

BEFORE THE UNITED STATES  
DEPARTMENT OF COMMERCE

P. 86 46 43

Dynamic Random Access Memory )  
Semiconductors of 256 Kilobits )  
and Above from Japan, No. A-588-505 )

Prehearing Brief By the Bureau of Competition,  
Bureau of Consumer Protection, and Bureau of Economics  
of The Federal Trade Commission

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This brief represents the views of the Bureaus of Competition, Economics, and Consumer Protection and does not necessarily represent the views of the Commission or any individual Commissioner. The Commission, however, has authorized the submission of this brief.

Prehearing Brief on the final  
antidumping determination for dynamic  
random access memory semiconductors of  
256 kilobits and above from Japan

Introduction and Summary

The Department of Commerce ("Department") has made a preliminary determination that dynamic random access memory semiconductors of 256 kilobits and above ("256K and above DRAM") imported from Japan are being dumped. 51 Fed. Reg. 9475 (March 19, 1986). We offer these comments to the Department to assist it in making its final determination of the dumping margins.

Using data for the last six months of 1985, the Department found that many sales in Japan were at prices below the Japanese cost of production and so derived the dumping margin by comparing the United States price of 256K and above DRAM with "constructed value" <sup>1</sup>, rather than with the price in Japan. The statute states, in pertinent part, that the Department should disregard sales in Japan made at "less than the cost of producing the merchandise" if they "are not at prices which permit recovery of all costs within a reasonable period of time in the normal course of trade." 19 U.S.C. § 1677b(b).<sup>2</sup>

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<sup>1</sup> Constructed value is computed by adding: (1) the cost of materials and fabrication or processing, (2) general expenses associated with the manufacture of such merchandise but not less than 10 percent of cost, (3) profit usually derived from sales of such merchandise but not less than 8 percent of the sum of general expenses and cost, and (4) the cost of packaging such merchandise for shipping to the United States. 19 U.S.C. § 1677(b)(e)(1).

<sup>2</sup> The Annual Report of the Council of Economic Advisers ("Council") states that semiconductor prices are lower in Japan than in the United States and that a Japanese strategy of selling semiconductors below cost "could be economically advantageous to Japanese firms if they could drive U.S. competitors from the [semiconductor] market permanently and then raise prices collusively." Economic Report of the President (1986) at 119. The Council expressed no opinion as to whether in fact such a strategy was likely. Id. The Federal Trade Commission ("FTC"), which enforces various statutes aimed at promoting competition in United States commerce to the benefit of United States consumers, has an interest in preventing such a collusive price increase.

The question now before the Department is whether Japanese firms are selling in Japan at prices below their costs, thereby leading the Department to disregard sales in Japan when computing the dumping margin. In section I we argue that Congress, when it enacted the provision requiring the Department to use constructed value in certain circumstances, recognized that in a competitive industry it is normal for prices sometimes to be below average total cost and intended that home market prices be used in such a situation. Section II summarizes an analysis by the Bureau of Economics that concludes that Japanese prices in Japan in the last six months of 1985, even if below Japanese average total costs in the last six months of 1985, "permitt[ed] recovery of all costs within a reasonable period of time in the normal course of trade." 19 U.S.C. § 1677b(b). Section III summarizes an analysis by the Bureau of Economics that concludes that the Japanese home market for 256K and above DRAM is competitive and that Japanese firms are probably not engaged in predatory pricing in Japan. Accordingly, we suggest that the Department should use prices in Japan rather than constructed value in making its final determination of the dumping margin.

#### Argument

- I. "Home market value" should be used when the Japanese market is competitive, since in a competitive market the Japanese firms are selling in Japan at prices that "permit recovery of all costs within a reasonable period of time in the normal course of trade."

The antidumping tariff is equal to the "foreign market value" of the product plus the cost of delivery to the United States less the foreign firm's price in the United States. 19 U.S.C. §§ 1673, 1677a, 1677b; 19 C.F.R. § 353.1. The foreign market value may be the foreign firm's price in its home market or in sales to third countries. 19 U.S.C. § 1677b(a)(1). If, however, those sales are made at less than "the cost of producing the merchandise" and if those sales "are not at prices which permit recovery of all costs within a reasonable period of time in the normal course of trade," then the

observed foreign prices are "disregarded," and the foreign market value is a "constructed value."<sup>3</sup> 19 U.S.C. § 1677b(b). Congress understood that costs as measured by accountants may not reflect true economic costs and indicated that the Department should use economic costs when deciding whether to use constructed value.<sup>4</sup>

The use of home market sales is preferable to the use of constructed value. Smith-Corona Group v. U.S., 4 ITRD 2297, 2303 n.20 (Fed. Cir. 1983). The calculation of constructed value is inherently laden with issues not amenable to either easy or any reasoned resolution. For example, difficult economic problems surround the estimation of the appropriate rate of return to be earned by investors in 256K and above DRAM firms, including the riskiness of the industry as perceived by investors; whether original or replacement plant costs should be used in calculating the appropriate level of investor earnings; and the effect of anticipated inflation and exchange rates on the appropriate return. More troublesome is the allocation of costs that may be common to 256K and above DRAM and other products produced by the firms (e.g., microprocessors). Such common costs might include research and development expenditures, overhead or administrative expenses, and promotional expenses. Because these costs are common to a number of the firm's products, any allocation of common costs to a specific product would of necessity be arbitrary.

Given the difficult nature of constructed value estimation, the Department may inadvertently calculate a dumping margin far higher or far lower than would be warranted based upon the correct constructed value estimates. In the former case, the

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3 Thus, the statute refers to three types of costs: "the cost of producing the merchandise," "all costs," and "constructed value." Although the statute gives a formula defining "constructed value," 19 U.S.C. § 1677b(e), there is no statutory definition of either "the cost of producing the merchandise" or "all costs."

4 The Department "will employ accounting principles generally accepted in the home market of the country of exportation if [the Department] is satisfied that such principles reasonably reflect the variable and fixed costs of producing the merchandise." H.R. Rep. No. 571, 93d Cong., 1st Sess. (1973) at 71.

injured domestic industry will receive more protection than is appropriate. Consumers would bear the burden of that excessive protection through inappropriately high consumer prices. If the constructed value estimate were too low, the purpose of the statute would be frustrated because the domestic industry would receive too little protection.

Because of the high probability of error in estimating constructed value, the Department should minimize that probability by relying on home market prices absent a compelling reason to believe that such prices are insufficient to recover costs. In particular, we argue below that in the absence of substantial evidence of below-competitive pricing in Japan, home market prices should be used for assessing the dumping margin.

