Reindustrialization or New Industrialization: Minutes of a Symposium (1981)

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REINDUSTRIALIZATION OR NEW INDUSTRIALIZATION

Minutes of a Symposium
January 13, 1981

Manufacturing Studies Board
Assembly of Engineering
National Research Council
Washington, D.C.

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PREFACE

"Reindustrialization" has achieved a good deal of currency recently to describe the efforts by U.S. industry to improve growth, raise productivity, and work better and smarter. The precise meaning of the word is the subject of dispute. Matters are complicated by the use of another term, "new industrialization," which has been defined as the intention to find new and more promising areas of production for U.S. industry, rather than to support existing companies when they falter.

The imprecision of these terms should not obscure the need for revitalizing the economy's industrial sector, which may be the most critical public policy issue of the coming decade. The issue raises difficult questions. How, for example, does one balance the impacts of continued support for traditional industries against the potential risks and benefits of stimulating new industries? What criteria can be used to distinguish viable industries from moribund ones? How useful in this country are foreign models of industry-government cooperation? What is the role of industrial innovation, and how can it be fostered?

To inform itself of current views on these questions and others, the National Research Council's Manufacturing Studies Board organized a symposium on January 13, 1981. At the symposium invited speakers, with a variety of interests and views, presented their thoughts on industrial trends, the federal role in strengthening U.S. industry, and the issues that need to be clarified before an effective industrial policy can be developed.

This document contains the minutes of the symposium in the form of a summary and the statements of the speakers. It is issued by the Manufacturing Studies Board for the use of its members and other interested parties. As such, it does not constitute a report of the National Research Council, and, accordingly, it was not subjected to the customary report review process of the National Research Council. For its part the Manufacturing Studies Board does not endorse any of the explicit or implicit recommendations presented. The papers in these minutes represent the views of eight individuals, who are largely, though by no means entirely, in agreement.

The Manufacturing Studies Board was established to examine manufacturing issues for policy-makers in the federal government. Its scope encompasses all aspects of manufacturing, including productivity, innovation, technology, related basic sciences, human and organizational behavior, government policies, social and economic change, and international competition. A list of its members appears on the following page.

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SUMMARY

The word "reindustrialization" was coined to suggest responses to a range of economic problems that, for many, are symptoms of industrial and economic deterioration. The sudden appearance of an international balance of payments deficit in 1974 and its growth since provided a key signal that the nation's economic health was impaired. In the past few years, plant closings, double-digit inflation, declining productivity growth, and the purchase of many American assets by foreign interests have brought the economic condition of the nation increasingly to the attention of the government, news organizations, industry, labor, and the general public.

In a broad sense, reindustrialization means upgrading industrial production facilities and methods. Its definition may be narrowed to refer to the modernization of existing industries and contrasted in this sense with "new industrialization," meaning entry into new or nontraditional industries where the United States can gain comparative advantage in competition. A variety of proposed solutions is encompassed by these terms. Without a strong and productive industrial base, the United States cannot sustain, much less improve, its national defense, its quality of life, or its ability to compete in world markets.

Many see the nation's older industries as the focus of reindustrialization efforts. It is clear, though, that no industrial sector can feel secure. For example, the computer and semiconductor industries, among the brightest stars of today's economy, are facing serious foreign competition in both markets and technologies. Other recently revitalized industries such as textiles are fighting hard to retain their domestic markets against aggressive international competition.

Throughout the Manufacturing Studies Board's day-long meeting, participants found areas of consensus. Japan and the Federal Republic of Germany were consistently pointed to as models of effective cooperation among government, industry, and labor in industrial planning. Participants at the meeting from government, universities, business, and labor were unanimous in citing the critical need for a higher rate of capital investment by industry as a means of improving productivity and innovation. They agreed that present federal laws and regulations do much to inhibit such investment.

There was also general agreement on the need for greater cooperation in the relations among labor, management, government, and universities and a marked lowering of the hostile rhetoric that has too often characterized such relationships. Several speakers noted that the issues of productivity and industrial innovation have become far too serious to admit of extreme adversarial positions. All participants stressed the need for more information and informed debate.

The presentations and the comments from the audience can be summarized as a number of questions, for which few have certified answers.

1. What balance of reindustrialization and new industrialization should be the major thrust of national industrial policy? What, in fact, constitutes a dying industry, especially in the light of the widely announced demise and subsequent revitalization of the U.S. textile industry of the past 20 years? Should public policy concentrate on bolstering existing industries or on encouraging new, high-growth industries or on some combination of both?

2. How can the nation create an economic environment more conducive to industrial innovation and increased productivity? What kinds of tax incentives are needed to increase capital formation? What kinds of regulatory disincentives should be discarded? What forms of cooperation among government, business, and labor would prove productive? To what extent are German and Japanese models applicable to the American experience and culture?

3. How can industry shift its thinking from a national perspective to an international one with respect to

    -- Markets

    -- Product development

    -- Sources of raw materials

    -- Sources of components

    -- Technology development?

    How can multinational business cope with the often conflicting regulations and priorities of their host countries?

4. Is the industrial make-up of the labor force, as is often suggested, undergoing a revolution that will profoundly alter the nation's social and economic fabric? If so, how rapidly is that revolution taking place? What policies and actions are needed to address the social and economic results? How can government, business, and labor cope with social trends? Has the rapid decline of employment in the nation's production industries caused excesses of certain skills? Meantime, has the development of "information industries" created a shortage of other skills, for which there is no quick, ready supply?

   Is retraining, no matter who sponsors and finances it, really the answer for the middle-aged assembly line operator? Can the now unskilled be trained to meet the needs of an information-intensive industry? What are the educational system's responsibilities, and what are its resources to meet these demands?

5. Does government-sponsored, defense-oriented research and development contribute to or inhibit private industry's domestic R&D efforts, especially for R&D that competes with the R&D of foreign industries whose governments have no comparable defense commitments?

6. What can the government do to aid the growth of productivity, given the complexity of that issue? Do we need, first, new measures of productivity beyond output per labor-hour, which is not suited to new style manufacturing technology or the information- and service-based industries? To what extent should government planning and policy involve itself in the fates of particular industries?

7. Do the current antitrust laws and other federal regulations impede U.S. firms in their competition with foreign firms abroad?

8. Should there, in fact, be a broad national industrial policy, especially in the light of the long lead-time required to establish the framework of a national energy policy? Can the industrial problems of the United States wait for such a policy, or should the problems be addressed piecemeal? Can the nation compete abroad and reindustrialize at home without a national consensus represented by a formal policy? What perception of public policy objectives and national goals will motivate

business management to shift from an unduly risk-averse, short-term perspective to the more traditional acceptance of risk in hopes of long-term profitability?

Though summarized here as a number of questions, the speakers' talks did present recommendations for action that would answer, if only initially, some of these basic questions. A brief summary of each presentation follows and each speaker's key action recommendations is summarized on the page preceding the full text of the presentation. These minutes do not include the discussions of the papers that took place at the meeting.

Howard Love, speaking about the steel industry, recommended diversification, modernization of facilities (despite cost), tax incentives to make capital available and to spur research, more realistic antipollution laws, and revision of antiquated depreciation rates. He noted that citizens need to change their attitudes to become economically more responsible.

Thomas Atkinson spoke from the vantage point of a global manufacturer. He stressed the need for worldwide sources of parts and components, reduced regulation, and elimination of inflexibilities in conditions of employment. Competition, he said, will be a more effective stimulus to reindustrialization than protectionist measures for the automotive industry.

Erich Bloch spoke about the experiences of the semiconductor and computer industries, two current U.S. successes. For industry he suggested that a long-range view is needed to emphasize technical innovation, increased productivity, and quality improvements. Training and education should be concerns of both industry and academia. Government, he said, should become a sophisticated user of computers; initiate tax reform in the areas of research and development, depreciation, and capital gains; remove barriers to free trade and technology transfer; and pursue regulatory reform.

James Fry, from the textile industry, spoke about its recent revitalization and the outlook for the future. From the viewpoint of that industry, government aid should take the form of changes in depreciation policy, tax reform, renewal of the Multifiber Agreement, and reduced regulations. Government's direct involvement should be limited primarily to tax incentives.

Ralph Cross addressed actions that government can take to improve productivity. Specifically, he recommended reforms in the capital cost recovery system, reduction of the capital gains tax, assistance for research and development, and improved trade between the United States and the Soviet Union.

Steven Schlossberg recommended a new "social contract" to include business, labor, and government. This social contract would be characterized by cooperation among all parties, in particular between labor and management through worker participation. Actions for government might include tax incentives for investment, protection against imports, reductions in regulation, and revision of antitrust laws.

William Wolman pointed out the differences between a weak reindustrialization policy based upon changes in tax structure and a strong policy based upon the Japanese and German models of industrial planning and cooperation. He stressed the need for new forms and levels of government-industry-labor cooperation and concluded that public attitudes are now ripe for the kinds of economic, legal, and social changes generally thought to be included under the rubric of "reindustrialization."

George Brown described the role of government as providing incentives rather than direct support to industry. He reported on accomplishments of the 96th Congress in the area of patent rights and in the provisions of the Stevenson-Wydler Technology Innovation Act. The 97th Congress can be expected to show interest, Congressman Brown stated, in high-technology small business, in foreign trade, and in tax measures to stimulate innovation.

1. REINDUSTRIALIZATION AND THE STEEL INDUSTRY

Howard M. Love
President and Chief Executive Officer
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Pittsburgh, Pennsylvania

SUMMARY

Many popularly believed fears about the steel industry are overstatements of the problem. The steel industry will have a key role to play in the reindustrialization of America. Strategies for this industry are to diversify (new markets and new products) as protection against cyclicality, to modernize facilities, and to strengthen employee relations.

As individuals, we need to change our attitudes to become more economically responsible and to produce more than we consume. The government can offer tax incentives to increase capital and to foster research. Current anti-pollution laws are confusing and contradictory; they should reflect the ability of industry to provide the capital needed to comply. Further, antiquated depreciation rates cause profits to be overstated and should be changed.

1. Reindustrialization and the Steel Industry

Today, January 13, is the anniversary of the historic day in 1898 when a Parisian, named Emile Zola, published a small article entitled "J'Accuse" (I Accuse). Zola's famous article rose to the defense of a French soldier named Alfred Dreyfus who was being railroaded by the French establishment on charges of treason.

The Zola article aroused France and the world. Before the case was over, not only was Captain Dreyfus vindicated, but the government of France and the French military establishment were rocked to their heels. Such is the power of an idea.

Another Frenchman, Victor Hugo, reminds us that: "No army can withstand the strength of an idea whose time has come." Reindustrialization in America is an idea whose time has come.

The evidence of the people's demand to re-establish economic order and the swelling tide for economic and social stability became obvious in the conservative landslide of the 1980 election.

Double-digit inflation and double-digit interest rates stirred up in the cauldron of the 1980 election, and the public debate that ensued was, to the economic disarray in the American economy, what Emile Zola's accusation was to the injustice in the French government -- the touchstone for change. The American people are demanding that their fundamental economic institutions be strengthened and restored. We would all do well to mark the date November 4, 1980 -- election day -- on our calendar because future historians may report that date as a turning point in American social and economic history. In my view, future American historians could mark that date with the same relative importance in twentieth century American history as:

- The crash of 1929 and the beginnings of the Great Depression,
- The Roosevelt election of 1932 and the start of the New Deal, or
- The Kennedy election of 1960 and the start of the "counter-culture."

Quite clearly, the election of 1980 could represent a fundamental change in the direction of American social and economic thinking. Whether or not it does will depend on President-elect Reagan. But the American people have given a clear signal for the need to change. And I think the term "reindustrialization" has been connected to the economic sector of that fundamental change.

I will attempt to provide some definition to the problem of reindustrialization, to discuss a few remedial applications as they apply to industry in general, and then to comment briefly on conditions and remedies that specifically apply to the steel industry.

Last November, I addressed the Economic Club of Detroit on the subject of reindustrialization. I told that audience that I believed that the term "reindustrialization" has become all things to all people. I remarked that reindustrialization has become the slogan and the battlecry of:

- Both liberals and conservatives,
- Democrats and Republicans,
- Labor and management, and
- Right wing and left wing.

I also said that while each economic, social, and political faction uses the term "reindustrialization," there is, in fact, a great deal of difference as to what each faction is seeking, from whom, and for what purpose. I expressed my concern that while some factions heralding "reindustrialization" had some very positive and beneficial goals, others were more suspect, and a few were downright dangerous.

Let me first address the economic condition that reindustrialization is aimed at solving. The primary economic problem in our industry today is the precipitous fall in productivity, as determined by the output per manhour.

- Between 1948 and 1965, productivity in America increased by an average of 3 percent per year.
- Between 1964 and 1973, productivity in America increased by only 2.3 percent per year.
- In 1979, productivity did not grow at all -- as a matter of fact it declined nine-tenths of a percent!
- With the recession this past year, productivity was down 1.7 percent for the first half of 1980.

I won't belabor the statistics. Suffice it to say that the problem is one of not keeping our ability to produce up to our demand to consume. Just as obviously the solution is to increase productivity or reduce consumption -- preferably the former. When consumption

is held down artificially, as it is now by high interest rates, it will only cause a surge in buying later. Consumption can be delayed, but demand will remain.

The key question is how to raise productivity. Our first inclination is to play our own version of Emile Zola -- point at the government and say "J'Accuse." The government is used to the abuse and it makes us all feel good. But while much can, and should, be done to restore our economic vigor through the government, in the final analysis the turnaround in productivity must come from everyone at all levels:

- As individuals, by producing more than we consume,
- As businesses and corporations, by working smarter and by the applications of more capital and research,
- As voters and taxpayers, by not demanding of the government any more security, goods, and services in any given year than we are willing to pay for in that given year, and
- As citizens, by applying the leadership that will give average Americans the courage to stop consuming beyond their means and to invest their money and their energy into building for the future.

To recapitulate, the obvious economic problem is the lack of capital investment and the resulting plunge in productivity leading to continued stagflation. The solution to the problem lies, therefore, in increased production, the creation of capital investment, fiscal and monetary responsibility, and that all-important but elusive factor -- economic and political courage to stop this "inflation-recession" merry-go-round (that is not so merry) and to live responsibly.

To me, reindustrialization is the synergistic application of all these factors. It is the job of getting ourselves straightened out, economically, and rebuilding the supply side of our economy while keeping the demand side carefully in sight all the while. Reindustrialization will require rewarding investment in the private sector over the manipulation of demand and government spending.

Supply-side economics assumes that the government will:

- Reduce its restriction and control over the private sector (it does not try to impede demand),
- Reduce expenditures as a percent of the gross national product, and

- Reduce the marginal tax rates and keep a tight check on the growth of the supply of money.

In a recent Wall Street Journal editorial, Professor Irving Kristol, of New York University's Graduate School of Business, addressed those who ask: "What if this new conservative political economy doesn't work?" Professor Kristol said: "It had better work. It is the last, best hope of democratic capitalism in America." But we cannot look to government alone. We must act as individuals, as businesses, and as voters. Let me first address individual action. I think it is impossible to be prescriptive about what Americans should do about individual attitudes, but I do know that the government only reflects what the people demand. William Buckley was fond of reminding us "that the conservatives take great delight in telling us that the liberals always want to be liberal with someone else's money." Buckley stingingly reminds us that it's equally true that conservatives always want to be conservative with someone else's benefits. Suffice it to say that as individuals we can't blame government for representing the public's own excesses. Through public and private leadership we can bring a halt to our excesses, including excessive government programs, and demand that government represent our new-found economic responsibility.

We have two kinds of leadership in this country -- private and public. Our public leadership will be no better than that demanded by private leadership. You and I must take the economic issues to the people through our employees, through civic organizations, through political organizations, and through genuine social discourse.

The second side of reindustrialization reflects those actions that are within the means of the business community to resolve. Let me share with you some comments on the major criticisms that have been leveled against the steel industry over the past few years.

The first charge is that the steel industry is a dying industry. That's just not so. When you talk about reindustrialization, you are fundamentally talking about the creation of consumer and capital goods, which means steel -- and lots of it. Some competitive materials are coming into broader use, such as plastics and aluminum. But steel is, and will continue to be, the basic, least expensive, and most available material for the rebuilding of America. The demand for steel is expected to increase to the point where it may be in very tight supply by the mid-to-late 1980s.

The second charge is that the American steel industry is not competitive with foreign steel. That charge really makes my blood boil. The European steel producers that dumped so much cheap steel

into the United States over the past few years lost a total of 14 billion dollars over the past year. That loss was partially made up by infusion of money by the governments of Europe. Not that I'm suggesting it, but if the U.S. government were to throw $14 billion of American tax money into the American steel industry, it wouldn't be long before foreign steel producers were asking what went wrong with them.

There is no doubt that the Japanese are efficient steel producers with modern equipment for their own market, but it's my opinion that Japanese steel, priced on a landed cost basis, remains non-competitive with domestic steel producers for the American market with the possible exception of some west coast locations.

The third charge is that the steel industry is outdated. Again, that just isn't so. The American Iron and Steel Institute recently conducted a study of international steel productivity. They found that in 1978, U.S. productivity -- based on actual operating rates -- was 7.8 manhours per ton while Japanese productivity was 8.9 manhours per ton.

Another charge is that American labor costs are pricing us out of the international market. There is no doubt that the American steel worker is the highest paid in the world, but the others are catching up rapidly, and at an ever-increasing rate. Between 1964 and 1978, American steel labor costs rose by 219 percent. But German labor costs leaped by 363 percent, Britain's by 341 percent, Japan's by 333 percent, and France's by 320 percent.

Another charge is that the American steel industry is extremely cyclical. That, for the most part, is true. We are an industry that requires huge applications of very expensive capital goods. Our profitability is extremely dependent on our operating rates. The American industry has, in the past, geared itself to being able to meet peak demands in the terribly cyclical demand for steel that seems to parallel the economy. We now know that we should not increase steel capacity until demand increases, and then only through such improvements as the efficiencies gained from new technology such as continuous casting.

One of the principal problems derived from the cyclicality of our business is that in the low point of the cycle, profitability is weak and profit margins are poor. But, when the industry reaches the high point of the cycle, the government is usually on a very stringent anti-inflation program and strongly resists any increase in steel prices. That really puts us between the "rock and the hard place" of de facto price controls.

Another charge is that the steel industry is operating only outdated facilities. It is true that the industry has built very

few so-called Greenfield facilities over the past decade. But it is also true that, while some of the buildings date back several decades, the actual working guts are in many cases equal to the best in the world.

One charge that the steel industry can't duck is that the industry is capital-starved. The question is: Why?

In the first place, because of the profit restrictions that I mentioned before, there are not a lot of retained earnings. In the second place, out of the meager profits that do exist, we have been required by the government to comply with confusing and contradictory state and federal anti-pollution laws that have resulted in the building of excessively stringent anti-pollution devices that not only don't add to the bottom line, but, in fact, add up to 15 percent of the operating costs for the facilities.

And, finally, as you well know, the steel industry is terribly capital intensive. The antiquated depreciation rates, which were based on the days when inflation rates and replacement costs were increasing by only a few percent each year, cause profits to be overstated and the tax burden for steel to be excessive.

I hope that some of the myths surrounding the steel industry have been laid to rest. We've got serious problems, but we also have significant advantages. Among those advantages are:

- We are serving the most prolific steel market in the world. As the momentum for reindustrialization increases, the demand for steel will further improve.

- We believe that the Reagan Administration will not only implement the so-called steel package, but will improve the package and expedite its effective implementation. This package is not government aid but merely corrects some of the government's inequities of the past. We expect the package to:

  (1) give us faster depreciation rates that better reflect current inflation rates,

  (2) provide tax incentives for capital investment and for research and development,

  (3) provide schedules for the implementation of environmental projects which better reflect the ability of the industry to provide the capital required, and

  (4) effectively enforce the U.S. Trade Laws that prohibit dumping so that other nations cannot export their

unemployment to the U.S. by supporting their steel industry with government funding.

