Setting the Record Straight On Semiconductors

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The increasing interest in industrial policy in the United States has been coupled with charges that Japanese industrial policy is unfair for its targeting select industries and supporting their growth.

Specifically, the charge has been made that governmental targeting has been a major factor in the very rapid growth achieved by the Japanese semiconductor industry, and the force of repetition has given this argument such an air of plausibility that it is now accepted by U.S. legislators, industrialists, and other people who should know better. Industrial policy has been enshrined in the myth of Japan Inc.

One of the main studies triggering this crescendo of criticism of targeting policy for the semiconductor industry is the February 3, 1983 report by the United States Semiconductor Industry Association (SIA): "The Effect of Government Targeting on World Semiconductor Competition." Subtitled "A Case History of Japanese Industrial Strategy and Its Costs for America," this report attributes the growth of the Japanese semiconductor industry to Japanese government protection and assistance, labels this government role unfair, and lambasts the Japanese government for violating free market principles.

In reading this SIA report, however, three things should be borne in mind: (1) The report plucks industrial policy out from among the many factors accounting for the semiconductor industry's growth and assumes that it is the only factor. (2) The report assumes that its analysis of the 64K RAM market is equally valid for the whole of the semiconductor industry. (3) Even this limited analysis of industrial policy and the 64K RAM market is flawed throughout with wrong data and misleading generalizations.

Before rebutting the SIA report, however, it should be noted that the origins of the semiconductor problem between the United States and Japan are different from the origins of other trade friction. Whether in steel, automobiles, or whatever, most other friction has arisen from the comparative advantage of the Japanese industry, the consequent growth of Japanese sales within the U.S. market, and the resultant trade account imbalance. In semiconductors, however, the U.S. industry is still the world's leader and commands approximately 60% of the world market as U.S.-Japan trade has been expanding in equilibrium. Indeed, the 64K RAM sector which the SIA report concentrates on as though it were typical of the whole is only a small part of either the U.S. or world markets in semiconductors, yet it is this minor sector that the SIA report concentrates on in raising the alarm about Japan's "unfair" competitive strength.

This situation has been aptly characterized by Phillip Trezise of the Brookings Institution (in a panel discussion on "Outlook for U.S.-Japan Economic Relations in 1983" at the Johns Hopkins University U.S.-Japan Study Center on February 3, 1983) as: "We are in danger... of putting ourselves in a position where we are fighting a dragon that doesn't have much fire and doesn't breathe as hot a flame as we have been led to believe."

Nevertheless, because the SIA report has gained such wide currency and sparked such a furor with its allegations of an unfair Japanese industrial targeting policy, it deserves detailed rebuttal.

U.S. and Japanese Shares of the World IC Market (1982)

	U.S. Share	Japanese Share
IC Total	62	31
MOS	60	35
Microprocessor	64	33
Memory	65	33
Logic	49	40
Bipolar	62	27
Linear	51	35
Digital	74	19

Source: EIAJ
Note: Where totals do not add up to 100, the remaining share is held by European companies.

(unit: %)

SIA claim re Japanese industrial strategy

The Japanese government has set domination of the global high technology field as its long-term goal, assigned the semiconductor industry an important part in this strategy, and, in close cooperation with private Japanese companies, has embarked upon a policy of industrial restructuring, production rationalization, market protectionism, and subsidies to both R&D and production, and has taken a variety of other policy initiatives to enable the domestic industry to gain a leadership position in the Japanese market. In effect:

(a) Ministry of International Trade and Industry (MITI) consults with the industry and sets goals for the entire industry and then, in line with these goals, guides the restructuring of the semiconductor industry, guides the formation of cartels, and provides immunity from the provisions of the antitrust law.
(b) Demand has been ensured for domestic manufacturers by systematically excluding foreign (i.e. U.S.) companies and products from the market.
(c) There has been a "VLSI project" constituted as a joint government-business research effort on VLSIs, and the Japanese semiconductor industry is also nurtured by wholly-funded subsidies, low-interest loans, and other assistance as well as by preferential taxation and other relief.

As a result of these policies, the Japanese semiconductor industry has achieved rapid growth and was ready to begin an export drive by the end of the 1970s.

The market interventions of the Japanese government have served to distort the free market principles in the semiconductor industry and doomed the U.S. industry to a disadvantageous position.

EIAJ (Electronic Industries Association of Japan) rebuttal

The policies of the Japanese government are fully in accord with the recommendations of the Japan-U.S. Working Group on High Technology that the government's role in high technology fields should be limited to improving the environment for private-sector investment and R&D and ensuring free and open flow of goods, investment and technology.

