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1 Trade Politics and the Semiconductor Industry

Douglas A. Irwin

1.1 Introduction

On March 27, 1987, President Ronald Reagan announced that prohibitive (100 percent) tariffs would be imposed on $300 million worth of imports from Japan. This unilateral retaliatory action—the largest and the first such action against this U.S. ally in the postwar period—arose from the Reagan administration's determination that Japan had violated a 1986 bilateral agreement on international trade in semiconductors. More than any single event, this action dramatized the seriousness with which the U.S. government viewed the semiconductor agreement, which in turn reflected how important the government regarded the interests of U.S. semiconductor producers.

Indeed, the very existence of a semiconductor trade agreement was testimony to the U.S. industry's success in getting the government to act on its behalf in its dispute with Japan. Few industries ever receive the sustained, high-level attention needed to result in the negotiation of a governmental agreement on trade in just one sector. Such a sectoral agreement is attractive from the perspective of virtually any import-competing industry because it virtually guarantees the institutionalization of trade policy for that industry. In the case of semiconductors, getting such special treatment in the first place was more difficult than perpetuating it: once the agreement was on paper, the policy debate within the U.S. government was essentially over. The government, including those agencies that may have originally opposed the

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agreement, then had a direct stake in its enforcement, lest the credibility of such foreign commitments be undermined. Once the agreement was in place, it required monitoring and at some point renewal or renegotiation. This provided a natural rationale for ongoing contacts between the industry and the government, providing the industry with easy access to key policymakers and allowing close industry-government ties to develop.

The semiconductor industry's success on these dimensions did not prevent the 1986 accord with Japan from arguably representing the most controversial U.S. trade policy action of that decade. In this agreement, the government of Japan agreed to end the "dumping" of semiconductors in the United States and in other markets and to help secure 20 percent of the Japanese semiconductor market for foreign producers within five years. The antidumping provisions—resulting in part from the extraordinary self-initiation of an antidumping action by the U.S. government against Japan—later proved to be in partial violation of the General Agreement of Tariffs and Trade (GATT) and drew the ire of prominent high-technology semiconductor-using industries, particularly computer systems manufacturers. Computer producers formed a countervailing interest group to oppose these provisions and eventually forced them to be dropped in the 1991 renegotiation of the agreement.

The 20 percent market share provision—an exceptional request from the standpoint of traditional U.S. trade policy—was the negotiated solution to the problem of market access in Japan based on circumstantial evidence that the market was closed to foreign semiconductor producers.[1] This provision proved successful in that foreign producers achieved a 20.2 percent market share in Japan in the fourth quarter of 1992, although the share fluctuated subsequently. But by concentrating on specific, quantitative "results" and "outcomes" rather than the principle of market access, the provision provoked sharp debate: it was either heralded as a positive, concrete step toward gaining greater sales in Japan ("making the cash registers ring," as it was commonly put) or scorned as a step toward cartelized "managed trade" and export protectionism via government-fixed market shares. Despite this controversy, the provision has survived as a part of U.S. trade policy toward semiconductors, having been supported and perpetuated by three different U.S. trade representatives (USTRs—Clayton Yeutter, Carla Hills, and Mickey Kantor) serving under three different presidential administrations, the most recent of which promised to expand the concept of import targets with Japan to other sectors. (See table 1.1 for a chronology of the trade dispute.)

This chapter examines how the U.S. semiconductor industry became the beneficiary of this unprecedented sectoral trade agreement by analyzing the

1. The theory of commercial policy now includes this new instrument of trade policy in its analysis: Jagdish Bhagwati has dubbed such market share targets as "voluntary import expansions" (VIEs), the import counterpart to voluntary export restraints (VERs). See the analysis and critique of import targets in Irwin (1994).

Table 1.1 Chronology of the U.S.-Japan Semiconductor Trade Dispute

1977	Semicondutor Industry Association (SIA) formed
1981–82	Cyclical downturn in the semiconductor industry
	Japan achieves domination of the DRAM market
	SIA first approaches U.S. government about trade relief
1982–83	U.S.-Japan High Technology Working Group negotiations
1985	Cyclical downturn in the semiconductor industry
	U.S.-Japan agree to eliminate tariffs on semiconductors
	SIA files section 301 petition alleging import barriers in Japan
	Micron files antidumping petition on 65K DRAMs
	President Reagan delivers "fair trade" speech; USTR begins self-initiating section 301 cases
	Intel, AMD, and National Semiconductor file antidumping petition on EPROMs
	Commerce Department initiates antidumping investigation on 256K+ DRAMs
1986	ITC issues affirmative "material injury" final ruling in 64K DRAM case
	U.S.-Japan reach a semiconductor trade agreement, preventing dumping and improving market access in Japan
1987	U.S. retaliates against Japan for noncompliance with the agreement
1988	DRAM prices soar in the United States as computer demand recovers
1989	Computer Systems Policy Project (CSPP) founded by semiconductor users IBM, Tandem, and Hewlett-Packard to oppose the agreement
1991	U.S.-Japan renegotiate 1986 agreement, removing antidumping provisions and formalizing 20 percent market share target
1992	Foreign share of Japan's semiconductor market breaks 20 percent in the fourth quarter

political and economic forces leading up to the 1986 accord and shaping subsequent events. The primary purpose is to understand how various groups—firms in the U.S. semiconductor industry, agencies within the U.S. government, and domestic semiconductor-using industries—interacted in the political realm in the determination of policy. To this end, I shall address how the economic structure of the industry and the legal framework of U.S. trade institutions shaped the opportunities of and the constraints on the industry and policymakers, and hence helped determine the observed outcomes. Particular attention will be devoted to how the political process functioned in the semiconductor case, with its unusual amalgamation of antidumping and market-opening actions which have been both celebrated and vilified. Furthermore, much of the interesting politics and negotiations behind U.S. semiconductor trade policy was not between the industry and the government as monolithic actors, but between factions *within* the industry and *within* the government. Although such maneuverings are often hidden from the public record, I shall attempt to shed some light on the consensus-building process within the industry and the government that ultimately led to the 1986 agreement and the willingness of the Reagan administration to impose high tariffs against a large foreign ally.

1.2 Organization of the U.S. Semiconductor Industry

Semiconductors are a key microelectronic component used in a multitude of goods ranging from televisions and microwave ovens, aircraft and automobiles, computers and calculators, to telephones and watches. The origins of the semiconductor industry date from 1947 when Bell Labs developed the first transistor and from 1959 with the invention of the integrated circuit. Integrated circuits, in which increasing numbers (at first hundreds, then thousands, and now millions) of transistors are etched onto a thin wafer of silicon, quickly became the building block of the industry. Propelled by the demands for such circuits by the military and space programs, which generated sizeable revenues to be plowed back into research and development (R&D) expenditures, the U.S. semiconductor industry grew rapidly in the 1960s. Rapid growth and technological change continued in the 1970s and 1980s with the proliferation of commercial applications for semiconductors, particularly in computers, telecommunications, and consumer electronics.[2]

The rapid growth experienced by the U.S. industry is illustrated in table 1.2, which indicates that the nominal value of shipments grew at a 15.7 percent average annual rate from 1975 to 1991, an average that masks negligible growth in 1981–82 and 1989–90 and a 17.5 percent contraction in 1984–86.[3] By contrast, overall industrial production in manufacturing increased only by an average 4.5 percent annually over the same period. Competition among semiconductor producers is marked by rapid technological change and continual product innovation driven by the devotion of substantial resources to R&D. In 1989, for example, the U.S. electronic components industry spent 8.3 percent of net sales on R&D, compared with 3.1 percent for U.S. industry overall.[4] These R&D investment expenditures reflect firms anticipating production in the next generation of semiconductors and result in relatively short product life cycles.

Semiconductors are often divided into three broad product categories, discrete devices (basic transistors), optoelectronic devices (light-sensitive chips), and—by far the largest category—integrated circuits. Integrated circuits accounted for over 80 percent of U.S. semiconductor consumption in 1985 and include several different types of products, including logic chips (for arithmetic and decision-making functions), microprocessors (the central processing

2. As demand shifted away from military applications toward new consumer electronics (often produced outside of the United States), foreign firms began to enter the market and the position of U.S. semiconductor producers began to erode gradually in the 1970s. Military demands accounted for roughly half of U.S. semiconductor shipments in the early 1960s but dropped to 10 percent by 1981.

3. The undeflated average growth rate severely understates real output growth because semiconductor prices have experienced secular declines. See fig. 1.1.

4. Electronic components (SIC 367) is a broader industry aggregate than semiconductors (SIC 3674). When federal funds are included, the industry spent 9.3 percent of net sales (National Science Foundation, *Research and Development in Industry, 1989*, NSF 92–307 [Washington, D.C.: Government Printing Office, 1992], Detailed Tables, 77).

Table 1.2 Selected Economic Indicators of the U.S. Semiconductor Industry

Year	Value of Shipments (billion $)	Total Employees	Production Workers	Payroll per Employee ($)	New Capital Expenditures (million $)	Exports (billion $)	Imports (billion $)
1975	3.277	96,700	52,400	12,414	282.9	n.a.	n.a.
1976	4.474	102,500	57,900	13,377	362.3	n.a.	n.a.
1977	5.323	114,000	63,500	14,044	409.0	n.a.	n.a.
1978	6.435	130,800	73,600	14,517	636.9	1.785	1.661
1979	8.267	142,900	81,100	15,741	850.5	2.521	2.351
1980	10.501	160,700	87,300	18,268	1,595.8	3.347	3.157
1981	11.702	169,500	84,900	20,088	1,493.1	3.873	3.189
1982	12.430	166,500	81,300	22,732	1,723.8	4.579	3.434
1983	14.339	169,300	84,100	25,322	1,831.6	5.589	4.171
1984	19.135	192,300	96,100	27,124	2,817.6	7.846	5.531
1985	16.487	190,400	91,800	26,346	2,831.7	5.596	4.411
1986	15.785	172,900	79,200	28,728	2,220.2	5.939	5.054
1987	19.795	184,600	87,400	29,766	1,920.8	7.783	6.559
1988	22.597	179,400	86,500	32,884	2,680.9	10.963	9.035
1989	25.708	184,000	90,500	34,316	3,132.0	12.329	12.745
1990	25.977	181,800	87,700	35,382	3,439.3	12.169	13.324
1991	29.668	175,000	86,200	37,090	2,945.0	13.083	14.348

Source: U.S. Department of Commerce, Bureau of the Census, *Annual Survey of Manufacturers* (Washington, D.C.: Government Printing Office, various years).

Note: Data are for SIC code 3674, semiconductors and related devices. Export and import figures are from unpublished census data on U.S. trade by SIC code. They are affected, however, by the off-shore assembly provisions of the U.S tariff code and by the substantial trade in components.

unit in computers), and various application-specific integrated circuits (configured for particular user needs). Even within these categories semiconductors perform quite different functions and are generally imperfect substitutes for one another, with specific devices often filling small market niches. Amid this product variety, technological progress tends to be incremental, and specific product generations are not clearly defined.

Much of the intense international competition and consequent trade dispute in the 1980s, however, centered on a unique set of digital integrated circuits—memory chips—which are primarily used in computers to store and retrieve data in various forms.[5] Memory chips accounted for 18 percent of all U.S. semiconductor purchases in 1985. DRAMs, the largest volume of all semiconductor products, constituted 7 percent of the total market and EPROMs another 3 percent (see Federal Interagency Staff Working Group 1987, 5). Within the several categories of memory chips, the market approximates perfect competi-

5. Random-access memories (RAMs) temporarily store data or information; dynamic random-access memories (DRAMs) are designed to store large amounts of data, while static random-access memories (SRAMs) are faster but hold less information. Read-only memories (ROMs) store data more permanently than RAMs; erasable programmable read-only memories (EPROMs) allow data programs to be easily erased and reprogrammed.

tion: DRAMs, for instance, are a standardized product and are almost perfectly interchangeable regardless of which firm produces them. In addition to product homogeneity, DRAMs are marked by well-defined generations that give rise to distinct product cycles. In 1970, the 1K RAM chip (capable of storing 1,024 bits of information) was introduced. This was followed by the 4K chip in 1973, 16K in 1976, 64K in 1979, 256K in 1982, 1M in 1985, 4M in 1989, and 16M in 1991. A key industry transition occurs when the cost per bit becomes equivalent for adjacent generations of chips. For example, in 1978 price per bit equivalency was achieved between 4K and 16K chips, accelerating the demise of 4K demand, and hence the value of investments specific to the production of 4K chips, and the assent of 16K demand. Firms unprepared for such transitions could see their sales evaporate in the space of months.

Such rapid product cycles imply that firms have a relatively short period in which to earn sufficient profits to recover their generation-specific R&D and capital investments. The riskiness of having a relatively short horizon in which to recover the earlier R&D and up-front capital expenditures is compounded by low marginal costs of production (the actual material and labor costs of manufacturing semiconductors are quite small), which leads to the temptation during periods of weak demand to undercut the price of rivals and thereby undermine industry profitability. Both the large fixed costs (in the form of R&D and capital expenditures) and learning by doing imply that only a few firms can survive in the memory chip segment of the industry.[6] Continuous innovations in high technologies offset this tendency and allow small start-up or spin-off firms to enter the semiconductor market and possibly experience rapid growth (though the failure rate is high).

These distinctive aspects of the semiconductor industry give most firms an interest in obtaining certain government policies to reduce risks in the sector: more favorable tax treatment for R&D, relaxed antitrust restrictions on joint research ventures, greater patent protection for chip designs and innovations, and so forth. These common interests were behind the formation of an industry association in 1977. Perhaps the strongest impetus for an industry group, however, arose from the entry of Japanese semiconductor producers in the late 1970s. This new competition shocked the U.S. industry and provided a common external threat that motivated the start of concerted political action. Before discussing Japanese competition in more detail in the next section, some additional economic features of the U.S. semiconductor industry that bear upon its entry into the political market require analysis.

In *The Logic of Collective Action* (1971), Mancur Olson pointed to economic size and concentration (both geographic and economic) as key determi-

6. Firm-specific learning by doing, wherein past production experience provides valuable information that allows firms to reduce their cost of production, generates dynamic economies of scale in that firms that have large (cumulative) output should have cost advantages over other producers. For a recent evaluation of learning by doing in the semiconductor industry, see Irwin and Klenow (1994).

nants of whether firms could successfully organize for cooperative political action. Even though current U.S. trade laws enable individual firms to seek import relief even in the absence of industry collective action, these factors remain influential in the political market and are worth describing in the context of the semiconductor industry. In 1989, the value of U.S. semiconductor industry shipments was $25.7 billion and total U.S. employment was 184,000 (roughly 1.3 percent of total manufacturing employment). Compared with the two manufacturing sectors most notable in receiving U.S. trade protection—the textile and apparel industry with shipments of $130 billion and employment of 1,671,000, and the motor vehicle industry with shipments of $149 billion and direct employment of 250,000—semiconductors may seem small. Yet the steel industry—with shipments of $63 billion and employment of 256,000—is only twice as large as the semiconductor industry, which is certainly larger than, say, the shipbuilding industry (with $9.6 billion in shipments and employment of 119,000).[7] While the semiconductor industry is a relatively small part of the economy as a whole, it is not (unlike the products it produces) minuscule by standard measures. Furthermore, the industry has often been thought to take on an economic importance larger than such numbers would indicate, owing to its "strategic" position in the high-technology sector with "critical" downstream linkages to the computer and defense industries (to borrow the rhetoric of such industry groups as the National Advisory Committee on Semiconductors).

What the industry lacks in sheer economic size is compensated by a fair degree of concentration in a few parts of the United States. According to the 1987 Census of Manufactures, about a third of U.S. semiconductor employment was located in California, with Arizona, Texas, and New York accounting for another third. Particularly because of its concentration in "Silicon Valley," part of northern California around San Jose, the industry has been able to capture the attention and services of California's congressional representatives. During the 1980s, Republican Senator Pete Wilson and Democratic Senator Alan Cranston both strongly championed the cause of U.S. industry, sponsoring congressional actions to assist the industry and to pressure the executive branch to act upon the interests of the industry.

Geographic concentration is matched by some degree of economic concentration. Firms in the industry range from the enormous—such as International Business Machines (IBM), by far the largest semiconductor producer in the world in the mid-1980s—to the minuscule—such as tiny Micron Technology, which specialized exclusively in DRAMs. In 1989, IBM employed about 383,000 people and had $41,586 million in revenues, generating net income of $3,758 million (9.0 percent of revenue). An unknown fraction of its re-

7. These figures are taken from U.S. Department of Commerce *U.S. Industrial Outlook, 1992* (Washington, D.C.: Government Printing Office, 1992). The data are for semiconductors and related devices (SIC 3674), textile mill (SIC 22) and apparel and other textile products (SIC 23), motor vehicles and car bodies (SIC 3711), and steel mill products (SIC 3312, -15, -16, -17).

sources are devoted to semiconductors, but IBM was reputed to have semiconductor output nearly 25 percent greater than the next largest competitor, Nippon Electric Corporation (NEC), in the mid-1980s. By contrast, Micron had 3,000 employees in 1989 with a net income of $106 million on sales of $446 million (23.8 percent of revenue).[8] Despite this gross mismatch in terms of overall size (Micron's sales were only two-tenths of 1 percent of IBM's), both firms proved equally pivotal in determining U.S. trade policy in semiconductors.