As explained in detail in the appendix by Dr. Sarah Goodfriend of the Bureau of Economics, if Japanese markets are competitive, then the competitive price in the long-run will indeed "permit recovery of all costs within a reasonable period of time in the normal course of trade" when these costs are properly measured to "reflect the variable and fixed costs of producing the merchandise." H.R. Rep. No. 571, 93d Cong., 1st Sess. (1983) at 71.<sup>5</sup>

The House and Senate reports on the 1974 Act, when the present language was added to the law,<sup>6</sup> are consistent with this economic analysis. The 1974 Senate report

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5 Any competitive long-run 256K and above DRAM price below average total cost would result in the exit of some firms from the Japanese home market. This exit would be accompanied by an output reduction of 256K and above DRAM and thus a price rise sufficient to recoup all production costs. The exiting firms would, of course, not recover all their production costs. Any competitive long-run price higher than average total cost would result in the entry of new firms into the Japanese home market. This entry would be accompanied by an expansion of 256K and above DRAM output and a fall in price until price again equals average total cost.

6 The Trade Agreements Act of 1979 reenacted this portion of the dumping law without any substantive change. S. Rep. No. 249, 96th Cong., 1st Sess. (1979) at 95; H.R. Rep. 317, 96th Cong., 1st Sess. (1979) at 75. The Trade and Tariff Act of 1984 did not amend these provisions of the antidumping law.

contains the following explanation of when foreign sales should not be ignored in determining foreign market value:

"These standards would not require the disregarding of below-cost sales in every instance, for under normal business practice in both foreign countries and the United States, it is frequently necessary to sell obsolete or end-of-model year merchandise at less than cost. Similarly, certain products, such as commercial aircraft, typically require large research and development costs which could not reasonably be recovered in the first year or two of sales. Thus, infrequent sales at less than cost, or sales at prices which will permit recovery of all costs based upon anticipated sales volume over a reasonable period of time would not be disregarded. However, the practice of systematically selling at prices which will not permit recovery of all costs would be covered by this amendment and such sales would accordingly be disregarded." (emphasis added) S. Rep. No. 1298, 93d Cong., 2d Sess. (1974) at 173.

This legislative history indicates that Congress did not intend to have constructed value applied to firms that sell at prices below average total cost provided that prices are sufficient to recoup average total cost over the expected life of the product.<sup>7</sup> Because in competitive markets the price will not be "systematically" below average total costs over the trading cycle, the use of home market value in Japan — if the home market is competitive — for calculating the dumping margin is appropriate. As explained in detail in the appendix by Dr. Goodfriend, economists expect that in a competitive industry it is normal for firms to sometimes sell at prices that are below average total cost, since over the entire trade cycle the firms cover all their economic costs. Accord Southwest Florida Winter Vegetable Growers Association v. U.S., 584 F. Supp. 10, 15-16 (C.I.T. 1984) (in finding no dumping, the Department properly did not disregard sales by Mexicans that were as much as 50 percent below cost of production — even though such sales accounted for up to 50 percent of all sales —

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7 One exception to this statement is the following. If investment in 256K and above DRAMs has ex post been excessive and if the life of the product is shorter than the economic amortization period, a long-run competitive price will never result in the recovery of all production costs.

because this was normal business practice that permitted full cost recovery by Mexican growers of winter vegetables).<sup>8</sup>

However, the legislative history also indicates that the use of constructed value is appropriate when firms in the home market "systematically" sell at prices below average total costs.<sup>9</sup> As discussed in the appendix, this pricing behavior would be described by economists as predatory. We assess the evidence on whether there is predation in Part III of this Brief.

II. Because the Japanese market appears to be competitive, the Japanese firms are probably selling 256K and above DRAM in Japan at "prices which permit recovery of all costs within a reasonable period of time in the normal course of trade."

The Senate Report, quoted supra at 5, makes clear that it is only the systematic sale of goods below full cost which requires use of constructed value, illustrating the point with reference to sales of commercial aircraft below cost for several years. This position was confirmed and further illustrated by the Department in its Mexican Winter Vegetable investigation, discussed supra at 5. The unifying theme in the analysis is the requirement that the "reasonable period of time in the normal course of trade" language

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<sup>8</sup> See also Welded Stainless Steel Pipe and Tubing from Japan, 43 Fed. Reg. 17439, 17440 (April 24, 1978) and Carbon Steel Plate from Japan, 43 Fed. Reg. 12780, 12782 (March 27, 1978) (in finding dumping, Treasury recognized the four-year business cycle of the Japanese steel industry as the appropriate period over which to determine whether all costs had been recovered). Congressman Schulze introduced a summary of the International Trade Commission's injury determinations in these latter two cases into the record of the debates of the 1979 Act. 125 Cong. Rec. H 5572-73 (daily ed. July 10, 1979). While these summaries relate directly only to injury and not to determination of dumping margins, they do show that Congress was aware of the cases when it passed the Trade Agreements Act of 1979.

<sup>9</sup> The FTC has articulated a similar standard in determining whether a firm's low prices are "predatory" and violate section 2 of the Sherman Act, 15 U.S.C. § 2. In the antitrust context the FTC said that prices that exceed or equal average total cost are conclusively presumed to be legitimate, that prices below variable cost for a significant period of time are rebuttably presumed to be anticompetitive, and that prices between average variable cost and average total cost should be strongly presumed to be legal. International Telephone & Telegraph Corp., 104 F.T.C. 280, 403-404 (1984). See also General Foods Corp., 103 F.T.C. 204, 342-45 (1984).

of 19 U.S.C. § 1677b(b) must be applied in light of the nature of the demand for the product and the cost factors (such as research and development expense) attendant on its production.

Current Japanese prices in Japan might be below Japanese average total costs because, as discussed below, current prices are influenced strongly by present demand and by the learning curve phenomenon. The Department indicated, in its preliminary determination, that it investigated sales of 256K and above DRAM for the last six months of 1985 and decided to use constructed value for some of the transactions. 51 Fed. Reg. 9475 (March 19, 1986). As discussed in detail in the appendix, Dr. Goodfriend has concluded that business conditions in the last half of 1985 made it likely that Japanese prices in Japan in the last half of 1985 for 256K and above DRAM are consistent with competitive pricing and with a long-run competitive price that would "permit recovery of all [Japanese] costs within a reasonable period of time in the normal course of trade" even if these price were below average total Japanese costs in the last half of 1985.

