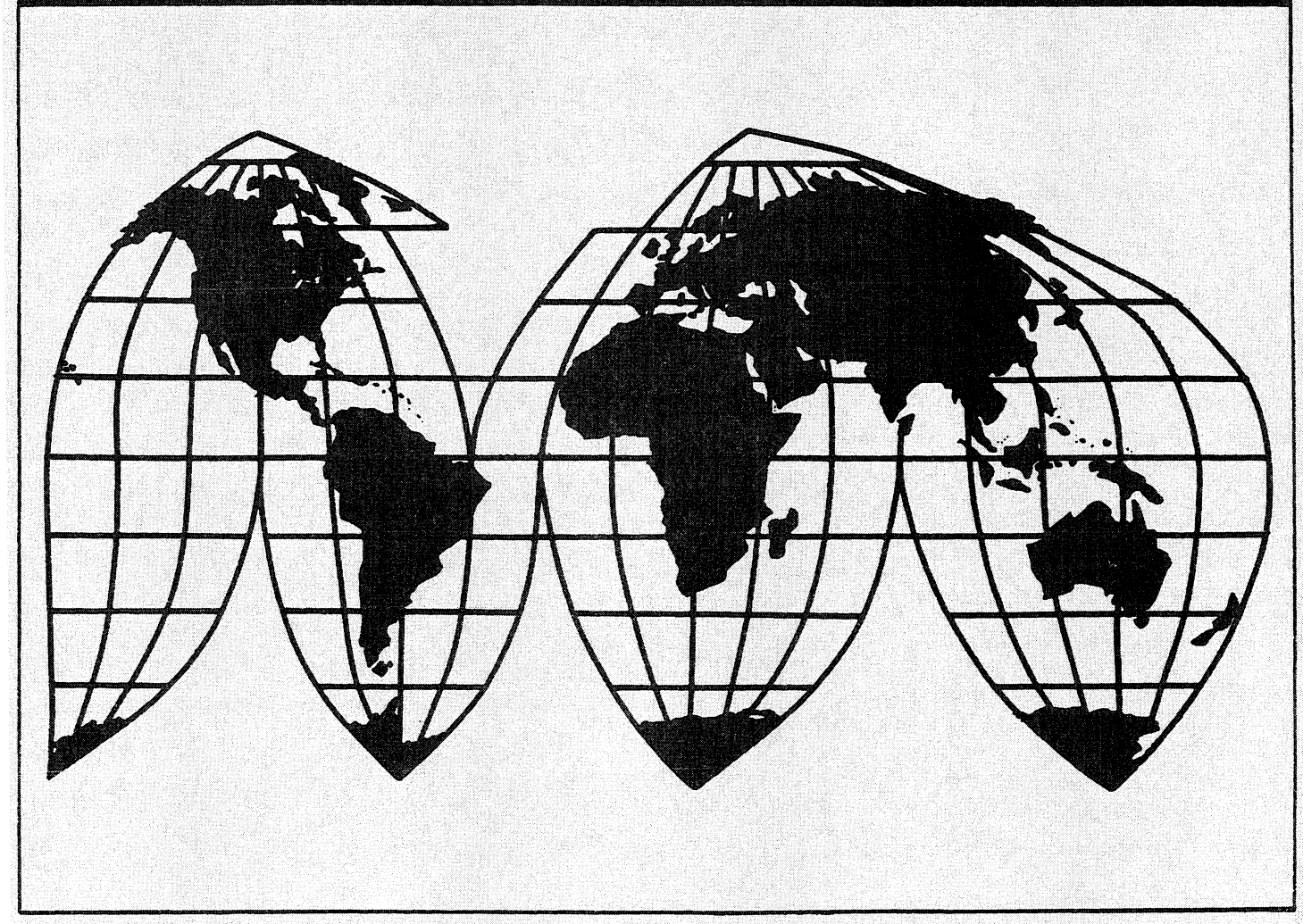
DRAMs of One Megabit and Above From the Republic of Korea

Determination of the Commission in
Investigation No. 731-TA-556 (Final)
Under the Tariff Act of 1930,
Together With the Information
Obtained in the Investigation

Publication 2629 **May 1993**

U.S. International Trade Commission



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U.S. International Trade Commission

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May 1993

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

Note.--Information that would reveal confidential operations of individual concerns may not be published and therefore has been deleted from this report. Such deletions are indicated by asterisks.

UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation No. 731-TA-556 (Final)

DYNAMIC RANDOM ACCESS MEMORIES OF ONE MEGABIT AND ABOVE FROM THE REPUBLIC OF KOREA

Determination

On the basis of the record[1] developed in the subject investigation, the Commission determines,[2] pursuant to section 735(b) of the Tariff Act of 1930 (19 U.S.C. § 1673d(b)) (the Act), that an industry in the United States is materially injured by reason of imports from the Republic of Korea (Korea) of dynamic random access memories (DRAMs) of one megabit (Meg) and above,[3]

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[1] The record is defined in sec. 207.2(f) of the Commission's Rules of Practice and Procedure (19 CFR § 207.2(f)).

[2] Vice Chairman Watson and Commissioners Brunsdale and Crawford dissenting.

[3] The scope of Commerce's investigation is as follows:

> The products covered by this investigation are dynamic random access memory semiconductors (DRAMs) of one megabit and above from the Republic of Korea. For purposes of this investigation, DRAMs are all one megabit and above dynamic random access memory semiconductors, whether assembled or unassembled. Assembled DRAMs include all package types. Unassembled DRAMs include processed wafers, uncut die, and cut die. Processed wafers produced in Korea but packaged, or assembled into memory modules, in a third country are included in the scope; however, wafers produced in a third country and assembled or packaged in Korea are not included in the scope.
>
> The scope of this investigation includes memory modules. A memory module is a collection of DRAMs the sole function of which is memory. Modules include single in-line processing modules (SIPs), single in-line memory modules (SIMMs), or other collections of DRAMs whether unmounted or mounted on a circuit board. Modules that contain other parts that are needed to support the function of memory are covered. Only those modules which contain additional items which alter the function of the module to something other than memory, such as video graphics adapter (VGA) boards and cards, are not included in the scope.
>
> The scope of this investigation also includes video random access memory (VRAMs), as well as any future packaging and assembling of DRAMs.
>
> The scope of this investigation also includes removable memory modules placed on motherboards, with or without a CPU, unless the importer of motherboards certifies with the Customs Service that neither it, nor a party related to it or under contract to it, will remove the modules from the motherboards after importation.
>
> The scope of this investigation does not include DRAMs or memory modules that are reimported for repair or replacement.

provided for in subheadings 8473.30.40 and 8542.11.00 of the Harmonized Tariff Schedule of the United States, that have been found by the Department of Commerce to be sold in the United States at less than fair value (LTFV).

Background

The Commission instituted this investigation effective October 29, 1992, following a preliminary determination by the Department of Commerce that imports of DRAMs of one Meg and above from Korea were being sold at LTFV within the meaning of section 733(b) of the Act (19 U.S.C. § 1673b(b)). Notice of the institution of the Commission's investigation and of a public hearing to be held in connection therewith was given by posting copies of the notice in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and by publishing the notice in the Federal Register of November 12, 1992 (57 F.R. 53777). The hearing was held in Washington, DC, on March 18, 1993, and all persons who requested the opportunity were permitted to appear in person or by counsel.

VIEWS OF CHAIRMAN NEWQUIST, COMMISSIONER ROHR, AND COMMISSIONER NUZUM

Based on the record in this final investigation, we determine that the industry in the United States producing dynamic random access memories (DRAMs), as defined below, is materially injured by reason of imports of DRAMs of one Megabit and above from the Republic of Korea (Korea) that the Department of Commerce has determined are sold at less than fair value (LTFV). In addition, we conclude that even had we not found LTFV imports from Korea to be a cause of the material injury experienced by the domestic industry, we would determine that those imports threaten material injury to the industry.

I. LIKE PRODUCT AND THE DOMESTIC INDUSTRY

A. Statutory Definition

As a threshold matter in an investigation under title VII of the Tariff Act of 1930, as amended, ("the Act") the Commission must define the domestic industry. Section 771(4)(A) of the Act defines the relevant domestic industry as "the domestic producers as a whole of a like product, or those producers whose collective output of the like product constitutes a major proportion of the total domestic production of that product . . . ."[1] Like product, in turn, is defined as "a product which is like, or in the absence of like, most similar in characteristics and uses with, the article subject to investigation . . . ."[2]

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[1] 19 U.S.C. § 1677(4)(A).

[2] 19 U.S.C. § 1677(10). The Commission's decision regarding the appropriate domestic product or products like the imported articles subject to investigation is essentially a factual determination, and the Commission has applied the statutory standard of "like" or "most similar in characteristics and uses" on a case-by-case basis. The like product factors considered by the Commission have included: (1) physical characteristics and end uses; (2) interchangeability of the products; (3) channels of distribution; (4) producer and customer perceptions; (5) common manufacturing facilities, production

(continued...)

B. Background and Product Description

The Department of Commerce (Commerce) has defined the class or kind of merchandise subject to this investigation as:

> dynamic random access memory semiconductors (DRAMs) of one megabit and above from the Republic of Korea. . . . DRAMS are all one megabit and above dynamic random access memory semiconductors, whether assembled or unassembled. . . . The scope of this investigation includes memory modules. . . . The scope of this investigation also includes video random access memory (VRAMs), as well as any future packaging and assembling of DRAMs. . . .[3]

A DRAM is a monolithic integrated memory circuit containing thousands of memory storage cells, each of which contains a transistor and capacitor.[4] Information is stored on the DRAM by electrically charging selected capacitors. The electrical charge stored on the cells must be sampled and regenerated periodically because of leakage, and regenerated after being

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[2](...continued)
processes and production employees and; (6) where appropriate, price. Calabrian Corp. v. United States, 794 F. Supp 377 (Ct. Int'l Trade 1992); Torrington Co. v. United States, 767 F. Supp. 744 (Ct. Int'l Trade 1990), aff'd. 938 F.2d 1278 (1991); Asociacion Colombiana de Exportadores de Flores v. United States, 693 F. Supp. 1165, 1168 n.4, 1180 n.7 (Ct. Int'l Trade 1988) (hereinafter Asocoflores). No single factor is dispositive, and the Commission may consider other factors it deems relevant based upon the facts of a particular investigation. Gray Portland Cement and Cement Clinker from Venezuela, Inv. No. 303-TA-21 and 731-TA-519 (Preliminary), USITC Pub. 2400 (July 1991) at 12. Generally, the Commission disregards minor variations between the articles subject to an investigation and looks for clear dividing lines between possible like products. S. Rep. No. 249, 96th Cong., 1st Sess. 90-91 (1979). "It is up to [the Commission] to determine objectively what is a minor difference." Asocoflores, 693 F. Supp. at 1169.

[3] Final Determination of Sales at Less than Fair Value; Dynamic Random Access Memory Semiconductors of One Megabit and Above from the Republic of Korea, 58 Fed. Reg. 15467, 15467-68 (hereinafter Commerce Final Notice), reproduced at Report, Appendix A, A-13. In reaching this final determination, Commerce considered a number of scope exclusion requests filed by parties to the investigation. Commerce specifically considered whether future generation DRAMs should be excluded from the scope of the investigation. Commerce concluded that future generations should be included in the scope of the investigation. While the Commission is not bound by Commerce's determination, we found Commerce's analysis of this issue informative, and considered it in making our own determination.

[4] Report at I-6.

accessed.[5] DRAMs vary in the speed at which the storage cells can be addressed (access time), and in density (the number of capacitors or "bits").

The production of DRAMs can be divided into several basic manufacturing operations.[6] The production of the dice on the silicon wafer, called wafer fabrication, is one of the most difficult and costly of these operations. Wafer fabrication generally involves repeated photolithographic steps using "masks" to form the circuitry design, and the controlled introduction of impurities (dopants) into the silicon crystal wafer to form conductive regions enabling the circuitry to operate.

Wafer fabrication involves significant investment of capital, both in research and development of the DRAM itself, and in developing and bringing on-line the highly sophisticated manufacturing technology.[7] Following fabrication, each die on the wafer is electrically tested, and defective dice are marked for discard. This stage, also known as wafer sorting, is generally performed at the same manufacturing establishment where wafer fabrication takes place. The process of wire bonding the dice to lead frames (which provide connection between the circuitry of the die and the outside) and final sealing of the individual die in a case is called assembly, and may take place

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[5] The required regeneration of the charge on the capacitors makes the device "dynamic." The need to regenerate the stored charges distinguishes DRAMs from other random access memory semiconductors, called static RAMs (SRAMs), which do not require refresh charges, but are more costly to produce. Id. at I-7 n.26. In addition, information can both be written to, and read from, DRAMs, which distinguishes them from, for instance, erasable programmable read only memories (EPROMs), which are "read only" memories, and cannot have information routinely written to them. Thus, with certain limited exceptions, these semiconductor chips are not interchangeable in use. Id. See id. at Glossary, A-30,32; Micron Technology Inc. (hereinafter "Micron") Post-hearing Brief at Appendix A, A.7-A.8.

[6] Report at I-8 - I-9.

[7] See id. at I-8, I-59, Table 37, Transcript of the Hearing at 21-22 (Mr. Kaplan), 38 (Mr. Langrill).

in the same manufacturing establishment as wafer fabrication, or elsewhere. After assembly, each unit is tested and marked for identification prior to shipment.

C. Like Product Issues

In its preliminary determination, the Commission considered several issues concerning the definition of the like product: (a) whether assembled and unassembled DRAMs are separate like products; (b) whether DRAMs of different densities are separate like products; (c) whether video dynamic random access memory (VRAMs) are a separate like product; (d) whether Single In-Line Processing Modules (SIPs) and Single In-Line Memory Modules (SIMMs) (two types of memory modules) are separate like products; and (e) whether future generation DRAMs should be specifically included or excluded from the like product.[8] Only the last of these issues is contested by the parties in this final investigation.[9] Each of these issues is addressed below.

The Commission addressed the issue of whether assembled and unassembled DRAMs are separate like products in its preliminary determination by using a

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[8] DRAMs of One Megabit and Above from the Republic of Korea, Inv. No. 731-TA-556 (Preliminary), USITC Pub. 2519 (June 1992) at 5-6 (hereinafter DRAMs Preliminary). As the Commission noted, id. at 6, some of these issues were addressed by the Commission in 64K Dynamic Random Access Memory Components from Japan, Inv. No. 731-TA-270 (Preliminary) and (Final), USITC Pubs. 1735 and 1862 (August 1985, July 1986)(hereinafter 64K DRAMs Preliminary and 64K DRAMs Final) and Dynamic Random Access Memory Semiconductors of 256 Kilobits and Above from Japan, Inv. No. 731-TA-300 (Preliminary) USITC Pub. 1803 (January 1986)(hereinafter 256K and Above DRAMs). However, as the Court of International Trade has repeatedly held, Commission determinations are sui generis, and the Commission's determination in each investigation "must be based on the particular record at issue including the arguments raised by the parties." Asocoflores, 693 F. Supp. at 1169 n.5 (1988) (specifically addressing like product determination); Citrosuco, 12 CIT at 1209, 704 F. Supp. at 1087-88; Armstrong Bros. Tool Co. v. United States, 483 F. Supp. 312, 328-29 (Cust. Ct.), aff'd, 626 F.2d 168 (CCPA 1980).

[9] See Transcript of Hearing at 103 (Mr. Kaplan), 201-202 (Messrs. Griffith and House).

semi-finished product analysis,[10] and concluded that assembled and unassembled DRAMs are a single like product.[11] No material new facts have been adduced in the final investigation on these matters, and no party has argued that the Commission should reach a different conclusion. We adopt the analysis set forth in the preliminary determination[12] and make the same determination in this final investigation.

Similarly, the Commission concluded in its preliminary determination that DRAMs of different densities are a single like product.[13] Again, no material new facts have been adduced in the final investigation on these

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[10] When considering whether "semifinished" products are "like" the finished product, the Commission has examined: (1) the necessity for, and the costs of, further processing; (2) the degree of interchangeability of articles at the different stages of production; (3) whether the article at an earlier stage of production is dedicated to use in the finished article; (4) whether there are significant independent uses or markets for the finished and unfinished articles; and (5) whether the article at an earlier stage of production embodies or imparts to the finished article an essential characteristic or function. Certain Telephone Systems and Subassemblies Thereof from Japan and Taiwan, Inv. Nos. 731-TA-426 and 428 (Final), USITC Pub. 2237 (Nov. 1989). The Commission has applied a semi-finished product analysis specifically in the case of DRAMs, and reached the same conclusion, in previous investigations. 64K DRAMs Final at 8-11, 256K and Above DRAMs at 6-9.

[11] DRAMs Preliminary at 6-7. In reaching this conclusion, the Commission found that DRAM wafers and dice are dedicated to use in assembled DRAMs, have no independent use other than assembly into finished DRAMs, embody and impart to finished DRAMs the essential memory characteristics for which DRAMs are used, and that there is no independent commercial market for unassembled DRAMs.

[12] Id.

[13] DRAMs Preliminary at 7. In reaching its conclusion, the Commission found that DRAMs, regardless of density, share the same general physical appearance, that there is some degree of substitutability among different generations of DRAMs, that channels of distribution for DRAMs of all densities are the same, and that while some manufacturers have dedicated wafer fabrication lines for different densities, the general manufacturing process and equipment used is the same for all densities of DRAMs. The Commission had previously reached the same conclusion. 64K DRAMs Final at 6-8, 256K and Above DRAMs at 9-12. The Commission has also determined that "all EPROMs" are a single like product, regardless of density. Erasable Programmable Read Only Memories from Japan, Inv. No. 731-TA-288 (Preliminary), USITC Pub. 1776 (November 1985).

questions, and no party has argued that the Commission should reach a different conclusion. We adopt the analysis set forth in the preliminary determination[14] and make the same determination in this final investigation.

For purposes of its preliminary determination, the Commission concluded that VRAMs are part of the like product.[15] The information on the record in this final investigation indicates that VRAMs share the same physical characteristics and operate on the same principles as DRAMs, are distributed through the same channels as DRAMs, and share common technology and manufacturing methods processes, with the exception of the use of different mask sets during the wafer fabrication stage.[16] No party has argued during this final investigation that the Commission should find VRAMs to constitute a

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[14] DRAMs Preliminary at 7.

[15] Id. at 7-8.

[16] VRAMs are "dualport" DRAMs, used in video graphics display applications. The existence of two data ports allows VRAMs to simultaneously send and receive data from accessed information to a video graphics display. Report at I-8. Information on the record indicates that VRAMs are a specialty DRAM, specifically designed to enhance the video performance of computers and other video devices, that VRAMs operate on the same principles as standard DRAMs, have virtually identical physical appearances, and are sold in the same channels of distribution as standard DRAMs. Micron Post-Conference Brief at 10-11. While VRAMs are a special configuration of DRAM, they are based on the same essential technology and manufacturing methods, the only difference being the use of different mask sets during the photolithographic stage. Id. at I-9. By contrast, even though production of other semiconductor chips such as SRAMs and EPROMs utilizes similar, and sometimes the same, production equipment and technologies, and may be undertaken by the same producers, the fabrication of chips other than DRAMs is based on separate research and development, and requires different mask sets, different processing steps, and different numbers of processing steps, as well as modifications to equipment and consequent down-time, resulting in lost efficiencies. Thus, there is a significant cost differential between DRAMs and other chips, and switching from production of one to the other on a short term basis is not very feasible. See Micron Post-hearing Brief at Appendix A, A.8-A.9, Transcript of Hearing at 180-181 (Mr. McDonald).

separate like product.[17] We conclude that VRAMs are part of the like product in this final investigation.

The Commission also included memory modules in the like product for purposes of its preliminary determination.[18] DRAM memory modules are a packaging arrangement consisting of a printed circuit board containing two or more DRAMs, providing a more convenient means of using DRAMs in various applications that require significant memory capacity and of upgrading memory capacity.[19] The essential characteristics of modules are thus defined by the DRAMs they contain. Construction of memory modules usually consists of soldering or otherwise attaching assembled DRAMs to a printed circuit board or other substrate.[20] Memory modules may be assembled either by the manufacturer of the DRAM, or by third party purchasers of DRAMs, and may be assembled from either domestic or imported DRAMs, or a combination of both.[21] The information on the record indicates that module assembly requires relatively small amounts of technological expertise and capital.[22] No party argued that

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[17] In the preliminary investigation, respondents Goldstar Electron Co., Ltd., Goldstar Electron America, Inc., Hyundai Electronics Industries Co., Ltd., Hyundai Electronics America, Inc., Samsung Electronics Co., Ltd., and Samsung Semiconductor, Inc. (hereinafter collectively "respondents") indicated that there may be a basis for distinguishing VRAMs from DRAMs, Respondents' Post-Conference Brief at 9 n.14., but did not elaborate on their position, either at that time, or during the final investigation.

[18] DRAMs Preliminary at 8-9.

[19] DRAM modules may also contain other parts. If those other parts change the function of the module to something other than memory, they are excluded from the scope of Commerce's investigation. Commerce Final Notice at 15468. See Memorandum for Joseph Spetrini, Acting Assistant Secretary for Import Administration concerning the Scope of the Investigation (undated) at 8-10.

[20] Report at I-9; Transcript of Staff Conference at 164-65.

[21] Report at I-9.

[22] Id. at I-9. At the hearing, representatives of both petitioner Micron and respondents testified that module assembly is relatively simple. Transcript of Hearing at 86-87 (Mr. Garrett); 179-180 (Mr. Portnoy).

modules should be considered a separate like product.[23] We conclude that memory modules are part of the like product in this final investigation.

In its preliminary determination, the Commission noted that it was not necessary to determine whether all future generations of DRAMs are specifically included in or excluded from the like product.[24] In this final investigation, the parties argue that the Commission should make such a determination.[25]

The Commission has not, in the past, "limited" its like product determination to currently existing products, nor has it expressly included future products. In most cases, it is entirely possible that there will be further product developments. The fact that it is well known that DRAM development is a continual process, and that it is expected that new, higher density DRAMs will, in all likelihood, continue to be introduced every three to four years,[26] does not in our view warrant treating the like product issue differently in this investigation than in other cases.

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[23] Transcript of Hearing at 86-87 (Mr. Garrett); 179-180 (Mr. Portnoy).

[24] DRAMs Preliminary at 9-10.

[25] Micron Pre-hearing Brief at 7-11, Post-hearing Brief at Appendix A, A.28-A.32; Respondents' Pre-hearing Brief at 4-12, Post-hearing Brief at Responses to Commission and Staff Questions, 19-20.

The issue of future generation DRAMs concerns DRAMs above 16 Meg. The 16 Meg DRAM is now being sold in commercial quantities, and respondent Samsung has reported prototype development of the 64 Meg DRAM. Micron Pre-hearing Brief at 10. NEC, a Japanese producer with production facilities in the United States, has reported it would begin sample shipments of 64 Meg DRAMs in April 1993, with volume production in late 1994. It is also reported that 256 Meg DRAM production, based on existing technology, can begin by 1996, and that development of the 1 Gigabit DRAM is in progress. Report at I-6 - I-7.

[26] Over the history of DRAM production, a new generation of DRAMs has been introduced within 3 1/2 to 4 years of the previous generation. Id. at I-6, I-84 - I-85 and Figure 2. The anticipated commercial introduction of the 64 Meg generation in 1995, Respondents' Pre-hearing Brief at 7 n.9, suggests that this pattern is continuing, the 16 Meg generation having been introduced in 1991-92.

Because future generation DRAMs do not yet exist, information concerning the characteristics and uses of future generation DRAMs is, at best, theory and speculation. The Commission does not have, and obviously could not at any given time obtain, information sufficient to determine whether non-existent future generation DRAMs are or are not like DRAMs currently being produced and imported. Thus, we do not have a sufficient basis in fact either to exclude or include future generation DRAMs from the like product.[27] It may be true that future generations of DRAMs will be "like" the existing generations. However, it may also be true that the technological obstacles to be overcome in the development of future generation volatile memory chips will require revolutionary developments of design and process technology. Such revolutionary change could result in a product which might or might not be "like" the articles subject to the scope of this investigation.[28] We believe that a determination whether future developments in this technology will be evolutionary or revolutionary is inherently speculative if made at this time, and that it is neither necessary nor appropriate for us to make such a determination at this time.[29]

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[27] Contrary to respondents' argument, we do not believe that a lack of "substantial evidence" to support the conclusion that future generation DRAMs are like existing generations requires the Commission to determine that they are unlike. The conclusion that future generation DRAMs are not like existing generations must also be based on evidence on the record, and we believe there simply is not sufficient evidence to support a conclusion either way.

[28] We note that whether or not the Commission limits the like product in this investigation to currently existing DRAMs will not predetermine whether any order issued in this case will be applied to imports of future generation DRAMs. The characteristics and uses, including the technology, of such higher density DRAMs will be known if such DRAMs are, at some future time, included in the scope of any order issued as a result of this investigation, and the question may then be dealt with appropriately. See 19 U.S.C. § 1677j; 19 U.S.C. § 1675(b).

[29] We note that in the 256K and Above DRAMs case, there was information of record concerning the technological problems to be faced in the development of

(continued...)

We determine that the like product is "all DRAMs," irrespective of density or whether assembled or not. We further determine that the like product includes VRAMs and memory modules. Finally, we do not establish an "upper limit" on the like product based on the existing densities of DRAMs currently available.[30]

D. Domestic Industry Issues

In its preliminary determination, the Commission considered several issues concerning the definition of the domestic industry: (a) whether the Commission should include captive producers in the domestic industry; (b) whether the Commission should include in the domestic industry companies that perform only wafer fabrication or assembly, but not both, in the United States; and (c) whether the Commission should include in the domestic industry

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[29](...continued)
DRAMs of a capacity greater than 1 Meg which suggested that such a product faced significant difficulties both in development of the design of such a chip and the development of manufacturing technologies for its production, suggesting that higher density volatile memory chips would not be "like" the then-existing generations of DRAMs. Indeed, parties in opposition to the imposition of antidumping duties in that case argued that the 1 Meg DRAM represented a change in technology sufficient to render it a different product, an argument rejected by the Commission in determining that the like product was "all DRAMs." 256K and Above DRAMs at 10, 13. Developments since the determination have not borne out the implications of that information and argument. The information on the record in this investigation indicates that 4 Meg and 16 Meg DRAMs share all the essential characteristics of lower density DRAMs, in design, operation, function, use, and manufacturing technology. In addition, the information available on Samsung's and NEC's 64 Meg DRAMs suggests that they too share those characteristics, as does the available information on NEC's 256 Meg DRAM. Report at I-6 - I-7.

[30] We note that in its preliminary determination regarding imports of DRAMs from Korea, the Commission of the European Communities also considered the question of whether future generation DRAMs are within the like product, and specifically determined that "all types, densities and variations of DRAM products, . . . including future densities, future process technologies and future packages, are to be viewed as one product[.]" Commission Regulation (EEC) No. 2686/92, 1992 O.J. (L 272) 13, 15. In its final determination, the Council of the European Communities confirmed this conclusion. Council Regulation (EEC) No. 611/93, 1993 O.J. (L 66) 1, 2.

companies that assemble DRAMs onto memory modules.[31] None of these issues is contested in this final investigation, and only petitioner Micron presented any argument on the domestic industry issues.