Between these extremes lie a handful of prominent midsized firms that constitute the core of the U.S. semiconductor industry. Five key firms (1989 data) are Texas Instruments (TI), with 70,000 employees and a net income of $291.7 million on revenues of $6,521.9 million (4.5 percent of revenue); Motorola, with 104,000 employees and a net income of $498 million on net sales of $9,620 million (5.2 percent); Advanced Micro Devices (AMD) with 13,072 employees and a net income of $46.1 million on sales of $1,604.6 million (2.9 percent); National Semiconductor with 32,200 employees and suffering a net loss of $23.2 million on net sales of $1,647.9 million (−1.4 percent); and Intel with 22,000 employees and a net income of $391.0 million on sales of $3,126.8 million (12.5 percent). The 1991 market share rankings of these firms in the North American semiconductor market (including captive production) were 9.8 percent for Intel, 9.3 percent for Motorola, 5.1 percent for TI, and 3.8 percent for National Semiconductor.[9]

The political economy of the industry's trade policy efforts, however, hinges more on structural features of these firms—particularly the distinction between captive and merchant firms—than on firm size or profitability. Captive producers—such as IBM, American Telephone and Telegraph (AT&T), Hewlett-Packard, and Control Data—are vertically integrated and manufacture semiconductors mainly for internal consumption, that is, for use in downstream goods and services that they produce and sell themselves. These firms rarely, if ever, supply their semiconductors to other producers.[10] Primarily because of IBM's position as the world's largest semiconductor producer, captives account for a substantial share of U.S. output, but they may have little impact on semiconductor prices and trade because most of their transactions take place within the firm.[11] Yet captives are generally unable to produce the entire range of semiconductors for their own use, and they are often large purchasers

8. These 1989 data, as well as those in the next paragraph, are taken from *Moody's Industrial Manual, 1991.*

9. U.S. International Trade Commission (USITC 1993b, 7).

10. After deregulation, AT&T briefly sold DRAMs on the open market. IBM reportedly feared the antitrust implications of entering the DRAM market, as well as the awkward position of supplying a key input to its competitors in the computer market. In 1992, however, IBM began selling its DRAMs on the merchant market.

11. Captives accounted for 15.8 percent of the North American semiconductor market in 1991, 11.2 percentage points of which was IBM (USITC 1993b, 7).

of semiconductors, particularly IBM, which is frequently a major consumer to the industry as a whole.

Merchant firms, by contrast, produce semiconductors for sale to other firms. Motorola is the largest U.S. merchant firm that, along with TI, is diversified and produces semiconductors for its own products—telecommunications equipment in the case of Motorola, calculators and defense electronics in the case of TI. Motorola and TI also have production facilities in Japan and export to the United States. Other firms, including Intel, AMD, National Semiconductor, and Micron, are smaller, less diversified, and more purely merchants in that all production is sold to other semiconductor-using firms. These companies also differ in size and in the range of products they produce.

The divide among firms as captives or merchants plays a key role in the political economy of the industry. Merchant firms potentially reap a substantial gain from diminishing import competition and maintaining high prices for semiconductors; captive producers are likely to be net purchasers of semiconductors and desire low input prices. These sharply diverging and conflicting interests within the industry have plagued its efforts at unified political action, and each group has had to make partial accommodation with the other in the collective industry association.

The international nature of semiconductor production also influences the types of trade policies the industry has sought. In an effort to reduce costs, the U.S. semiconductor industry by the early 1970s began to move labor-intensive assembly operations overseas, particularly to Southeast Asia. Off-shore assembly was encouraged by sections of the U.S. tariff code under which only foreign value added is taxed upon the reimportation of designated goods. It may not be uncommon, for example, for a semiconductor to be designed in the United States, fabricated in Japan, assembled in Malaysia, and distributed for sale in Europe. Unlike industries traditionally seeking protection against import competition, that is, domestic producers whose assets are generally fixed in the United States (such as textiles and steel) and whose rivals are based abroad and export to the United States, the international character of semiconductor production and assembly implies that import protection via nondiscriminatory tariffs or quotas are not desirable to the industry since many U.S. firms are the importers. In fact, as will be discussed below, the U.S. industry (i.e., management) spearheaded a successful effort to eliminate most tariffs on semiconductor products in both the United States and Japan in 1985. The fundamental challenge facing U.S. firms was not excessive imports to be remedied through higher tariffs, but competition from non-U.S. producers regardless of the location of their production.

While industry concentration and location relate to the costs and benefits of collectively organizing for political activity, the theory of international trade points to the economic interests of various factors of production, such as labor and capital owners, in shaping the configuration of trade policy lobbying. As

Mussa (1974) and others describe, these economic interests depend on the intensity with which the factors are used in a given sector of production and their specificity to that sector. Economic theory suggests that the more specific and immobile are labor and capital in a given sector of employment, the more their fate is tied to the fortunes of that sector and the more likely they are to seek policies favoring that sector.

Unlike many import-competing sectors in which organized labor plays a major role in the industry's political action, semiconductor workers did not directly participate in the quest for government relief from Japanese competition. That average weekly wages in the semiconductor industry, which averaged $614 in 1987, were roughly 24 percent above the average for manufacturing overall might suggest that labor should be concerned that an industry contraction would place this premium in jeopardy.[12] Yet the apparent lack of political activism among semiconductor workers can be explained by evidence that many of them have skills useful in various related industries, thereby ensuring their mobility across the high-technology sector. Ong and Mar (1992) calculated how a sample of semiconductor workers laid off in 1985—a year in which half the workforce was furloughed (either temporarily or permanently) and industry employment in northern California fell by 14 percent—were faring two years later based on data from California's unemployment insurance program. They found that workers reemployed by other semiconductor or high-technology firms earned comparable wages to those rehired by their original semiconductor employer, suggesting the presence of sector-specific rather than industry- or firm-specific human capital.[13] If such labor is mobile across the high-technology sector, workers do not have a particularly strong stake in the fate of semiconductor firms per se as long as other high-technology sectors are performing well. That labor was largely silent in the semiconductor trade dispute does not mean that its interests were neglected by politicians: labor's political action committee (the International Brotherhood of Electronic Workers [IBEW] Committee on Political Education) channeled $1.6 million to political candidates in 1985–86 and over $2.2 million in 1987–88, according to the Federal Election Commission.[14]

Thus, in the many congressional hearings held on policy toward the semiconductor industry in the 1980s, testimony was taken almost exclusively from corporate executives and industry officials, not labor representatives. The stance of management, the principal capital owners in the industry (merchant firms were not uncommonly still controlled by their founders), hinged primar-

12. U.S. Department of Labor, *Employment and Wages, Annual Averages for 1987* (Washington, D.C.: Government Printing Office, 1988). These figures are unadjusted for skill differences.

13. In their sample, 57 percent of workers were rehired, 16 percent became reemployed in other semiconductor or high-technology firms, and 27 percent found employment in other sectors. Workers reemployed in non–high-technology sectors, however, suffered earnings losses of 27–36 percent relative to rehired workers.

14. This does not include contributions by several IBEW local union political action committees (PACs).

ily on whether the firm was a merchant or captive producer of semiconductors. Captive producers, most importantly IBM, were cautious about initiating any trade dispute with Japan. Not only did IBM's substantial investments in Japan provide a rationale to avoid trade friction, but as a net purchaser of semiconductors it had little interest in policies that might result in higher semiconductor prices. TI was similarly cautious about acting against Japan: with a long-standing direct investment stake in Japan (it was the first U.S. firm to produce semiconductors in Japan), TI did not wish to jeopardize its economic or political ties there, nor would it welcome trade restraints that might prevent it from importing into the United States production from its Japanese facilities.

Executives from merchant producers were the most vociferous proponents of policies that would diminish Japanese competition and raise the price of their output. Politically active Motorola often took an aggressive stance against its Japanese rivals, filing antidumping complaints against Japanese exports of pagers and cellular phones during the 1980s, for example. Micron, which was not well diversified and only produced chips for sale on the open market, strongly supported import protection against Japanese competition and pushed for decisive actions against the "dumping" of semiconductors in the United States. Larger merchant firms such as Intel, AMD, and National Semiconductor were also concerned about competition from Japan and wanted intellectual property protection to prevent foreign firms from copying chip designs.

In 1977, several merchant producers banded together to form the Semiconductor Industry Association (SIA) to promote common interests.[15] The SIA was founded by five industry leaders (all but one were either chairmen or chief executive officers)—W. Jerry Sanders III (AMD), Robert Noyce (Intel), Wilfred J. Corrigan (Fairchild), Charles Sporck (National Semiconductor), and John Welty (Motorola). Each of these firms competed fiercely with one another on certain dimensions—suing each other over alleged patent violations, for example, or even conducting espionage against one another—but they could agree on several common policy objectives, such as obtaining greater patent protection for chip designs, improving the tax treatment of R&D investment, and heightening political awareness of the emerging Japanese competition.

Despite entering the policy arena as political novices, the SIA did not find a particularly hostile audience in Washington for any of these objectives, especially in Congress. But because the few firms that the SIA comprised lacked the stature needed to give the organization visibility and political weight in Washington, specific accomplishments in the form of legislation or policy action were initially absent. To redress this weakness, the SIA broadened its membership in 1982 to include vertically integrated captive producers, such as IBM, Hewlett-Packard, Digital Equipment Corporation (DEC), and AT&T. Beyond adding to the political standing of the SIA, this move had a more important impact on its lobbying activities. The inclusion of the captive producers

15. See Mundo (1992) for a general discussion of the SIA's organization and objectives.

exerted a moderating influence on the SIA trade policy stance because it forced the merchants to consult with the captives in order to arrive at an industry consensus on policy positions.[16] Four large merchant producers also formed PACs with which to provide campaign contributions to national political candidates. The disbursements of these PACs appear to be related to the trade dispute with Japan: payments totaled $354,318 at the peak of the dispute in 1985–86, 40 percent higher than in 1983–84 and 17 percent higher than in 1987–88 after trade tensions had simmered down.[17]

Several characteristics distinguish the SIA from most other industry interest groups. The industry association remains an extremely small institution: in 1992, the entire SIA staff consisted of just 13 people, seven professionals and six office personnel. The firms that the SIA comprises sought to prevent the organization from becoming a large, independent, staff-driven entity that would pursue objectives increasingly divorced from the industry that it was intended to represent. The SIA's primary function is to provide a forum for industry leaders to reach a consensus on issues of joint concern and to oversee any political action based on whatever consensus emerged. The main forum for determining the industry's views on trade policy is the SIA's Public Policy Committee, consisting of representatives from several (but not all) member firms.[18] In carrying out that consensus, the SIA coordinates the industry's political strategy but must (by virtue of its size) rely heavily on the work done by individual companies. Thus, it is the individual companies that constitute the SIA that are mainly engaged in political action, rather than the association as an independent entity. The SIA staff rarely testify before Congress, for example, but work with member companies to enlist or designate the upper management of a given firm to testify on behalf of the association.

The SIA was also deliberately located in San Jose, California, not in Washington, D.C., to ensure close contact with industry. However, many members of the SIA—such as Motorola, IBM, TI, and Intel, for example—maintain their own Washington offices to monitor policy developments of interest. These offices primarily support the political activities of the firms, but they also work on SIA initiatives. Consequently, there was little need for the SIA to maintain an office in Washington, because the work of the industry association fell heavily on member firms that already had offices there. The SIA had an additional resource in Washington: the services of the law firm Dewey Ballantine. By subcontracting part of its policy activity to Dewey Ballantine, the SIA avoided the overhead costs of maintaining staff in Washington, as well as gain-

16. By 1992, the SIA had 32 regular members, although not all are equally politically active.

17. These data are from the Federal Election Commission. The semiconductor PACs include the National Semiconductor Corporation Employees PAC, the Intel PAC, the Motorola Employees Good Government Committee, and the Constructive Citizenship Committee of Texas Instruments. Many of the contributions went to California congressmen.

18. The SIA has other committees on, for example, industry statistics, occupational health, environment, and communications.

ing the counsel of politically astute Washington insiders, including the well-connected trade lawyer Alan Wolff. Such contracting reduced the start-up costs of political action, and the SIA reportedly spent only about $1 million per year on Washington activities during the mid-1980s.

Yoffe (1988) points to other factors of the SIA's organization and strategy that allowed it to advance its political agenda in Washington successfully after 1982. In contrast to many large industry associations in which the primary workload falls to the staff level, the lobbying activity by the semiconductor industry was distinguished by a high degree of personal involvement by chief executive officers and upper management. Robert Noyce, a co-inventor of the integrated circuit and chairman at Intel, reportedly spent 20 percent of his time in Washington during the early 1980s. Such high-level involvement commanded respect among politicians and gave semiconductor producers access to policymakers at higher levels of government than the ordinary staff of any industry association could normally achieve. Extensive internal debates within the SIA before seeking specific policy actions allowed a consensus to emerge among members on a common approach to a given issue of collective interest. This consensus added to the credibility of the industry association, which targeted its efforts at friendly institutions within the government (often Capitol Hill, the Commerce Department, and the Office of the USTR).

Producer interests seeking protectionist policies sometimes face the countervailing force of downstream users of that particular good. For a period of time, the SIA did not face or was able to defuse potential opposition to its proposals. Computer manufacturers are the most important domestic users of memory chips, and it is precisely from this group that one would expect potential opposition to proposals that would raise semiconductor prices. Semiconductors constituted 6.4 percent of the value of output in the electronic computing equipment industry in 1982, a share that rose to 15.0 percent in 1986.[19] With shipments of $59.8 billion and total employment of 263,000 in 1989, the computer industry (narrowly construed) was also slightly larger than the semiconductor industry.[20] Semiconductors also constituted 6.7 percent of the value of output in the telephone and telegraph equipment industry, 8.3 percent in the radio and television communications equipment industry, and 5.0 percent in the home entertainment equipment industry in 1986. These semiconductor consumers were broadly organized in the American Electronics Association (AEA), a large group that included many SIA members and one that supported the SIA's complaint about the lack of market access in Japan. With the rise in DRAM prices subsequent to the 1986 agreement, the AEA proved too unwieldy and diverse to organize opposition to the accord, and computer

19. Calculated from input-output tapes of the U.S. Department of Commerce, Bureau of Economic Analysis.

20. From U.S. Department of Commerce, *U.S. Industrial Outlook, 1992* (Washington, D.C.: Government Printing Office, 1992), for computers and peripherals (SIC 3571, -2, -5, -7).

manufacturers formed a splinter group to counter the SIA's influence on U.S. semiconductor trade policy.

Individual Japanese producers, their industry association (the EIAJ—Electronics Industry Association of Japan), and the government of Japan were the only other major groups engaged in political action during the semiconductor trade dispute. Japanese firms hired legal counsel in the United States to defend them at various administrative hearings (related to both the antidumping and section 301 actions) and hired specialists in public relations and policy monitoring. According to the Department of Justice, all Japanese firms and the EIAJ spent $3.8 million in 1985–87 on semiconductor trade-related political action, the bulk of this expense in 1986. Roughly $1.1 million over these three years was devoted, mainly by the EIAJ, to countering the section 301 action. This suggests that lobbying expenditures by the SIA and Japanese producers were roughly comparable on this particular issue.[21]

1.3 Semiconductor Competition from Japan

Japan's emergence as a major producer of semiconductors beginning in the late 1970s manifested itself in a dramatic increase in its share of the world semiconductor market. At the end of the 1970s, U.S. firms accounted for over 60 percent of the world market and Japanese firms less than 30 percent; by mid-1985, the market shares of the two countries were about equal at 45 percent, after which time the Japanese took the lead. This success was most spectacular in the DRAM market, arguably the natural class of semiconductors in which a Japanese entrant could achieve dominance given the relatively straightforward design technology and high degree of quality control required in large-volume DRAM production. In the worldwide DRAM market, the United States and Japan traded places: the U.S. share plummeted from 70 percent in 1978 to 20 percent in 1986, while the Japanese share jumped from under 30 percent to peak at 75 percent in that same period.[22]

The rapid expansion of Japanese production did not vastly increase Japan's import penetration in the United States. Figures in Tyson (1992, 129) indicate that Japan's share of total U.S. semiconductor consumption rose from 7.5 per-

21. Office of the Attorney General, *Administration of Foreign Agents Registration Act* (Washington, D.C., various issues). I am indebted to Steve Husted for providing these data to me. Yoffe (1988, 89) cites no source for the claim that Japanese firms spent $30–$50 million opposing the trade petitions of SIA members in the mid-1980s. The $1 million annual figure of SIA does not include the costs borne by private firms in their Washington lobbying effort, particularly in pursuing separate antidumping actions, nor PAC contributions. The figure for Japanese firms is also inflated partly due to the redundancy of a half-dozen or so Japanese firms seeking separate legal counsel in the United States (owing to potential conflicts of interests among the attorneys) rather than coordinating their activities as a group like U.S. firms.

22. After making initial inroads in the 16K DRAM market, Japanese producers shocked U.S. producers with the rapid introduction of the 64K chip in 1978. Japanese firms accounted for about two-thirds of the 64K DRAM market from 1979 to 1986 and achieved over 80 percent of the smaller but burgeoning market for 256K DRAMs from 1982 to 1986. See Tyson (1992, 106ff.).

cent in 1982 to 12.3 percent in 1984, before dropping back to 9.8 percent in 1986. The U.S. share of the Japanese semiconductor market exceeded Japan's share of the U.S. market until the mid-1980s and was roughly comparable for a few years thereafter. But 70 percent of Japanese semiconductor exports to the United States were DRAMs, where they accounted for about 20 percent of the U.S. DRAM market in the mid-1980s. Japan's share of the U.S. market was not fully indicative of the force of the new competition in DRAMs because, in an integrated world market, Japanese producers could only capture market share abroad by forcing the market price downward everywhere.

The rise of Japan's semiconductor industry was driven by the rapid expansion in demand for transistors from the domestic consumer electronics industry. The different basis for the growth of the American and Japanese semiconductor industries reflected the considerable differences in end-use demand for semiconductors in the two markets: in Japan, consumer electronics provided 47 percent of semiconductor demand (the comparable figure in the United States being 8 percent), while data processing constituted 44 percent of U.S. demand in 1984. The different structure of final demand also led to a different way of meeting that demand in Japan. Whereas the U.S. industry was composed primarily of independent merchant producers of modest size, the major Japanese semiconductor producers were also the major semiconductor consumers (i.e., the electronics firms). According to Okimoto (1987, 394), the 10 largest firms accounting for 80 percent of Japan's semiconductor production also accounted for 50 percent of Japan's total consumption. A few large, quasi–vertically integrated producers—such as NEC, Toshiba, Hitachi, Fujitsu, Mitsubishi, Matsushita, Sharp, Sony, Sanyo, and Oki Electric—dominated Japan's industry and ensured a high degree of captive production, ranging from 75 percent for Sanyo, to 55 percent for Matsushita, 50 percent for Fujitsu, and down to about 20 percent for NEC, Hitachi, Mitsubishi, and Toshiba in the mid-1980s. These firms also tended to specialize in the production of certain types of semiconductors and trade these devices with one another based on long-term contracts or long-standing ties to one another.