I would like to comment briefly on some of the steps we, at National Steel, are taking to improve our productivity and our profitability within our own resources.

First, we are trying to purge some of the cyclicality out of our profitability by diversifying our product lines and by expanding sales to other markets that show promise of greater growth and stability.

Second, National is attacking the cyclical problem, on a second front, by diversifying into areas that provide a more stable profit base. We began by diversifying into aluminum in 1972. That diversification has proven to be a profitable, successful, and consistent part of our business. Last year, we acquired the United Financial Corporation of California, which operates some 83 savings and loan facilities throughout California. Again, this acquisition has provided strong support to profits over the last year when steel demand plummeted. We would like to diversify further. We think it makes good sense. But first and foremost, we are a steel company and we will stay a steel company. I would be less than candid with you if I didn't say that our earlier decision to diversify has been a tremendous help in alleviating some of the impact of the steel crisis. But I think you recognize that with the conditions I recounted earlier, it will be extremely difficult to find capital for further diversification.

The last area I would like to stress comes under the heading of "doing what we do best." We are pressing hard toward our goal to be the highest quality, lowest cost steel producer in the world and I have no intention of letting up until we get there. Our efforts center on three areas:

First, by paying the severe dues to stay modern. One of the major criteria of modernization in the flat-rolled business is in continuous casting. The American integrated steel producers, on an average, cast only about 17 percent of their steel through continuous casting. When our Granite City caster comes on line, in the next two months or so, National will have three casters operating and will be able to produce over 50 percent of its steel through continuous casting. The Japanese steel industry recently reported that 58 percent of its product was continuously cast.

Secondly, we are taking every step possible to analyze our own operations -- through task force analyses within the company, through outside consultants, and through working with overseas firms. We're not leaving any stone unturned.

And, finally, we're initiating ways to work in closer cooperation with our employees at all levels. We cannot afford to have an adversary relationship with our employees. There is a tremendous potential for improving the efficiency of all our operations by gaining from some of the insights of our employees. We have one of the most sophisticated work forces in the world, and we intend to take greater advantage of their expertise. But this effort has got to be sincere, long-term, and mutually beneficial -- and, it must be honest.

I began this commentary by comparing the current fiscal and social move toward reindustrialization and conservatism to Emile Zola's historic accusation. But, in creating excesses of the past in American economics, we are all guilty. We all stand accused. We can all do better. And I think that finally the average American has come to that realization, and it is time to stop accusing and start cooperating. It is time to get the energies of the American people squarely behind the effort to reindustrialize, to revitalize, and to reinvigorate our industrial base back to the point where we lead the rest of the world into the future -- technically, socially, economically, and every other way.

2. A GLOBAL MANUFACTURER LOOKS AT AN AMERICAN INDUSTRIAL POLICY

Thomas R. Atkinson
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General Motors Corporation
New York, New York

SUMMARY

Mr. Atkinson addressed U.S. industrial policy from his point of view as a global manufacturer in the automotive industry. He reported on the industry's response to intensified competition, particularly from Japan. The industry is adapting through changes in product line-up, production methods, and organization. Worldwide sources for parts and components are becoming increasingly important as a means to improve productivity and reduce costs.

Recognizing that the prime responsibility for improved competitiveness falls on management, the U.S. industry is striving to increase capital per worker and the level of technology. The federal government needs to reduce regulations on products and manufacturing processes. Restrictions on the employment conditions must be reduced although, heartenningly, labor has taken a flexible approach to new technology. Protectionist measures, however, are probably not appropriate for the automotive industry; in the long run, competition is a more effective strategy for reindustrialization.

2. A Global Manufacturer Looks at an American Industrial Policy

The modern discipline of economics cut its teeth on a form of national industrial policy, that is, mercantilism, and in the course of the argument developed the principles of competition, specialization, and gains from international trade. Can it be that some two hundred years later the principles that served to condemn a form of industrial policy then may no longer apply in regard to specific industry programs? With the present difficulties of the automotive industry added to those of steel and perhaps others, the calls for an organized policy for troubled industries are not likely to be stilled by the obvious shift in national economic sentiment as reflected in the 1980 election. But the question remains whether a nation can benefit from an industrial policy that somehow forces a departure from economic principles that find value in competition and trade.

At the outset it is necessary to be specific about "industrial policy" since the term has been used to mean many different things. I refer to a collection of measures tailored to a specific industry, not general measures to aid all industries nor macroeconomic policies to improve the major aggregates. Industrial policy in the automotive industry might include deregulation, tax measures to stimulate sale of vehicles or to encourage investment in plants and equipment, financial assistance to manufacturers, aid to workers and communities, and protection from import competition. While policies might be selectively applied to firms, a conscious policy of picking industries as winners and losers is not discussed here.

The New Competitive Environment

In the late 1960s the world automotive industry was characterized by:

- differentiated products adapted to particular markets,
- modest export flows of finished vehicles that did not threaten domestic-based industries,
- little international flow of parts and components,
- simplistic import substitution policies in developing countries with auto production, if any, at low volumes, and
- extreme international differences in labor and material costs which were not competitively effective because of market organization.

Thus the world auto industry was operating in isolated cells. The U.S. industry was particularly isolated. Here the sole import of consequence, the Volkswagen Beetle, was radically different from American cars and was selling in too small volume to attract U.S. firms to manufacture a competitive vehicle. U.S. exports were discouraged by an overvalued dollar and lack of spare capacity. Inflexibilities and inefficiencies had become built into the U.S. system, as all producers labored under the same handicaps and were not challenged by competition to eliminate them.

Ten years and two oil crises later, as the 1980s began, the automotive industry found itself in a vastly different set of circumstances. With minor exceptions, vehicles are interchangeable around the world, that is, there are many differentiated products, but they are adapted to virtually all markets. More and more, vehicles are competitive across national lines on price and quality. Parts and components flow across borders at a growing rate, fostered both by sophisticated regulations covering less developed countries and by increased attention to competitiveness internationally. In industrial countries regulations govern the final product and conditions of manufacture to a much greater extent.

During the 1970s Japan emerged as an internationally competitive vehicle-manufacturing center. With a cost basis lower than that of the U.S. or Europe, the Japanese auto industry was a worldwide force. The U.S., hampered by arduous credit restraints imposed in 1979-80, higher fuel prices, and burdensome regulation, was particularly vulnerable.

Japan's advantage derived from newness of plants, unusually beneficent labor relations for a mass production industry, lower labor costs, geographical concentration of suppliers, and lower material costs. The Japanese auto industry was originally assisted by helpful governmental policies. When these disappeared by the early 1970s, the industry rapidly achieved high volume as its product's features, smallness and fuel economy, came suddenly into demand. The result has been that manufacturers in Europe and America are challenged by highly demanded vehicles from outside their cost-of-production environment.

One not undisputed estimate of the Japanese advantage attributes about half to wage differentials and most of the balance to labor/management relations and greater automation and mechanization. A portion of the Japanese advantage results from lower material costs stemming from the same low labor cost and high productivity found in the auto industry. The hourly labor cost for the parent company, which is the greatest part of the difference, is $11.00 in Japan (at current exchange rates) compared with $18.00 in the U.S. A similar magnitude of rate differential appears to exist for suppliers. Some

observers attribute Japanese product advantages, such as quality and standard "options," to the initial lower labor costs which make it possible to improve design, materials, and inspection procedures.

In both Japan and the U.S., automotive workers constitute an elite group of wage earners, with both wages and total compensation, including fringes, at higher levels than the average for wage earners in general. The earnings premium over the all-industry average is greater in the case of U.S. auto workers, however. For example, auto workers' average hourly wages (including all benefits) were 50 percent above all manufacturing wages in the U.S. and only 23 percent above the manufacturing wage average in Japan. A difference in favor of the U.S. can be justified only by superior productivity, but in the auto industry the Japanese have perhaps a 20 or 30 percent productivity advantage. Other disadvantages of U.S. companies are undoubtedly design and managerial as well as accidents of history (old, inner city factories) and geography (lack of contiguousness of suppliers and non-availability of water transportation).

The difference arising from direct automotive labor is compounded by additional cost advantages in materials, which also stem largely from labor cost differences. Thus, according to a consultant to the Organization for Economic Cooperation and Development (O.E.C.D.) Steel Committee, labor costs per ton in Japan in the late 1970s were 35 percent below U.S. costs and 31 percent below European costs. The Japanese cost advantage in steel alone has been estimated at $50 to $88 per subcompact car. In the case of steel, technology and U.S. protection may also play a part in the competitive advantage of the Japanese. Capital costs as well have apparently been lower to the Japanese as a result of a higher savings rate, official encouragement of capital formation, controlled financial markets, and better experience with inflation. This is particularly significant for a capital-intensive industry such as automotive.

In the mid-1970s the shift of the entire industry to low-wage developing countries was feared as the source of a lower cost base. So far this prediction has not materialized. Fully assembled vehicles produced in developing countries are still not cost competitive worldwide despite lower wages overall. Only a few developing countries have achieved sufficient volume to bring about truly low costs. Given sufficient volume and proper facilities, physical productivity may be just as high as in industrial countries; however, high material costs fostered by import-substitution policies often offset any wage advantage. The few imports from less developed countries have been the result of production switches from Europe to Mexico and Brazil by non-U.S. makers. Instead, the coincidence of events bringing the Japanese onto center stage has produced the need for all major producers to adapt to a changed competitive environment.

Adaptations to Changed Environment

How has the U.S. automotive industry adapted to the changes in characteristics and cost competition in the 1970s? Let me discuss product, source, and manufacturing changes at General Motors.

The mainstay of any manufacturer, of course, is the product lineup. In addition to the present scaled-down models, two new models featuring high fuel economy are well on the way to production. The electric car is promised by the middle of the decade, and there will be further development of diesels and of variable displacement engines for passenger car use. These products are destined sooner or later for production and sale overseas. Beyond specific fuel-economic models, the entire concept of the "World Car" and worldwide sources are obvious strategies of adaptation to increased competition. The world car of major manufacturers is intended to appear in similar form in a multiplicity of countries. GM has been approaching the world car in successive models from the "T" Car introduced in Brazil in 1973 and now made in 10 countries, the "J" Car to be introduced in 1981, and ultimately the "S" Car scheduled for 1984 that will be almost completely identical wherever manufactured. World cars are not visualized as important export products but their parts and components are, as production becomes rationalized.

Growing out of the concept of common vehicle design, GM's world-wide source program, which covers trade in parts and components, is evolving into a competitive strategy. In this program some parts are traded across borders as the result of a ceaseless search for lower costs of processes that do not seem well adapted for U.S. manufacture, such as the light hand assembly work characteristic of electrical and electronics components. Thus, principal U.S. manufacturers have Mexican border plant operations and offshore electronics production facilities which provide light parts to keep U.S. facilities operating. A different category consists of small volume parts, which are expensive to make in the U.S. because mechanized processes are not justified. Overseas sources are sometimes developed because capacity happens to exist in one place and not in another, as in the use of the Strasbourg facility to manufacture Chevette transmissions.

Meeting export requirements as part of the industrialization policies of various nations is a special category of offshore production in which the cost element plays a lesser role. If a company desires to be a part of the particular market, accommodation to these host government regulations is essential. The Befiex program of Brazil, which requires acceptance of a contract to export a given value, the Mexican Automotive Decree, and the Australian automotive program are examples of such performance requirements to which the foreign-based automotive industry has been forced to adapt. General Motors Holdens, our Australian subsidiary, worked hard to modify an

excessively rigid local content requirement in the Australian program. Now instead of meeting high local content requirements for each car, we can under the "company average local content plan" produce the same effect by manufacturing a single component, in this case engines. Two-thirds of the engines are destined for export, and other parts are imported. Thus, Australia, a low-volume market, could become the basis of efficient production on a world scale otherwise not attainable. Recent reports indicate that Canada is also modifying its requirements on the same principle.

Somewhat akin to this worldwide source program are special mechanisms for handling required payments. In the case of countries outside of the market system, such as centrally planned economies strapped for foreign exchange, companies wishing to trade usually must agree to make counter-purchases. Very often the manufacture of such goods is assisted by the Western company. But sometimes there are other goods or commodities to be sold outside of normal channels. To account for the variety of counter-trade, evidence accounts are set up through which all transactions are directed. Products that are not used in GM facilities flow through a GM marketing organization known as Motors Trading Company, which finds outside buyers.

Four things about obtaining parts from worldwide sources should be emphasized. First, performance requirements enable exports to the "source" countries as well as from them. For example, under the Mexican Auto Decree which started in 1977, a positive U.S. balance in automotive trade is expected to continue into the second half of the decade. Second, the worldwide source programs are truly worldwide and not aimed simply at the United States. Austrian-made engines are destined for western Europe as are Yugoslavian foundry products and Greek aluminum parts. Third, without the ability to move parts from one country to another, the GM operation would be less competitive and smaller both here and abroad, to the detriment of U.S. economic interest. Fourth, the Combined Average Fuel Economy (CAFE) requirements legislation puts a 25 percent limit by value on foreign parts and components for U.S. vehicles to be counted to meet the combined average fuel economy standard.

No description of changes taking place in the American industry would be complete without mentioning some changes in mechanical design and production methods. Briefly, these include:

- Four new, from-the-ground-up assembly plants with wide aisles and single story design for most efficient servicing. Remodeling of other plants scheduled plus additional new facilities possible.

- New ferrous metal casting technology including low-energy waste reclamation.

- Experimentation with the Japanese Kanban system in areas where there is a geographic concentration of suppliers.

- Introduction of a new automotive body framing method to improve quality.

- Increase in robotic machinery. By 1985, 5,000 robots will be in use at GM, and by 1990, some 14,000 will do welding, painting, machining body, die casting, transfer, palletizing, inspecting, and assembly.

- Full conversion to computer-controlled paint booths.

- Computer command control for final inspections.

- Speed-up in die making; single cycle grinding of camshafts.

- One piece stampings rather than several smaller pieces that require welding.

The product, supply, and manufacturing adaptations to the changed environment and new cost competition from Asia are only part of the U.S. response. An additional chapter could be written on efforts in human relations such as training, quality consciousness programs, and quality of working life.

What about changes in the industry organization? The world automotive industry is adapting to increased competition first by equity arrangements between firms to inject capital and improve product lineups (Chrysler and American Motors) and, more lately, through a burst of production agreements such as Nissan with Alfa Romeo in Italy, Volkswagen with Nissan in Japan, and perhaps Toyota with Ford in the U.S. The GM counterpart is much older -- the 1971 purchase of 34 percent of Isuzu, a Japanese manufacturer. Isuzu eventually produced a GM European-designed car for sale in the U.S. and, in a program now phased out, supplied finished vehicles for sale through GM channels. In the future Isuzu will produce for GM parts and components such as a small diesel engine. Again, a separate chapter could be written on the changes in industry organization as a result of need to adapt to intensified competition.

Industrial Policy in the Automotive Industry

In addition to private initiatives to adapt to new competitive conditions, calls continue to be made in both Europe and America for an automotive industrial policy. On this side of the water, at least, there is little agreement as to what such a policy would do. Three not mutually exclusive objectives of an industrial policy are often

distinguished -- assisting transfer of resources from a shrinking sector to industries with a brighter future, revitalization of the existing domestic industry, and constraining the forces seen as creating the problem.

European industrial policy seems to stress the first category or what might be termed burial assistance -- assistance to shrinking industries and displaced workers in the form of help in creating new products and retraining, for example. Adjustment assistance is part of U.S. trade legislation, although the problems of shrinking industries are not necessarily related to trade. Because this type of action seems mainly connected with rescuing firms as employers and with the preservation of communities, it may best be described as social policy and properly not dealt with in an enterprise context.

The view of industrial policy as revitalization is a more positive approach to the problem as long as the responsibility is seen as belonging primarily to management. No one advocates capital and operating subsidies as any permanent solution. More promising for major manufacturing industries that have been hit by both product and process requirements in recent years would be the removal of unnecessary burdens. These are two types -- regulatory burdens, which now amount to nearly $1400 per vehicle; and inflexibilities deeply ingrained in the American system through specific legislation, institutions, and practices. These range from local content requirements for vehicles counted in fleet averages under CAFE standards to specific agreements on who performs what jobs in a plant.

Because major gains in productivity not only require engineering but also involve shifts in the combination of resources, the most fruitful area of revitalization efforts seems to be a broad reexamination of what inhibits the optimum use of factors of production. The high level of compensation for labor can only be supported with a high productivity level. Productivity concerns often lead to confrontation, and the automotive industry demonstrates this very well. Raising productivity can entail plant closings, jurisdictional questions, and, unfortunately, the scrapping of agreements setting forth limits to daily output. There are emotional issues. The compensation package itself can be at issue because factor cost differences are very much at the root of the problem of international competitiveness. For the economy as a whole, attempts to hold real wages up in the face of declining international competitiveness may merely hasten the shrinking of the economy. For a major industry the principle is the same. On the management side, protection of existing investment as an excuse for retention of outmoded facilities is no less a target for change. Under revitalization it is interesting to note that one of the stumbling blocks to various proposals to aid the industry has been the fact that many of the measures would have unintentionally aided GM as much as or more than the more distressed firms. This is a curious reason for avoiding any action and suggests the incongruity of industrial policy within the U.S.

system, which traditionally tries to align short- and long-term objectives.

A word about technology. As part of the $40 billion capital program, the machinery and equipment investment by General Motors will incorporate state-of-the-art technology that will undoubtedly result in a higher amount of capital per worker. Robots are not really the issue despite the fact that the cost of some models is at or below the equivalent of a worker's annual compensation. It is impossible to equate the 14,000 robots forecast to be employed by 1990 to an equal or double loss of jobs (in the case of two shift operations) as the calculation is much more complex. Maintenance experts with high skills will be required in a ratio of one to each seven or eight robots. Of much more significance in labor use is the total reorganization of the production process of which robots are only a small part. In part, this process is governed by the understanding on new technology with the United Auto Workers, which specifies that work associated with new technology should use the same classification of workers as previously employed. The union continues to be cooperative in the countless adjustments that must be made. In any event, without capital equipment and new technology, the viability of the U.S. industry would be in serious question.

Turning to the third identified objective, a justification for an industrial policy is often described in terms that suggest the remedy. The problem of a distressed industry is viewed as caused primarily by a surge of imports. Often the import surge is linked to present or past practices of foreign countries that allegedly have caused America both to lose her share of world trade and to begin to experience major import inroads. Thus, the problem in steel, textiles, television, and automobiles is often described in such a way as to suggest an industrial policy that features protectionist measures. But perhaps Occam's razor cuts here, in that there is a simpler explanation of rising U.S. imports and falling share of world exports. Post-World War II shifts in the world distribution of productive capacity, technology, and skilled labor, as detailed in the recent Office of the Trade Representative's Competitiveness Study, are undoubtedly enough to explain the decline of U.S. trade dominance. It would be strange if cost shifts did not occur which in turn affected some U.S. industries, in the form of both increased imports and loss of some exports. A national effort to increase the competitiveness of American industry may well be needed. However, if the object is improving productivity, increasing jobs, and reducing inflation, the causes giving rise to these deficiencies within the U.S. industry and the economy should be dealt with directly. It is not sufficient merely to seek to moderate the import competition that reveals or highlights the deficiencies.

Can protectionist measures be justified as buying time? The formal trade machinery in the U.S. provides for protection from injurious imports only on a temporary basis and requires phase-out provisions of tariffs or quotas unless they are later extended. While some industries have obviously benefited, others such as specialty steel have had to request extensions and since only one of three years duration is allowed, protection continues in the form of surge monitoring. Apparently tough cases make bad law, and the result has been informal protection for some industries without phase-out. The web of administrative actions to sidestep U.S. law and provide more permanent protection has its international precedents.

