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1 The U.S.-Japan Semiconductor Trade Conflict

Douglas A. Irwin

1.1 Introduction

The 1986 U.S.-Japan semiconductor trade agreement ranks among the most controversial trade policy actions of the 1980s. In this agreement the government of Japan agreed to end the “dumping” of semiconductors in world markets (not just the United States) and to help secure 20 percent of their domestic 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—later proved to be partly illegal under the General Agreement on Tariffs and Trade (GATT) and drew the ire of prominent high-technology, semiconductor-using industries, particularly computer 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. These producers did achieve a 20.2 percent market share in Japan by the end of 1992, although the share has subsequently fluctuated. But by concentrating on a specific, quantitative “outcome” rather than the principle of market access, the provision provoked sharp debate: either it was heralded as a positive, concrete step toward gaining greater sales in Japan (“making the cash registers ring”) or

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scorned as a step toward cartelized “managed trade” and export protectionism via government-fixed market shares.¹

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. This paper examines how the U.S. semiconductor industry became the beneficiary of this unprecedented sectoral trade agreement.²

1.2 The U.S. Semiconductor Industry

The U.S. semiconductor industry—a prominent, high-technology, R&D-intensive industry—produced \$25 billion in output with employment of just under 200,000 in 1989.

1.2.1 Firms

Firms range from the enormous—such as IBM, the world’s largest semiconductor producer in the mid-1980s—to the minuscule—such as Micron Technology of Boise, Idaho, which specialized in memory chips. Although Micron’s sales were only $\frac{2}{10}$ of 1 percent of IBM’s, both firms equally influenced the course of U.S. trade policy. Between these extremes lie a handful of prominent midsized firms that constitute the core of the U.S. industry: Texas Instruments (TI), Motorola, Advanced Micro Devices (AMD), National Semiconductor, and Intel.

1.2.2 Products

The 1980s trade dispute centered on a unique set of digital integrated circuits—memory chips—which computers use to store and retrieve data and which accounted for 18 percent of all U.S. semiconductor purchases in 1985. Dynamic random-access memories (DRAMs) comprised 7 percent of the total market. The DRAM market approaches perfect competition because DRAMs are a standardized commodity produced by many firms.³

1.2.3 Capital and Labor

In 1977 corporate executives, the principal capital owners in the industry (many firms were still dominated by their founders), formed the Semiconductor Industry Association (SIA) to lobby for trade actions. Some firms organized political action committees, whose disbursements appear related to the trade

1. The Clinton administration has promised to use import targets with Japan in other sectors. For a critical analysis, see Irwin (1994).

2. This paper is a significantly condensed version of my longer paper of the same title issued as NBER Working Paper no. 4745, May 1994. The longer version should be consulted for fuller details of this issue.

3. The industry is often thought to be a strategic industry because of learning spillovers. For an assessment, see Irwin and Klenow (1994).

dispute with Japan.⁴ With one-third of U.S. semiconductor employment in California, the SIA ably employed California's congressional representatives to pressure the executive branch into trade action.

Labor itself was largely mute. The lack of political activism among workers could be attributed to their interindustry mobility: evidence suggests that many of them have skills useful in related high-technology industries.⁵

1.2.4 Merchants and Captives

Captive producers, such as IBM and AT&T, are vertically integrated (making semiconductors for internal consumption) but are net purchasers of semiconductors from others. Merchant firms produce semiconductors for sale to other firms. Merchant firms have an interest in high semiconductor prices, whereas captive producers do not. These conflicting interests within the SIA had to partially accommodate each other.

1.2.5 Downstream Users

Computer manufacturers are the most important domestic users of memory chips and could be expected to oppose proposals that would raise semiconductor prices. These manufacturers did not initially oppose the 1986 agreement, but did so with the subsequent rise in DRAM prices.

