
CHAPTER 1

S u m m a r y

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This study of international competitiveness compares three U.S. industries—steel, electronics, and automobiles—and also discusses “industrial policy” and the prospects for better integration of policies affecting industry in the United States. It does not address specific policy measures for the three industries in detail.

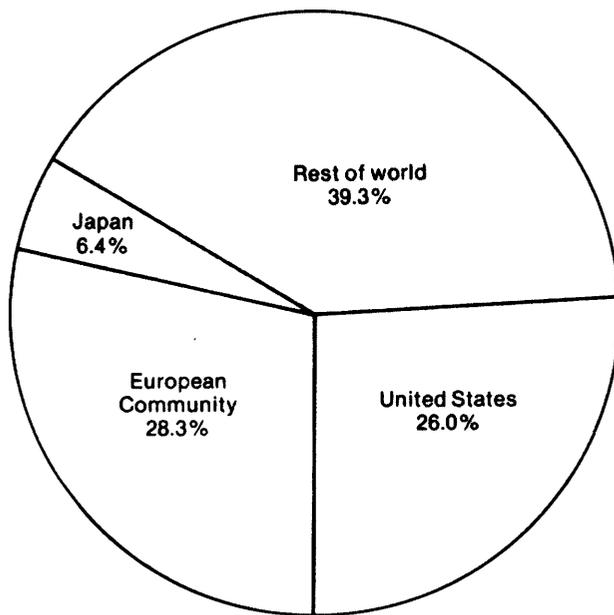
The report draws heavily on recently completed and ongoing work at OTA: the study of the steel industry recently published as *Technology and Steel Industry Competitiveness*; a complementary effort on international competitiveness in electronics that is still in progress; and several studies related to the automobile industry.

Principal Findings

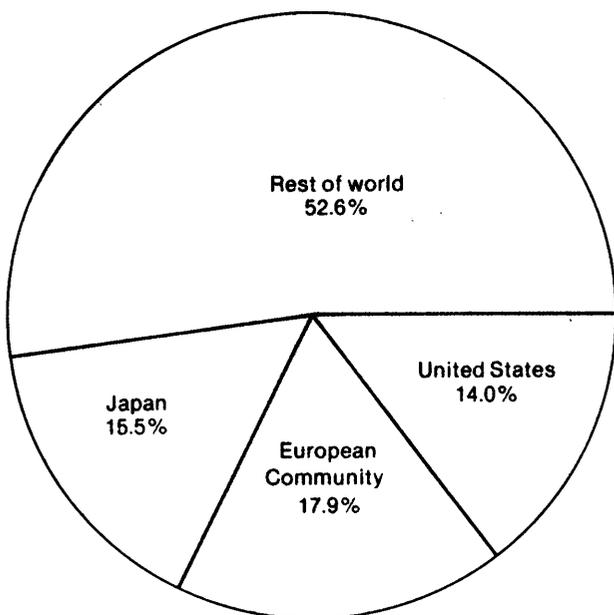
Competitiveness

1. The steel, electronics, and automobile industries are all increasingly pressed by international competition—as are many other sectors of the American economy. The United States must accept the reality of a highly competitive global marketplace—one that this country can no longer expect to dominate as in the 1950’s. Markets in the United States are the largest in the world—this is a strength for domestic industries, but makes an attractive target for other countries. In semiconductors and computers, American firms have prospered by treating domestic markets as only a part of the larger world market—as have Japan’s automobile and consumer electronics producers. Where a global market exists, firms operating on a worldwide basis may have advantages over those that restrict themselves to a domestic market even as large as that of the United States.
2. Public perceptions that U.S. competitiveness has been slipping in manufacturing industries such as steel, electronics, and automobiles are basically correct. At the same time, both the magnitude of the problems and their consequences can be overdrawn. On the average, American steelworkers have labor productivity as high as any in the world; the industry remains more profitable than its foreign rivals. The automobile industry has suffered as much from recession and escalating fuel prices as from declining competitiveness. The high-technology sectors of the U.S. electronics industry continue to be world leaders. In absolute terms, much of American industry remains efficient and innovative, although in relative terms it may have declined with respect to other countries.
3. Helping to improve the competitiveness of American industry—both the ability to export and the ability to compete with imports in U.S. markets—is a feasible objective for Congress. Both causes and effects of shifts in international competitiveness are influenced in significant ways by public policies. Among the causes are relative rates of productivity growth and relative technological capabilities—which depend on investment incentives and R&D stimuli, among other factors. Effects of shifts in competitiveness include changes in standards of living and in employment levels. In the past, public policies have seldom directly addressed the sources of competitiveness and economic efficiency. Congress could decide that the time has come for a more focused and consistent approach.
4. While the United States retains technological superiority in many industries, it has no across-the-board advantage. In some technologies and in some sectors, U.S. firms are behind in the installation and use of available technologies. Where the

World Steel Production



1960



1980

Totals: 1960—346.1 million tonnes
1980— 7177 million tonnes

SOURCES 1960— *Technology and Steel Industry Competitiveness* (Washington D C Office of Technology Assessment June 1980) p. 116.
1980— World Crude Steel Output Drops *ASM News*, February 1981 p 1

United States continues to be technologically preeminent, this superiority remains a vital competitive tool; but American industry can only stay ahead by continuing to innovate—in product and process technologies, as well as marketing, sales, and service. This requires continuing investment in R&D and in new plant and equipment, plus aggressive, market-oriented commercialization of new technologies.

5. Long-term decreases in domestic employment opportunities are occurring in mature industries such as steel, consumer electronics, and automobiles. Maintaining or enhancing competitiveness generally requires raising productivity. Improvements in labor productivity in the absence of a growing market can result in falling employment. In industries facing stagnant or slowly growing markets, the United States may have to choose between maintaining competitiveness at the sacrifice of employment opportunities or maintaining employment at the sacrifice of competitiveness.
6. A commonplace observation that nevertheless deserves reiteration is that American firms and industries compete among themselves as well as with foreign concerns. Entirely apart from competition between firms within an industry, different industries vie for resources such as investment capital—which goes to those sectors that appear to offer the best returns. Firms and industries seek from Government policies and regulations (or the absence of policies and regulations) that will give them advantages over their competitors. They also compete for the best people—on the shop floor, in the R&D laboratory, and in executive ranks.

Effects of Public Policies on Industry

1. In the United States, public policies affecting industry are typically formulated, legislated, and implemented on an ad hoc basis. One result is that they are sometimes contradictory and may lack continuity. Often the conflicts—e.g., between protecting the

Average Annual Rates of Productivity Growth in Manufacturing
(physical output per hour, all employees)

Time period	United States	Japan	France	West Germany	United Kingdom
1950-70	2.40%	10.1%	5.20%	5.8%	2.90%
1970-79	2.3	7.4	5.0	5.3	2.1