Japan overtook the United States in overall semiconductor production by making substantial investments in production capacity. Indeed, throughout the late 1970s and early 1980s, the U.S. industry failed to keep pace with the investment rates of Japanese firms. According to the Organisation for Economic Co-operation and Development (OECD 1992, 147), Japanese firms devoted roughly an average of 28 percent of their sales to capital spending during 1978–85, while the comparable figure for U.S. firms was 16 percent. Such large investments were facilitated by a structural feature of Japanese industry that perhaps constituted its most decisive advantage over U.S. producers. Japanese firms are often affiliated with a large bank that can play a role in corporate governance through equity ownership and corporate board participation (such activities are illegal in the United States). Such bank ties not only gave Japanese semiconductor firms easier access to capital but allowed them to weather

industry downturns much better than their U.S. counterparts. Hoshi, Kashyap, and Scharfstein (1990) find evidence that Japanese firms with bank ties produce and invest more in periods of financial distress (cash flow disruptions) than firms without such bank connections. Thus, large and diversified Japanese firms with deep financial resources to undertake investments and sustain losses were pitted against undiversified, midsized merchant firms in the United States.

Indeed, continued production and investment by Japanese firms in the face of slack demand baffled and infuriated U.S. producers, who would scale back both activities in industry recessions. In the aftermath of the industry downturn in 1974–75, a period in which foreign competition was not yet a serious concern, U.S. semiconductor firms were cautious about investing in additional production capacity. Consequently, there was a shortfall in U.S. capacity when semiconductor demand surged in 1977—even IBM entered the merchant market as a purchaser of DRAMs. Then when price per bit equivalency between 4K and 16K DRAMs was achieved in 1978, new Japanese producers aiming to enter the 16K market were able to satisfy the world demand that U.S. producers could not meet. Japan seized 40 percent of the 16K DRAM market by 1979. This situation repeated itself in the next recession of 1981–82. Demand again slackened just as U.S. firms had caught up and became well established in the 16K market. Japanese firms continued to invest and shifted production up to 64K chips, capturing 70 percent of that market by the end of 1981.

The Japanese government also played a modest role in fostering domestic production of memory chips as a by-product of its effort to promote the domestic computer industry. The Ministry of International Trade and Industry (MITI) sponsored the Very Large Scale Integration (VLSI) program of 1976–79, which directed $200 million in funds over four years, as well as interest-free loans, to several major manufacturers of semiconductors, such as Fujitsu, Hitachi, Mitsubishi, NEC, and Toshiba. These firms formed cooperative laboratories for the joint development of basic semiconductor technology (manufacturing technology and circuitry design), although not product development. In comparison with similar programs in the United States (albeit skewed toward defense-related and not basic research), formal Japanese support for its semiconductor industry was modest at best. But the perception that the programs constituted "unfair industry targeting" by MITI was fully exploited by the U.S. semiconductor producers and generated sympathy for their pleas in Washington.

Aside from the different financial and economic structure of the Japanese semiconductor industry, U.S. firms faced several additional obstacles beyond their control. The SIA attributed the investment difficulties of member firms to the high cost of capital in the United States in the early and mid-1980s compared with Japan. The industry's problems were exacerbated by the substantial appreciation of the U.S. dollar on foreign exchange markets in the early 1980s, which harmed U.S. exports of low-margin DRAMs and provided a favorable

boost to the Japanese industry. The U.S. industry also left itself exposed to the potential entry of foreign rivals in several ways. The industry was unprepared for a change in process technology away from the standard N-channel metal oxide semiconductor (NMOS) to the complementary metal oxide semiconductor (CMOS) favored by Japan. Compounding these technical problems were questions about the quality of U.S. semiconductors. In a widely publicized paper presented at an industry conference in 1981, a representative from Hewlett-Packard presented evidence that the firm experienced many fewer defects on 16K chips from Japanese producers than from U.S. producers. This U.S. producers heatedly denied, but the perception (and later acknowledged reality) of a quality gap allowed long-term supply contracts to shift to Japanese firms.[23]

All of these factors contributed to an exodus of U.S. firms from the DRAM market: while there were 15 U.S. producers of the 4K chip, 12 of the 16K chip, and at one time 10 producers of the 64K chip, all except two merchants were driven from the market. Most firms simply abandoned DRAM production and concentrated on other product lines, but one firm (Mostek) went bankrupt.

With the onslaught of Japanese competition, two issues framed the U.S. industry's complaints: "dumping" and market access. The dumping complaints arose from the periodic sharp price declines that were a feature of the industry recessions. As Baldwin (1994) points out, the semiconductor market is one in which price rather than output adjusts in response to demand fluctuations; even in the industry recession of 1985, for example, output continued to grow rapidly while prices fell steeply. This is a consequence of the underlying economic structure of the industry: low marginal costs of production induce firms, even in periods of soft demand, to cut margins and maintain production at high levels to generate additional revenue.[24] Such industry recessions had occurred in the absence of foreign competition (as in 1974–75), but the rapid buildup of production capacity by Japanese firms (and their willingness to continue production and investment in the face of an adverse cash flow situation, due to the bank ties discussed above) exacerbated the concomitant price collapses when demand was slack. This contributed to the steep declines in world prices in 1981 and 1985, illustrated in figure 1.1, of which the U.S. industry was a casualty. Despite the U.S. industry's complaint that such "dumping" was "predatory" and "unfair," price declines of this sort clearly do not require predatory intent or unfair competition when high production and inventory levels confront a negative demand shock.[25]

The U.S. industry also complained about the lack of access to Japan's mar-

23. This is recounted in Okimoto, Sugano, and Weinstein (1984).

24. Marginal costs are so low that it may not pay to reduce output and thereby sacrifice revenues that might pay off fixed costs or be invested in the next generation of semiconductors. Learning-by-doing effects, wherein cumulative experience helps improve yields and reduce costs, provide firms with an additional incentive to keep output high even when demand is slack.

25. Dick (1991) and Flamm (1993a) analyze the issue of semiconductor dumping.

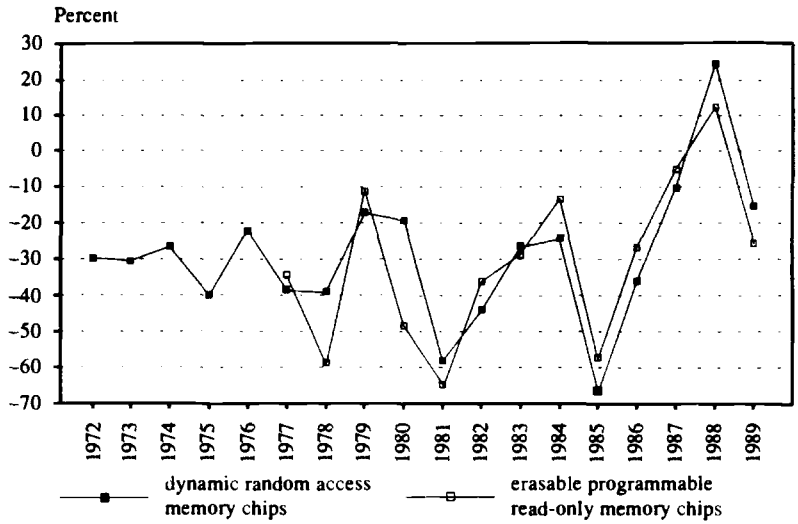

Fig. 1.1 Fisher-ideal price indexes, 1972–89
Source: Flamm (1993b, 273).

ket. Prior to 1975, imports of semiconductors into Japan were restricted by formal quotas and prior-approval requirements, and foreign investment was so strictly regulated as to be essentially forbidden. These restrictions were liberalized in 1975, after which few formal governmental trade barriers remained in place. Yet the U.S. share of the Japanese market scarcely budged after 1975. Supported by evidence that was necessarily anecdotal, the SIA claimed that informal nontariff barriers lingered in Japan after 1975 and that MITI used active countermeasures to undermine the liberalization. One explanation for the failure of the formal liberalization to alter the U.S. share was the structure of the Japanese industry. Not only was the structure of final demand different, but U.S. merchants encountered difficulties in selling to captive producers and overcoming long-term relationships between Japanese firms.[26]

26. As Okimoto (1989, 103ff., emphasis added) points out:

> The difficulties of breaking into the organizational nexus are particularly frustrating for foreign producers of high-tech intermediate goods, because the enclosed and long-term nature of relations between buyers and sellers alters the character of spot-market, arms-distant transactions. . . . Instead of meeting all their needs on the merchant market, Japanese computer companies make their own semiconductors and sell what they do not use. Captive, in-house production thus imposes limits on the expansion of foreign shares in Japan's semiconductor market. . . . Japanese industrial organization emphasizes the importance of extramarket factors, especially the strong preference for stable predictable, long-term business relationships based on mutual obligation and trust. This has had the effect of raising the barriers to entry from the outside, whether by foreign manufacturers or by nonmainstream Japanese producers. *Such nontariff barriers, deeply embedded in the structure of the industrial economy, are not directly connected to Japanese industrial policy.* But their existence, whether by design or by accident, serves basically the same function as formal measures of home market protection—only more effectively, because they do not diminish the vigor of market competition between domestic producers.

The SIA sought to blame both the dumping and market access problems on the Japanese government, enabling them to invoke the politically attractive rhetoric of "fair trade" and to argue that the playing field of international competition was skewed. This was precisely the interpretation in *The Effect of Government Targeting on World Semiconductor Competition,* published by the SIA in 1983, which set out to "describe the decade or more of coordinated effort by the Japanese government to put the Japanese producers in a dominant world-wide position in key product lines."

According to the SIA, Japanese government support took three forms. First, the government provided direct and indirect financial assistance to the domestic industry. The SIA claimed that anywhere from $507 million to $2 billion was directed to Japan's semiconductor industry during 1976–82 in government funds, as well as tax breaks and other advantages. These promotion policies supposedly provided a "favorable environment" that gave firms a willingness to invest even during a recession. By reducing risks, this led to capacity-building races and, with a downturn in domestic demand, export "avalanches." Second, the government formed a research cartel within the domestic industry to pool R&D resources and promote large firms. The government's aim was to "organize and channel the collective resources of Japan's largest electronic firms" to achieve domination of the world market. In addition, the government telecommunications monopoly transferred at little cost to NEC, Fujitsu, and Hitachi the design and manufacture technology of 256K DRAMs. Third, the government protected the domestic market for its semiconductor firms by condoning and reinforcing "buy Japan" policies among its major producers and consumers. According to the SIA, the government undertook active countermeasures to undermine the liberalization in 1970s and 1980s. By securing the home market for domestic producers, Japanese firms benefited from the cost reductions associated with production experience, thereby assisting in their penetration of the world market.

There are two noteworthy elements to this key SIA document. First, it does not explicitly accuse Japanese firms of dumping. The report argues that overcapacity led to aggressive pricing by Japanese firms, driving prices lower than they otherwise would be. But the report, in effect, concedes that because Japanese costs of production were not known, no dumping complaint could be made. This is significant: while many individual U.S. semiconductor producers accused Japan of dumping from the late 1970s, throughout the entire trade dispute the SIA itself never filed an antidumping petition. The captive producers in the SIA prevented the group from taking a strong position on the dumping issue until the 1986 accord, when the merchant firms reasserted themselves in determining SIA positions.

Second, the document pins the blame for the lack of U.S. market access squarely on the Japanese government, not on the behavior of private firms or the structure of the Japanese market. This reflects the SIA's preparation for a section 301 action against Japan. Section 301 of the Trade Act of 1974 provided a remedy for foreign unfair trade practices, but at this time had only

been used to attack government policies (unlike the antidumping laws, which relate to the prices charged by private firms). If the R&D and capital investments were made solely by shrewd private firms in Japan without government support, the sense of unfairness, and hence the claim to government assistance, would have been lost.

To remedy the situation, the SIA called for the U.S. government to "announce as U.S. policy that foreign industrial targeting practices will not be allowed to undermine U.S. technological and economic leadership in this critical industrial sector." In addition, the "U.S. government must identify, analyze, and counter the distorting effects of foreign industrial targeting practices" by monitoring foreign developments such as predatory export drives and market barriers, promising to enforce U.S. trade laws as necessary. This is as close as the SIA came in this document to advocating antidumping duties. However, one recommendation stands out: "U.S. firms must receive real, not 'cosmetic' market access, reflected in significantly greater participation by U.S. firms in the Japanese market. This will require an affirmative action program to normalize competition in Japan. The Japanese government should establish necessary programs to see that this result is achieved" (SIA 1983, 6).

Thus, the report reflected the divisions within the SIA—no consensus on whether antidumping measures were appropriate, but stronger sentiment that the Japanese market must be "opened up" in such a way that "the cash registers ring." But the U.S. government lacked effective policy instruments to suspend the R&D or investment policies of another country or to recast the vertical links or organizational structure of private foreign firms. Hence, the legal requirements of U.S. trade policy forced the SIA to address only the trade-related symptoms of its problem, namely, the exports of semiconductors from Japan (through antidumping measures) and imports of semiconductors by Japan (through section 301).

1.4 Early Industry Pressure, 1977–84

The demands by U.S. semiconductor producers for trade relief are strongly associated with the industry recessions of 1974–75, 1981–82, and 1985–86; in intervening periods of high demand, the attention of industry executives was diverted from pressing the government for actions on their behalf. The industry recession of 1974–75, predating large-scale production by Japanese firms, was not marked by significant foreign competition, and hence there was no significant pressure to limit imports or take other trade-related actions.[27] Yet Japan's entry into the semiconductor market helped trigger the formation of the SIA

27. In 1971, Sprague Electric Company, of North Adams, Mass., petitioned the U.S. Tariff Commission for adjustment assistance under section 301 of the Trade Expansion Act of 1962. Sprague complained about imports of capacitors, transistors, and integrated circuits, but the commission determined that imports as a result of concessions granted under trade agreements were not a cause of serious injury.

in 1977. But until the industry was actually harmed, there was little the government was prepared to do. "After a transcoastal pilgrimage to Washington to inform Robert Strauss, the U.S. Trade Representative during the Carter Administration, that 'the Japanese are coming,'" writes Flamm (1993b, 256 n. 13), "semiconductor executives were reportedly dismayed to get a 'so?' reaction from Strauss." The SIA prompted a Senate subcommittee of the Committee on Banking, Housing, and Urban Development to request a report from the International Trade Commission (ITC) on the competitive position of the U.S. industry just as Japanese firms were making inroads in the 16K DRAM market in 1978. Issued in late 1979, the ITC report concluded that the U.S. industry could maintain its lead despite trade barriers abroad and foreign government support for their industry.

Steeply falling prices for semiconductors during the industry recession of 1981, along with the early Japanese capture of 70 percent of the market for 64K DRAMs, triggered a more concerted political response by the U.S. industry. "It was at this juncture in the fall of 1981," recalls Clyde Prestowitz (1988, 148), then deputy assistant secretary for international economic policy in the Department of Commerce, "that representatives of the U.S. semiconductor industry began making regular trips to Washington," among them Robert Noyce of Intel, Charles Sporck of National Semiconductor, and W. Jerry Sanders III of AMD. According to Prestowitz (1988, 149–50), who championed the industry's cause within the government:

> These representatives of the semiconductor industry visited the departments of Commerce, State, and Treasury as well as the U.S. Trade Representative and members of Congress. They asked not for protection but for an end to the Japanese dumping, for the same opportunity to sell in Japan as the Japanese had in the United States, and for an end to Japanese copying of new chip designs. They got a reception as cool as the autumn weather in Washington. The lawyers, academic economists, and career bureaucrats who filled many key government positions shared a suspicion of business as protectionist and opposed to consumer interests. . . . Lionel Olmer and I, who represented the Commerce Department in these meetings with industry, disagreed, however, with the majority of other officials.

This cool reception can be traced to several things. First, the newly installed Reagan administration had an ideological or, perhaps more accurately, rhetorical commitment to free trade and limiting government intervention in the economy. The initial reaction of most Reagan officials to any industry complaining about foreign competition was likely to be one of skepticism. Many officials believed that this was the first time that these insulated U.S. producers had to confront the rude shock of foreign competition and that a healthy dose of such competition was no cause for alarm. Second, the U.S. semiconductor industry was hardly on its deathbed. While sales of the U.S. merchant semiconductor firms fell 7.1 percent in 1981, they had risen almost 30 percent in each of the preceding three years. According to SIA statistics, the merchant industry was

still profitable: after three years in which pretax income as a percentage of sales was roughly 12 percent, this measure slipped to 4.7 percent in 1982 before registering a slight loss of −1.4 percent in 1983.

Furthermore, in the absence of a formal complaint under U.S. trade law, it was unclear what specific action the industry wanted the government to undertake. Motorola seriously considered filing an antidumping petition on 64K DRAMs in early 1982 but failed to do so to avoid antagonizing Hitachi, a Japanese partner, and for lack of industry support: IBM, as a new member of the SIA, strongly opposed such a move, and ultimately the SIA took no formal action. Instead, Motorola requested that the Commerce Department informally monitor Japanese prices. This request put government officials in an awkward situation because they could not really act without a formal complaint—"our only tools were bluff and persuasion," lamented Prestowitz (1988, 150), who attributed the lack of a formal complaint from Motorola to the cost and length of time such an action would take rather than to divisions within the industry. At any rate, Lionel Olmer, who as under secretary for international trade was responsible for administering the antidumping laws, warned MITI that the Commerce Department was inclined to monitor Japanese chip prices in the United States. This led to an interesting instance of government agencies working at cross-purposes: the mild threat appeared to "work" in that MITI informed Japanese firms of this possibility and exports to the U.S. were reduced, but just months later the Department of Justice launched an antitrust investigation into reports of Japanese collusion to raise prices in U.S. market![28]

The idea of a section 301 action was also broached in 1982. However, USTR William Brock advised the SIA against filing a petition because the case appeared weak. While the Japanese had captured a large share of the DRAM market, the U.S. share of the world semiconductor market was still roughly twice Japan's share and the industry appeared to be in reasonable financial health as well. Thus, the semiconductor industry was viewed as fundamentally sound and Japanese competition healthy for the industry. In this context, Brock reported the administration consensus that a section 301 action would not be viewed favorably.

