more advanced integrated circuits and especially CMOS (complementary metal oxide silicon) devices and the latest generation of random access memories (RAMs). By the end of 1979, the Japanese firms controlled 43 percent of the U.S. market for 16-kilobit (16K) dynamic RAM (DRAM) devices.<sup>16</sup> By the end of 1981, they supplied almost 70 percent of 64K DRAMs in the open part of the U.S. market.<sup>17</sup> In 1984, Japanese firms introduced 256K DRAMs before a number of major U.S. firms did so. The same thing happened in 1987 with 1-Megabit DRAMs. Japanese firms controlled over 90 percent of both 256K and 1-Megabit DRAM markets after 1986, and, on average, 75 percent of total DRAM markets between 1985 and 1987.<sup>18</sup>

### *Employment*

Employment in the British steel industry fell from over 270,000 in 1972 to around 52,000 in 1981. This was the largest percentage drop in steel employment in the five countries, but the largest absolute decline in steel employment was in the United States. U.S. employment in steel dropped from 478,000 in 1974 to 170,000 in 1988. Although there were major reductions in jobs in the Japanese and German steel industries after 1973, they were not as large as the declines in the United States and Britain (see Figure 6.6).<sup>19</sup>

Employment in the British auto industry fell from 184,000 in 1972 (a peak year) to 78,000 in 1985 (see Figure 6.6). U.S. auto employment dropped from 304,000 in 1978 to 194,000 in 1982, but rose again to around 250,000 in 1984 and 1985 (due to the recovery of the U.S.

16 Michael Borrus, James Millstein, and John Zysman, *International Competition in Advanced Industrial Sectors: Trade and Development in the Semiconductor Industry* (Washington, D.C.: Joint Economic Committee of Congress, 1982), p. 106.

17 Gene Bylinsky, "Japan's Ominous Chip Victory," *Fortune*, December 14, 1981, p. 55.

18 Dataquest data presented by Andrew A. Procassini, President of the Semiconductor Industry Association, at Stanford University, on October 21, 1988.

19 All data cited in this paragraph are from the *U.S. Industrial Outlook* (Washington, D.C.: United States Government Printing Office, 1988 and 1989).