1.2.6 Japanese Producers

Japanese lobbying during the antidumping and Section 301 (of the Trade Act of 1974) deliberations was limited because of the strict administrative procedures under U.S. trade law. The Electronic Industries Association of Japan (EIAJ) and its members spent \$3.8 million on K Street lawyers for their legal defense between 1985 and 1987.⁶

1.3 Semiconductor Competition from Japan

Japan emerged as a major producer of semiconductors in the late 1970s. Spectacular success was achieved in DRAMs: the U.S. market share plummeted from 70 to 20 percent between 1978 and 1986 as the Japanese share jumped from under 30 to about 75 percent.⁷ Import penetration increased. Japan's share of total U.S. semiconductor consumption rose from 7.5 percent in 1982 to 12.3 percent in 1984, before dropping back to 9.8 percent in 1986. Yet

4. According to the Federal Election Commission, payments totaled \$354,318 at the peak of the dispute in 1985 and 1986, 40 percent higher than in 1983 and 1984.

5. See Ong and Mar (1992).

6. Roughly \$1.1 million over these three years was devoted to countering the Section 301 action, comparable to that spent by the SIA alone on the Section 301 case. Figures from the Department of Justice.

7. See Tyson (1992, 106 ff).

Japan's share of the U.S. market was not fully indicative of the force of the new competition because, in an integrated world market, Japanese producers could capture market share abroad only by forcing the market price downward everywhere.

Why were Japanese firms so successful? The role of the Ministry of International Trade and Industry (MITI) and industrial policy has been wholly exaggerated by those sympathetic to the semiconductor industry. Japanese firms probably had easier access to capital: they are often affiliated with a large bank that could play a role in corporate governance through equity ownership (the Glass-Steagall Act prohibits such activities in the United States). Such bank ties probably allowed Japanese producers to weather industry downturns much better than their U.S. counterparts.⁸ On the U.S. side, the high cost of capital in the early 1980s, the appreciation of the U.S. dollar, lagging adoption of new process technology, and quality control problems all hampered U.S. firms.

1.4 Trade Action against Japan

SIA members had two complaints about their foreign rivals: dumping and market access.

1.4.1 Dumping

The dumping complaints arose during the periodic sharp price declines in this cyclically volatile industry. The industry recession of 1985 was extremely severe because of a brief slowdown in the computer market. After increasing by a factor of five between 1981 and 1984, domestic shipments of microcomputers actually fell by 8 percent in 1985.

Prices collapsed and the memory-chip market contracted 60 percent. Merchant firms racked up unprecedented losses. Capacity utilization and employment plummeted. Every U.S. merchant producer was pushed out of the DRAM market except Texas Instruments and Micron.⁹

Despite complaints that dumping was "predatory" and "unfair," Japan did not pick 1985 as the year to drive U.S. firms out of business. Indeed, Japanese firms experienced similar losses and layoffs as world demand fell. Imports did not cause the recession: Japanese import penetration actually fell in the two years after 1984. Three-quarters of the fall in revenues of U.S.-based companies in 1985 were due to declining overall demand, only a quarter due to lost market share.¹⁰

Regardless of the underlying economics, the antidumping laws were always available. Captive producers opposed higher tariffs on semiconductors and prevented the SIA from ever filing an antidumping complaint. A small firm that

8. See Hoshi, Kashyap, and Scharfstein (1990).

9. Most firms simply abandoned DRAM production and concentrated on other product lines, but one (Mostek) went bankrupt in 1985.

10. Federal Interagency Staff Working Group (1987, 10).

at the time was not even a member of the SIA forced the issue. In June 1985, Micron filed an antidumping complaint against Japanese exporters of 64K DRAMs. Merchant SIA members soon broke ranks: in September 1985, Intel, AMD, and National Semiconductor filed for antidumping action against imports of erasable programmable read-only memories (EPROMs) from Japan.¹¹ In an unusual move, the Commerce Department self-initiated an antidumping case on 256K and future generations of DRAMs in December 1985.

As the petitions ground through the administrative trade bureaucracy, preliminary determinations from the International Trade Commission indicated support for the industry, and final affirmative findings appeared to be inevitable.