Her conclusion stems from two characteristics of the semiconductor industry in general and 256K and above DRAM in particular. First, both United States and Japanese semiconductor firms believe that current production costs depend both on the current level of production and on accumulated past output; this latter factor — the learning curve phenomenon — indicates that production costs fall as firms acquire experience. In such an situation both United States and Japanese semiconductor firms maximize profits by setting prices during the first few years of a new product, like 256K and above DRAM, below current average total costs in order to increase current sales, thereby lowering future production costs. Second, there was a recession in the 256K and above DRAM industry in late 1985. In such a situation both United States and Japanese firms set prices below current average total costs, but above average variable costs, properly measured, in order to maximize profits or minimize losses.

III. The Japanese home market is probably competitive because there is little likelihood that it is characterized by the conditions necessary for a successful predatory pricing strategy.

We have argued in Parts I and II that in a competitive market, long run competitive equilibrium will result in the recovery of costs "within a reasonable period of time in the normal course of trade." This leaves open the question of whether the market is competitive or whether Japanese firms are systematically selling at a below competitive — that is a predatory — price.

There is an extensive body of both United States antitrust decisions and scholarly research on predatory pricing. Professor (now Judge) Bork, for example, concludes "that predation by such [pricing] techniques is very improbable." R. Bork, The Antitrust Paradox (1978) at 154. Professor (now Judge) Posner argues that one should examine the relevant market to see if it "has characteristics predisposing it toward the effective use of predatory pricing." R. Posner, Antitrust Law (1976) at 191. The Supreme Court has recently stated "there is a consensus among commentators that predatory pricing schemes are rarely tried, and even more rarely successful." Matsushita Electric Industrial Co., Ltd. v. Zenith Radio Corp., 54 U.S.L.W. 4319, 4323 (March 26, 1986).

As explained in more detail in the appendix, in all probability prices within the Japanese market are competitively determined rather than predatory. Successful predation requires that a number of stringent conditions be satisfied, and these conditions do not appear to be satisfied in the Japanese market. For example, in order for the predator to charge supra-competitive prices in the post-predation period, the

predator must be able to wield market power.<sup>10</sup> Thus, the predator must be a single firm with a substantial market share or, if no single dominant firm exists, there must be a group consisting of a small number of Japanese firms that can behave as a single firm.

Dr. Goodfriend's assessment of the characteristics of 256K DRAM market in Japan indicates the absence of a single dominant firm. On the contrary, it appears to her that the market is characterized by equally situated competitors.

Further, if there were a dominant firm currently charging predatory prices, one would predict a decline in the production capacity of the victimized firms and withdrawal from the Japanese market. Instead Dr. Goodfriend observes expansion by firms producing in Japan and new entry, observations totally at odds with the hypothesis that current Japanese pricing is predatory.

She also finds the alternative possibility — that a small number of Japanese firms might be able to tacitly or overtly collude and so behave as a single dominant firm — to be without empirical support. The most likely candidates for inclusion in such a group would be the beneficiaries of the Ministry of International Trade and Industry's ("MITI") preferential treatment of established semiconductor firms. The efforts by MITI to promote semiconductors may have provided a forum for these established firms to collude on a predatory pricing strategy.

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10 In determining whether a firm's low prices violate the Sherman Act, the FTC said that a violation requires, inter alia, a showing of likely market power, which "depends on all the relevant characteristics of a market: the strength and capacity of current competitors; the potential for entry; the historic intensity of competition; and the impact of the legal or natural environment, to name just a few." General Foods Corp., 103 F.T.C. 204, 345 (1984). See also International Telephone & Telegraph Corp., 104 F.T.C. 280, 411-412 (1984). While the FTC's analysis dealt with the pricing policy of a single firm, the Supreme Court has recently applied a similar analysis in the context of deciding whether Japanese producers of television sets conspired to drive United States firms from the United States market by selling at "predatory" low prices in the United States and high prices in Japan. Matsushita Electric Industrial Co., Ltd. v. Zenith Radio Corp., 54 U.S.L.W. 4319, 4323-4 (March 26, 1986).

If, however, such a collusive group did develop, the group would require a mechanism to distribute the burden of any losses incurred during the predatory period; to share the profits in the post predation period; to detect cheating of the collusive agreement; and to assess penalties against the cheaters. Matsushita Electric Industrial Co., Ltd., supra, 54 U.S.L.W. 4323. The probability of success in developing these mechanisms would be greatest if the market shares of the individual group members were stable or easily predictable. The collusive group could allocate the losses and profits by a market share criteria and utilize unexpected changes in market shares as a basis for determining whether any member of the collusive group violated the agreement.

In fact, market shares in DRAM production generally and 256K DRAM production specifically are highly volatile. Consequently, agreement on the sharing of the losses and profits would be difficult to reach and market share changes could not be used to evaluate whether a violation of the agreement occurred. Further, even if such an agreement were attained, the growth and expansion of DRAM producers outside of the MITI group and the entry of non-Japanese firms, would result in the failure of the collusive group to maintain supracompetitive prices in Japan and would render a predatory strategy a failure. Indeed, as in the dominant firm case, the mere fact of this entry and expansion by firms not part of the MITI group suggests that current prices in Japan are not predatory.

In sum then, in all likelihood the Japanese market for 256K DRAM is characterized by competitive pricing rather than by predatory pricing.

#### Conclusion

The home market in Japan appears competitive and not susceptible to successful predatory strategies, and business conditions in the last half of 1985 suggest that Japanese firms could cover all their costs over the trade cycle even if prices in the last half of 1985 were temporarily below their costs. Thus, use of constructed value may result in a dumping margin higher than the statute requires. United States consumers

will ultimately bear the cost of this error in the form of higher prices for goods and services that utilize 256K and above DRAM. Thus, for the reasons stated above, we suggest that in its final determination the Department should calculate the dumping margin by comparing the price in the United States with the price in Japan rather than with constructed value.

Respectfully submitted,

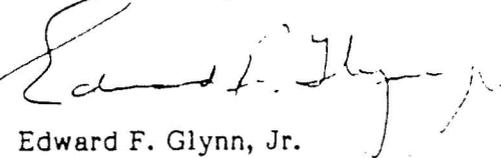
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## APPENDIX

### ANALYSIS OF THE 256K DRAM MARKET IN JAPAN

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## I. INTRODUCTION

Based on constructed value, the Department of Commerce has calculated dumping margins for several Japanese producers of 256K DRAMs. The Department notes that use of constructed value is appropriate when there are insufficient home market sales above the cost of production. However, in a competitive market, product prices will approximate short-run marginal cost, which can, in the short-run, deviate substantially from average total cost. Thus, unless there is compelling evidence that the home market prices are below competitive levels, home market value should be used to calculate dumping margins. Below we describe, in general and with specific reference to the market for 256K DRAMs, the dynamics of competitive pricing. In particular, we demonstrate that a price less than average total cost is not sufficient to show that in the Japanese home market, pricing is below the competitive level. (i.e., is predatory).<sup>1</sup> In the subsequent two sections, we outline the conditions necessary for pricing below competitive levels to be a profitable strategy. We conclude that these conditions are not met in the Japanese home market and therefore that the Japanese home market is indeed competitive. Consequently, we urge the Department to utilize home market value in its calculation of the dumping margins.