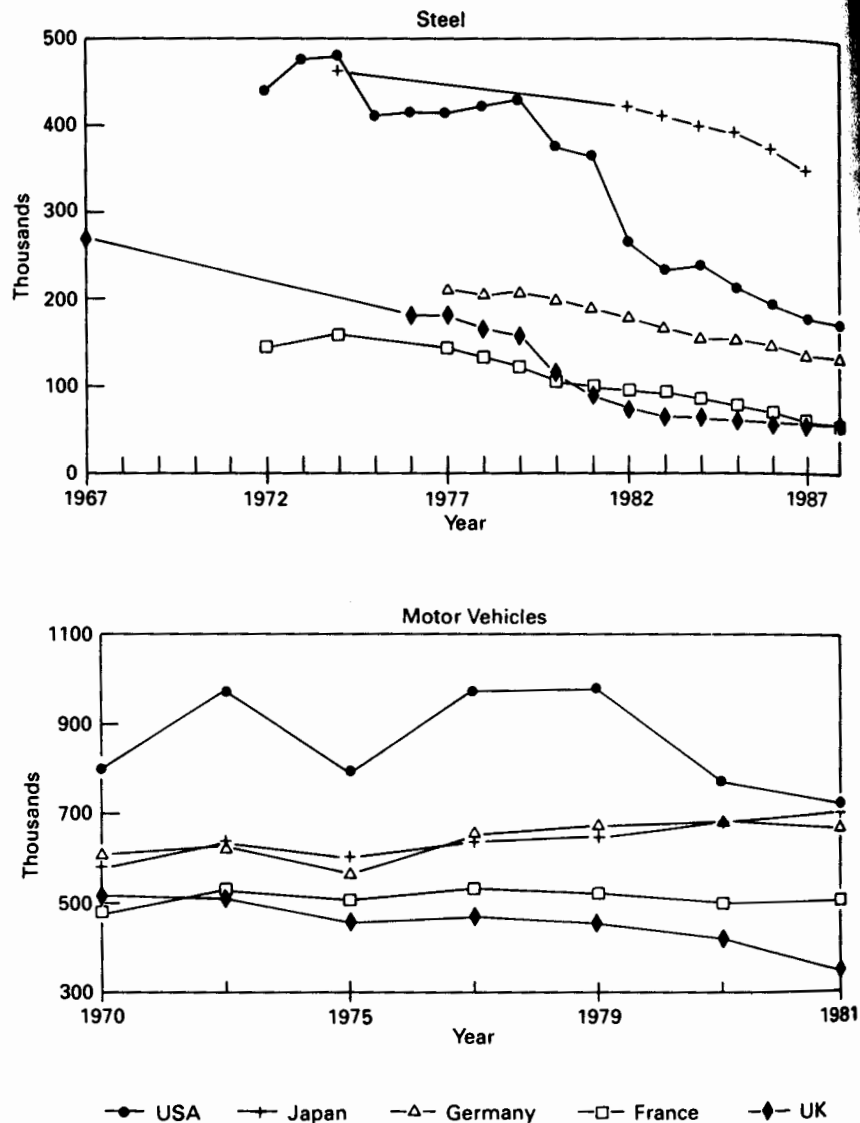


Figure 6.6. Employment in steel and motor vehicles. Sources: Louka Tsoukalis and Robert Strauss, "Crisis and Adjustment in European Steel: Beyond Laissez-Faire," in Yves Mény and Vincent Wright, eds. *The Politics of Steel: Western Europe and the Steel Industry in the Crisis Years* (New York: Walter de Gruyter, 1986), p. 208; Statistical Office of the European Community, *Iron and Steel Yearbook* (Luxembourg: Eurostat, 1989), p. 24; *U.S. Industrial Outlook* (Washington, D.C.: United States Government Printing Office, various years); and Alan Altshuler, Martin Anderson, Daniel Jones, Daniel Roos, and James Womack, *The Future of the Automobile: The Report of MIT's International Automobile Program* (Cambridge, Mass.: MIT Press, 1984), p. 201.



economy and the Voluntary Export Restraint [VER] agreement with Japan). The French and German auto industries created new jobs in the 1960s and 1970s, but the French industry began to shed jobs in the 1980s. German employment in automobile production stabilized during the 1980s, possibly at the expense of needed rationalization.

Accurate and fully comparable statistical data on employment in the semiconductor industry are hard to find for the countries in this study. Most countries have only recently begun to report figures on employment in the semiconductor industry. Several countries lump data on employment in semiconductors together with data on employment in electronics or data processing. With these caveats in mind, I will report my findings.

Employment in semiconductor production in the United States rose from 234,000 in 1972 to 375,000 in 1984, and then fell to around 320,000 in 1986–87.<sup>20</sup> Employment in electronics in Japan was exceedingly buoyant from the early 1970s on, increasing from 948,000 workers in 1982 to 1,212,000 workers in 1986.<sup>21</sup> Employment in the production of monolithic integrated circuits remained flat at around 50,000 workers in France, Britain, and Germany between 1983 and 1989. Employment in hybrid integrated circuits increased in Germany from 58,000 to 103,000 workers and in France from 80,000 to over 150,000 workers during the same period; British employment in this area declined slightly from 182,000 to 164,000 workers.<sup>22</sup>

### *Profitability*

Firms in all five countries experienced financial difficulties during global recessions, but Japanese and German firms tended to do better during these periods and to emerge from them in better shape than American, British, and French firms. Both Japanese and German steel firms suffered financially from the stabilization in demand for steel after 1973. In contrast, the larger automobile firms of both countries did remarkably well

20 Ibid.

21 MITI data from the census of manufacturers as cited in *Facts and Figures on the Japanese Electronics Industry* (Tokyo: Electronic Industries Association of Japan, 1988), p. 29. These figures include employment in the manufacturing of all types of electronic components and systems and not just employment in semiconductor manufacturing.

22 Eurostat, *Industrial Production: Quarterly Statistics* (Luxembourg: Eurostat, Third Quarter 1990), p. 173.

financially for the entire period. There were exceptions, of course, such as the financial problems of Mazda and Volkswagen in the mid-1970s. But these were generally short-lived. Smaller firms which had financial problems were either acquired by larger firms or became linked to larger firms through various forms of interfirm cooperation. The profits of the Japanese semiconductor industry have been very strong, especially since 1986, while the profits of the semiconductor operations of Siemens, Germany's largest producer, have been relatively small compared with its main source of profits: large central-office switches for public telecommunications networks.