1.4.2 Market Access

An important barrier to the sale of foreign semiconductors in Japan was the high degree of vertical integration there (that is, captive production, like IBM and AT&T).¹² Few governmental barriers remained after Japan formally liberalized its semiconductor trade in 1975. The SIA viewed this as a sham because the U.S. share of the Japanese market scarcely budged.

In June 1985, the SIA filed a Section 301 petition with the Office of the United States Trade Representative (USTR), providing circumstantial evidence of market barriers in Japan. In 1984, U.S. producers accounted for over 83 percent of sales in the United States, 55 percent in Europe, 47 percent in elsewhere, yet just 11 percent in Japan. But they had no smoking gun: 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.”¹³ The SIA demanded “affirmative action” in the Japanese market.

Coincidentally, the SIA’s political timing was superb. Unlike in 1982, when a trial Section 301 petition was shot down by USTR William Brock, the massive trade deficit focused the Reagan administration’s attention on such matters. The USTR self-initiated Section 301 cases to divert protectionist pressure from closing the U.S. market to opening up foreign markets. The audience for this “tough” trade policy was Congress.¹⁴ With this political backdrop, 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.

11. Notably absent from this list was Texas Instruments, the largest U.S. producer of EPROMs with direct investments in Japan.

12. Japanese firms also tended to specialize in certain types of semiconductors and trade these devices with one another based on long-term contracts or long-standing ties to one another.

13. SIA and Dewey Ballantine (1984, 2), emphasis added.

14. The administration desperately sought to avoid a congressional trade bill forcing the president to impose sanctions against countries running a trade surplus with the United States. For a discussion of the political environment of trade policy in the mid-1980s, see Destler (1992).

But any petition guaranteed to generate a major confrontation with Japan would encounter some opposition within the administration. The SIA made vague claims about how Japan's government fostered "Buy Japan" attitudes and identified Japan's market structure (reciprocal trading relationships among firms) as a trade barrier. But what were the explicit government policies that were actionable under Section 301? To some administration officials, past government policies, vertical integration, and long-term relationships hardly seemed to constitute actionable "unfair trade practices."

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 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. Japanese access to the U.S. market also may have been hindered by discrimination in the distribution system.¹⁵

But there being no major opponents to the petition, the USTR initiated the Section 301 case against Japan.

1.5 The Semiconductor Trade Agreement of 1986

With the exception of Micron, virtually no party had an interest in seeing the antidumping duties imposed. For captive producers and downstream users, the U.S. market would become a "high-priced island." For merchants, the antidumping remedy alone would still permit Japanese dumping in third markets and kill U.S. sales there. For the Japanese producers, a voluntary export restraint to capture scarcity rents would be preferable to antidumping duties. All forces were driving toward a negotiated settlement before the antidumping duties went into effect.

The negotiations got stuck on third-country dumping and market access. Japan wanted to hedge on both points. The SIA was adamant. Japan capitulated to avoid the automatic imposition of antidumping penalties and possible 301 sanctions. In doing so, the EIAJ felt abandoned by MITI, perhaps accounting for its later reluctance to adhere to guidelines enforcing the agreement.

Japan agreed to take actions that would end dumping in the United States.¹⁶ The agreement on preventing third-market dumping was more vague and the

15. U.S. semiconductor firms limited Japanese access 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*, 9 December 1985, S28.

16. The Department of Commerce would determine company-specific price floors each quarter and convey this information to the Japanese firms.

government's obligation less clear. On market access, the agreement exhorted Japanese producers to create more sales opportunities for others. But a secret side-letter explicitly but ambiguously mentioned the 20 percent market share: "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."

What policy measures and instruments did Japan have, beyond mere exhortation, to enforce the agreement and 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 since they did not directly control the industry.

To prevent worldwide dumping, MITI did the only thing it knew how to do—reduce the quantity of semiconductors exported to raise export prices. MITI essentially imposed an "antidumping" voluntary export restraint (VER)—an export restraint designed to meet a price target rather than a quantitative target. MITI issued directives to reduce output but had no statutory authority to force any firm to comply and indeed had difficulty in getting firms to comply.¹⁷ On market access, MITI undertook surveys of firms's purchasing plans and encouraged greater purchases of foreign semiconductors. Once again, they had no direct policy instrument to enforce the provisions and compliance was initially weak.