The first precedent is incorporated in the O.E.C.D. discussions and statements on industrial policy. These accept the need for specific policies in distressed industries but seek to minimize their distorting effects through provision for fade of import restrictions. The test of these objectives will be the evolution of the O.E.C.D. Steel Committee. Although not fully organized, this committee has apparently made the trigger price mechanism internationally agreeable as a compromise whereby the U.S. is able to moderate the influx of both European and Japanese steel imports. Unfortunately the "buying time" argument seems less and less applicable as successive adjustments of the U.S. program become more, rather than less, restrictive.

The second precedent is the international Multifiber Arrangement under the General Agreement on Tariffs and Trade (GATT), which has been in existence in one form or another since 1961. It "legalizes" bilateral agreements that in effect put a ceiling on textile and apparel exports from low-cost developing countries. The only acknowledgments of the temporary aspect of protection are the occasional need to renegotiate the individual agreements and a formula to avoid freezing the absolute amount shipped by growing low-income countries. The protection to the U.S. industry afforded by the bilateral agreements has apparently been sufficient to encourage substantial new investment by American mills. In the last few years, the textile industry of the U.S. has achieved a sizeable export surplus aided by modernized facilities, favorable exchange rates changes vis-a-vis Europe, and the fact that the U.S. has reasonably open access to its traditional European markets while imports from the Orient are less favored. Although very little call has been heard for a world automotive agreement and the industry is very different from textiles, it is a possible alternative, and one whose probability is rising.

Conclusions

The U.S. automotive industry in the last decade experienced a change in the environment within which it operates as a result of fuel price increases, a shift of consumer demand, and the penetration

of its home market by low-cost Japanese products with many perceived advantages. To a lesser extent, these factors operated in Europe as well. Most recently, the U.S. industry has been vulnerable because of a general recession in consumer demand and highly restrictive monetary policy.

To various degrees depending on their resources, U.S. firms have attempted to meet the new competition by drastic changes in product line-up, worldwide sources, and substantial changes in production methods, including new technology. In recognition that high U.S. costs, including labor costs, can only be offset by compensating productivity capabilities, a prime effort is being made to increase capital per worker and improve the level of technology in use. Governmental efforts can go only a small distance in this effort, but as part of revitalization the reduction in regulation of products and manufacturing processes is essential. Urgently needed but more difficult to attain is the elimination of legislation, institutions, and practices tending to introduce inflexibilities. Restrictions on product include CAFE standards requiring U.S. content and others on worker assignments, wages, location, and conditions of employment. Hearteningly, labor has taken a flexible approach to new technology.

A conscious industrial policy that incorporates protectionist measures may well be seen as dealing with increasing import penetration, the most obvious manifestation of high factor costs, technological deficiencies, and low productivity. Such a program does not directly deal with these problems and may well inhibit both the stimulus to take necessary action and some of the actions themselves, such as adaptation through overseas sources of components. The case against protection as buying time in making needed changes in product and facilities is more equivocal. Unfortunately, the available precedents for protection are largely devices for permanent protection masquerading as international agreements on market sharing with only a nod to the principle of phase-out. Under any label, industrial policy or reindustrialization, the American public does not deserve an industrial machine that leaves us less efficient than our economy is capable of being and less competitive than those with whom we must trade in an interdependent world.

3. SEMICONDUCTORS AND COMPUTERS

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SUMMARY

This paper explores the relationship between reindustrialization and the semiconductor and computer industries. It indicates that these two industries are not distressed. Quite the contrary: they have been, and will continue to be, the premier growth industries of the Post War era.

These two industries are highly interdependent. There can be no technological advance in one without commensurate technological advances in the other. Both industries have experienced similar growth curves based upon rapid progress in their independent technologies. If anything, the pace of this progress must intensify if these two industries are to compete effectively in the international marketplace.

Since semiconductors and computers are productivity tools, the industrial nations of the world have judged them to be basic industries, as basic as steel, automobiles, and rubber were in an earlier period of industrial development. As a result, foreign governments are taking steps to foster and protect their native semiconductor and computer industries through subsidies, joint R&D efforts, tariff barriers, and procurement policies. Meanwhile the domestic semiconductor industry faces new problems in terms of its capital requirements, tax system that discourages investments, a lack of trained scientific personnel, and trade barriers in general.

To overcome these problems, industry and academia and government must direct their energies toward a common goal.

Industry must take a long-range view. It must emphasize innovation and the timely development of new products. To realize this goal, it must increase its investments in research and development as well as new plants and equipment.

The academic sector must undertake research programs jointly with industry and government. It must upgrade its facilities and its curricula to permit training in leading edge technical areas not now covered.

Government must focus on tax policies that promote savings and capital formation. These include a lower corporate tax rate, tax credit for R&D, and faster depreciation allowances. It must be a stimulus to innovation by better use of its procurement power. In addition, the government must continue and intensify its efforts to secure easier access of U.S. industries to foreign markets, including further reductions in foreign tariffs and non-tariff barriers.

3. Semiconductors and Computers

Introduction

Reindustrialization is a new and somewhat nebulous word in our economic vocabulary, one that still lacks precise definition. It seems to suggest the adoption of public policies to help or resurrect marginal industries. But the semiconductor and computer industries are hardly marginal. They are, in fact, the premier growth industries of the postwar era.

However, and this is crucial, they cannot be overlooked in the formulation of public policies, for the U.S. could quite easily lose its preeminence in both industries in the future if it fails to face up to major challenges.

The threat is real. What happened to such distressed industries as steel, automobiles, textiles, radio and TV manufacturing, and photographic equipment could also happen to semiconductors and computers. Patently, recognizing the existence of the threat is the first step in avoiding it.

It is important for those who formulate public policy to understand the source of that threat. It flows from the fact that the industrial countries of the world correctly judge semiconductors and computers to be the new basic industries, as basic as steel, automobiles, and rubber were in our earlier industrial development. As a direct consequence, they are being fostered, protected, and supported by national governments as a matter of fundamental economic importance. These national governments are encouraging semiconductor and computer developments not only for their domestic use, but also for their export potential and as means to participate in world trade.

This is a matter of grave concern to U.S. manufacturers, for this increasing worldwide competition is occurring at a time when both industries are facing new problems at home. These include:

- Capital requirements: An ever higher percentage of every sales dollar must be reinvested in research, development, plant, tools, and equipment because of growing technological complexity.

- Inflation: The ongoing spiral of rising costs has affected the productivity and profitability of these two industries in the same way it has affected most others.

- Human Resources: There is an acute shortage of professional men and women due to the fall-off in science and engineering enrollments in universities and colleges.

- Trade Barriers: Unequal tariff and non-tariff barriers have artificially reduced the U.S. share of markets in Western Europe and Japan.

- Investment Incentives: The U.S. tax system does not provide sufficient incentives for savings and investment compared with foreign countries.

Industry Growth and Outlook

If we trace the growth of the semiconductor and computer industries we can see what is at stake. Both were minuscule industries in the early 1950s. Since then, sales of both have moved upward rapidly. In the past decade alone (1970-80) we have witnessed six-fold increase in the shipments of U.S. semiconductor products (Figure 1) and a threefold increase in yearly shipments of computers (Figure 2).

There is little doubt that the demand for computer and semiconductor products will continue to grow in the future as it has in the past. This expectation is founded upon their need; at heart, semiconductors and computers are productivity tools. Computers enable organizations and individuals to accomplish more work in less time with less drudgery. For that reason, they are essential to all industries, especially those that need revitalization. Semiconductors offer a unique opportunity for new and innovative products.

This expectation for continued growth is also rooted in the rate of technological change. No other industries have improved their price/performance ratio at such a rapid and predictable rate. It is widely recognized today that while the price of virtually everything else has been going up, the price of semiconductors and computers has been going down.

Semiconductors have become pervasive, replacing mechanical and electro-mechanical technologies in industrial control applications, consumer products, communications, and military equipment. Their impact is seen everywhere:

- In electronic watches, which are cheaper and more accurate than mechanical timepieces.

- In electronic calculators, which have made bulky desk-top calculators obsolete.

- In cars, where they control complex functions to reduce fuel consumption and increase operating efficiency.

- And in consumer wares, such as appliances and electronic games -- to name a few.

Like semiconductors, computers have also become pervasive. In the early 1950s, there were only a handful of installations. Today there are more than 300,000 computer installations in the United States alone. The impact of computers on our economy cannot be denied.

In 1970, per capita spending on data processing equipment amounted to $100. By 1977, it had increased to $195. Currently, in the U.S., we spend as much per capita on computers as we do on cars.

During the past quarter-century, the industrialized nations of the world have entered a new era which some analysts have called the Information Economy. It is a moot question whether computers have ushered in that era or responded to its needs. What is clear, however, is that the largest sector of that economy is involved in the generation, dissemination, and use of information (Figure 3).

In the world of data processing the electronic machines engaged in processing data are not addressing mere accounting and administrative functions alone. In many cases now and increasingly in the future, they are controlling production on the shop floor, the assembly line, and the chemical process plant. They are operating at the core of business, providing management with timely information essential to its daily operation.

Interrelationships: Semiconductors and Computers

We are considering, then, two high-technology industries with one key point in common: both are heavily science-based. The semiconductor industry derives its fundamentals from solid state physics. The computer industry evolved from information theory, Boolean Logic, systems engineering, electronic engineering, and the newly developing science of programming.

These two industries have, in a sense, merged to the point where they are highly interdependent, and any reindustrialization policy must recognize the symbiotic relationship between the two.

Semiconductors are the basic building blocks of computers. There can be no advance in computer technology without a commensurate advance in semiconductor technology. By the same token, progress in semiconductor technology depends upon progress in computer technology. The computer is the essential tool in the design of sophisticated semiconductor products, and it controls the high-technology process by which semiconductors are manufactured and tested.

Semiconductors and computers, therefore, cannot be considered separately; they must be considered together, for they reinforce each other. To understand this fully, we must trace their parallel technical development. We have already observed how they exhibit similar growth curves (Figures 1 and 2). These growth curves are based upon rapid advancements in both technologies -- advancements that have driven down the cost of semiconductors and the cost of computing while improving reliability.

Advances in the semiconductor industry can be measured in terms of the levels of "integration" the industry has achieved in logic and memory. (Integration, in the industry, refers to the increasing number of circuits placed on a silicon chip, as well as the increasing number of chips incorporated in a package.)

In the late 1960s, IBM was placing five or six logic circuits on a single bipolar silicon chip. This rather low level of integration gave way by the mid-1970s to the 100 bipolar logic chip. Today the company produces a silicon bipolar chip that contains 1500 circuits.

The same order of advances apply to memory: In 1970, the industry was looking at the 1 K bit/chip (that is, a silicon chip with 1000 bits of memory on it). By 1979, IBM had introduced the 64 K bit/chip, and today work in the laboratories is progressing toward a 265 K bit chip.

During this same period, the industry has moved into the world of Very Large Scale Integration (VLSI). Not only is the industry putting more circuits on a chip, but it is also placing more chips together, and interconnecting them in a single, integrated package.

From one chip per substrate or package in the past, the 4300 computer, which IBM introduced in 1979, interconnects nine chips -- each with 704 circuits -- on a multilayer ceramic substrate. In the recently announced 3081 computer, more than 100 chips on a ceramic substrate the size of a bathroom tile are interconnected. This is micro-miniaturization, which calls for substantial investments on an ongoing basis in highly trained people and highly sophisticated tools and plants.

Because industry can now put many more circuits or bits into the same area of silicon, the price per circuit or bit has been decreasing. For logic circuitry, the price of a packaged circuit has decreased by a factor of 100 over 15 years. At the same time, the volume of circuits produced has been going up twenty-fold every year. Most of this volume increase, of course, results from the decrease in price or cost -- a good example of an elastic market.

The learning curve rate for bipolar logic circuitry has been 65 percent over the last 15 years (Figure 4).

Similarly, the price/bit has shown considerable decline. Over the ten years of their existence, memory bits have dropped by a factor of 100 -- from 2 to 3 cents per bit in the early 1970s to 20 to 50 milicents today. The learning curve for memory has been 67 percent during the last 15 years (Figure 5). To express it somewhat differently, in 1952 the user paid $200 K per megabyte of memory per month. Today that same amount of memory can be rented for $400 per month (Figure 6).

This drive to higher and higher levels of integration for logic and memory not only results in lower cost, but directly contributes to improved performance, lower power requirements, and higher reliability. The smaller the circuit devices and the more dense the circuitry, the shorter the distances electronic signals must travel and the higher the performance. Chip density also contributes to computer reliability to the extent that it reduces mechanical interconnections. It is axiomatic in the production of semiconductors that "smallness is goodness."

Largely as the result of increasing circuit and memory densities, processor performance has steadily increased to the 10 million instructions per second range (Figure 6). This, too, has favorably affected processing costs. For example, back in 1952, in the days of vacuum tubes, it cost $1.26 to carry out 100,000 multiplications. By 1964, as we moved into integrated circuits, that cost dropped to 12 cents. Today, in an era of Very Large Scale Integration, it stands at a penny for a 100-fold decrease (Figure 7).

Meanwhile, data processing technology has also forged ahead at a rapid pace. During the past decade, these systems have migrated from single function batch operations to vast data networks that operate online and in real time. These networks -- with their large mass storage devices, their interlinked terminals, and their sophisticated communications technology -- are the nerve centers of business organizations, handling vast volumes of information.

What we have seen -- and what we expect to see in the future -- is the interplay between decreasing costs and new applications. As computing costs go down, new applications become economical and new demand and volume drive costs down even further. In short, the growth of the semiconductor-computer marketplace has been founded on continual productivity gains, fueled by technological advances. These productivity gains run counter to the economy as a whole. Between 1975 and 1979, national productivity barely grew at all. It advanced at .9 percent. But productivity in the semiconductor

industry -- and the rate is similar in the computer industry -- advanced at an annual 6.4 percent rate (Figure 8). Semiconductor merchant sales expanded in the same timeframe 2.5 times or 26 percent per year.

The productivity increases do not include the extra value of semiconductors due to added functional improvement, increased performance, improved reliability, and lower cost. This performance is unmatched in the U.S. economy.

Yet, despite the rapid rate of technological advance, silicon as the prevalent semiconductor material today is still orders of magnitude away from its ultimate limits as defined by the laws and principles of physics. By inference, because of the interrelationship of semiconductors and computers, improvements in computers will also continue.

Industry Challenges and Changes

Despite this impressive record of accomplishment, the domestic semiconductor and computer industry cannot afford to relax or rest on its laurels. Its future health depends on how well it copes with a number of pressing realities: foreign competition, capital formation and investment, the training of people, continual improvement in productivity, and quality.

In regard to foreign competition, it must be noted that the underlying technical knowledge base for semiconductors and computers is widely disseminated. Competition is worldwide because industrial nations recognize the importance of semiconductors and computers to their long-term economic health.

What is most significant, however, is that foreign governments tend to encourage and support their native industries through a number of policies and practices that put U.S. manufacturers at a distinct disadvantage. For example, many nations now impose on imported computer products tariff rates that are at least double the U.S. rate. Similar comparisons can be made for semiconductors.

Among the industrial nations, Brazil, France, West Germany, the United Kingdom, and Japan have all taken steps to foster national semiconductor and/or computer industries to rival our own. The British and French governments, for example, have been investing large amounts of tax dollars in these industries in the form of direct and indirect subsidies.

In Japan, the government coordinates the industry, encouraging reorganization and consolidation. Through combined industry/government funding, it has established research programs and a VLSI

laboratory in which all companies with a stake in the industry participate. In short, all our trading partners are building strong semiconductor and computer industries with export as a high priority.

Meanwhile U.S. semiconductor and computer manufacturers are facing severe constraints. To maintain their competitive position, they must invest huge sums in new product development and in tools and plants to make and test those products (Figure 9). They must do this despite the adverse economic conditions that have brought inflation and stagnation, in order to stay competitive with foreign companies that benefit from their government's support.

In addition, the domestic industry lacks sufficient numbers of trained scientists and engineers in the variety of disciplines required to develop new products and new technologies. Solid-state physicists, chemists, metallurgists, electronic and electrical engineers, mechanical engineers, computer scientists and programmers, mathematicians: individuals trained in all these diverse fields are essential to the future of the industry. Yet the rate of engineering graduates in the U.S.A. has stayed constant in the last 10 years, whereas it is increasing in Japan.

The industry is also burdened with regulatory restrictions governing the environment and the transfer of technical knowledge.

To meet these various pressures, the U.S. semiconductor and computer industry has been undergoing structural changes. To begin with, there have been no new U.S. entries into the capital-intensive semiconductor market in the last six years. Because of the high capital requirements, we are witnessing the growth of joint ownerships and acquisitions. In addition, we are seeing increased foreign ownership of U.S. semiconductor companies (Figure 10).

At the same time, there is a growing trend towards vertical integration, both backward and forward. Semiconductor companies are integrating forward with other companies that make end products, including computers. At the same time, computer and other companies are integrating backward with companies that make semiconductors. The trend toward vertical integration is driven by necessity: it is one way the industry can satisfy its technological and capital requirements (Figure 11).

Remedies & Actions

To maintain the U.S. position of leadership in these two vital industries, semiconductor and computer companies, along with the academic sector and government, must work together.

What are the remedies?

A. Industry

Its prime energies must go into technical innovation, into creating new and improved products and the tools and plants to produce those products. It must carry out that mission through strengthened research and development activities and through capital investments in new plant and equipment. To succeed in this endeavor it must take the long-range view in planning and capital outlays, even to the detriment of short-term profits.

Technology moves fast in both semiconductors and computers. The only guarantee not to be overtaken by competition is to be best in research, foremost in innovation, and first in the marketplace with new products.

Considered as a whole, U.S. industry is truly laggard when it comes to capital investment, and this is bound to catch up with us. Japan reinvests 28 percent of its output; West Germany and France 19 percent, and the United Kingdom 17 percent. But the U.S. invests only 14.7 percent (Figure 12). The U.S. semiconductor industry exceeds the national average. It reinvests 20 percent of its output, but it is still behind the average in Japan. It should be realized that the Japanese semiconductor and computer companies invest at a higher rate than the Japan industry average.

More than in the past, the semiconductor and computer industries must continue to focus on productivity gains and quality improvement. Indeed, this will be the international battleground in the coming years. Productivity gains translate into savings, part of which are passed along to the end user and part of which are plowed back into the business. Quality is essential to customer satisfaction. But, and this is often overlooked, quality also translates into productivity gains. When industry improves quality, it reduces defects in subassemblies and the end product. When it improves the quality of its end product, it reduces the need for field service. Too many industries erroneously equate quality with high cost. Actually the inverse is true.

Indeed, quality and productivity are interrelated to such an extent that it is difficult to discern which is cause and which is effect. Japan has achieved an enviable reputation for being a low-cost producer of high quality products. The U.S. needs to improve its performance and its reputation in these areas. This can be done if management considers quality a high priority goal and focuses on its attainment.

In addition, industry must intensify its on-the-job and off-the-job training and education programs for all its employees, and take an interest in the technical vitality of its scientific and engineering personnel. This is crucial in an industry such as ours in which technical knowledge advances so rapidly.

B. Academic Sector

The academic community also has a crucial role to play in helping the semiconductor and computer industries maintain their leadership. Most important, they must undertake fundamental research projects in those scientific areas that support semiconductor and computer technology. They must be amenable to undertaking these projects with the sponsorship and participation of industry and government.

In addition, the academic community must modernize its teaching methods and laboratories. At the moment, universities and colleges, with few exceptions, do not possess the latest equipment and do not offer the curricula that address the pressing needs of the industry: graphic interactive design, robotics, computer-aided process development, and manufacturing, to cite a few. Nor do they focus on manufacturing engineering disciplines, including such subjects as productivity, quality, and process control disciplines. The decline of enrollment in science and engineering is in part, at least, a reflection of the academic community's failure to keep pace with new requirements and teaching methods.

Further, there is a shortage of qualified engineering faculty -- a reflection of the widening gap between industry and faculty salaries.

C. Government

As observed at the outset, the semiconductor and computer industries are not troubled industries. They do not need special help. But they do need the stimulus of broad-based policies geared to raise needed capital and provide incentive for increased R&D activities. This should help the U.S. to compete on more equal terms in the international marketplace. The obvious should be pointed out: that any general economic stimulus is bound to affect these industries favorably.