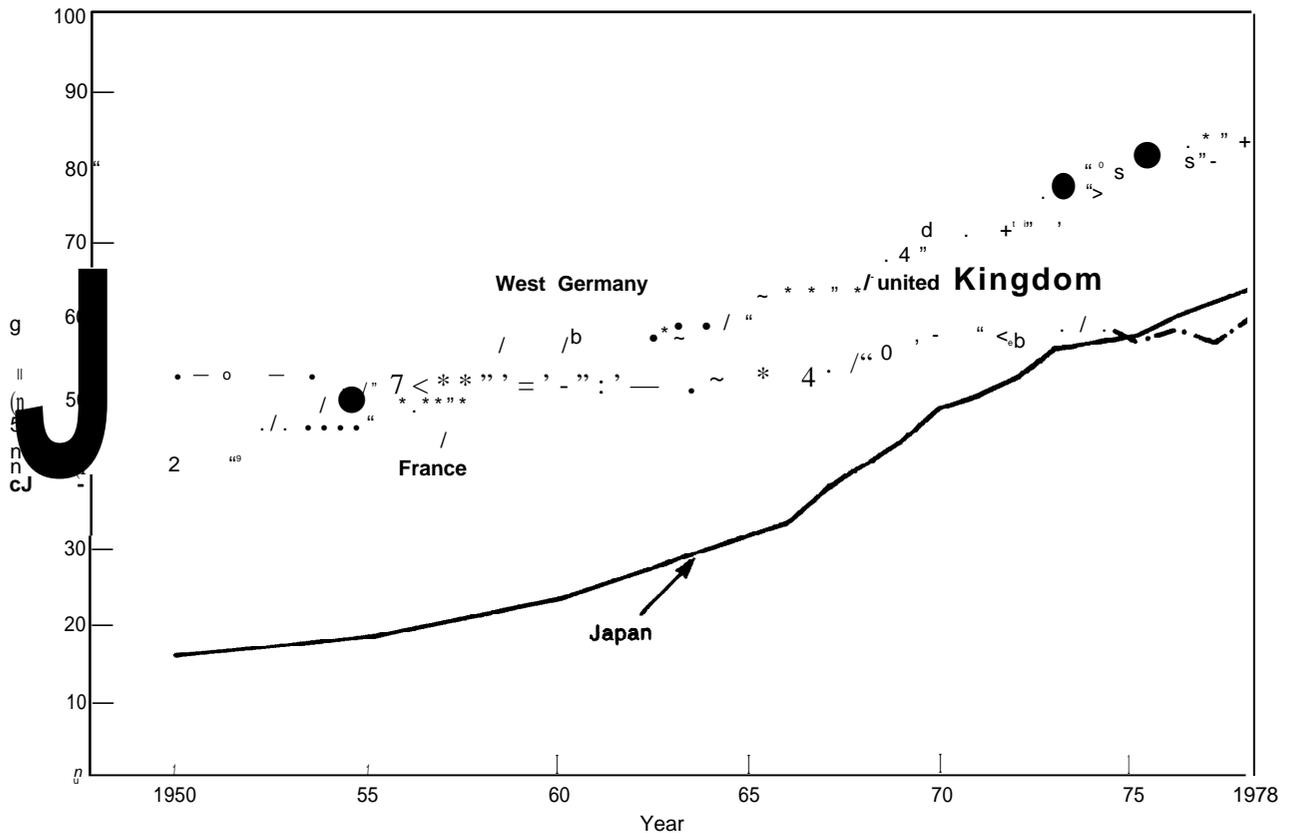
SOURCE *Output per Hour, Hourly Compensation and Unit Labor Costs in Manufacturing Eleven Countries 1958-1979* (Washington D C Bureau of Labor Statistics December 1980)

environment and encouraging energy production—contribute to a lack of national consensus on priorities. Industry in the United States is therefore sometimes faced with rapid shifts in Government policy, In contrast, industrial policies in other countries often rely rather effectively on consistent sets of signals or projections to guide and encourage industry. International competitiveness has seldom been treated as a major policy goal by either

Congress or the executive branch; as a result, inconsistency and lack of continuity in public policies have sometimes harmed U.S. competitiveness.

2. The objectives of public policies affecting U.S. industries are seldom well-integrated and not always well-defined. Such policies include regulatory measures directed at all industry (such as workplace safety and some environmental standards), regula-

Real Gross Domestic Product (GDP) per Employed Person Relative to the United States as 100



SOURCE M E Moguee *Technology and Trade Some Indicators of the State of U.S. Industrial Innovation* (Washington D C Subcommittee on Trade Committee on Ways and Means U S House of Representatives Apr. 21 1980), p 25 From BLS data

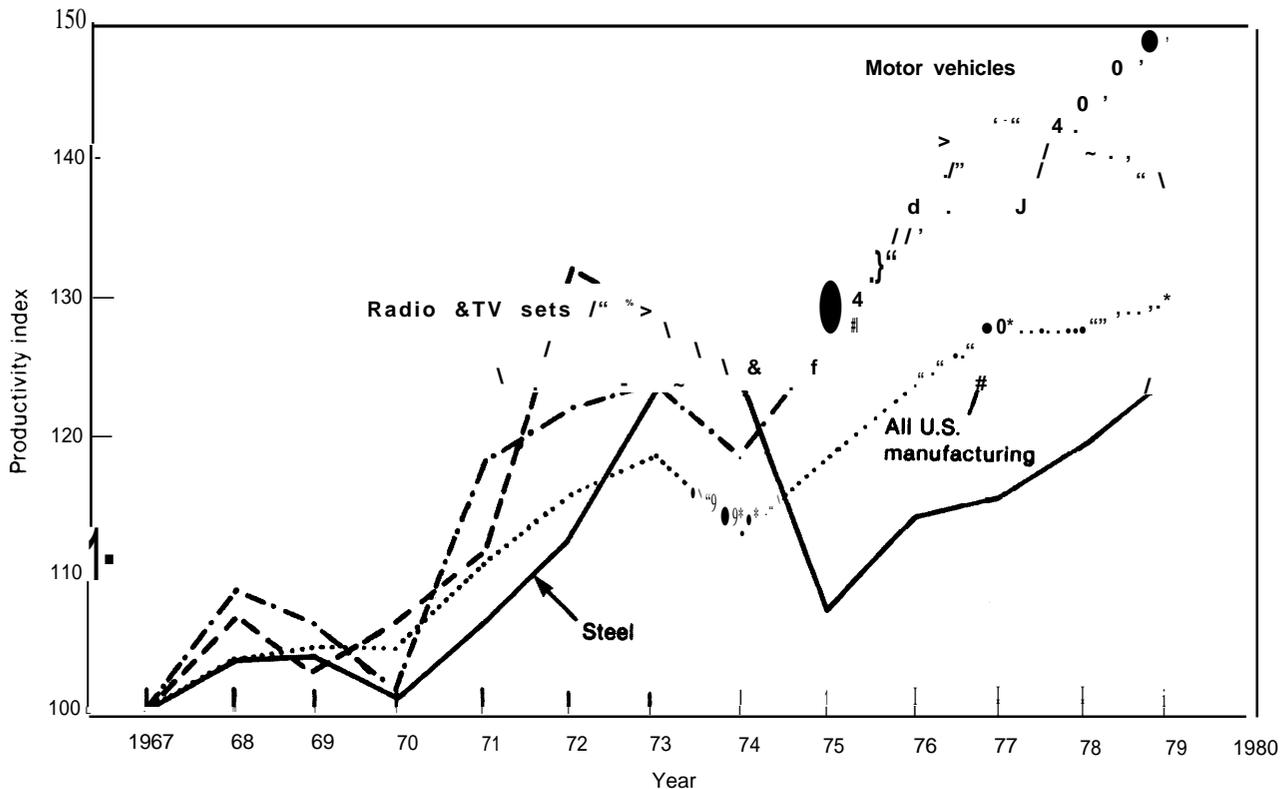
tions that apply only to specific industrial sectors (such as automobile fuel economy standards), tax policies that encourage particular kinds of investment, emergency measures such as the Chrysler loan guarantee, and a substantial degree of “jaw-boning” (directed at targets as various as steel prices and Japanese automobile imports). There is little coordination among such policies. Nor are macroeconomic policies formulated with much attention to effects on particular industrial sectors.

3. Despite the undoubted importance of public policies in setting the conditions under which firms and industries compete—both domestically and internationally—many Government actions have only indirect and secondary effects on competitive behavior. The wide range of performance exhibited over the years by American firms within a given industrial

sector—e.g., steel or computers—and the fluctuations from year to year, show that Government is only one influence among many in determining competitive position. A well-developed appreciation for the often subtle and indirect ways in which Government influences industry would be an important step toward a more coherent industrial policy.