MITI's inability to bring Japanese firms quickly in line looked like waffling to the SIA and the administration. Fearing Capitol Hill's reaction to another "failed" trade agreement with Japan, President Reagan imposed 100 percent tariffs on \$300 million worth of Japanese imports in April 1987. The retaliation ranks among the most dramatic events of postwar U.S. trade policy. Japan was stunned, but some reports indicated that MITI was secretly pleased because it proved to Japanese firms that they should follow MITI's directives.

1.6 Economic Effects of the 1986 Agreement

As with other VERs, the beneficiaries included Japanese exporters. The MITI-induced production cutbacks generated an enormous windfall for exporters. According to some reports, profits on 1M DRAM sales for Japanese producers amounted to \$1.2 billion in 1988 alone, which could be plowed back into R&D and product upgrading. Higher DRAM prices accelerated the entry of South Korean firms not covered by the restraint.

Only two U.S. merchant firms (TI and Micron) remained in the DRAM market to benefit from the antidumping actions. DRAM sales reportedly accounted

17. However, bureaucratic delays in approval of export licenses—also tightened to prevent dumping—could "unexpectedly" arise for recalcitrant firms.

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 1988.¹⁸ U.S. producers did not reenter the DRAM market. Motorola agreed to buy prefabricated semiconductor dies from Toshiba, assemble them in Malaysia, and import them under Motorola's name to avoid the antidumping duties. U.S. Memories, a consortium to establish greater domestic DRAM production, was stillborn.

The clear losers from the agreement were semiconductor users, particularly computer manufacturers dependent on DRAMs. They soon fought back.

1.7 Aftermath of the 1986 Agreement

Of the three major provisions of the 1986 agreement, only one (on market access) survived through the renegotiation of the agreement in 1991.

The third-market dumping provision died in 1988. Responding to a complaint from the European Community, a GATT panel ruled that Japanese monitoring of export prices on third-market sales violated Article 11 of the Agreement.

The U.S. dumping provision died with the new 1991 agreement. When semiconductor demand picked up again, U.S. DRAM prices soared and proved so costly to purchasers that they ended the SIA's monopoly as the USTR's adviser on semiconductor trade policy. IBM, Tandem, and Hewlett-Packard led others in founding the Computer Systems Policy Project (CSPP) in 1989 to oppose the antidumping measures. The USTR could not possibly negotiate a satisfactory agreement in the face of sharply conflicting domestic interests. Rather than mediate, the USTR instructed the SIA and the CSPP to resolve their differences.

The SIA and the CSPP declared the antidumping provisions a "success." The CSPP was indifferent to the market access provisions so long as there were no sanctions for noncompliance. The 1991 accord extended by one year (to the end of 1992) the deadline for meeting the target, while stating that the target "constitute[s] neither a guarantee, a ceiling, nor a floor on the foreign market share."

Contrary to virtually all expectations, the foreign market share in Japan reached 20.2 percent in the fourth quarter of 1992. MITI pressure on other purchasers and a greater presence in Japan by U.S. firms probably accounted for the increase in U.S. market share. There is little evidence that the changing composition of Japanese demand (toward products the United States was better at producing, like microprocessors) did the trick.¹⁹

18. The employment effects of the agreement were probably negligible: back-of-the-envelope calculations suggest increased semiconductor employment of 2,300, but for each of these another was lost in computer manufacturing.

19. See Bergsten and Noland (1993, 136).

1.8 Conclusions

Those guilty of post hoc, ergo propter hoc reasoning attribute the rebound in the U.S. semiconductor industry since the mid-1980s to the agreement. The agreement did spawn greater cooperation and joint ventures between SIA and EIAJ members. But the U.S. industry did well to get out of memory chips (where the Japanese are now battling the South Koreans) and into microprocessors and application-specific integrated circuits. The agreement had little to do with this.

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