Full liberalization was effected in November 1974 for investment and for trade the next month (December 1974), and the government has sought to promote the uninhibited flow of goods, capital and technology. There are no barriers to either foreign companies or foreign products. In 1982, for example, IC imports to Japan were worth ¥127,382 million, a 2.5-fold increase over the 1974 import level of ¥51,066 million. Looking at corporate entry, Texas Instruments, for example, was also a going concern in Japan in the 1960s.

The role of the Japanese government in the semiconductor industry has been primarily indirect and indicative of an effort to create an environment conducive to vigorous private-sector activity. There has been no direct intervention such as the nationalizations or other policies seen in some countries, nor has there ever been any government guidance on industrial restructuring or cartel formation.

In Japan, as in the United States, R&D assistance, low-interest financing, interest assistance, and other policies have been implemented when necessary to supplement market mechanisms and promote economic development. Moreover, there have been fewer of these policies in Japan than in the U.S. Governmental R&D expenditures in the semiconductor field totaled $127 million in the period 1976–82, less than half of the U.S. government expenditures of $279 million in the shorter 1978–82 period. While the Japanese VLSI project is over, the U.S. is currently engaged in a project of even larger scope and importance in its VHSIC (Very High Speed IC) project (1979–84 with a total budget of approximately $300 million and with the participation of Motorola, Fairchild and other semiconductor producers).

The dramatic development of the Japanese semiconductor industry is due to fierce market competition, untiring research and development efforts, long-range plant investment, solid marketing, and quality control nonpareil; and the only role the government has played has been that of sound economic management (e.g. the low inflation rate) to create a climate conducive to research and development as well as investment, and hence to promote competition within the semiconductor market.

Comparison of Governmental R&D Assistance in Semiconductor Field

U.S. (1978-82)	
VHSIC	78
VHS project	201
Total	279

Japan (1976-82)	
VLSI project	121
New-function element	6
Total	127

(unit: $ million)

Sources: MITI for Japan and National Research Council for U.S.

According to "A Report on the U.S. Semiconductor Industry" by the U.S. Department of Commerce (September 1979), the U.S. semiconductor industry's per-annum average R&D investment during the years 1958-76 was $2,415 million, of which the government contributed a per-annum average of $702 million (29.1%).

SIA claim re R&D assistance

The Japanese VLSI project was constituted with private companies conducting research and development with government funding in order to develop the VLSI as the centerpiece of semiconductor high technology.

With cooperation among MITI, Nippon Telegraph and Telephone Corp. (NTT), and Japan's five leading computer companies (NEC, Hitachi, Toshiba, Fujitsu, and Mitsubishi), the participating companies in this VLSI project have divided the research to avoid duplication and are

EIAJ rebuttal

The U.S. government is actively providing research contracts, R&D assistance, (e.g. the "VHSIC project" in VLSI) in super computers, and in other fields where it is unreasonable to hope for smooth development on a purely private-sector basis. Such government leadership and R&D promotion in these high-risk fields is of essential importance to pushing back the economic frontiers and revitalizing the world economy.

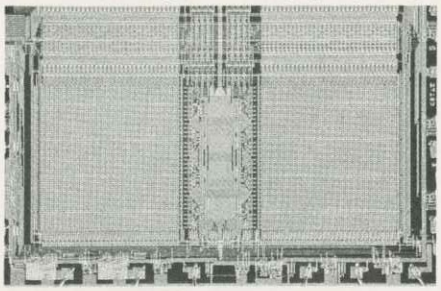
It is from same perspective that Japan engaged upon its VLSI development project (1976–79; total government expenditure approximately ¥29.1 billion) and the new function element project (1981–82; total government expenditure approximately ¥1.8 billion).

The first, the VLSI project, was research in the very basic field of micro-processing technology, and it was not intended to either develop or commercialize the 64K RAM. The patents derived from this project have been made available to participating companies and, through them, to large numbers of U.S. firms (including IBM and Fairchild) through cross-licensing agreements.

Likewise, because this project was concerned not with product development and commercialization but rather with basic research, the joint research by the participating

sharing the fruits of their research in what might be termed a research cartel. With this VLSI project, the participating companies gain access to state-of-the-art technology at very low cost, and thus it was that the six leading Japanese companies were able to produce the 64K RAM as an advanced VLSI device by the fall of 1980.