4. The fragmented industrial policy of the United States is also a potential strength. Our pluralistic system, which is responsible for much of the ad hoc character of U.S. policies toward industry, creates an environment where flexible and innovative responses are sometimes possible. Each industry interacts with a variety of public agencies; there are many avenues for seeking changes in response to new or growing problems, or to new opportunities. With policy made throughout the system, inter-

BLS Productivity Indexes (physical output per hour—all employees, 1967= 100)



SOURCE Productivity Indexes for Selected Industries (Washington D C Bureau of Labor Statistics)

ested parties can generally find a hearing, and often an advocate. Genuine conflicts of interest and genuine disagreements about priorities are illuminated rather than suppressed.

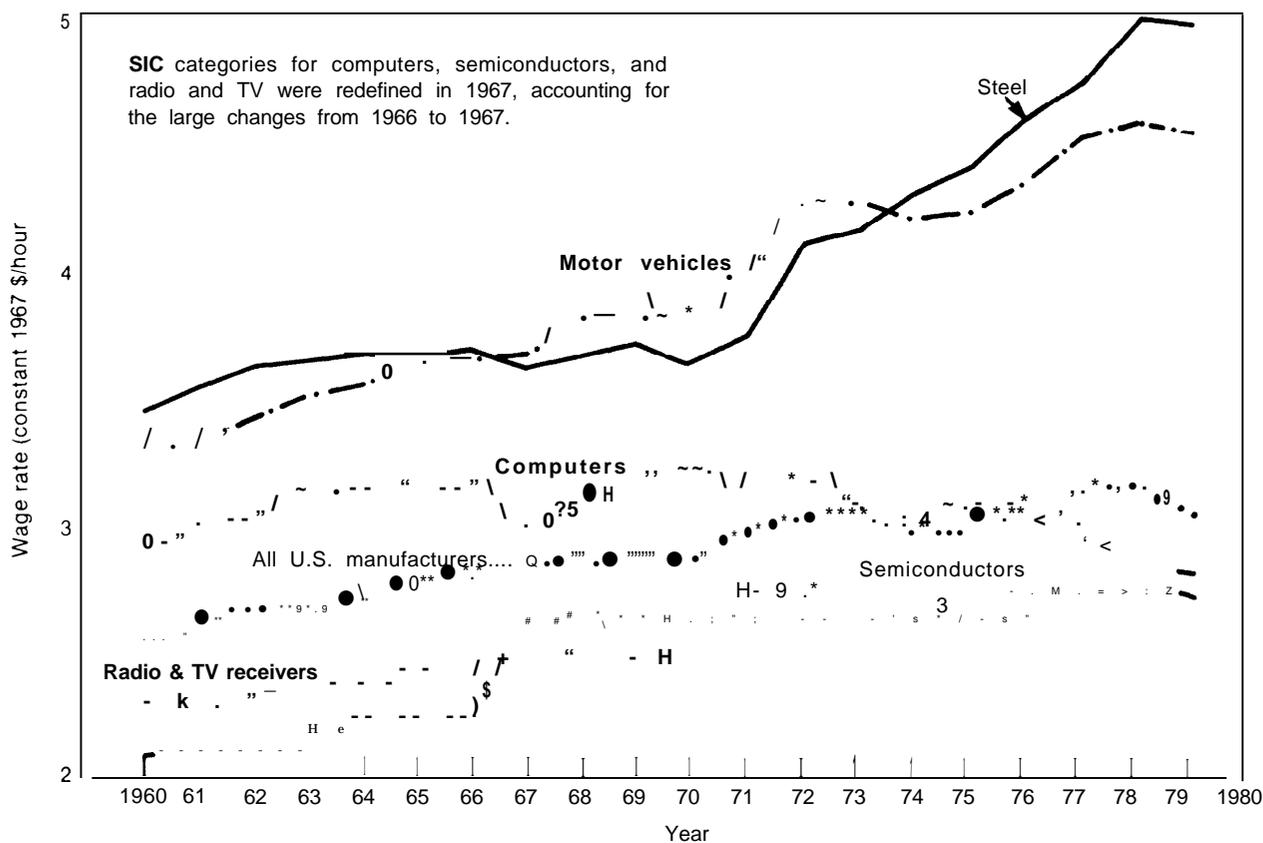
- American industry has often responded to evidence of declines in competitiveness by arguing that Government has become too concerned with regulating industry, insufficiently concerned with supporting it. Many in the business community contend that they need reductions in effective corporate tax rates (e.g., liberalized depreciation allowances), modifications to environmental and safety regulations, and more vigorous enforcement of laws governing

“unfair” trade practices such as dumping. Policy changes of these sorts might in some cases be appropriate, but in the three industries studied would by themselves be insufficient to ensure future U.S. competitiveness.

Industrial Policy

- OTA’S study of competitiveness suggests that Congress consider developing a more coherent and explicit policy toward industry. The ad hoc approach to industrial policy followed in years past may not suffice in the current context. Today the United States no longer enjoys the overwhelming technological lead or relative

Average U.S. Wage Rates for Production Workers in Constant 1967 Dollars per Hour



SOURCES: All U.S. manufacturing—*Employment and Earnings, 1909-1979* (Washington, D.C.: Bureau of Labor Statistics, June 1980).
 Electronics: 1960-66—*Employment and Earnings, 1909-1975* (Washington, D.C.: Bureau of Labor Statistics, July 1976).
 1967-71—*U.S. Census of Manufacturers, 1972*.
 1972-79—*Employment and Earnings, 1909-1979* (Washington, D.C.: Bureau of Labor Statistics, June 1980).
 Steel—*Annual Statistical Report* (Washington, D.C.: American Iron and Steel Institute, June 1979).
 Motor vehicles—*Employment and Earnings, 1909-1979* (Washington, D.C.: Bureau of Labor Statistics, June 1980).

economic strength it possessed two or three decades ago. A climate now exists within the United States that appears potentially receptive to new policy approaches and to a consciously developed industrial policy. While genuine cooperation among Government, industry, labor, and public interest groups is unlikely to spring up overnight, there is at least shared concern over U.S. competitiveness. This growing awareness could facilitate agreement on the objectives of industrial policy.

2. Two prerequisites for a coherent and effective industrial policy are: first, a set of objectives that can be broadly agreed on—the development of which is largely a political task; and second, enhanced analytical capability within Government. Analysis is needed not only for linking the overall goals of industrial policy with particular policy instruments—e.g., for determining differential effects of tax measures on various sectors—but also for evaluating competitiveness, and for relating sectors to one another and to the aggregate economy. Judgments concerning competitiveness and economic efficiency are complex and demanding. A practical, working knowledge of each industry, including its technology, is required.
3. Although analyses of competitiveness must begin by examining sectors individually, industrial policy itself need not be sectoral. To have an industrial policy does not necessarily mean targeting certain industries for promotion, or subsidizing industries in decline. Such measures will always be among the options and alternatives available, but are by no means essential characteristics of industrial policy. There is considerable doubt that such targeting has worked consistently well in the countries where it has been tried. (Industrial policy in Japan, for example, is much more complex than the notion of a target industry suggests.)
4. Industrial policy implies some perspective or framework for formulating and imple-

menting policy measures. The analysis in this report suggests a framework that OTA calls “macroindustrial policy.” Macroindustrial policy would be based on sector-by-sector analyses of competitiveness, but rely where possible on market signals and policies with aggregate objectives in preference to sectoral measures. The first choice among tools would be macroeconomic policies. If the analysis indicates that these would not suffice, then the second choice would be other aggregate measures such as market promotion policies. (Market promotion policies are intended to enhance the workings of the market system; examples are job relocation and retraining programs, or science and technology policies.) If these too seemed insufficient, policies specific to the particular industry or to individual firms might be developed.