French firms did less well financially than the German and Japanese firms, especially during the 1980s, after steady growth in revenues and profits in the 1960s and 1970s. The French steel firms were unprofitable from the late 1970s until the late 1980s. The two main French auto firms suffered losses from 1980 until 1986–87, although Renault's losses were deeper and longer lasting than those of Peugeot. The only major French producer of semiconductors, Thomson, was not making much money in that business during the entire 1980s.

British financial performance mirrored the stop-and-go pattern of the British economy, but British profits took a turn for the worse in the 1970s and 1980s. British Steel Corporation and British Leyland, the national champions in steel and automobiles, suffered deep and prolonged losses in the 1970s and 1980s, even during periods of economic recovery. British semiconductor firms were marginally profitable, but profits were contingent upon the continued funding of defense programs which provided the main source of demand in Britain for application-specific integrated circuits (ASICs). British firms, with the exception of a small firm called Inmos, did not produce high-volume, standardized semiconductor devices.<sup>23</sup>

American financial performance was reasonably strong in all three industries until the 1970s. The profits of the American auto industry generally depended on levels of domestic demand and were highly cyclical as a result. The huge losses of Chrysler and the lower profitability of Ford and GM beginning in the late 1970s were ended artificially with the negotiation of the voluntary export restraint with Japan in 1981. The semiconductor industry seemed recession-proof until the global semicon-

23 Inmos was sold to SGS-Thomson, a Franco-Italian semiconductor firm, in 1989.

ductor slump of 1985. Firms such as Intel and Motorola sprang back quickly when demand increased again, while others, such as AMD and National Semiconductor, never fully recovered from the shock.

Thus, profitability data reinforce the notion that Germany and Japan experienced increased international competitiveness during the period, while the United States and Britain suffered from competitive decline. The French experience was mixed: profits were generally up until 1980; the losses of the mid-1980s were followed by a general turnaround in the late 1980s.

### *Industrial crises*

Table 6.1 below lists forty-seven industrial crises in the five countries in steel, automobiles, and semiconductors between 1960 and 1989. The main criterion for selection is the broad perception of the potential for financial collapse of a firm or industry and major possible consequences in increased unemployment, national or regional, and negative effects for important downstream industries.<sup>24</sup> Connected with each crisis is a combination of government, business, and labor responses and a variety of outcomes – including bankruptcies, liquidations, acquisitions and mergers, and government rescues.

Japan experienced the fewest industrial crises during the period, and only one after 1973. Most of the crises it suffered were limited in scope, dealt with quickly, and did not recur. In contrast, Britain and France suffered the most crises, but the British crises were deeper than the French and more prone to recur. French crises were often provoked by the breakdown of bargaining between business interests and the state and are not, therefore, always good indicators of changes in competitiveness of firms or industries. Even though the United States suffered relatively few industrial crises, when they occurred they tended to be industry-wide. The management of industrial crises in the United States was much more likely to involve government imposition of trade barriers than in the other four countries.

One surprise in Table 6.1 is the frequency of German industrial crises.

24 For a more complete description and analysis of these data, see Jeffrey A. Hart, "Crisis Management and the Institutionalization of Corporatist Bargaining Mechanisms," paper delivered at the Conference of Europeanists of the Council for European Studies, Washington, D.C., October 18–20, 1985.

Table 6.1. *Industrial crises since 1960 in the five industrial countries in steel, motor vehicles, and electronics*

Country	Steel	Motor vehicles	Electronics
United States	1968	1970 Chrysler	1985 semiconductors
	1977	1979 Chrysler	
	1981	1980	
Japan	1964	1966 Prince	
		1968 Isuzu, Mitsubishi	
		1977 Toyo Kogyo (Mazda)	
Germany	1962	1965 Auto Union	1980 AEG-Telefunken
	1977 Saar	1967 BMW	1982 AEG-Telefunken
	1982 Ruhr	1969 NSU	
		1974 VW	
France	1965	1963 Simca	1964 Bull
	1976	1974 Citroen	1968 CSF
	1983 Creusot	1978 Chrysler	1970 Bull/GE
		1980 Renault	1975 CII
		1984 Citroen	1977 Sescosem
Britain	1967	1964 Rootes	1964 ICL
	1977 BSC	1967 Triumph, Talbot	1980 ICL
	1982 BSC	1974 Chrysler	1984 Inmos
		1977 Chrysler	1989 Inmos
		1981 BL	
		1982 DeLorean	
	1986 BL/Rover		

*Note:* Each crisis is identified by its initial year. If no specific firm or region is mentioned after that date, the crisis affected the whole industry in all regions.