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<sup>1</sup> Pricing may be below competitive levels for reasons other than predation, such as a subsidy. However, because this proceeding is not one involving a countervailing duty determination, we do not address the subsidy issue.

## II. HOME MARKET SALES SHOULD BE USED WHEN HOME MARKET SALES OCCUR UNDER CONDITIONS OF COMPETITIVE PRICING.

A. THE DYNAMICS OF COMPETITIVE PRICING. If prices in the Japanese market are competitive, then home market sales and not constructed value should be used to calculate the dumping margin. In the long run, under stable cost and demand conditions, competitive markets tend to result in prices that are sufficient to cover all costs of production. However, many of the costs of developing, designing and installing plant to produce 256K DRAM chips were incurred in the past; and under competitive conditions, past expenses may have little or no bearing on current prices, as well as on prices expected in the near future. In the short-run, competitive prices are determined by demand and variable cost conditions. Competition among the producers tends to force present prices to levels that approximate only the costs directly incurred in present production -- in particular, to short-run marginal cost. Present output decisions may also be influenced by what is often called learning-curve effects which are alleged to be of substantial importance in chip production. The learning curve reflects the possibility that future production costs will fall as current output is expanded. As a consequence, prices may fall below apparent short-run marginal costs which exclude learning effects but prices will not fall below true short-run marginal cost in a competitive environment. The nature of competitive behavior in combination with demand may result in the existing price being well above or below the "long-run" price; and if it is less, it by no means implies predation. The divergence between price and long-run cost is a common phenomenon in all competitive industries.

From recent trade press accounts, it appears that 256K DRAM production specifically, and DRAM production generally, is marked by periods when prices can be significantly in excess of average total costs (or constructed cost) and other periods when price is significantly less than average total costs. For example, during 1983 and 1984, the demand for 256K DRAMs increased at a dramatic rate, driven by the demand for personal computers and other microcomputer products.<sup>2</sup> During this period,<sup>3</sup> 256K DRAM producers experienced substantial profits,<sup>4</sup> they rapidly added production capacity, and new producers entered production.<sup>5</sup> When in 1985 the demand for personal computers and other workstation products failed to grow as rapidly as anticipated, 256K DRAM prices began dropping dramatically to below \$2 per chip.<sup>6</sup> This is consistent with the sunk cost of excess capacity not being a component of short-run marginal costs, and therefore, not being a determinant of price. However, 256K DRAM prices are now rising and are expected to rise dramatically to as high as \$3.50 by year-end 1986.<sup>7</sup> The observation that at a particular point in the course of trade price is not sufficient to recoup average total cost is of no competitive significance. Economic theory predicts that (assuming the DRAM

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<sup>2</sup> R. Neely, "A Restructured IC Economy Needs a Restructured Strategy," Electronic Business (3/1/86) p. 84.

<sup>3</sup> Id. at 88.

<sup>4</sup> See, for example, "Precipitous Decline of Memory-Chip Firm Shakes the Industry," Wall Street Journal (1/18/86), p. 1.

<sup>5</sup> Neely, op. cit. at 84. See also "The Bloodbath in Chips," Business Week (5/20/85), p. 63.

<sup>6</sup> "Japan Chips Found Dumped," New York Times (1/23/86), p. D4.

<sup>7</sup> "See 256K DRAM Price Rising Steadily Demand Grows." Electronic News (1/2/86), p. 42.

market is not in permanent decline) producers will earn a normal return on their investments--i.e., that prices, on average, over the long term, will approximate full economic costs. This would occur through profits during the peaks offsetting the losses in the valleys of the trading cycle.

Even absent these peaks and valleys, it would be quite possible that in the early years of 256K DRAM production price would be considerably below constructed value, and perhaps above it in later years. This would be consistent with the "learning curve" phenomena, discussed subsequently, that characterizes semiconductor production generally. If future costs of producing 256K DRAM chips depend on the volume of output previously produced, present output decisions will take into account their influence on future costs. To the producer, the perceived cost of producing an additional 256K DRAM today is the measured additional cost of production less the (present value of the) reduction in future production costs attributable to today's additional DRAM production.<sup>8</sup>

The observation that current 256K DRAM prices are below average total and perhaps average variable costs should therefore not be construed as evidence of predatory pricing in Japan. Rather, because the production of 256K DRAMs today reduces production costs in subsequent years, the "true" average total and variable costs, as perceived by the competitive Japanese producer of 256K DRAMs, is lower than the measured cost. By ignoring these learning curve effects, constructed value, even if appropriate in the short run (which it is not), would overstate true average total cost.

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<sup>8</sup> M. Spence, "The Learning Curve and Competition," Bell Journal of Economics (Spring 1981), pp. 49-70.

One rough indicator of the significance of the learning curve phenomena is the projected decline in measured average variable cost in 256K DRAM production. Between 1984 and 1985, average variable cost is estimated to have declined by 66% (from \$8.0313 to \$2.7376).<sup>9</sup> Between 1985 and 1986, these costs are expected to fall by 52% (from \$2.7376 to \$1.2989).<sup>10</sup> If, as projected, 256K DRAM prices continue to rise to the \$3.50 level, then the price of 256K DRAMs will significantly exceed measured average variable costs. Indeed, one analyst has concluded that learning effects may be the primary explanation for the appearance of Japanese producers pricing below measured costs.<sup>11</sup>

B. SUMMARY. In sum, if Japanese producers are behaving competitively, we believe that the Department of Commerce should use home market value to calculate the dumping margin. The previous description of the cyclical nature of the semiconductor market and the apparent significance of learning curve effects in explaining the behavior of costs suggest that any difference between home market value and constructed value may be explained by factors other than below-competitive pricing. In order to determine whether in fact predation is the relevant explanation, we now examine the extent to which the conditions in the Japanese home market are conducive to a successful predatory price strategy.

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<sup>9</sup> "Dynamic Ram Prices Continue to Drop," Dataquest (5/10/85), p. 9.

<sup>10</sup> Id. These cost figures include scale effects as well as volume-related learning curve effects.