In its preliminary determination, the Commission, noting that its consistent practice was to include all domestic production, whether toll-produced, captively consumed, or sold in the open market, in the definition of the domestic industry, defined the domestic industry to include captive producers of the like product.[32] No party has argued that the Commission should reach a different conclusion in this final investigation, and no material new information has been adduced which would support a different conclusion. We adopt the analysis set forth in the preliminary determination[33] and reach the same conclusion in this final investigation.

The Commission also concluded, for purposes of its preliminary determination, that companies which perform either wafer fabrication or assembly in the United States are included in the domestic industry.[34] No party has argued that the Commission should reach a different conclusion in

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[31] As the Commission noted in its preliminary determination, some domestic producers have imported DRAMs and/or modules within the scope of the investigation from Korea during the period of investigation. Report at I-77 - I-78. No U.S. producers reported imports of VRAMs within the scope of the investigation. Id. at B-3. We therefore considered whether appropriate circumstances exist to exclude such producers from the domestic industry under the related parties provision of the statute, 19 U.S.C. § 1677(4)(B). As in the preliminary investigation, no party argued that they should be excluded. Based on information in the confidential record, see id. at I-77 - I-78, we determine that appropriate circumstances do not exist to warrant the exclusion of these producers from the domestic industry.

[32] DRAMs Preliminary at 10-11.

[33] Id.

[34] Id. at 11-12. The Commission reached the same conclusion in prior investigations. 64K DRAMs Final at 12; 256K and Above DRAMs at 15-16.

this final investigation,[35] and the information of record has not changed materially with respect to these factors. We adopt the analysis set forth in the preliminary determination[36] and reach the same conclusion in this final investigation.

In the preliminary determination, we concluded that module manufacturers who purchase DRAMs from either domestic producers or importers are not part of the domestic industry.[37] Micron argues that the Commission should determine that the domestic industry does not include companies that merely "stuff" modules with DRAMs purchased from foreign or domestic sources.[38] Micron asserts that there is very little value added in module assembly alone, and that a company that purchases DRAMs and assembles them into modules should not be considered a U.S. producer of the like product. Respondents made no arguments concerning this question.

The Commission's analysis of domestic industry is a factual determination and is made on a case-by-case basis.[39] As a general proposition in title VII investigations, "the like product determination is the industry determination,"[40] that is, companies which produce the like product constitute the domestic industry. However, questions arise where not all aspects of the production of the like product occur in the United States, or where the nature of the production activities related to the like product differs from company

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[35] Micron argues that the Commission should reach the same conclusion in this final investigation. Micron Pre-hearing Brief at 13-15. Respondents presented no arguments concerning this question.

[36] DRAMs Preliminary at 11-12.

[37] Id. at 12-13 (Views of Chairman Newquist, Commissioner Rohr, and Commissioner Nuzum).

[38] Micron Pre-hearing Brief at 15-17.

[39] See Cellular Mobile Telephones and Subassemblies Thereof from Japan, Inv. No. 731-TA-207 (Final), USITC Pub. 1786 (1985); EPROMs, supra; 64K DRAMs, supra.

[40] Asocoflores, 693 F. Supp. at 1169.

to company. In such cases, the Commission has examined the overall nature of production-related activities in the United States, including the extent and source of a firm's capital investment, the technical expertise involved in production activity in the United States, the value added to the product in the United States, employment levels, the quantity and type of parts sourced in the United States, and any other costs and activities in the United States directly leading to production of the like product.[41]

We determine that companies which purchase DRAMs (either foreign or domestic) on the open market for assembly and sale in memory module form are not domestic producers of the like product, and thus are not part of the domestic industry. The information of record indicates that memory module assembly does not require significant production activities, significant capital, or significant technical expertise. In addition, the value added in assembly into memory modules is relatively low in comparison to the cost of the DRAMs.[42]

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[41] 64K Final at 12 n.19. The Commission noted in High Information Content Flat Panel Displays that the value added in the United States is not determinative. USITC Pub. 2413 at 15-16. See also Certain Personal Work Processors from Japan, Inv.No. 731-TA-483 (Final), USITC Pub. 2411 (August 1991) at 49-57 (Additional Views of Commissioner Newquist).

[42] Two domestic memory module manufacturers appeared at the staff conference in the preliminary investigation, and testified in opposition to the imposition of antidumping duties. Both purchase most, if not all, of their DRAMs from foreign, and primarily Korean, sources. They testified that their cost of DRAMs ranged between 75.0 and 82.5 percent of their cost of sales. One manufacturer testified that "the DRAM price is very significant, and [he does] a very small value added in resell." Transcript of Staff Conference at 146 (Mr. Freie). Confidential information on the record regarding the ratio of the cost of DRAMs to the total cost of goods sold for companies that assemble modules supports the same conclusion. Report at C-6. While this ratio does not include selling, general, and administrative expenses, it represents a reasonable approximation of the value added to the purchased DRAMs in the assembly of modules.

In summary, we determine that all companies which perform some aspect of DRAM production in the United States are part of the domestic industry. We further determine that companies which only assemble memory modules from purchased DRAMs, whether domestic or foreign, and do not themselves manufacture DRAMs, are not part of the domestic industry.[43] Finally, we do not exclude any domestic producer under the related parties provision.

II. CONDITION OF THE INDUSTRY

In assessing whether there is material injury to a domestic industry by reason of LTFV imports, the Commission is instructed to consider "all relevant economic factors which have a bearing on the state of the industry in the United States . . . ."[44] In undertaking that assessment, we consider, among other relevant factors, U.S. consumption, production, shipments, capacity utilization, employment, wages, financial performance, capital investment, and research and development expenses.[45] No single factor is dispositive in our evaluation of these indicators.[46] In each investigation, the Commission considers the particular nature of the industry under investigation in the "context of the business cycle and conditions of competition that are distinctive to the affected industry."[47]

The DRAM industry is characterized by a fairly predictable product life cycle. Since the introduction of the 1 kilobit DRAM in 1970, each succeeding generation has represented a quadrupling of memory capacity. The increased

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[43] We would also include companies that assemble modules under tolling arrangements for domestic DRAM producers in the domestic industry as producers of the like product. However, the Commission did not receive questionnaire information from any such toll producers.

[44] 19 U.S.C. § 1677(7)(C)(iii).

[45] See id.

[46] 19 U.S.C. § 1677(7)(E)(ii).

[47] 19 U.S.C. § 1677(7)(C)(iii). See also H.R. Rep. No. 317, 96th Cong., 1st Sess. 36; S. Rep. No. 249, 96th Cong., 1st Sess. 88.

memory capacity of the newer generation DRAM results in fewer units being necessary to satisfy the same demand for memory. As each new generation of DRAM is introduced to the market, costs of production and selling prices tend to be high. However, as production increases during the growth phase of the product cycle, costs and prices decline as producers move along the learning curve, lowering defects and improving yields. In the mature phase of the product cycle, costs are generally lowest, and prices continue to fall. Historically, each new generation has been introduced within three to four years after commercial introduction of the previous generation, during the latter's growth or maturity phase. The competition between succeeding generations also contributes to price declines for the mature DRAM.

This pattern of generational shifts and declining costs and prices complicates consideration of the information concerning the condition of the DRAM industry. There are variations among producers with respect to their progress along the learning curve for each generation, as well as significant difficulty in assessing whether the industry is operating "normally" -- that is, as would be expected in light of the product life cycle. We have considered these factors in weighing the evidence and arguments on the record.

Apparent U.S. consumption of DRAMs, measured in bits,[48] increased dramatically throughout the period of investigation. In the three-year period 1989 through 1991, consumption almost tripled, from 266 trillion bits to 705

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[48] Demand for DRAMs is often measured by the amount of memory contained, that is, bits. Moreover, since we have determined that the like product includes all DRAMs, VRAMs, and modules, consideration of production, consumption, and import data in terms of units is not always meaningful because of variations in density. Thus, we have focussed on quantities measured in bits in considering these factors, and looked to quantities measured in units where meaningful.

trillion bits.[49] Between interim 1991 and 1992, consumption of DRAMs (in bits) almost doubled, from 500 trillion bits to 885 trillion bits, a level above consumption for the entire year 1991.[50] Consumption of DRAMs is driven by the demand from producers of electronic equipment -- primarily computers -- for memory capacity. The parties are in agreement that aggregate U.S. demand for DRAMs is increasing and is projected to continue to do so.[51] This conclusion is supported by the substantial increases (measured in bits) in domestic production and U.S. shipments (as well as imports) during the period of investigation.

U.S. producers' capacity to fabricate wafers, measured in terms of thousands of wafer starts, increased from 1.3 million wafers in 1989 to 1.6 million wafers in 1991, as well as between the interim periods, from 1.1 million wafers in January-September 1991 to 1.2 million wafers in January-September 1992.[52] Capacity to assemble DRAMs, measured in terms of units, increased as well from 1989 to 1990, but then declined in 1991, and showed a continued decline between the interim periods.[53] Domestic producers reported

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[49] Report at I-26, Table 6. We note that it is estimated that "other imports" included in total apparent U.S. consumption account for approximately 60 percent of imports from countries other than Korea, based on Commerce's official import statistics. However, official import statistics are overstated, as they include products outside the scope of this investigation. Id. at I-18, n.55. Imports from countries other than Korea reported to the Commission are believed to account for a much higher share of imports than the 60 percent indicated. Id. Thus, apparent consumption is only somewhat understated as a result of imports not counted, and we believe that the data concerning market penetration of LTFV imports discussed below are reliably accurate.

[50] Id. at I-26, Table 6.

[51] Micron Post-conference Brief at 14; Respondents' Post-conference Brief at 12.

[52] Report at I-28, Table 7. Capacity to fabricate wafers and assemble DRAMs cannot meaningfully be measured in bits.

[53] Id. at I-31, Table 9. Reported estimates of module capacity were not meaningful. Id. at C-4.

closing DRAM wafer fabrication and assembly facilities, delays in bringing production facilities on-line, and converting production capacity from production of DRAMs to other products, due to, inter alia, market conditions, including DRAM price declines.[54]

Domestic producers' capacity utilization for uncased DRAMs declined from 1989 to 1991, and showed a further decline between the interim periods.[55] Capacity utilization for DRAM assembly increased from 1989 to 1991, but declined between the interim periods.[56] While capacity utilization was relatively high overall during the period of investigation, we note that other products are produced on the same equipment and machinery, by the same employees, as DRAMs.[57] Thus, capacity to produce DRAMs, and capacity utilization, depend in part on prior decisions as to product mix. Those decisions in turn are made based on expectations as to the market, in addition to other factors. U.S. producers could have increased production of DRAMs during the period of investigation, without adding new production lines, by not closing facilities, bringing new facilities on-line as originally scheduled, and increasing DRAM production at the expense of production of other products. Therefore, we consider the relatively high rates of capacity utilization to be of limited significance.

The domestic industry's production of cased DRAMs as reported in units increased slightly from 148.6 million units in 1989 to 149.2 million units in 1990, and then to 151.3 million units in 1991, but dropped to 104.0 million units in the 1992 interim period, as compared with 118.2 million units in

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[54] Id. at I-27, I-30.
[55] Id. at I-28, Table 7.
[56] Id. at I-31, Table 9.
[57] See id. at I-30.

interim 1991.[58] Apparent consumption of cased DRAMs, however, increased throughout the period of investigation, from 427 million units in 1989 to 472 million units in 1991, and from 357 million units in interim 1991 to 365 million units in interim 1992.[59] Measured in bits, domestic production of DRAMs more than tripled from 1989 to 1991; between interim 1991 and interim 1992, however, the rate of increase slowed. Domestic production increased by 37 percent from interim 1991 to interim 1992, from 124.2 trillion bits to 170.3 trillion bits.[60]

The domestic industry's U.S. shipments of DRAMs measured by units declined throughout the period of investigation, falling from 222 million units in 1989 to 198 million units in 1991, and from 153 million units in interim 1991 to 136 million units in interim 1992.[61] When measured in bits, the domestic industry's U.S. shipments increased throughout the period of investigation, although less than did U.S. production. U.S. shipments more than doubled from 118.1 trillion bits in 1989 to 260.2 trillion bits in 1991, and increased from 188.8 trillion bits in interim 1991 to 255.6 trillion bits in interim 1992.[62] The difference between domestic production and domestic

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[58] Id. at I-31, Table 9. The data for U.S. production, capacity, shipments, inventories, and employment cover production of DRAMs and VRAMs of all densities. We have not separately considered data for domestic producers' module production, in order to avoid double counting, based on our definition of domestic producers of modules.

[59] Report at I-22, Table 4.

[60] Id. at I-33, Table 10.

[61] Id. at I-40, Table 20.

[62] Id. The discrepancy between production and U.S. shipments measured in units and in bits is accounted for by the shift from lower to higher density DRAMs. See id. at Appendix D, Tables D-6 - D-10. However, between interim 1991 and 1992, U.S. production of 1 Meg DRAMs dropped markedly. Id. at Table D-8.

shipments is explained by an increase in U.S. producers' exports of DRAMs, measured in bits, during the period of investigation.[63]

U.S. producers' inventories of assembled DRAMs measured in units increased from 14.55 million units in 1989 to 16.82 million units in 1990, before declining slightly to 16.75 million units in 1992, and more significantly between the interim periods, falling from 18.30 million units in interim 1991 to 10.87 million units in interim 1992.[64] Measured in bits, U.S. producers' inventories almost tripled from 1989 to 1991, but showed a decline from 18.6 trillion bits in interim 1991 to 15.8 trillion bits in interim 1992.[65] As a ratio to shipments on the basis of bits, domestic producers' inventories increased from 1989 to 1991, and declined in interim 1992 as compared with interim 1991.[66] Inventories of unassembled (uncased) DRAMs, measured in both units and bits, declined dramatically from 1989 to 1991, but increased in interim 1992 to a level higher than that reported in 1989.[67] As a ratio to shipments, those inventories similarly declined from 1989 to 1991, then increased in interim 1992, although to a level well below that reported in 1989.[68]

The number of production and related workers engaged in the production of DRAMs fluctuated during the period of investigation, showing a substantial decline overall.[69] Hourly wages and compensation increased throughout the

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[63] Id. at I-40, Table 20.
[64] Id. at I-43, Table 23. We note that inventory information does not reconcile with reported production and shipments. Producers cited several reasons for the discrepancies, including scrap and customer returns and recalls.
[65] Id. at I-43, Table 23.
[66] Id.
[67] Id. at I-42, Table 21.
[68] Id.
[69] Id. at I-45, Table 24, I-47, Table 25.

period of investigation, but hours worked fell from 1989 to 1991, and again between interim 1991 and interim 1992.[70] Productivity increased throughout the period.

DRAM production is capital intensive, and producers must have access to sufficient capital to be able continually to invest large sums in research and development of higher density DRAMs in order to participate in the market for the next generation. Thus, weak financial operating results are particularly significant in this industry, as they indicate producers lack sufficient resources to fund necessary research and development internally and may have difficulty raising money in capital markets.[71]

The financial information shows a 33 percent decline in net sales between 1989 and 1990, from $1.74 billion to $1.16 billion, followed by a slight increase to $1.19 billion in 1991, and a further decline in interim 1992 to $871.57 million as compared with $914.56 million in interim 1991.[72] These declines in net sales, despite the introduction of 4 Meg DRAMs during this period, are troubling signs for the industry. Although the industry

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[70] Id.

[71] Some producers reported to the Commission that they have slowed down or delayed planned research and development and capital expenditures intended for higher density DRAMs. Id. at I-13 - I-15 and Appendix G. Micron's Vice President of Finance and Chief Financial Officer testified at the staff conference that Micron was forced to reduce its credit line in May 1991 because of deteriorating financial condition due to low prices. In addition, rapidly declining DRAM prices reportedly prevented Micron from raising capital through an equity offering in 1992. Transcript of Staff Conference at 23-24 (Mr. Langrill), Transcript of the Hearing at 38 (Mr. Langrill).

[72] Report at I-55, Table 33. Respondents argued that the existence of significant captive production affects the information concerning the domestic industry's financial performance, and that the information should be considered in that light. Respondents' Pre-hearing Brief at 23-33, Respondents' Post-hearing Brief at 19-20. The Commission gathered financial information from producers accounting for almost all of domestic production. Even considering the reporting of transfer values, we are satisfied that it is an accurate reflection of the profitability of the industry.

reported operating income of $515 million in 1989, it reported operating losses of $164 million in 1990 and $253 million in 1991. Operating losses continued in interim 1992, although they were less than reported in interim 1991, $130 million as compared with $161 million. Domestic producers realized a combined operating return of 29.6 percent in 1989, but operating losses during the rest of the period of investigation, as a percentage of net sales, were significant, increasing from 14.1 percent in 1990 to 21.3 percent in 1991, and declining from 17.6 percent in interim 1991 to 15.0 percent in interim 1992.[73]

The industry showed significant operating and net returns on assets in 1989, but reported significant and increasing operating and net losses on barely increased assets in 1990 and 1991.[74] Capital expenditures declined significantly, from $612 million in 1989 to $514 million in 1991, and declined from $482 million in interim 1991 to $272 million in interim 1992.[75] Research and development expenses also declined from 1990 to 1991, and fell from $116 million in interim 1991 to $82 million in interim 1992.[76]

Thus, although production and sales volumes of higher density DRAMs increased, the industry was not realizing significant increases in net sales and operating returns. As a consequence, capital investment and research and development, which are vital in this industry, were suffering. These results,

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[73] Report at I-55, Table 33.
[74] Id. at I-59, Table 37.
[75] Id. at I-60, Table 38.
[76] Id. at I-61, Table 39.

as well as our review of the confidential information concerning cash flow,[77] lead us to conclude that the industry is materially injured.[78]

III. MATERIAL INJURY BY REASON OF IMPORTS

In making a final determination in an antidumping duty investigation, the Commission is to determine whether an industry in the United States is materially injured "by reason of" the imports as to which Commerce has made an affirmative determination.[79] In making this determination, the statute directs the Commission to consider in each case:

> (I) the volume of imports of the merchandise which is the subject of the investigation,
>
> (II) the effect of imports of that merchandise on prices in the United States for like products, and
>
> (III) the impact of imports of such merchandise on domestic producers of like products, but only in the context of production operations in the United States.[80]

The Commission may consider other factors it deems relevant, but must explain why they are relevant.[81]

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[77] Id. at I-55, Table 33. Cash flow is an important financial indicator in this capital-intensive industry. Depreciation is a relatively high share of costs, due to the large capital investments in production facilities and equipment and the relatively short useful life of the equipment used in DRAM product. The industry's capital expenditures on DRAMs exceeded depreciation in each period for which data was requested, and also exceeded cash flow in each period except 1989. Id. at I-84.

[78] Commissioner Nuzum does not reach a separate conclusion of material injury based solely upon the condition of the industry.

[79] 19 U.S.C. § 1673d(b).

[80] 19 U.S.C. § 1667(7)(B)(i). The statute also directs the Commission to consider subsidiary factors concerning the volume, price effects, and impact of imports, and directs the Commission to evaluate all relevant economic factors in the context of the business cycle and conditions of competition that are distinctive to the affected industry. 19 U.S.C. § 1677(7)(C)(i) - (iii).

[81] 19 U.S.C. § 1677(7)(B).

The Commission may consider alternative causes of injury, but it is not to weigh causes.[82] The Commission need not determine that imports are the sole, or even a principal or substantial cause of material injury.[83] Rather, the Commission is to determine whether imports are contributing to material injury.[84] The Commission may also consider whether factors other than the LTFV imports have made the industry more vulnerable to the effects of the LTFV imports.[85] Although the Commission may take into account the departures from an industry, the Commission must assess the condition of the industry as a whole, and not on a company-by-company basis.[86]

LTFV imports from Korea, measured in bits, increased significantly during the period of investigation, more than tripling from 1989 to 1991, and then more than doubling just from interim 1991 to interim 1992.[87] Subject imports' share of apparent U.S. consumption increased in every period for

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[82] E.g., Citrosuco Paulista, S.A. v. United States, 704 F. Supp. 1075, 1101 (Ct. Int'l Trade 1988); Encon Industries Inc. v. United States, Slip op. 92-164 (Ct. Int'l Trade September 24, 1992) at 4-5.

[83] "Any such requirement has the undesirable result of making relief more difficult to obtain for industries facing difficulties from a variety of sources, industries that are often the most vulnerable to less-than-fair-value imports." S. Rep. No. 249, at 74-75.

[84] E.g., Metallverken Nederland v. United States, 716 F.Supp. 17, 25 (Ct. Int'l Trade 1989) ("contribute, even minimally"); Citrosuco Paulista, 704 F.Supp. at 1101 ("contribute, even minimally, to conditions of the domestic industry"); Hercules, Inc. v. United States, 11 CIT 710, 673 F. Supp. 454, 481 (1987) ("even slight contribution from imports"); Maine Potato Council v. United States, 9 CIT 293, 613 F. Supp. 1237, 1244 (1985) (the Commission must reach an affirmative determination if it finds that imports are more than a "de minimis" cause of injury).

[85] See generally Iwatsu Elec. Co. Ltd. v. United States, 758 F. Supp. 1506, 1512 (Ct. Int'l Trade 1991).

[86] See Metallverken Nederland B.V. v. United States, 728 F. Supp. 730 (Ct. Int'l Trade 1989).

[87] Report at I-78, Table 50. We note that currently, subject imports include DRAMs of 1 Meg, 4 Meg, and 16 Meg, modules containing such DRAMs, and VRAMs of 1 Meg and above. Thus, our analysis of the effects of subject imports on the domestic industry necessarily focusses on those products.

which data were requested.[88] Measured in bits, subject imports' market penetration increased from 14.2 percent in 1989 to 24.8 percent in 1991, and increased again to 30.0 percent in interim 1992 as compared with 22.9 percent in interim 1991.[89] By value, subject imports' share of apparent U.S. consumption increased from 11.3 percent in 1989 to 19.7 percent in 1991, and jumped from 18.0 percent in interim 1991 to 25.0 percent in interim 1992.[90] The significant and increasing share of consumption accounted for by LTFV imports is an important factor in our affirmative determination.

Respondents argue that the declining price trends for 1 Meg and 4 Meg DRAMs are consistent with price trends for previous-generation DRAMs, and are due solely to the course of the product life cycle. Petitioner, while agreeing that price declines are to be expected, argues that the subject imports undersell the domestic product, resulting in price declines in excess of what would be expected in the absence of LTFV imports. The parties disagreed, however, as to the "expected" declines in price. We did not rely on either party's econometric estimates in drawing our conclusions about the impact of LTFV imports on domestic prices.[91]

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[88] As discussed above, the relatively high levels of reported capacity utilization during the period of investigation did not preclude the domestic industry from increasing production and sales. In addition, there were imports of DRAMs from other countries throughout the period of investigation. Thus, the significant increase in the market share of LTFV imports from Korea was not necessary to satisfy U.S. demand.

[89] As noted above, we believe apparent consumption is only somewhat understated as a result of imports not counted, and that the data concerning market penetration of LTFV imports are reliably accurate.

[90] Report at I-82, Table 55.

[91] The parties provided econometric estimates of expected price declines as a function of either time or cumulative output. Both parties' models appear to fit the available data equally well, one showing actual prices slightly above expected prices, the other showing actual prices slightly below expected prices. Neither showed statistically significant differences between estimated prices and actual prices. Neither model submitted to the Commission

(continued...)

As would be expected, both import and domestic product prices for all products sold to all types of purchasers declined overall during the period of investigation.[92] However, when compared over the period during which both domestic and Korean product prices were reported to the Commission, U.S. producer prices for several products sold to different categories of purchasers declined by a greater percentage than did Korean product prices, ending the period at levels below Korean product prices.[93]

Quality is an important issue in the DRAM industry, and was mentioned most frequently by purchasers as the number one factor considered in deciding from whom to purchase DRAMs.[94] While there are differing opinions among U.S. producers and importers, the vast majority of purchasers reported that Korean DRAMs are comparable in quality to U.S. DRAMs.[95] The majority of purchasers stated that the failure rates of U.S. and Korean DRAM suppliers were equal.[96] However, purchasers reported differences with regard to factors such as credit terms, contracts, availability, and reliability of supply.[97] Nonetheless, price was ranked number one by the second largest number of purchasers, and

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[91](...continued)
is more persuasive on the question of whether domestic prices are below what would be expected in the absence of LTFV imports from Korea. See Memorandum EC-Q-042 at 8-11 (April 19, 1993).

[92] The Commission requested price information from U.S. producers and importers for their monthly spot and quarterly contract sales of DRAMs during the period of investigation. Information was requested for six specific products, including 1 and 4 Meg DRAMs, VRAMs, and modules, and for sales to original equipment manufacturers, franchise distributors, value-added resellers/aftermarket resellers, and brokers/independent distributors. U.S. producers' contract sales to OEMs followed trends similar to those for spot sales to OEMs. Report at I-92, n.130.

[93] Products 1, 2, 3, and 4 sold to OEMs, id. at I-94, Tables 56 and 57, and Products 1, 3, and 4 sold to franchise distributors, id. at I-94, Table 59.

[94] Id. at I-99.

[95] Id. at I-90 - I-91, I-99; Memorandum EC-Q-042 at 28-29.

[96] Memorandum EC-Q-042 at 29 & n.66.

[97] Memorandum EC-Q-042 at 29-32.

price was mentioned most often as one of the three primary considerations in purchasing decisions.[98] Despite the price sensitive nature of the market and the general substitutability of domestic and Korean DRAMs, pricing comparisons showed a surprising and significant degree of underselling.

In the OEM market, of 110 possible comparisons of domestic producers' and importers' prices,[99] Korean DRAMs (products 1-4) were priced below domestic product in 64 instances.[100] In the broker/independent distributor market, Korean DRAMs were priced below the domestic product in 14 of 17 possible comparisons.[101] For sales of VRAMs, Korean product undersold domestic product in the OEM market in 17 of 19 instances.[102] In the OEM market, Korean modules were priced below domestic product in 15 of 27 possible comparisons.[103]

Many DRAM suppliers offer price protection policies, particularly in the distributor market. Under these policies, producers often reduce the prices of their products after the product has been sold and shipped to the distributor, based on the distributor's inability to sell the product. The Commission obtained information concerning both the initial price charged to distributors, and the final adjusted price, for all products examined. A comparison of final adjusted U.S. prices and Korean prices during the period masks the existence of underselling, since the adjustment indicates the

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[98] Report at I-99, n.149.

[99] Because of the small sample size and consequent limited number of comparisons, we found the purchasers' price comparisons less probative in this case.

[100] Report at I-96 and Table 61.

[101] Id.

[102] Id. at n.140 and B-8, Table B-15. There were no VRAM price comparisons possible in the broker/independent distributor market.