Yet in the midst of the sharpest U.S. recession in the postwar period with widespread fears of "deindustrialization," concerns about the fate of this "sunrise" industry could not be dismissed entirely by the administration. The entrepreneurial mystique surrounding Silicon Valley high-technology industries had bipartisan appeal in Congress, which demanded the administration at least appear to be doing something about high-technology trade with Japan. Consequently, Brock formed a U.S.-Japan High Technology Working Group to relieve trade-related tensions, although the working group's negotiations with

28. Flamm (1993b, 262) reports that "the Japanese semiconductor industry openly acknowledged that these reductions in exports were spurred by MITI guidance." Nothing came of the antitrust investigation.

Japan did not have a precise goal and were not viewed as a top priority within the U.S. government. Prestowitz (1988, 153–54) complained that

> we had to operate within the bounds of a consensus obtained from the various agencies on the U.S. negotiating team that included members of the Office of the U.S. Trade Representative, the Council of Economic Advisers, the National Security Council, the Office of Management and Budget, and the departments of State, Labor, Treasury, Commerce, and Defense. The consensus was that, while it was appropriate to request better market access, asking for a specific market share or sales volume would violate free-trade doctrine and hence be unacceptable. Similarly, with regard to dumping, collecting data on the volume of shipments was acceptable—but not on prices, because in view of the Justice Department that might violate antitrust laws on price fixing. . . . Thus, before even talking to the Japanese, we limited ourselves to asking simply for a more open market, whose meaning we did not define, and a system of gathering statistics on semiconductor shipments. Moreover, the consensus, strongly influenced by the State Department and the National Security Council, would not allow—even as a tactic—the suggestion of any retaliation if Japan did not respond favorably for fear that the overall relationship between the two countries might be harmed.

Discussions with Japan began in June 1982 and led to an accord in November, which in Prestowitz's (1988, 155) opinion was more a "monument to clever drafting than anything else." Besides stating broad principles, an agreement was reached to reduce both country's tariffs and to collect Japanese semiconductor shipment data (but not price information), allowing the Commerce Department to better monitor the market.

The agreement did nothing to change the underlying, fundamental determinants of supply or demand in the semiconductor market. Hence, "within three months, further threats of congressional action along with the possibility of private unfair-trade suits drove the U.S. delegation to a second round of negotiations, one focusing entirely on market access," Prestowitz (1988, 155) writes. The recommendations (it cannot really be called an agreement) that emerged from the working group in November 1983 called for complete tariff elimination in the United States and Japan, better data collection, a removal of investment barriers, and greater market access for U.S. firms. On market access, the text stated that "the Government of Japan should encourage Japanese semiconductor users to enlarge opportunities for U.S.-based suppliers so that long-term relationships could evolve with Japanese companies." But, according to Prestowitz (1988, 156), a key part of the negotiations "was the confidential chairman's note from Kodama [the MITI negotiator] to Murphy and me [the U.S. negotiators], in which Kodama said that MITI would 'encourage' (a euphemism for 'give guidance to') the major Japanese chip users to buy more U.S. chips and to develop long-term relationships with U.S. suppliers." This proved to be too weak a version of the "affirmative action" the industry requested because, with no fundamental change in the organizational structure

of the Japanese semiconductor industry, this moral suasion would be ineffective.

The 1983 negotiations marked the end of the first round of U.S.-Japan discussions over semiconductors. The round ended not because of success in resolving any of the underlying grievances of the U.S. semiconductor industry, but because the industry entered a period of surging demand from mid-1983. Distracted by the business of filling orders and making new investments, industry executives took the heat off the government.

Despite accomplishing little to resolve its trade dispute with Japan, the SIA did achieve several legislative and administrative goals during the pronounced industry expansion of 1983–84. First, the SIA succeeded in its desire to eliminate tariffs on final and unfinished semiconductors in the United States and Japan. As late as 1978, the United States maintained a 6 percent tariff on imported semiconductors, while Japan had a 12 percent tariff. In 1982, as a result of the first U.S.-Japan Working Group talks, both countries set their tariff at 4.2 percent. The Trade and Tariff Act of 1984 authorized the president to negotiate even lower tariffs on semiconductors. In February 1985, USTR Brock and the foreign minister of Japan exchanged letters that eliminated most tariffs on semiconductors.

Although major U.S. semiconductor firms already benefited from the offshore assembly provisions of the U.S. tariff code, the SIA wanted the additional assurance that its members could ship semiconductor components into and out of the United States and Japan at no tariff charge.[29] According to the SIA, this action would benefit U.S. producers more than Japanese exporters because 75 percent of U.S. imports were shipped by U.S. firms. Tariff elimination, it argued, would save U.S. firms roughly $100 million per year, which could be plowed back into R&D expenditures, as well as increase access to the Japanese market. The SIA further maintained that abolishing the duty would not result in shifting production abroad because the tariff was too small to influence plant location decisions. In addition, the SIA viewed a U.S.-Japan agreement to abolish semiconductor tariffs as establishing the principle of free trade, as well as a step toward securing greater governmental concern about reducing the alleged import barriers in Japan. The AEA and the Computer and Business Equipment Manufacturers Association (CBEMA), representing important semiconductor-using industries, also supported the proposed tariff elimination.

The tariff elimination was opposed by one small U.S. merchant producer, Micron Technology, whose production focused on memory chips, precisely the device most subject to Japanese import competition. Micron contended that the move would increase Japan's penetration of the U.S. market without changing the ability of U.S. firms to sell in Japan. Micron also wanted to delay elimi-

29. This and the next paragraph draw on USITC (1985).

nating the semiconductor tariff until the European Community and Korea also reduced their trade restrictions. Despite the European Community's 17 percent tariff and Korea's 30 percent tariff on semiconductors (at the time), both countries would be eligible for duty-free shipments of semiconductors to the United States as the tariff abolition would apply on a most-favored-nation basis.

The IBEW also opposed tariff reduction on the grounds that U.S. producers would shift production to foreign assembly plants as a result. They maintained that, because U.S. exports to Japan were so small and Japanese exports to the U.S. were so large, tariff elimination would give Japanese firms a financial boon five times the amount of U.S. firms. Japan, they argued, could reinvest these funds in R&D and further undermine the domestic industry.

Given their failure to obtain a sympathetic hearing from the administration about possibly filing a section 301 petition, a second SIA objective was to broaden the scope of governmental practices that could be actionable under the statute. Section 301 provided for government action against "unreasonable, unjustifiable, and discriminatory" foreign trade practices, but these key words were left undefined and gave open-ended discretion to the government in deciding to accept a petition. The Trade and Tariff Act of 1984 amended section 301 by mandating that the definition of unreasonable "includes, but is not limited to, any act, policy, or practice which denies fair and equitable market opportunities."[30] The scope of section 301 was thereby broadened to include just the sorts of activities that the SIA was seeking to attack in Japan.

Finally, Congress enacted SIA-supported legislation on intellectual property rights and R&D in 1984. The National Cooperative Research Act relaxed the antitrust treatment of joint R&D ventures and the Semiconductor Chip Protection Act of 1984 prohibited the unauthorized copying of chip designs.

1.5 Petitions, Procedures, and Negotiations, 1985–86

The 1983–84 boom ended with yet another industry recession in 1985. Compared with other downturns, this industry recession was extremely severe and was particularly concentrated on the memory chip market. While overall semiconductor sales slumped about 20 percent in 1985, the DRAM market contracted by about 60 percent. The root cause was a brief slowdown in the computer market: after increasing by a factor of five between 1981 and 1984, domestic shipments of microcomputers actually fell 8 percent in 1985, as depicted in figure 1.2. With chip shipments and inventories remaining relatively

30. This was further strengthened (along lines desired by the SIA) in the Omnibus Trade and Competitiveness Act of 1988 to include the denial of "fair and equitable market opportunities, including the toleration by a foreign government of systematic anticompetitive activities by private firms or among private firms in the foreign country that have the effect of restricting, on a basis that is inconsistent with commercial considerations, access of United States goods to purchasing by such firms."

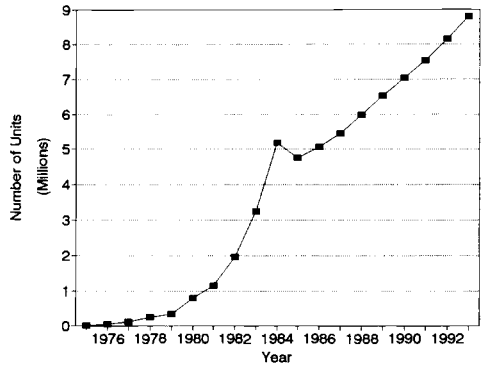

Fig. 1.2 U.S. domestic output of microcomputers
Source: Computer Business Equipment Manufacturers Association, *Information Technology Industry Databook, 1960–2002* (Washington, D.C., 1992), 94.

high, prices collapsed in the face of slumping demand. The price of a 64K DRAM fell from roughly $3.00 in the first quarter of 1984 to $0.75 by the middle of 1985; the price of 256K DRAMs fell from $31.00 to $3.00 over the same time period. Rapid price declines were always expected in the semiconductor industry because of learning by doing, but not so sharply in such a short period of time (see fig. 1.1).

As a result, merchant semiconductor firms racked up unprecedented losses: pretax income as a percentage of sales fell from over 14 percent in 1984 to almost −10 percent in 1985. Capacity utilization among the merchant firms dropped from over 70 percent in 1984 to under 45 percent in 1985, according to SIA statistics. Merchant semiconductor employment fell nearly 20 percent (about 55,000 workers) in the first three quarters of 1985. The 1985 industry recession pushed virtually every U.S. producer out of the DRAM market—Mostek went bankrupt, and AMD, Intel, Motorola, and National Semiconductor abandoned DRAM production to concentrate on other semiconductor product lines. Only TI and Micron remained in the merchant DRAM market, although IBM and AT&T continued captive production. Imports were not a direct cause of the recession: Japanese import penetration actually fell in the two years after 1984, and three-quarters of the fall in revenues of U.S.-based semiconductor companies in 1985 was due to declining overall demand, only a quarter due to lost market share, according to calculations in Federal Interagency Staff Working Group (1987, 10). Indeed, Japanese firms experienced similar losses and layoffs as world demand had slumped in an integrated world market.

Just as the industry recession of 1981–82 spawned industry efforts at political action, the 1985 recession precipitated a similar response. As Prestowitz (1988, 159) dramatically put it, "With survival at stake in the spring and summer of 1985, executives of the U.S. companies and their industry associations

descended on Washington."[31] However, this descent received a much warmer welcome than had been the case in 1982. Then the industry was just one of many U.S. industries reeling from recession and appealing for help. Although the dollar was just peaking on foreign exchange markets, the U.S. economy was in its third year of expansion in 1985, and fewer industries were facing the dire straits of the semiconductor industry. Therefore, competition among industries for the attention of policymakers was less intense. In 1982, the industry was split on filing an antidumping petition and faced resistance on any section 301 action; in 1985, it pursued (and the government largely welcomed) both courses of action.

The industry's timing was propitious for a related reason: unlike 1982, the appreciation of the U.S. dollar on foreign exchange markets and the accompanying lurch into a large trade deficit served to focus the Reagan administration's attention on international economic policy. The Economic Policy Council, the cabinet-level group chaired by Secretary of Treasury James Baker and responsible for formulating the administration's economic policy, met frequently during this period amid complaints about the gaping U.S. trade deficit from industries highly exposed to international trade. The administration responded by formulating a two-pronged policy of containment: an exchange rate policy aimed at reducing the foreign exchange value of the dollar, and market-opening initiatives aimed at diverting protectionist "pressure by focussing on measures to open up the Japanese market rather than closing the U.S. market."[32] After a strong "fair trade" speech by President Reagan outlining this new approach in September 1985, the USTR for the first time began to self-initiate section 301 cases.[33] The principal audience for this "tough" trade policy was Congress: the administration desperately sought to avoid a congressional trade bill that would force the president to impose sanctions (like the Gephardt amendment) against countries having a trade surplus with the United States.[34] With this political backdrop, a high-profile industry in search of a market-opening initiative against Japan was far more likely than in previous years to achieve a sympathetic hearing from the administration.

For its part, the semiconductor industry was so shaken by economic condi-

31. Needless to say, the executives do not descend on Washington when times are good, and the financial losses of U.S. firms were real in 1984–85. Yet U.S. firms maintained large market shares in many categories of semiconductors besides DRAMs and were not being driven from all markets.

32. Niskanen (1988, 152). William Niskanen was the acting chairman of the Council of Economic Advisers during 1984–85.

33. The first three cases of what Jagdish Bhagwati has called "aggressive unilateralism" concerned Brazil's informatics policies, Japan's tobacco restrictions, and Korea's insurance regulations. With the U.S. government acting on its own in self-initiated cases, the likelihood of retaliation is greater if no progress is made in reducing foreign trade barriers. The more symbolic Market-Oriented Sector-Specific (MOSS) talks with Japan also began, which aimed at increasing Japanese purchases of telecommunications, pharmaceutical, forest products, and other items.

34. For a discussion of the political environment of trade policy in the mid-1980s, see Destler (1992).

tions in early 1985 that the question was not whether to take action, but what particular form the action should take within the constraints and remedies specified under U.S. trade law. Filing a petition under U.S. trade law would constitute a formal request for a specific government remedy and would end the informal, ad hoc, and sporadic bilateral negotiations that had done little to alter the industry's position vis-à-vis Japan. The advantage of filing under U.S. trade law was that by initiating a specific process, pressure would be placed on the Japanese to change their actions or face retaliation. This drove the industry once again toward a section 301 action. Other trade statutes were less attractive because their main remedy was simply the imposition of higher tariffs on semiconductors. While individual merchant firms might desire higher tariffs on Japanese imports, captive producers ensured that the industry as a whole would not favor the imposition of tariffs that it had sought to eliminate in the first place. This made objectionable to the SIA applying either for escape clause protection under section 201 of the Trade Act of 1974 (which, in addition, had a special ITC injury test, leaving no assurance that tariff protection would even be forthcoming) or for antidumping duties under section 731 of the Tariff Act of 1930 (more easily obtained because of a more lax injury standard). Just because the SIA was deadlocked on the antidumping issue, of course, did not constrain individual firms either inside or outside the association from proposing such remedies.

Unlike most industries seeking assistance, the semiconductor industry had important links to the defense industry and therefore had a special appeal—national security—that enabled the industry to seek invocation of section 232 of the Trade Expansion Act of 1962. This statute permits the president, upon the recommendation of the Department of Commerce, to take remedial action against imports that threaten to impair national security. The semiconductor industry's active friends in the Commerce Department, combined with the view that semiconductors were a "strategic" component of U.S. defense, might have arranged this course of action.[35] But the remedies would not be substantially different than those obtained under the antidumping or escape clause laws, and market access in Japan was not a clear national security issue.

Even though this option was never seriously considered, one might suspect that the Reagan administration would have supported the semiconductor industry's pleas on national security grounds. Somewhat surprisingly, the foreign policy and national security agencies were divided in the semiconductor dispute. In the mid-1980s, the Central Intelligence Agency expressed its concern over U.S. dependence on foreign semiconductor products, a view strongly supported in a 1987 report by the Defense Science Board, an industry advisory group. But the Department of Defense was neutral in the semiconductor dispute, not only because it usually played a minor role in trade policy issues

35. There is no ITC injury test under this statute, and Congress cannot override the president's decision.

overall but because another faction within the Pentagon supported inexpensive sourcing of microelectronic components from Japan, in their mind a key strategic ally with whom continued good relations were vital.[36] The National Security Council supported this position, and its opposition to any trade action against Japan deprived the industry of a potentially influential supporter and meant that administration support for the industry on "national security" grounds was unlikely. Curiously enough, USTR Yeutter took the national security argument seriously and sometimes argued that position against the National Security Advisor in cabinet-level meetings.

In any event, section 301 and antidumping petitions were soon filed. Unlike the indecision of 1981–82, the actual filing of complaints triggered an administrative timetable at the end of which loomed the possible imposition of large retaliatory or antidumping duties.

1.5.1 Market Access and Section 301

The case for filing a section 301 petition first had to be made within the SIA. This action—involving substantial legal resources and personnel time (both on the SIA staff and in individual firms)—was financed by a special assessment above regular SIA membership dues to meet the estimated $900,000 cost. A draft version of the petition supported by Intel and AMD called for import restraints on Japanese semiconductors should the negotiations on market access fail. IBM and other larger purchasers balked at this proposal, and to prevent the captive firms from opposing the petition altogether, the final version eliminated this demand.

On June 14, 1985, the SIA filed a petition with the Office of the USTR under section 301 of the Trade Act of 1974. The general thrust of the SIA's complaint about market access in Japan was no different from what it had been in the early 1980s, only the context (the Reagan administration's view of market opening), the law (section 301 as amended in 1984), and the USTR (Clayton Yeutter had replaced William Brock) had changed. The petition focused on four aspects of Japan's semiconductor policy. First, the petition provided circumstantial evidence of market barriers in Japan. In 1984, the U.S. semiconductor industry accounted for over 83 percent of sales in the U.S. market, 55 percent in the European market, 47 percent in the other (Asian) markets, but only 11 percent in the Japanese market. The U.S. share of the Japanese market, they noted, remained fixed near 10 percent for a decade despite the formal liberalization of the Japanese market in 1975. Second, the SIA argued that structural barriers in the Japanese market, such as "buy Japan" attitudes and reciprocal trading or tie-in relationships among firms, were an impediment to U.S. entry. Third, the Japanese government condoned anticompetitive practices and undertook countermeasures such as administrative guidance and VLSI

36. The Pentagon has often been liberal on trade issues, reflecting the export-oriented stance of many defense contractors.

subsidies to undermine the 1975 liberalization. Finally, by reducing investment risks and adding to capacity, these government policies promoted the dumping of semiconductors by Japanese firms.