Government a Stimulus to Innovation

One important step the federal government can take is to become an informed and sophisticated user of technology. It was at one point, but it no longer is. A recent study

conducted by the General Accounting Office, as reported in the New York Times, shows that only two percent of the government's full-size computers have been acquired in the past five years. As a result, government data processing has fallen behind the pace set by private industry. This is unfortunate for government, for it lowers its productivity.

In the last ten years defense programs have not been a spur to new developments and innovations in semiconductors contrary to their effect in the 1950s.

Tax Policies & Capital Formation

Beyond spurring innovation through its procurement policy, the government should stimulate investment through tax reform.

Semiconductors and computers, as well as other high technology industries, require heavy capital investments to stay competitive compared to its foreign competitors. U.S. companies are at a disadvantage, since the U.S. high technology sector is faced with a higher cost of capital than its international competition.

A study by Chase Manhattan Bank revealed that the cost of capital of American semiconductor manufacturers is between 15-17 percent compared to 9.3 percent for their Japanese counterparts. This variance results from the fact that U.S. companies must depend on expensive equity market financing, while the Japanese companies use low-rate revolving short-term debt. Yet, American semiconductor manufacturers are achieving a rate of return of 15-16 percent, thereby marginally earning their cost of capital; in contrast the return of Japanese companies averages 7.5 percent, nearly 2 points below their cost of capital. American firms could not operate and survive with this level of return. As the Japanese industry steadily gains market share in their domestic and export markets, because of the structural advantages offered by their economy, the capability of the American producers to continue to earn a sufficient return to cover investor risk will be reduced in the face of this competition.

The government and our economic system must respond through policy initiatives that would contribute to a higher rate of return and through tax incentives that would liberalize the business environment for innovative,

technical growth companies. The tax incentive program could include the following elements:

- Further decrease of the corporate income tax rate to benefit innovative, fast growth companies throughout the economy.

- Depreciation reform to provide accelerated write-off or higher investment tax credits for short-lived equipment due to technological obsolescence.

- Tax credit for research and development expenditures in excess of the tax payer's annual level of expenditures over the past three years, and tax credit for corporate contributions to U.S. university research.

Remove Barriers to Free Trade

In addition to tax reform, the government needs to continue its focus on trade barriers. A fundamental precept of the semiconductor and computer industries to maintain their competitive posture in the world market is that they must have access to foreign markets and investments, particularly Japan and the European Economic Community, free of artificial political barriers, as a quid pro quo for the U.S. government's maintaining open access for foreign products and investments.

A prima facie example is the overtures by the Office of the U.S. Trade Representative to the Government of Japan that both countries reduce their tariffs on semiconductors to 4.2 percent on April 1, 1981. This would carry out the agreements made at the Tokyo Round of the Multilateral Trade Negotiations, except accelerating by six years their implementation. Currently, the U.S. tariffs are 5.8 percent, compared to Japan's 10.05 percent. Japan no longer needs to protect a fledgling industry since Japanese semiconductor firms are world class. They have achieved technological parity with the U.S. as well as a 42 percent market share in the sophisticated memory market. Further, the Japanese enjoy a widening trade surplus with the United States in integrated circuits, the high technology segment of the industry.

Beyond the achievement of parity, the U.S. and Japan should press other trade partners to follow their lead in liberalizing tariffs. The EEC still maintains a level of 17 percent on most computer products.

The eventual complete elimination of tariffs on semiconductors and computers worldwide should be the goal, similar to last year's multilateral agreement providing for elimination of all tariffs and discriminatory inducements in trade in civil aircraft.

A fruitful area for trade liberalization is in the removal of non-tariff barriers: e.g. subjective customs valuation, subsidies, government procurement, and standards. There is reason for encouragement in the bilateral agreement between Japan and the U.S. to open Nippon Telegraph and Telephone (NTT) procurement to international bidding without discrimination, thereby opening a market of over $3 billion to American electronics manufacturers. In return for this the United States waived "Buy American" preference provisions in awarding contracts.

More needs to be done with regard to other non-tariff barriers to assure equal access for America's computer and semiconductor industries.

The ultimate proof of access to Japan, the EEC, and other industrial markets will be the ability of our computer and semiconductor companies to compete with indigenous companies in the domestic markets strictly on the basis of product attributes and free of favoritism based on national origin.

Global View of Technology Transfer

The government needs to adopt a global view of technology transfer. If the semiconductor and computer industry is to compete effectively around the world, it is essential for the U.S. government to base its export licensing decisions on the issue of strategic security in such a manner that trade by Americans in high technology products flows as freely and rapidly as those of its free world trade partners.

Reasonable controls on the export to Communist countries of strategic products and design and manufacturing know-how must obviously continue. However, this safeguard should not impede the flow of product and bilateral cross-licensing of know-how, even of critical technologies, between members of the Consultative Group Coordinating Committee (CoCom) consisting of NATO alliance members and Japan.

Environmental & Safety Regulations

Concerning government regulation, the innovative industries support policies that protect the public health, safety, environment, and the consumer, provided the policies are rational and do contribute to the long-term health and strength of the nation. Some aspects of the present laws have been unnecessarily detailed and complex, to the point that regulations preceded technology to implement it. A better balance must be obtained between what is desirable and do-able.

If the reindustrialization debate results in a new approach to coherent and long-range policies that allow industry to continue to compete in the world market and world economy, it will have served its purpose. For this to happen it takes the cooperation -- in place of contention -- between government, industry and the academic sector of American society.

Worldwide Shipments
U.S. Based Semiconductor Companies

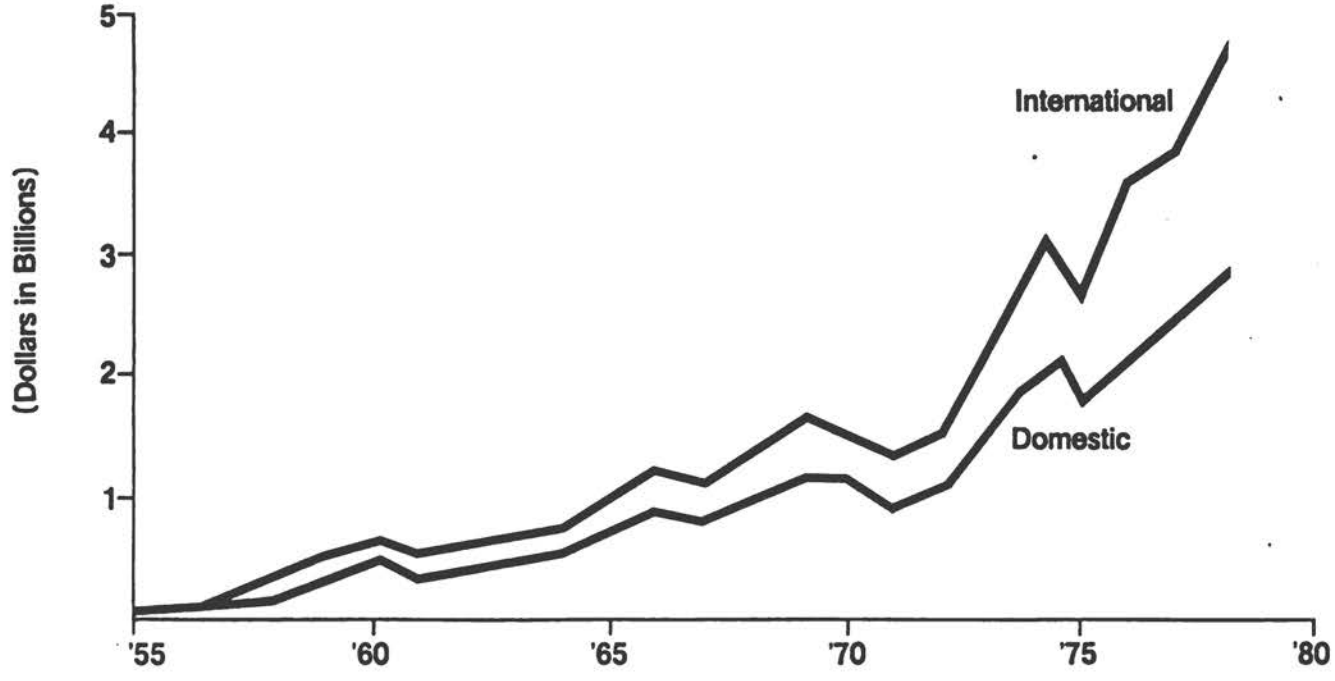


Fig. 1

U.S. Computer Industry Shipments

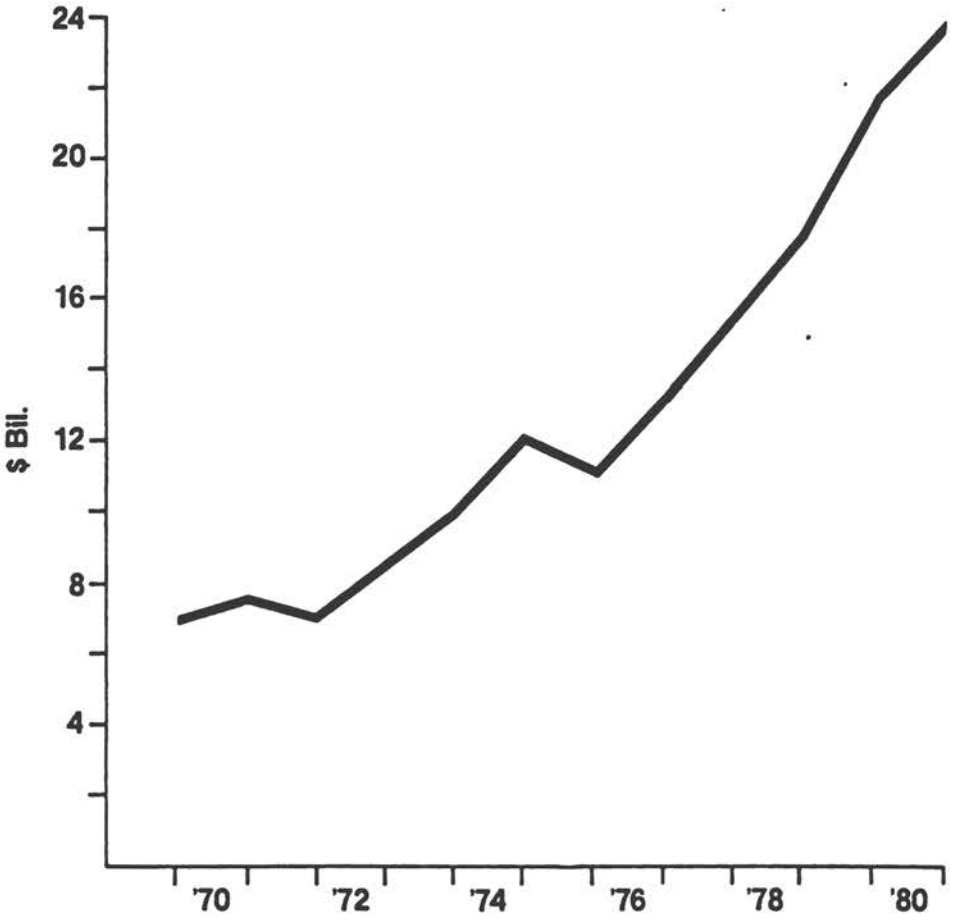
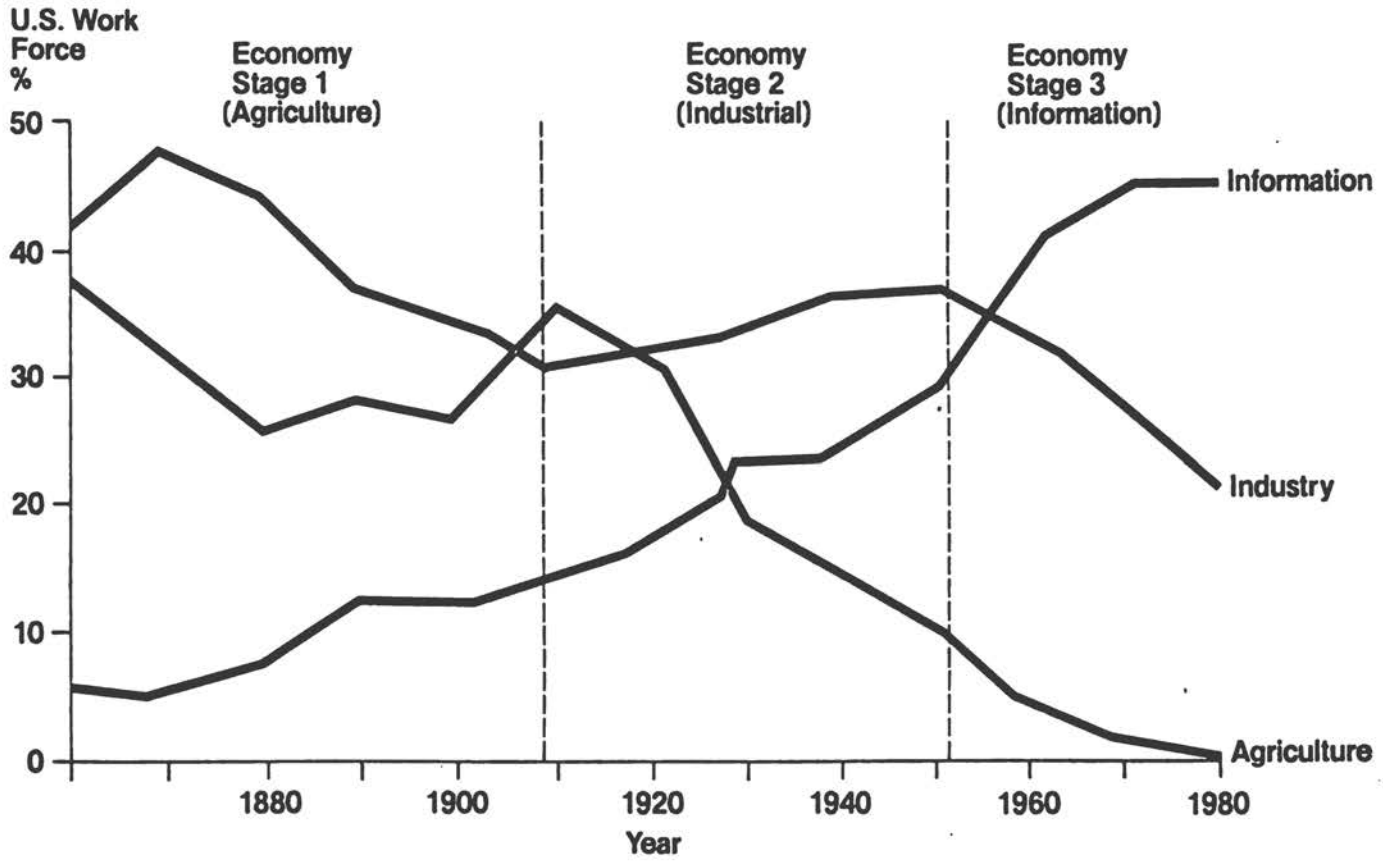


Fig. 2

Composition of U.S. Work Force



(Source: M.U. Porat. Office Of Telecommunications)