*Source:* Jeffrey A. Hart, "Crisis Management and the Institutionalization of Corporatist Bargaining Mechanisms," paper delivered at the Conference of Europeanists of the Council for European Studies, Washington, D.C., October 1985.

It should be noted, however, that the biggest crises were in steel and that the others were relatively limited in scope and time. The German system was able to manage most of its crises without resort to governmental intervention. Indeed, the propensity of the federal government to avoid industry-specific interventions is a key factor in the generation of German industrial crises.

#### *Summary of industry-specific indicators of competitiveness*

Industry-specific measures of competitiveness provide evidence for the increased competitiveness of Japan and Germany and the decreased com-

petitiveness of Britain and the United States. French industry-specific competitiveness rises until the late 1970s, and then declines 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 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.<sup>25</sup>

The state-societal dichotomy, which has deep roots in liberal political 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>26</sup> In an ideal, free-enterprise economy, all business corporations would be private and relatively au-

- 25 For a convincing argument that agricultural groups need to be included in descriptions of social dynamics in earlier historical periods, see Ronald Rogowski, *Commerce and Coalitions: How Trade Affects Domestic Political Alignments* (Princeton, N.J.: Princeton University Press, 1989).
- 26 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 Bertrand Badie and Pierre Birnbaum, *Sociologie de l'Etat* (Paris: Bernard Grasset, 1979); Martin Carnoy, *The State and Political Theory* (Princeton, N.J.: Princeton University Press, 1984); Eric A. Nordlinger, *On the Autonomy of the Democratic State* (Cambridge, Mass.: Harvard University Press, 1981); Reinhard Bendix, ed., *State and Society* (Boston: Little, Brown, 1968); Charles Tilly, ed., *The Formation of National States in Western Europe* (Princeton, N.J.: Princeton University Press, 1975); John A. Hall and G. John Ikenberry, *The State* (Minneapolis, Minn.: University of Minnesota Press, 1989); and Alfred C. Stepan, *The State and Society: Peru in Comparative Perspective* (Princeton, N.J.: Princeton University Press, 1978).

onomous 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.<sup>27</sup> 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 which might resist state leadership.<sup>28</sup> The neo-corporatist ideal is the concertation of the state and privileged groups – especially business and labor – to determine national policies.<sup>29</sup>

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

27 See David Held and Joel Krieger, “Theories of the State: Some Competing Claims,” in Stephen Bornstein, David Held, and Joel Krieger, eds., *The State in Capitalist Europe: A Casebook* (Winchester, Mass.: Allen & Unwin, 1984).

28 I owe this formulation of the fascist ideal to Gregory Kasza, *Administered Mass Organizations* (forthcoming).

29 A very clear statement of this ideal is in Wolfgang Streeck and Philippe C. Schmitter, “Community, Market, State – and Associations? The Prospective Contribution of Interest Governance to Social Order,” in Wolfgang Streeck and Philippe C. Schmitter, eds., *Private Interest Government: Beyond Market and State* (Beverly Hills, Calif.: Sage, 1985), p. 10. See also Gerhard Lehmbruch, “Introduction: Neocorporatism in Comparative Perspective,” in Gerhard Lehmbruch and Philippe C. Schmitter, eds., *Patterns in Corporatist Policy Making* (Beverly Hills, Calif.: Sage, 1982).

may be embodied in new political, social, and economic institutions which are designed to settle, for a time, the domestic debates.<sup>30</sup>

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 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.<sup>31</sup>

#### SYSTEMATIC OBSERVATION OF STATE-SOCIETAL ARRANGEMENTS

State-societal arrangements will 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

30 On this subject, see G. John Ikenberry, "Conclusion: An Institutional Approach to American Foreign Economic Policy," in G. John Ikenberry, David A. Lake, and Michael Mastanduno, eds., *The State and American Foreign Economic Policy* (Ithaca, N.Y.: Cornell University Press, 1988), pp. 223-25; and Stephen Krasner, "Approaches to the State: Alternative Conceptions and Historical Dynamics," *Comparative Politics*, 16 (January 1984), p. 234.