MITI assistance has continued even after the termination of this VLSI project, and the new function element project is one of the most conspicuous. This project is funded entirely by the government under the guise of "contracted research" with MITI putting up ¥25 billion (US$106 million at an exchange rate of $1 = ¥235) and the participating companies are under no definite obligation to repay anything.



companies in this VLSI project has been deemed to have no impact on free competition and is not a "research cartel." Even in the U.S., there is heightening awareness of the importance of cooperative or joint research. The Justice Department's "Antitrust Guide Concerning Research Joint Ventures" (announced in the fall of 1980) is explicit in stating that joint research in basic research does not work to stifle free competition. Thus it was that a number of leading U.S. semiconductor and computer companies joined together in December 1982 to form Microelectronics and Computer Technology Corporation (MCC) to conduct joint research in their areas of interest and obtained a Justice Department ruling that MCC was not in violation of the Antitrust Law.

The new function element project is intended to do basic development work on those devices needed to sustain social and economic progress in the decade of the 1990s. All proprietary rights accruing from this project become the property of the Japanese government, and all companies (Japanese, American, or otherwise) are assured non-discriminatory access to this information.

In the U.S., semiconductor technology has been a focus of attention since the 1950s, and the Department of Defense (DOD), Defense Advanced Research Project Agency (DARPA), and other agencies have served as conduits for massive subsidies and funding which far surpass anything the Japanese government has done. U.S. government R&D assistance in semiconductors in the 1978–82 period ($279 million), for example, was approximately 2.2 times as much as similar Japanese government assistance in the longer 1976–82 period ($127 million). Typical is the VHSIC project now under way in the U.S. (1979–89 with funding projected to reach approximately $300 million). This VHSIC project, which includes among its aims the development of a VHSIC production line, is being promoted with the active cooperation of Texas Instruments, Fairchild and other leading semiconductor manufacturers. In addition, the U.S. government is also involved in research on (GaAs) ICs, permeable base transistors (PBTs), and a host of other commercial technologies.

Such government-supported R&D projects have inestimable and undeniable spinoff benefits for the U.S. semiconductor industry.

Investment Tax Credits

U.S.	Provided for investment in new equipment and machinery, this tax credit is worth 10% of the value of new equipment and machinery with a depreciation life of 3 years or more and 6% of the value of new equipment and machinery with a depreciation life of less than 3 years.
Japan	No equivalent system.

It is estimated that U.S. industry took tax write-offs worth approximately $650 million on plant investment during the years 1976-82. This is more than 160 times more than the approximately $4 million that the Japanese semiconductor industry is estimated to have saved through the availability of low-interest financing from the JDB during the same period.

U.S. and Japanese Tax Measures for R&D

U.S.	Tax credit worth 25% of all investment in R&D testing which exceeds the average level for the past three years. No upper limit on the value of the tax credit, and this credit may be carried forward for 15 years.
Japan	Tax credit worth 20% of all investment in R&D testing which exceeds the highest annual level in the past. Upper limit on the value of the tax credit of one-tenth of the company's corporate tax.

SIA claim re financial assistance

In addition to this R&D assistance, the Japanese semiconductor industry receives other financial assistance from the government.

One form this takes is preferential lending from the Japan Development Bank (JDB). This is a major conduit for funneling government money to the semiconductor industry. Moreover, along with acting as a subsidy, this funding from the JDB also serves to put the government's seal of approval on the individual companies and to enable them to obtain ready loans from the major commercial banks. Thus even if

EIAJ rebuttal

U.S. preferential taxation provisions designed to spur the private sector to greater R&D are more industry-advantageous than those in Japan. In the U.S., a tax credit is allowed for 25% of all R&D spending beyond the average for the last three years, with no upper limit on the amount of this credit and with the credit's being carried forward for 15 years. In Japan, the equivalent tax credit is 20% of all R&D spending in excess of the highest past level and with a limit of 10% of the company's corporate tax. In addition, the U.S. also has an investment promotion tax incentive system which provides a 10% tax credit on equipment with a life of 3 years or longer (6% on equipment with depreciation lives of less than 3 years) and which has no equivalent in Japan.

These systems are especially advantageous to the semiconductor industry and other high technology fields where there is heavy spending on R&D and equipment investment, and they have contributed considerably to the development of the U.S. semiconductor industry.

Moreover, the recent emphasis on science and technology education (*vide* President Reagan's January 1983 State of the Union Message) is also, in the long run, expected to channel resources more efficiently into the high technology fields.