Fig. 3

Bipolar Digital Circuits Learning

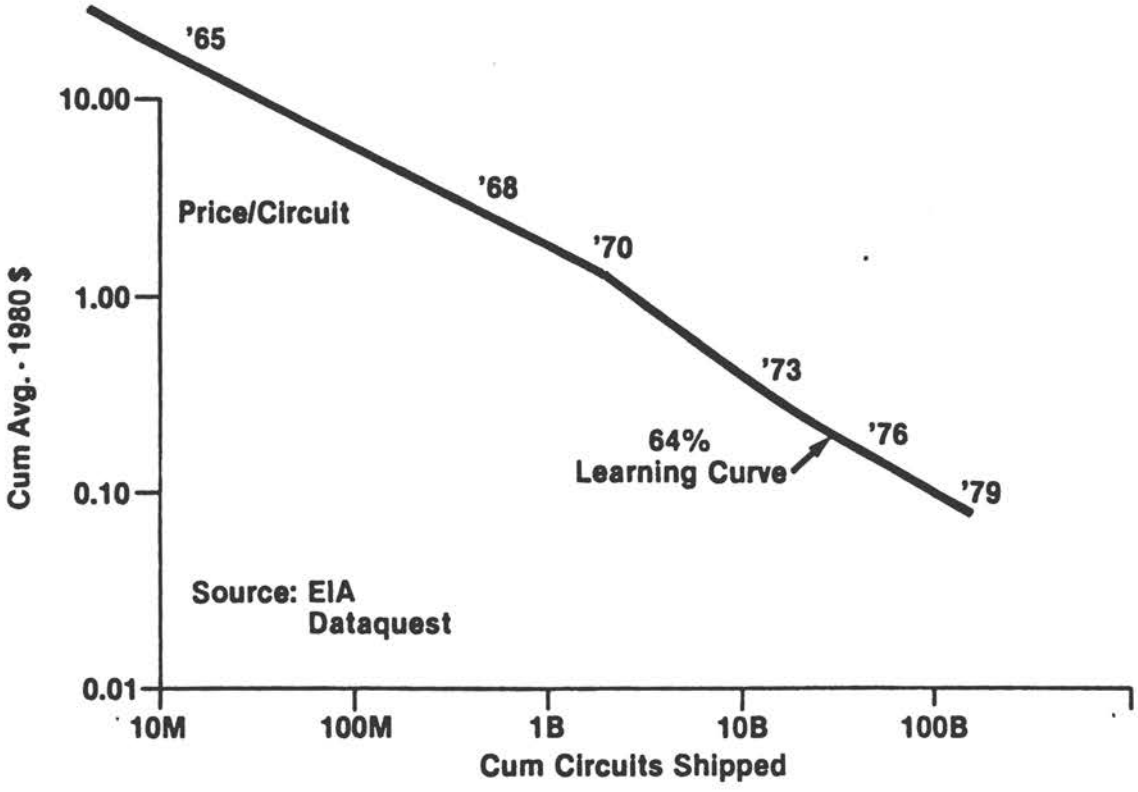


Fig. 4

FET Dynamic RAM Learning

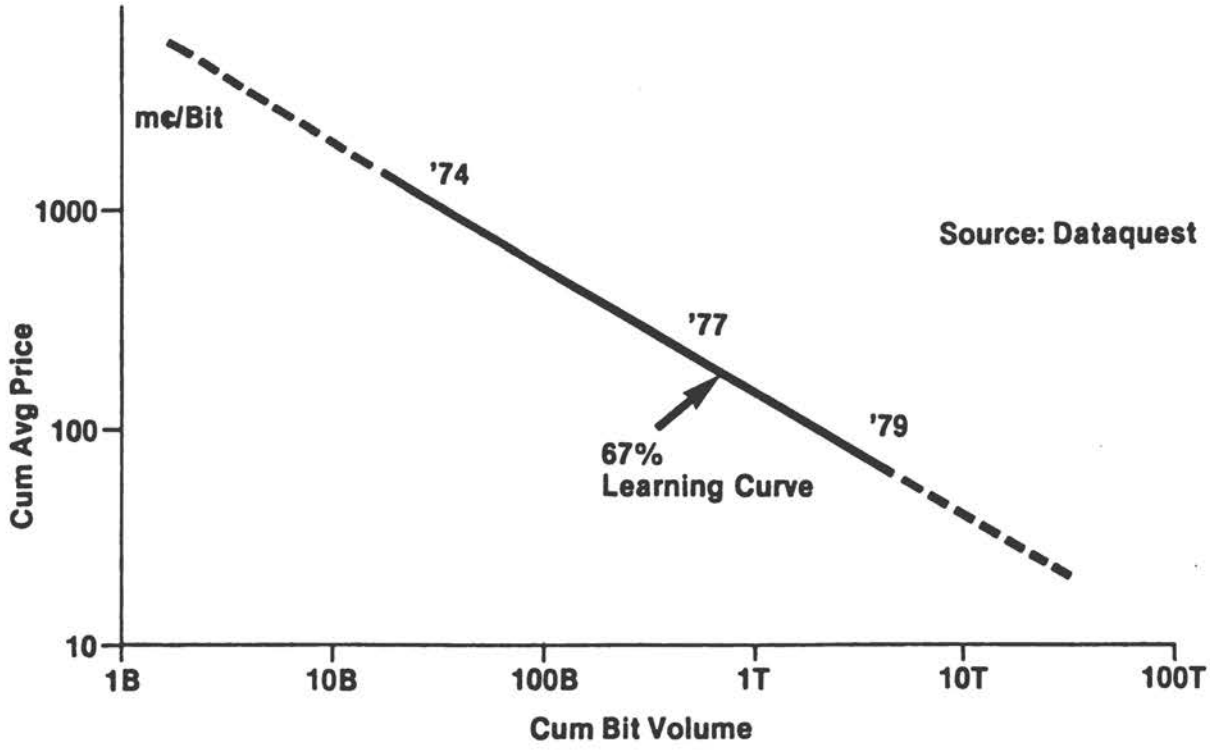


Fig. 5

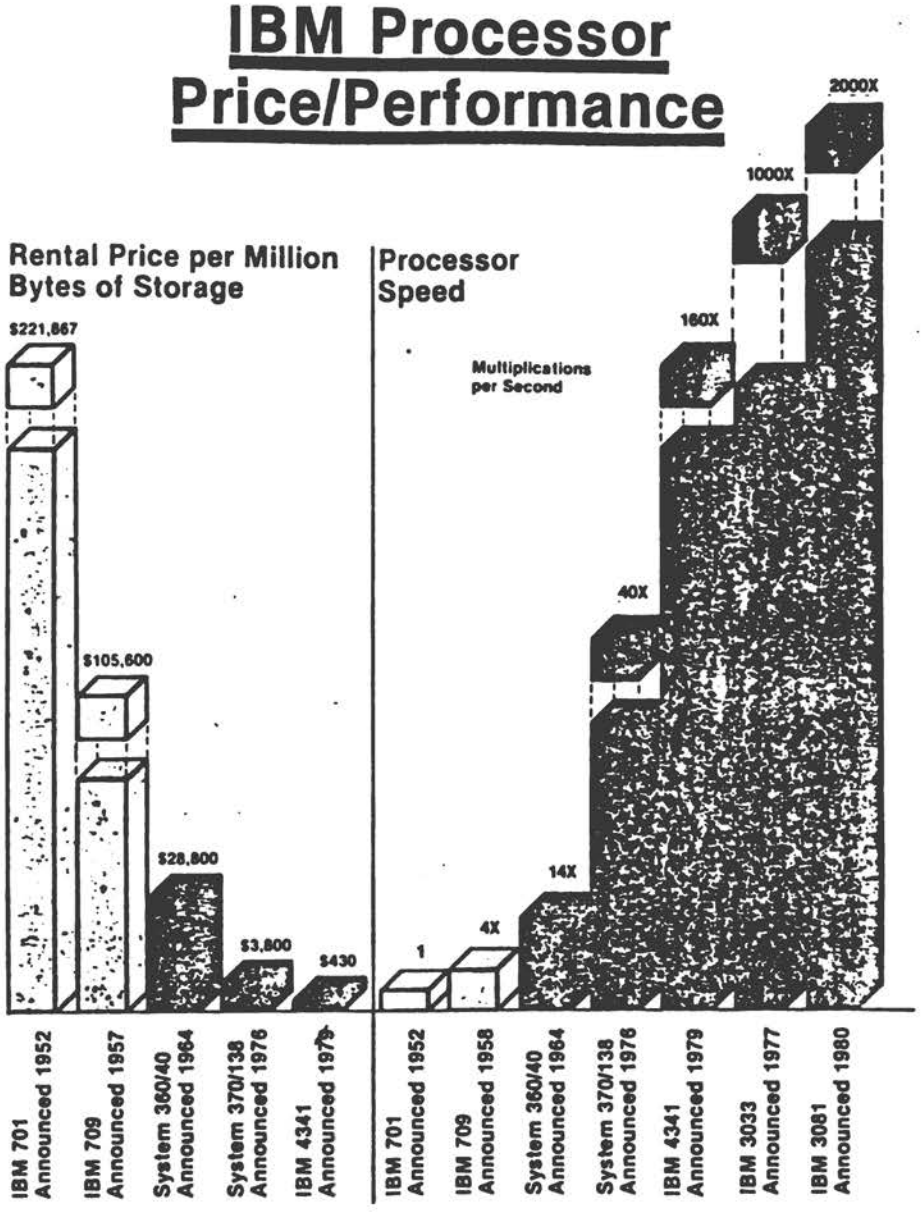

IBM Processor
Price/Performance
Rental Price per Million
Bytes of Storage
$221,867
$105,600
$28,800
$3,800
$430
IBM 701
Announced 1952
IBM 709
Announced 1957
System 360/40
Announced 1964
System 370/138
Announced 1976
IBM 4341
Announced 1979
Processor
Speed
Multiplications
per Second
1
4X
14X
40X
160X
1000X
2000X
IBM 701
Announced 1952
IBM 709
Announced 1958
System 360/40
Announced 1964
System 370/138
Announced 1976
IBM 4341
Announced 1979
IBM 3033
Announced 1977
IBM 3081
Announced 1980

Fig. 6

Computer Cost

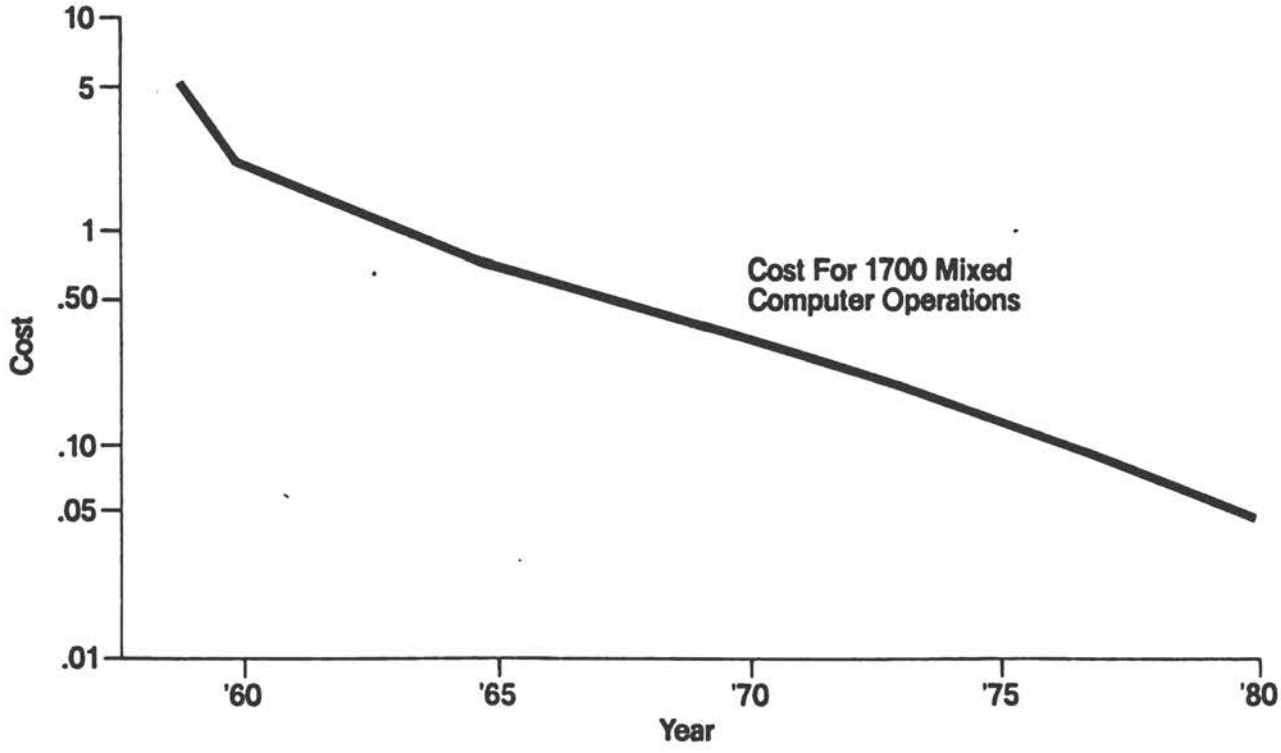


Fig. 7

- **Productivity Slowdown Nationally**
  - **3.4%/Year — 1958 - 1974**
  - **0.9%/Year — 1973 - 1979**
- **Semiconductor Industry**
  - **5.2%/Year — 1958 - 1974**
  - **6.4%/Year — 1975 - 1979**

Fig. 8

U.S. Semiconductor Industry

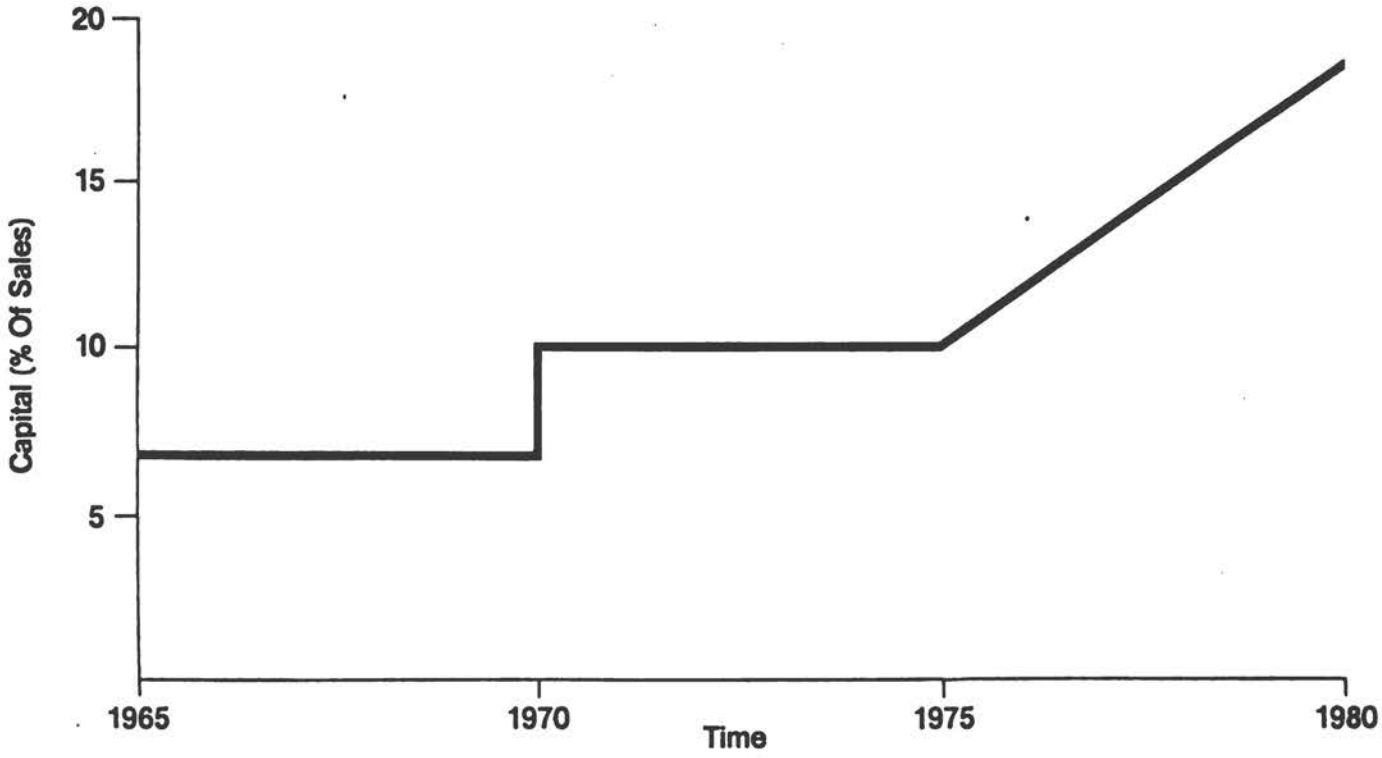


Fig. 9

Foreign Interests Buy Into/Start American Companies

Country	U.S. Company	Foreign investors	Date	% of Equity
Japan	Electronic Arrays Inc.	Nippon Electric (N.E.C.)	Dec/78	100%
	Micropower Systems	Hatori (Seiko)	1971	77%
	Fujitsu—TRW Computer	Fjujitsu	1980	49%
	American Telecomm	Fujitsu		
Germany	Amdahl	Fujitsu	Aug/76	29%
		Nixdorf	1972	5%
Germany	American Microsystems	Robert Bosch	Jun/77	25%
	Dickson (Now Siemens)	Siemens	1973	100%
	Advanced Micro Devices	Siemens	Oct/77	20%
	Microwave Semiconductor	Siemens		100%
	Litronix	Siemens	Nov/77	80%
	FMC Semiconductor	Siemens		
	Solid State Scientific	VDO	Sept/77	25%
Netherlands	Signetics	N.V. Philips	1975	100%
UK	Siliconix	Lucas	Jan/78	24%
	Inter Design	Ferranti	Nov/77	100%
Canada	Monolithic Memories	Northern Telecom	1969	12%
	Intersil	Northern Telecom	Sep/77	24%
	MOS Technology	Commodore	Jul/76	99%
France	Solid State Scientific	Thompson CSF	Mar/79	100% of RF PWR Devices
	Fairchild	Schlumberger	1979	100%
	Unitrode	Schlumberger		

Rockwell International Report 6/80

Fig. 10

Captive Suppliers: Computer And Telecommunications

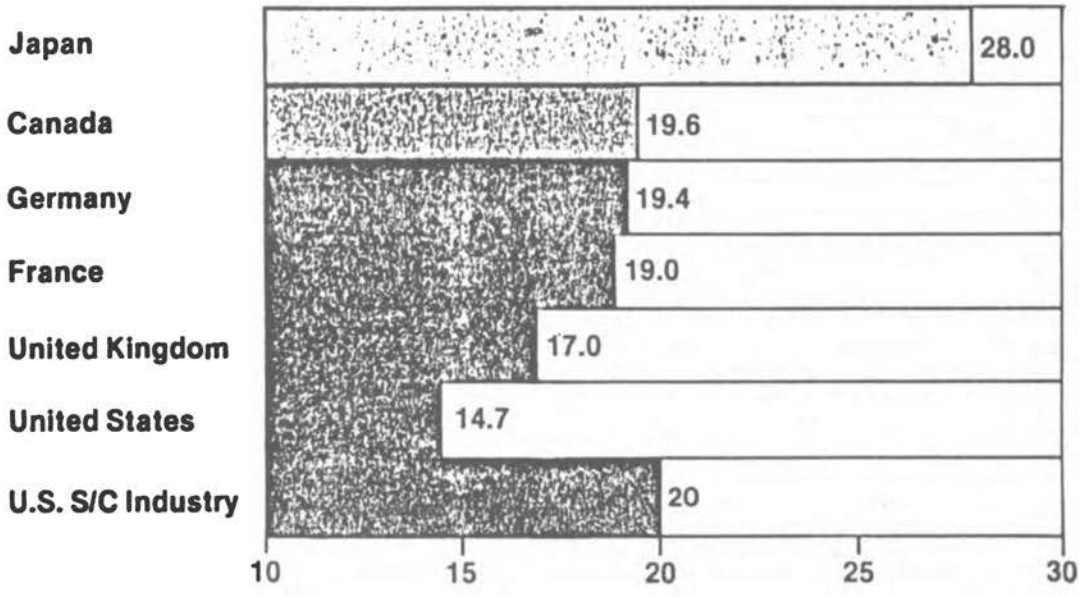
	Outside Sales	
	No	Yes
1. U.S.		
Amdahl	X	
Burroughs	X	
CDC		X
Data General		X
DEC	X	
GTE	X	
Hewlett-Packard	X	
Honeywell		X
IBM	X	
National		X
NCR		X
Sperry Univac	X	
Storage Technology	X	
Western Electric	X	

	Outside Sales	
	No	Yes
2. Other		
Fujitsu		X
Hitachi		X
NEC		X
Philips		X
Siemens		X
Toshiba		X

Source: ICE

Fig. 11

Average Annual Rate of Capital Investment as a Percent of Output



Source: U.S. Department of Labor

Fig. 12

4. REINDUSTRIALIZATION OR NEW INDUSTRIALIZATION: THE TEXTILE INDUSTRY

James C. Fry
Executive Vice President
Ti-Caro, Incorporated
Gastonia, North Carolina

SUMMARY

Mr. Fry spoke about the recent history and the future of the textile industry. The industry sees the following as an appropriate role for the federal government:

- Spur capital formation through changes in depreciation policy and tax reform to encourage individual saving and investment,
- Renew the Multifiber Agreement (MFA) to ensure orderly trade on world markets,
- Reduce the burden of regulations,
- Limit government involvement primarily to a tax system that encourages investment.

4. Reindustrialization or New Industrialization: The Textile Industry

Background

It is important that prior to looking at the future, we take a quick look at some of the events and trends of the recent past -- the decades of the Sixties and Seventies. These were difficult times for our industry, and those of us who survived are a lot smarter and a lot tougher because of the experience. We are also optimistic that we can survive and prosper in the future!

Twenty years ago, the problems associated with international competition were just beginning to emerge as a very real, and a very serious, threat to our industry. The problem was concentrated in the natural fibers area, and overall import penetration levels were less than 6 percent of the total domestic textile market. Despite twenty years of intensive efforts on the part of the industry, imports have continued to grow much faster than domestic market growth, resulting in a current import penetration level of 13 percent. Unfortunately, imports are heavily concentrated in apparel items, causing major market difficulties for producers operating in those areas. Today over 100 countries export textiles into the U.S. market.

These rapidly growing levels of imports created intense pressure in the domestic market, and the textile industry, simply to survive, had to become more cost efficient, had to improve productivity, had to innovate, and had to market more aggressively. There were obviously many who didn't survive.

Although the man-made fiber industry was already a major factor in 1960, the growth of these fibers exploded in the decade of the Sixties. New fibers and new fiber variants led to the introduction of a host of new products, new manufacturing technology, and entirely new marketing concepts. Man-made fibers represented slightly more than one-fourth of the total fibers consumed in the industry in 1960; today they represent almost three-fourths of total consumption. This has been an exciting development for our industry and for the American consumer. The interfiber competition has been intense, and as a result, even the natural fibers have been substantially improved to the ultimate benefit of the consumer.

With the developments in new fiber technology and other factors, per capita consumption of textile fibers increased by more than 50 percent between the late 1950s and the late 1970s. Today we consume

almost 60 pounds of fiber per capita in this country, twice that of the European community, stretched across a broad spectrum of products from apparel (27 pounds) to home furnishings (19 pounds) to industrial uses (14 pounds).

Parallel to the healthy domestic market trends on the one hand, and growing intensity of import competition on the other, the domestic textile industry was spending substantial sums of money on modernization and new technology. It also sharpened its skills in basic human resource and asset management. The net result was that between 1960 and 1980, our productivity gains (manhours per pound of fiber processed) were almost double that of all U.S. manufacturing. That ratio has continued to hold, even in the late 1970s, when gains have been much harder to come by. We also reduced energy consumption per pound of fiber consumed by 17-18 percent during the 1970s. And we have accomplished all of this without one cent of government money -- unlike other industries.

During the 1970s, I doubt if any American industry has had the range of governmental programs directed at it as has the textile industry. I refer simply to noise regulation, dust and work environment regulation, air regulations, water regulations, consumer protection regulation, energy regulation, and the list could go on and on. Although certainly some of these programs have had good benefits, they have also siphoned off a tremendous amount of effort and capital investment. They have resulted in increased costs to the producer in this country as compared to his competition abroad.