31 The works that inspired this formulation are Andrew Schonfield, *Modern Capitalism* (London: Oxford University Press, 1965); Peter Katzenstein, ed., *Between Power and Plenty* (Madison, Wis.: University of Wisconsin Press, 1978); John Zysman, *Governments, Markets, and Growth; Financial Systems and the Politics of Industrial Change* (Ithaca, N.Y.: Cornell University Press, 1983); and Peter Hall, *Governing the Economy: The Politics of State Intervention in Britain and France* (New York: Oxford University Press, 1986).

peak associations?<sup>32</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 workforce is unionized? Are unions organized on an enterprise or industrial basis? Can unions successfully block 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 United States, Japan, Germany, France, and Britain. I will argue below that the distribution of power among those three social actors is the basic underpinning of state–societal arrangements.

32 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.



THE 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. While 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 afterwards the claims of competing explanations.

*The 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 U.S. In 1970, 79.1 percent of Japanese production was basic oxygen, while U.S. production was still only 48.2 percent basic oxygen.<sup>33</sup> 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 which figured importantly in U.S.–Japanese relations in the years prior to the

33 Leonard H. Lynn, *How Japan Innovates: A Comparison with the United States in the Case of Oxygen Steelmaking* (Boulder, Colo.: Westview, 1982), p. 23.

attack on Pearl Harbor.<sup>34</sup> But the firms themselves had an interest in lowering their dependence on imported scrap, as 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>35</sup>

While 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 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 Figure 6.7).

U.S. industry remained far behind Japan and Europe in the adoption 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 steelmaking furnace directly onto a processing line which produces the required shapes. The savings in the energy required to reheat the cooled steel ingots and slabs are substantial, as are the savings in processing time and handling. Continuous casting requires relatively so-

34 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. See Paul Kennedy, *The Rise and Fall of the Great Powers* (New York: Random House, 1987), p. 303.