[103] Id. at I-96, n.140, C-9, Table C-10. There were no module price comparisons possible in the broker/independent distributor market.

distributor's inability to sell the product at the original price.[104] Comparing U.S. producers' original f.o.b. prices to Korean prices, Korean DRAMs undersold the domestic product in 68 of 80 possible comparisons,[105] and Korean VRAMs undersold the domestic product in 13 of 16 possible comparisons.[106] Even comparing final adjusted U.S. prices, however, Korean modules undersold domestic product in 28 of 33 possible comparisons in the franchise distributor market.[107]

Respondents argue that Micron entered the 1 Meg and 4 Meg markets late, and at prices below the prevailing market prices, leading prices downward. Confidential information concerning the first commercial sale of each generation of DRAM by U.S. and Korean producers does not bear out this contention, either for Micron specifically, or, more importantly, for the domestic industry as a whole, which is, under the statute, our concern.[108] Moreover, Micron is only one of several significant producers in the domestic industry. Whether Micron's own pricing practices adversely affected its operations is not determinative of the question before us -- whether the

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[104] If final adjusted prices are compared, Korean DRAMs were priced below domestic product in 23 of 80 possible comparisons, Report at I-94, Tables 56-59, and Korean VRAMs were priced below domestic product in 6 of 16 possible comparisons, id. at B-8, Table B-15. However, this comparison overstates the incidence and degree of Korean overselling, since price adjustments are made on a distributor's remaining inventory, not on the entire volume of the original shipment. The calculation of final adjusted prices in the report does not take this into account. For our price comparisons to be accurate, the final adjusted price would have to reflect both the volume sold at the original price and the volume sold at the final adjusted price, which would result in a higher "adjusted" price than is reflected in our data, and different results of the price comparisons.

[105] Id. at I-94, Tables 58 and 59.

[106] Id. at B-8, Table B-15.

[107] Id. at C-9, Table C-10.

[108] Id. at I-86.

domestic industry as a whole is materially injured by reason of LTFV imports from Korea.[109]

Overall, the information in this final investigation indicates that LTFV imports from Korea, often sold at prices below the domestic product, and accounting for an increasing share of apparent U.S. consumption, have significantly depressed domestic prices and had an injurious impact on the sales and operating results of the domestic industry. Because the DRAM industry is one in which producers must be able continually to invest large sums in order to bring new generation DRAMs to market, profitability is extremely important. The poor operating results reported by the domestic industry, clearly attributable at least in part to the effects of LTFV imports from Korea, resulted in declines in capital investment and research and development expenditures, which negatively affected U.S. producers' ability to continue the rapid product development necessary in this industry. Thus, the poor operating results of this industry not only indicate that the industry is currently injured by reason of LTFV imports, but also that it is extremely vulnerable to material injury from continued LTFV imports.

For all the reasons set forth above, we determine that the domestic industry producing DRAMs is materially injured by reason of the subject imports from Korea. In addition, as discussed below, even if we had determined that LTFV imports were not currently a cause of material injury to the domestic industry, we would have found a threat of material injury by reason of those imports.

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[109] The statute requires the Commission to determine whether there is a reasonable indication of material injury to the domestic industry "as a whole" by reason of imports. 19 U.S.C. § 1677(4)(A); Copperweld Corp. v. United States, 682 F. Supp. 552, 569 (Ct. Int'l Trade 1988); Calabrian, 794 F. Supp. at 385.

IV. THREAT OF MATERIAL INJURY BY REASON OF IMPORTS

Section 771(7)(F) of the Tariff Act of 1930 directs the Commission to determine whether a U.S. industry is threatened with material injury by reason of imports "on the basis of evidence that the threat of material injury is real and that actual injury is imminent. Such a determination may not be made on the basis of mere conjecture or supposition."[110] The Court of International Trade has upheld the Commission's consideration of the present condition of the industry in assessing the issue of threat, stating that such consideration "is supported by the language of the statute and the legislative history. Such consideration, however, only establishes the background against which the Commission considers the likely effect of future imports, based on consideration of the factors set forth in the statute."[111,112]

The Commission must consider ten factors specifically set forth in the statute in a threat analysis.[113] These statutory factors primarily serve as guidelines for the Commission's analysis of the likely impact of future imports.[114] In addition, the Commission is required to consider the effect of dumping in third-country markets.[115]

As discussed above, LTFV imports from Korea have increased rapidly and significantly during the period of investigation. U.S. importers' inventories of Korean DRAMs also increased throughout the period of investigation, and

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[110] 19 U.S.C. § 1677(7)(F)(ii). See Metallverken Nederland B.V. v. United States, 744 F. Supp. 281, 287 (Ct. Int'l Trade 1990).
[111] Calabrian Corp. v. United States, 794 F. Supp 377, 388 (Ct. Int'l Trade 1992).
[112] Based on the discussion above, we find the domestic industry is extremely vulnerable to the impact of LTFV imports from Korea.
[113] 19 U.S.C. § 1677(7)(F)(i)(I)-(X). Factors (I) and (IX) are not at issue in this investigation.
[114] Calabrian, 794 F. Supp at 387.
[115] 19 U.S.C. § 1677(7)(F)(iii).

almost doubled between the interim periods.[116] Korean producers expanded their capacity to produce subject DRAMs significantly from 1989 to 1991.[117] Capacity utilization fluctuated over the period of investigation, but remained relatively high overall.[118] However, since, as in the domestic industry, other products are also produced on the same equipment and machinery,[119] Korean producers have some flexibility to expand production of DRAMs. Press reports of significant investment in DRAM facilities and research and development, as well as confidential information in the record, indicate that Korean producers will continue to have the capacity to produce significant and increased volumes of DRAMs.[120]

The nature of the DRAM industry, entailing high levels of production in order to benefit from learning economies,[121] supports the conclusion that Korean producers will have significant incentives to continue selling large volumes of DRAMs in the United States, which is one of the, if not the, largest consumers of DRAMs. In addition, as discussed above, LTFV imports of DRAMs from Korea have had a significant depressing effect on domestic producers' prices. In view of the declining price structure of the industry, continued significant volumes of LTFV imports at prices below those of the domestic product are likely to exacerbate that effect.

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[116] Report at I-65, Table 41.
[117] Id. at I-70, Table 44.
[118] Id.
[119] Id. at I-66.
[120] See Micron Pre-hearing Brief at 57, 60; Micron Post-hearing Brief at 11. Moreover, since DRAMs are produced on the same equipment by the same employees as other semiconductor products, there is a significant potential for shifting production from those other products into DRAM production should economic conditions warrant.
[121] See Transcript of Hearing at 22-23 (Mr. Kaplan), 124-125, 128 (Mr. McDonald); Report at I-132.

Exports to the United States have consistently accounted for a significant share of Korean shipments of DRAMs. Moreover, even if shipments to the United States as a percentage of Korean production do not increase, the volume of imports is likely to increase. While respondents argued that both a worldwide shortage of DRAMs and the availability of other export markets for Korean DRAMs demonstrates that Korean imports pose no threat of injury to the domestic industry, the information in the record belies that claim.[122]

In March 1993, the Council of the European Communities determined that dumped imports of DRAMs from Korea caused material injury to the EC DRAM industry, and imposed imposing antidumping duties of 24.7 percent, which represented the highest individual level of price undercutting of any Korean producer, on imports of DRAMs from Korea.[123] The Council accepted price undertakings offered by Samsung, Goldstar, and Hyundai, and deemed acceptable by the Commission of the European Communities, as meeting the objectives set forth above.[124] The antidumping determination in the European Community

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[122] The three largest markets for DRAMs, the United States, Japan, and Europe, account for approximately 80 percent of world-wide DRAM consumption. Korean producers have historically had an insignificant share of the Japanese market, and no information on the record suggests that that share is likely to increase significantly in the near future. See Micron Pre-hearing Brief at 69.

[123] Council Regulation (EEC) No. 611/93, 1993 O.J. (L 66) 1, 7. The Council noted that in establishing the level of duties imposed, it was

> appropriate to ensure that prices of the Community industry can achieve a reasonable level and that any future price depression caused by dumped Korean imports can be prevented. In order to obtain this result, the export prices of the Korean producers should be at a level where dumping is eliminated and sales at prices below the Korean producers' costs of production are prevented.

Id. at 6.

[124] Id. at 7. See Commission Decision 93/157 (EEC), 93 O.J. (L 66) 37. The undertakings generally provide that respondents will, for a period of five years, not sell DRAMs in the European Community at a price which is less than the price established pursuant to a minimum price based on each company's

(continued...)

indicates that a significant market for Korean DRAMs during the period of this investigation is likely to be less available in the near future.

Thus, there is every likelihood that LTFV imports of DRAMs from Korea would continue, and continue to adversely affect the domestic industry's sales volumes, revenues, and prices, and consequently its ability to continue to invest the sums necessary to remain viable. If we had not concluded that the domestic industry is materially injured by reason of LTFV imports from Korea, we would have determined that those imports pose a real threat of imminent material injury to the domestic industry producing DRAMs.

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[124](...continued)
lowest cost of production of DRAM devices within a given density, plus a minimum of 9.5 percent. Respondents' Post-hearing Brief at Responses to Commission and Staff Questions at 12 and Exhibit 6. The undertakings also provide that respondents will sell only DRAMs for which a minimum price has been established and cost data has been submitted to the EC Commission.

DISSENTING VIEWS OF VICE CHAIRMAN WATSON AND
COMMISSIONERS BRUNSDALE AND CRAWFORD
DRAMs of 1 Megabit and Above from the Republic of Korea
Inv. No. 731-TA-556 (Final)

On the basis of information obtained in this final investigation, we determine that an industry in the United States is not materially injured or threatened with material injury by reason of imports of dynamic random access memories (DRAMs) of one megabit and above from Korea found by the Department of Commerce to be sold at less-than-fair-value (LTFV). We begin our analysis by defining the like product and the domestic industry that produces it.

I. LIKE PRODUCT AND THE DOMESTIC INDUSTRY

This investigation raised a number of interesting like product issues, only a few of which were discussed by the parties in any detail. They may be divided into three groups: the "horizontal" (i.e., finished products that might be like the imported DRAMs), the "vertical" (i.e., unfinished products that become finished DRAMs, or downstream products that incorporate DRAMs), and the "temporal" (i.e., generations of DRAMs as yet not sold by any domestic industry in commercial quantities). We address each in turn.

The first of the "horizontal" questions is whether VRAMs and DRAMs should be one like product or two. (Both are included in the scope of investigation as defined by the Commerce Department, and so we must find a domestic product like each.) Those who buy

DRAMs and VRAMs do not view them as interchangeable, and the products do have different uses: VRAMs have two ports and are thus able simultaneously to send and receive data, which makes them particularly useful in graphics displays.[1] However, as our colleagues point out, VRAM manufacture is identical to DRAM manufacture, with the only difference being the use of different mask sets.[2] We fully agree that this is sufficient proof that VRAMs and DRAMs are one like product and not two.[3] As Micron itself noted, "The decision to produce either DRAMs or VRAMs on a fabrication line is simply a matter of deciding which mask sets to insert into the photolithography steppers, a very quick process. Any company that currently produces DRAMs can easily either design or license a VRAM."[4]

The second "horizontal" question is whether other integrated circuits, such as CMOSs, SRAMs, MCUs, EPROMs, ASICs, MPUs, consumer LSIs, etc., none of which is listed in the scope of investigation, are sufficiently like the imported DRAMs and VRAMs so as to make up one like product.[5] The petitioner argued at the hearing that switching production from DRAMs or VRAMs to another one of these

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[1] Report at I-8.

[2] Op. at 8.

[3] Micron has also developed a triple port DRAM, which allows even more flexibility in graphics applications. Rep. at I-9, n.34. To the extent that switching production from a VRAM to a triple port DRAM is easy and cheap, these triple port DRAMs would also be part of a single like product.

[4] Pet. Preh. Br. at 77; quoted in Rep. at I-9, n.35.

[5] The abbreviations are explained in Appendix A of the Staff Report.

products is difficult and costly.[6] However, the industry's questionnaire responses show that in fact U.S. producers do have the ability to use DRAM equipment in the production of these other products. Many manufacturers make these other products on the same lines using the same workers as they do in producing VRAMs and DRAMs.[7] So it makes us uncomfortable to conclude that DRAMs and VRAMs are one like product because they are made on the same lines, but that these other products are not. However, we simply do not have the data to make an injury determination for the industry that makes all these other products in addition to DRAMs and VRAMs. We therefore do not include them in the like product. (However, the ability of U.S. producers of these other products to convert to the production of the like product does influence our view of the importance of the high capacity utilization rate reported by the domestic industry.)[8]

We also agree with our colleagues' conclusions on the "vertical" like product issues this investigation raised. Unassembled and assembled DRAMs (both of which are mentioned in the scope of investigation) are one like product because there is no independent use for unassembled DRAMs, and because the same companies that fabricate unassembled DRAMs also assemble them

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[6] Pet. Posth. Br. at Exh. A, 7-9.

[7] Report at I-27, I-30. See also Micron Questionnaire Resp., quoted in EC-Q-042 at 26 n.59.

[8] See 50, infra.

(although often not at the same location)[9]. The makers of unassembled and assembled DRAMs have the same economic interest. As we did in the preliminary investigation,[10] we therefore conclude that unassembled and assembled DRAMs are one like product.

Memory modules of various configurations are also included in the scope of investigation, so we must decide whether they should be treated as the same like product as DRAMs. As with the non-DRAM integrated circuits, the record on memory modules is thin. There is evidence on the record that the worldwide module market is split 70-30 between firms that make modules from DRAMs they themselves produce and firms that make modules from DRAMs that they buy.[11] It is only logical to think that producers of modules who do not themselves make DRAMs would like nothing better than to have a large supply of cheap DRAMs, and so there might not be that identity of economic interest that is shared by makers of assembled and unassembled DRAM manufacturers. Moreover, there are uses for DRAMs other than incorporation into modules.[12] However, our efforts to get data from nonintegrated manufacturers were not very successful.[13] Under 19 U.S.C. § 1677(4)(D), then, we must examine "the production of the narrowest group or range of products, which includes a like product, for which the necessary information can

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[9] Report at I-16, Table 1.

[10] DRAMs Preliminary at 6.

[11] Report at I-17 and C-3, n.2.

[12] Report at I-8.

[13] Report at C-3.

be provided." Even if modules were a distinct like product, this absence of meaningful data would still force us to treat them as part of the same like product as DRAMs and VRAMs; and so we will.

In the preliminary determination, the Commission concluded that it was not necessary to determine whether all future generations of DRAMs are specifically included in or excluded from the like product.[14] We believe it is necessary to address the issue in this final investigation.

The parties have addressed at great length whether to include future generations of DRAMs (i.e., those of more than 16 Meg density) in the like product. Much of the debate, particularly the debate regarding anticircumvention, seeks to frame the question as a novel issue. In fact, the debate regarding anticircumvention is irrelevant to our like product determination. Commerce specifically included future generations of Korean DRAMs in the scope of investigation,[15] and so they will be included within the scope of the antidumping order Commerce will issue after receiving the Commission's final affirmative determination. The anticircumvention provisions of the statute apply only to products that are not covered by the antidumping order.[16] Future Korean DRAMs are covered and so, if and when they are imported, antidumping duties will be collected on them.

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[14] DRAMs Preliminary at 9.

[15] See Memorandum for Joseph Spetrini, Acting Assistant Secretary for Import Administration, concerning the Scope of the Investigation (undated) at 1-5.

[16] 19 U.S.C. § 1677j(d).

In sum, the anticircumvention provisions relating to later-developed merchandise apply only if Commerce proposes to include future imports of Korean products other than DRAMs in the scope of order. Accordingly, the anticircumvention provisions are not relevant to the analysis of whether or not to include future generations of domestic DRAMs in the like product.

We must, however, still decide what domestic product is like or most similar to future generations of Korean DRAMs. By definition, no future generations of Korean DRAMs exist. Notwithstanding petitioner's and respondents' assertions, there is virtually no factual information about them the Commission can use to identify a domestic product that is "like" future generations of Korean DRAMs. The most we can say is that they will be DRAMs of greater density.

Similarly, by definition, no production of future generations of domestic DRAMs exists. As a result, the domestic product "most similar to" future generations of Korean DRAMs are all DRAMs regardless of density.

In conclusion, we find one like product, consisting of all DRAMs and VRAMs, assembled or unassembled, packaged in memory modules or not.

The definition of the domestic industry follows from the definition of the like product. As the Court of International Trade has concluded, under the statute's definition of domestic industry "the like product determination is the industry

determination."[17] We thus always include captive production, toll production, or production for sale in the definition of domestic industry.[18] Similarly, as the entire Commission did in the preliminary investigation, we include both wafer fabricators and assemblers in the domestic industry: Both functions add significant value, and are necessary, to the production of a finished DRAM.[19] Finally, as we ourselves did in the preliminary investigation, we include those companies that buy DRAMs for incorporation into memory modules in the domestic industry: What little information we have suggests that the value added by their operations is not trivial[20] and, of course, their activities are just as necessary to the production of a finished memory module as the activities of integrated producers.

II. NO MATERIAL INJURY BY REASON OF LTFV IMPORTS

The Commission is required to make a final determination of whether an industry in the United States is materially injured or threatened with material injury by reason of LTFV imports.[21] In making our determination, the Act provides that the Commission shall consider:

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[17] Asociacion Colombiana de Exportadores de Flores v. U.S., 693 F.Supp.1165, 1169 (CIT 1988).

[18] See DRAMs Preliminary at 10-11 (and cases cited therein).

[19] See DRAMs Preliminary at 11-12.

[20] Report at C-6.

[21] 19 U.S.C. § 1673d(b).

(I) the volume of imports of the merchandise which is the subject of the investigation,

(II) the effect of imports of that merchandise on prices in the United States for like products, and

(III) the impact of imports of such merchandise on domestic producers of like products, but only in the context of production operations within the United States.[22]

The Act also requires the Commission to consider all relevant economic factors that have a bearing on the state of the industry and to consider these factors within the context of the business cycle and conditions of competition distinctive to the affected industry.[23]

A. Background

The market for DRAMs is driven by demand for a variety of products that require high-density random-access memory, such as computers, office automation equipment, telecommunications equipment, and consumer electronics. Demand for memory increased during the period of investigation. The majority of DRAMs, 70-80 percent, are used in personal computers. As processing speed and computing power have increased with successive generations of microprocessors (Intel's 486 family is the current industry standard, with the next-generation Pentium to be produced in commercial quantities by the middle of 1993), the demand for memory

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[22] 19 U.S.C. § 1677(7)(B). The statute also indicates that the presence or absence of any factor pertaining to volume, price effects, or impact "shall not necessarily give decisive guidance" to the Commission's determination. See 19 U.S.C. § 1677(7)(E)(ii).

[23] See 19 U.S.C. § 1677(7)(C).

has increased accordingly. Greater computing power has increased the demand for DRAMs while declining prices for personal computers have pushed PC makers to get lower prices for DRAMs (an important but by no means the most expensive input into PCs).[24]

The DRAM industry follows a fairly predictable product life cycle that generally lasts several years.[25] As each new DRAM generation is introduced to the market, selling prices and costs tend to be high. However, as the product moves into the growth phase of the cycle, production costs tend to fall because most producers are moving along a learning curve and are able to reduce the number of defects and increase yields. (Yield is the percentage of "dice" that work from a given silicon wafer of 5, 6 or 8 inches in diameter). It should be noted that not all learning curves have equal slope -- they will vary by firm; some learn faster, some slower. As costs decline, prices fall and sales volume increases. Moreover, when a new generation DRAM enters the market, competition between them pushes prices even lower.[26]

Suppliers that are first to enter the market (with a particular generation or density of DRAM) benefit from being able to capture part of the market when there is little competition; this often allows a supplier to charge a higher price and recoup some of its investment before prices begin to drop as part of the normal product life cycle. Late entrants to the market for a

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[24] Report at I-84.

[25] Report at I-84 and Figure 2 on page I-85.

[26] Report at I-84.

particular generation of DRAM face lower prices from the start. Purchasers are, after all, buying memory capability (expressed in bits). As the next generation of memory chip (DRAM) comes on line it offers a four fold increase in memory capability (hence the progression 16K, 64K, 256K, 1 Meg, 4 Meg, 16 Meg, etc.) usually for a price that is not much more than the older generation DRAM it is soon to replace.

The U.S. industry includes a number of firms that produce for captive consumption. During the period of investigation, between 56% and 64% of U.S. production was captively consumed.[27] As a result, subject imports do not compete directly with a significant proportion of U.S. production. In addition, the existence of this captive production makes an analysis of the industry's performance indicators, particularly financial data, difficult because sales of captive production, while valued at estimated market prices, are not subject to the same rigors of competition in the marketplace.

B. Volume

In determining whether there is material injury by reason of LTFV imports, the statute directs the Commission to consider "whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States, is significant."[28]

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[27] Report at I-55, Table 33.

[28] 19 U.S.C. § 1677(7)(C)(i)

The market share of the domestic industry decreased from 44.5 percent in 1989 to 36.9 percent in 1991. At the same time, the market share of subject imports increased from 14.2 percent in 1989 to 24.8 percent in 1991. However, these figures are not complete and may overstate the actual market share of subject imports. Questionnaires were sent to some 150 firms identified as possible importers of DRAMs. Sixty-nine firms said they did not import DRAMs, and 56 firms did not respond. Usable import data were received from only 26 firms. Seventeen of these reported imports of Korean DRAMs, and 18 reported imports of DRAMs from other countries.

We believe our data reflect more than 95 percent of U.S. imports from Korea, but only 60 percent of U.S. imports from other countries. Thus, market share figures for Korean DRAMs must be viewed with caution. Commission staff believe the market share figures for Korea are a close approximation to reality because they believe official import statistics for DRAMs are overstated. These statistics, they note, include products that are outside the scope of this investigation, and may also incorrectly report the transshipments of Korean product to the United States through other countries.[29] In any case, there is some portion of the import market about which we don't have reliable data. Therefore a Korean "market share" of 25 percent, with knowledge of only 60 percent of the true market, could in reality be 15 percent if 100 percent of the market were accounted for.

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[29] Report at I-17, 18 and fn. 60.

While the apparent market share of subject imports is relatively large, its significance is further tempered by the presence of other fairly traded imports, which held an apparent market share of approximately 40 percent throughout the period of investigation. In addition, the percentage of U.S. production that is exported increased substantially to approximately 20 percent.[30]

It is clear that the larger the volume of imports, the larger the effect they will have on the domestic industry. The determination of whether the volume of imports or their increase is significant, however, cannot be made in a vacuum.[31] We must consider other factors, such as the nature of the market and the level of substitutability between domestic and Korean DRAMs, as discussed below.

C. Price Effects

In evaluating the effect of LTFV imports on prices, the Commission considers whether there has been significant price underselling of imports and whether the imports depress prices to a significant degree or prevent price increases that otherwise would have occurred, to a significant degree.[32]

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[30] Report at E-7, Table E-3.

[31] See H.R. Rep. No. 319, 96th Cong., 1st Sess. 46 (1979) ("For one industry, an apparently small volume of imports may have a significant impact on the market; for another the same volume may not be significant."); S. Rep. No. 249, 96th Cong., 1st Sess. 88 (1979); H.R. Doc. No. 153, Part II, 96th Cong., 1st Sess. 434 (1979).

[32] 19 U.S.C. § 1677(7)(C)(ii).

A number of factors are relevant to the determination as to price suppression, including the volume and market share of subject imports, the degree of substitutability between domestic DRAMs and the subject imports, and the availability of fairly traded imports and substitute products.

The more substitutable the products, the more likely that potential purchasers will make their purchasing decisions based on price differences between the products. Conversely, the more differentiated the products, the less substitutable they will be, and the less likely that price will be a determining factor in purchasing decisions. In addition to physical differences, differences in quality, reliability, and price can affect the substitutability of competing products.

Petitioner asserts that DRAMs are "commodity" products, and that domestic DRAMs and subject imports are close substitutes. Record evidence from purchasers indicates that there are no significant quality differences between domestic DRAMs and subject imports.[33] However, while price is an important factor in purchasers' decisions, other non-price factors are also important.

DRAM purchasers can be divided into three main classes. Tier one customers are the premium customers, usually large Original Equipment Manufacturer (OEMs), with high standards for quality. They often have long qualification processes, but suppliers are able to obtain a premium price. Tier two buyers, which include smaller OEMs, are somewhat less demanding and have shorter

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[33] Report at I-90 - I-91.

qualification processes. Tier three is the spot market which has few, if any, qualification procedures and lower prices.[34]

The record indicates that Korean suppliers were superior with regard to availability, delivery time and reliability of supply. In addition, the existence of the large percentage of captive consumption is a non-price factor that limits the substitutability between domestic DRAMs and subject imports. Finally, purchasers reported paying higher prices for domestic DRAMs even though comparable Korean DRAMs were available at a lower price, and vice versa, demonstrating that non-price factors are important considerations in purchasing decisions. Based on these non-price factors, we conclude that DRAMs are not a commodity product, and that domestic DRAMs are moderately substitutable with both subject and nonsubject imports.[35]

The fact that prices for domestic DRAMs decreased during the period of investigation tells us nothing about whether the subject imports caused price depression or suppression. As discussed above, DRAM prices decline as more firms progress along a learning curve, and so in the later stages of the product life cycle, as more firms move down the curve, DRAM prices will fall regardless of unfair trade practices. Later entrants will receive lower prices. These market forces, combined with the other factors discussed in this opinion, lead us to conclude that the price

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[34] Report at I-86 - I-87.

[35] Even if we accepted Petitioner's assertion that DRAMs are commodity products, our determination would not change.

depression or suppression, if any, caused by subject imports is not significant.

Although the underselling/overselling comparisons are almost evenly split, we do not place much weight on evidence of underselling. As discussed above, the confluence of demand for memory and the point in the product life cycle largely explain the price of DRAMs at any particular point in time. As a result of these market forces, price comparisons are only meaningful if they are contemporaneous, i.e. at the same point in the DRAM product life cycle. In this investigation, the price comparisons between domestic DRAMs and subject imports are not contemporaneous. Accordingly, the price comparisons do not constitute substantial evidence that any underselling is significant.

Although we do not place much weight on reported lost sales, we note that staff was unable to confirm the vast majority of lost sales and lost revenue allegations it investigated.[36]

D. Impact on the Affected Domestic Industry

In assessing the impact of LTFV imports on the domestic industry, we consider, among other relevant factors, U.S. consumption, production, shipments, capacity utilization, employment, wages, financial performance, capital investment, and research and development expenses.[37] We have carefully considered these criteria, and do not find a sufficient impact of LTFV imports

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[36] See Report at I-100 to I-104.

[37] See 19 U.S.C. § 1677(7)(C)(iii).

on the industry to warrant an affirmative determination.