5. One aim of macroindustrial policy could be to preserve the flexibility and adaptability of the American economic system while creating a stable climate for industrial growth and the enhancement of competitiveness. The following measures are among those that could improve competitiveness and might play a role in macroindustrial policy:
 - policies to stimulate innovation, to strengthen the technology base for commercial (rather than exclusively military) applications, and to promote R&D (and the diffusion of its results) directed at commercial products and processes.
 - policies, including tax and regulatory measures, to encourage capital formation and investment in new technologies—both product technologies and new, more productive manufacturing methods.
 - support for education and training of the work force, including retraining of those displaced by technological change, and the encouragement of labor mobility. In general, the United States appears to have more low-skill manpower and less high-skill manpower than an industrial

economy of the 1990's will require; an overall upgrading of the work force (engineers and managers as well as production workers) could directly improve productivity and competitiveness.

- economic adjustment policies aimed at smoothing flows of capital and labor from declining firms or industries to those with strong prospects for future competitiveness, but leaving the market to identify sectors of growth and decline.
 - measures designed to encourage competitive U.S. firms to export, together with policies to promote open world trade—including fully reciprocal treatment of U.S. industries that export or invest overseas—and protection against unfair competition in domestic markets.
6. The increasing concern in the United States with competitiveness and “reindustrialization” has not yet led to agreement on how to move toward a consciously formulated industrial policy. To lay groundwork for further development, Congress might consider steps of the following sorts:
- creating a central focus within Congress—such as a caucus, task force, or

an ad hoc committee on industrial policy—for members and staff with responsibility for policies that affect industry.

- encouraging broadly based participation by consumer and other public interest groups, and labor, as well as representatives of Government and business, aimed at clarifying the goals and objectives of industrial policy and going beyond sectoral concerns,
- creating an analytical group with ongoing responsibilities for examining competitiveness and economic performance and their relationships to productivity; technology; and regulatory, tax, and trade policies—as well as the social and economic impacts of shifts in competitiveness. Such a group might include projections and forecasting among its responsibilities, as well as the dissemination of such projections to the private sector—including analyses of new technological developments and their prospective commercial impacts, both domestic and foreign. It could be located either in the executive or legislative branch.

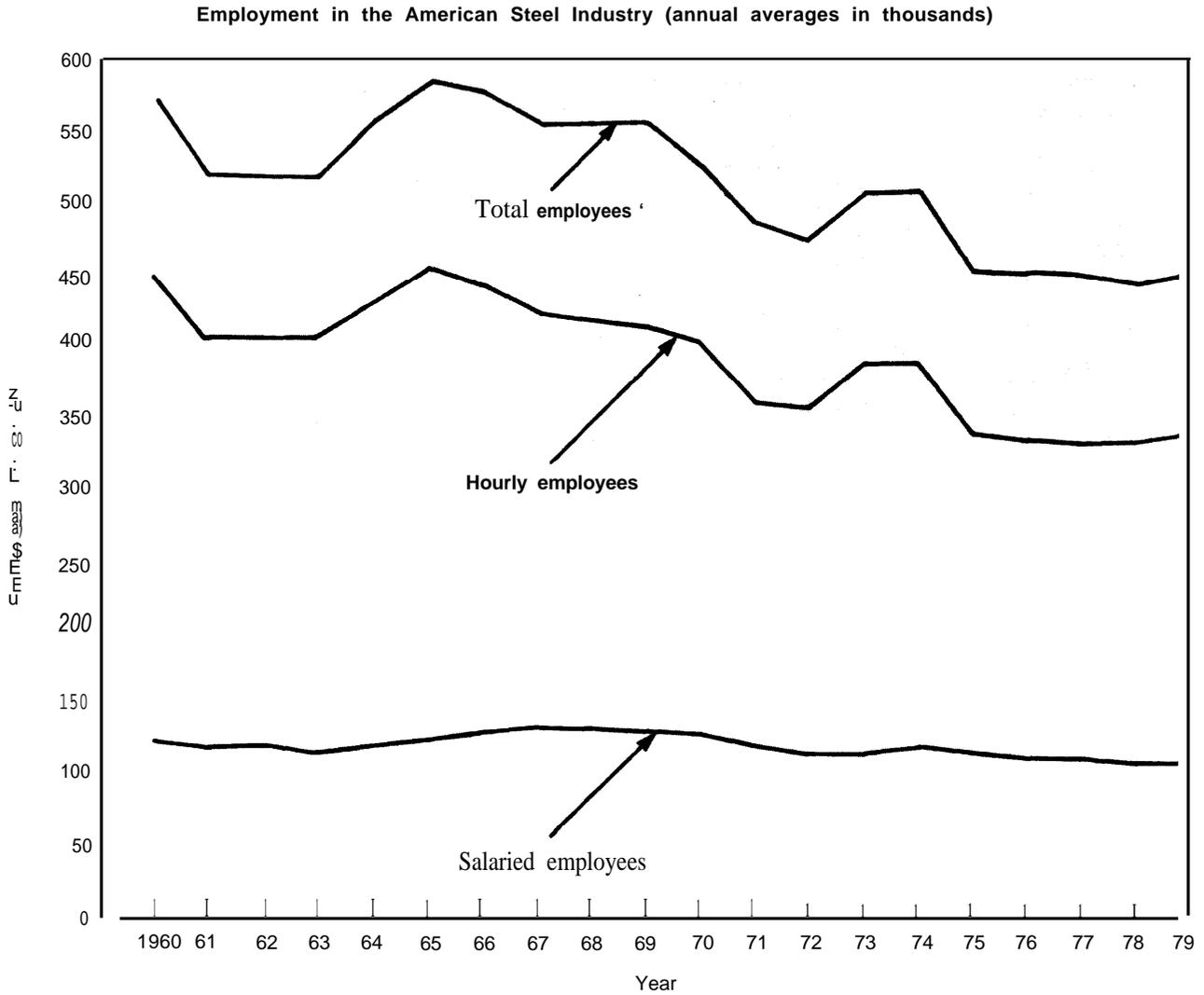
The Steel Industry

The competitiveness of the integrated portion of the American steel industry has declined in part because wages have increased faster than productivity. Although the labor productivity of the industry is high compared to most of the rest of the world—as are profits, on the average—the industry's plant and equipment have not been modernized rapidly enough to give efficiency improvements that would keep pace with rising wages.

Steelmaking costs vary widely among American firms, tending to be higher in the integrated segment of the industry, which comprises 85 percent of U.S. production. (Integrated firms are those that start with ore and market finished steel products.) Nonintegrated firms often have more modern equip-

ment and lower costs, though producing only a limited range of products. Shifts in competitiveness will continue to increase the relative importance of nonintegrated and alloy/specialty steelmaker.

Costs in many portions of the U.S. industry are now high enough that domestic steelmaker are in a poor position to combat imports, particularly those “dumped” by foreign producers. Costs are also too high for exports of most types of steel to be competitive. Since the late 1960's, the U.S. Government has adopted a variety of policies intended to insulate American steel firms from foreign competition—and particularly from “unfair” trade practices (those prohibited by U.S. law or international obligations). At best, these



SOURCES *Annual Statistical Report*, American Iron and Steel Institute, 1978, 1979

have had limited success; antidumping remedies, in particular, have often been ineffective. Positive measures to aid American steelmaker in modernizing, restructuring, or otherwise enhancing their competitiveness have been few in number and of little impact.