35 Interview materials.

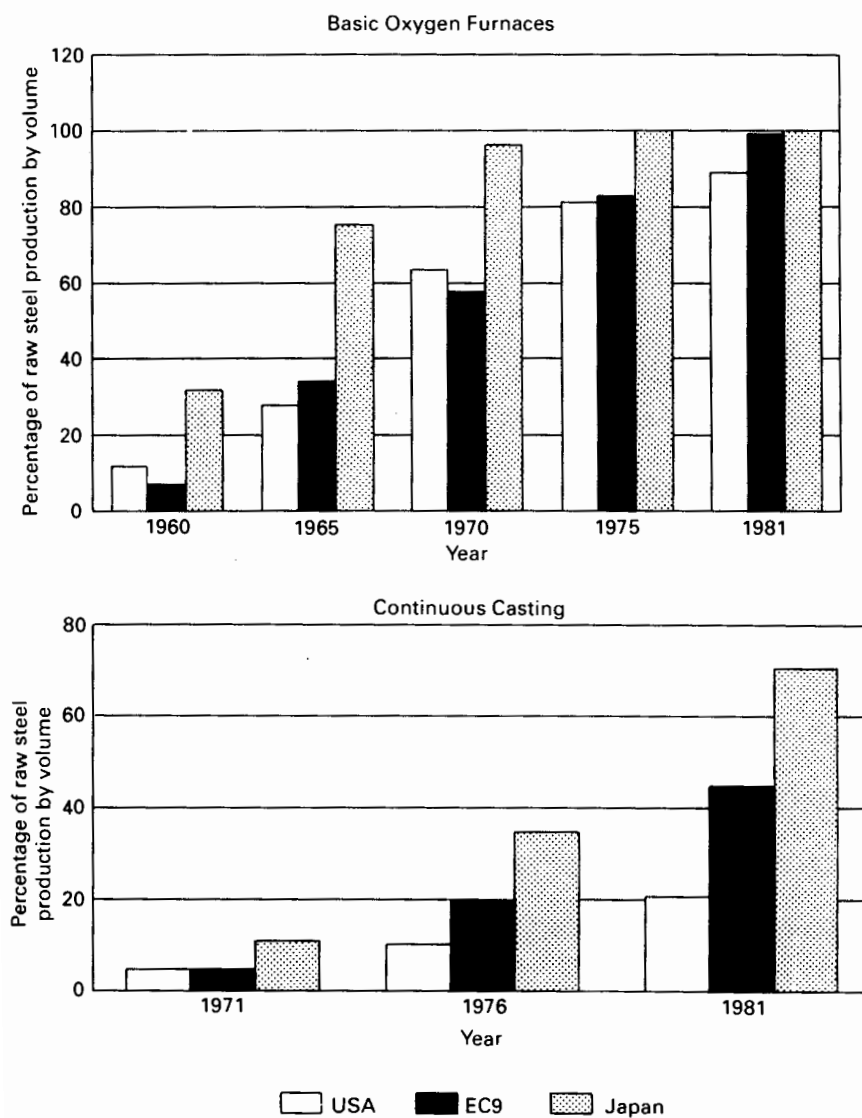


Figure 6.7. Diffusion of new production technologies. *Source:* Donald Barnett and Louis Schorsch, *Steel: Upheaval in a Basic Industry* (Cambridge, Mass.: Ballinger, 1983), p. 55.

phisticated scheduling, however, which 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 U.S. and Europe.<sup>36</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 which 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 idle workforce 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.

36 “Greenfield” means that no previous facility was on the site. “Brownfield” means that a previous facility was modernized or renovated. For a discussion of this issue, see Ira C. Magaziner and Robert B. Reich, *Minding America's Business: The Decline and Rise of the American Economy* (New York: Vintage Books, 1983), chap. 13.

*The 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 co-production 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.<sup>37</sup>

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

37 See C. S. Chang, *The Japanese Auto Industry and the U.S. Market* (New York: Praeger, 1981); Michael A. Cusumano, *The Japanese Automobile Industry* (Cambridge, Mass.: Harvard University Press, 1985); Yasuhiro Monden, *Toyota Production System* (Norcross, Ga.: Industrial Engineering and Management Press, 1983); and Richard J. Schonberger, *Japanese Manufacturing Techniques* (New York: Free Press, 1982).

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 innovations 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, 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 multi-model 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.<sup>38</sup> Both European and U.S. manufacturers also responded to the Japanese challenge by moving some production to lower-wage countries.

The issue of offshoring production comes up again in the case of semiconductors. The Japanese firms in both autos and semiconductors

38 See, e.g., Wolfgang Streeck and Andreas Hoff, "Industrial Relations and Structural Change in the International Automobile Industry," working paper, International Institute of Management, Berlin, August 1981.

acted as if they did not have the option to locate labor-intensive production processes overseas, thus forcing themselves to use automation to compensate for increasing wages. U.S. and European firms, in marked contrast, 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.

### *The 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 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.<sup>39</sup>

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 to 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 U.S. 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

39 The best sources of information on these matters are: Ernest Braun and Stuart Macdonald, *Revolution in Miniature: The History and Impact of Semiconductor Electronics*, Second edition (New York: Cambridge University Press, 1982); Michael Borrus, *Competing for Control: America's Stake in Microelectronics* (Cambridge, Mass.: Ballinger, 1988); and George Gilder, *Microcosm: The Quantum Revolution in Economics and Technology* (New York: Simon & Schuster, 1989). Gilder provides an excellent bibliography on this subject on pp. 385-402.



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

Some of the judgments implicit in Figure 6.8 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 – that is, 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

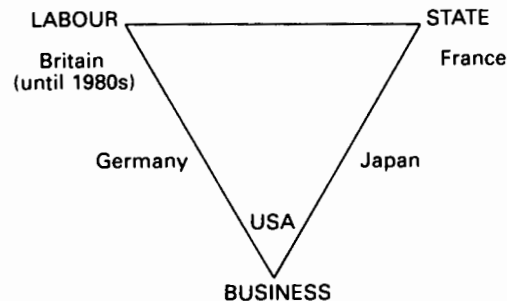


Figure 6.8. State–societal arrangements in the five countries.

gained some influence in Japan with the unification of the *Sobyo* 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 6.8, 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. While 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.

#### THE LINKAGE BETWEEN STATE-SOCIETAL ARRANGEMENTS AND THE CREATION/DIFFUSION OF TECHNOLOGIES

The relative power of the state, business, and labor in the domain of industrial policy is closely linked with the creation and diffusion of new technologies. Labor must be receptive to the introduction of new technologies at the workplace, business must be prepared to adopt new technologies in a timely manner, and the state must be able to work with both business and labor to maximize the probability that new technologies will be created and diffused rapidly.