Although the market share of subject imports is relatively large, the weighted average dumping margin of 3.89 percent is quite low.[38] The domestic industry is operating at a high level of capacity utilization. As a result, the domestic industry might not have been able to increase significantly its production of DRAMs if fairly traded Korean imports would have increased the quantity demanded of the domestic product. However, because the domestic industry exports approximately 20 percent of its production, it may have been able to increase its U.S. sales of DRAMs by switching from export markets to the U.S. market if fairly traded Korean imports would have allowed the domestic industry to increase its prices in the U.S. market. There is also some evidence that domestic DRAM producers might well be able easily to shift production from other types of integrated circuits to DRAMs.[39]

In addition, as noted above, DRAMs are moderately substitutable. Purchasers continue to buy domestic DRAMs even though comparable Korean DRAMs are available in the market at a lower price, and vice versa. As a result, it is likely that many purchasers would still buy Korean imports if they had been sold at fairly traded prices, or would switch from fairly traded Korean imports to other, nonsubject imports. While some additional

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[38] In this case, Vice Chairman Watson's analysis of the statutory criteria provided compelling reasons for his injury determination. Accordingly, the dumping margin was not a significant factor in his analysis. See, Minivans From Japan, p. 29, note 114.

[39] Report at I-27 and I-30.

customers may have purchased domestic DRAMs, it is not likely that this increase in demand for domestic products would have led to increased total sales for domestic producers or increased prices such that we would conclude that the domestic industry is materially injured by reason of LTFV imports. We conclude, therefore, that the domestic industry is not materially injured by reason of the LTFV DRAMs from Korea.

III. NO THREAT OF MATERIAL INJURY BY REASON OF LTFV IMPORTS

We further determine that there is no threat of material injury by reason of LTFV DRAM imports from Korea. Under the statute, the Commission is required to consider various criteria.[40]

Our application of the statutory threat criteria supports our negative determination. The statute provides that a threat determination "shall be made on the basis of evidence that the threat of material injury is real and that actual injury is imminent," and that our decision "may not be made on the basis of mere conjecture or supposition."[41] In addition, the evidence must show more than a "mere possibility" that injury might occur.[42]

This investigation does not involve subsidies, agricultural products or any potential for product shifting due to other findings or orders under the U.S. antidumping or countervailing duty laws. Thus, those factors are not pertinent to this

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[40] See U.S.C. 19 § 1677(7)(F).

[41] See 19 U.S.C. § 1677(7)(F)(ii).

[42] Alberta Gas Chemicals, Inc. v United States, 515 F. Supp. 780 (1981).

investigation.

Although productive capacity in Korea increased in absolute terms, capacity utilization was high during the period of investigation, and is projected to remain high in the immediate future. As a percentage of total shipments, Korean exports to the United States declined consistently during the period of investigation, and are projected to decline further in 1993, to less than one-third the level in 1989. At the same time, Korean exports to markets other than the United States and sales in the home market have both increased as a percentage of total shipments, and each accounts for a larger percentage of total shipments than exports to the United States.[43] Accordingly, we conclude that Korean capacity and capacity utilization data do not constitute evidence that any threat of material injury is real.

Although the market share of subject imports increased during the period of investigation, we do not find it likely that market penetration will increase to an injurious level. As previously discussed, the relatively large market share of subject imports is tempered by the substantial presence of nonsubject imports and the degree of substitutability between domestic DRAMs and subject imports. Because there is no evidence that either of these facts will change in the future, we conclude that the likelihood that market penetration will increase to an injurious level is small, and therefore, actual injury is not imminent.

Similarly, there is no evidence that the DRAM learning curve,

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[43] Report at I-71, Table 45.

the product life cycle or the degree of substitutability between domestic DRAMs and subject imports will change in the future. In addition, because the dumping margin is low,[44] LTFV imports are unlikely to cause price depression or suppression in the future. Accordingly, we conclude that the probability is small that LTFV imports will have a sufficient price depressing or suppressing effect on domestic prices to justify a finding that actual injury is imminent.

U.S. importers' inventories increased in absolute terms during the period of investigation. As a percentage of total shipments, however, these inventories declined consistently during the period of investigation, from 24.9 percent in 1989 to 10.7 percent in 1991.[45] As a result, we find that the increase in inventories in the United States was not substantial.

We have considered the assertions by domestic producers of the actual and potential negative effects on the existing development and production efforts of the domestic industry. In light of the product life cycle, producers' learning curves and the low dumping margin,[46] we do not consider these assertions to constitute sufficient evidence that actual injury is imminent.

We find no evidence of any other demonstrable adverse trends that indicate the probability that subject imports will be the cause of actual injury.

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[44] See n.38, supra.

[45] Report at I-65, Table 41.

[46] See n.38, supra.

Finally, we have considered the price undertaking affecting Korean DRAM exports to the European Community (EC). Effective March 18, 1993, the EC Commission and the Korean DRAM producers agreed to set minimum floor prices for their exports to the EC for five years. These prices are intended to reflect the producers' quarterly costs of DRAM production plus 9.5 percent profit. The respondents assert that this will have no effect on the volume of their exports to the EC. Inasmuch as this does not restrict directly the volume of these exports or increase the respondents' costs (as a duty would), it would be sheer conjecture to conclude that the respondents will shift their exports to the United States.

Based on our evaluation of the relevant statutory criteria, we conclude that the record does not contain substantial evidence that any threat of material injury is real or that actual injury is imminent. Accordingly, we determine that the domestic industry is not threatened with material injury by reason of LTFV imports of DRAMs from Korea.

INFORMATION OBTAINED IN THE INVESTIGATION

INTRODUCTION

Following a preliminary determination by the U.S. Department of Commerce (Commerce) that imports of dynamic random access memories (DRAMs) of 1 megabit (Meg)[1] and above from the Republic of Korea (Korea)[2] are being, or are likely

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[1] 1 Meg equals 1,048,576 bits. A bit (binary digit) is a single character of a language having just two characters, as either of the binary digits "0" or "1." It represents a unit of information storage capacity, as of computer memory.

[2] The scope of Commerce's investigation is as follows:

> The products covered by this investigation are dynamic random access memory semiconductors (DRAMs) of one megabit and above from the Republic of Korea. For purposes of this investigation, DRAMs are all one megabit and above dynamic random access memory semiconductors, whether assembled or unassembled. Assembled DRAMs include all package types. Unassembled DRAMs include processed wafers, uncut die, and cut die. Processed wafers produced in Korea but packaged, or assembled into memory modules, in a third country are included in the scope; however, wafers produced in a third country and assembled or packaged in Korea are not included in the scope.
>
> The scope of this investigation includes memory modules. A memory module is a collection of DRAMs the sole function of which is memory. Modules include single in-line processing modules (SIPs), single in-line memory modules (SIMMs), or other collections of DRAMs whether unmounted or mounted on a circuit board. Modules that contain other parts that are needed to support the function of memory are covered. Only those modules which contain additional items which alter the function of the module to something other than memory, such as video graphics adapter (VGA) boards and cards, are not included in the scope.
>
> The scope of this investigation also includes video random access memory (VRAMs), as well as any future packaging and assembling of DRAMs.
>
> The scope of this investigation also includes removable memory modules placed on motherboards, with or without a CPU, unless the importer of motherboards certifies with the Customs Service that neither it, nor a party related to it or under contract to it, will remove the modules from the motherboards after importation.
>
> The scope of this investigation does not include DRAMs or memory modules that are reimported for repair or replacement. (58 F.R. 15467)

The subject products are currently covered by statistical reporting numbers 8473.30.4000, 8542.11.0001, 8542.11.0024, 8542.11.0026, and 8542.11.0034 of the Harmonized Tariff Schedule of the United States (HTS) Annotated for statistical reporting purposes. Prior to 1991, the subject products were covered by statistical reporting numbers 8473.30.4000, 8542.11.0035, and 8542.11.0002 of the HTS Annotated.

to be, sold in the United States at less than fair value (LTFV),[3] the U.S. International Trade Commission (Commission), effective October 29, 1992, instituted investigation No. 731-TA-556 (Final) under section 735(b) of the Tariff Act of 1930 (the act).[4] This investigation was instituted to determine whether an industry in the United States is materially injured or threatened with material injury, or the establishment of an industry in the United States is materially retarded, by reason of imports of such merchandise. Notice of the institution of the Commission's investigation and of a public hearing held in connection therewith was posted in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and published in the Federal Register.[5] The Commission's hearing was held at the U.S. International Trade Commission Building in Washington, DC, on March 18, 1993.

In its final determination,[6] Commerce found that imports of DRAMs of 1 Meg and above from Korea are being, or are likely to be, sold in the United States at LTFV. The applicable statute directs the Commission to make its final injury determination within 120 days after notification of Commerce's preliminary determination or within 45 days after notification of Commerce's final determination, whichever is later.[7] The Commission is scheduled to make its final injury determination in this investigation by May 3, 1993.

A list of participants in the Commission's hearing and copies of Commerce's and the Commission's Federal Register notices are presented in appendix A. A glossary of certain industry terms is also presented in appendix A.

BACKGROUND

This investigation results from a petition filed with the Commission and Commerce by counsel on behalf of Micron Technology, Inc. (Micron), Boise, ID, on April 22, 1992, alleging that an industry in the United States is materially injured or threatened with material injury by reason of LTFV imports of DRAMs of 1 Meg and above from Korea. In response to that petition the Commission instituted investigation No. 731-TA-556 (Preliminary) under section 733 of the act[8] and, on June 8, 1992, determined that there was a reasonable indication of such material injury.

PREVIOUS AND RELATED COMMISSION INVESTIGATIONS

The Commission has conducted two previous antidumping investigations concerning DRAMs. The first investigation,[9] based on a petition filed by Micron on June 24, 1985, covered imports from Japan of assembled 64 kilobit

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[3] 57 F.R. 49066, Oct. 29, 1992.
[4] 19 U.S.C. § 1673d(b).
[5] 57 F.R. 53777, Nov. 12, 1992.
[6] 58 F.R. 15467, Mar. 23, 1993.
[7] 19 U.S.C. § 1673d(b)(2).
[8] 19 U.S.C. § 1673b(a).
[9] U.S. International Trade Commission, 64K Dynamic Random Access Memory Components From Japan (inv. No. 731-TA-270), USITC Pub. 1862, June 1986.

(K)[10] DRAMs of the N-channel metal oxide semiconductor (NMOS) type and resulted in an affirmative final determination by the Commission. The second investigation,[11] self-initiated by Commerce on December 11, 1985, covered imports from Japan of 256K and above DRAMs of both the NMOS and the complementary metal oxide semiconductor (CMOS) type,[12] whether in the form of processed wafers, unmounted dice, mounted dice, or assembled devices. The investigation was suspended following an agreement entered into by Commerce with the respondents on August 1, 1986. The agreement called for Japanese producers/exporters to revise their U.S. prices to eliminate sales of DRAMs of 256K and above at LTFV.[13]

On March 10, 1986, the Commission instituted an investigation of unfair trade practices[14] concerning the importation into (or sale in) the United States of certain DRAMs, components thereof, and products containing the same, by reason of alleged direct, contributory, and induced infringement of certain claims of 10 U.S. patents, the effect or tendency of which is to destroy or substantially injure an industry that is efficiently and economically operated in the United States. The complaint, filed by Texas Instruments, Inc. (TI), named as respondents Japanese and Korean manufacturers and Japanese, Korean, and U.S. importers of DRAMs. The Commission found a violation of section 337, and a limited exclusion order was issued in September 1987. Following the President's disapproval of the limited exclusion order, the Commission issued a modified limited exclusion order in December 1987, which remains in effect. Complainant TI appealed from the portion of the Commission's determination finding no violation of section 337 with respect to one patent. On appeal, the Court of Appeals for the Federal Circuit reversed and remanded. Following remand proceedings, the Commission found a violation of section 337, and issued a second limited exclusion order in February 1990.

On May 3, 1990, the Commission instituted an investigation of unfair trade practices[15] concerning the importation into (or sale in) the United States of certain DRAMs, static random access memories (SRAMs), components thereof, and products containing the same, by reason of alleged infringement of certain claims of eight U.S. patents. The complaint, filed by SGS-Thompson Microelectronics, Inc., named a Korean manufacturer and its U.S. subsidiary as respondents. On August 29, 1990, the Commission terminated the investigation on the basis of a settlement agreement.

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[10] 1 K equals 1,024 bits.

[11] U.S. International Trade Commission, Dynamic Random Access Memory Semiconductors of 256 Kilobits and Above From Japan (inv. No. 731-TA-300).

[12] It appears that in recent years the markets have moved toward CMOS DRAMs, while NMOS DRAMs increasingly have become part of a somewhat obsolete process technology.

[13] The agreement also addressed pricing of erasable programmable read only memories (EPROMs), which were the subject of an ongoing antidumping investigation, and various other issues, including market access in Japan.

[14] Inv. No. 337-TA-242.

[15] Inv. No. 337-TA-312.

On December 11, 1992, the Commission instituted an investigation[16] to determine whether there is a violation of subsection (a)(1)(B) of section 337 of the act[17] in the importation and sale of certain anisotropically etched 1 Meg and greater DRAMs, components thereof, and products containing such DRAMs, alleged to be manufactured abroad by a process covered by a patent held by Micron.[18] Micron filed the complaint with the Commission on November 13, 1992,[19] alleging that Hyundai Electronics America, Inc.; Hyundai Electronics Industries Co., Ltd. (Hyundai); Goldstar Electron America, Inc.; and Goldstar Electron Co., Ltd. (Goldstar) are importing and selling DRAMs of 1 Meg and above that were produced by a process that infringes Micron's patent.[20] On March 25, 1993, the Commission determined not to review an initial determination designating the investigation "more complicated," thereby extending the deadline for completion of the investigation by 6 months, until June 20, 1994.[21]

THE PRODUCT

Description and Uses

A 1 Meg DRAM is a monolithic integrated circuit (IC) with 1,048,576 storage cells (bits), each of which contains a miniature transistor and capacitor. The 1 Meg DRAM is one of a series of DRAMs produced with increasing densities since the 1K DRAM was first introduced in 1970. Following the introduction of 4K and 16K DRAMs during the 1970s and 64K and 256K DRAMs during the early 1980s, the 1 Meg DRAM was first offered for sale in limited quantities in 1985. In 1989, DRAMs with a density of 4 Megs (4,194,304 bits) began to be commercialized, and by 1991, limited amounts of 16 Meg (16,777,216 bits) DRAMs reached the marketplace, with commercial quantities sold in 1992.

The 64 Meg (67,108,864 bits) DRAM device, still reportedly in its development stage, is currently being researched in laboratories and pilot lines for eventual production and commercialization forecast for 1994.[22] Media reports also indicate that several Japanese-owned firms (all of which maintain DRAM production facilities in the United States) have developed 256 Meg DRAM prototypes. It is reported that by adapting existing technology,

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[16] Inv. No. 337-TA-345.

[17] 19 U.S.C. § 1337.

[18] 57 F.R. 60246, Dec. 18, 1992.

[19] A supplement to the complaint was filed on Dec. 3, 1992.

[20] Hyundai and Goldstar are Korean producers of DRAMs and respondents in this antidumping investigation. A third Korean DRAM producer, Samsung Semiconductor, Inc. (Samsung), was not named in the patent infringement complaint because the firm reportedly has a cross-licensing agreement with Micron. "DRAM Suits Mounting," Electronic Buyers' News, Nov. 23, 1992.

[21] 58 F.R. 18810, Apr. 7, 1993.

[22] On Mar. 24, 1993, NEC announced that it would begin sample shipments of 64 Meg DRAMs by April 1993. The firm noted that volume production is scheduled to begin in late 1994 at one of its Japanese plants, with an initial monthly production of 10,000 units. U.S. Department of State telegram, Mar. 29, 1993, Fukuoka, message reference No. 0065.

DRAM producers can begin manufacturing 256 Meg DRAMs by 1996. In addition, at least one Japanese-owned firm has reportedly developed a manufacturing technique that could be used to produce 1 Gigabit (Gig) DRAMs.[23] Despite the apparent rush to develop future generations of DRAMs, doubts have been raised concerning the difficulty of manufacturing the 1 Gig DRAM. Press reports indicated that "It is one thing to produce a prototype, it is another to manufacture 1 Gig chips in bulk with an acceptably low throwout rate."[24] Furthermore, one source concluded that "the 256 Meg DRAM may represent the technological limit for mass manufacture given known technology."[25]

In each DRAM cell, information is stored as an electrical charge (voltage) impressed on the capacitor, which is connected to one of the transistor elements. Storage requires two different levels of energy--one to represent the binary digit "0" and another to represent the binary digit "1." The storage cells in the DRAMs are arranged in a rectangular matrix of columns and rows, thus allowing each cell to be accessed independently (random access). When a column or row is selected and activated, the cell transistor acts as a solid-state switch that connects the capacitor to the column or data line. The simultaneous selection of a row and column determines the specific cell address. The speed at which the cell can be addressed is called access time and is expressed in nanoseconds (ns), or one-billionths of a second. DRAMs sold in the U.S. market are largely designed with access times ranging from 60ns to 100ns.

The information stored on cell capacitors must be regenerated after each address (read sequence), since the charge is attenuated by the sharing of the cell capacitance with the capacitance of the data line. The charge is also attenuated by leakage across the cell capacitor plates. Because of the leakage, the energy on the cell capacitors is constantly sampled and maintained at a predetermined charge level by "threshold" amplifiers. A threshold amplifier is required to maintain the charge level on the cell capacitors connected to each data line. The required regeneration of the charge on cell capacitors makes the device "dynamic."[26]

Other items included in the scope of Commerce's investigation are VRAMs of 1 Meg and above and DRAM memory modules containing DRAMs of 1 Meg and

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[23] 1 Gig equals 1,073,741,824 bits.

[24] U.S. Department of State telegram, Mar. 3, 1993, Tokyo, message reference No. 03411.

[25] Ibid.

[26] SRAMs, other random access memory devices not included in the scope of Commerce's investigation, do not require refresh charges, but are more costly to produce because tight cell densities are more difficult to achieve. Due primarily to the complexity of the SRAM cell structure, the development typically lags that of DRAMs by a generation. EPROMs, other semiconductor memory devices that are not included in the scope of Commerce's investigation, also store data permanently and do not require refresh charges. Further, EPROMs contain "read only" memories (see discussion in the glossary) while DRAMs contain "read/write" memories and thus, are not interchangeable in use.

above.[27] VRAMs, i.e., dualport DRAMs, are DRAMs that contain two data ports used to simultaneously send and receive data. A DRAM memory module is a packaging arrangement consisting of a printed circuit board containing two or more DRAMs.[28] The most common types of DRAM memory modules are SIPs, SIMMs, memory cards, and memory boards.

DRAMs and DRAM memory modules imported into the United States are essentially interchangeable with those produced by U.S. firms. The devices are dual in-line packages (a single DRAM) or memory modules (containing multiple DRAMs) that are lead-to-lead compatible; lead spacings and encapsulation are standard.[29] DRAMs and memory modules that contain these devices are used in a variety of products that require the storage of dynamic random access memory, such as computers, computer accessories, office automation equipment, automated data processing equipment, telecommunications equipment, and consumer electronic products. The largest of the DRAM end uses is for main memory in computers.[30] DRAM memory modules are primarily used to expand storage capacity and provide more versatility than dual in-line packages.[31] VRAMs are used primarily in video graphics display applications.

Manufacturing Process

The production of DRAMs is generally divided into four separate operations: wafer fabrication, wafer probe,[32] assembly, and testing. DRAMs are produced in large numbers on a single silicon wafer; each of the uncased DRAMs is called a chip or a die. The production of the chips on the silicon wafer, called wafer fabrication, is relatively the most technologically demanding and costly of the operations. The process needed to produce the chips on the silicon wafer includes repeated photolithographic steps, using a mask set to form the circuitry design, and the controlled introduction of impurity atoms (dopants) into the silicon crystal. The introduction of the dopants into the silicon wafer forms conductive regions on the wafer by changing the electrical characteristics in selected areas. Metal connections between selected areas of each die are formed and a final protective coating

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[27] Also included in the scope of Commerce's investigation are unassembled DRAMs of 1 Meg and above, including processed wafers, uncut dice, and cut dice. In its final determination, Commerce added to the scope of its investigation removable memory modules placed on motherboards, unless the importer certifies it will not remove the modules from the motherboards after importation.

[28] DRAM memory modules may also contain other parts. If those other parts change the function of the module to something other than memory, such as VGA boards and cards, they are excluded from the scope of Commerce's investigation.

[29] International Business Machines Corp. (IBM), a captive producer of DRAMs, indicated ***.

[30] Petitioner indicated that 70 to 80 percent of DRAMs are used in personal computers. Transcript of the hearing, p. 46.

[31] Petitioner indicated that personal computers, which previously used primarily dual in-line DRAM packages, currently use almost exclusively DRAM memory modules. Petitioner's posthearing brief, app. A, p. 11.

[32] Also known as wafer sorting.

is then deposited on the wafer. It is during wafer fabrication that the essential technical characteristics of the finished DRAM are developed. Following wafer fabrication, each die on the wafer is electrically tested and defective dice are marked. This stage, known as wafer probe, is generally conducted where wafer fabrication is performed. The wafers are then cut into dice and the good dice are usually wire bonded or otherwise connected to lead frames and encapsulated. The process of wire bonding and encapsulation/final sealing (or installation into a plastic or ceramic case)[33] is called assembly. After assembly, the cased DRAMs are marked for identification purposes and tested to ensure quality and reliability.

According to industry sources, the manufacturing process for VRAMs is identical to that for DRAMs. The dual port circuitry design of the VRAM (as opposed to the single port circuitry design of other DRAMs)[34] is created by using a different mask set during the photolithographic process at the DRAM wafer fabrication stage.[35]

DRAM memory modules are usually constructed by soldering or otherwise attaching assembled DRAMs to a printed circuit board or other substrate. Following assembly, the modules are cleaned and tested. In the United States, DRAM memory modules are produced by DRAM producers, by those who purchase DRAMs from domestic or foreign suppliers, and by those who produce modules for others under a toll agreement. Evidence on the record in this investigation suggests that there are a large number of small module assemblers that assemble memory modules from purchased DRAMs or on a toll basis and that there is very little value added by these assemblers.[36] In addition, module assembly, a relatively simple process, reportedly requires little technical expertise[37] and relatively small amounts of capital to operate.[38]

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[33] Ceramic packaging, often required by military customers, can provide greater protection from mechanical shock and the external environment than plastic packaging.

[34] In 1992, Micron expanded its product line to include another "derivative" DRAM product, the "triple port DRAM." This DRAM contains three access ports, allowing faster graphics applications with more flexibility.

[35] "The decision to produce either DRAMs or VRAMs on a fabrication line is simply a matter of deciding which mask sets to insert into the photolithography steppers, a very quick process. Any company that currently produces DRAMs can easily either design or license a VRAM." Petitioner's prehearing brief, p. 77.

[36] According to Micron, "the standard cost in today's market of the material, labor and overhead for a SIMM module, not including the cost of the DRAMs themselves, is $2 or less." Petitioner's prehearing brief, pp. 11-12. The petitioner adds that the DRAMs contained in a module account for at least 90 percent of the cost of the module. Petitioner's posthearing brief, app. A., p. A.11.

[37] The petitioner indicates that "the relative ease of module assembly" is shown by comparing the relatively low yield loss experienced during module assembly and the relatively high yield loss experienced during DRAM production. Petitioner's prehearing brief, p. 12. For further information concerning the U.S. producers' yield losses, see the section of this report entitled "Financial Experience of U.S. Producers."

[38] Transcript of the hearing, pp. 86, 101, 179-180.

U.S. Tariff Treatment

The U.S. Customs Service (Customs) has determined that, for tariff and marking purposes, the country of origin of imported DRAMs is the location of assembly rather than the location of wafer fabrication.[39] Under Customs regulations in the European Community (EC) and Japan, in contrast, the country of origin is determined by the location of the wafer fabrication.

Imports of DRAMs are classified in HTS subheading 8542.11.00.[40] This tariff subheading provides for digital monolithic ICs, including metal oxide semiconductor (MOS) memory devices of silicon.[41] Uncased or unassembled DRAMs are covered by statistical reporting number 8542.11.0001, along with all uncased digital monolithic ICs of silicon. Since 1991, cased DRAMs of 1 Meg and above have fallen under 3 separate 10-digit statistical provisions.[42] Cased or assembled DRAMs with a density of 1 Meg are counted under statistical reporting number 8542.11.0024 (over 300,000 but not over 3,000,000 bits), and cased or assembled DRAMs with a density above 3,000,000 bits are reported under statistical reporting numbers 8542.11.0026 (over 3,000,000 but not over 15,000,000 bits) and 8542.11.0034 (over 15,000,000 bits). Memory modules are classified in HTS subheading 8473.30.40. This subheading provides for parts and accessories (other than carrying cases and the like and those incorporating a cathode ray tube) suitable for use solely or principally with automatic data processing machines and units of HTS heading 8471 (see U.S. Customs Service ruling HQ 087791 of February 1, 1991).[43]

During the period covered in this investigation, U.S. imports of 1 Meg and above DRAMs, provided for in HTS subheading 8542.11.00, as well as memory modules, provided for in HTS subheading 8473.30.40, entered under the column 1-general or most-favored-nation unconditionally free rate of duty.

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[39] Because of this U.S. origin criterion and the scope of Commerce's investigation, Customs would be responsible for examining not only every DRAM, VRAM, and memory module entering the Customs territory, but also every motherboard and CPU, regardless of the country of export.

[40] VRAMs are provided the same tariff treatment as other DRAMs.

[41] By virtue of HTS general rule of interpretation 2(a), the subheading covers such goods whether complete or incomplete, finished or unfinished, or assembled or unassembled.

[42] The method by which DRAMs were classified under the HTS changed during the period for which information was requested in this investigation. Prior to 1991, all DRAMs were classified under a number that also included SRAMs. Beginning in 1991, DRAMs and SRAMs were given separate classification numbers.

[43] Some types of memory modules may also be classified in HTS subheading 8548.00.00, which provides for electrical parts of machinery or apparatus, not specified or included elsewhere in chapter 85 of the HTS. Although this HTS subheading was not cited in Commerce's scope of the investigation, Commerce's written description is dispositive. During the period for which data were requested in this investigation, memory modules provided for in HTS subheading 8548.00.00 were subject to a 3.5-percent ad valorem tariff.

THE NATURE AND EXTENT OF SALES AT LTFV

On March 23, 1993, Commerce published in the Federal Register notice of its final determination regarding imports of DRAMs of 1 Meg and above from Korea.[44] In its final determination, Commerce found that the subject imports are being, or are likely to be, sold in the United States at LTFV, as provided in section 735 of the act. The final margins, as amended,[45] are presented in the following tabulation (in percent):

Producer/manufacturer/exporter	LTFV margin
Goldstar	4.97
Hyundai	11.45
Samsung	.82
All others	3.89

Commerce determined that the products covered by its investigation constitute three "such-or-similar" categories of merchandise: (1) DRAM semiconductor chips of 1 Meg and above; (2) VRAM semiconductor chips of 1 Meg and above; and (3) memory modules. In determining whether sales of the subject products to the United States were made at LTFV, Commerce compared the United States price (USP) to the foreign market value (FMV) during the period November 1, 1991, through April 30, 1992. The USP was based either on the purchase price of the Korean product by unrelated purchasers in the United States prior to importation or, in those instances when sales to the first unrelated purchaser took place after importation, on exporter's sales price. The FMV for Goldstar and Samsung merchandise was based on sales to unrelated customers in Korea, while the FMV for Hyundai products was based on third-country sales to unrelated customers because there were insufficient sales in Korea to serve as a viable basis for calculation of FMV. Singapore was selected as the third country.