<sup>11</sup> Electronic Business (1/15/86), p. 96.

III. ARE THE PRICES PREDATORY? Although prices below costs are consistent with competition, they are also consistent with predatory pricing. Predatory pricing may be defined as a reduction of price in the short-run so as to drive competing firms from the market or to discourage entry of new firms in an effort to gain larger profits (via higher monopoly prices in the long-run) than would have been earned if the price reduction had not occurred.<sup>12</sup> During the period of predation, the predatory firm (or groups of firms acting jointly) will charge a lower price and produce at a greater output level than would occur under strictly competitive conditions. Specifically, the predator can be expected to price at a level lower than short-run marginal cost even after account of learning effects is taken. Bork explains: "The concept of predation clearly contains an element of wrongful or specific intent, of a deliberate seeking of market power through means that would not be employed in the normal course of competition."<sup>13</sup> Predatory pricing will always impose short-run losses on competitors<sup>14</sup> with the expectation that the losses incurred by the predator(s) will be offset by future prices that are no longer competitive.

Determining whether a particular price is predatory would conceptually require a comparison of price with short-run marginal cost. If price and short-run marginal cost are approximately equal, the allegation of predation would be without basis: the firm's behavior corresponds to competitive

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<sup>12</sup> Paul L. Joskow and Alvin K. Klevorick, "A Framework for Analyzing Predatory Pricing Policy," Yale Law Journal, Vol. 89, No. 2, Dec. 1979, p. 219.

<sup>13</sup> Robert H. Bork, The Antitrust Paradox: A Policy at War with Itself, (1978) p. 144.

<sup>14</sup> Joskow, Klevorick, *supra*, p.220

behavior. In most instances, this conceptual test is not practical because of the difficulty in measuring marginal cost. Instead, average variable cost is often suggested as a reasonable proxy for short-run marginal cost.<sup>15</sup> If pricing is below average variable cost (using average variable cost as a reasonable proxy for marginal cost), some evidence supporting a predatory pricing allegation would exist.<sup>16</sup>

If predatory pricing requires at least that Japanese prices be less than average variable costs, then it is clear that the use of constructed value would not be appropriate for the determination of the dumping margin if the dumping charge itself stems from an allegation of predation.<sup>17</sup> Since constructed value includes costs that were incurred in the past and may be of little relevance to present prices, an inference of predation based on constructed value cannot be made. As noted above, a more appropriate test would be whether prices are below average variable costs, which exclude costs incurred in the past that do not influence present prices in the short run. Even here the test can be misleading if "learning effects" are not accounted for properly. As previously noted, the short-run competitive price can and should deviate from the constructed value, and in itself this divergence provides no evidence of predation.

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<sup>15</sup> Phillip Areeda and Donald F. Turner, "Predatory Pricing and Related Practices Under Section 2 of the Sherman Act", Harvard Law Review (vol 88, 1985) p.716

<sup>16</sup> Areeda and Turner, p. 697 and International Telephone & Telegraph Corp., F.T.C. 280, 403-404, (1984).

<sup>17</sup> Indeed, the economically correct measure for the dumping margin would be the difference between appropriately adjusted short-run marginal cost of the Japanese firms and the Japanese chip price in the United States.

To conclude that pricing in the Japanese home market is predatorily below competitive levels, a number of relatively stringent conditions must hold. We outline these conditions below and subsequently assess the facts of 256K DRAM production in Japan to determine whether they appear met.

A. THE PREDATING FIRM(S) MUST HAVE A SIGNIFICANT ACTUAL OR PERCEIVED COST ADVANTAGE OVER EXISTING OR POTENTIAL RIVALS. If the predator (or predatory group) has no lasting cost advantage over existing or potential rivals and if this fact is easily discerned by the predator's rivals (e.g., because production technology is reasonably standardized throughout the industry), it is not likely that the predator will be able to succeed in driving rivals from the market. As a result, any losses incurred by the predator during the low-price period would not be recouped by higher future prices.

B. THE PRICE ELASTICITY OF DEMAND FOR 256K DRAMS SHOULD BE RELATIVELY LOW. If this is the case, then a post-predation price rise will be more profitable, all else being the same, and provides greater incentive to the predator. However, if there are good substitutes available, then the future price increase will be less profitable. How long the higher price might be expected to survive is also of relevance. If, for example, new product development and innovations are important characteristics of the market at issue, then monopoly over one such good may be very short-lived, and provide little incentive to predate. Clearly this seems to be a fundamental characteristic of chip production and technologies.

C. IF A PREDATORY PRICE DOES SUCCEED IN REDUCING OR ELIMINATING THE NUMBER AND OUTPUT OF RIVALS, THEN ENTRY FOLLOWING THE POST-PREDATION PRICE RISE MUST BE SMALL OR

NONEXISTENT. Current suppliers of 256K DRAMs must be unable (i.e., at approximately the same cost as the predator) to re-enter the market following the price rise, and producers of related products, such as erasable programmable read-only memory semiconductors (EPROMs) or 64K DRAMs, must be unable to shift production towards 256K DRAMs. If in fact such production shifts are possible at a relatively low cost, then a higher 256K DRAM price in the post-predation period would result in new entry, an expansion of output and a lower 256K DRAM price. If the would-be predator cannot deter post-predation entry, then a predation strategy would fail.

D. BECAUSE SUCCESSFUL PREDATION REQUIRES SUPRA-COMPETITIVE PRICES IN THE POST-PREDATION PERIOD, POSSESSION OF MONOPOLY (MARKET) POWER IS A PREREQUISITE. Supra-competitive prices can only be sustained if there exists a dominant firm with market power in 256K DRAM production within the Japanese home market or, failing that, a group of firms that can successfully coordinate their behavior so as to approximate the behavior of a dominant firm. For such coordination to be successful, there must be a mechanism for distributing any losses incurred during the predatory period and the profits reaped during the post-predation period among the members of the concerted action group. There must also be a mechanism for detecting any cheating by members of the group and for the imposition of penalties against the cheaters.