As we attempt to capsule the events of the past 20 years, it can be accurately stated that rapid changes and intense competition have made today's U.S. textile industry the most productive, the most innovative, and the most efficient of any in the world. With changes in the international monetary system, we have become cost competitive with Europe, with Japan, and with practically all of the more developed areas of the world. We still cannot compete with subsidized state economies or the true lesser developed free economies, and these nations continue to cause problems for us.

It would be most rewarding for me to be able to conclude this section looking back over the past two decades by saying that our industry had also emerged as one of the most profitable of American industries. Unfortunately that isn't the case. Our industry's average return on sales is about half of the average of all manufacturing, our return on equity is about two-thirds. Last year these percentages were 3.2 percent return on sales, 11.9 percent return on equity. So as we begin the 1980s, it is obviously not without some trepidation. The progress we have made is substantial, the potential ahead is awesome, but the challenges ahead are also very real.

The Future

What does the future hold for our industry? Let's begin by looking at some very basic assumptions on total market growth. First, most population projections that I have seen indicate a very modest growth of 1 percent per year, or less, over the next decade. Second, the pressure of other essential purchases on the consumer dollar almost dictates that there will be little growth in per capita textile fiber consumption. We are a mature and affluent society, and there just isn't a lot of growing room in the domestic market.

The textile industry has traditionally not been very export oriented, but in recent years this has dramatically changed. Between 1978 and 1979, our dollar exports of textiles and apparel increased by 42 percent; through the first three quarters of 1980, we showed a gain of almost 19 percent. These were not easy gains to achieve, but they do indicate that with the right kind of marketing commitment, we can increase our share of world markets. Obviously, currency values also have a tremendous influence.

To reinforce my optimism about worldwide potential, let me share with you the fact that per capita textile consumption in the more industrialized areas of the world such as Europe and Japan is right at 30 pounds per capita, or just about one-half our rate of 60 pounds. Worldwide, the average per capita consumption rate is 15 pounds, or one-fourth our rate. In the true lesser developed areas, such as the People's Republic of China, per capita consumption is less than 7 pounds. It simply indicates to me that there is a tremendous potential out there if one assumes that the growing expectations of literally billions of people are going to be met. A fairly conservative estimate of worldwide textile fiber growth is 50 percent over the next fifteen years. If we can capture even a small percentage of that worldwide increase, it can amount to a substantial growth for our domestic industry.

Basic textile manufacturing technology today is a worldwide technology. Sadly, many of our purchases of equipment are made in Europe and Japan. Our competitors anywhere in the world can make the same purchases. Despite some almost $11 billion in new plant and equipment expenditures during the 1970s, our industry faces an even larger task ahead if it is to survive and prosper. It would be my conservative estimate that we need to spend a minimum of $20 billion during the 1980s, twice that of the Seventies, and that is on technology that is known and proven today. That is a healthy order for an industry whose after-tax profits this year will probably be in the range of $1 billion.

The current organizational structure of our industry is pretty efficient, and it is hard to visualize any massive changes.

Certainly, because of capital needs alone, there will be further consolidation of the industry into larger units -- but this has already been occurring at a good pace. Our markets are so diverse that it is just not possible in the foreseeable future for a few large companies to dominate, or to be competitive in every area. Perhaps the best proof of the industry's efficient structure is the fact that the producer price index for textile products has moved upward at a rate one-third less than the rate for all industrial commodities over the last 13 years (1967 base). Most of us in the industry simply believe that competition and time will stimulate further consolidation, and there is little to be gained by artificially stimulating the process. There also don't seem to be any large advantages to simply being large.

Assuming a moderation in import growth, coupled with modest export gains, the outlook for growth in domestic manufacturing activity still remains fairly cautious for the next decade. Productivity gains alone will probably accommodate this growth potential, leaving employment trends flat, or even with a small decline. As newer technology is installed, however, the skill requirements will be increased substantially. We hope this will allow us to close the gap between current textile wage levels and all manufacturing wage levels, without destroying our improving competitiveness. The textile industry today employs almost 50 percent women, and approximately 20 percent minorities. Our industry is proud of the contribution it has made in providing "gateway" opportunities for unskilled workers and looks forward to similar opportunities to upgrade skill levels and opportunities for its work force.

In concluding this look at the future, let me simply say that the most damaging scenario that I can imagine is stagnation either in the world economy or the U.S. economy. The chilling chain of events in world energy economies has already had a profound effect upon us. The growing expectations of literally billions of people throughout the world will put tremendous pressure on all world economies. We sincerely believe that the capability and capacity of the U.S. textile industry is needed to meet those expectations.

Summary

The question before this panel is "Reindustrialization or New Industrialization?" There seems to be almost total agreement in the country that a new initiative is needed at this time to spark a new wave of productivity gains and technological developments. We hope forums such as this will contribute to that result.

Let me briefly target what our industry sees as the role of the federal government in improving our competitive position and the competitive position of the nation as a whole.

First, the most critical problem facing the textile industry is the shortage of capital. We strongly recommend adoption of the so-called 10-5-3 depreciation proposal, along with tax reforms that will encourage individual saving and investment. We are confident that such reforms would key a capital investment boom in our industry that would restore productivity growth, help curtail inflation, and strengthen our competitiveness in world markets. It would restore business confidence and encourage business executives to assume additional risks.

Second, the federal government, along with many other governments in the world, long ago recognized that the textile industry was unique. Under the auspices of international rules of trade and the GATT, an international approach to orderly trade was implemented in the form of the Multifiber Arrangement, now known as the MFA. With certain modifications in growth rates, this concept should be extended for the foreseeable future. It is in our best interest, and it is in the world's best interest. Fortunately, the incoming Administration has committed to renewal of this agreement.

Third, the textile industry, along with most other American industry, needs to be freed from some of the burdens of too much government, too much regulation. Enough has already been said about this problem.

Fourth, and finally, our industry is a great believer in the free market system. Given the financial incentives, we believe strongly that American industry will react strongly and positively to opportunities to become more productive. It will require a minimum of government involvement, primarily in the role of providing a tax system that encourages new investment and the savings to finance it.

Let me conclude by saying that the most dangerous course of action that could be taken by the government is the targeting of certain industries for either extinction or heavy subsidization. It is against every principle that this country was built upon. Give the system a chance! Let's learn from the lessons of Germany, Japan, and others.

5. IMPROVING AMERICAN PRODUCTIVITY

Ralph E. Cross
Chairman of the Board
Cross & Trecker Corporation
Bloomfield Hills, Michigan

SUMMARY

Mr. Cross addressed actions that government can take to improve productivity. The private sector and free enterprise system, he said, will take action if government provides the right business climate. He offered four specific suggestions:

1. Reform the capital cost recovery system to recognize depreciation as a true cost of doing business, accelerate amortization rates, and retain or increase the investment tax credit; these strategies should result in additions to capital stock.

2. Reduce the capital gains tax; a reduction will increase capital investment, raise the gross national product, create jobs, increase both personal disposable income and federal tax revenues, and improve the productivity of capital.

3. Assist research and development by providing tax incentives for firms to fund university research.

4. Improve trade between the United States and the USSR by granting most favored nation status and making the export-import bank available, to provide more experiences and more business for U.S. industry and to promote peace.

5. Improving American Productivity

The subject of this meeting -- improving American productivity -- is unquestionably one of the most critical problems that our nation has faced in this century. I won't dwell on the fact that the country is in trouble. The situation has been well documented on numerous occasions by others. I will, therefore, try to go forward from where others have left off.

What is basically wrong in the American industrial complex has been precisely stated in a recent issue of Harpers magazine by editor William Tucker. The following is a quote from Mr. Tucker's comments:

"One of the comfortable assumptions that became a part of the lore of America's post-war prosperity is that American industries had 'solved the problem of production' and therefore were completely invulnerable. Giant, globe-spanning gorgons with unlimited amounts of money, American corporations were huge reservoirs of unlimited resources that could be pushed and pulled, led in one direction and another, tapped for this and that social benefit, even occasionally plundered, without sapping their vitality. The myths once attached to the American frontier have now been transferred to the American industrial system. They are vast reservoirs of wealth capable of absorbing any financial, psychological, or social whim or fancey that people attach to them....

"The major premise of liberal economics since World War II has been the academia-born hypothesis that modern corporations had escaped the rigors of competition and no longer operated within the limits of the laws of supply and demand."

If we need any proof that this hypothesis is wrong, let me ask you to explain the sad dilemma that exists today in the automobile industry. In spite of this overwhelming evidence that contradicts such crazy theories, plus similar evidence in the steel and other industries, there are those who still think that American business ignores its customers and goes on its merry way feathering its own nest at the expense of everyone else. Until the thinking of these academia thought-innovators and their followers is changed, improvement in productivity and the competitive position of American industry will be seriously retarded.

Fortunately, the mood of the country is changing and today we can see some signs of a willingness on the part of government to do what should have been done long ago. Incidentally, I am going to limit my comments to the things that government can do because I

firmly believe that when government provides the right business climate the private sector and the free enterprise system will do the rest.

With this thought in mind I would like to suggest some changes which, in my opinion, are absolutely necessary if we are going to get out of our troubles and once again become a dynamic country. In capsule form these changes are:

- Reform the capital cost recovery system.
- Reduce the capital gains tax.
- Assist research and development.
- Improve trade between the United States and the USSR.

Reform the Capital Cost Recovery System

In 1978 the National Machine Tool Builders' Association conducted a study of 16 major metalworking companies' annual reports. Needless to say, they are the best customers of the machine tool industry. Without question, the companies selected are leaders in their industries. Ten of them are in the top one hundred of the fortune 500, and every one of the 16 would be considered a blue chip on Wall Street.

Briefly, the results of this study tell us that capital spending by these blue chips, in constant dollars, has been declining steadily since 1965 -- in spite of the fact that during this period sales were increasing. When viewed as a percentage of sales, the portion of every dollar reinvested by these companies has fallen nearly 40 percent from 6.6 percent to 4.1 percent.

In short, because of chronic underinvestment, the 16 companies in the sample have been, on the average, in an unconscious and involuntary liquidation. And the same probably holds true for almost all of America's manufacturing industries. What does this mean?

Studies by the Department of Labor show that, in general terms, productivity in the private sector has increased in direct proportion to capital stock additions from 1950 up to the present time. So, if we want to improve productivity we must add to our capital stock.

One of the bright spots in the 96th Congress was the foresight of Congressmen Jones and Conable who sponsored

HR-4646, the "Capital Cost Recovery Act of 1979." Regrettably, this legislation, which received much election year comment, was not enacted into law. Let us hope it will come up again early in 1981.

Under the theory of HR-4646 the current asset depreciation range system would be replaced by a capital cost recovery system calling for accelerated amortization of:

- Buildings over a ten-year period
- Machine tools and other long-life equipment over a five-year period
- The first $100,000 worth of rolling stock over a three-year period

HR-4646 was often referred to as the 10-5-3 Act.

Improving the cash flow of industry through the changes provided in HR-4646 has never been more important than it is in today's inflationary times. Every year that the current unrealistic laws remain in effect will result in a further shortfall between the cash flow generated by depreciation and the actual outlay needed to replace obsolete products, plants, and equipment.

The key feature to any change in depreciation allowances must be a realistic drive to treat capital spending in a more progressive sense. It must be treated, more rationally, as a true cost of doing business, instead of a fictitious allowance for the wear and tear on equipment, which is now the case.

Another instrument of our tax system, namely, the 10 percent investment tax credit, is extremely important to offset the effects of rising equipment prices during this inflationary period and to reduce the risk of developing and applying new technology. This credit should be retained at all costs and should be increased to 12 percent if at all possible. Inasmuch as it applies primarily to the capital-intensive companies, it places resources where they will do the most good.

Policies designed to make it possible for American industries to increase the amount of capital employed are the most important ingredients for improving productivity.

Reduce the Capital Gains Tax

How many times have you heard someone say, "Why save money? If I invest it, Uncle Sam will take all of the profits anyway. I'm going to spend it and enjoy myself."

Whether or not you agree with this thinking is immaterial. The facts are that this is the attitude of many potential investors. The capital gains tax, from its very beginning, has retarded capital formation. How much? No one can say for sure, but Data Resources, Inc., a prestigious forecaster of business activities, made an analysis back in 1978 that predicted what would happen if the capital gains tax had been completely eliminated in January of that year. Their conclusions were as follows:

Over the five-year period, from 1978 through 1982, America's fixed business capital investment would grow by an additional 81 billion in constant, non-inflated 1978 dollars. That is in addition to the investment that would occur if there had been no change in the tax laws.

This 81 billion of extra investment would translate into an extra 199 billion of GNP over the five-year period (in constant 1978 dollars).

The extra investment would also create jobs. According to the study 3,136,000 man-years of extra employment would be created which would, in turn, mean 440,000 new, permanent jobs for Americans.

The higher investment and the growth in employment would also increase the personal disposable income of Americans. The predicted after-tax increase would amount to 102 billion of uninflated 1978 dollars over the five-year period.

Finally, the increased level of business activity, the growth in GNP, and the rise in employment would net the federal government an extra 37 1/2 billion tax dollars over the five-year period.

During the last session of Congress the Senate tried to change the capital gains exclusion (from ordinary income) from 60 percent to 70 percent. I think it should be changed from 60 percent to 80 percent, and if this proves half as beneficial as the Data Resource study indicates, then I think it would be prudent to eliminate the tax entirely.

Incidentally, Western Germany and Japan, our most formidable competitors in the industrial world, have no capital gains tax and their capital formation as a percent of gross national product is considerably higher than capital formation in the United States or the United Kingdom, which also has a capital gains tax.

Finally, elimination of the capital gains tax will improve the productivity of capital by making it easier for investors to transfer their funds from less productive to more productive enterprises.

Assist Research and Development

The last session of Congress brought forth the "Research Revitalization Act of 1980," HR-6632. Although not yet enacted into law, the underlying concepts of this act recognize that research and development (R&D) spending can provide economic benefits similar to those brought about by a high rate of capital investment. Specifically, in providing incentives for business firms to fund research performed at colleges and universities, this measure provided for the following:

1. Individual companies would be permitted to set up reserve accounts which would be 100 percent tax exempt and which would carry a 25 percent tax credit in addition to the 100 percent exemption; and in addition,

2. Payments from the reserve would provide a tax exemption in the amount of 100 percent when they are dispersed to universities.

The benefits of such an approach are numerous. It will create a greater incentive for innovative and industrially useful R&D. By involving universities, it will encourage more and broader-based research; it will help refocus a portion of university research on industrially useful innovation; and finally, it will contribute to expanding the pool of highly trained engineers and scientists who are oriented to the on-going research needs of industry.

Research and development is the seed corn for: 1) new technology; 2) the industrial application of new technology; and 3) the improvement of manufacturing processes, all three of which are necessary for productivity improvement.

Improve Trade Between the United States and the USSR

As a machine tool builder, my mission in life is to create and build machine tools or integrated manufacturing systems that will improve the productivity of industry throughout the world. In order to carry out this mission our company must think up new and better ways to manufacture the products our customers make and sell. In short, we provide profit-making answers to our customers' manufacturing needs.

When we are successful in winning a contract to implement one of our profit-making projects, we design, build, and test the machines or system in our plant, then install it in our customer's plant. After the project is working to our customer's satisfaction, we catalogue the things we have learned from the experience and then use this know-how for improvements and for creating other new developments. This is the way we grow! The more we do, the more dynamic we become, and the more productive our customers become. New innovations are important, as we all know, but opportunities to exploit and learn from experiences are equally or even more important. The engine that powers manufacturing productivity improvement is experience. The more you do, the better you get.

The USSR is the second largest consumer of machine tools in the world, slightly smaller than the United States. When we are unable to participate in this market, as is true now, we reduce the potential opportunities for creating new machines and systems that will improve productivity and keep our American machine tool industry and our customers out in front of our foreign competition. The problem is not export control laws, but rather government's habit of linking trade with moral principles, and the implied threats and vociferous name-calling by some of the members of Congress.

With respect to the linkage situation, the USSR continues to trade with our competitors in Germany, Italy, and Japan on a very large scale, while trade with our American factories is practically nil. When we try to find the reason, we learn that the adverse political situation is primarily responsible. For example, the USSR doesn't understand why we treat them less favorably than other nations when it comes to trade, and why they are denied the use of the export-import bank, which, by the way, was created by Franklin Roosevelt to finance trade between the United States and the Soviet Union.

I think it is axiomatic that we don't go out of our way to irritate our customers, regardless of what we may think of their political beliefs. Why we in the United States must con-

tinue to do things to irritate the USSR, while our competitors in Japan and Western Germany do not, is a mystery to me.

I think we would all be mystified if we were to see Lee Iacocca storm into a Chrysler show-room and say to a salesman, "Don't sell that man a Chrysler. He is an atheist, and we don't want to do business with unbelievers." I am just as mystified when I hear members of Congress damning and threatening our customers in the USSR, when there is absolutely no need for it.

Linkage also adversely affects the sale of machine tools to our United States customers. For example, consider the grain embargo that is linked to the Afghanistan situation. When the farmers' incomes were reduced by the grain embargo, they bought fewer farm machines; then, our customers who make the farm machines bought fewer machine tools; then, we machine tool builders bought fewer materials and supplies from our vendors; and so on down the line. I don't think the chain reactions that result from these political decisions are always thought through as well as they should be by the people who make them.

Well, what about the risk of war? Will trade with the USSR destroy the chances for peace? I don't think so. It's my firm belief, and I have said it many times in the past 10 years, that the surest way to peace is through trade. The same thought was expressed recently by Roger Smith, the new chairman of General Motors, when he said, "Show me two countries that are trading with one another and I'll show you two countries that are not going to war." Also, there is a growing belief in some circles that the large volume of trade between Western Germany and the USSR is one of the major reasons why the Soviets are taking a wait-and-see attitude toward the Polish situation.

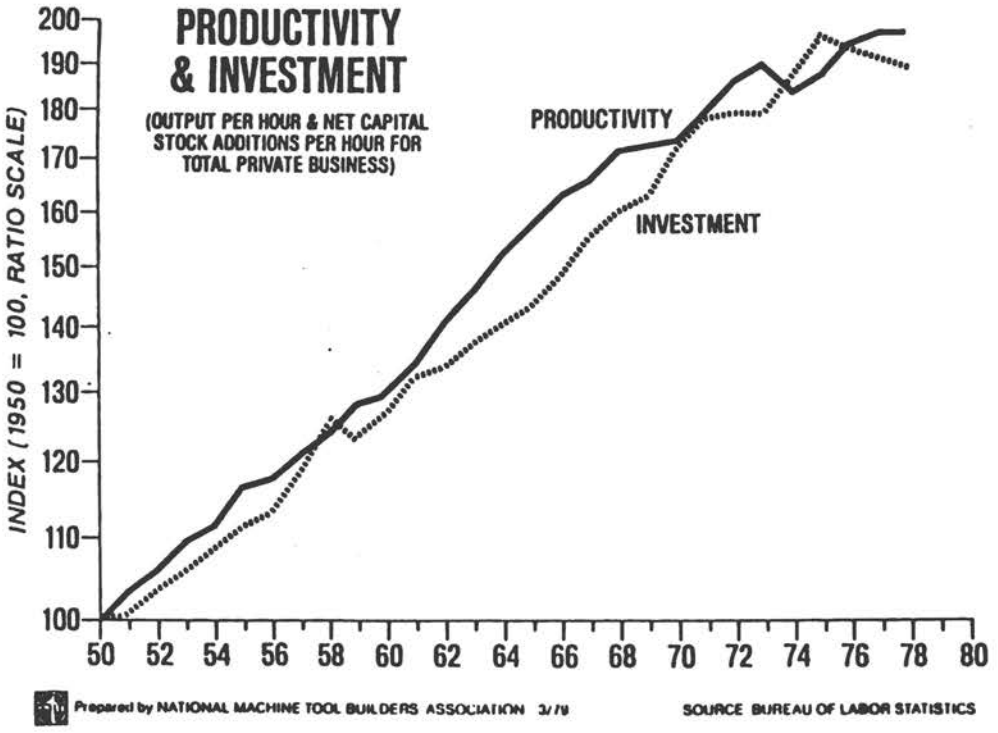
As a first step toward developing a better relationship with the USSR, I think the United States should immediately negotiate a trade agreement that would provide them with "most favored nation treatment" as we have with many other socialist countries, and we should make credits from the export-import bank available to them, to the same extent that we do to our other trading partners.