In addition, petitioner alleged the existence of "critical circumstances" with respect to imports of DRAMs of 1 Meg and above from Korea. In accordance with section 735(a)(3) of the act, Commerce determined that critical circumstances do not exist with respect to the subject imports.

In its final determination and in accordance with section 733(d)(1) of the act, Commerce directed Customs to continue to suspend liquidation of all entries of the subject products that are entered, or withdrawn from warehouse, for consumption on or after October 29, 1992, and to require a cash deposit or the posting of a bond equal to the final dumping margins.

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[44] 58 F.R. 15467, Mar. 23, 1993.

[45] Commerce revised the final LTFV margins "based on a reexamination of information used in the final determination." U.S. Department of Commerce, letter to USITC, Apr. 21, 1993.

THE U.S. MARKET

The period for which data were collected in this investigation is from January 1989 through September 1992. Data concerning DRAMs, VRAMs, and DRAM memory modules were collected separately for the time period indicated above; however, unless specified otherwise, the information presented in the remainder of the body of this report is for DRAMs (including VRAMs).[46] Information collected in this investigation concerning VRAMs and DRAM memory modules is presented separately in appendixes B and C, respectively, unless specified otherwise.[47] Data collected concerning DRAMs, by densities, are presented in appendix D and DRAM (including VRAM) summary data are presented in appendix E, unless specified otherwise.

For the purpose of presentation in this report, "domestic" DRAMs include U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location).[48] "Imported" DRAMs include Korean-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and uncased DRAMs that are fabricated in countries other than the United States and Korea and are assembled in countries outside the United States.

U.S. Producers

U.S. producers of uncased DRAMs perform wafer fabrication (and generally wafer probe) in the United States, and U.S. producers of cased DRAMs conduct DRAM assembly and testing operations in the United States. The Commission sent DRAM producers' questionnaires requesting data on DRAM operations to 11 firms identified in the preliminary investigation as U.S. DRAM producers. The Commission also sent DRAM producers' questionnaires to 31 additional firms identified as possible participants in the U.S. DRAM market by industrial directories and by the preliminary investigation record. Twenty-four firms responded that they did not produce DRAMs in the United States and seven firms did not respond to the Commission's request for information. Of the 11 known producers of DRAMs, 9 firms performed wafer fabrication in the United States, 6 of which also generally performed some DRAM assembly operations in the United States, and 2 firms performed only DRAM assembly operations in the United States. The 11 U.S. producers from whom data were collected in this investigation are believed to account for all DRAM wafer fabrication and assembly performed in the United States. Each of the firms and the nature of its operations relating to the production of DRAMs are discussed below.

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[46] VRAMs are included in the DRAM data in the body of this report because VRAMs are part of the family of DRAMs.

[47] Data on DRAMs (including VRAMs) and memory modules that contain such devices are not combined in the majority of the presentations in this report because a large amount of double counting would occur for the DRAMs used in U.S. module production. However, where possible, a combined presentation of the items has been made in the body of this report.

[48] There were virtually no reported U.S. imports of uncased DRAMs from Korea during the period for which data were collected in this investigation. Therefore, U.S.-assembled DRAMs that contain Korean-fabricated dice are virtually nonexistent. According to questionnaire responses, there was no reported U.S. assembly of Korean-fabricated dice.

Fujitsu Microelectronics, Inc. (Fujitsu)

Fujitsu Ltd. is a major global corporation headquartered in Tokyo, Japan. The Japanese parent and its subsidiary companies produce computer and information processing systems, telecommunication systems, electronic devices, and other products. The firm's total net sales in fiscal year 1991 were $21 billion, with net income of $586 million, compared with its U.S. DRAM establishment net sales in 1991 of ***.

The Japanese parent owns and operates DRAM wafer fabrication facilities in the United States, Japan, and the United Kingdom and DRAM assembly operations in the United States, Japan, the United Kingdom, ***. In the United States, Fujitsu fabricated uncased DRAMs in Gresham, OR, approximately *** of which were sent to its San Diego, CA, facility for assembly during the period for which information was requested. The remaining uncased DRAMs were shipped to Fujitsu's foreign affiliates for assembly.[49] In San Diego, CA, Fujitsu assembled cased DRAMs *** from U.S.-fabricated uncased DRAMs.

* * * * * * *

The Japanese parent and its wholly-owned subsidiaries in the United Kingdom, ***. During the period covered by the investigation, Fujitsu reported ***. ***.

Hitachi Semiconductor (America), Ltd. (Hitachi)

Hitachi Ltd. is a multinational corporation based in Japan. The Japanese parent and its subsidiary companies produce a wide variety of products, including information systems, electronics, power and industrial systems, consumer electronics, home appliances, and other materials and services. The firm's total net sales in fiscal year 1991 were $54 billion and net income was $1.6 billion, compared with its U.S. DRAM establishment net sales of ***.

The parent firm maintains DRAM *** facilities in the United States and Japan and DRAM *** facilities in Japan, the United States, Germany, and Malaysia. ***. In the United States, *** in Texas and ***. ***.

* * * * * * *

International Business Machines Corp. (IBM)

IBM, headquartered in Armonk, NY, and its worldwide subsidiaries produce a wide range of advanced information technology products and offer a variety of related services. The firm's total revenues in fiscal year 1991 were $64 billion, with a net loss of $2.8 billion. IBM indicated that virtually all DRAMs produced are internally consumed.

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[49] Fujitsu reported ***.

Matsushita Semiconductor Corp. of America (Matsushita)

Matsushita is a wholly-owned subsidiary of the multinational corporation, Matsushita Electric Corp., headquartered in Osaka, Japan. The firm operates DRAM *** facilities in Japan and the United States. The firm's DRAM *** operations began in the United States ***.

* * * * * * *

Micron Technology, Inc. (Micron)

Micron, the petitioner, performs DRAM wafer fabrication and assembly activities at its headquarters in Boise, ID. At the same location, the firm also produces SRAMs, other semiconductor components, and memory-intensive board-level products. ***. In 1991, the firm accounted for *** percent of uncased DRAM production and *** percent of cased DRAM production in the United States.

* * * * * * *

Mitsubishi Semiconductor America, Inc. (Mitsubishi)

Mitsubishi is wholly owned by Mitsubishi Electric Corp. in Japan. The firm reported DRAM *** facilities in the United States and Japan. In the United States, DRAMs are *** in Durham, NC, ***.

* * * * * * *

Motorola, Inc. (Motorola)

Motorola, a multinational corporation headquartered in the United States, is the sole owner of DRAM *** facilities in the United States and the United Kingdom and of DRAM *** operations in Malaysia and Japan. In addition, Motorola entered into an agreement with Toshiba in 1988 to jointly own and operate a DRAM wafer fabrication facility in Japan.

* * * * * * *

NEC Electronics, Inc. (NEC)

NEC Corp., headquartered in Tokyo, Japan, is an international supplier of electronic products that include communication systems and equipment, computers and industrial electronic systems, and electronic devices. The firm's total net sales in fiscal year 1991 were $26 billion with net income of $952 million, compared with its U.S. DRAM establishment net sales of *** in 1991.

NEC Corp. in Japan, the parent of NEC, maintains DRAM *** facilities in Japan, the United Kingdom, and the United States. NEC also owns and operates a DRAM *** facility in Singapore. In the United States, NEC operates a DRAM

*** facility in Roseville, CA. During the entire period for which data were collected, the firm indicated that it manufactured *** DRAMs in the United States.

* * * * * * *

Oki Semiconductor (Oki)

Oki is wholly owned by Oki Electric Industry Co., Ltd. in Japan. The Japanese parent owns and operates DRAM production facilities in the United States and Japan. In the United States, Oki performs DRAM *** operations in Tualatin, OR.

* * * * * * *

Texas Instruments, Inc. (TI)

TI, headquartered in Dallas, TX, produces semiconductors, defense electronic systems, software productivity tools, computer systems and peripheral products, custom engineering and manufacturing services, electrical controls, metallurgical materials, and consumer electronics products. The firm's net revenues for 1991 were $6.8 billion and the company reported a loss of $249 million; its U.S. DRAM establishment's net sales in 1991 were ***.

TI wholly owns DRAM *** facilities in the United States, Japan, and Italy and jointly owns DRAM *** facilities in Taiwan, Singapore, and Japan. DRAM *** operations located in Singapore, Italy, and Japan are wholly owned by TI. ***.

In the United States, DRAM *** is performed in Dallas, TX.[50]

* * * * * * *

Toshiba America, Inc. (Toshiba)

Toshiba is wholly owned by Toshiba Corp. headquartered in Tokyo, Japan. The parent firm wholly owns DRAM *** facilities in Japan and DRAM *** operations in Japan and the United States. Toshiba also jointly owns and operates a DRAM *** facility with Motorola in Japan.

In the United States, Toshiba's *** facility is in Sunnyvale, CA.

* * * * * * *

Presented in table 1 are the 11 known U.S. firms that reported uncased or cased DRAM production during the period for which data were collected. Also presented is each firm's position on the petition, share of total 1991

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[50] ***.

Table 1
DRAMs: U.S. producers, positions on the petition, shares of reported 1991 U.S. production of uncased and cased DRAMs, U.S. production locations, and U.S. production activities[1]

Firm	Position	Share of uncased DRAM production[2]	Share of cased DRAM production[3]	U.S. production location(s)	U.S. production activity[4]
		Percent	Percent		
Fujitsu.....	***	***	***	Gresham, OR San Diego, CA	Fab A/T
Hitachi.....	***	***	***	Irving, TX	***
IBM.....	***	***	***	Essex Jct., VT	***
Matsushita..	***	***	***	Puyallup, WA	***
Micron.....	Supports[7]	***	***	Boise, ID	Fab & A/T
Mitsubishi..	***	***	***	Durham, NC	***
Motorola....	***	***	***	Mesa, AZ	***
NEC.....	Supports	***	***	Roseville, CA	***
Oki.....	***	***	***	Tualatin, OR	***
TI.....	Supports	***	***	Dallas, TX	***
Toshiba.....	***	***	***	Sunnyvale, CA	***
Total...		100.0	100.0		

[1] The information presented is from all known U.S. producers of uncased and cased DRAMs.

[2] The shares presented are calculated based on total 1991 uncased DRAM production (i.e., DRAM dice fabrication in units) reported by U.S. DRAM fabrication facilities. Uncased DRAM production includes that product which is used internally for the production of cased DRAMs and that which is shipped. Note that the uncased DRAM production activity is relatively the most technologically demanding and costly of the operations.

[3] The shares presented are calculated based on total 1991 cased DRAM production (i.e., cased DRAM assembly in units) reported by U.S. DRAM assembly facilities. Cased DRAM production includes that product which is used internally for the production of other products and that which is shipped, regardless of the source of the uncased DRAMs. No U.S. assembly of uncased Korean DRAMs was reported.

[4] "Fab" indicates that the firm performs wafer fabrication in the United States and "A/T" indicates that the firm performs assembly and testing in the United States.

[5] ***.

[6] ***.

[7] Micron is the petitioner in this investigation.

Note.--Because of rounding, figures may not add to the totals shown.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. production of uncased and cased DRAMs, locations of U.S. production facilities, and the production operations performed at each U.S. facility.

According to information submitted in petitioner's posthearing brief,[51] producers of both DRAMs and memory modules account for 70 percent of world production of memory modules. Petitioner submitted an excerpt from a May 1992 report by In-Stat, Inc., entitled "The Merchant Market for DRAM Modules." According to this report:

* * * * * * *

The In-Stat report shows that firms that produce DRAMs in the United States also accounted for over one-half of the value of world shipments of DRAM modules in 1991 (although not all of these firms assembled modules in the Unites States). Samsung, a Korean DRAM producer, was the largest single producer of DRAM modules, with almost 10 percent of the total.[52] Additional information on modules is contained appendix C of this report.

U.S. Importers

The Commission sent importers' questionnaires to approximately 150 firms identified as possible U.S. importers of DRAMs by ***, the preliminary investigation record, and industrial directories. Sixty-nine firms responded that they did not import DRAMs and 56 firms did not respond to the Commission's request for information. Thirty-two firms indicated that they imported DRAMs into the United States during the period for which information was requested; however, usable import data were received from only 26 firms. Of the 26 importing firms that responded to the Commission's request, 17 firms reported imports of Korean DRAMs and 18 firms reported imports of DRAM products from other countries.[53] During the period of investigation, *** of the importing firms also performed DRAM wafer fabrication and/or DRAM assembly operations in the United States, *** of which reported imports of subject DRAMs from Korea. Import data provided in the questionnaire responses are

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[51] Posthearing brief, app. A, Responses to Commission Questions, p. A.12, and exh. A.3.

[52] The report notes that ***.

[53] Imports of products from other countries include imports from Japan, Taiwan, the United Kingdom, Germany, Italy, Singapore, and Canada.

estimated to account for more than 95 percent of U.S. imports from Korea[54] and approximately 60 percent of U.S. imports from countries other than Korea.[55]

Channels of Distribution[56]

Both U.S.-produced and Korean DRAMs are sold to a variety of customers, including original equipment manufacturers (OEMs), franchise distributors, value-added/aftermarket resellers, and brokers/independent distributors. Sales of both U.S.-produced and Korean DRAMs are made to unrelated and related customers. Presented in table 2 are U.S. shipments of U.S.-produced DRAMs and Korean DRAMs to unrelated and related distributors and OEMs.

According to questionnaire responses, in 1991, *** percent of U.S. shipments of U.S.-produced cased DRAMs were made to related OEMs and *** percent were made to unrelated OEMs. During the same period, all of the U.S. shipments of U.S.-assembled DRAMs to distributors went to unrelated firms.

Importers of Korean DRAMs shipped *** percent of their total shipments of such DRAMs to related OEMs and *** percent to unrelated OEMs. Of the U.S. shipments of Korean DRAMs to distributors, virtually all went to unrelated distributors.

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[54] Data coverage concerning imports from Korea was estimated as a percentage of Korean producers' total exports of DRAMs to the United States as reported in the foreign producers' questionnaires.

[55] Data coverage concerning imports from other sources was estimated as a percentage of imports as reported in Commerce's official import statistics. Staff believes, however, that it has received import information from the largest importers of DRAMs from countries other than Korea and that the data coverage is actually much higher than that indicated because staff believes the official import statistics are overstated. Official import statistics include products that are outside the scope of this investigation during a portion of the period of investigation (see the section of this report entitled "U.S. Tariff Treatment") and may also incorrectly report the transshipments of Korean product to the United States through other countries.

[56] Separate channels of distribution data were not collected for value-added/aftermarket resellers. For additional information concerning channels of distribution and other factors affecting demand, see the section of this report entitled "Pricing and Marketing Considerations."

Table 2
Cased DRAMs: U.S. producers' U.S. shipments[1] and Korean importers' U.S. shipments[2] of cased DRAMs to unrelated and related distributors and OEMs, 1991

(In 1,000 units)

Product	Distributors		OEMs	
	Related	Unrelated	Related	Unrelated
U.S. producers' U.S. shipments.....	***	***	***	***
Korean importers' U.S. shipments.....	***	***	***	***

[1] The data presented for U.S. producers' U.S. shipments were provided by all known U.S. producers of cased DRAMs. These shipment data include U.S.-assembled DRAMs regardless of the source of the uncased DRAM. No U.S. assembly of imported uncased Korean DRAMs was reported.

[2] The data presented concerning Korean DRAMs were provided by 17 U.S. importers, whose DRAM imports from Korea in 1991 are estimated to account for greater than 95 percent of total U.S. DRAM imports from Korea. Note that there are virtually no imports of uncased DRAMs from Korea.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Apparent U.S. Consumption

Data concerning apparent U.S. consumption of DRAMs of 1 Meg and above and all DRAMs are presented in tables 3 and 4, respectively. These data are calculated based on U.S. shipments of cased DRAMs as reported by U.S. producers and importers.[57]

The quantity of apparent U.S. consumption of DRAMs of 1 Meg and above, in units and bits,[58] increased in every period for which data were requested. Likewise, the quantity of apparent U.S. consumption of all DRAMs, in units and bits, increased in all periods.

U.S. apparent consumption of DRAMs of 1 Meg and above, in terms of value, increased irregularly from 1989 to 1991 and increased sharply from January-September 1991 to January-September 1992. U.S. apparent consumption

[57] Apparent U.S. consumption as presented in tables 3 and 4 is understated by the import data concerning DRAMs from countries other than Korea that were not provided by importers' questionnaire recipients. Despite the understatement, which staff believes to be relatively small, apparent U.S. consumption, as presented, was calculated using the import data submitted in response to Commission questionnaires rather than official import statistics because staff believes that the official import statistics are overstated and that the primary data collected are more reliable.

[58] Because demand for DRAMs is often measured by the amount of memory contained, quantities in bits, as well as units, are presented throughout this report, when available.

Table 3
Cased DRAMs≥1 Meg: U.S. shipments of "domestic" product,[1] U.S. shipments of "imported" product,[2] and apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Quantity (billion bits)				
U.S. shipments of "domestic" product:					
DRAMs made from U.S. dice--					
Cased in Korea	0	0	0	0	0
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
DRAMs made from 3rd-source dice cased in U.S.	***	***	***	***	***
Total	***	***	***	***	***
U.S. shipments of "imported" product:					
DRAMs made from Korean dice--					
Cased in Korea	***	***	***	***	***
Cased in United States	0	0	0	0	0
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
DRAMs made from 3rd-source dice--					
Cased in Korea	0	0	0	0	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
Total	***	***	***	***	***
Apparent consumption	187,373	351,647	597,182	419,096	720,378
	Quantity (1,000 units)				
U.S. shipments of "domestic" product:					
DRAMs made from U.S. dice--					
Cased in Korea	0	0	0	0	0
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
DRAMs made from 3rd-source dice cased in U.S.	***	***	***	***	***
Total	***	***	***	***	***
U.S. shipments of "imported" product:					
DRAMs made from Korean dice--					
Cased in Korea	***	***	***	***	***
Cased in United States	0	0	0	0	0
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
DRAMs made from 3rd-source dice--					
Cased in Korea	0	0	0	0	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
Total	***	***	***	***	***
Apparent consumption	175,948	298,754	389,149	288,283	333,354

See footnotes at end of table.

Table 3--Continued
Cased DRAMs≥1 Meg: U.S. shipments of "domestic" product,[1] U.S. shipments of "imported" product,[2] and apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Value (1,000 dollars)				
U.S. shipments of "domestic" product:					
DRAMs made from U.S. dice--					
Cased in Korea	0	0	0	0	0
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
DRAMs made from 3rd-source dice cased in U.S	***	***	***	***	***
Total	***	***	***	***	***
U.S. shipments of "imported" product:					
DRAMs made from Korean dice--					
Cased in Korea	***	***	***	***	***
Cased in United States	0	0	0	0	0
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
DRAMs made from 3rd-source dice--					
Cased in Korea	0	0	0	0	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
Total	***	***	***	***	***
Apparent consumption	1,995,253	1,934,552	2,322,531	1,693,718	2,106,553

[1] "Domestic" product includes U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location). The data presented for U.S. shipments of "domestic" cased DRAMs are from all known U.S. producers of uncased and cased DRAMs and account for virtually all known U.S. shipments of "domestic" products. Shipment data do not reconcile with inventory and production data. Firms cited "yield loss, scrap, samples, returns, and theft" as the reasons for the discrepancies.

[2] "Imported" product includes Korean-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and uncased DRAMs that are fabricated in countries other than the United States and Korea and are assembled in countries outside the United States. The data presented are from 26 U.S. importers of DRAMs. Reported U.S. imports of DRAMs from Korea are estimated to account for greater than 95 percent of total U.S. DRAM imports from Korea in 1991 and reported U.S. imports of DRAMs from all other countries are estimated to account for approximately 60 percent of U.S. DRAM imports from all other countries in the same period (see the section of this report entitled "U.S. Importers"). Shipment data do not reconcile with inventory and import data. Firms cited "scrap, samples, returns, and theft" as the reasons for the discrepancies.

Note.--The term "3rd source" refers to countries other than Korea and the United States. Bit figures presented have been truncated rather than rounded; however, bit totals were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 4
Cased DRAMs: U.S. shipments of "domestic" product,[1] U.S. shipments of "imported" product,[2] and apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Quantity (billion bits)				
U.S. shipments of "domestic" product:					
DRAMs made from U.S. dice--					
Cased in Korea	0	0	0	0	0
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	91,675	144,629	215,300	157,269	196,480
DRAMs made from 3rd-source dice cased in U.S.	26,454	33,967	44,854	31,481	59,150
Total	118,130	178,597	260,154	188,750	255,631
U.S. shipments of "imported" product:					
DRAMs made from Korean dice--					
Cased in Korea	***	***	***	***	***
Cased in United States	0	0	0	0	0
Cased in 3rd sources	***	***	***	***	***
Subtotal	50,053	91,842	150,483	101,230	185,537
DRAMs made from 3rd-source dice--					
Cased in Korea	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	80,115	121,609	207,578	146,518	287,208
Total	130,168	213,452	358,062	247,749	472,745
Apparent consumption	248,298	392,049	618,216	436,499	728,376
	Quantity (1,000 units)				
U.S. shipments of "domestic" product:					
DRAMs made from U.S. dice--					
Cased in Korea	0	0	0	0	0
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	174,442	156,416	163,791	126,767	111,425
DRAMs made from 3rd-source dice cased in U.S.	47,529	45,868	34,356	26,084	24,388
Total	221,971	202,284	198,147	152,851	135,813
U.S. shipments of "imported" product:					
DRAMs made from Korean dice--					
Cased in Korea	***	***	***	***	***
Cased in United States	0	0	0	0	0
Cased in 3rd sources	***	***	***	***	***
Subtotal	95,181	139,194	144,423	107,219	101,247
DRAMs made from 3rd-source dice--					
Cased in Korea	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	109,998	117,926	129,113	96,614	127,883
Total	205,179	257,120	273,536	203,833	229,130
Apparent consumption	427,150	459,404	471,683	356,684	364,943

See footnotes at end of table.

Table 4--Continued
Cased DRAMs: U.S. shipments of "domestic" product,[1] U.S. shipments of "imported" product,[2] and apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Value (1,000 dollars)				
U.S. shipments of "domestic" product:					
DRAMs made from U.S. dice--					
Cased in Korea	0	0	0	0	0
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	813,592	764,570	807,443	621,318	568,585
DRAMs made from 3rd-source dice cased in U.S.	335,601	178,082	172,800	125,943	163,394
Total	1,149,193	942,652	980,243	747,261	731,979
U.S. shipments of "imported" product:					
DRAMs made from Korean dice--					
Cased in Korea	***	***	***	***	***
Cased in United States	0	0	0	0	0
Cased in 3rd sources	***	***	***	***	***
Subtotal	562,898	479,695	563,957	393,573	535,366
DRAMs made from 3rd-source dice--					
Cased in Korea	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	1,179,917	801,316	907,310	661,434	884,246
Total	1,742,815	1,281,011	1,471,267	1,055,007	1,419,612
Apparent consumption	2,892,008	2,223,663	2,451,510	1,802,268	2,151,591

[1] "Domestic" product includes U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location). The data presented for U.S. shipments of "domestic" cased DRAMs are from all known U.S. producers of uncased and cased DRAMs and account for virtually all known U.S. shipments of "domestic" products. Shipment data do not reconcile with inventory and production data. Firms cited "yield loss, scrap, samples, returns, and theft" as the reasons for the discrepancies.

[2] "Imported" product includes Korean-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and uncased DRAMs that are fabricated in countries other than the United States and Korea and are assembled in countries outside the United States. The data presented are from 26 U.S. importers of DRAMs. Reported U.S. imports of DRAMs from Korea are estimated to account for greater than 95 percent of total U.S. DRAM imports from Korea in 1991 and reported U.S. imports of DRAMs from all other countries are estimated to account for approximately 60 percent of U.S. DRAM imports from all other countries in the same period (see the section of this report entitled "U.S. Importers"). Shipment data do not reconcile with inventory and import data. Firms cited "scrap, samples, returns, and theft" as the reasons for the discrepancies.

Note.--The term "3rd source" refers to countries other than Korea and the United States. Bit figures presented have been truncated rather than rounded; however, bit totals were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

of all DRAMs, in terms of value, fell irregularly from 1989 to 1991, but also increased in January-September 1992.

Data concerning DRAM memory modules are presented separately in appendix C and cannot be directly combined with DRAM data because double counting would occur for the DRAMs used in U.S. module production. However, if the assumption is made that all reported domestic module production is from DRAMs included in tables 3 and 4, then an estimate of combined U.S. consumption can be made by simply adding U.S. shipments of imported modules to U.S. consumption of DRAMs. Presented in table 5 are estimated U.S. consumption data on DRAMs (including VRAMs) of 1 Meg and above and memory modules that contain these devices. Apparent consumption of DRAMs of 1 Meg and above and modules that contain these devices increased in every period, by quantity. By value, apparent consumption fell slightly from 1989 to 1990 but increased in the remaining periods.

Presented in table 6 are estimated U.S. consumption data on all DRAMs (including VRAMs) and memory modules that contain these devices. Apparent consumption of all DRAMs and DRAM memory modules increased in every period by quantity, but fluctuated by value.

CONSIDERATION OF ALLEGED MATERIAL INJURY

The information presented in this section of the report is based on responses to Commission questionnaires by all of the 11 known U.S. producers of DRAMs.[59] During the period for which data were requested in this investigation, nine firms performed wafer fabrication in the United States; six of the nine also generally performed some, but not necessarily all, assembly operations in the United States. The firms that maintained only assembly operations in the United States are ***. Data submitted by the producers are believed to account for virtually all DRAM wafer fabrication and DRAM assembly in the United States. See table 1 and the section of this report entitled "U.S. Producers" for a description of the nature of each firm's U.S. DRAM operations.

U.S. Capacity and Production

The uncased and cased DRAM capacity data requested consists of U.S. producers' full production capability to fabricate DRAM wafers and assemble cased DRAMs, respectively, based on the maximum level of production that their DRAM wafer fabrication and assembly operations could reasonably expect to attain under normal operating conditions.

Production data presented for uncased and cased DRAMs are intended to represent the successful fabrication of uncased DRAM dice and successful assembly of cased DRAMs, respectively. Adjustments to production data were made to account for yield loss; however, in many instances, firms could not

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[59] *** did not provide employment data. *** U.S. producers provided financial data; however, the financial data submitted by *** were not usable. *** did not provide any financial data.