IV. IT IS UNLIKELY THAT THESE CONDITIONS ARE MET IN THE JAPANESE HOME MARKET.

A. COMPETITORS IN THE JAPANESE HOME MARKET APPEAR TO BE EQUALLY SITUATED IN TERMS OF PRODUCTION COST.

If learning curve effects are important and persist, then the first firm to produce commercially should have a persistent production cost advantage over other would-be producers. Hitachi produced 256K DRAMs in sample quantities in 1982 and began commercial production in early 1983. In mid-1983, Toshiba began commercial production. By the end of 1985, there were eight semiconductor firms producing 256K DRAMs commercially in Japan. The rapid growth in the number of domestic producers suggests that no single firm has a substantial cost advantage over any other firm. Interestingly, although NEC did not begin commercial production until 1984, it nonetheless was second only to Hitachi in volume of 256K DRAMs produced that year.<sup>18</sup> NEC's quick ascendancy to a production volume rivaling Hitachi's is further evidence that the first-mover advantage is not of enormous importance.<sup>19</sup>

The U.S. experience in 64K static and dynamic RAMs is illustrative of the apparent absence of lasting and substantial cost advantages in semiconductor production. The first 64K RAM chip to reach the U.S. merchant market was Japanese. Fujitsu's introduction of the 64K RAM, however, was a design failure. In 1980, Motorola's 64K RAM was the largest seller. By the end of 1981, the Japanese firms (in aggregate) had a 70% share of the U.S. merchant market; However, by mid-1982, TI had overtaken Motorola as the top merchant supplier and by mid-1983 the Japanese share

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<sup>18</sup> International Trade Commission, "Dynamic Random Access Memory Semiconductors of 256 Kilobits and Above from Japan," Preliminary Determination, January 1986, p. A-13.

<sup>19</sup> Thus, while learning curve effects may be important in explaining the behavior of 256K DRAM production costs, these effects are far less significant as a barrier to entry.

had fallen to 55%. (Throughout these swings, IBM remained the largest single producer of 64K RAMs in the world.)<sup>20</sup>

Because of the apparent absence of any significant and lasting cost advantage of any one firm over any other firm in the Japanese home market and because of the rapid rate of entry, it is likely that each firm recognizes that any cost advantages are small and transient. Thus, use of a below-competitive price by a predator to "fool" rivals into believing that the rival has lower costs is likely to fail.

B. THERE APPEAR TO BE GOOD SUBSTITUTES FOR THE 256K DRAM. If there are good substitutes for 256K DRAM, the price elasticity of demand for the 256K DRAM will be relatively high. Generations of DRAMs are highly substitutable. "As a rule of thumb...large scale displacement by a new generation occurs once the price ratio of the new generation falls to 5:1 of the old"<sup>21</sup>. (This reflects the 4:1 ratio of storage capacity and a premium for the value of space-saving embodied in the newer chip.) The rate at which a new product generation displaces the preceding generation results in a product lifecycle for each generation. Raising prices above the competitive level in a particular generation can be expected to initially increase the demand in existing applications for a preceding generation and/or quicken the development of the emerging generation. To obtain high profits from pricing 256K DRAMs above production cost, it would be necessary to preclude DRAM purchasers from purchasing 64K DRAMS at

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<sup>20</sup> Franklin B. Weinstein, Michiyuki Uenohara, and John G. Linvill, Chapter 3, Technological Resources in Competitive Edge: The Semiconductor Industry In the U.S. and Japan, (1984), pp. 39-42.

<sup>21</sup> U.S. Dept. of Commerce Memorandum, from David L. Binder to Gilbert B. Kaplan, Public File A-588-505, Appendix p.2.

competitive prices. The rule of thumb for large scale displacement of a current DRAM generation by a new DRAM generation (noted on p.11) indicates that the additional space requirements to an end-user who substitutes four 64K DRAM chips for one 256K DRAM chip is only equivalent to the cost of one 64K DRAM chip. Thus, the ability of a predator to raise price significantly in the post-predation period will be severely constrained by the ability of end-users to substitute 64K DRAMs for 256K DRAMs.

Further, other products may substitute for DRAMs in certain applications. In semiconductors (more so than in other high-technology industries) <sup>22</sup> both process and product innovation stimulate innovation in final goods. In turn, new end-use applications modify the demand for the function the DRAM performs. With DRAMs, non-standard chips perform the same function and offer customized features. Predictions are that the industry's future growth will be in ASICs (application-specific integrated circuits). In 1985, the customized chip accounted for about 12% of all [integrated circuit] sales worldwide. This market segment is predicted to grow faster than the rest of the industry and by 1990 will generate 15% to 20% of all sales.<sup>23</sup>

Because of the availability of close substitutes for the 256K DRAM, it is unlikely that a dominant firm such as Hitachi could succeed in raising prices significantly above competitive levels during the post predation period.

#### C. IN THE POST-PREDATION PERIOD, ENTRY MUST BE DETERRED.

Assuming that the predator has succeeded in driving out his rivals, the

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<sup>22</sup> Organization for Economic Cooperation and Development (OECD), The Semiconductor Industry (1985), p. 12.

<sup>23</sup> According to Dataquest, NYT, 2/9/86.

predator may attempt to use the threat of a predatory low price to convince potential entrants into 256K DRAM production that the predator has lower costs than the entrant could ever expect to attain. However, as previously noted, DRAM production generally does not appear to be characterized by any lasting cost advantages. Thus, firms with prior DRAM production experience are likely to be aware of this characteristic.

Indeed, the most likely entrants into 256K DRAM production in the period of supra-competitive prices are current DRAM producers. That is, there is apparently the relatively easy ability to shift production from 64K DRAMs to 256K DRAMs, suggested by the experience of U.S. producers. The ability to substitute production plant between sequential DRAM generations is suggested by the shift of production resources from 64K to 256K DRAM production in the U.S.<sup>24</sup> and the modification of 16K plants for 64K DRAM production in Japan.<sup>25</sup> Consequently, domestic 64K producers are likely entrants into 256K DRAM production. The ITC reports that "approximately 10 firms produce 64K DRAMs in Japan." (The two or more potential 256K DRAM producers are not identified by name.)<sup>26</sup> Thus, firms with previous DRAM production experience are likely potential entrants. However, NMB Semiconductor, a Japanese firm, is scheduled to enter 256K DRAM production in Japan in mid-1986, despite that fact that its has no previous production

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<sup>24</sup> See U.S. DOC memorandum, supra, Appendix, p. 11.

<sup>25</sup> Weinstein, Technological Resources, p. 67

<sup>26</sup> See supra, ITC Prelim., p. A-11.

experience.<sup>27</sup> After fulfilling contract (second source) sales to Inmos, NMB plans to sell in the U.S. and Japan.<sup>28</sup>

The NMB experience raises the issue of the extent to which the learning curve combined with late entry could inhibit entry in the post-predation period. Learning economies, or experience curve effects have long been a characteristic of production in the semiconductor industry.<sup>29</sup> "Learning reduces costs over time as the firm discovers how to do things better in product design, process layout, job design for workers, machine operating rates, organizational coordination and the like."<sup>30</sup> However, several conditions must be met if the advantages of "the learning curve" are to prohibit new entrants from producing competitively.