Government regulations, such as those dealing with environmental protection, have required significant capital expenditures by the industry. But the money spent in meeting regulatory standards would have been insufficient to maintain U.S. competitiveness even

if directed entirely at modernization and productivity improvement. At the same time, the Federal Government has not attempted to offset such investments—as do several other countries with similar regulations—so that the industry could otherwise update its plant and equipment. This is one reason why most of the productivity growth in the American industry has come piecemeal through improvements to existing facilities. With the exception of minimills and other small producers, the U.S. industry is often unable to match the technology installed in foreign mills. To catch

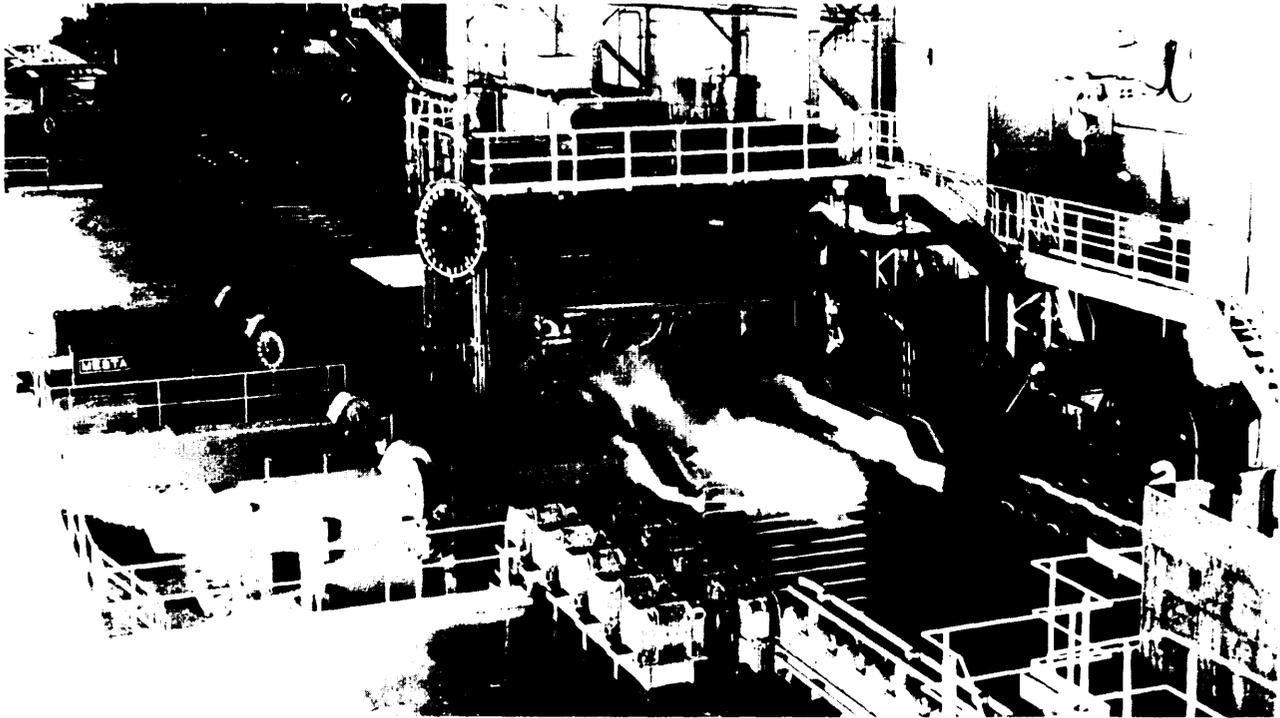


Photo credit: American Iron and Steel Institute

Slab casting machinery

up would require capital spending at rates approximately double those of the past few years,

There are nonetheless positive signs for American steelmaker. First, competition is transforming the U.S. industry, and obsolete, inefficient mills are being closed. Second, other countries have now achieved many of the immediate productivity increases available from new mills and new process technologies; they will have more difficulty making further gains. Finally, long-term trends in prices for material inputs used in making iron and steel should favor the United States.

At the same time, with current and probable prices for steel, and existing process technologies, new integrated mills based on existing technologies may no longer be economic in this country. Nor are they likely to be economic in any industrialized nation with high labor costs. In the future, developing countries with low labor costs such as South

Korea are likely to be among the stronger international competitors. During 1980, steel production decreased in the industrialized world, while increasing in the developing world.

Because growth in domestic consumption will be slow, because large export sales are unlikely, and because productivity advances will continue, employment in the American steel industry is unlikely to recover. If productivity grows more rapidly than the market, which is likely, employment will continue to decrease. As in other mature industries, the goal of increased competitiveness may conflict with the goal of increased employment. It may be impractical to maintain existing employment levels in such industries. The United States faces a fundamental dilemma in reconciling possible employment decreases in particular industries with the need to maintain competitiveness and employment across many industries.

The Electronics Industry

U.S. competitiveness varies markedly across the diverse segments of the electronics industry; it is greatest in high-technology sectors such as semi-conductors and computers. Government policies could help maintain the present advantages.

OTA'S study focused on three sectors of electronics: consumer electronics (mainly radios and televisions), semiconductors, and computers. These sectors differ in their technologies, in their present competitive positions and future prospects, and in the ways in which public policies have affected them. Although the U.S. consumer electronics industry has declined in competitiveness, our semiconductor and computer sectors remain the strongest in the world.

In international terms, the U.S. consumer electronics industry is now rather small. American-owned firms retain the major share of the domestic color TV market, but much of their production has been relocated to foreign countries to reduce costs. Weaker U.S. manufacturers of TVs and other consumer electronics products have disappeared.

As the competitive positions of U.S. companies have declined, foreign firms—principally Japanese—have located assembly plants here. Negotiated quotas on imports of color TVs from Japan, Taiwan, and South Korea have hastened this trend. While em-

ployment has been maintained at levels higher than would otherwise have been the case, much of the value-added remains overseas, along with management control and many professional and skilled jobs.

The future of the U.S. consumer electronics sector depends on new generations of home entertainment products. If these products are designed, developed, and successfully marketed by American firms, and if advantages in either product or process technologies can be maintained, the United States could retain a substantial presence.

As is the case for steel, productivity gains in consumer electronics—e.g., resulting from automation—will work against maintaining employment. Only if new products with large markets are introduced (which remains a possibility), or if U.S. firms begin to compete aggressively and successfully in other parts of the world (which now seems unlikely), will it be possible to increase employment in this sector.

In the semiconductor and computer sectors, markets are growing rapidly; therefore employment is rising even while productivity increases. Although American firms retain more than half of world sales in both semiconductors and computers, there is still cause for concern. First, the U.S. share of the world

Import Penetration in Consumer Electronics, 1978

Product	Imports as % of U.S. consumption
Videotape players /recorders	1000/0
Household radios	100
CB radios	90
Black and white TVs	85
Electronic watches	68
High fidelity and stereo components	64
Phonographs and compact stereo systems	43
Audio tape recorders.	35
Microwave ovens.	25
Color TVs	18

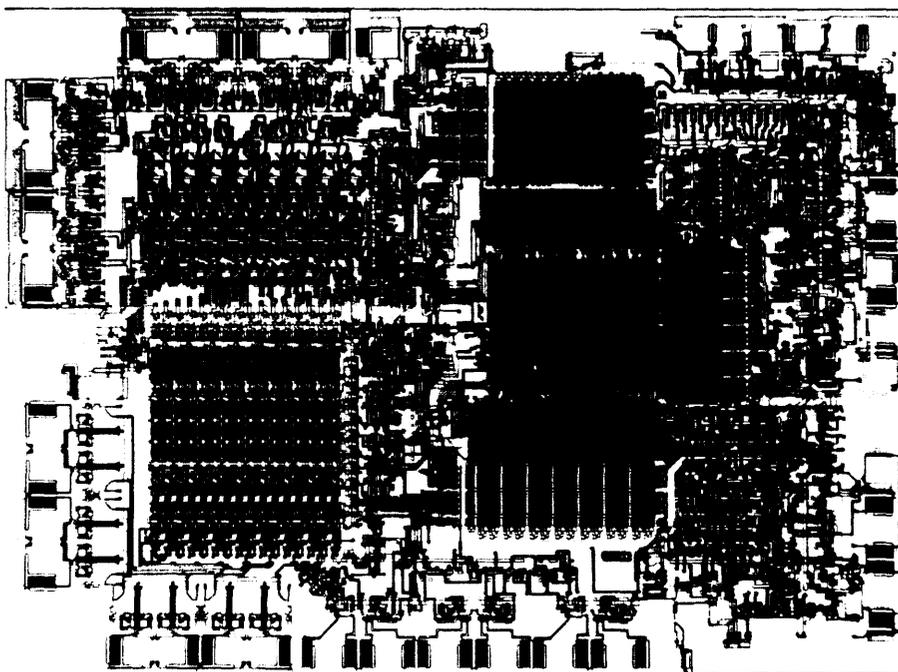
SOURCE "The U S Consumer Electronics industry and Foreign Competition, Executive Summary, " final report under EDA grant No 0626. 07002.10, Department of Commerce, Economic Development Administration, May 1980, p 2