These actions, concluded the SIA, violated U.S. trade agreements with Japan (article XI of the GATT on the transparency of trade barriers, and the 1983 bilateral agreement on greater U.S. participation in the Japanese semiconductor market), denied U.S. firms "fair and equitable market opportunities," and therefore were "unreasonable" under the meaning of section 301. The SIA requested relief in the form of an "equivalence of market participation" in the Japanese market and an end to "dumping." Therefore, the SIA encouraged USTR to get the Japanese government to stimulate greater purchases of U.S. semiconductors, to develop a price-cost framework to prevent dumping, and to initiate an investigation of antimonopoly law violations. If no settlement was reached, the SIA recommended sanctions against Japan to achieve these objectives as long as the sanctions would not deny domestic semiconductor consumers access to adequate volumes of these goods.

The procedures governing USTR's handling of section 301 cases are quite different from administered protection cases considered by the Commerce Department and the ITC. Once a section 301 petition has been formally filed, USTR (in consultation with other agencies) has 45 days to accept or reject the petition. During this period, USTR and key agencies within the administration must be persuaded that the case is legitimate. Although section 301 cases are handled principally by USTR, they are constrained to the extent that they had to solicit (if not heed) advice from other agencies.[37] More substantively, Lande and Van Grasstek (1986, 42) note that "whereas Commerce and the USITC are intended to deal with cases solely on their objective merits as defined by the relevant statutes, the USTR's task is more subjective. It must not only investigate the petitioner's allegations, and determine whether a legal right of the United States has been violated, but also must be prepared to devise and pursue a negotiated solution with a foreign government. The USTR both adjudicates and advocates these cases."

Consequently, "the USTR exercises greater legal and political judgment when it accepts a petition under section 301" than the Commerce Department does in antidumping and countervailing duties investigations. In fact, "the USTR has complete discretion to accept or reject petitions" and can reject a petition "if, in its judgment, the case might lead to unwanted political complications for the United States." Acceptance of a petition is treated as a serious matter because, once it is accepted and the United States begins to negotiate,

37. As Prestowitz (1988, 424) notes: "The trade representative coordinates by chairing a series of interdepartmental committees, culminating in a cabinet-level committee that passes recommendations to the president. The concern for ensuring that all possible interests are considered in making any trade policy means that virtually every agency of the government sits on these committees. This procedure puts strong emphasis on consensus. Unanimity is not required, but major efforts are made to accommodate dissenting agencies."

the government becomes an interested party and its credibility is at stake. The government must be persuaded that a real trade barrier exists and that a settlement is feasible.

Thus, once the section 301 request had been filed, the SIA's job had just begun. Now the administration had to be convinced not only that the case had merits, but that the U.S. could obtain a settlement with Japan that would not seriously affect diplomatic relations between the two countries. "Because Japan is both friend and ally, and because the problem with Japan arose from a set of interrelated policies carried out over many years rather than from a specific trade action," Prestowitz (1988, 160) points out, "there was great reluctance in Washington, particularly at the Department of State and the National Security Council, to brand Japan an unfair trader." The SIA sought to persuade all agencies in the administration, particularly those that might oppose the petition, such as the traditionally skeptical Office of Management and Budget (OMB) and Council of Economic Advisers (CEA), about the merits of its case.

How as the section 301 petition initially received within the Reagan administration? From Prestowitz's (1988, 159–60) perspective at the Commerce Department, "While Commerce and the Trade Representative's office were sympathetic, other departments such as State, Treasury, the National Security Council, and even Defense argued that Japan had opened its market by removing formal tariffs and quotas in 1975. They dismissed the countermeasures to the liberalization as merely a matter of Japanese government exhortation to its industry with no concrete significance and again blamed the problems of the U.S. industry on poor management which had not taken the long-term view and had not really tried to get into the Japanese market." This statement somewhat overstates the hostility to the petition. Prior to the filing of a petition, the industry consults the administration on the advisability of taking formal action. Unless there is positive feedback, a petition is unlikely to be filed, as happened in 1982. The SIA's petition was attractive in many respects: it was in line with the administration's emerging stress on opening foreign markets, did not directly advocate closing the U.S. market, and would help mollify congressional critics who wanted a tougher Japan policy. Personal contacts also appear to have secured the petition a sympathetic hearing at USTR. In 1985, William Brock (who had rejected a section 301 in 1982) had been replaced as USTR by Clayton Yeutter. The SIA main counsel, Alan Wolff of Dewey Ballantine, had worked with both Yeutter and his deputy, Michael Smith, at USTR in the Ford administration.[38] Such high-level contacts in USTR ensured that the SIA's petition would receive serious consideration.

Yet Prestowitz's recollection also captures some of the skepticism in the administration. Any petition, particularly a controversial one guaranteed to

38. Wolff was general counsel at USTR during 1975–77. Yeutter was deputy special trade representative at USTR during 1975–77. Smith was chief of the Textile and Fiber Division at the State Department during 1973–75, chief textile negotiator at USTR during 1975–79, and deputy special representative for trade negotiations at USTR during 1979–81.

generate a major confrontation with Japan, would encounter a fair degree of caution and even opposition within the administration. But his recollection does not do justice to the troublesome problems with the petition. First, what were the "unfair" and "discriminatory" government trade barriers that were actionable under section 301? The SIA pointed to past government policies, but no current practices, inhibiting imports. Aside from vague and amorphous claims about the policies and attitudes of the Japanese government and firms, the SIA resorted to identifying the structure of the Japanese market as a barrier to trade. They merely observed that the largest semiconductor producers were also major consumers, that captive production was large (25 percent of total consumption), and that producers engaged in reciprocal trading. By SIA's numbers, foreign firms already had nearly 20 percent of the Japanese market if captive production was excluded from "the market" as it was in the United States.

As for the widely distributed SIA pie charts showing country shares in regional markets, an alternative hypothesis was consistent with no Japanese unfair practices: U.S. producers dominated the U.S. market, Japanese producers dominated the Japanese market, and U.S. producers essentially split European and other markets with other producers, holding a slightly higher share in Europe owing to long-standing direct investments in Europe behind the tariff barrier that kept out Japanese imports. The strongest statement the SIA could muster was that "these trade [market share] figures, coupled with Japan's protectionist heritage in microelectronics, *strongly suggests* that market barriers still exist in Japan."[39] To economists at OMB, CEA, Justice, and elsewhere, no compelling, persuasive evidence of market barriers existed: defunct government policies, vertical integration (like IBM and AT&T), and long-term relationships hardly seemed to constitute actionable unfair trade practices. To wit, Japanese access to the U.S. market in the early 1980s may have been hindered by a discriminatory distribution system.[40]

These economists also pointed out that U.S. semiconductor firms were the beneficiaries of just as much government support as Japanese semiconductor producers. In 1986, U.S. government financial support for semiconductor R&D outstripped Japan's support by a factor of 10, although U.S. support tended to be not commercial, but defense related.[41] The SIA wanted "equal market access," but the U.S. market share in Japan was comparable to the Japanese market share in the United States. Furthermore, the current industry reces-

39. SIA and Dewey Ballantine, *Japanese Market Barriers in Microelectronics,* Memorandum in Support of a Petition Pursuant to Section 301 of the Trade Act of 1974, as amended, June 14, 1984 (Washington, D.C., 1985), 2. Emphasis added.

40. U.S. semiconductor firms contained Japanese access to the U.S. market by terminating contracts with distributors who agreed to carry Japanese products. Japanese semiconductor firms had only one nationwide distributor in the United States (Marshall Industries) because of the "unspoken ban on Japanese franchises" and the "dictum that large houses will not take on the Japanese so long as they are supported by domestic suppliers" (see *Electronic News,* December 9, 1985, S28).

41. Federal Interagency Staff Working Group (1987, 31).

sion was worldwide, with no import surge in the United States and with Japanese firms experiencing financial losses and layoffs as well. If the SIA's case appeared weak to government economists, the remedies proposed by the SIA appeared worse. They feared that any governmental agreement would result in a worldwide cartel with the government fixing prices and arranging market shares by fiat. The SIA was requesting an unprecedented package: a promise by the Japanese government to force its firms to raise its prices, not just in the United States but in *all* markets, as well as agree to a market share performance target for market access. Left unclear was precisely the Japanese government's obligation and mechanism by which those ends would be achieved. Although the SIA never filed a dumping complaint, the section 301 petition also touched on the sensitive issue of antidumping remedies, raising questions about the appropriateness of this avenue of relief.

In its persuasion effort, the SIA tried to ensure that there were no obvious domestic opponents to the petition by coopting potential opposition. No one could seriously object to the principle of market access, but the mention of antidumping measures in the petition raised some alarms. The AEA was the one organization containing major semiconductor users and might object to policies that increased the price of semiconductors. Many members of the AEA were sympathetic to anything that resembled market opening in Japan, a precedent that many of its members would have liked to see established and emulated for their own industry. These semiconductor users could not foresee any possible resolution of a section 301 case that could harm its interests. The SIA shrewdly consulted with the AEA before and after filing the petition, and in the end the AEA wrote a letter to USTR supporting the petition. However, semiconductor equipment manufacturers publicly opposed the petition because they would be hurt by efforts to reduce Japanese production investments, but they appear not to have engaged in lobbying efforts.[42]

The SIA also hired a public relations firm to elicit media coverage and organized a support group of 20 congressmen from both political parties to spearhead activities on Capitol Hill. They put pressure on the administration to support the SIA's petition, often writing letters to or holding meetings with administration officials, or organizing votes on nonbinding resolutions. Perhaps the most important congressional service to the SIA was providing access to key administration officials. Senator Alan Cranston of California set up meetings for SIA representatives with Secretary of State George Shultz. At one meeting, recounted by Coleman (1987), Secretary Shultz was apparently impressed with SIA charts depicting the low U.S. market share in Japan compared to other markets and was evidently persuaded of the merits of their case.

42. As an official of the Semiconductor Equipment Manufacturing Institute stated, "I can tell you that American semiconductor production equipment firms are being kept alive today only from Japanese orders. We have 'zero' orders from U.S. semiconductor manufacturers. If it weren't for the Japanese manufacturing expansion, many U.S. equipment firms would be out of business" (*Electronic News,* June 24, 1985, 62).

The State Department's traditional defense of Japan was muted in this particular case, an achievement that could not have happened without converting the secretary. This in turn may not have happened had not a senator insisted on a meeting with one of the busiest administration officials.

By contrast, the scope for Japanese lobbying while the petition was being considered was actually quite limited. Recognizing that congressional support would never be forthcoming in the current environment, the Japanese government concentrated their diplomatic efforts on the foreign policy establishment, such as the State Department and National Security Council, to forestall the section 301 action. The EIAJ and the SIA kept the international trade lawyers busy by filing counterbriefs to each other's briefs. The EIAJ argued that U.S. firms were successful in the Japanese market, that Japanese market structure did not prevent U.S. participation, and that the section 301 case was not actionable because no current government practice was identified. The EIAJ strenuously objected to giving the SIA a "guaranteed" market share in Japan.

In the end, the pressures to move forward with a significant market-opening initiative against Japan triumphed. Less than a month after the filing of the SIA petition, USTR initiated the semiconductor case and requested consultations with the government of Japan.

1.5.2 Antidumping

The opposition of the captive producers to higher tariffs on semiconductors prevented the SIA from ever filing an antidumping complaint. This did not, of course, prevent any individual member from filing on its own, although there would be pressure not to break ranks from the SIA consensus. But the antidumping issue was forced by a small semiconductor firm that was (at the time) not even a member of the SIA—Micron Technology of Boise, Idaho. On June 24, 1985, Micron filed an antidumping complaint against four principal Japanese exporters of 64K DRAMs—NEC, Hitachi, Mitsubishi, and Oki—alleging that these firms had been dumping DRAMs in the U.S. market. Furthermore, Micron contended that the home market sales of the Japanese producers were below their costs of production so that the foreign market value (the "fair" U.S. sales price) had to be based on constructed value (i.e., a U.S. government-imputed cost of production).

How could Micron argue that it represented the industry with the SIA actively in place? If the relevant market for determining legal standing is judged to be 64K DRAMs alone, then all U.S. merchant producers except Micron and TI had abandoned DRAM production by the end of 1985. While the SIA remained formally neutral in the antidumping process, AMD, Mostek, Motorola, National Semiconductor, TI, and Intel all indicated their support for the petition during the ITC investigation. (Motorola, TI, and Intel even sent representatives to testify before an ITC hearing.) The participation of TI, the only other remaining producer of DRAMs, is somewhat surprising. TI did not cosponsor the petition for fear of jeopardizing ties in Japan, where it produced

semiconductors and had long-standing direct investments. Both AT&T and IBM as captive producers took no position on the petition, and silence is generally viewed as support.

Merchant members of the SIA soon broke ranks: on September 30, 1985, Intel, AMD, and National Semiconductor filed for antidumping action against imports of EPROMs from Japan, aimed primarily at Hitachi, Mitsubishi, and Fujitsu. Notably absent from this list once again was TI, the largest U.S. producer of EPROMs. Like Micron, these producers claimed that Japanese home prices were below their costs of production so that the foreign market value had to be determined by means of constructed value.

Then Prestowitz (1988, 161) at the Commerce Department stepped in. "Since shock treatment was needed in order to get some negotiating leverage, I recommended that the U.S. government do what it had the legal authority to do but never had done before: start its own dumping case on 256K RAM chips without waiting for private industry to file a suit, and thus move the government from the position of intermediary to one of advocate."[43] Secretary of Commerce Malcolm Baldrige agreed, and the proposal went to a cabinet-level trade task force, which—after contentious discussions—did not oppose it. In December 1985, the Commerce Department self-initiated an antidumping case on 256K and future generations of DRAMs.

The scope for Japanese lobbying in such administrative trade cases is severely limited. The antidumping process is one in which the provision of information can be important but is not susceptible to much influence as a result of foreign pressure. Each of the "defendants"—NEC, Hitachi, Fujitsu, Mitsubishi, Toshiba, and Oki—hired separate legal counsel in the United States to defend their cases before the Commerce Department and the ITC. But once the petitions had been filed and the formal antidumping administrative process was underway, there were great incentives for the Japanese to settle the dispute with the petitioners directly rather than to see the antidumping process through in the hopes of vindication: the Commerce Department virtually always finds dumping, often at high margins, although there is some uncertainty about whether the ITC will find final injury. Faced with the likely prospect that antidumping duties will be imposed, the antidumping process affords an opportunity for the domestic industry and their foreign competitors to arrive at some mutually agreeable solution, such as a VER. The strict timetable of the antidumping process—cases must be resolved within roughly 280 days—provides a fixed deadline for such negotiations.

As the semiconductor antidumping petitions ground through the administrative trade bureaucracy toward the inevitable conclusion, the pressure steadily built on Japan. In August 1986, the ITC issued a preliminary determination in

43. The Commerce Department acquired statutory authority over the antidumping laws in 1979. The Treasury Department had initiated several cases on its own related to the trigger-pricing mechanism covering steel products.

the 64K DRAM case affirming that there was a reasonable indication of material injury to the domestic industry by means of imports. In December, the Commerce Department announced its preliminary determination that Japanese firms were pricing at less than fair value. But by this time, the negotiations had begun.

1.6 The Semiconductor Trade Agreement of 1986

After many preliminary discussions in late 1985, negotiations between MITI (and the EIAJ) and USTR (and the SIA) to settle both the antidumping and the market access questions began in earnest in early 1986. The deadline imposed by the section 301 statute for the negotiations was July 1, although this was later extended to July 31, which was also when the final antidumping determinations were due from the Commerce Department. Since no party (with the possible exception of Micron) had an interest in seeing the antidumping duties imposed, this date became the fixed endpoint to the negotiations, which, of course, lasted until the last moment with an agreement finally being reached shortly before midnight on July 30.[44]

The objectives of the parties can be briefly described as follows. MITI and the EIAJ wanted an agreement that would end both the section 301 and antidumping cases without making specific promises to guarantee market access or prevent third-country dumping. These were precisely the issues that the SIA viewed as essential parts of any agreement: an end to dumping on a worldwide basis and "real" market access in Japan. Any agreement that just prevented dumping in the United States would be inadequate; this would not only make the United States a "high-price island" of semiconductors to the detriment of domestic user industries but (more directly in the SIA's interest) would harm the sales of U.S. firms in third markets as Japan shifted its sales elsewhere. The SIA also required not just better opportunities for sales in Japan, but the actual realization of sales ("the cash registers must ring," as it was put at the time) to be assessed by a quantitative appraisal of market access. On the basis of studies it had commissioned, the SIA believed it would have at least 24–40 percent of the Japanese market under "free" conditions and wanted the agreement to stipulate some explicit target share.

For its part, USTR essentially wanted any agreement that satisfied the SIA. Although only government officials could be present at and participate in the formal negotiations, held in the Winder Building (which houses USTR, on 17th Street across from the Old Executive Office Building in Washington), SIA representatives were often in an adjacent room, available for close consultations during the negotiations and ready to advise USTR about what was accept-

44. The principal negotiators with final responsibility for the agreement were Clayton Yeutter, the USTR, and Michio Watanabe, the minister of MITI. Their deputies (Michael Smith and Makato Kuroda) and staff handled most of the detailed negotiations.

able and what was not.[45] The principal location of the negotiations in Washington is also not insignificant as the USTR negotiators thereby benefited from the services of the U.S. intelligence community, which appear to have played a role at more than one juncture in this dispute.