It may be that it requires an imaginative person to see how improving trade relations with the Soviet Union will help improve productivity in the United States. Because the machine tool industry is one of the key drivers for improving productivity, I believe that anything that strengthens this industry is in the national interest. Opening up the Soviet market is certainly a step in this direction.

For a future date I would like to see us deal with the following:

- Better tax treatment for American citizens working in foreign countries,
- The merits of the value-added tax as a partial substitute for the income tax,
- Ending the double taxation of dividends, and
- Product liability legislation.

CHART 3


PRODUCTIVITY
& INVESTMENT
(OUTPUT PER HOUR & NET CAPITAL STOCK ADDITIONS PER HOUR FOR TOTAL PRIVATE BUSINESS)
PRODUCTIVITY
INVESTMENT
INDEX (1950 = 100, RATIO SCALE)
200
190
180
170
160
150
140
130
120
110
100
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
Prepared by NATIONAL MACHINE TOOL BUILDERS ASSOCIATION 3/79
SOURCE BUREAU OF LABOR STATISTICS

6. CURRENT CHALLENGES IN REINDUSTRIALIZATION: A UAW VIEW

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SUMMARY

Mr. Schlossberg argues the need for a new social contract, to include at a minimum business, labor, and government. The essence of a social contract is that each party must contribute appropriately and that a spirit of cooperation must prevail. Stockholders and management should make comparable contributions and sacrifices. Labor and management especially need to cooperate, through worker participation. Government could contribute to the social contract in any of a number of ways: tax incentives for investment, protection against imports, streamlined regulation, financial assistance for rebuilding plants, sponsorship of research and development, and others.

6. Current Challenges in Reindustrialization: A UAW View

The Need For A New Social Contract

The time is on us. We are an industrial nation in deep trouble. We can no longer afford the luxury of confrontation. Traditional adversary relationships must be tempered by the new necessities for growth and even for survival.

A. The Principal Actors.

The parties to the social contract must include, at minimum, business, labor, and government. A program excluding the government cannot succeed because of the realities and necessities of government intervention and public policy considerations -- tax policies, economic policies, monetary policies, international affairs, the legal system, and regulation all require government participation as a contracting party. And, of course, since the public has a huge stake in the undertaking, it must be adequately represented. Absent power centers locally and nationally equipped to speak for important segments of the public and the total population, only government can represent the public. It is fair to say that the public, on the basis of experience, would have reason to question unfettered discretion by "big business" and "big labor" to determine the economic destiny of the society.

B. Goals of the Social Contract.

Of course, the basic reason for the new social contract is to reinvigorate the American economy and make it healthy. There must, however, be broader purposes than the enrichment of one segment or the entrenched security of another segment of the economy. If public funds are made available to industry, whether through appropriation, loan, or tax expenditure; incentives of one kind or another are provided through the social contract -- in short, if any kind of benign or favorable government action is in the offing, there must be clearly stated and understood public benefits accruing from the contract. Of course, the public gains through the establishment of profitable industrial bases, but such indirect benefit, while substantial, is not sufficient.

There can be no abandonment of the commitment to civil rights, equality, the environment, and the health and welfare of the people. Will private capital and labor protect the

wilderness and the rest of the environment? Will they see to the needs of the disadvantaged in society?

The economic goals of the social contract should be long-term growth and ultimate long-term stability. All of this means a healthy, full employment economy providing rising standards of living for the people of this country and, indirectly, for people all over the world.

These goals can be achieved in part by adequate investment in new plants, equipment, and technology, with concomitant improvements in quality, value, and productivity. Obviously, all of the parties to the compact will be required to make short-term sacrifices for the eventual rewards of success. Immediate benefits, however, must accrue to consumers of manufactured goods in terms of price and value, quality, safety, and general desirability. If such benefits are not soon apparent, regardless of their cost in terms of profits or wages, the ultimate goals will be in serious jeopardy.

An Underlying Basis to the Social Contract.

A. Overall Guidance by the Parties

There is much to be learned from foreign economic experiences. Obviously, cultural, historical, and physical differences are too great for the full-scale emulation by the U.S. of another, different society, but we must draw some conclusions as to useful tactics and strategies that have been successful in other economies.

The parties must have accepted facts at their disposal; one policy should not war against another; and marketing targets must be chosen by the parties to the compact. All of this can be formal or informal, but it seems to argue that any new social contract in the United States that includes business, labor, and government must have a planning component. Without some kind of indicative national and sectoral planning the social contract is likely to be incoherent, undirected, and unsuccessful. Almost no industrial nation operates its economy without some national economic planning -- by whatever name it is called.

When private economic institutions seek the assistance and cooperation of government, they can no longer treat government as an enemy. Nor can a society form an activist social contract demanding contributions from all major segments and rely entirely on the market to regulate, direct, and preserve the economy and, in the end, the society. In other words, rein-

dustrialization requires at least the tacit admission that we have and need a mixed economy. There is no absolute free market and cannot be under this concept. Indeed, in my own view, the kind of undertakings we here discuss may be essential to the survival of a healthy, competitive enterprise system.

B. Civility of the Parties

One need hardly elaborate on the obvious fact that ideological and rhetorical attacks on one's "partner" are not likely to ensure the success of the partnership. We can no longer afford "Big Business Days," "Union Free Environments" and the slogan that "the government couldn't organize a two-car funeral."

Equality of Sacrifice and Reward -- The Role of the Parties

A. The Workers

If workers are to take less and produce more for an ultimate economic prosperity, they must be assured of the following:

-- Stockholders and management must make comparable contributions and sacrifices toward the eventual goals.

-- Cooperation -- not cooptation -- must be the nature of the relationship between business and labor. Strategies are worker participation in operational joint decision making on such crucial matters as the introduction of new technology and its effect on workers; the location and relocation of facilities which can have serious consequences, not only for workers, but also for communities; and experiments to improve quality, safety, productivity, and plant morale.

Since worker performance, remuneration, and job tenure are ultimately at issue, the parties should pursue worker participation and consultation on such important matters as the financial plans of the enterprise: investments, plant design, markets, products, and pricing.

Finally, if workers are required to share in economic austerity and to make sacrifices for ultimate industrial success, they should share also, along with stockholders and managers, in profits. Obviously this entails some profit sharing, deferred compensation, stock ownership, or a combination of any of those.

B. Management

Given a fair social compact, management must demand and obtain from the work force punctual, high quality work on a sustained, uninterrupted basis; a high degree of loyalty and enthusiasm for the work; and a sense of purpose and imagination. In such event absenteeism would be held to an absolute minimum. Cooperation and motivated effort should dominate at every manufacturing level. Responsible unions are obliged to take leadership in these efforts.

It goes without saying that the management and labor partners have a whole set of demands for government. In any working social compact, labor and responsible political leaders would work with business to win necessary government concessions and commitments.

C. Government

Government, while demanding responsible corporate and union behavior, must make its contribution. Among other actions, government might undertake one or all of the following:

1. Government, through noncoercive planning with industry and labor, should help to find targets of opportunity on the industrial horizon. Such tripartite planning should lead to energy conservation and the development of alternative energy sources.

2. Taxes are a fruitful area for government assistance. The government should provide tax incentives for investment but not for the encouragement of plant relocation, which results in chaos and economic destabilization for workers and communities. Real tax reform, aimed at improving the economy, must be carefully targeted. General tax cuts for business and individuals are not likely to do the job. Imaginative tax devices must be devised to encourage the use of new technology, increased efficiency, and better quality.

3. Government must provide basic protection against imports and encourage exports.

4. It must streamline regulation, eliminating red tape, waste, and incoherent and inconsistent policies.

5. We must have programs of government loans, grants, or guarantee mechanisms to assist the rebuilding of plants, and the reinvigoration of manufacturing sectors.

6. Special sectoral tax expenditures -- such as scrappage credits, credits for more energy efficient cars.

7. We must have a modern, efficient transportation system, good road beds for railroads, adequate ports, and well kept highways and airports.

8. We need retraining and relocation for displaced workers and aid for communities affected by plant closings.

9. There must be a large, continuing government-sponsored research and development program.

10. There should be a restructuring of anti-trust laws to permit joint work in such areas as fuel efficiency and other energy conservation, safety, pollution control, and other such national and public goals.

7. REINDUSTRIALIZATION OR NEW INDUSTRIALIZATION

William Wolman
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SUMMARY

Mr. Wolman describes two different kinds of arguments for reindustrialization. The weaker case states that capital formation and economic growth will be stimulated by changes in the tax structure to favor investment and savings relative to consumption. A strong form of reindustrialization would entail an "industrial policy," some form of state capitalism in which the federal government would channel capital into industries with potential for success and manage the shrinkage of less fortunate industries. Business Week favors both forms of reindustrialization but was unable to recommend ways to proceed with the strong case.

The argument for revisions in the tax structure has already been won and will soon be tested. Other strategies, short of state capitalism, that would further reindustrialization include revised antitrust laws and better indicative planning.

7. Reindustrialization or New Industrialization

Vermont Connecticut Royster, former editor of the Wall Street Journal and the dean of business journalists, has said that journalists are professionals who make a profession of being amateurs. I am very much in that tradition; I don't know a heck of a lot about reindustrialization other than what was printed in Business Week in June 1980.

I am not going to talk about reindustrialization, actually, because anything I know about it is in that issue, which is still available as a reprint. What I want to do is talk about the impact of what might loosely be called the reindustrialization movement and what you can expect of it. All the press can do, in a fundamental sense, is follow the news. Usually, though, we go beyond merely following the news and issue a white paper attempting to call public attention to a big problem.

The "reindustrialization" issue of Business Week, which appeared in June 1980, represented the second time in the 20 years I have been associated with Business Week that we have done this kind of thing. We did one in the 1960s on the social responsibility of business. It is a very rare occasion for us in the press.

We embarked on the reindustrialization issue with great trepidation because we don't like to take editorial positions in our non-editorial-page columns, and we do so only under what we regard as duress. The duress that we felt in June of this year was the substantial decline in the industrial strength of the United States. The manifestation of that decline during the past year was a wave of plant closings.

We understood that much of the industrial decline of the United States in the post-World War II period was an inevitable readjustment of a world that had been shattered by the war. During the 1970s, though, that excuse ran out. In that decade, the U.S. dollar (which had probably been overvalued in the post-war period) depreciated by about 30 percent against key currencies in the 1970s. Yet the industrial decline of the United States continued and perhaps accelerated.

The perception of that problem was not widespread in this country, believe it or not, before June 30, 1980; but apparently we picked the right time to do this issue. It came out in a quarter in which GNP was declining at a 9 percent annual rate and the inflation rate was relatively high. Apparently we had found an important issue.

I think the reindustrialization movement is important, too. It is important not because of any specific program that is likely to come out of it, but because it represents a rallying point.

A number of the speakers here have already said that reindustrialization is a nebulous concept. I think that is certainly true, but then, so are all important concepts, like God, democracy, and freedom. The important point is that reindustrialization does represent a focal point for change in American attitudes. The Lonely Crowd, by David Reisman, described a change in the world to a situation in which the big problems of society were really the problems of consumption. We had to learn how to consume in a relatively graceful and effective way, he said, because the problems of production had been solved. Another famous statement of the notion that you could take growth for granted was John Kenneth Galbraith's The Affluent Society, which proclaimed the U.S. as an affluent society at the precise time when the sources of its affluence began to erode. The fact of the matter is that a whole post-war generation -- maybe two -- accepted the idea that the United States could pretty much take growth and production for granted and that the real problems of the society were something else.

But the fact of the matter is better described by what Kenneth Boulding has described as the bathtub theorem, which states that capital accumulation equals production minus consumption. We discovered around August of 1965 (the time when the Vietnam War began in earnest and when President Johnson was trying to fight the Vietnam War and build the Great Society at the same time) that inflation was beginning to accelerate.

I am a monetarist in most ways, so I think that the sources of inflation are basically monetary in character. But the fact of the matter is that in the late 1960s we began to demand more from our resource base than it was able to supply. That problem intensified in 1974 with OPEC I, when the United States and the rest of the industrial world assumed, in addition to the burdens of income redistribution by means of social programs, the burden of what, in effect, represents the transfer of income from us to those who have oil to export. The result was a situation in which perceptions of the world formed in the post-war period no longer seemed to apply.

Reindustrialization is an important notion, I think, because it brings into the public arena an important slogan, which goes back to the bathtub theorem: "capital accumulation equals production minus consumption." Somehow, we have been consuming too much, we have not been producing enough, and therefore, the capital we have accumulated is shrinking.

The notion of reindustrialization fosters the idea that we have to accumulate more capital by suppressing consumption and increasing production, and thus increasing the margin between them.

This is a very painful thing for a society to do. And the fact of the matter is that you do not accumulate capital unless you are willing to forgo consumption. In a democratic society, to do this, you must have some kind of ideology that tells all those TV watchers out there that we have to do something now in order to change the nature of our economy.

I would submit that very considerable progress is being made in this area. I think it had to be made because people are getting a sense that something is wrong. But there has been a very, very substantial change in attitudes toward the issue of capital accumulation, which lies at the core of the reindustrialization argument.

Take, for example, the left wing of the intellectual establishment. Lester Thurow has just written a book called The Zero Sum Society, and one of the basic arguments of that book was that we must change things in a way to increase capital accumulation. His formula for doing that is quite similar to those of most people in industry, I think, although there are aspects of it with which they would disagree. But the fact that a book by a very intelligent gentleman of the left was written on this subject last year indicates a change in attitudes.

Also, of course, it is very clear that the media have changed their attitudes in this area. Walter Cronkite now probably knows how to spell capital accumulation, and it is quite possible that he even knows how to pronounce it. And that represents, I think, a very considerable change in the world.

Finally, and very importantly, there has been substantial change in Congressional attitudes towards the issue of how taxes ought to be structured. The revenue acts of 1974 and 1978, for example, aimed at increasing the effective progressivity of the tax structure and dropping a lot of people out of being taxed at the lower scale. However, if you look at the Steigher amendment and at what is going to happen, in all likelihood, to taxes in the upcoming Congress, you will find a considerable change indeed in Congressional attitudes in this area. Congress, too, has learned how to spell capital accumulation, and that represents a very important change.

Reindustrialization does represent a rallying cry. My only question about it stems from Wallich's Law (first enunciated by Henry Wallich, a member of the Federal Reserve Board), which states that the attention of the American public cannot be focused on any

problem for more than two years. I think it is uncertain how long the current attention can continue, but great progress has clearly been made. I think part of this progress was prompted by necessity, but even when necessity enters, an engineering of consent is necessary for a change in law.

I would also submit that increasing capital investment and getting the tax changes we want are terribly important in terms of the long-term outlook for inflation. While I do think that inflation is primarily a monetary phenomenon, it is also terribly convenient socially, a fact that Ronald Reagan will discover. When a society is growing slowly, as ours has been over the past decade, with resources being transferred abroad, painful choices are imposed on that society. The virtue of inflation to politicians is not only that it transfers income to government through the progressive tax structure, but also that it obscures the issues of income distribution that are associated with relatively low growth. One must take steps to increase the growth rate if one is going to have any hope of ending inflation by monetary means. Reindustrialization and the option of increasing capital accumulation are alternatives to slow growth and rapid inflation.

We have inflation because it is convenient to have inflation. One thing that I really fear about the next four years is that President Reagan or Congress may discover, now that a serious attempt to end inflation is probably underway, how painful this is and how convenient inflation really was for them. But reindustrialization and all that is associated with it does represent an alternative organizing principle for the society, it seems to me.

There are really two different kinds of reindustrialization arguments. The weaker of the two simply says that if you tilt the tax structure so that it tends to favor investment and savings relative to consumption, you will make progress in increasing capital formation and the growth rate of the economy. That argument is, I believe, won on almost every ground. We will probably get that kind of change in the tax structure. We do not have it yet, but I suspect that a revenue act passed in the next few years will be a very different revenue act from those of 1974 and 1978; it will cut marginal tax rates in all brackets, including the topmost bracket, and it will establish the 10-5-3 depreciation formula or its equivalent.

There is, in addition to that weak argument for reindustrialization, an argument for a strong reindustrialization policy. That policy is an "industrial policy," which involves government in some form of state capitalism in which the government would actually channel capital into industries that are potential winners, manage orderly shrinkage of potential losers, and possibly provide

indicative planning in the way that MITI, the Japanese industrial ministry, does.

When we did the Business Week special issue on reindustrialization, we generally favored both the weak case and the strong case for reindustrialization as well. We also argued for a government policy that will pick winners and losers.

In the six months since that issue was done, one interesting thing is that we have not heard any bright ideas on how to do that. We did not have any terribly bright ideas how to do it. We did write a long article on how the Japanese manage it and how the Germans do it, but we were not too specific about how the United States should do it. I must say that the last six months have not increased my wisdom in this area by one jot. So I am much more nervous about the support we gave the strong case for reindustrialization than I was six months ago. But, after all, in journalism one must generate enthusiasm. If we are going to do something in reindustrialization, let's go all the way.

One thing that I did not do in connection with writing that piece was go to Japan. But I did go to Germany and France, and I spent considerable time at the OECD. One sense that I got in those countries was that they had managed to develop a social dynamic in the interactions of government, labor, and business that in the current world economy seems to give them an edge. They have a different kind of social dynamic, and their state of mind, in thinking about the world economy, seemed to me to work better than ours did.

That makes me think, you see, that there is an argument for doing more about reindustrialization than simply adopting the weak argument for reindustrialization. There might be some scope, as Mr. Schlossberg suggested today, for greater cooperation between labor and capital in advancing the case of reindustrialization. For example, everyone talks about the Japanese quality circles, and there is certainly something to be said in favor of that. In fact, many companies are looking into that kind of program now.

Certainly, also, there is a lot to be said for changing the antitrust laws. After all, most American legislation was designed to guarantee some kind of a rough equality of opportunity in exploiting the opportunities by a large internal frontier. The antitrust laws were established to prevent one business from cheating another in exploiting that huge domestic market.

A lot of our laws, such as the Homestead Act, were designed to ensure that people had roughly equal access to land on a large domestic frontier. Well, that frontier closed more than 80 years

ago. The outstanding competition now facing American companies is clearly competition with countries abroad. World trade as a share of the American GNP is increasing, as we discovered with the revision of the Gross National Product data just recently. That is also why the Gross National Product is going to go out of business very shortly in favor of the Gross Domestic Product.

But that is beside the point. The point is, international markets impinge on our world much more than they used to, and basic institutions clearly must change to account for that fact. One very obvious area in which we might need change is in the antitrust laws. A world in which the antitrust laws foster conglomerate mergers, rather than vertical integrations, does not seem to make much sense in the present environment, and those who say we need some change in the antitrust laws, it seems to me, are making a great deal of sense.

Finally, there may also be an argument for better indicative planning than we've got. I know that most economists and corporate planners are much better at producing Edsels than they are at producing good plans, and that is certainly true about the government as well. But the work that has been done by MITI is pretty impressive compared to most of the stuff that is done by American corporate planners and by Americans who study foreign markets. Maybe we can get a leaner, trimmer, more effective sense of what is going on in the world economy, and maybe that sense should be shared among people in various industries, in the manner of MITI. There can be no harm in a good system of indicative planning, and a lot of good may even come out of it.

The great unanswered question, of course, is whether we are in fact going to have to have some form of state capitalism. My suspicion -- I cannot answer the question -- is that the weak reindustrialization argument is going to get a very fair test over the next few months. Changes in the tax structure will, it seems to me, strengthen our ability to produce a margin of production above consumption that will increase our capital formation.