Comparison of the United States and Japan in Digital Integrated Circuit Technology

Process technologies	
Electron-beam lithography	=
X-ray lithography	=
Deep ultraviolet lithography	-
Resists	=
Quality control	?
Silicon materials	=
Automated assembly.	=
Product technologies	
Computer-aided design capability.	+
Memory circuit designs.	=
Microprocessor designs	+

+ United States ahead
 - United States behind
 = Rough parity
 ~ See text (ch 5)

SOURCE. H C Lin for OTA electronics study



8-bit microprocessor circuit

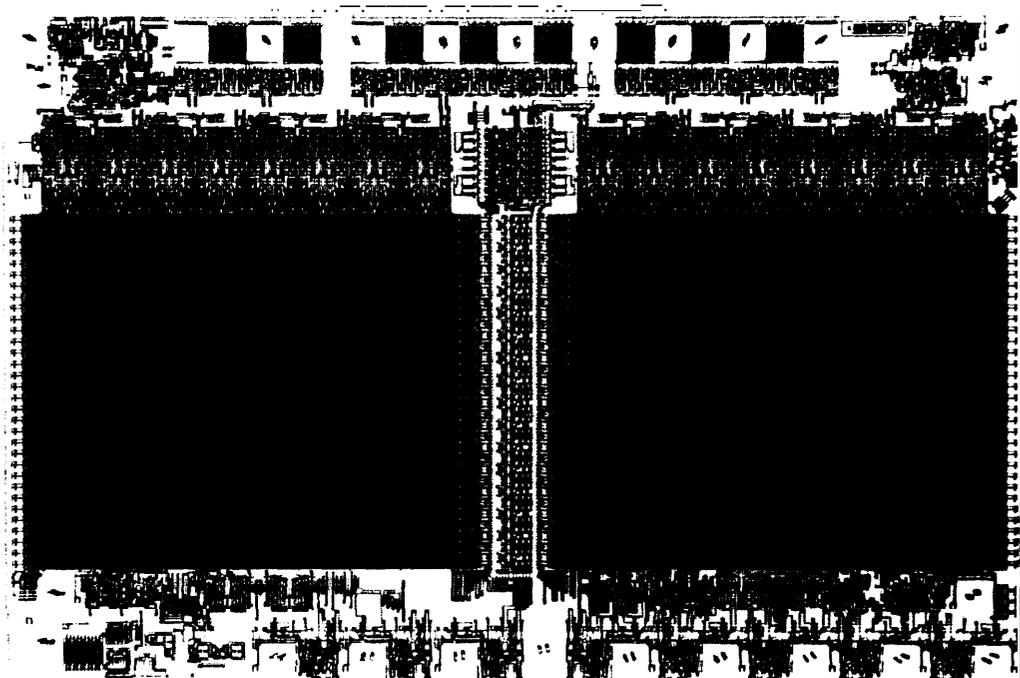
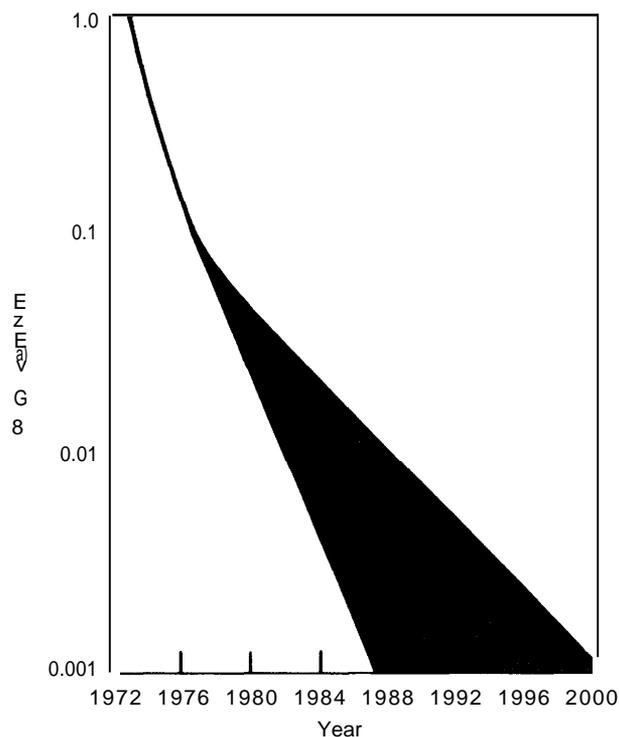


Photo credits Intel Corp

Integrated circuit memory chip that can store more than 32,000 bits of information

Figure 12.—Projected Decrease in Cost per Bit for Random Access Memory Circuits



SOURCE K D Wise, K Chen, and R E Yokely, *Microcomputers: A Technology Forecast 10 the Year 2000* (New York: John F. Wiley & Sons, 1980), p. 57.

market is shrinking, more so for semiconductors than computers. Second, Japanese firms have made startling inroads into U.S. markets

for several high-technology semiconductor products. Third, other governments are actively supporting and promoting their semiconductor and computer industries.

In both semiconductors and computers, the technology gap that American firms established in the 1960's has shrunk; in some cases it has vanished. The United States must continue to innovate in order to maintain the technological capabilities on which competitiveness depends. This is vital not only for the electronics industry, but for the many other portions of our society and economy that depend in some way on electronics technology and its applications—ranging from computerized control of steelmaking processes to biomedical implants such as cardiac pacemakers. Supportive Government policies toward R&D and product development can help maintain a technological lead.

An important advantage of American semiconductor and computer firms is their demonstrated ability to compete on a global scale. In the 1980's, the health of these sectors will depend on their ability to generate and attract capital, on an adequate supply of well-trained engineers and scientists, on success at R&D and innovation, and on trade policies that protect American firms from unfair competition at home while seeking fully reciprocal access to foreign markets.

The Automobile Industry

The automobile industry is undergoing long-term international restructuring; superimposed are a series of difficult short-term problems for American manufacturers. Public policies toward this industry, as for the others, could ease the adjustment process.

Automotive technology, like that for steel, is well-diffused internationally; no one country has a technological advantage. Technical change in these industries is slow compared to electronics, major innovations infrequent.

Despite losses during 1980 totaling more than \$4 billion, the American automobile in-

dustry is in many respects stronger relative to the rest of the world than our steel industry. For example, the U.S. automobile industry's productivity record compares more favorably with that of other countries, as well as with other domestic industries. But since 1978, decreased total demand for automobiles has combined with a shift in the market toward small cars to produce sharp declines in domestic production and employment. The decrease in demand is associated with a gradual change from a growth market to one which is more nearly a replacement market, and with a recession marked by tight credit.