The sticking points of the negotiations were, as expected, third-country dumping and market access. In early 1986, MITI offered to institute an export price floor or related VER on shipments to the United States. The industry and therefore the administration rejected this offer because it would still permit dumping in third markets. On market access, MITI also approached members of the SIA and reportedly offered to guarantee 20 percent of the purchases of Japan's five largest users of chips to U.S. suppliers by 1990. The SIA rejected this offer as disingenuous because it would only raise the U.S. market share in Japan 4 percentage points to about 13 percent.[46]

Meanwhile, the antidumping cases were slowly grinding their way through the trade bureaucracy. In January 1986, the ITC ruled without dissent in the 256K+ DRAM case that there was a "reasonable indication" the domestic industry was materially injured. In March, the Commerce Department announced preliminary dumping margins on EPROMs and 256K and higher DRAMs. Reported with the Commerce Department's usual precision, the margins were astounding, ranging from 21.7 to 188.0 percent for EPROMs and from 19.8 to 108.72 percent (for a weighted average of 39.68 percent) for 256K and 1M DRAMs. Upon the announcement of preliminary margins, importers had to post bond, meaning the duties went temporarily into effect. At the end of April, the Commerce Department issued its final dumping determination in the 64K DRAM case against four major Japanese firms, with a weighted average 20.75 percent dumping margin (ranging from 11.87 to 35.34 percent). It must be made clear what these determinations implied—that Japanese prices in the United States (foreign market values) were below the constructed cost figures of what prices "should have been" in Japan. It is by no means evident that Japanese firms were pricing below average costs and therefore losing money on sales to the United States. To the contrary, according to the Commerce Department's report, the one Japanese firm that provided verifiable profit data for the first six months of 1985 on 64K DRAM sales earned a profit that exceeded the 8 percent statutory minimum, and this profit was imputed to others in determining the foreign market value of Japanese exports.[47]

45. The USTR, Clayton Yeutter, speaking at an SIA dinner in September 1986, remarked: "With so many familiar faces in the audience, I feel particularly at home here this evening. We joked in Washington that many of you were becoming permanent fixtures at USTR during the innumerable days (and nights) of semiconductor talks with the Japanese" (Ambassador Clayton Yeutter, United States Trade Representative, Remarks at Semiconductor Industry Association Annual Forecast Dinner, September 23, 1986, Santa Clara, Calif.).

46. MITI sometimes communicated directly with specific members of the SIA rather than the U.S. government or the industry association itself, possibly in an effort to divide the industry.

47. *Federal Register,* April 29, 1986, 15946; also USITC (1986c, a-11).

At the end of May, the ITC voted 4–2 in the final determination in the 64K DRAM case that the domestic industry was materially injured, the affirmative citing the poor financial condition of domestic producers as well as the sharp decline in market prices. This outcome presaged a similar finding in the 256K+ DRAM case and thus made it absolutely clear that, barring an agreement, the antidumping duties would remain in effect with the Commerce Department's final determination. Two dissenting commissioners, however, argued that the industry was experiencing a normal cyclical downturn with no evidence of injury by means of imports. Commissioner Anne Brunsdale pointed to two striking facts. First, import penetration of Japanese DRAMs had actually fallen sharply: the ratio of imports from Japan to apparent U.S. consumption dropped to 13.5 percent in 1985, from 23.6 percent in 1984 and 29.3 percent in 1983. Second, ITC data indicated that the 64K DRAM had been quite profitable for the industry: gross profits by U.S. and Japanese firms amounted to $165 million over 1983–85 with an average margin of nearly 18 percent (the particularly large margins in 1983 and 1984, reaching 33.2 percent in 1984, compensated for deep losses in 1985).[48] The final Commerce Department determinations on EPROMs were due on July 30, and on 256K+ DRAMs on August 1, with the final ITC rulings in these cases slated for September.

The large preliminary antidumping findings and the first material injury decision strengthened the bargaining position of U.S. negotiators even further: Japan had to settle the case to avoid the automatic and nonnegotiable imposition of these duties, as well as possible section 301 sanctions. Congress reinforced the leverage of U.S. negotiators: in May, the House of Representatives voted 408–5 to recommend that the administration take some action (i.e., retaliate) under section 301 if it could not secure a market access agreement with Japan. The Japanese also confronted a broad administration consensus that some type of semiconductor trade agreement was needed. In late June, Deputy USTR Michael Smith informed the Japanese that the cabinet was prepared to retaliate if no agreement was reached. This apparently was a bluff, but a highly credible bluff nonetheless.[49]

In the end, Japan largely capitulated and acceded to most of the U.S. negotiator's (i.e., industry's) demands. While USTR did quite well in securing what the SIA wanted, the EIAJ felt abandoned by MITI, which may account for its later reluctance to adhere to MITI's guidelines enforcing the agreement. However, the agreement was plagued by two problems regarding third-country dumping and market access that soon brought the governments into renewed conflict with one another: (1) the considerable ambiguity as to the exact obliga-

48. USITC (1986c, 48, 53).

49. According to Prestowitz (1988, 171), "In fact, no one will ever know whether the cabinet would actually have voted against the Japanese. To some extent Smith's move was a ploy to scare them." Prestowitz also notes that "the critical change had been at the State Department, which for years had acted to protect Japan from its critics."

tions of the government of Japan and (2) the inexact timetable for achieving the objectives of the agreement.

Under the agreement, Japan agreed to take actions that would end dumping in the United States. The antidumping provisions of the arrangement hinged on a suspension agreement between the Department of Commerce and the individual Japanese firms in which Japanese exporters agreed to report data on all U.S. sales and on actual and anticipated costs of production. Based on this information, the Commerce Department would determine company-specific price floors (foreign market values, or FMVs) each quarter and provide this information to the Japanese firms.[50] In monitoring prices and costs of shipments to the U.S. market, the agreement stipulated that "the Government of Japan will take appropriate actions . . . to prevent exports at prices less than company-specific fair value." The agreement primarily concerned DRAMs and EPROMs, but the United States reserved the right to add or drop semiconductor products from the list.

Despite the U.S. understanding that Japan was obligated to prevent dumping in third-country markets, the agreement makes no explicit statement of the government's responsibility for taking action to prevent such dumping. In a separate section of the agreement on third markets, the text merely reads: "Both Governments recognize the need to prevent dumping. . . . In order to prevent dumping, the Government of Japan will monitor, as appropriate, costs and export prices on the products exported by Japanese semiconductor firms from Japan." There is no mention of the government of Japan taking "appropriate actions," and MITI later denied responsibility for preventing third-country dumping, although the phrase "in order to prevent dumping" implies some measure of responsibility.

On the issue of market access, how did U.S. negotiators handle the SIA's demand for specific targets for increasing sales in Japan? In 1985, in the midst of congressional pressure over the surging trade deficit, the administration had considered but rejected a proposal that Japan import a specified quantity of U.S. manufactured goods.[51] Even if the notion of import targets had been circulating within the administration for congressional consumption, market opening under section 301 usually took the form of removing a formal government trade barrier, such as a quota or some form of nonnational treatment, and then allowing the market to operate without interference. There was still great resistance to specifying an exact import market share because it smacked of man-

50. The purpose of company-specific FMVs was to avoid a fixed export price floor and allow low-cost producers the freedom to cut prices.

51. According to Niskanen (1988, 152), "In preparation for the Reagan-Nakasone meeting in January 1985, a paper prepared by [Beryl] Sprinkel [then undersecretary for monetary affairs at the Department of Treasury, and later chairman of the CEA] proposed that the United States insist that the Japanese set quantitative targets to increase manufactured imports; this proposal was broadly supported, against my lonely opposition, through four cabinet council meetings until the intervention of [Secretary of State] Shultz and [Secretary of Defense] Weinberger reminded the president of our larger interests in Japan."

aged trade and raised questions of how Japan could implement such targets. Prestowitz (as an advocate of targets) provides one perspective on this point:

> It's not that we don't try to force the Japanese to make the commitments; it's more that we ourselves are loathe to spell out just what the commitment should be. To some extent, the Japanese outnegotiate us, but they do so because we handicap ourselves. We never allow our negotiators to negotiate for an explicit share. In this negotiation of semiconductors, our negotiators could never actually ask for 20 percent. And the reason was not because the Japanese didn't let them; the reason was because our own trade policy, our own thinking about economics, prevents us from asking for a market share. We think it's contradictory to the free-market principles that we uphold. So we never allow our negotiators to ask for anything concrete. And so they were always in a position where they ask for market access. The Japanese say, "You have market access." And our negotiators say, "Yeah, but we never sell anything." The Japanese say, "Well, how much do you want?" And the Americans can never respond to that. They often have to say we want significantly more. The Japanese say, "That's fine. How much more?" And Americans say, "Buh-buh-buh-buh-buhhh." The Japanese say, "How about . . ." and they name a number. Then you get into winking and nodding across the table. (Quoted in Warshofsky 1989, 167–68)

The official text of the 1986 agreement supports this view, simply stating that "the Government of Japan will impress upon the Japanese producers and users of semiconductors the need to aggressively take advantage of increased market access opportunities in Japan for foreign-based firms which will improve their actual sales performance. . . . Both Governments agree that the expected improvement in access should be gradual and steady over the period of this Arrangement." This language is little different from the 1983 High Technology Agreement in which MITI agreed to encourage Japanese firms to buy U.S. semiconductors.

Contra Prestowitz, however, a "number" was discussed at various levels in the government from the start of the negotiations because that was the specific remedy proposed by the SIA. Yet final authority to request a specific number (a highly sensitive and controversial issue) is appropriately limited to cabinet-level officials, specifically the USTR, rather than lower-level bureaucrats. In this case, USTR Yeutter explicitly asked for 20 percent in a Tokyo meeting with Minister Watanabe on May 28, 1986. A now infamous, secret side-letter to the final agreement, reproduced in the appendix, explicitly mentions the 20 percent market share. However, the language of the secret side-letter is vague, reading simply that "the Government of Japan recognizes the U.S. semiconductor industry's expectation" that sales will rise to "slightly above 20 percent" in five years and that "the Government of Japan considers that this can be realized." This language surely is ambiguous as to whether it constitutes a binding governmental commitment, and this later proved to be a source of dispute. Although its contents were widely known at the time (the side-letter was par-

tially published in the *Financial Times* prior to the conclusion of the agreement), the letter remained officially secret—and in fact was withheld by USTR from other government agencies.[52] This secrecy allowed both sides to deny that they had carved up markets in a "managed trade" agreement, but the effect of the secrecy was asymmetric: Japan denied there was any explicit commitment about guaranteeing a market share, while the United States held Japan accountable for such a commitment though it could not produce the text in public to support its position.

With the agreement in place, Japan confronted the next critical issue: how was it to be enforced? What policy measures and instruments did they have at their disposal, beyond mere exhortation, to guarantee that Japanese firms did not dump in the world market and bought the requisite amount of foreign-made chips? Implementation—quite mistakenly—was not viewed as a major concern for U.S. negotiators, but it was a real problem for Japan precisely because it was now committed to certain actions in a governmental agreement and under threat of sanction if the terms of the agreement were violated. Having made a commitment, Japan now faced the burden of making the agreement work. The U.S. government now expected Japan to adhere to the agreement, illustrating how the semiconductor industry had turned its grievance into the government's affair.

To prevent dumping, the Japanese government (specifically, MITI) did the only thing it knew how to do—reduce the quantity of semiconductors exported in an effort to raise export prices sufficiently. MITI essentially imposed an "antidumping VER"—an export restraint designed to meet a price target rather than a quantitative target, and therefore inherently more difficult to administer. MITI issued supply and demand forecasts to provide targeted production levels and induce firms to trim output. MITI had no statutory authority to force any firm to comply in reducing output, but bureaucratic delays in approval of export licenses—also tightened to prevent dumping—could unexpectedly arise for recalcitrant firms. These guidelines and regulations were at first easily evaded, and MITI's initial efforts to prevent dumping were not fully successful and semiconductors leaked out of Japan into third markets. TI-Japan was reportedly one of the least cooperative firms in cutting output and adhering to its FMV for sales to the United States.

The agreement's first problem materialized even before the official signing of the agreement on September 2, 1986.[53] In August, the Commerce Department issued the first quarterly FMVs, and because the minimum prices were based on old production data, by late September the U.S. price of a 256K DRAM had almost doubled. Semiconductor users in the AEA were shocked. They regarded the high antidumping margins announced during the course of

52. This secrecy bred deep suspicion in other executive agencies of USTR and Commerce, particularly as the market access commitment became one of the grounds for retaliation.

53. The SIA supported a public signing of the agreement in the Rose Garden of the White House to underscore the gravity of the commitments undertaken.

the negotiations as a bargaining tool and (perhaps naively) never actually believed that they would be implemented. The AEA complained that members might have to move production of computers and other electronics goods overseas to avoid high U.S. semiconductor prices. The CBEMA wrote to the commerce secretary requesting a change in the methodology for setting FMVs. The SIA sought to sooth these concerns by bringing better data to the Commerce Department, and prices were brought down when the next quarter's FMVs were issued.

The second problem concerned the issue of third-country dumping. In late October, the SIA complained to USTR that such dumping was continuing and proposed retaliation for Japan's noncompliance with the agreement. After consultations with USTR, MITI issued a directive urging dumping to cease. Yet MITI continued to have difficulty in getting Japanese firms to comply with the request and prices continued to be depressed in third markets. A striking differential in semiconductor prices arose across international markets, and colorful stories surfaced of arbitragers purchasing chips in Asia, flying them to Canada or Mexico, and then smuggling them across the U.S. border. The trunk of a passenger vehicle supposedly accommodates approximately 25,000 chips, meaning a price difference of $2 or so per chip can save a firm upward of $40,000 in one car!

The third problem arose in early October when the European Community strenuously objected to the semiconductor accord and filed a complaint before the GATT. The European Community argued that the third-market provisions set "arbitrary [price] increases" for European semiconductor consumers and the market access provisions afforded U.S. firms "privileged access" to the Japanese market. A GATT panel ruled in 1988 that monitoring of export prices on third-market sales by Japan violated article XI of the GATT (on governmental quantitative restrictions), although the market access provisions of the agreement were not found to violate most-favored-nation treatment. As a result, Japan announced that it would desist from monitoring sales in third countries. In 1989, the European Community and Japan concluded their own semiconductor agreement that set minimum export prices on sales in Europe. The European Community remained suspicious that the market share target discriminated against European semiconductor producers. In 1992, the European Electronic Components Manufacturers Association demanded their own market share target of 5 percent in Japan.[54]

As for the market access provisions of the 1986 agreement, the SIA directed attention to the quarter-by-quarter movement in the foreign share of the Japanese semiconductor market. Foreign producers held 8.5 percent of Japan's market in the second quarter of 1986, just prior to the agreement, and the share

54. In setting this target, the association noted that Europe's estimated world market share outside of Europe and Japan was roughly 5 percent, while its share in Japan was less than 1 percent. European producers believed they had been excluded from trade missions sponsored by the SIA and the EIAJ (see *Electronic News,* December 14, 1992, 23).

was constant at 8.6 percent in the second half of that year. The SIA deemed this as evidence of Japan's noncompliance. Although this share rose to 9.0 percent in the first quarter of 1987, this was not known until well after preparations had begun for retaliation.

By early 1987, MITI's export controls on sales to the United States succeeded in preventing dumping, but the SIA renewed its complaints about the continuation of third-country dumping and about the lack of movement in its market share in Japan. MITI had insufficient power to force Japanese producers to purchase foreign chips in the space of a few months but tried to boost DRAM prices by issuing recommendations (administrative guidance) in February to reduce output by 10 percent. From MITI's perspective, such a production cutback would not only assist in enforcing the agreement but would be a step toward an antirecession cartel to coordinate production and investment decisions for the industry's benefit.

At least one merchant producer (Micron) argued that a 10 percent reduction was insufficient. But the SIA blasted the move, accusing MITI of trying to create "artificial shortages" and increasing government interference in the market.[55] This baffling criticism—that the SIA did not want Japan to sell less, they just wanted them to charge a higher price—ignored the fact that the production cuts were a natural outcome of the agreement. As Prestowitz (1988, 166–67) observed, requiring the Japanese government to drive up prices in the United States and in third markets "amounted to getting the Japanese government to force its companies to make a profit and even to impose controls to avoid excess production—in short, a government-led cartel. For the free-traders of the United States to be asking Japan to cartelize its industry was the supreme irony. Yet it was logical. . . . It was subsequently criticized for doing so, but it had little choice."

After having devoted so much time to securing an agreement with Japan, the administration was concerned—even after less than six months of operation—that Japan was not adhering to the agreement: "dumping" continued in third countries and market access had not "measurably" improved.[56] Fears of a loss of credibility with Capitol Hill (if not with Japan), which could trigger a backlash against another "failed" trade agreement with Japan, meant that even executive agencies opposed to the agreement felt it necessary to adopt strong measures to ensure its implementation. By the end of January 1987, the administration gave Japan 60 days to demonstrate that it was enforcing the agreement. On March 19, 1987, the Senate passed by 93–0 a nonbinding reso-

55. Andrew Procassini, president of the SIA, stated that "rather than requiring Japanese semiconductor producers to price devices at or above cost, as the agreement requires, MITI is trying to drive up prices artificially by creating shortages through production controls" (*Electronic News*, September 14, 1987, 1).

56. Japanese officials, of course, denied the existence of third-country dumping. The Central Intelligence Agency lured Japanese sales agents of Oki Electric into DRAM transactions at less than FMVs in Hong Kong in March 1987. Invoices were then presented to Japanese negotiators by USTR officials.

lution, introduced by Senator Pete Wilson (R-Calif.), calling on the administration to force compliance with the trade agreement, although it fell short of explicitly calling for retaliation. By that time the administration had already made preparations to impose retaliatory tariffs. Eight days later the White House announced its intent to retaliate against Japan.