Table 5
Cased DRAMs≥1 Meg and memory modules that contain DRAMs≥1 Meg: Apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Quantity (billion bits)				
U.S. shipments of LTFV imports:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total LTFV imports	37,668	85,013	175,133	114,378	265,834
U.S. shipments of other imports:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total other imports	***	***	***	***	***
U.S. shipments of "domestic" cased DRAMs	***	***	***	***	***
Apparent consumption	201,941	389,005	682,648	481,465	876,636
	Value (1,000 dollars)				
U.S. shipments of LTFV imports:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total LTFV imports	383,235	424,230	667,317	451,182	782,363
U.S. shipments of other imports:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total other imports	***	***	***	***	***
U.S. shipments of "domestic" cased DRAMs	***	***	***	***	***
Apparent consumption	2,410,575	2,363,522	3,237,147	2,386,017	3,075,252

[1] The data presented are from all known U.S. producers of uncased and cased DRAMs and account for virtually all known U.S. shipments of "domestic" products. The data presented are also from 26 U.S. importers of DRAMs and DRAM memory modules. Reported U.S. imports of DRAMs and DRAM memory modules from Korea are estimated to account for greater than 95 percent of total imports of these products from Korea in 1991 and reported U.S. imports of DRAMs and DRAM memory modules from all other countries are estimated to account for approximately 60 percent of total imports of these products from all other countries in the same period (see the section of this report entitled "U.S. Importers").

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 6
Cased DRAMs and DRAM memory modules: Apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Quantity (billion bits)				
U.S. shipments of LTFV imports (≥1 Meg):					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total LTFV imports	37,668	85,013	175,133	114,378	265,834
U.S. shipments of other imports:					
From Korea (<1 Meg):					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
From other countries:					
Cased DRAMs	80,115	121,609	207,578	146,518	287,208
DRAM memory modules	16,371	27,738	50,035	40,302	72,606
Total other imports	109,924	167,109	269,489	196,573	363,481
U.S. shipments of "domestic" cased DRAMs	118,130	178,597	260,154	188,750	255,631
Apparent consumption	265,722	430,719	704,776	499,701	884,946
	Value (1,000 dollars)				
U.S. shipments of LTFV imports (≥1 Meg):					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total LTFV imports	383,235	424,230	667,317	451,182	782,363
U.S. shipments of other imports:					
From Korea (<1 Meg):					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
From other countries:					
Cased DRAMs	1,179,917	801,316	907,310	661,434	884,246
DRAM memory modules	493,190	402,647	771,198	599,321	705,976
Total other imports	1,856,425	1,309,495	1,737,859	1,310,881	1,610,347
U.S. shipments of "domestic" cased DRAMs	1,149,193	942,652	980,243	747,261	731,979
Apparent consumption	3,388,853	2,676,377	3,385,419	2,509,324	3,124,689

[1] The data presented are from all known U.S. producers of uncased and cased DRAMs and account for virtually all known U.S. shipments of "domestic" products. The data presented are also from 26 U.S. importers of DRAMs and DRAM memory modules. Reported U.S. imports of DRAMs and DRAM memory modules from Korea are estimated to account for greater than 95 percent of total imports of these products from Korea in 1991 and reported U.S. imports of DRAMs and DRAM memory modules from all other countries are estimated to account for approximately 60 percent of total imports of these products from all other countries in the same period (see the section of this report entitled "U.S. Importers").

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

determine with complete accuracy the amount of successful fabrication and assembly of DRAMs. Therefore, production data presented may be slightly overstated by the amount of unadjusted yield loss and do not reconcile with shipment and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for the reconciliation discrepancies.

Wafer Fabrication Operations

Data concerning the capacity, wafer starts, and capacity utilization for uncased DRAMs of 1 Meg and above and all uncased DRAMs, as reported by U.S. DRAM producers, are presented in table 7. Production data are presented for uncased DRAMs of 1 Meg and above and all uncased DRAMs in table 8. The data presented were provided by nine U.S. producers of uncased DRAMs and are believed to account for virtually all U.S. uncased DRAM capacity and production.

U.S. producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year. As reported, U.S. producers' capacity to produce uncased DRAMs of 1 Meg and above and all uncased DRAMs increased in every period for which information was requested. The U.S. producers' reported changes in capacity status are explained by the wafer fabrication facility openings and/or expansions of ***. DRAM wafer fabrication facility closures and production delays include ***. Reasons cited for these production delays and shutdowns include ***.

The U.S. producers of uncased DRAMs reported other products that are produced on the same equipment and machinery used in the production of DRAMs. These products include CMOS logic, SRAMs, MCUs, EPROMs, ASICs, MPUs, consumer LSI, and other configurations and packages of memory.

The requested data concerning wafer starts represent the number of raw silicon wafers introduced into the DRAM wafer fabrication process and do not account for yield loss. These data were collected in this investigation in order to calculate the capacity utilization of U.S. DRAM wafer fabrication facilities. Wafer yield (i.e., the percentage of wafer starts that reach the final test step prior to assembly, in terms of usable DRAM dice) reported by U.S. producers of uncased DRAMs ranged from *** to *** percent during the period for which data were requested. *** U.S. producers reported the use of 6-inch silicon wafers in the DRAM wafer fabrication process. *** reported the use of 5-inch wafers and *** reported the use of 5- and 8-inch wafers. The total quantity of wafer starts reported by U.S. producers of uncased DRAMs of 1 Meg and above and all uncased DRAMs increased from 1989 to 1991. Wafer starts for DRAMs of 1 Meg and above rose from January-September 1991 to January-September 1992, but wafer starts for all densities of DRAMs fell slightly during the same period.

The calculated capacity utilization for U.S. production of uncased DRAMs of 1 Meg and above increased from 1989 to 1991, but fell slightly in the partial-year periods. The capacity utilization for all uncased DRAMs fell in almost all periods of the investigation. ***, representing *** percent (on the basis of units) of aggregate U.S. production of all uncased DRAMs in 1991,

Table 7
Uncased DRAMs: U.S. capacity,[1] wafer starts,[2] and capacity utilization, by products, 1989-91, January-September 1991, and January-September 1992[3]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Average-of-period capacity (1,000 wafers)				
Uncased DRAMs≥1 Meg.....	***	***	***	***	***
All uncased DRAMs.....	1,291	1,558	1,575	1,149	1,226
	Wafer starts (1,000 wafers)				
Uncased DRAMs≥1 Meg.....	***	***	***	***	***
All uncased DRAMs.....	1,241	1,393	1,416	1,070	1,043
	Capacity utilization (percent)				
Uncased DRAMs≥1 Meg.....	***	***	***	***	***
All uncased DRAMs.....	96.1	89.4	89.9	93.1	85.1

[1] U.S. producers reported wafer capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year.

[2] Wafer starts represent the number of raw silicon wafers introduced into the DRAM wafer fabrication process and do not account for yield loss; they were collected in this investigation in order to calculate the capacity utilization of U.S. DRAM wafer fabrication facilities. Wafer yield reported by U.S. producers of uncased DRAMs ranged from *** to *** percent during the period for which data were requested. *** U.S. producers reported the use of 6-inch silicon wafers in the DRAM wafer fabrication process. *** reported the use of 5-inch wafers and *** reported the use of 5- and 8-inch wafers.

[3] Data presented were provided by nine U.S. producers of uncased DRAMs and are estimated to account for virtually all U.S. uncased DRAM capacity and production.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 8
Uncased DRAMs: U.S. production, by products and by firms, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Production (1,000 units)				
Uncased DRAMs≥1 Meg:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All uncased DRAMs:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	274,258	247,303	268,023	203,459	202,257
	Production (billion bits)				
Uncased DRAMs≥1 Meg:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All uncased DRAMs:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	132,574	202,399	322,594	230,352	321,726

[1] Data presented were provided by nine U.S. producers of uncased DRAMs and are estimated to account for virtually all U.S. uncased DRAM production. Production data presented for uncased DRAMs are intended to represent the successful fabrication of uncased DRAM dice. Production data may not reconcile with shipment and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for the discrepancies.

Note.--Bit figures presented have been truncated rather than rounded; however, bit totals were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

reported operating at full capacity in all periods for which data were requested.[60] *** indicated that other products are produced on the same equipment and machinery as DRAMs and that the firms operate at full DRAM capacity for the product mix chosen in each time period.[61]

Total production of 1 Meg and above uncased DRAMs reported by U.S. producers increased substantially in all periods, in terms of both units and bits. Production of uncased DRAMs by *** accounted for a large portion of the increase in units from 1989 to 1991 and production by *** accounted for a large portion of the increase in units from January-September 1991 to January-September 1992. Total production of all uncased DRAMs reported by U.S. producers in terms of bits increased substantially in all periods; however, production of all uncased DRAMs in terms of units fell in most periods.

Assembly Operations

Capacity and production data concerning cased DRAMs, as reported by U.S. DRAM producers, are presented in table 9. Production data, by firms and origin of the DRAM dice, are presented for 1 Meg and above and all uncased DRAMs in table 10. The data presented were provided by eight U.S. producers of cased DRAMs and are believed to account for virtually all U.S. cased DRAM capacity and production.

U.S. producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year. As reported, U.S. producers' capacity to assemble cased DRAMs of 1 Meg and above increased in each year from 1989 to 1991, but fell slightly from January-September 1991 to January-September 1992. The U.S. producers' capacity to assemble all cased DRAMs increased from 1989 to 1990, but fell in 1991 and decreased further from January-September 1991 to January-September 1992.

Openings and/or expansions reported by U.S. DRAM assemblers include ***. U.S. DRAM assembly facility closures include ***. Reasons for the closures and conversions include ***.

The U.S. producers of cased DRAMs reported other products that are produced on the same equipment and machinery used in the assembly of cased DRAMs. The products include SRAMs, MCUs, ASICs, MPUs, consumer LSI, and other configurations and packages of memory.

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[60] The petitioner stated that "with such high fixed costs there is only one way that a DRAM producer can stay competitive; lower the unit cost of a finished DRAM." Therefore, in order to be a low-cost DRAM producer, it must "run as close to full capacity as possible to spread the huge depreciation costs over the largest possible number of wafers." Transcript of the hearing, pp. 22-23. The petitioner also indicated that "statements of capacity and capacity utilization are dependent on product mix, which can change over time" and "there is, in short, considerable untapped capacity for the production of additional units of DRAMs by U.S. producers, should market conditions make it attractive." Petitioner's posthearing brief, p. 6 and app. A, p. 6.

[61] ***.

Table 9
Cased DRAMs: U.S. capacity,[1] production,[2] and capacity utilization, by products, 1989-91, January-September 1991, and January-September 1992[3]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Average-of-period capacity (1,000 units)				
Cased DRAMs≥1 Meg.....	***	***	***	***	***
All cased DRAMs.....	166,583	169,945	162,937	127,276	118,191
	Production (1,000 units)				
Cased DRAMs≥1 Meg.....	***	***	***	***	***
All cased DRAMs.....	148,604	149,218	151,303	118,195	103,993
	Capacity utilization (percent)				
Cased DRAMs≥1 Meg.....	***	***	***	***	***
All cased DRAMs.....	89.2	87.8	92.9	92.9	88.0

[1] U.S. producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year.

[2] Cased DRAM production represents the successful assembly of DRAMs. Adjustments to production data were made to account for yield loss and scrap; however, in many instances, firms could not determine with complete accuracy the amount of successful assembly of cased DRAMs. Therefore, production data presented may be slightly overstated by the amount of unadjusted yield loss and do not reconcile with shipment and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for the discrepancies.

[3] Data presented were provided by eight U.S. producers of cased DRAMs and are estimated to account for virtually all U.S. cased DRAM capacity and production.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Total production of cased DRAMs of 1 Meg and above and all cased DRAMs, as reported by U.S. producers in terms of units and bits (regardless of the source of the dice), increased in each year from 1989 to 1991. During the periods January-September 1991 and January-September 1992, production fell in terms of units but increased in terms of bits.

The capacity utilization data (calculated on the basis of units) for U.S. assembly of 1 Meg and above cased DRAMs increased irregularly from *** percent in 1989 to *** percent in 1991 and fell to *** percent in January-September 1992. Capacity utilization for the U.S. assembly of all cased DRAMs increased irregularly from 89 percent in 1989 to 93 percent in 1991 and fell to 88 percent in January-September 1992. ***, representing *** percent (on the basis of units) of total U.S. assembly of all cased DRAMs in 1991, indicated that its assembly facility, like its wafer fabrication facility, operated at full capacity during all periods for the product mix chosen.

Table 10
Cased DRAMs: U.S. production,[1] by origin of dice, by products, and by firms, 1989-91, January-September 1991, and January-September 1992[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Production (1,000 units)				
U.S.-fabricated dice:					
Cased DRAMs≥1 Meg:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All cased DRAMs:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
3rd-source fabricated dice:					
Cased DRAMs≥1 Meg:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All cased DRAMs:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All cased DRAMs with dice of any origin:					
Cased DRAMs≥1 Meg:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All cased DRAMs:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	148,604	149,218	151,303	118,195	103,993

See footnotes at end of table.

Table 10--Continued
Cased DRAMs: U.S. production,[1] by origin of dice, by products, and by firms, 1989-91, January-September 1991, and January-September 1992[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Production (billion bits)				
U.S.-fabricated dice:					
Cased DRAMs≥1 Meg:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All cased DRAMs:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
3rd-source fabricated dice:					
Cased DRAMs≥1 Meg:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All cased DRAMs:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All cased DRAMs with dice of any origin:					
Cased DRAMs≥1 Meg:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
All cased DRAMs:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	54,613	101,926	167,504	124,159	170,312

[1] Cased DRAM production represents the successful assembly of DRAMs. Production data, however, may be slightly overstated by the amount of unadjusted yield loss and do not reconcile with shipment and inventory data.
[2] Data presented are estimated to account for virtually all U.S. cased DRAM capacity and production.

Note.--Bit figures presented have been truncated rather than rounded; however, bit totals were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. Producers' Shipments

The uncased and cased DRAM shipment data requested of the U.S. producers consist of shipments of U.S.-fabricated uncased DRAM dice and U.S.-assembled cased DRAMs, respectively, net of returns made in the period during which the product was originally shipped. Adjustments to shipment data were made to account for returns; however, in many instances, firms could not determine with complete accuracy the amount and timing of the returns and the period during which the product was originally shipped. Therefore, shipment data do not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for the reconciliation discrepancies.

Uncased DRAMs

U.S. producers' shipments of uncased DRAMs of 1 Meg and above and all uncased DRAMs are presented in tables 11 and 12. The data presented are from all known U.S. producers of uncased DRAMs and are believed to account for virtually all known shipments of U.S.-fabricated uncased DRAMs in all periods.

The overwhelming majority of U.S.-fabricated uncased DRAMs were either assembled by the firm in the United States or by its foreign affiliates. U.S. producers' total shipments of uncased DRAMs of 1 Meg and above increased in every period for which data were requested, in terms of both units and bits. U.S. producers' total shipments of all uncased DRAMs also increased in every period for which data were requested in terms of bits. In terms of units, U.S. producers' shipments of all uncased DRAMs fell in most periods.

By value, total shipments of 1 Meg and above uncased DRAMs and all uncased DRAMs increased in each period from 1989 to 1991, but fell slightly from January-September 1991 to January-September 1992. The average bit value of U.S. producers' shipments of uncased DRAMs of 1 Meg and above and all uncased DRAMs fell in each period for which data were requested in this investigation.

Cased DRAMs

U.S. producers' shipments of U.S.-assembled DRAMs containing U.S.-fabricated dice are presented in tables 13 and 14. U.S. producers' shipments of U.S.-assembled DRAMs containing dice fabricated in countries other than Korea[62] and the United States are presented in tables 15 and 16. U.S. producers' shipments of cased DRAMs assembled in countries other than Korea and the United States from dice fabricated in the United States are presented in tables 17 and 18. U.S. producers' shipments of total "domestic" cased DRAMs are presented in tables 19 and 20. The data presented are from all known U.S. DRAM producers and are believed to account for virtually all shipments of "domestic" DRAMs.

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[62] There were no U.S.-assembled DRAMs that contained Korean-fabricated dice reported in this investigation.

Table 11
Uncased DRAMs≥1 Meg: Shipments by U.S. producers, by types, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Quantity (1,000 units)				
Company transfers[2]	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Quantity (billion bits)				
Company transfers[2]	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Value (1,000 dollars)				
Company transfers[2]	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Unit value (per million bits)				
Company transfers[2]	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***

[1] Data presented were provided by nine U.S. producers of uncased DRAMs and are estimated to account for virtually all shipments of U.S. uncased DRAMs. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for discrepancies.

[2] Company transfer shipments reflect the amount of uncased DRAMs that were consumed internally in the assembly of cased DRAMs by the firm in the United States.

[3] Unrelated export shipments were reported by ***. ***.

Note.--Bit figures presented have been truncated rather than rounded; however, bit totals and ratios were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 12
Uncased DRAMs: Shipments by U.S. producers, by types, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Quantity (1,000 units)				
Company transfers[2]	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	274,684	251,202	268,260	204,538	197,956
	Quantity (billion bits)				
Company transfers[2]	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	132,685	206,130	323,048	232,119	312,970
	Value (1,000 dollars)				
Company transfers[2]	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	651,229	671,198	827,624	620,400	594,712
	Unit value (per million bits)				
Company transfers[2]	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	$4.91	$3.26	$2.56	$2.67	$1.90

[1] Data presented were provided by nine U.S. producers of uncased DRAMs and are estimated to account for virtually all shipments of U.S. uncased DRAMs. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for discrepancies.

[2] Company transfer shipments reflect the amount of uncased DRAMs that were consumed internally in the assembly of cased DRAMs by the firm in the United States.

[3] Unrelated export shipments were reported by ***. ***.

Note.--Bit figures presented have been truncated rather than rounded; however, bit totals and ratios were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 13
Cased DRAMs≥1 Meg (U.S.-assembled DRAMs containing U.S.-fabricated dice): Shipments by U.S. producers, by types, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented are estimated to account for virtually all shipments of U.S.-assembled DRAMs that contain U.S.-fabricated dice. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for reconciliation discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 14
Cased DRAMs (U.S-assembled DRAMs containing U.S.-fabricated dice): Shipments by U.S. producers, by types, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented are estimated to account for virtually all shipments of U.S.-assembled DRAMs that contain U.S.-fabricated dice. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for reconciliation discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 15
Cased DRAMs≥1 Meg (U.S.-assembled DRAMs containing dice fabricated in countries other than Korea and the United States): Shipments by U.S. producers, by types, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented are estimated to account for virtually all shipments of U.S.-assembled DRAMs that contain dice fabricated in countries other than Korea and the United States. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for reconciliation discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 16
Cased DRAMs (U.S.-assembled DRAMs containing dice fabricated in countries other than Korea and the United States): Shipments by U.S. producers, by types, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Quantity (1,000 units)				
Company transfers	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	47,529	45,868	34,356	26,084	24,388
Affiliate exports	***	***	***	***	***
Unrelated exports[2]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Quantity (billion bits)				
Company transfers	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	26,454	33,967	44,854	31,481	59,150
Affiliate exports	***	***	***	***	***
Unrelated exports[2]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Value (1,000 dollars)				
Company transfers	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	335,601	178,082	172,800	125,943	163,394
Affiliate exports	***	***	***	***	***
Unrelated exports[2]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Unit value (per million bits)				
Company transfers	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	$12.69	$5.24	$3.85	$4.00	$2.76
Affiliate exports	***	***	***	***	***
Unrelated exports[2]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***

[1] Data presented are estimated to account for virtually all shipments of U.S.-assembled DRAMs that contain dice fabricated in countries other than Korea and the United States. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for reconciliation discrepancies.
[2] Unrelated export shipments were principally destined for ***.

Note.--Bit figures presented have been truncated rather than rounded; however, bit totals and ratios were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 17
Cased DRAMs≥1 Meg (DRAMs assembled in countries other than Korea and the United States containing dice fabricated in the United States): Shipments by U.S. producers, by types, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented were provided by U.S. producers of uncased DRAMs and are estimated to account for virtually all shipments of U.S.-fabricated DRAM dice that are assembled in countries other than Korea and the United States. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for reconciliation discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 18
Cased DRAMs (DRAMs assembled in countries other than Korea and the United States containing dice fabricated in the United States): Shipments by U.S. producers, by types, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented were provided by U.S. producers of uncased DRAMs and are estimated to account for virtually all shipments of U.S.-fabricated DRAM dice that are assembled in countries other than Korea and the United States. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for reconciliation discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 19
Cased DRAMs≥1 Meg: Shipments of "domestic" product by U.S. producers,[1] by types, 1989-91, January-September 1991, and January-September 1992[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] "Domestic" product includes U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location).
[2] Data presented were provided by U.S. producers of uncased and cased DRAMs and are estimated to account for virtually all shipments of "domestic" product by U.S. producers. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for reconciliation discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 20
Cased DRAMs: Shipments of "domestic" product by U.S. producers,[1] by types, 1989-91, January-September 1991, and January-September 1992[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Quantity (1,000 units)				
Company transfers	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	221,971	202,284	198,147	152,851	135,813
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Quantity (billion bits)				
Company transfers	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	118,130	178,597	260,154	188,750	255,631
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Value (1,000 dollars)				
Company transfers	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	1,149,193	942,652	980,243	747,261	731,979
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***
	Unit value (per million bits)				
Company transfers	***	***	***	***	***
Domestic shipments	***	***	***	***	***
U.S. shipments	$9.73	$5.28	$3.77	$3.96	$2.86
Affiliate exports	***	***	***	***	***
Unrelated exports[3]	***	***	***	***	***
All exports	***	***	***	***	***
All shipments	***	***	***	***	***

[1] "Domestic" product includes U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location).

[2] Data presented were provided by U.S. producers of uncased and cased DRAMs and are estimated to account for virtually all shipments of "domestic" product by U.S. producers. Reported shipment data may not reconcile with production and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for reconciliation discrepancies.

[3] Unrelated export shipments were principally destined for ***.

Note.--Bit figures presented have been truncated rather than rounded; however, bit totals and ratios were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

As reported, total shipments of cased "domestic" DRAMs of 1 Meg and above and all cased "domestic" DRAMs, on the basis of quantity in bits, increased in every period. By quantity in units, shipments of cased "domestic" DRAMs of 1 Meg and above increased from 1989 to 1991, but fell in the partial-year periods and shipments of all cased "domestic" DRAMs fell in every period. Shipments of cased "domestic" DRAMs of 1 Meg and above, by value, increased in every period, while the shipments of all cased "domestic" DRAMs, by value, fell in most periods. The average bit value of shipments of 1 Meg and above cased "domestic" DRAMs and all cased "domestic" DRAMs fell in every period for which data were requested.

U.S. Producers' Inventories[63]

Uncased DRAMs

U.S. producers' inventories of uncased DRAMs of 1 Meg and above and all uncased DRAMs are presented in table 21. The data presented are from all known U.S. producers of uncased DRAMs and are believed to account for virtually all U.S. inventories of U.S.-fabricated DRAM dice in all periods.

U.S. producers' inventories of DRAMs of 1 Meg and above and all uncased DRAMs, in terms of both units and bits, fell from 1989 to 1991; however, a relatively large increase during the partial-year periods was reported. The ratio of inventories to total shipments on the basis of units fell from 1989 to 1991, but increased from January-September 1991 to January-September 1992.

Cased DRAMs

U.S. inventories of cased "domestic" DRAMs of 1 Meg and above and all cased "domestic" DRAMs are presented in tables 22 and 23, respectively. The data presented are from all known U.S. producers.

U.S. inventories of cased "domestic" DRAMs of 1 Meg and above and all cased "domestic" DRAMs, in terms of units and bits, generally increased from 1989 to 1991, but fell from January-September 1991 to January-September 1992. For cased "domestic" DRAMs of 1 Meg and above and all cased "domestic" DRAMs, the ratio of inventories to total shipments of "domestic" product increased from 1989 to 1991, and fell during the partial-year periods.

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[63] The uncased and cased DRAM inventory data requested of the U.S. producers consist of finished goods inventory of uncased and cased DRAMs, respectively. Note that for reasons specified earlier in this report, inventory data do not reconcile with production and shipment data.

Table 21
Uncased DRAMs: U.S. producers' end-of-period inventories, by products, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Quantity (1,000 units)				
Uncased DRAMs≥1 Meg.....	***	***	***	***	***
All uncased DRAMs.....	***	2,216	1,979	1,131	***
	Quantity (billion bits)				
Uncased DRAMs≥1 Meg.....	***	***	***	***	***
All uncased DRAMs.....	***	2,998	2,544	1,230	***
	Ratio to total shipments, on the basis of bits (percent)				
Uncased DRAMs≥1 Meg.....	***	***	***	***	***
All uncased DRAMs.....	***	***	***	***	***

[1] Data presented were provided by nine U.S. producers of uncased DRAMs and are estimated to account for virtually all inventories of U.S. uncased DRAMs. Reported inventory data may not reconcile with production and shipment data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for discrepancies.

Note.--Ratios are calculated using data of firms supplying both numerator and denominator information. Part-year inventory ratios are annualized.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 22
Cased DRAMs≥1 Meg: End-of-period inventories of "domestic" product,[1] by origins of dice, 1989-91, January-September 1991, and January-September 1992[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*	*

[1] "Domestic" product includes U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location).

[2] Data presented were provided by all U.S. producers of uncased and cased DRAMs and are believed to account for virtually all inventories of "domestic" products held by such producers. Reported inventory data may not reconcile with production and shipment data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 23
Cased DRAMs: End-of-period inventories of "domestic" product,[1] by origins of dice, 1989-91, January-September 1991, and January-September 1992[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Quantity (1,000 units)				
All DRAMs made from U.S. dice--					
Cased in Korea	0	0	0	0	0
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
All DRAMs made from 3rd-source dice cased in United States	***	***	***	***	***
Total	14,549	16,820	16,752	18,298	10,872
	Quantity (billion bits)				
All DRAMs made from U.S. dice--					
Cased in Korea	0	0	0	0	0
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
All DRAMs made from 3rd-source dice cased in United States	***	***	***	***	***
Total	5,964	9,447	17,367	18,608	15,754
	Ratio to total shipments of "domestic" product, on the basis of bits (percent)				
All DRAMs made from U.S. dice--					
Cased in Korea	(3)	(3)	(3)	(3)	(3)
Cased in United States	***	***	***	***	***
Cased in 3rd sources	***	***	***	***	***
Subtotal	***	***	***	***	***
All DRAMs made from 3rd-source dice cased in United States	***	***	***	***	***
Average	4.7	4.8	5.1	5.7	4.1

[1] "Domestic" product includes U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location).

[2] Data presented were provided by all U.S. producers of uncased and cased DRAMs and are believed to account for virtually all inventories of "domestic" products held by such producers. Reported inventory data may not reconcile with production and shipment data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for discrepancies.

[3] Not applicable.

Note.--Bit figures presented have been truncated rather than rounded; however, bit totals and ratios were derived from the untruncated data. Ratios are calculated using data of firms supplying both numerator and denominator information. Part-year inventory ratios are annualized.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. Employment, Wages, and Productivity

All of the firms providing employment information indicated that a union does not represent their production and related workers who produce DRAMs.[64] In addition, almost all of the firms reported the production of other products using the same workers employed in the production of DRAMs.[65]

*** reported reductions in the number of production and related workers of at least 5 percent or 50 workers that were made during the period for which information was requested. The firms, all of which at least operate DRAM wafer fabrication facilities in the United States, reported a total of *** layoffs occurring from *** to ***.[66] The causes of the layoffs as specified by these firms are as follows: ***. The remaining U.S. producers indicated that there were no reductions in the number of production and related workers of at least 5 percent or 50 workers during the period for which information was requested.[67]

* * * * * * *

DRAM Wafer Fabrication Facilities

Eight of the nine U.S. producers of uncased DRAMs supplied full employment data on their uncased DRAM fabrication facilities in response to the Commission's request.[68] These data are presented in table 24.