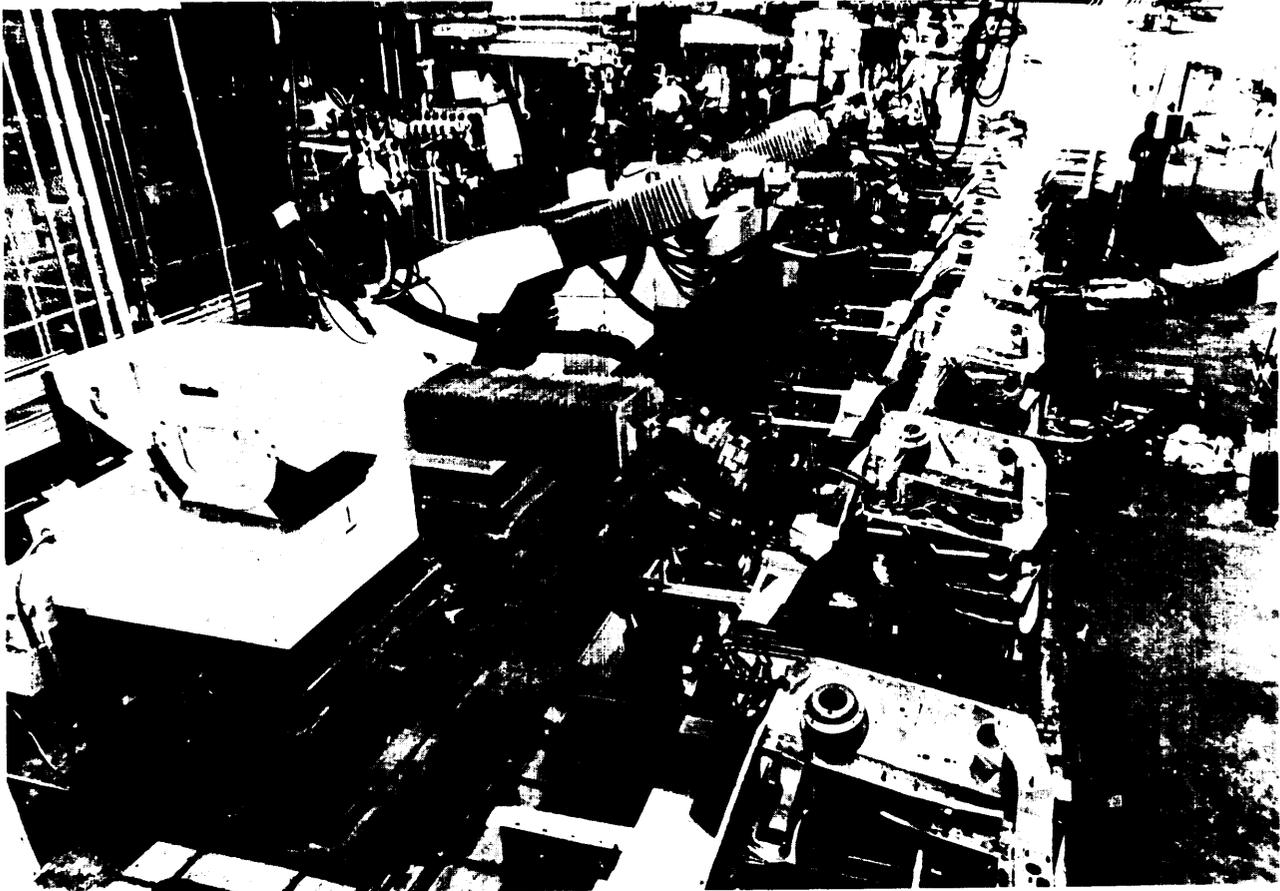


Photo credit Ford Motor Co

Robots welding automobile subframes

In marked contrast to previous periods of decline in total sales, sales of imports from Japan have continued to increase. Rising gasoline prices are an important cause of this shift in consumer demand. Redesign and retooling to produce new generations of small cars are straining the capital resources of U.S. automakers. In contrast, their competitors face substantially lower expenditures because they already build small cars almost exclusively—a legacy of markets which have been less affluent and of fuel prices which have historically been much higher.

For subcompact cars, Japanese firms appear to have production cost advantages over U.S. automakers that may be 20 percent or

more—largely because of lower labor costs; this gives them flexibility but is only one reason for their current success. Using conventional designs, and engineering which is often clever but generally not particularly innovative, the larger Japanese automobile manufacturers have learned product differentiation from American firms and applied the lessons to the small-car segment of the market—where the product lines of American automakers are thinnest. Furthermore, they have established an image—largely justified—of high-quality and trouble-free service, which has combined with expanded and strengthened dealer organizations to give good resale value as well as wide coverage of markets.

Motor Vehicle Production and Sales Figures (thousands of cars and trucks)

Year	U.S. production	Domestics	Sales		Import penetration
			Imports	Total	
1978	12,875	12,890	2,320	15,210	15.3740
1979	11,471	11,132	2,743	13,875	19.8
1980	8,012	8,581	2,883	11,464	25.1

SOURCE, Tables 5 and 6 in ch. 4.

Projected Sales of Passenger Cars in Major World Markets

	Sales (millions of cars)		Growth rate (% per year)
	1978	2000	
United States.	11.1	12.1	0.4%
West Germany, France, Italy, United Kingdom. . .	7.4	10.2	1.5
Japan	2.9	4.4	2.0
U. S. S. R., East Germany, Yugoslavia, Czechoslovakia, Poland . .	1.8	4.3	4.0
Rest of world	8.0	17.2	3.5
World total	31.2	48.2	2.0%

SOURCE the Changing World Automotive Industry Through 2000 (Cambridge, Mass Arthur D Little, Inc., January 1980).

Japanese automakers are now firmly established in the United States, and will not yield market share easily. Their competitiveness is demonstrated by recent sales increases in Europe as well as the United States. Japanese manufacturers are currently attempting to further broaden and strengthen their product lines to counter the new small cars American firms are introducing.

U.S. automobile manufacturers have been more directly affected by public policies than steel or electronics firms. At the same time, domestic regulations dealing with exhaust emissions, safety, and fuel economy also apply to foreign firms selling in the United States. The difference is that the Europeans and Japanese have been building small cars with good fuel economy for many years. When the market turned to small cars even more rapidly than regulations had pushed in this direction, imports reaped the benefits.

On a world scale, the automobile industry is going through a period of corporate consolidation but geographic dispersion. Some observers predict that as few as six transnational producers could dominate world auto markets by the end of the century. Automobiles designed and produced in different parts of the world are becoming more similar. This and other forces are leading to the spread of production to developing countries with low labor costs and growing markets. Such changes will affect suppliers to the industry, as well as the automakers themselves. Sales growth in most parts of the developed world will be slow compared to the newly industrializing countries. Strength in developing country markets will be one of the factors determining future competitive success in the world automobile industry.

As in steel and consumer electronics, some of the current unemployment in the U.S. automobile industry seems irreversible. The domestic auto market is growing only slowly. Prospects for large export volumes are slight because, although some U.S. automakers have large sales overseas, they serve foreign markets primarily through local production. In any case, exports from the United States are generally not cost competitive after transportation charges. Given slow domestic market growth and productivity that must increase if American automakers are to remain competitive, employment will decrease. There is little alternative.

Policies Toward Industry

The United States has many policies that affect industry—ranging from broad, macroeconomic fiscal, monetary, and tax policies to tightly defined regulations imposed on specific industrial sectors. But it cannot be said that the United States has a consciously designed or coherent industrial policy. In principle, fragmentation of policy can be a strength—providing interested parties with access to the Government at many points and contributing to flexible responses. But in recent years there have been few signs of this.