On April 17, 1987, President Reagan imposed 100 percent tariffs on $300 million worth of laptop computers, desktop computers, televisions, and power tools imported from Japan. According to administration calculations, $135 million of the retaliation was for the injury suffered by domestic firms from continued third-country dumping, and $165 million for lack of progress in increasing the foreign market share.[57] The sanctions were crafted to hit the exports of the principal Japanese semiconductor producers—such as NEC, Toshiba, Hitachi, and Matsushita—but not entail significant consumer losses by virtue of close substitutes (except laptops) from domestic and other foreign producers. The retaliation ranks among the most dramatic events of postwar U.S. trade policy. Japan was stunned, but the move played directly into MITI's hands and enhanced its power; indeed, there were reports that some in MITI were secretly pleased about the retaliation because it proved to Japanese firms that they should follow MITI's directives.

The third-country dumping sanctions were gradually eased for diplomatic reasons as well as the gradually increasing effect MITI's controls had on external prices of Japanese semiconductors. In June, $51 million in sanctions were lifted before the annual G-7 summit for partial compliance with the third-country dumping provisions. In November, the administration found Japan in full compliance and the remaining $84 million in tariffs were removed. The $165 million in market access sanctions remained intact until the signing of the 1991 semiconductor accord.

1.7 Toward the 1991 Revision

The U.S. retaliation convinced Japanese firms to fall in line and follow MITI's directives more closely. By the end of its first year of operation, the semiconductor agreement succeeded in ending Japanese "dumping" in the United States and, by and large, in third markets. To adhere to the antidumping terms of the agreement, the Japanese government restricted export volume in order to meet the price targets, the functional equivalent of a VER.

As is usually the case with other VERs with Japan, the beneficiaries included Japanese semiconductor firms. The MITI-induced production cutbacks provided a substitute for cooperative industry behavior and raised the price of DRAMs on sales abroad, generating an enormous windfall for Japanese producers. According to market analysts reported in Flamm (1989, 21), profits

57. There was much discussion within the administration on the precise dollar amount of retaliation. The Commerce Department had floated an early figure of $1 billion.

on 1M DRAM sales for Japanese producers amounted to $1.2 billion in 1988 alone. As with other VERs, these implicit quota rents could be plowed back into R&D, capital spending, and product upgrading. Japanese firms also opened new semiconductor fabrication lines in the United States to avoid the FMVs. Other foreign beneficiaries included foreign producers not covered by the VER, particularly in South Korea where higher worldwide DRAM prices accelerated the entry of Samsung, Goldstar, and Hyundai.

The U.S. semiconductor industry was a partial beneficiary of the antidumping provisions of the 1986 accord. Even prior to the agreement, Hughes, Lenway, and Rayburn (1993) found significant positive abnormal stock returns to U.S. merchant semiconductor producers on several key announcement dates in 1986 and 1987. In the DRAM market, the main beneficiaries were limited to only two merchant firms—TI (which was reluctant to initiate any aggressive trade policies against Japan) and Micron (which ranked among the smallest of U.S. producers). According to market analysts reported in Tyson (1992, 116–17), DRAM sales accounted for as much as 60 percent of TI's profits in 1988, and Micron's sales rose by a factor of six between 1986 and 1988. The employment effects of the agreement were probably small: TI and Micron had a total DRAM-related employment of approximately 13,000, and a back-of-the-envelope calculation by Denzau (1988) suggests that for each job retained in DRAMs, another was lost in downstream computer manufacturing.[58]

For all the concern about the importance of DRAMs, however, there was no reentry of U.S. producers into the market in the aftermath of the agreement. In August 1986, Motorola agreed to buy prefabricated semiconductor dies from Toshiba, assemble the semiconductors in Malaysia, and ship them to the United States to avoid the FMVs. In June 1989, several firms—AMD, Hewlett-Packard, DEC, Intel, LSI Logic, and National Semiconductor—contributed $50,000 each to finance U.S. Memories, a consortium to establish domestic DRAM production. These firms committed themselves to buy output from U.S. Memories equivalent to half of their equity in percentage points (a firm owning 5 percent of U.S. Memories, e.g., was obligated to purchase 2.5 percent of the consortium's output). Despite even IBM's support, U.S. Memories was stillborn and collapsed in January 1990 owing to insufficient financial support and an unwillingness of other major buyers, such as Apple Computer and Sun Microsystems, to commit to future purchases. Yet beginning in 1988, the industry received extensive financial support ($100 million per year for five years) from the Department of Defense for Sematech (SEmiconductor MAnufacturing TECHnology), a industry-led process R&D consortium.

The clear losers from the semiconductor agreement were the larger and far more numerous semiconductor users, particularly computer manufacturers de-

58. Further back-of-the-envelope calculations by Hufbauer and Elliott (1994, 106–10) suggest increased domestic semiconductor employment of about 2,300 workers, increased producer surplus of $260 million, increased foreign producer surplus of $835 million, and reduced consumer surplus of $1.2 billion.

pendent on DRAMs. Despite numerous complaints among users and even isolated instances of outright antagonism toward the accord—Tektronix wanted to revoke the agreement completely—opposition to the 1986 agreement failed to crystalize before 1988. As figure 1.1 illustrates, DRAM prices (which usually fell sharply after introduction) shot up dramatically in 1988. The price of 256K DRAMs jumped from about $2.20 at the end of 1986 to $3.50 by the end of 1988—although long-term supply prices in Japan were largely unchanged. The price bubble mainly reflected a surge in demand for DRAMs from another rapid expansion in the computer industry as well as the MITI-induced production cutback, which now had affected capacity investment decisions.

There were also indications that Japanese producers were cooperating in a de facto market-sharing cartel. Flamm (1993b, 280) notes that "before the Semiconductor Trade Arrangement of 1986, episodes of successfully coordinated restraint on exports or output by Japanese producers seem to have occurred only after bureaucrats and politicians responded to trade friction." But even as MITI's intervention in the DRAM market became less pronounced from 1989, DRAM prices in the United States remained substantially above estimates of the FMVs. There is evidence that trade restrictions became, in Krishna's (1989) term, a "facilitating practice," that is, facilitated tacit collusion between Japanese exporters.[59] As a result of production controls, Japanese firms had to ration output to U.S. consumers, and this possibly fostered coordination and collusion. U.S. firms criticized Japanese producers for denying them adequate volume of semiconductors and hinted that it was a deliberate attempt at retribution. Japanese firms more likely allocated their production to firms with whom they had long-standing ties and avoided selling "too much" in the United States.[60] No such bubble appeared in the price of EPROMs, which were also subject to the FMVs. Intel, AMD, TI, National Semiconductor, and other U.S. producers never exited the EPROM market, and the much lower Japanese share of this market meant their power to produce a substantial price rise was much less.

The price bubble for 256K DRAMs in 1988 proved so costly to semiconductor users that it heralded the end of the SIA's monopoly position as USTR's adviser on U.S. semiconductor trade policy. Three CEOs of major computer systems firms—John Akers (IBM), James Treybig (Tandem), and John Young

59. Evidence on Japanese collusion is considered in Tyson (1992) and Flamm (1993b).

60. As Okimoto (1987, 389–90) points out, just as purchasers of semiconductors rely on other ties besides price, "from the supplier's standpoint, too, organizational factors can overwhelm narrowly defined market forces. During periods of economic upturn, for example, when supply fails to keep pace with demand, Japanese companies are not inclined to sell on a neutral, first-come, first-served basis. Rather, they are apt to allocate limited stocks of semiconductor components according to an implicit hierarchy of customers. Loyal, long-standing customers get priority over companies that buy sporadically on a spot market basis. Vendors and end-users alike operate within the framework of long-term, reciprocal relations, which constrain free entry into, and exit from, market transactions and which change the calculus of commercial transactions."

(Hewlett-Packard)—formed the Computer Systems Policy Project (CSPP) in early 1989 as a forum for policy discussions and coordination in this segment of the electronics industry. These executives believed that the interests of the computer industry were not being met either by the AEA (owing to its size and inclusion of semiconductor firms) or the CBEMA (owing to the membership of Japanese firms).[61] The CSPP was designed explicitly to function as a counterpart to the SIA: it was to facilitate and coordinate the industry's positions on public policy at the CEO level, with only a small staff to manage the activities of individual companies. In May 1989, these three firms invited (at an entry fee of $50,000) other firms—including AT&T, Apple Computer, Compaq Computer, Control Data, Cray Research, DEC, NCR, Prime Computer, Sun Microsystems, Tektronix, and Unisys—to join the CSPP.[62] The overarching objective of the CSPP was to develop policy recommendations relating to the competitive position of the computer manufacturers, although in the invitational letter to other firms the CSPP founders wrote that "issues relating to the U.S.-Japan semiconductor agreement" were the group's "first project" and noted that without collective political action the government "may well adopt policies counterproductive, and in some cases inimical, to the interests of our companies."[63]

Opposition among semiconductor consumers, of course, first materialized in the weeks after the initial FMVs had been issued. But this opposition remained ineffective for nearly two years because it lacked organization. The CSPP succeeded in advancing its agenda for precisely the same reasons the SIA had succeeded—CEOs were directly involved, sympathetic political audiences were targeted, and proposals carried an industry consensus. And the CSPP began its organizational life by directly opposing the SIA on several issues. John Young, the CEO of Hewlett-Packard, wrote to Senator John Heinz (R-Pa.) that the "tone" of a Senate resolution in mid-1989 on Japan's noncompliance with the 1986 agreement would "set back rather than advance" the interests of computer manufacturers.

The newly invigorated opposition to the accord was the first of a series of setbacks for the SIA in 1989. The Bush administration's new USTR, Carla Hills, criticized the 20 percent figure in the semiconductor agreement as "managed trade" and announced a dedication to "process not results" in trade policy. Hills later clarified that she would enforce the provisions of the semiconductor agreement, but her devotion to the accord was brought into question, and the SIA did not view her as an ally. Some in the semiconductor industry argued

61. As early as July 1988, Tandem argued before the AEA's executive board that there was an "urgent need" to request "significant modifications" to the 1986 semiconductor agreement to curb its "adverse impact" on downstream semiconductor users. This proposal was essentially ignored. (See *Inside U.S. Trade*, August 19, 1988, 13–14.)

62. The charter members of the CSPP were Apple Computer, Unisys Corporation, Compaq Corporation, Cray Research, Hewlett-Packard, IBM, NCR, Sun Microsystems, and Tandem. At the end of 1993, membership also included AT&T, Control Data, Data General, and DEC.

63. *Inside U.S. Trade*, June 16, 1989, 3.

that the perception that Hills took the heat off Japan stalled further progress in market access, quantitatively measured; the foreign market share stood at 13.6 percent in the third quarter of 1989 and, after rising slightly, fell back to 13.4 percent in the first quarter of 1991.

Other setbacks for the SIA arose when the 20 percent market share target appeared beyond reach for the deadline of the end of 1991. The SIA pressured the Bush administration to have Japan cited as a priority country, under the new "Super 301" provision of the Omnibus Trade and Competitiveness Act of 1988, for its failure to abide by the 1986 agreement. The EIAJ declared that such a designation would jeopardize cooperation between the two groups and threatened to propose Japan's withdrawal from the agreement. Then the CSPP and the CBEMA both directly opposed the SIA's bid in letters to USTR Hills. While supportive of policies to promote greater market access, the CSPP thought that a "priority" designation was "unnecessary and unwise" and bluntly stated that the "CSPP does not believe that the Semiconductor Arrangement should be extended." The CBEMA also attacked the notion of import targets, suggesting that an approach focusing specifically on excluded products "would be far more productive than continually reiterating the dated approach of a 20 percent market share, which was arbitrary at its inception in 1986, and remains so today."[64]

As a result of this coalition of semiconductor consumers, trade negotiators at USTR no longer faced a single voice—the SIA's—on what should determine U.S. semiconductor trade policy. With the expiration of the accord on the horizon, USTR could not possibly negotiate a satisfactory agreement in the face of sharply conflicting domestic interests. Rather than mediate between the producers and users, USTR instructed the SIA and the CSPP to resolve their differences over trade policy themselves. Whereas the SIA wanted the status quo, the CSPP wanted the agreement scrapped, or at least the antidumping provision of the agreement that kept U.S. semiconductor prices high. The CSPP was basically indifferent toward the market access provision, so long as sanction for noncompliance did not impinge on its interests.

After lengthy negotiations, the SIA and the CSPP announced in October 1990 a joint proposal concerning the shape of a renegotiated agreement. They declared the antidumping provisions of the 1986 agreement a "success" and maintained that the Commerce Department should no longer collect costs or price data or issue FMVs for DRAMs and EPROMs. (However, a "fast track" for new antidumping complaints would be maintained.) They also agreed that "market access results should be measured by quantifiable indicators of progress" and that the 20 percent market share should be attained by the end of 1992, an extension of one year.

64. The CBEMA also argued that priority designation was "inappropriate" because the 1986 agreement already was an "adequate mechanism for pursuing the market access goal for semiconductors" (*Inside U.S. Trade*, April 20, 1990, 8–10).

The cooperative front formed by the two groups was important to the SIA. The joint statement avoided the embarrassment of a larger, downstream high-technology industry vocally opposing renegotiation of the semiconductor agreement and was in its tradition of defusing potential opponents. This compromise also eased the burden on USTR of renegotiating the 1986 agreement prior to its expiry in mid-1991. Although Japan first denied the need for a new agreement, they were soon brought to the bargaining table. With the antidumping provisions no longer a key issue, the main discussions centered on whether the market access provisions should move from the now not-so-secret side-letter into the agreement's text. Japan resisted but agreed, in exchange for the removal of the remaining $165 million in sanctions. The final (five-year) agreement was reached on June 4, 1991, and the text on this provision read: "The Government of Japan recognizes that the U.S. semiconductor industry expects that the foreign market share will grow to more than 20 percent of the Japanese market by the end of 1992 and considers that this can be realized. The Government of Japan welcomes the realization of this expectation. The two governments agree that the above statements constitute neither a guarantee, a ceiling, nor a floor on the foreign market share."

The comparative ease of the 1991 negotiations demonstrated how institutionalized the semiconductor agreement had become. Unlike the serious conflicts during the 1986 negotiations, both the United States and Japan had grown accustomed to the arrangements by 1991. Cooperative interaction between the SIA and the EIAJ and their members had expanded immensely since 1986. The Deputy USTR S. Linn Williams flatly stated that the accord was "a much more businesslike agreement than its predecessor." When asked what was different between the October joint SIA-CSPP proposals and the final agreement, Williams remarked, "I would characterize most of these differences as questions of technical matters, not policy."

In awaiting the end of 1992, the only decision left to the SIA was whether to recommend retaliation if the market share target was not reached. In March 1992, the SIA released a report entitled "Headed towards Crisis" that argued that the trade agreement was "at the threshold of failure" and urged "immediate and decisive action" by all parties to ensure compliance. Contrary to virtually all expectations and propelled by weakness in the Japanese economy, the foreign (merchant) market share in Japan reached 20.2 percent in the fourth quarter of 1992. How was the market share target achieved? Even prior to the 1986 agreement, certain (nonintegrated) Japanese firms (such as Sony) purchased over 20 percent of their semiconductors from U.S. firms. MITI pressure on other purchasers (by conducting surveys of the purchasing plans of firms) and a greater presence in Japan by U.S. firms probably accounted for the gradual increase in U.S. market share. Two other hypotheses—that the composition of Japanese demand shifted toward products the United States was better at producing, or U.S. technological advance in certain rapidly growing product

lines, such as Intel's 486 microprocessors, account for the larger U.S. share—are largely unsupported by disaggregated evidence on sales in Japan, according to figures presented in Bergsten and Noland (1993, 136).

How would the SIA react if the 20 percent market share were maintained? The SIA (1990, 33) once argued that "after a 20 percent level had been achieved, [the] foreign share would float to an appropriate level based on competitive merit and without further government targets. . . . [The target was] a threshold from which market forces would then take over and operate." Shortly after the 20.2 percent figures was released, a spokesman for TI stated that the industry "would be happier with less government involvement" in overseeing market access since they were becoming "part of the *keiretsu*."[65] The SIA quickly disavowed abandonment of market share targets, however, and some industry sources indicated that perhaps the market share target should be increased. After the market share dropped to nearly 18 percent in mid-1993, however, USTR Kantor requested "emergency" consultations with Japan to discuss the market access targets.[66]

The beginning of 1993 brought the SIA better news when an administration sympathetic to high-technology industries and market share targets with Japan took office.[67] Yet, as keenly illustrated in a virtual repeat of the semiconductor trade dispute in 1992–93, with South Korea as the defendant, the Clinton administration's embrace of import targets stumbled on the political realities of trade policy determination. In April 1992, Micron filed an antidumping petition alleging "less than fair value" imports of 1M and higher DRAMs from Korea. In October, the Commerce Department announced preliminary dumping margins (based on petitioner information) against Samsung (87.40 percent), Goldstar (52.41 percent), and Hyundai (5.99 percent). Faced with stiff antidumping duties, the Korean industry and government proposed in January 1993 a bilateral semiconductor trade agreement fashioned on the earlier one with Japan. In exchange for a suspension of the antidumping case, the Korean industry promised to monitor prices of export sales to the United States. The Korean government offered to sign an agreement in which it would commit itself to (as a draft stated) "demonstrable and measurable results in terms of increasing sales in Korea of U.S. semiconductors and semiconductor equipment." The government also promised to reduce or eliminate the Korean tariff

65. *Wall Street Journal,* June 7, 1993, A3.

66. One MITI official was quoted as saying, "The more the U.S. side overemphasizes this decline in the market share, the more we are convinced that we will never again negotiate a semiconductor-type arrangement" (*Wall Street Journal,* December 28, 1993, A3).

67. In early March, after less than two months in office, both the USTR (Mickey Kantor) and the Secretary of Commerce (Ronald Brown) of the Clinton administration had traveled to California to address the SIA. Kantor promised to be "vigilant" in monitoring the agreement, while Brown embraced the 1986 and 1991 accords as fine examples of results-oriented agreements, which he promised the administration would expand to other sectors. In addition, Laura D'Andrea Tyson, who had extensive personal contacts in the semiconductor industry and known policy positions sympathetic to the industry, was named chair of the CEA.

on semiconductors, secure greater intellectual property protection of U.S. chip designs, and increase U.S. sales through a variety of other means.