First, we define what is meant by "learning effects." Then, we examine, in turn, what the implications are for entry into DRAM production. Porter (1981)<sup>31</sup> identifies the four conditions of production which are commonly represented as learning curve effects: (1) static economies of scale, and dynamic learning as a function of (2) cumulative volume, or (3) time, or (4) exogenous technical change. We consider each in turn. We

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<sup>27</sup> Integrated Circuit Engineering, "Status 1985: A Report on the IC Industry", p.137.

<sup>28</sup> Electronic Business, "NMB: A New Contender in 256K DRAMs", Oct. 15, 1984, p.59.

<sup>29</sup> In 1960, Motorola contracted to supply silicone rectifiers for auto alternators for 75¢ a piece when the prevailing industry price was \$2.00. Production techniques improved so much in filling the large order that Motorola made money on the contract. (John E. Tilton, International Diffusion of Technology: The Case of Semiconductors, 1971)

<sup>30</sup> Michael E. Porter, in "Strategy, Predation, and Antitrust Analysis", Steven C. Salop, ed., Bureau of Economics, Bureau of Competition, FTC, 1981, p. 457.

<sup>31</sup> Porter, supra.

ultimately conclude that learning curve effects, while substantial, are not sufficiently great or sufficiently unique to the first mover to preclude entry by other firms.

The first learning-curve effect involves static economics of scale. Such economies exist in DRAM production. That is, spreading the fixed costs of the engineering support staff in fabrication, the cost of chemical storage, and investment in nitrogen plants over a large output produces some manufacturing cost advantage for large volume producers.<sup>32</sup> No consensus exists as to the size of the scale advantage on production cost for high volume producers relative to (the typical output level of) smaller volume producers.<sup>33</sup>

Porter enumerates several conditions that are necessary, in general, for cumulative volume to confer a cost advantage on the high volume producer:

(1) Learning must be kept proprietary. Otherwise, the opportunity for low-cost copying (at smaller investment in R&D) puts the leader at a cost disadvantage.

(2) Innovation must be incremental and highly correlated with R&D. Otherwise, innovations may change the product or the process technology sufficiently to create a new learning curve, placing the leader at a disadvantage. And,

(3) Competitors must not be able to capture market share by focusing on parts of the product line or customer segments. As discussed earlier, because the demand for the DRAM is a demand for the function it performs,

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<sup>32</sup> Electronic News, April 1, 1985, p. 27, Don Brooks, Pres. and CEO of Fairchild Camera & Instrument.

<sup>33</sup> For example, compare the remarks of Don Brooks, cited above, with the conclusion of Joe Parkinson, of Micron, in the WSJ, 1/17/86, p. 6.

the opportunity exists to offer a less standardized alternative to particular customer segments.

Where conditions (1)-(3) characterize the market, there may also exist other forces weakening the advantages associated with cumulative volume effects on production. One such force is the growth in demand for non-standard memory, discussed previously. Another force tending to erode the firm-specific learning curve advantage is growth in demand. As indicated earlier, growth in Japanese GNP has resulted in relatively continuous growth in semiconductor demand in Japan.<sup>34</sup> The volatility in 64K DRAM market shares in the U.S., discussed earlier, was, in part a response to periods of excess demand. Weinstein, et. al. (1984) concludes:

Being first to market with a new product has always been important in the semiconductor industry.... On the other hand, the enormous market for the 64K RAM makes it possible to overcome much of the disadvantage resulting from a late entry. Indeed, surging demand for the 64K RAM in mid-1983 pushed prices up, opening new opportunities for latecomers to gain a reasonable return on the chip.<sup>35</sup>

Of the two remaining sources of dynamic learning, time in the industry is likely to be correlated with volume. To the extent it is important, volume-related advantages are reinforced. However, since industrial organization in Japan tends to facilitate initial entry by several firms at nearly the same

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<sup>34</sup> In the last two years (1984-1985), actual world consumption has shifted away from the U.S. and toward Japan and Europe. The Japanese consumption share in ICs rose from 30% to 34%, Electronic Business, Business Barometer, March 1, 1986.

<sup>35</sup> See supra, Weinstein, Technological Resources, p. 41.

time <sup>36</sup>, such advantages would accrue to the first wave of entrants rather than a particular firm.

Thus, learning curve effects appear to be available to all firms, with no firm appearing to have a persistent, "first-mover" advantage over other firms.

In addition, technological obsolescence of product designs indicates that any currently handicapped producer can quickly move to a learning curve for a new product design and eliminate an existing cost handicap. This is because learning as a function of exogenous technical change bears no relationship to cumulative volume of output or existing market share (unless the firm's ability to assimilate the innovation is related to its share). Exogenous technical change is of great disruptive potential. As discussed in the analysis of demand, the existence of a successfully monopolized market increases the value of attempts by excluded firms to find innovations which destroy the monopoly.

As an example of exogenous technical change, Porter uses improvements in machinery purchased from equipment suppliers. Innovations by equipment suppliers are an extremely important source of process innovation in semiconductors. The importance of equipment supplier innovation has grown with the increasing scale of chip integration (and decreasing line width on chips). <sup>37</sup> And, with increasing integration, exogenous process improvements are likely to continue their role of

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<sup>36</sup> See, supra, D.I. Okimoto, in Competitive Edge: The Semiconductor Industry in the U.S. and Japan (1984), p. 105.

<sup>37</sup> OECD, supra, p.44.

disrupting current market share and profit positions. Scherer(1980)

comments:

Some of the product lines in which learning by doing is most important (such as semiconductors, aircraft, and computers) are also characterized by rapid technological obsolescence of product designs. The development of a completely new design often permits an initially handicapped producer to jump to a new learning curve in a position of equality or even superiority.<sup>38</sup>

Consequently, in the semiconductor industry, the cost advantage of cumulative volume process experience is likely to be a transitory phenomenon. Operating in a technologically-dynamic industry the opportunity for transitory cost advantages and supranormal profits may encourage the rate at which innovation occurs. The ITC explains that, normally, the firm that initiates production of an innovative device expects to enjoy some brief period without direct competition.<sup>39</sup>

Moreover, when imports are a small portion of the production of individual firms exporting to Japan, these firms possess flexibility in responding to price changes in Japan<sup>40</sup>. Supracompetitive pricing may make production for export to Japan attractive to firms who previously did not export. IBM, which has had a subsidiary in Japan since 1937<sup>41</sup>, is in a

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<sup>38</sup> F.M. Scherer, Industrial Market Structure and Economic Performance, 2nd ed., 1980, p.251.