The number of production and related workers producing uncased DRAMs of 1 Meg and above and the hours worked, wages, and total compensation paid to these production and related workers increased from 1989 to 1991, but fell from January-September 1991 to January-September 1992. The hourly wages paid, hourly total compensation paid, and productivity increased in every period, while the unit labor costs fell in every period.

The number of production and related workers producing all uncased DRAMs and the hours worked by these workers fell irregularly from 1989 to 1991, and fell during the partial-year periods. Wages and total compensation paid to these workers increased from 1989 to 1991, but fell from January-September 1991 to January-September 1992. The hourly wages, hourly total compensation paid to these workers, and productivity increased in every period, while the unit labor costs fell in every period.

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[64] *** did not provide a response.

[65] ***. *** did not provide a response.

[66] The number of workers *** laid off is from ***. *** did not provide this information in its questionnaire response.

[67] *** did not provide a response.

[68] *** did not provide employment information.

Table 24
Average number of U.S. production and related workers producing uncased DRAMs, hours worked,[1] wages and total compensation paid to such employees, and hourly wages, productivity, and unit production costs,[2] by products, 1989-91, January-September 1991, and January-September 1992[3]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Number of production and related workers (PRWs)				
Uncased DRAMs≥1 Meg	***	***	***	***	***
All uncased DRAMs	4,655	4,150	4,340	4,290	3,710
	Hours worked by PRWs (1,000 hours)				
Uncased DRAMs≥1 Meg	***	***	***	***	***
All uncased DRAMs	9,382	8,676	9,056	7,474	6,121
	Wages paid to PRWs (1,000 dollars)				
Uncased DRAMs≥1 Meg	***	***	***	***	***
All uncased DRAMs	113,630	119,146	133,621	108,091	96,207
	Total compensation paid to PRWs (1,000 dollars)				
Uncased DRAMs≥1 Meg	***	***	***	***	***
All uncased DRAMs	145,544	148,474	164,844	132,793	119,518
	Hourly wages paid to PRWs				
Uncased DRAMs≥1 Meg	***	***	***	***	***
All uncased DRAMs	$12.11	$13.73	$14.75	$14.46	$15.72
	Hourly total compensation paid to PRWs				
Uncased DRAMs≥1 Meg	***	***	***	***	***
All uncased DRAMs	$15.51	$17.11	$18.20	$17.77	$19.52
	Productivity (million bits per hour)				
Uncased DRAMs≥1 Meg	***	***	***	***	***
All uncased DRAMs	14.1	22.7	35.4	30.8	52.6
	Unit labor costs (per million bits)				
Uncased DRAMs≥1 Meg	***	***	***	***	***
All uncased DRAMs	$1.10	$0.76	$0.51	$0.58	$0.37

[1] Includes hours worked plus hours of paid leave time.
[2] On the basis of total compensation paid.
[3] The eight firms providing employment data presented accounted for more than 99 percent of total U.S. uncased DRAM production in 1991.

Note.--Ratios are calculated using data of firms supplying both numerator and denominator information.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

DRAM Assembly Facilities

Seven of the eight U.S. producers of cased DRAMs supplied full employment information on their cased DRAM assembly facilities in response to the Commission's request for data.[69] These data are presented in table 25.

The number of production and related workers assembling cased DRAMs of 1 Meg and above and the hours worked, wages paid, total compensation paid, and hourly wages paid to these production and related workers increased during every period for which data were requested. The hourly total compensation paid to these workers and unit labor costs increased from 1989 to 1991, but fell during the partial-year periods, while productivity fell from 1989 to 1991, but increased during the partial-year periods.

The number of production and related workers assembling all cased DRAMs, the hours worked, and the wages and total compensation paid fell during most periods for which data were requested. Hourly wages, hourly total compensation, and productivity increased during all periods, and unit labor costs fell.

Financial Experience of U.S. Producers

Eight producers of DRAMs, ***, supplied financial data[70] on overall establishment operations, operations on all DRAMs, and operations on 1 Meg and above DRAMs. These producers represented approximately 99 and 94 percent, respectively, of U.S. production of uncased and cased DRAMs in 1991. The U.S. operations of each firm varied, with some producers manufacturing almost exclusively in the United States, while the operations of others are widely scattered throughout the world. In addition, the firms produce a wide variety of DRAM-related products. The financial data presented represent the aggregation of each diversified firm's U.S. operations. *** were unable to provide usable financial data. *** did not provide financial data.

Of the responding producers, net sales of all DRAMs represented about *** percent of overall establishment sales in 1991, and net sales of 1 Meg and above DRAMs represented about *** percent.

Data for TI, accounting for approximately *** percent (***) of total net sales of all DRAMs in 1991, were verified by the Commission's staff.

* * * * * * *

Data for Micron, accounting for approximately *** percent (***) of total net sales of all DRAMs in 1991, were also verified by the Commission's staff.

* * * * * * *

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[69] *** did not provide employment data for its U.S. DRAM assembly facility.
[70] ***.

Table 25
Average number of U.S. production and related workers assembling cased DRAMs, hours worked,[1] wages and total compensation paid to such employees, and hourly wages, productivity, and unit production costs,[2] by products, 1989-91, January-September 1991, and January-September 1992[3]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Number of production and related workers (PRWs)				
Cased DRAMs≥1 Meg	***	***	***	***	***
All cased DRAMs	1,727	1,636	1,676	1,520	1,389
	Hours worked by PRWs (1,000 hours)				
Cased DRAMs≥1 Meg	***	***	***	***	***
All cased DRAMs	3,671	3,522	3,485	3,006	2,702
	Wages paid to PRWs (1,000 dollars)				
Cased DRAMs≥1 Meg	***	***	***	***	***
All cased DRAMs	40,709	39,828	40,755	34,449	31,601
	Total compensation paid to PRWs (1,000 dollars)				
Cased DRAMs≥1 Meg	***	***	***	***	***
All cased DRAMs	50,851	49,233	49,944	42,354	41,160
	Hourly wages paid to PRWs				
Cased DRAMs≥1 Meg	***	***	***	***	***
All cased DRAMs	$11.09	$11.31	$11.69	$11.46	$11.69
	Hourly total compensation paid to PRWs				
Cased DRAMs≥1 Meg	***	***	***	***	***
All cased DRAMs	$13.85	$13.98	$14.33	$14.09	$15.23
	Productivity (million bits per hour)				
Cased DRAMs≥1 Meg	***	***	***	***	***
All cased DRAMs	13.4	27.0	46.3	39.7	57.2
	Unit labor costs (per million bits)				
Cased DRAMs≥1 Meg	***	***	***	***	***
All cased DRAMs	$1.04	$0.52	$0.31	$0.35	$0.27

[1] Includes hours worked plus hours of paid leave time.
[2] On the basis of total compensation paid.
[3] The seven firms providing employment data presented accounted for 96 percent of total U.S. cased DRAM assembly in 1991.

Note.--Ratios are calculated using data of firms supplying both numerator and denominator information.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Overall Establishment Operations

Income-and-loss data on the overall establishment operations of the producers with U.S. operations are shown in table 26.

* * * * * * *

Operations on DRAMs of 1 Meg and Above

The 1 Meg and above DRAM operations of U.S. producers responding to Commission questionnaires are shown in table 27. Net sales decreased *** percent from *** in 1989 to *** in 1990, ***. Net sales increased *** percent from 1990 to *** in 1991. As indicated in table 28, the per-unit average sales value dropped annually from 1989 to 1991, but aggregate sales revenue ***. Net sales decreased *** percent from *** in January-September 1991 to *** in the comparable period of 1992 based on lower per-unit net sales values and higher sales volume.

Operating losses were incurred in all periods except 1989 for the reporting companies in the aggregate. ***. The operating loss ratio for 1990, 1991, and interim 1991 fluctuated from *** percent to *** percent, but it decreased to *** percent in interim 1992.

Selected income-and-loss data for DRAMs of 1 Meg and above, by firm, are presented in table 29. ***.

DRAM production costs and sources reported by U.S. producers for their most current fiscal year are presented in appendix F. For 1 Meg DRAMs, the total domestic value added as a share of total cost ranged from a high of approximately *** percent for *** to a low of *** percent for ***. For 4 Meg DRAMs, the total domestic value added as a share of total cost ranged from a high of approximately *** percent for *** to a low of *** percent for ***. For 1 Meg VRAMs, *** reported approximately *** percent total domestic value added as a share of total cost and *** reported approximately *** percent. These value-added percentages are an indication of the cost and location of the production efforts of the producers.

Operations on All DRAMs

The total DRAM operations of the reporting U.S. producers are shown in table 30. Net sales values declined in each comparative period, from $1.59 billion in 1989 to $1.05 billion in 1990 and to $1.03 billion in 1991. Net sales values continued to decline from $793.4 million in interim 1991 to $736.5 million in interim 1992. Net sales quantities in units (table 31) followed the same downward trend, decreasing from 288.3 million units in 1989 to 267.7 million units in 1990 and to 266.2 million units in 1991. The quantity decline continued from 204.8 million units in interim 1991 to 197.2 million units in interim 1992. The per-unit sales value decreased from $5.51 in 1989 to $3.91 in 1990, and to $3.88 in 1991. There was a further decrease in the unit sales value to $3.73 in interim 1992.

Table 26
Income-and-loss experience of U.S. producers[1] on the overall operations of their establishments wherein all DRAMs are produced, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Value (1,000 dollars)				
Net sales	1,965,836	1,417,815	1,514,354	1,156,742	1,170,533
Cost of goods sold	1,223,021	1,361,727	1,500,175	1,118,581	1,099,932
Gross profit or (loss)	742,815	56,088	14,179	38,161	70,601
Selling, general, and administrative expenses	345,939	324,106	352,197	264,545	242,946
Operating income or (loss)	396,876	(268,018)	(338,018)	(226,384)	(172,345)
Startup or shutdown expense[2]	***	***	***	***	***
Interest expense	***	***	***	***	***
Other income, net	***	***	***	***	***
Net income or (loss) before income taxes	***	***	***	***	***
Depreciation and amortization	***	***	***	***	***
Cash flow[3]	***	***	***	***	***
	Ratio to net sales (percent)				
Cost of goods sold	62.2	96.0	99.1	96.7	94.0
Gross profit	37.8	4.0	0.9	3.3	6.0
Selling, general, and administrative expenses	17.6	22.9	23.3	22.9	20.8
Operating income or (loss)	20.2	(18.9)	(22.3)	(19.6)	(14.7)
Net income or (loss) before income taxes	***	***	***	***	***
	Number of firms reporting				
Operating losses	***	***	***	***	***
Net losses	***	***	***	***	***
Data	***	***	***	***	***

[1] The producers are ***.
[2] The startup or shutdown expenses include ***.
[3] Cash flow is defined as net income or loss plus depreciation and amortization.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 27
Income-and-loss experience of U.S. producers[1] on their operations producing DRAMs of 1 Meg and above, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. This table includes DRAMs and VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 28
Income-and-loss experience (on a per-DRAM basis) of U.S. producers[1] on their operations producing DRAMs of 1 Meg and above, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. This table includes DRAMs and VRAMs. Unit values were computed only for those companies having sales of DRAMs of 1 Meg and above and may not be derivable from the data presented.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 29
Income-and-loss experience of U.S. producers[1] on their operations producing DRAMs of 1 Meg and above, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. This table includes DRAMs and VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 30
Income-and-loss experience of U.S. producers[1] on their operations producing all DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Value (1,000 dollars)				
Net sales:					
Trade sales	***	***	***	***	***
Company transfers	***	***	***	***	***
Total net sales	1,587,888	1,046,496	1,032,734	793,377	736,478
Cost of goods sold	887,296	1,011,382	1,020,062	770,053	705,338
Gross profit or (loss)	700,592	35,114	12,672	23,324	31,140
Selling, general, and administrative expenses	233,671	218,570	232,672	177,412	139,836
Operating income or (loss)	466,921	(183,456)	(220,000)	(154,088)	(108,696)
Startup expense	***	***	***	***	***
Interest expense	***	***	***	***	***
Other income, (expense), net	***	***	***	***	***
Net income or (loss) before income taxes	***	***	***	***	***
Depreciation and amortization	***	***	***	***	***
Cash flow[2]	***	***	***	***	***
	Ratio to net sales (percent)				
Cost of goods sold	55.9	96.6	98.8	97.1	95.8
Gross profit	44.1	3.4	1.2	2.9	4.2
Selling, general, and administrative expenses	14.7	20.9	22.5	22.4	19.0
Operating income or (loss)	29.4	(17.5)	(21.3)	(19.4)	(14.8)
Net income or (loss) before income taxes	***	***	***	***	***
	Number of firms reporting				
Operating losses	***	***	***	***	***
Net losses	***	***	***	***	***
Data	***	***	***	***	***

[1] The producers are ***. This table includes DRAMs and VRAMs.
[2] Cash flow is defined as net income or loss plus depreciation and amortization.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 31
Income-and-loss experience (on a per-DRAM basis) of U.S. producers[1] on their operations producing all DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept-- 1991	Jan.-Sept-- 1992
	Quantity (1,000 units)				
Trade sales	***	***	***	***	***
Company transfers	***	***	***	***	***
Total	288,347	267,679	266,184	204,754	197,240
	Value (per unit)				
Net sales:					
Trade sales	***	***	***	***	***
Company transfers	***	***	***	***	***
Average	$5.51	$3.91	$3.88	$3.87	$3.73
Cost of goods sold	3.08	3.78	3.83	3.76	3.58
Gross profit or (loss)	2.43	.13	.05	.11	.16
Selling, general, and administrative expenses	.81	.82	.87	.87	.71
Operating income or (loss)	1.62	(.69)	(.83)	(.75)	(.55)

[1] The producers are ***. This table includes DRAMs and VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The mix of quantities and unit values by density has a major impact on the combined sales values and related costs. During the period for which data were collected, the sales quantity of DRAMs under 1 Meg declined sharply, the sales quantity of 1 Meg DRAMs increased and then decreased, and the sales quantity of 4 Meg DRAMs increased. The unit sales values of each of these densities declined during the period. A summary of the quantities sold, the sales values, and the unit sales values as presented in appendix B for VRAMs and appendix D for DRAMs is presented in the following tabulation:

* * * * * * *

The product yield loss, expressed as a percent of production quantity input, has an effect on the cost of production, i.e, the lower the loss, the more units are produced which, in turn, lowers the costs per unit. The yield losses reported by the companies[71] are presented in the following tabulation (in percent):

* * * * * * *

[71] *** reported that the yield loss for DRAM memory modules was ***.

Cash flow is an important financial indicator in this capital-intensive industry. Depreciation is a relatively high share of costs, due to the large capital investments in production facilities and equipment and the relatively short useful life of the equipment used in DRAM production. In the operations on all DRAMs, capital expenditures (discussed in a subsequent section) exceeded depreciation in each time period and also exceeded cash flow in each period except 1989.

Selected income and loss data for all DRAMS, by firms, are presented in table 32. The financial results of the operations of these firms are influenced by their specific products produced. The companies included the following items in their financial data:[72]

* * * * * * *

Combined Operations on All DRAMs and All Memory Modules

The combined operations of the producers on all DRAMs and all memory modules are shown in table 33.[73] Net sales fluctuated, dropping significantly from $1.74 billion in 1989 to $1.16 billion in 1990 and rising slightly to $1.19 billion in 1991. Net sales were $871.6 million in interim 1992 compared to $914.6 million in interim 1991. The companies realized a combined operating return of 29.6 percent of net sales in 1989, but then incurred significant operating losses in 1990, 1991, interim 1991, and interim 1992. As shown in table 34, ***.

Combined Operations on DRAMs of 1 Meg and Above and Memory Modules Containing DRAMs of 1 Meg and Above

The combined operations of the producers of DRAMs of 1 Meg and above and memory modules containing DRAMs of 1 Meg and above are shown in table 35. Net sales fluctuated, dropping from $1.08 billion in 1989 to $983.1 million in 1990, then rising above the 1989 level to $1.12 billion in 1991. Net sales were $848.9 million in interim 1992 compared to $843.2 million in interim 1991. The companies realized a combined operating return of 25.5 percent of net sales in 1989, but then incurred significant operating losses in 1990, 1991, interim 1991, and interim 1992. As shown in table 36, ***.

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[72] In order not to double count the revenue from DRAM production, the revenue includes only the final sales or transfer values of U.S.-produced cased DRAMs and the final sales or transfer values of U.S.-produced uncased DRAMs that are not used as captive consumption in the assembly of U.S.-produced cased DRAMs. For this reason, the aggregate financial data do not track the shipment data, which segregate uncased and cased DRAM shipments; however, on an individual company basis the shipment values and financial revenue were reconciled.

[73] This section combines data on the producers' operations on DRAMs with data on modules assembled by producers as provided in app. C.

* * * * * * *

Table 32
Income-and-loss experience of U.S. producers[1] on their operations producing all DRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Value (1,000 dollars)				
Trade sales:					
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
Total.....	***	***	***	***	***
Company transfers:					
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
Total.....	***	***	***	***	***
Total net sales:					
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
Total.....	1,587,888	1,046,496	1,032,734	793,377	736,478
Operating income or (loss):					
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
Total.....	466,921	(183,456)	(220,000)	(154,088)	(108,696)
	Ratio to net sales (percent)				
Operating income or (loss):					
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
***.....	***	***	***	***	***
Average.....	29.4	(17.5)	(21.3)	(19.4)	(14.8)

[1] The producers are ***. This table includes DRAMs and VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 33
Income-and-loss experience of U.S. producers[1] on their operations producing all DRAMs and modules, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Value (1,000 dollars)				
Net trade sales	***	***	***	***	***
Net company transfers	***	***	***	***	***
Total net sales	1,739,964	1,160,084	1,190,331	914,560	871,571
Cost of goods sold	965,350	1,088,201	1,190,922	881,591	852,404
Gross profit or (loss)	774,614	71,883	(591)	32,969	19,167
Selling, general, and administrative expenses	259,224	235,656	252,605	193,752	149,629
Operating income or (loss)	515,390	(163,773)	(253,196)	(160,783)	(130,462)
Startup or shutdown expense	***	***	***	***	***
Interest expense	***	***	***	***	***
Other income, net	***	***	***	***	***
Net income or (loss) before income taxes	***	***	***	***	***
Depreciation and amortization	***	***	***	***	***
Cash flow[2]	***	***	***	***	***
	Ratio to net sales (percent)				
Cost of goods sold	55.5	93.8	100.0	96.4	97.8
Gross profit or (loss)	44.5	6.2	[3]	3.6	2.2
Selling, general, and administrative expenses	14.9	20.3	21.2	21.2	17.2
Operating income or (loss)	29.6	(14.1)	(21.3)	(17.6)	(15.0)
Net income or (loss) before income taxes	***	***	***	***	***
	Number of firms reporting				
Operating losses	***	***	***	***	***
Net losses	***	***	***	***	***
Data	***	***	***	***	***

[1] The producers are ***. This table includes DRAMs, VRAMs, and memory modules.
[2] Cash flow is defined as net income or loss plus depreciation and amortization.
[3] Less than (0.05) percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 34
Income-and-loss experience of U.S. producers[1] on their operations producing all DRAMs and modules, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Value (1,000 dollars)				
Net trade sales:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
Net company transfers:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
Total net sales:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	1,739,964	1,160,084	1,190,331	914,560	871,571
Operating income or (loss):					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	515,390	(163,773)	(253,196)	(160,783)	(130,462
	Ratio to net sales (percent)				
Operating income or (loss):					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Average	29.6	(14.1)	(21.3)	(17.6)	(15.(

[1] The producers are ***. This table includes DRAMs, VRAMs, and memory modules.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 35
Income-and-loss experience of U.S. producers[1] on their combined operations producing DRAMs of 1 Meg and above and modules containing DRAMs of 1 Meg and above, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Value (1,000 dollars)				
Net trade sales	***	***	***	***	***
Net company transfers	***	***	***	***	***
Total net sales	1,078,450	983,062	1,119,280	843,159	848,934
Cost of goods sold	621,426	931,478	1,135,566	828,352	829,892
Gross profit or (loss)	457,024	51,584	(16,286)	14,807	19,042
Selling, general, and administrative expenses	181,917	219,704	249,657	189,309	149,645
Operating income or (loss)	275,107	(168,120)	(265,943)	(174,502)	(130,603)
Startup or shutdown expense	***	***	***	***	***
Interest expense	***	***	***	***	***
Other income, net	***	***	***	***	***
Net income or (loss) before income taxes	***	***	***	***	***
Depreciation and amortization	***	***	***	***	***
Cash flow[2]	***	***	***	***	***
	Ratio to net sales (percent)				
Cost of goods sold	57.6	94.8	101.5	98.2	97.8
Gross profit or (loss)	42.4	5.2	(1.5)	1.8	2.2
Selling, general, and administrative expenses	16.9	22.3	22.3	22.5	17.6
Operating income or (loss)	25.5	(17.1)	(23.8)	(20.7)	(15.4)
Net income or (loss) before income taxes	***	***	***	***	***
	Number of firms reporting				
Operating losses	***	***	***	***	***
Net losses	***	***	***	***	***
Data	***	***	***	***	***

[1] The producers are ***. This table includes DRAMs, VRAMs, and memory modules.
[2] Cash flow is defined as net income or loss plus depreciation and amortization.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 36
Income-and-loss experience of U.S. producers[1] on their combined operations producing DRAMs of 1 Meg and above and modules containing 1 Meg and above DRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Value (1,000 dollars)				
Net trade sales:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
Net company transfers:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***
Total net sales:					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	1,078,450	983,062	1,119,280	843,159	848,934
Operating income or (loss):					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	275,107	(168,120)	(265,943)	(174,502)	(130,603)
	Ratio to net sales (percent)				
Operating income or (loss):					
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Average	25.5	(17.1)	(23.8)	(20.7)	(15.4)

[1] The producers are ***. This table includes DRAMs, VRAMs, and memory modules.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Sources of Financing

The producers were requested to provide information concerning their sources of financing for capital expenditures.

* * * * * * *

Investment in Productive Facilities and Return on Assets

Data on investment in productive facilities and return on assets are shown in table 37 for all DRAMs. Many of the producers indicated in their questionnaire responses that much of the equipment is commonly used for the production of all densities of DRAMs; therefore, operating and net returns by density are not provided.

Table 37
Value of assets and return on assets of U.S. producers for all DRAMs, fiscal years 1989-91[1]

Item	As of the fiscal year end-- 1989	1990	1991
	Value (1,000 dollars)		
Fixed assets:			
Original cost	1,801,155	2,386,451	2,768,205
Book value	1,014,748	1,394,285	1,562,598
Total assets[2]	1,394,144	1,879,887	1,978,862
	Return on total assets (percent)		
Operating return[3]	33.5	(9.8)	(11.1)
Net return[4]	***	***	***

[1] The producers are ***. This table includes DRAMs and VRAMs. ***.
[2] Defined as the book value of fixed assets plus current and noncurrent assets. Total establishment assets are apportioned, by firm, to product groups on the basis of the ratios of the respective book values of fixed assets.
[3] Defined as operating income or loss divided by asset value.
[4] Defined as net income or loss divided by asset value.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital Expenditures

The capital expenditures of the U.S. DRAM producers are shown in table 38, by firms, for all DRAMs. The questionnaire requested the producers to describe how capital expenditures are allocated among products. Many of the companies indicated that DRAMs and VRAMs are produced on the same equipment and that some equipment is common to the various densities of DRAMs. Some of the companies allocated capital expenditures using specific identification, cycle time, or quantity produced. Total capital expenditures for all DRAMs combined decreased in each year, from $612.5 million in 1989 to $533.7 million in 1990 and $514.2 million in 1991. Capital expenditures in interim 1992 were $271.6 million, considerably less than the $481.8 million in interim 1991.

Table 38
Capital expenditures by U.S. producers[1] of DRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

(1,000 dollars)

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	612,472	533,738	514,183	481,790	271,642

[1] The producers are ***. This table includes DRAMs and VRAMs. ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

R&D Expenses

The R&D expenditures[74] of the responding producers are shown in table 39. The ability to fund continuing R&D in this industry is critical to continued profitability.

* * * * * * *

[74] In accordance with generally accepted accounting principles, R&D expenditures are expensed in the year incurred.

Table 39
R&D expenses of U.S. producers[1] of DRAMs, by products and by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

(1,000 dollars)

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
DRAMs (other than VRAMs):					
DRAMs below 1 Meg:					
***	***	***	***	***	***
1 Meg DRAMs:					
***	***	***	***	***	***
4 Meg DRAMs:					
***	***	***	***	***	***
16 Meg DRAMs:					
***	***	***	***	***	***
Over 16 Meg DRAMs:					
***	***	***	***	***	***
All VRAMs:					
***	***	***	***	***	***
Total	***	154,103	152,634	115,950	82,337

[1] The producers are ***. This table includes DRAMs and VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Micron[75] stated in its questionnaire response that ***. TI stated ***. Decisions to make R&D investments ***.

Aggregate reported R&D expenses for all DRAMs (including VRAMs) increased from *** in 1989 to $154.1 million in 1990 and then decreased slightly to $152.6 million in 1991. R&D expenses were $82.3 million in interim 1992, substantially less than those in interim 1991.

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[75] *** the following disclosure in Micron's 1992 annual report to shareholders.

"Micron Technology, Inc.'s cross-license agreement with Texas Instruments, Inc. expired on September 3, 1992. Attempts to negotiate a new cross-license agreement on terms acceptable to the company were unsuccessful. Consequently, Micron Semiconductor, Inc. brought suit in the U.S. District Court for the District of Idaho to have certain Texas Instruments, Inc. patents declared invalid or not infringed. Texas Instruments, Inc. brought suit against Micron Technology, Inc. and Micron Semiconductor, Inc. in the U.S. District Court for the Eastern District of Texas, alleging patent infringement by the company subsequent to expiration of the cross-license agreement. Due to the early stage of the litigation, the company cannot predict the outcome of these suits. An adverse decision on infringement of the Texas Instruments, Inc. patents may require material changes in production processes or products and may have a material adverse effect on the company's future financial position or results of operations."

Capital and Investment

The Commission requested the U.S. producers to describe any actual or potential negative effects of imports of DRAMs of 1 Meg and above from Korea on their growth, development and production efforts, investment, and ability to raise capital (including efforts to develop a derivative or improved version of its product). Comments from the companies are presented in appendix G.