Here was the very prototype of a market-opening import target agreement that Clinton administration officials said they coveted with another country to which U.S. firms had requested access, yet it was rejected. Confident of resting securely behind high antidumping duties imposed against Korea and prospectively unaffected by the Korean market-opening actions, Micron strongly opposed suspension of the case. The Commerce Department, acting on Micron's wishes, had little authority to pursue the agreement and, absent any pressure from the industry, USTR remained inert and basically ignored the overture. By March, the Korean firms provided production cost data to the Commerce Department, and the final antidumping margins were drastically cut—0.74 percent for Samsung, 4.97 percent for Goldstar, and 7.19 percent from Hyundai. In May, the ITC split 3–3 on the final material injury, with the default being that a tie goes to the affirmative and duties will be imposed. Thus, Micron squeaked by the ITC but received nowhere near the protection it thought it would get by rejecting the Korean proposal, and the Commerce Department in representing a "customer-client" firm passed up an opportunity to reduce Korea's semiconductor tariff for all U.S. semiconductor firms.[68]

1.8 Conclusions

Beneath the rhetoric about strategic high-technology industries that pervade public policy discussions of semiconductors, the semiconductor dispute followed the political economy script of virtually every other instance of U.S.-Japan trade friction, from textiles to televisions to automobiles. Japanese firms rapidly enter an industry, provide a quality product at a reasonable price, and force an insulated U.S. industry to face acute competition. Amid calls for "fair trade" and against "dumping," the domestic industry solicits the government for assistance. Foreseeing the inevitability of trade restraints, Japan opts for a VER. The VER is adopted by other countries (the European Community) that fear a shift in Japanese sales toward their market. The VER generates large profits for the now-collusive Japanese producers, often giving them an incentive to upgrade product quality or move into more profitable lines of production. The restraint provides modest support for remaining U.S. firms in the industry, and an opportunity for producers in other countries to accelerate their entry into the market. To avoid the VER, Japanese firms make direct investments in the United States, seeking joint ventures with U.S. firms to create a web of multinational interests that diminish the anti-Japanese position of U.S. firms. Downstream users are harmed by the protection and, if they organize, demand offsetting policies or protection for themselves.

The semiconductor case is unique because of the unprecedented, overreach-

68. See *Inside U.S. Trade*, March 19, 1993, 20; USITC (1993a).

ing—and in some ways outrageous—demands made by an industry on U.S. trade policy. The industry wanted an end to what it called "dumping" (implying something more than simply a bad demand shock adversely affecting all producers, Japanese included) not just in the United States but in all other markets as well. Dumping was never proved to exist in those third markets, and even if proved the United States had no authority whatsoever to enforce antidumping measures in those countries. The antidumping measures in the 1986 agreement, however, proved not to be politically sustainable in the face of opposition from downstream user industries.

The semiconductor case was also unique in the market share target to compensate for insufficient market access. On market access, the industry failed to identify any governmental import barriers and simply condemned the "structure" of the Japanese market as an impediment to its sales there. While denying the target was a "guaranteed" market share (and despite many qualifications to the target in the official agreements), both the industry and USTR certainly acted as though it was. In contrast to antidumping, the SIA succeeded in perpetuating the import targets even though the 20 percent figure was reached.

The question remains: given that the semiconductor industry received all it asked for from the government, did the agreement revitalize the industry? Robert Baldwin's notion of the "inefficacy of trade policy" is relevant here. Despite the all-encompassing dumping and market access provisions of the 1986 agreement, the agreement was actually quite narrow in scope. While the "affirmative action" market access provisions were generic, the antidumping provisions affected only one segment of the entire semiconductor industry, DRAMs, a segment which most U.S. firms had abandoned never to return, and to a lesser extent EPROMs. The agreement did not exterminate industry recessions: in 1989–91, industry sales were extremely weak. The agreement did not reverse the declining U.S. market share held by merchant firms: the merchant share slipped from about 83 percent in 1986 to 70 percent in 1992, although on a worldwide basis the slide in the merchant's share ended in the mid-1980s.[69]

The semiconductor industry was not myopic in its reluctance to reenter the DRAM market: not only has South Korean and Taiwanese competition emerged (Samsung recently overtook Toshiba as the world's largest DRAM producer), but growth in the memory chip market has slowed from almost a 15 percent annual rate in 1984–88 to about 7 percent in 1988–92. Meanwhile, growth in microdevices (such as microprocessors) has accelerated to over 20 percent annually from 1988 to 1992. The market for these semiconductor products, which embody a greater degree of intellectual property than memory chips, is also much more profitable (witness Intel's success) and much less volatile than the market for memory chips. Japan's success in producing homo-

69. Statistics from the SIA.

geneous DRAMs pushed U.S. firms into product-differentiated markets in which they would enjoy greater markups and face less direct competition.

The semiconductor dispute also yields certain reflections on U.S. trade policy institutions. If the U.S. industry's policy demands were far reaching, so is the extent to which certain government agencies sought to accommodated those demands. Both the antidumping and the market access issues illustrate how trade policy can be driven by a coalition of a few vocal firms, or sometimes (as was the case in antidumping with Micron) just one firm. Both in the 1986 and 1991 negotiations with Japan, the bargaining stances taken by USTR were precisely the positions held by the SIA and then the SIA and CSPP together. These groups had effective veto power over any agreement. In these trade negotiations, the Commerce Department and USTR—constrained by the legal procedures under U.S. trade law—proved incapable of any independent conception of what sorts of policies would best serve the interests of the economy overall.

Appendix

Text of Secret Side-Letter to U.S.-Japan Semiconductor Agreement (1986)

By this exchange of letters, we record the following with respect to the Arrangement between the Government of Japan and the Government of the United States concerning Trade in Semiconductor Products:

I. Market Access

1. The Governments of Japan and the United States of America have met on numerous occasions since July 1985. Both Governments are desirous of enhancing free trade in semiconductors on the basis of market principles and the competitive positions of their respective industries. The Government of Japan welcomes a significant increase in imports and sales of foreign based semiconductors in the Japanese market through free and fair competition.
2. The Government of Japan recognizes the U.S. semiconductor industry's expectation that semiconductor sales in Japan of foreign capital-affiliated companies will grow to at least slightly above 20 percent of the Japanese market in five years. The Government of Japan considers that this can be realized and welcomes its realization. The attainment of such an expectation depends on competitive factors, the sales efforts of the foreign capital-affiliated companies, the purchasing efforts of the semiconductor users in Japan and the efforts of both Governments.

3. The Government of Japan will encourage Japanese users to purchase more foreign-based semiconductors and to provide further support for expanded sales by foreign capital-affiliated semiconductor companies in Japan through the establishment of an organization to provide sales assistance for foreign capital-affiliated semiconductor companies and through promotion of long-term relationships between Japanese semiconductor purchasers and foreign capital-affiliated semiconductor companies.

Source: Inside U.S. Trade 6, no. 46 (November 18, 1988).

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Comment

Andrew R. Dick

Douglas Irwin has constructed a detailed case study of semiconductor trade policy starting in the late 1970s, when the industry first received sustained attention from policymakers and among trade theorists. His analysis has three primary strengths. First, rather than confining attention narrowly to policy outcomes, Irwin analyzes how industry characteristics and U.S. trade institutions also shaped the negotiating *process* in market access and antidumping disputes. Second, Irwin appropriately emphasizes the semiconductor industry's efforts to build a political consensus both within its ranks and within U.S. trade agencies. As he points out, it is incorrect to regard the industry and the government as monolithic actors in the semiconductor dispute. Finally, Irwin addresses the three questions that George Stigler required in any study of economic regulation: (1) What determines the timing of protection? (business cycles and import penetration trends), (2) What determines the level of protection? (the political costs of and returns to industry lobbying), and (3) What determines the form of protection? (the industry's risk and cost characteristics).

Irwin's chronology of the semiconductor trade dispute is comprehensive and carefully documented. Accordingly, my comments focus not on the facts of the case study but instead on their interpretation and the conclusions that can be drawn. First, I believe that the semiconductor industry proved less adept at exploiting its political capital than Irwin suggests. Despite its designation as a "strategic" industry, its adoption as a focal point in U.S.-Japanese trade negotiations, and the absence of effective downstream opposition, the industry failed to earn a politically sustainable level of administered protection. Second, Irwin correctly notes that countervailing pressures limiting semiconductor protection came largely from *within* the industry, rather than from Japanese competitors or major semiconductor purchasers. He stresses the opposing pricing objectives of integrated and nonintegrated semiconductor firms as the primary factor limiting industry influence. Another influential factor deserves equal attention,

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however: the extensive scale of international cross-ownership in semiconductor production, which erodes the policy distinction between American and Japanese firms. Third, while Irwin does not emphasize them, his case study offers insights into ongoing policy debates over "rules" versus "outcomes" approaches to trade negotiations and bilateralism versus multilateralism.

How Successful Was Semiconductor Lobbying?

Irwin argues that the "semiconductor industry received all it asked for from the government" (section 1.8) and notes that "few industries ever realize the sustained, high-level attention needed to result in the negotiation of a governmental agreement on trade in just one sector" as semiconductor producers received (section 1.1). The industry's policy achievements include (1) convincing the International Trade Commission and Department of Commerce to levy antidumping duties on Japanese DRAMs, (2) persuading the U.S. Trade Representative (USTR) to press for greater access to Japanese markets under section 301, and (3) setting the terms for negotiations in 1986 and 1991 to regulate Japanese pricing and import practices. While these achievements proved largely unsuccessful in revitalizing the U.S. industry, the consensus view is that when the semiconductor industry spoke, U.S. trade agencies listened.

While not denying that the semiconductor industry received unprecedented and prolonged attention in Washington, I believe that the industry proved to be less successful at exploiting its political capital than Irwin (and most other researchers) have concluded. By this I do not mean simply that protection turned out to be ineffective empirically for the reasons that Robert Baldwin (1982) has noted, but rather that the industry failed to earn a politically sustainable level of administered protection. Consider the 1986 agreement, which was intended to curb Japanese "dumping" in U.S. and third-country markets.[1] Irwin notes that even before the agreement was officially signed in November 1986, it began to unravel in response to domestic and foreign political pressures. Major semiconductor purchasers successfully challenged the Department of Commerce's fair-market-value (FMV) methodology for setting minimum Japanese import prices. Downstream opposition also forced the agreement's antidumping provisions to be dropped when its terms were renegotiated in 1991. Furthermore, the agreement's requirement that Japan regulate its third-country pricing proved unenforceable in light of the intransigence of the Ministry of International Trade and Industry and European objections. In sum, the twin pillars of the agreement's pricing provisions—FMV pricing in the United States and curbing third-country dumping—were soon undermined by political (rather than purely economic) forces in the United States, Japan, and Europe.

1. Contrary to the Department of Commerce's affirmative findings of dumping in its investigations of Japanese DRAM and EPROM pricing, there is little economic evidence of below-cost sales by Japanese producers. For an analysis of the dumping cases, see Dick (1991).

Why Would We Expect Successful Semiconductor Lobbying?

Semiconductor firms entered the 1980s with three important political advantages that raised the stakes for both the industry and U.S. policymakers. Viewed in isolation, these advantages guaranteed that the industry would receive unparalleled attention in Washington.

First, as Irwin notes, events in the semiconductor industry were driven in large measure by macro-level rather than industry-level pressures. Japan's trade surplus with the United States was growing steadily, and the trend was particularly acute in the computer and computer components sectors. The semiconductor industry seemed to mirror what was "wrong" in general: an industry that the United States had dominated in research and sales since its postwar inception was struggling to compete against Japanese producers buoyed by government subsidies and perceived unfair trade practices. It was in this environment that the semiconductor industry was adopted as the cause célèbre for those seeking to turn up the pressure on U.S.-Japan trade relations in general. Heeding the semiconductor industry's predictions of its imminent demise was the equivalent of drawing a line in the sand for U.S. policymakers.

Second, semiconductors had been designated a "strategic" industry. The defense establishment, which had underwritten much of the industry's basic research and acted as a major demand source since its infancy, has long regarded a secure domestic supply of semiconductors (and semiconductor producers) as essential to military preparedness. The strategic trade policy literature, which began in the early 1980s and quickly received attention in policy circles, also stressed the semiconductor industry's steep learning curve, large up-front research investments, short product cycles, and downstream linkages.[2] That literature has shown how government policies can interact with such strategic industry characteristics to allow firms to make credible commitments to preempt rivals' investments. When trade policy acquires a strategic value, the economic return to intervention grows and the industry's potential base of political support expands.

Third, the Semiconductor Industry Association (SIA) was fortunate in that semiconductor purchasers mounted only disorganized and ineffective opposition. The American Electronics Association (AEA), representing manufacturers of computer systems and communications equipment, had diverse interests and even included several semiconductor producers. While computer manufacturers ultimately split from the AEA to form a splinter lobby group, Irwin notes that the SIA retained "its monopoly position as the USTR's advisor on semiconductor trade policy" until early 1989. By then, semiconductor trade policy had been institutionalized and the debate shifted away from whether to protect the industry and toward how to enforce the agreements already negotiated with Japan.

2. A 1984 conference in Washington, D.C., exposed many policymakers to the basic concepts of strategic trade policy and was later published in Krugman (1986).

Why Did Semiconductor Lobbying Fall Short of Expectations?

Given these three political advantages, why was the semiconductor industry less than completely successful in its lobbying activities? Irwin suggests, and I agree, that the SIA's heterogeneous membership forced it to temper its lobbying objectives. After an initially unsuccessful effort to press its case in Congress, the SIA was forced to expand its membership from just merchant firms (which sold on the open market, and thus favored higher prices) to include also vertically integrated firms (which produced largely for internal use, and thus sought to avoid price increases). Broadening its membership raised the SIA's political visibility and potential clout but also forced the association to moderate its lobbying position. Opposition by integrated firms, for example, forced the SIA to abandon plans to file an escape clause petition for import relief or to seek antidumping duties under the more lenient section 731 of the Tariff Act of 1930.

Another influence dampening semiconductor lobbying that merits greater attention than it receives stems from the extensive scale of international cross-ownership in semiconductor production. American and Japanese semiconductor firms have extensive cross-ownership in the form of direct equity stakes, research joint ventures, technology-licensing agreements, and second-sourcing of production. During negotiations leading to the 1986 industry agreement, for example, U.S. semiconductor firms had a total of 52 research, technology, and production agreements with their Japanese competitors (Haklisch 1986, 57). Elsewhere, I have shown how even much lower levels of cross-ownership can substantially dampen strategic policy incentives (Dick 1993). Cross-ownership not only directly lowers the economic and political return from protection but also raises the domestic industry's lobbying costs by introducing heterogeneous interests into the political coalition. In the semiconductor industry, this heterogeneity severely constrained SIA lobbying. For example, while firms without extensive Japanese ties such as Motorola and Micron aggressively lobbied for industry protection, their demands were muted by firms such as Intel which had numerous second-sourcing and technology-sharing agreements with Japanese competitors (Haklisch 1986; United Nations Center on Transnational Corporations 1986).

Drawing Conclusions from the Semiconductor Dispute

While he does not highlight them, Irwin's case offers insights into two ongoing policy debates: "rules" versus "outcomes" and bilateralism versus multilateralism. The USTR's adoption of numerical targets for American firms' Japanese market penetration mirrors the broader shift away from developing overall trading rules or principles in favor of mandating specific market outcomes. Setting market share targets gives the appearance of adding flexibility and objectivity to dispute resolution. The semiconductor agreements illustrate why both appearances are deceptive. When the U.S. share of the Japanese market fell modestly below the 20 percent target in late 1993, the USTR reacted by

seeking emergency consultations with Japan. The SIA also hardened its position, contending that failure to maintain the arbitrary 20 percent quota placed the agreement "at the threshold of failure."[3]

Market share targets ultimately proved to be unsustainable, however, not because of their rigidity but because they lacked any economic foundation. Throughout the trade dispute, the SIA failed to offer persuasive evidence of market barriers to its exports. The SIA sought "equal market access," yet as Irwin notes, the U.S. share of the Japanese semiconductor market actually *exceeded* Japan's share of U.S. chip consumption up until the mid-1980s and remained roughly comparable for a few years later. And while the SIA pointed to "unfair trading practices" to explain its stagnant Japanese market share, those practices—vertical integration, long-term relationships among producers, and exclusive distributorships—were equally commonplace in the U.S. industry. The SIA's success in pressing allegations of market barriers, absent empirical evidence, illustrates how an outcomes-based approach is susceptible to self-interested industry pressures.

The semiconductor case study also illustrates the pitfalls of bilateral dispute resolution when international markets are highly integrated. The USTR recognized that any agreement with Japan which merely prohibited dumping in the U.S. market would make the United States a high-price island and, by diverting Japanese exports to Europe, would reduce American semiconductor exports. Instead of seeking a multilateral agreement, however, the United States demanded that Japan raise prices in *all* export markets. Japan's inability (or unwillingness) to curb third-country dumping naturally led to smuggling of chips from lower-price Asian markets into the United States. The European Community also objected to being made a silent partner in the U.S.-Japan Semiconductor Agreement and ultimately persuaded a General Agreement on Tariffs and Trade panel that monitoring Japanese export prices on third-country sales violated article XI. To protect its own faltering semiconductor industry, the European Community eventually opted for a bilateral trade strategy that mirrored failed U.S. policies: initiating antidumping proceedings against Japanese DRAM and EPROM producers and signing a pricing agreement with Japan in 1989 (Schlesinger 1989). Europe's bilateral approach proved equally unworkable and spawned secondary trade disputes with the United States. Extensive integration in the semiconductor market required a multilateral pricing or production agreement rather than a market-by-market response.

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3. In one sense, the SIA demonstrated considerable flexibility toward the market share target. After the 20 percent quota was met in the fourth quarter of 1992, several semiconductor firms disavowed their earlier position that market forces should resume guiding trade flows and instead recommended raising the target.

Dick, Andrew R. 1991. Learning by doing and dumping in the semiconductor industry. *Journal of Law and Economics* 34:133–59.

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