I really do not know whether this will be enough. If you took a poll of the senior staff of Business Week, I think you might get them split fifty-fifty on the question of whether, three or five years from now, we will in fact have state capitalism, with government really managing change. The argument on that, I think, is not yet clear, but the weaker form of the argument will soon be tested.

I think that the weak form of reindustrialization raises some issues that are very important, to members of the business community in particular. Businessmen are now perceived by the press and the media as being, to use an old joke, part of the deserving poor. The argument that they have been beaten up by excess regulation,

that they are overtaxed, that companies in other countries have a lot of advantages in competing with them is a strong argument, and it has been accepted by the media.

Over the next two years, business will be perceived by the public as getting a much better break than it has gotten in the past. It is therefore very incumbent on business to perform. I know that is general hortatorical nonsense, but it still must be said. We are going to get a test of trickle-down economics.

If business uses its new-found power and its new-found responsibilities in ways that are seen as predatory, we are going back to trickle-down economics. I am all in favor of trickle-down economics. It is the only kind of economics that makes any sense to me because without it there is little growth. Societies discover eventually that they have to have economic organizations that can accumulate capital. If you let the average voter accumulate capital, you would get no capital.

The Russians know this. Everybody knows it, really, and we have to do it, but it makes those who are accumulating capital vulnerable to attack if they are not using their new-found power carefully. Launching a great war against consumerism, for example, would be a terrible mistake, just in terms of how the average television viewer, who is very important, perceives what is going on in the economy.

The second problem is with the labor unions, which are relatively anachronistic institutions. But there is another side to that story. Unions have lived in an environment in which they feel under great pressure because they think that business is out to bust them. In fact, lots of businesses are out to bust them, and lots of companies including the one I work for, certainly do not want any unions in. In a period when business is getting the breaks, there is something to be said for magnanimity towards the trade union as an institution I do not say that there is a justification for magnanimity when it come to wages, because I do not think there is ever anything to be said for that. I am merely saying that in an era when business, to repeat, is getting the goodies, one has to be careful in these areas.

What I am really arguing for is this: If you are going to get more money for capital accumulation, try to use it in a relatively genteel fashion, fellows, please!

One other point is terribly important here. Management attitudes toward growth are terribly important. I agree with a lot of what John Connally says, and I disagree with a lot, but one thing

that I do agree with fundamentally is his statement that 90 percent of all corporate managers are pompous boobs. I also think that 90 percent of all journalists, trade union leaders, et cetera, are pompous boobs. The important thing is what the other 10 percent do, and the fact is that everything that has been said about U.S. business having relatively short-term goals is very definitely true at present.

Now, that, of course, is partly a result of inflation. When interest rates and currency values are going up and down as they do, what happens on the financial side of the balance sheet is terribly important to a company. One cannot realistically expect a lengthening of goals until inflation is reduced. Reducing inflation is the greatest contribution that can be made to lengthening management's view. Given that, particularly if financial market fluctuations and interest rate fluctuations and currency fluctuations are reduced, the lengthening of goals will come about almost automatically.

But even with the uncertainty about how this is going to happen, much can be said in favor of management's being shaken up and made to realize that investments in production are terribly important. I am production oriented. I work for a production unit. I am basically a factory foreman. I have production values, and nothing irritates me more than when my production values run into the financial values of McGraw-Hill, the corporation that owns Business Week. It really irritates me, because I want to go out and produce new products and new issues. And I am right, too, and they are wrong.

In terms of the functioning of an economy, too, those with production values are clearly right and those with financial values are clearly wrong. Those who again have talked about the short-term values of American management should understand that, at the margin, there should be a real effort to give the production (and research) people in the companies a bit more of a break relative to the financial people.

I would like to give you two other things to think about before I close. Are we winning the reindustrialization fight? Are we really going to win? I really wish I knew the answer. If it were not for OPEC, I would have a great deal of faith that five years from now the inflation rate will be considerably less than it is now, that investment as a ratio to GNP, or what will then be GDP, will be higher than it is right now, and that, in general, we will be on our road to progress.

There is, however, a tremendous problem coming out of OPEC, and it modified my enthusiasm. The fact of the matter is that if it is not a monopoly, it is something very close to it, and they can

squeeze the surplus out of us. Instead of that surplus coming to us, it goes to them. The demand for their product continues to be inelastic, and there are real problems in that area. I think this creates some real problems for reindustrialization, and we will have to see whether it will work or not.

Apart from that, it seems to me that, although we may be just starting to work on this problem, we have come pretty far over the past year in engineering consent for a change in the economy of the kind that is likely to in fact result, at least to some degree, in the reindustrialization of America.

8. REINDUSTRIALIZATION VS. NEW INDUSTRIALIZATION: THE ROLE OF CONGRESS

The Honorable George E. Brown, Jr.
Committee on Science and Technology
Subcommittee on Science, Research and Technology
U.S. House of Representatives
Washington, D.C.

SUMMARY

Mr. Brown reports on the accomplishments of the 96th Congress, what can be expected from the 97th Congress, the needs of industry, and an appropriate role for the federal government in fostering innovation and productivity. He defines the federal role as the provision of financial incentives to industry rather than direct support of innovation.

The dual approach of reindustrialization (upgrading current capabilities) and new industrialization (adding new fields of enterprise) is needed to solve the country's economic problems. The 96th Congress provided patent rights to small businesses and nonprofit organizations for government-sponsored work. Among the provisions of the Stevenson-Wydler Technology Innovation Act (PL 96-480) are university-based Centers for Technological Innovation and personnel exchange between universities, industry, and government. Mr. Brown anticipates that the 97th Congress will consider legislation in the areas of patent rights for larger firms, foreign trade, high technology small businesses, and tax measures to stimulate innovation.

8. Reindustrialization vs. New Industrialization: The Role of Congress

It is a pleasure to be here today to speak to you on a subject so critical to the future economic well-being of the United States. I refer to the health of our nation's industrial technology and those efforts to improve it currently labeled reindustrialization or new industrialization.

I have little direct expertise in industrial manufacturing, heavy industry, or its management. However, the Subcommittee on Science, Research and Technology has been examining and proposing programs involving reindustrialization within the broader issue of innovation and productivity for the past two years. I feel qualified, therefore, to speak on the state of Congressional interest and on some needs of industry and government.

Throughout the Subcommittee's work I have been struck repeatedly by the need to establish a cohesiveness among the many sectors of society -- industry with academia and government; management with labor; technologist with economist; and existing industry with new entrepreneurship -- to address the complex issues of industrial innovation and productivity. I must confess, therefore, that I find the implications of the topic of this symposium "Reindustrialization or New Industrialization" somewhat disturbing, as if it should be an either/or option.

Reindustrialization usually refers to the need to upgrade our industrial production capabilities to the most modern available. It reflects a recognition that we must be inventive and continue to invest in the mechanisms that foster innovation to keep our existing industries at the cutting edge of manufacturing technology. New industrialization, by contrast, is the establishment of totally new fields of enterprise. Together they produce the goods of our economy. Technology will benefit both, either as an upgrading mechanism or in defining totally new paths. One makes the best of our existing capabilities, while the other extends them. These are not mutually exclusive.

I will comment today on the state of Congressional interest in innovation and productivity, discuss what my Subcommittee has been doing, and discuss our legislative accomplishments and failures. I will also make several observations concerning what this nation could do to improve the state of its economy over the long term, and what you, as senior executives, and we in government can do to help.

While policy analysts and economists may differ on the degree to which continued decline in U.S. industrial R&D and innovation will have negative economic consequences, or on the means by which industrial innovation should be stimulated, the evidence seems to indicate that industrial innovation is important to economic growth and productivity. For this reason, Congressional interest in industrial innovation has been running high. Even given the uncertainty of changed leadership in the Senate and many new members in both Houses, I expect it to increase. It would be an understatement to say that all of Congress is concerned with this nation's economic problems -- inflation, per capita income, the balance of payments, and so forth. I think all of you already recognize that increasing technological innovation and productivity, brought about through reindustrialization and new industrialization, is a very large part of the long-run solution to our economic problems. I believe Congress, including our new members, will come to understand this and will be willing to take the steps necessary to foster industrial innovation for the good of our national economy.

At a May 1979 conference on Technology and Innovation for Manufacturing sponsored by Don Fuqua, Chairman of the House Committee on Science and Technology, it was noted that in an industrial country manufacturing accounts for two-thirds of wealth production, but that the U.S. is exhibiting a major trade deficit in manufactured goods associated with mechanical technology that some estimated might reach $40 billion by 1982. It was further pointed out that among industry, federal government, and universities, none had provided a focus toward machinery and manufacturing advances. The federal government has generally taken the position that in an essentially capitalist economy its role is not to directly support efficiency and innovation in the process of production. Rather, these should result from the financial incentives provided to industry. However, when this process weakens and the nation's economic position is affected, it becomes government's role to find ways to either increase incentives or decrease disincentives toward a healthier industrial economic climate.

What has Congress accomplished to date?

There has been action on patent policy and on the operation of the Patent and Trademark Office in the House and Senate Judiciary Committees, the House Committee on Government Operations, and the House Science and Technology Committee. Those of you participating in government-sponsored research are aware of the desperate need to achieve reform in the area of ownership rights for inventions arising from government-sponsored research and to upgrade the patent system. In the 96th Congress we obtained the needed consensus between both Houses to enact only partial reform; the bill H.R. 6933 was signed by the President on December 12 and provides that small businesses

and nonprofit institutions may keep rights to patents arising from federally funded projects. Extension of this to larger business awaits action in the 97th Congress.

Tax measures to stimulate industrial innovation received serious consideration in the House Ways and Means Committee and the Senate Finance Committee but did not become law. A significant reason for our failure to enact legislation was the lateness with which the past Administration acted to take any position regarding substantive tax reform for stimulating innovation. I expect tax measures directed at stimulating the use of innovative technologies to encourage productivity to be enacted in this new Congress.

The Senate Banking Committee considered foreign trade matters. The Joint Economic Committee looked into technology as part of a broad study of our economy. The House and Senate Small Business Committees looked into high technology small business. Retiring Senator Adlai Stevenson played a substantial leadership role in having the Senate Commerce, Science and Transportation Committee look broadly at the subject of industrial innovation.

My own subcommittee and our parent committee held over 30 hearings on innovation and productivity issues during the 96th Congress, focusing on patent policy, university-industry relations, federal laboratory utilization, Federal Drug Administration (FDA) new drug regulation, the concept of a National Technology Foundation, small business, and other subjects. Together with our counterparts in the Senate we were successful in obtaining enactment and presidential approval of S. 1250, the Stevenson-Wydler Technology Innovation Act of 1980.

That Act, now Public Law 96-480, is designed to promote university-industry cooperation by authorizing the Department of Commerce and National Science Foundation (NSF) to establish and support university-based Centers for Industrial Technology. Another thrust of the Act is to establish an Office of Industrial Technology in the Department of Commerce to study national industrial policy and carry out a Centers Program at the Department. Other elements include a section designed to increase the use of federally owned technology by providing improved transfer mechanisms and increased federal funding levels. The Act established a National Technology Medal to be awarded to innovative individuals or firms. Finally, a section of the Act promotes university-industry-federal exchanges of scientific and technical personnel. While I take great pride in that Act, it is only a piecemeal first step in what needs to be done.

In reporting fiscal year 1981 authorization bills for the National Science Foundation and the National Bureau of Standards the

Subcommittee strengthened the innovation programs of the Foundation and the Bureau by about $10 million each.

The Subcommittee began three years ago to examine the drug approval process of the Food and Drug Administration. What began as an exercise to look at whether there was a drug lag and what effect that had on depriving U.S. citizens of pharmaceuticals became an example of how the regulatory process is affecting innovation, markets, and exports of the technology and jobs in an industry. We are concerned about such effects on innovation and productivity and have recently released a report on this process. As the products of biotechnology emerge, we are continuing and extending our oversight in this area.

To learn directly what others are achieving in reindustrialization, innovation, and robotics some members of our parent committee have just this week visited Japan. I am looking forward to their report when they return. The issues are complex and extend beyond the technology to government-industry interaction and industry-employee relations which are different from those in our society.

While Congressional awareness that science and technology are at the cutting edge of solving our nation's economic problems has been growing, our legislative progress as measured by bills enacted has been only modest at best. I am continually frustrated by the slowness with which Congress acts regarding scientific and technological issues. Take energy issues, for example. Some of the energy programs we have recently enacted could and should have been enacted years ago.

When I described the Stevenson-Wydler Act, I characterized it as being "piecemeal." Congress, when dealing with issues related to science and technology, generally fails to enact comprehensive solutions. This, in my opinion, is caused by a variety of factors. Perhaps the main reason for our failure to act comprehensively is our committee structure, a structure that compartmentalized Congress into committees with different interests and jurisdictions. Earlier I named 11 committees that dealt with innovation issues over the last two years. There are more. Jurisdiction over important innovation and productivity issues is spread all over the House and Senate.

In the House, we are working for coherence through a voluntary Task Force on Industrial Innovation chaired by Les AuCoin from Oregon. I have been working with Les and the Task Force in efforts to inform Congress about the issues and to provide coordination. My subcommittee staff prepares and circulates a periodic newsletter, "Congressional News Notes on Innovation and Productivity," which is done in conjunction with the Task Force. Unfortunately, all of

the steps combined are still not sufficient to provide the degree of coordination needed.

Therefore, I have asked my subcommittee staff to formulate a comprehensive legislative package on innovation and productivity for consideration. The background for this package is an analysis of the industrial innovation initiatives announced by President Carter in October 1979. I have been critical of those initiatives as being far too little, but I am hopeful that they, and what we will do in the future, will not be too late. Many of the outgoing Administration's initiatives have been cast into law in the Stevenson-Wydler Act and, therefore, will be continued by the new Administration. However, much, much more is needed. What support the Reagan Administration will give needed efforts outside of the tax area is unknown. We will all have to wait and see.

While I have already touched on some of the problems and some attempts at their resolution, we have a very long way to go. Now let me turn further to what we could do to move our nation once more to the forefront of innovation and productivity.

In some industries or firms we are still at the forefront. The general impression the Subcommittee has of manufacturing, however, is that we are lagging.

What can or should be done will differ by industry and differ by whether we speak of reindustrialization or new industrialization. Our society's traditional position rests on the assumptions that economic market incentives generally provide inadequate private investment in basic research but that the decisions in selecting and carrying out technology development projects should be made by those responsible for their commercialization. Thus the basic tenets are that the federal government should stimulate R&D and innovation but that, except in the support of basic research generally or R&D for which the federal government may be the primary user, the federal involvement should be through indirect means. We therefore have a difference philosophically of how to approach the problems of reindustrialization or the evolution of new industrialization.

This country needs to find means to form a national consensus on what U.S. industrial policy should be. In U.S. society, too many special interest groups are pulling in too many different directions to develop a genuine consensus. A whole host of barriers to innovation exist in the U.S., ranging from government policies (or lack of them) to attitudes of business managers or labor unions. It is easy to see where the Congress and the Executive Branch have erectd barriers; it is far harder to remove those barriers because some segment of society -- some special interest group -- usually favored the barrier in the first place. Our foreign competitors such as

Japan do much better at forming a national consensus. We need to to spend more time developing a consensus on goals, and then government and industry need to make compromises to reach those goals. Otherwise, the present stalemates are likely to continue.

In the United States an adversarial relationship has developed between industry and government. If we are to succeed at enhancing innovation and productivity, we must follow the lead of nations such as Japan and develop more cooperative attitudes and behavior between industry and government. Our economic planning both on the national and individual business level must be long term and must not be directed at just what is politically hot today or just what shareholders want today. We must plan and act for the future.

Taxation reform is critical to the revitalization of our industry. We need to encourage savings, discourage consumption of depletable resources, and encourage investment in innovative and productive enterprises. Our tax laws must be structured to encourage business to invest in R&D. Tax reform, however, is not the sole answer. We must find ways to infuse small amounts of capital for the small entrepreneur, at the early stages when it is the riskiest. Various legislation already introduced addresses this issue. Other steps will be necessary, and it goes without saying that the government must continue to sponsor substantial levels of R&D where needed.

Those of you who are chief executive officers must recognize that the long-term growth of our industrial base will depend at least as much on technical acumen as business management acumen in policymaking circles. Often the pressures are to maximize return on existing enterprises coupled with a diminished reinvestment in new technological ventures. There is insufficient appreciation that any existing technology-based product is always at risk of becoming obsolescent. Many examples of this exist. I was pleased last month to address a joint meeting of deans of colleges of business and engineering. They have recognized the need for joint programs and the need to train technically wise talent as a part of a well-trained upper management pool.

The federal government's role is to invest in research and to foster mechanisms to transfer technology arising from that research to the industrial private sector where commercialization can take place. At the same time we must not set up barriers that discourage the needed investment by industry to take advantage of the new innovations and transfer them to commercial product or production. Our nation's support and incentive mechanisms seem to have fostered our abilities in research (as evidenced by our eminence in science and nobel laureates) but not in applying it. In the field of manufacturing technology even our basic research position is questionable compared with the Japanese progress.

A look at some industries and examples may help to emphasize my points. In the domestic steel industry few corporations have made significant capital improvements in the last 25 years (except for what has been forced on them as the result of environmental concerns) to replace old, obsolete facilities. A 1980 study showed continued dependence on relatively small, old, and poorly laid out plants while the profits over the last decade, as a percentage of investment, were high. As a result the rate of productivity is decreasing while profits are invested in non-steel ventures. Our American steel industry is in trouble. Clearly the strategy for reindustrialization, for upgrading our steel industry with not only basic facilities but also the technologically sophisticated mechanisms of production, should have been a long-term project of the industry itself.

A November 24, 1980 article in Business Week points to the interesting events and decisions of the DuPont Company as an example of what I described earlier. DuPont for a long time relied on getting the most it could out of its fibers line while neglecting its deep roots in research for new growth. In this case the innovation was marshalled primarily to the existing product line; this was reindustrialization, without sufficient emphasis on new fields, new industrialization. The realization of trouble came when the product line, as a high percentage of total revenues, began to drop. DuPont is now returning to large investment in new technologies while maintaining a parallel effort in their existing base and bringing technical training back to the top corporate structure.

Robotics is another area for our examination. This is a field where basic research is being supported by NSF and other mission agencies. It is an example of an area originally intended for purposes of reindustrialization but can itself become a production and export industry. The Japanese invested heavily and are ahead of us in certain aspects of this work toward reindustrialization. Furthermore, they expect to export about 20 percent of their product within a few years and establish an international leadership position in a new industry.

The area of biotechnology is a final example I would like to touch on today. This certainly falls into the new industrialization category. It is an excellent example of what we can do and where we must be cautious not to disrupt the incentive for transfer to commercialization. The earliest and most fundamental work was supported through our basic science research mechanism, NSF, and through the specific mission agency, the National Institutes of Health in this case, as it moved to the health application arena. Now that it has clear commercial potential there is no lack of private sector interest. The role for government now is to insure orderly and safe development and to encourage the private sector to take initiatives. Thus there is no need for government infusion of funds but rather

for government to maintain the environment without undue disincentives through the regulatory process. At the same time the government should monitor the commercialization of biotechnology to ensure that potential negative effects can be minimized.

As we look ahead to the 97th Congress I see continued strong interest in innovation and productivity and the need to stimulate both reindustrialization and new industrialization. I expect some of the legislation that could not be completed this past year will be reintroduced. We may optimistically look to a December 19 interview in Science of Simon Ramo, cochairman of President-elect Reagan's science and technology task force, for some insights to forthcoming policy from the Executive branch. I think it noteworthy that Mr. Ramo supports the need for a more favorable climate for innovation. He does not embrace the premise that all be left to the private sector and insists that government involvement in R&D is necessary. He embraces the notion that a broader consensus among the sectors of our society is needed and believes that tax reform and regulatory reform are necessary, which is not so different from the work already begun in the 96th Congress.

The problems we face in revitalizing our industry, in fostering productivity and innovation, are not simple. I am pleased to have had the opportunity to address your meeting today and look forward to working with you during the 97th Congress.