<sup>39</sup> International Trade Commission, (ITC) "Competitive Factors Influencing World Trade in Integrated Circuits," pub. #1013, Nov. 1979, p. 21.

<sup>40</sup> Organization for Economic Cooperation and Development (OECD), The Semiconductor Industry: Trade Related Issues (1985), p.29.

<sup>41</sup> WSJ, "Out of Touch: Lobbying in Japan So Daunts U.S. Firms That Few Even Try," 4/1/86, p.1.

position to monitor pricing and respond quickly by diverting production from internal use.

To preclude entry by imports, it is necessary to keep the domestic price below importer's home market costs (plus freight and duties.)<sup>42</sup> Thus, increased exports provide a formidable threat to the success of any attempt by the Japanese firm group to charge monopoly prices in the post predation period. In short, then, learning curve effects and late entry should not deter new entrants in 256K DRAM production in the post-predation period.

D. THERE APPEARS TO BE NO SINGLE JAPANESE FIRM OR A COLLUSIVE GROUP OF JAPANESE FIRMS THAT COULD WIELD MARKET POWER IN THE POST PREDATION PERIOD. First, there appears to be no single dominant Japanese producer. As noted in section III(A), Hitachi and NEC are approximately equals in volume and market shares in DRAM production appear, highly volatile. There is the distinct absence of a strong candidate to play the role of dominant firm.

Industrial organization in Japan, in particular the relationship between the Japanese Ministry of International Trade and Industry (MITI) and firms in targeted<sup>43</sup> industries provides a forum which could be used to encourage and facilitate collusion among a group of firms. The prime beneficiaries of preferential government treatment are often a handful of established firms,

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<sup>42</sup> Scherer, supra, p.249.

<sup>43</sup> The ITC defines industrial targeting as coordinated government actions taken to direct productive resources to help domestic producers in selected industries become competitive. Actions include subsidies, tax incentives, import barriers or other market distorting policies. ITC, Foreign Industrial Targeting and Its Effects On U.S. Industries Phase I: Japan, (October 1983), p. 17.

(NEC, Mitsubishi, and Toshiba, are mentioned as examples).<sup>44</sup> Oki was not a participant in the MITI-sponsored Very Large Scale Integration (VLSI) Project (1976-1979) which resulted in initial production of the 64K RAM,<sup>45</sup> yet became competitive in DRAM production, as did Matsushita. A consensus as to MITI's current role in restraining or promoting competition is not at hand.<sup>46</sup>

Even if we were to ignore the fact that a number of major Japanese DRAM producers would not be part of a MITI provided forum for collusion, the collusive group would encounter enormous obstacles to successful coordination of behavior.

The obvious difficulty in coordinating pricing is agreement over the allocation in market shares and profit loss during the predatory period. Even if agreement is reached, policing would be necessary to insure that the agreed to distribution of losses from predation occurred. The difficulty of such concerted action is well known<sup>47</sup>, and the natural dynamism of individual market shares in DRAMs would increase the difficulty of detecting cheating. Because the market shares appear highly volatile, the dominant group would have great difficulty in reaching and then maintaining and policing such an agreement. For example, because of the highly changeable market shares, a firm may reduce output over the predatory period to reduce

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<sup>44</sup> Daniel I. Okimoto supra p.133

<sup>45</sup> The project, a government-funded cooperative R&D effort, was organized to assist in 4th generation computer development. ITC (October 1983), p. 149.

<sup>46</sup> Daniel I. Okimoto, supra, Conclusions p.215.

<sup>47</sup> F.M. Scherer, Industrial Market Structure and Economic Performance, 2nd ed., 1980, p.171.

losses the firm incurs and explain to the group that the output reduction was beyond the control of the firm. In the post-predation period of high prices, the same firm might increase output to gain a large share of the post-predation profits, and then attempt to explain the output increase to other group members as accidental.

In addition, the post-predation period may give rise to entry by Japanese producers attracted by higher prices. If this were the case (and this appears likely given our discussion in III (D) above), then the size of the Japanese firm group would increase, consisting of new members who never "paid the price" for entry by bearing losses in the predatory period.

Thus, it seems highly unlikely that a group of Japanese firms could or are successfully and rationally engaged in predation.

#### V. PRICING IN THE JAPANESE HOME MARKET APPEARS COMPETITIVE AND THE DOC SHOULD USE JAPANESE HOME MARKET SALES IN ASSESSING THE DUMPING MARGIN.

Analysis and evidence, then, lead us to conclude that there is no dominant firm in the Japanese home market for whom a predatory pricing strategy would prove profitable. Similarly, there does not appear to be a group of Japanese firms who together could approximate the behavior of a dominant firm and who would also consider predation a profitable strategy. The Japanese home market, then, appears to be characterized by competitive pricing behavior. Such behavior, over the normal course of trade (i.e., in the long run) would result in competitive prices sufficient to recoup all production costs including a competitive return to capital.

The most telling evidence against dominant firm predation is that instead of observing market withdrawal and output reduction (in response to

predation), the Japanese home market is experiencing expansion and entry. As mentioned previously, TI was producing 256K DRAMs commercially in Japan in 1984. Further, the "lion's share" of its DRAM production has come from its facility in Japan. <sup>48</sup>

Apparently the prospects of continued positive (albeit declining) growth in Japanese GNP stimulate expansion. In semiconductors, generally, Motorola and TI are expanding existing manufacturing capabilities in Japan. Fairchild has established a capability. <sup>49</sup> During the period of investigation, Samsung became the first (among four Korean companies planning to enter 256K DRAM production) to dedicate its wafer fabrication facility. <sup>50</sup> And the entry of NMB Semiconductor has been previously mentioned. <sup>51</sup>

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<sup>48</sup> Electronic News, 4/1/85, p.27.

<sup>49</sup> Electronics, "1986 Overseas Market Report: Japan," 1/13/86, p. 33.

<sup>50</sup> Jiji Press Ticker Service, Jiji Press Ltd., May 22, 1985 (Nexis).

<sup>51</sup> ICE, "Status 1985: A Report on the IC Industry", p.137.

Certificate of Service

I hereby certify that on this 11th day of April 1986, I have served the foregoing prehearing brief by causing the original and 10 copies to be hand-delivered to the Deputy Assistant Secretary for Import Administration, and a copy to be mailed first class, postage prepaid to the following:

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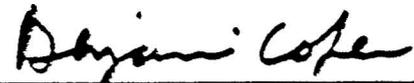
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