The receptivity of labor to the introduction of new technologies in the workplace depends on the confidence of labor that it will receive higher wages when productivity increases. This confidence depends very much on the political power of labor in the system, which in turn seems to depend on the level of skills possessed by the average laborer. In the absence of political power, labor may still accept new technologies if guaranteed job security and opportunities for training, but the upgrading of production technologies will be limited by a lower average level of skills in the workforce.

The ability of business to rapidly adopt new technologies depends on its access to information about technological change, which can be positively affected by the direct actions of an influential state (as in Japan) or by the transmission of this information by institutions, especially educational ones, that link state and society (as in Germany).

In Japan, the close working relationship between government agencies

and the larger firms, which is partly a function of the weakness of organized labor, but also of the long dominance of the Liberal Democratic Party in Japanese politics, allows Japan to combine private and public resources in order to pursue technological and economic priorities established jointly by government and business. The main payoff to labor has been job security and steadily increasing wages. A societal commitment to upgrading the skills of workers has also been part of the arrangement, but this commitment is not as deep in Japan as it has been in Germany. The big loser under the Japanese system is the average consumer (who is also the average worker), because the Japanese consumer tends to pay higher prices than those in other industrialized countries for equivalent consumer goods and receives lower interest on personal savings and investments. This set of arrangements – which could be upset in the future if labor and consumer interests are able to organize effectively – has been the basis of the dominance of the Liberal Democratic Party in Japanese politics since the 1950s.

The Japanese system is well organized for joint state and business efforts to bring Japan to the technological frontier in strategic industries and keep it there. There is very little room for resistance on the part of labor to the introduction of new product and process technologies. So far, these innovations have benefited labor as a whole, because of their effect on employment and wages. Business can block government measures that they perceive are against their interests, and especially measures that appear to favor a limited number of *keiretsu* over others, but they have enough weight in government–business forums to assure that government initiatives in technology creation enhance their individual and collective competitiveness.

In Germany, government plays a much less important role than in Japan, while labor plays a much more important role. The strength of the German system is built on the high skill level of German workers. Those skills are the end result of educational efforts that can be traced back to Wilhelmine Germany. After World War II, the traditional power of skilled labor in the workplace was reinforced by the growing power of organized labor in the political system and the embodiment of that power in legal institutions that guaranteed labor a voice in important policy-making forums.

The high influence of labor in the German system, combined with its higher than average level of skills, has meant strong support for technological improvements in established industries as a way of guaranteeing

continued growth in wages. German labor has been somewhat less enthusiastic about encouraging the growth of new industries such as micro-electronics because they are concerned that new process technologies will replace labor with machines. Nevertheless, increasing competition within the European Community and from the newly industrializing countries has made it clear to both business and labor that the rapid introduction of technological innovations is the key to continued German competitiveness.

While the government plays a minor role relative to other governments, it still has some important instruments. For example, the government is responsible for the educational system which transmits skills to the workforce. In addition, the government funds many of the activities of universities and the Fraunhofer Institutes, which help to assure the transmission of university-created knowledge to businesses. Finally, the German government, like that of Japan, has created a stable macroeconomic climate for business investments. Thus, the German system has worked nearly as well as the Japanese system because it encourages the creation and diffusion of technologies.

In sharpest contrast, the British system has not encouraged the diffusion of technologies, despite the continued importance of Britain in the creation of new technologies. The uncertainties created by fluctuating political and macroeconomic climates has clearly played an important role in delaying diffusion of new technologies. The relative weakness of both government and business in the face of a relatively unified and militant labor movement has added a further disincentive. Britain's competitive decline is partly, but not wholly, a function of poor management. But even wise management was confronted with important constraints that were not present in other industrial countries.

In the United States, the political weakness of labor, closely connected with the low average level of skills of the workforce, has impeded the diffusion of new production technologies. The fragmentation of the American state makes it difficult for the state to play the role of partner with business in the creation of new technologies, especially if those technologies have no possible military application. Business may impose its wishes on both the government and organized labor in the United States, but it is strongly constrained in the types of competitive strategies it can adopt as a result.