The three sectors examined by OTA have been influenced in different ways and to different degrees by Government actions. They are similarly dependent on a strong, stable economy, hence on effective macroeconomic policy. In the long term, sectoral remedies are unlikely to function effectively or efficiently in the absence of a healthy, growing aggregate economy; successful macroeconomic policies make sectoral problems easier to deal with.

Other policies with aggregate objectives also have important effects on the competitiveness of American industry. Often these work indirectly by influencing corporate strategy and decision-making; in the end, competitiveness depends on the success of many individual firms, each of which performs differently over time. Tax policies, for example, are an important part of the supply side linkage between macroeconomic policies and particular industrial sectors (and firms). Both development of new products and investment in new plant and equipment depend on cash flow, which is affected by direct taxes on corporate profits, investment tax credits, and depreciation allowances.

Taxes are but one example among many of aggregate policies with important and differential sector-specific effects. Government

support for the construction of roads and highways has had a major, long-term impact on the American automobile industry, as have energy policies. In the past, national defense programs helped shape the U.S. electronics industry. All sectors are dependent on the quality of the educational system.

Regulatory policies have had significant impacts on the steel and automobile industries. However, regulation cannot be blamed for the majority of the problems these industries face. Expenditures for regulatory compliance in the steel industry have been large in absolute terms—as have expenditures for diversification out of steelmaking—but still represent only a small fraction of what would have been needed to maintain competitiveness. (Steelmaker in Japan have spent more in meeting environmental regulations than those in the United States.) In the automotive industry, regulatory burdens have often affected imports, particularly from Europe, more heavily than domestic vehicles because American firms have been able to spread development costs over larger production volumes.

Trade policies have sometimes had unintended negative consequences. For example, protracted and unresolved dumping proceedings in sectors such as consumer electronics have harmed U.S. competitiveness by creating a climate of uncertainty and irresolution. The overall thrust of postwar American trade policy has also exposed U.S. industries to more intense competition. At the same time, the emphasis on opening and expanding international trade, as well as promoting economic development in other countries, has created new opportunities for many American firms,

Finally, the lack of effective policies for smoothing economic adjustment has added to



Photo credit National Semiconductor Corp.

Workers in a clean room testing wafers for integrated circuits

the problems of many industries, aggravating the effects of unemployment and related dislocations.

Does the United States then need a better industrial policy? Clearly the Government intervenes in many ways in the activities of industry and will continue to do so. This is necessary in a complex industrial society. The issue is not intervention versus nonintervention. The issue is whether a more coherent

industrial policy will function better than an ad hoc combination of macroeconomic and industry- or firm-specific measures. The answer is not obvious. The U.S. economy performed well for many years without a consciously developed industrial policy. During most of those years, the economy was growing rapidly; there was no apparent need for policies explicitly addressing competitiveness, productivity, or (nonmilitary) technology.

OTA'S review of these three industries suggests several reasons why a consciously formulated industrial policy might produce better results.

- First, it could give the private sector clear signals about what the Government will do in the future—something the existing policy process often fails to accomplish. The creation of a relatively stable environment often seems among the most beneficial characteristics of industrial policies in other countries.
- A second potential advantage of industrial policy is simply improved effectiveness. Recent policies toward the consumer electronics and steel industries include several cases of initiatives that failed to achieve their purported objectives. Industrial policy could provide better and more consistent means for evaluation and refinement of policy tools.
- Third, a conscious industrial policy might reduce the risks of capture by firms or sectors in temporary distress or long-term decline. Industries and their employees seldom approach the Government while their competitive position is strong. Those firms and industries that find their position weakening have strong incentives to seek Government aid such as subsidies or trade protection. Furthermore, the greater their immediate problems, the greater the drive toward a short-term palliative. Industrial policy could provide improved mechanisms for evaluating the problems of distressed firms and sectors within the overall context of the U.S. economy, considering the claims of various parties, and responding to undesirable trends before they reach crisis proportions.

Thus far, in attempting to deal with sectoral problems within the economy, there has been little movement toward prospective rather than reactive policies because the former have had no real constituency. While it is easy to show, for example, that trade protection generally has costs that in the aggregate outweigh its benefits, the real issues are distributional: Who bears the costs and who

receives the benefits? Is it a particular group of displaced workers? Is it the depressed local economy of the community where fading businesses are located? Or is it the nation as a whole, in which case costs and benefits are widely but thinly spread? When the costs but not the benefits of a policy are isolated and visible, the stage is set for a resolution on political grounds that may mask the problem rather than curing it.

The alternative is a more integrated and consistent industrial policy. But our current methods of making policy toward industry have deep historical roots and will not be quickly transformed. Industrial policy affects virtually every constituency, interest group, and public concern in the United States; those affected will want to be heard. The nature of the American political system virtually guarantees that policy toward industry will be to some extent fragmented and contradictory. This is not a bar to industrial policy, only a limitation on its form.

A consciously developed industrial policy does not imply centralized coordination or planning. Nonetheless, industrial policy would require relatively broad agreement on goals and objectives, together with a strengthened analytical capability within the Government for designing policy instruments to match these objectives, as well as for evaluating their effectiveness.

The Government has a variety of institutional mechanisms for formulating macroeconomic policies; by themselves these are insufficient. Industrial policy must be rooted in concrete, practical knowledge of the workings of industry and the sources of competitiveness. This demands an empirical appreciation of corporate decisionmaking and of the ways in which Government actions shape the behavior of firms in the private sector.

Any analysis of competitiveness, as well as any analysis of the effects of alternative policy measures, must proceed on a sector-by-sector basis. This does not mean that policies based on such an analysis will necessarily or exclusively focus on particular sectors.

Among the options will be both sector-specific and aggregate policy instruments. However, effective policies targeting particular sectors cannot be developed in isolation; rather they should be based on careful evaluation of costs and benefits throughout the economy. Sectoral policies of some types may aid a favored industry but carry high costs elsewhere.

Political and economic issues intersect in the design of industrial policy, elements of which will inevitably benefit some sectors at the expense of others. Distressed industries have the greatest incentives to exert political pressure for support and protection; over time an effective industrial policy must allow the efficient to thrive, the inefficient to decline. To do otherwise can be costly indeed; British taxpayers have recently been subsidizing their steel industry at the rate of \$2 million per day.

A suitable framework for industrial policy, one designed to fit the strengths of the American political and economic system, might be found in "macroindustrial policy." Macroindustrial policy would begin by providing a structure for integrating the various elements of public policies toward industry. It would be based on explicitly formulated objectives embracing economic efficiency and industrial competitiveness, as well as related social goals—e.g., employment opportunities. Competitiveness is important because it affects, among other things, national security and the standard of living.

The macroindustrial framework would stress the dependence of individual industrial sectors on macroeconomic and other aggregate policies, as well as emphasizing linkages among sectors. Macroindustrial policy

might have sectoral components and include sector-specific policy instruments, but would prefer aggregate measures and reliance on market mechanisms where possible.

Elements of macroindustrial policy could include measures to promote economic adjustment, innovation and the technological base for manufacturing and service industries, fair trade and competition, manpower training and mobility, capital formation, and new productive investment. Policies would aim to complement the market system, providing a structure for easing adjustment and spreading the costs of change so that particular groups were not gravely disadvantaged.

In the near term, modified tax policies designed specifically to stimulate capital investment in U.S. industry could have significant positive effects on U.S. productivity and competitiveness. So could tax incentives for R&D and the development and diffusion of new commercial technologies. Policy measures to improve the environment for industrial innovation are related steps that could also have immediate effects. In the longer term, macroindustrial policy might assign a particularly high priority to the development of more effective mechanisms for economic adjustment and to improving the country's human resources through support for education and training of the work force at all levels.

The development of macroindustrial policy or any other coherent and consciously evolved industrial policy would be a long-term undertaking. Congress and the President will have to decide whether the time has come when maintaining and enhancing the competitiveness of the U.S. economy requires such a policy.