In France, the main impediments to the creation and diffusion of new technologies have been the lack of domestic competition in important

markets and the marginalization of French labor. The lack of domestic competition will become less important as French firms deal with the problem of surviving in the increasingly open European market, but they will still have to grow out of their current dependence on the tutelary relationship with the powerful French state. The state has learned the lesson of being overly dependent on one or two national champions per industry. But the political fragmentation of organized labor is likely to continue, and there seems to be no major move toward upgrading the skills of the workforce. Nevertheless, state–societal arrangements have not been as much of a handicap to making the technological transition in France as they have been in Britain and the United States.

#### WHERE DO WE GO FROM HERE?

The two countries that experienced increased competitiveness in the last two decades – Japan and Germany – are not on the vertices of the state–business–labor triangle in Figure 6.8 but on the sides linking the state and business and business and labor respectively. The country that experienced the greatest decline in competitiveness – Britain – is on the labor corner, which suggests that this is a position to avoid in the future if possible. There is no example of a country on the side linking state and labor, although we might think of this as an option in countries undergoing a “populist” phase (e.g., Brazil under Goulart or Poland after the election of the Solidarity government). Neither populism nor full-fledged tripartite concertation appears to have been an option for large industrialized capitalist countries during the postwar period.

It seems reasonable to argue that it is easier to move from a corner of the state–business–labor triangle to an adjacent side or from a side to an adjacent corner than to a nonadjacent position. A move to a nonadjacent position means removing one societal grouping from a position of influence and replacing it with at least one other grouping. Such a change would probably involve a rather lengthy and perhaps violent struggle. If one assumes that Japanese- and German-style state–societal arrangements are likely to continue to be connected with increasing competitiveness in the world economy (this assumption will be reexamined below), then each of the other three countries faces a different set of choices about which of the two models to emulate in reforming its domestic institutions.

If the assumptions in the previous paragraph are correct, then the main option for France is to emulate Japan and for Britain to emulate Germany. To do this, France will have to build a much more competitive domestic

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 unification of Germany and the recent defeat of the Liberal Democratic Party 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, have shaken many people's confidence in the robustness of the German model. The new coalition government in Japan has already begun to attack the elite bureaucracy and has pledged itself to rapidly reduce Japan's trade surplus. Whether these are temporary aberrations remains to be seen.

In any case, I expect state-societal arrangements in the big five industrialized countries to remain reasonably close to the pattern illustrated in Figure 6.8 for the foreseeable future. If that is so, we should continue to see Germany and Japan outperforming 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, the completion of a new round of the GATT, further moves toward European unity, the creation of a stronger North American trading bloc 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.

market around competing industrial families. Given the position of France in the European Community, it is likely that the "Frenchness" of those industrial families will be even more broadly defined than it is at present. In addition, the French state will have to give up some of its prerogatives in the allocation of credit and focus more of its efforts on promoting the creation and diffusion of new technologies outside of the charmed circle of champion firms. Finally, the French state will have to work with business to create a more stable macroeconomic climate.

In Britain, there will have to be major efforts to increase the skills of the workforce. A major overhaul of the educational system will be required, with heavy involvement of both business and labor. New investments in British manufacturing will be required, and the most likely sources of new capital will be Japan and Germany. The government will have to focus its efforts on assuring that state-funded universities are creating technologies oriented toward manufacturing and can transfer those technologies to business, a task already begun under the Thatcher government. A new political coalition would have to form around the joint interests of business and labor, which would mean a centrist party of some sort and an avoidance of either the Thatcherism or laborism of the recent past.

The United States is fortunate in having a choice between the Japanese and German models. If it chooses the Japanese model, there will have to be a major upgrading of governmental agencies and a centralization of industrial policy making in a single agency. At the very minimum, there will have to be a civilian equivalent to the role of the Department of Defense in supporting the development of defense-related products and technologies. If the United States chooses the German model, there will have to be a major upgrading of the role of unions in government policy making and in labor-management relations. A significantly increased commitment to the training and retraining of workers will also be involved in such a choice. While the transition to the German style of state-societal arrangements will take longer, because of the need to narrow the gap in skill levels between the United States and Germany, a transition to a Japanese style would encounter strong resistance from those Americans (the vast majority) who are suspicious of strong central government.

#### SUMMING UP

How can we explain changes in international competitiveness among the major industrial nations in the last twenty years or so? The answer lies in the political and social institutions that establish the fundamental rela-



tionships 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 system 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 to raising the level of skills in the workforce, 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.<sup>40</sup> 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.

40 For evidence, see Jeffrey A. Hart, *The Politics of HDTV*, forthcoming.