CONSIDERATION OF THE QUESTION OF THREAT OF MATERIAL INJURY

Section 771(7)(F)(i) of the Tariff Act of 1930 (19 U.S.C. § 1677(7)(F)(i)) provides that--

> In determining whether an industry in the United States is threatened with material injury by reason of imports (or sales for importation) of the merchandise, the Commission shall consider, among other relevant economic factors[76]--
>
> > (I) If a subsidy is involved, such information as may be presented to it by the administering authority as to the nature of the subsidy (particularly as to whether the subsidy is an export subsidy inconsistent with the Agreement),
> >
> > (II) any increase in production capacity or existing unused capacity in the exporting country likely to result in a significant increase in imports of the merchandise to the United States,
> >
> > (III) any rapid increase in United States market penetration and the likelihood that the penetration will increase to an injurious level,
> >
> > (IV) the probability that imports of the merchandise will enter the United States at prices that will have a depressing or suppressing effect on domestic prices of the merchandise,
> >
> > (V) any substantial increase in inventories of the merchandise in the United States,
> >
> > (VI) the presence of underutilized capacity for producing the merchandise in the exporting country,

---

[76] Section 771(7)(F)(ii) of the act (19 U.S.C. § 1677(7)(F)(ii)) provides that "Any determination by the Commission under this title that an industry in the United States is threatened with material injury shall be made on the basis of evidence that the threat of material injury is real and that actual injury is imminent. Such a determination may not be made on the basis of mere conjecture or supposition."

> (VII) any other demonstrable adverse trends that indicate the probability that the importation (or sale for importation) of the merchandise (whether or not it is actually being imported at the time) will be the cause of actual injury,
>
> (VIII) the potential for product-shifting if production facilities owned or controlled by the foreign manufacturers, which can be used to produce products subject to investigation(s) under section 701 or 731 or to final orders under section 706 or 736, are also used to produce the merchandise under investigation,
>
> (IX) in any investigation under this title which involves imports of both a raw agricultural product (within the meaning of paragraph (4)(E)(iv)) and any product processed from such raw agricultural product, the likelihood that there will be increased imports, by reason of product shifting, if there is an affirmative determination by the Commission under section 705(b)(1) or 735(b)(1) with respect to either the raw agricultural product or the processed agricultural product (but not both), and
>
> (X) the actual and potential negative effects on the existing development and production efforts of the domestic industry, including efforts to develop a derivative or more advanced version of the like product.[77]

Information on the volume, U.S. market penetration, and pricing of imports of the subject merchandise (items (III) and (IV) above) is presented in the section entitled "Consideration of the Causal Relationship Between Imports of the Subject Merchandise and the Alleged Material Injury" and information on the effects of imports of the subject merchandise on U.S. producers' existing development and production efforts (item (X)) is presented in the section entitled "Consideration of Alleged Material Injury." Available information on U.S. inventories of the subject products (item (V)); foreign producers' operations, including the potential for "product-shifting" (items (II), (VI), and (VIII) above); any other threat indicators, if applicable (item (VII) above); and any dumping in third-country markets, follows. Other threat indicators have not been alleged or are otherwise not applicable.

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[77] Section 771(7)(F)(iii) of the act (19 U.S.C. § 1677(7)(F)(iii)) further provides that, in antidumping investigations, ". . . the Commission shall consider whether dumping in the markets of foreign countries (as evidenced by dumping findings or antidumping remedies in other GATT member markets against the same class or kind of merchandise manufactured or exported by the same party as under investigation) suggests a threat of material injury to the domestic industry."

U.S. Inventories of Imports From Korea

Cased DRAM Inventories

Data for U.S. importers' inventories of Korean cased DRAMs are presented in table 40. There were virtually no imports of uncased DRAMs from Korea reported during the period for which information was requested.

U.S. importers' inventories of cased Korean DRAMs of 1 Meg and above, by quantity in units, fell irregularly from 1989 to 1991, but increased from January-September 1991 to January-September 1992. By quantity in bits, U.S. importers' inventories of cased DRAMS of 1 Meg and above increased during all periods. The ratio of end-of-period inventories of 1 Meg and above DRAMs to total shipments (based on bits) fell in all periods.

U.S. importers' inventories of all cased Korean DRAMs, by quantity in units, fell in all periods for which data were requested. By quantity in bits, U.S. importers' inventories of all cased DRAMS increased during all periods. The ratio of end-of-period inventories of all DRAMs to total shipments (based on units) fell in all periods.

Table 40
Cased DRAMs: U.S. importers' end-of-period inventories of Korean product, by products and by sources, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*	*

[1] Inventory data presented are from firms whose imports of cased DRAMs from Korea are estimated to account for greater than 95 percent of U.S. DRAM imports from Korea. Inventory data may not reconcile with shipment and import data. Firms cited "scrap, samples, returns, and theft" as reasons for discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Total Subject Inventories

Imports from Korea of memory modules that contain DRAMs of 1 Meg and above are also subject to this investigation. Inventories of such products held in the United States are presented in appendix C (table C-2). Totals of U.S. inventories of the subject product are shown in table 41. Subject inventories increased in all periods; however the ratio of subject inventories to total shipments fell in all periods.

Table 41
Subject DRAMs≥1 Meg and modules containing such DRAMs: End-of-period inventories held by U.S. importers of the subject product, by products and by sources, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Quantity (billion bits)				
Cased DRAMs≥1 Meg:					
Korea (Korean dice).....	***	***	***	***	***
3rd sources (Korean dice)..	***	***	***	***	***
Subtotal.....	***	***	***	***	***
Modules from Korea containing DRAMs≥1 Meg.....	***	***	***	***	***
Total.....	10,234	14,613	19,697	18,480	33,782
	Ratio to total shipments, on the basis of bits, (percent)				
Cased DRAMs≥1 Meg:					
Korea (Korean dice).....	***	***	***	***	***
3rd sources (Korean dice)..	***	***	***	***	***
Average.....	***	***	***	***	***
Modules from Korea containing DRAMs≥1 Meg.....	***	***	***	***	***
Average.....	24.9	15.7	10.7	11.6	9.1

[1] Inventory data presented are from firms whose imports of cased DRAMs and DRAM memory modules from Korea and are estimated to account for greater than 95 percent of these imports from Korea. Inventory data may not reconcile with shipment and import data. Firms cited "scrap, samples, returns, and theft" as reasons for discrepancies.

Note.--The term "3rd source" refers to countries other than Korea and the United States. Bit figures presented have been truncated rather than rounded; however, bit totals and ratios were derived from the untruncated data. Ratios are calculated using data of firms supplying both numerator and denominator information. Part-year inventory ratios are annualized.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Ability of Korean Producers to Generate Exports and the Availability of Export Markets Other Than the United States

The Commission requested information regarding Korean operations producing DRAMs. Responses to this request were provided by Goldstar, Hyundai, and Samsung. These three firms are believed to represent virtually all DRAM production in Korea from January 1989 to September 1992.

The uncased and cased DRAM capacity data requested consist of Korean producers' full production capability to fabricate DRAM wafers and assemble cased DRAMs, respectively, based on the maximum level of production that their DRAM wafer fabrication and assembly operations could reasonably expect to attain under normal operating conditions. Production data presented for uncased and cased DRAMs are intended to represent the successful fabrication of all uncased DRAM dice and the successful assembly of all cased DRAMs, respectively. These data include products that are produced for captive consumption as well as market shipments.

The vast majority of Korean production of uncased DRAMs was used by each firm in its assembly of cased DRAMs, with a limited amount of reported market sales. In Goldstar's, Hyundai's, and Samsung's most recent fiscal years, sales of uncased DRAMs of 1 Meg and above represented *** percent, *** percent, and *** percent of total sales, respectively, and sales of cased DRAMs of 1 Meg and above represented *** percent, *** percent, and *** percent of each firm's total sales, respectively.[78]

In addition to DRAMs, all three Korean producers manufacture other products on the same equipment and machinery used in the production of DRAMs. These other products include SRAMs, EPROMs, electronically EPROMs (EEPROMs), programmable electrical erasable logic (PEEL), ASICs, and ROMs. Goldstar, Hyundai, and Samsung indicated that these other products accounted for *** percent, *** percent, and *** percent of total company sales in their most recent fiscal year, respectively.

Korean DRAM Wafer Fabrication Operations

Data received by the Commission on Korean operations concerning 1 Meg and above and all uncased DRAMs are presented in tables 42 and 43. Korean producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year. As shown, aggregate Korean capacity to produce uncased DRAMs of 1 Meg and above increased during all periods for which information was requested. Korean producers' capacity to produce all uncased DRAMs increased from 1989 to 1991 but fell slightly during the partial-year periods.

---

[78] The shares are calculated based on the total sales of Goldstar Electron Co., Ltd.; Hyundai Electronics Industries Co., Ltd.; and Samsung Semiconductor, Inc. All are owned by much larger Korean firms generally known by the same name; each produces many other products and has billions of dollars of total sales.

Table 42
Uncased DRAMs≥1 Meg: Korean capacity,[1] wafer starts,[2] capacity utilization,[3] production,[4] end-of-period inventories, and shipments, 1989-91, January-September 1991, January-September 1992, and projected 1992-93[5]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	Quantity (1,000 wafers)						
Average-of-period capacity...	***	1,212	1,866	1,291	1,536	2,103	2,037
Wafer starts.....	***	1,125	1,574	1,113	1,455	1,969	1,899
Capacity utilization (percent).....	***	92.8	84.4	86.2	94.7	93.6	93.2
	Quantity (1,000 units)						
Production.....	***	***	290,427	209,780	269,354	355,089	374,510
End-of-period inventories....	***	***	***	***	***	***	***
Shipments:							
Home market[6].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[7].....	***	***	***	***	***	***	***
Total exports.....	***	***	***	***	***	***	***
Total shipments.....	***	***	***	***	***	***	***
	Quantity (billion bits)						
Production.....	***	***	422,889	277,952	616,784	874,200	1,197,986
End-of-period inventories....	***	***	***	***	***	***	***
Shipments:							
Home market[6].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[7].....	***	***	***	***	***	***	***
Total exports.....	***	***	***	***	***	***	***
Total shipments.....	***	***	***	***	***	***	***
	Ratios and shares, on the basis of units (percent)						
Inventories to production....	***	***	***	***	***	***	***
Inventories to total shipments.....	***	***	***	***	***	***	***
Share of total quantity of shipments:							
Home market[6].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[7].....	***	***	***	***	***	***	***
	Ratios and shares, on the basis of bits (percent)						
Inventories to production....	***	***	***	***	***	***	***
Inventories to total shipments.....	***	***	***	***	***	***	***
Share of total quantity of shipments:							
Home market[6].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[7].....	***	***	***	***	***	***	***

[1] Korean producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year.

[2] Wafer starts represent the number of raw silicon wafers introduced into the DRAM wafer fabrication process and were collected in this investigation in order to calculate the capacity utilization of Korean DRAM wafer fabrication facilities. The reported sizes of the silicon wafers used in the Korean production of uncased DRAMs range from 4 to 6 inches.

[3] Capacity utilization is defined as wafer starts divided by capacity.

[4] Production data presented for uncased DRAMs are intended to represent the successful fabrication of uncased DRAM dice and include uncased DRAMs that are used in the production of cased DRAMs.

[5] Data presented are believed to account for all Korean DRAM production from 1989 to September 1992.

[6] "Home market" shipments include captive consumption as well as market shipments.

[7] Exports to "other markets" were principally destined for ***.

Note.--Capacity utilization and inventory ratios are calculated from data of firms providing both numerator and denominator information. Bit figures have been truncated rather than rounded; however, bit totals, ratios, and shares were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 43
Uncased DRAMs: Korean capacity,[1] wafer starts,[2] capacity utilization,[3] production,[4] end-of-period inventories, and shipments, 1989-91, January-September 1991, January-September 1992, and projected 1992-93[5]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	Quantity (1,000 wafers)						
Average-of-period capacity...	***	1,918	2,196	1,616	1,591	2,181	2,080
Wafer starts.....	***	1,589	1,801	1,323	1,504	2,027	1,947
Capacity utilization (percent).....	***	82.8	82.0	81.9	94.5	92.9	93.6
	Quantity (1,000 units)						
Production.....	***	***	425,788	325,257	299,440	391,554	400,840
End-of-period inventories....	***	***	***	***	***	***	***
Shipments:							
Home market[6].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[7].....	***	***	***	***	***	***	***
Total exports.....	***	***	***	***	***	***	***
Total shipments.....	***	***	***	***	***	***	***
	Quantity (billion bits)						
Production.....	***	***	458,333	308,197	624,381	883,451	1,204,888
End-of-period inventories....	***	***	***	***	***	***	***
Shipments:							
Home market[6].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[7].....	***	***	***	***	***	***	***
Total exports.....	***	***	***	***	***	***	***
Total shipments.....	***	***	***	***	***	***	***
	Ratios and shares, on the basis of units (percent)						
Inventories to production....	***	***	***	***	***	***	***
Inventories to total shipments.....	***	***	***	***	***	***	***
Share of total quantity of shipments:							
Home market[6].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[7].....	***	***	***	***	***	***	***
	Ratios and shares, on the basis of bits (percent)						
Inventories to production....	***	***	***	***	***	***	***
Inventories to total shipments.....	***	***	***	***	***	***	***
Share of total quantity of shipments:							
Home market[6].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[7].....	***	***	***	***	***	***	***

[1] Korean producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year.

[2] Wafer starts represent the number of raw silicon wafers introduced into the DRAM wafer fabrication process and were collected in this investigation in order to calculate the capacity utilization of Korean DRAM wafer fabrication facilities. The reported sizes of the silicon wafers used in the Korean production of uncased DRAMs range from 4 to 6 inches.

[3] Capacity utilization is defined as wafer starts divided by capacity.

[4] Production data presented for uncased DRAMs are intended to represent the successful fabrication of uncased DRAM dice and include uncased DRAMs that are used in the production of cased DRAMs.

[5] Data presented are believed to account for all Korean DRAM production from 1989 to September 1992.

[6] "Home market" shipments include captive consumption as well as market shipments.

[7] Exports to "other markets" were principally destined for ***.

Note.--Capacity utilization and inventory ratios are calculated from data of firms providing both numerator and denominator information. Bit figures have been truncated rather than rounded; however, bit totals, ratios, and shares were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

In answer to a question on whether or not the firm plans to add, expand, curtail, or shut down production capacity and/or production of DRAMs in Korea, Goldstar responded as follows:

* * * * * * *

Hyundai indicated ***. ***. The firm also indicated ***.[79]

Samsung reported ***.[80] ***.

The data presented concerning wafer starts represent the number of raw silicon wafers introduced into the DRAM wafer fabrication process. These data were collected in this investigation in order to calculate the capacity utilization of Korean DRAM wafer fabrication facilities. Wafer yield (i.e., the percentage of wafer starts that reach the final test step prior to assembly, in terms of usable DRAM dice) reported by Korean producers of all uncased DRAMs ranged from *** to *** percent for Goldstar,[81] *** to *** percent for Hyundai, and *** to *** percent for Samsung. The reported size of the silicon wafers used in the production of uncased DRAMs ranged from 4 to 6 inches. The total quantity of wafer starts reported by Korean producers of uncased DRAMs of 1 Meg and above and all uncased DRAMs increased during all periods of the investigation. The calculated capacity utilization for Korean production of uncased DRAMs of 1 Meg and above increased irregularly from *** percent in 1989 to 94.7 percent in January-September 1992. The Korean capacity utilization for all uncased DRAMs remained relatively stable at about 82 percent from 1989 to 1991, but increased to 94.5 percent during January-September 1992.

Korean production of uncased DRAMs of 1 Meg and above and all uncased DRAMs (in bits) increased in all periods. In units, Korean production of uncased DRAMs of 1 Meg and above and all uncased DRAMs increased steadily from 1989 to 1991. From January-September 1991 to January-September 1992, Korean production of uncased DRAMs of 1 Meg and above increased in units, but production of all uncased DRAMs fell. Inventories, though generally increasing throughout the period, remained relatively minor as a share of total shipments. Projections reported by Korean producers indicate that production and shipments of uncased DRAMs of 1 Meg and above and of all uncased DRAMs are expected to increase in both units and bits in 1993.

Korean DRAM Assembly Operations

Data received by the Commission on Korean operations concerning 1 Meg and above and all cased DRAMs are presented in tables 44 and 45. Korean producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year. As reported, total Korean capacity to produce cased DRAMs of 1 Meg and above increased during all periods for which

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[79] ***.

[80] ***.

[81] ***.

Table 44
Cased DRAMs≥1 Meg: Korean capacity,[1] production,[2] inventories, capacity utilization, and shipments, 1989-91, January-September 1991, January-September 1992, and projected 1992-93[3]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
			Quantity (1,000 units)				
Average-of-period capacity...	***	***	354,315	261,298	330,732	443,763	450,900
Production.....	***	***	286,332	206,211	260,312	343,323	370,280
Capacity utilization[4].....	***	***	80.8	78.9	78.7	77.4	82.1
End-of-period inventories....	***	***	***	***	***	***	***
Shipments:							
Home market[5].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	89,147	64,361	78,702	96,400	***
All other markets[6].....	***	***	***	***	***	***	***
Total exports.....	***	***	***	***	***	***	***
Total shipments.....	***	***	***	***	***	***	***
			Quantity (billion bits)				
Production.....	***	***	416,629	272,089	593,383	847,839	1,182,924
End-of-period inventories....	***	***	***	***	***	***	***
Shipments:							
Home market[5].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	133,906	88,887	171,344	225,826	***
All other markets[6].....	***	***	***	***	***	***	***
Total exports.....	***	***	***	***	***	***	***
Total shipments.....	***	***	***	***	***	***	***
			Ratios and shares, on the basis of units (percent)				
Inventories to production....	***	***	***	***	***	***	***
Inventories to total shipments.....	***	***	***	***	***	***	***
Share of total quantity of shipments:							
Home market[5].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[6].....	***	***	***	***	***	***	***
			Ratios and shares, on the basis of bits (percent)				
Inventories to production....	***	***	***	***	***	***	***
Inventories to total shipments.....	***	***	***	***	***	***	***
Share of total quantity of shipments:							
Home market[5].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[6].....	***	***	***	***	***	***	***

[1] Korean producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year.
[2] Production data presented for cased DRAMs are intended to represent the successful assembly of cased DRAMs.
[3] Data presented are believed to account for all Korean DRAM production from 1989 to September 1992.
[4] Capacity utilization is defined as assembly divided by capacity.
[5] "Home market" shipments include captive consumption as well as market shipments.
[6] Exports to "other markets" were principally destined for ***.

Note.--Capacity utilization and inventory ratios are calculated from data of firms providing both numerator and denominator information. Bit figures have been truncated rather than rounded; however, bit totals, ratios, and shares were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 45
Cased DRAMs: Korean capacity,[1] production,[2] inventories, capacity utilization, and shipments, 1989-91, January-September 1991, January-September 1992, and projected 1992-93[3]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	Quantity (1,000 units)						
Average-of-period capacity...	***	***	519,475	384,088	379,953	511,156	493,420
Production.....	***	***	416,983	317,969	290,253	380,666	395,774
Capacity utilization[4].....	***	***	80.3	82.8	76.4	74.5	80.2
End-of-period inventories....	***	***	***	***	***	***	***
Shipments:							
Home market[5].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	118,014	89,273	87,190	105,749	***
All other markets[6].....	***	***	***	***	***	***	***
Total exports.....	***	***	***	***	***	***	***
Total shipments.....	***	***	***	***	***	***	***
	Quantity (billion bits)						
Production.....	***	***	450,859	301,371	600,942	857,320	1,189,607
End-of-period inventories....	***	***	***	***	***	***	***
Shipments:							
Home market[5].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	141,238	95,291	173,325	228,003	***
All other markets[6].....	***	***	***	***	***	***	***
Total exports.....	***	***	***	***	***	***	***
Total shipments.....	***	***	***	***	***	***	***
	Ratios and shares, on the basis of units (percent)						
Inventories to production....	***	***	***	***	***	***	***
Inventories to total shipments.....	***	***	***	***	***	***	***
Share of total quantity of shipments:							
Home market[5].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[6].....	***	***	***	***	***	***	***
	Ratios and shares, on the basis of bits (percent)						
Inventories to production....	***	***	***	***	***	***	***
Inventories to total shipments.....	***	***	***	***	***	***	***
Share of total quantity of shipments:							
Home market[5].....	***	***	***	***	***	***	***
Exports to--							
The United States.....	***	***	***	***	***	***	***
All other markets[6].....	***	***	***	***	***	***	***

[1] Korean producers reported capacity data on the basis of ***- to ***-hour work weeks, operating *** to *** weeks per year.
[2] Production data presented for cased DRAMs are intended to represent the successful assembly of cased DRAMs.
[3] Data presented are believed to account for all Korean DRAM production from 1989 to September 1992.
[4] Capacity utilization is defined as assembly divided by capacity.
[5] "Home market" shipments include captive consumption as well as market shipments.
[6] Exports to "other markets" were principally destined for ***.

Note.--Capacity utilization and inventory ratios are calculated from data of firms providing both numerator and denominator information. Bit figures have been truncated rather than rounded; however, bit totals, ratios, and shares were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

information was requested. Korean producers' capacity to produce all cased DRAMs increased from 1989 to 1991, but fell during the partial-year periods.

Total production of 1 Meg and above cased DRAMs reported by Korean producers in units and bits increased in all periods of the investigation. Total Korean production of all cased DRAMs in bits increased in all periods; however, Korean production of all cased DRAMs in units increased from 1989 to 1991, but fell between the partial-year periods. The calculated capacity utilization for all Korean assembly of cased DRAMs of 1 Meg and above and of all cased DRAMs increased from 1989 to 1990, but fell thereafter.

Shipments of 1 Meg and above cased DRAMs to the United States accounted for *** percent of Korean producers' total shipments of 1 Meg and above cased DRAMs on the basis of bits in 1989, but fell each succeeding period to *** percent in partial-year 1992. However, these shipments increased in bits and units in all periods for which data were requested. Presented in the following tabulation are the three Korean producers and their shares of exports of DRAMs of 1 Meg and above to the United States (in percent):

				January-September	
Korean producer	1989	1990	1991	1991	1992
Goldstar.....	***	***	***	***	***
Hyundai.....	***	***	***	***	***
Samsung.....	***	***	***	***	***
Total.....	100.0	100.0	100.0	100.0	100.0

Korean shipments of cased DRAMs of 1 Meg and above and all cased DRAMs to the home market and to all countries other than the United States, in both units and bits, increased in all periods for which data were requested. Korean producers' end-of-period inventories of cased DRAMs of 1 Meg and above and of all cased DRAMs in terms of both bits and units generally increased from 1989 to 1991, but fell from January-September 1991 to January-September 1992. As a share of total shipments, inventories generally fell throughout the period.

Projections reported by Korean producers indicate that exports of 1 Meg and above cased DRAMs and of all cased DRAMs to the United States are expected to fall in both units and bits in 1993.[82]

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[82] A recent Korean press report, subsequent to Commerce's final determination, states that the Korean DRAM producers will "now devote their efforts to improving the export structure with emphasis placed on improvement of product quality. Although their export price might be high, they would avoid any sudden upsurge in their export in quantity. Samsung Electronics, Goldstar Electron, and Hyundai Electronics decided to keep the export quantities to the U.S. at last year's level." U.S. Department of State telegram, Mar. 29, 1993, Seoul, message reference No. 02971.

EC Investigation

In response to a complaint lodged by the European Electronic Component Manufacturers' Association,[83] the Commission of the European Communities (EC Commission) initiated an antidumping proceeding in March 1991 concerning imports into the EC of certain types of DRAMs originating in Korea. Following an investigation which covered the 1990 calendar year, the EC Commission concluded[84] that all types, densities, and variations of DRAM products,[85] including future densities, future process technologies, and future packages, are one product. The EC Commission also concluded that the Korean DRAM product sold in the Korean market and the EC DRAM product sold in the EC market are "alike." The EC Commission found that "the preliminary examination of the facts showed the existence of dumping in respect of imports of the product concerned originating in Korea" and that the EC "industry has been suffering material injury" caused by the dumped imports of DRAMs from Korea. The weighted-average dumping margins provisionally established by the EC Commission are as follows (in percent):

Korean producer	Dumping margin
Goldstar	122.4
Hyundai	57.3
Samsung	18.1
Other	122.4

As a result of the provisionally established dumping margins, the EC Commission provisionally imposed an ad valorem duty of 10.1 percent on all imports of DRAMs originating in Korea, effective September 18, 1992.

Effective March 18, 1993, the EC Commission and the Korean DRAM producers agreed to set minimum floor prices for their exports to the EC for 5 years.[86] These prices are intended to "reflect the producers' quarterly costs of DRAM production plus a reasonable amount for profit."[87] The EC will not impose antidumping duties on the Korean product unless the Korean producers withdraw from or violate the agreement.

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[83] The complainant represented a major proportion of the total EC production of DRAMs. EC producers supporting the complaint include Motorola Ltd. (Glasgow, United Kingdom) and Siemens AG (Munich, Germany). A third EC DRAM producer, NEC Semiconductors Ltd. (Livingston, United Kingdom), did not participate in the EC Commission's proceeding.

[84] The EC Commission's decision was published on Sept. 17, 1992, in the Official Journal of the European Communities.

[85] DRAM products include "DRAM wafers, DRAM dice, finished DRAMs, DRAM modules, stack DRAMs, VRAMs, and pseudo SRAMs."

[86] Respondents assert that the price undertaking will have no impact on their volume of exports to the EC. Respondents' posthearing brief, responses to Commission and staff questions, p. 13.

[87] Official Journal of the European Communities, Mar. 18, 1993. The respondents indicate that a minimum of 9.5 percent profit is required. Respondents' posthearing brief, responses to Commission and staff questions, p. 12.

CONSIDERATION OF THE CAUSAL RELATIONSHIP BETWEEN IMPORTS OF THE SUBJECT MERCHANDISE AND THE ALLEGED MATERIAL INJURY

U.S. Imports

Importers' questionnaires were sent to approximately 150 firms identified as possible importers of DRAMs; however, usable import data were received from only 26 firms. For the purposes of presentation in this report, U.S. imports of DRAMs from all countries consist of data provided by U.S. importers in response to importers' questionnaires. Data presented in this section of the report are believed to account for greater than 95 percent of U.S. DRAM imports from Korea and approximately 60 percent of total U.S. DRAM imports from countries other than Korea.[88]

Uncased DRAMs

Presented in tables 46 and 47 are U.S. imports of uncased DRAMs of 1 Meg and above and all uncased DRAMs. Virtually no imports of uncased DRAMs from Korea were reported.[89]

U.S. imports of uncased DRAMs of 1 Meg and above from sources other than Korea, by quantity in units, increased from 1989 to 1991, but fell during the partial-year periods. By quantity in bits, these imports increased in all periods. The value of these imports fell irregularly from 1989 to 1991, but increased in the partial-year periods. The average bit value fell throughout the period for which data were requested.

U.S. imports of all uncased DRAMs from sources other than Korea, by quantity in units, fell during most of the periods. By quantity in bits, these imports increased in all periods. The value of these imports fell irregularly from 1989 to 1991, but increased from January-September 1991 to January-September 1992. The average bit value fell throughout the period for which data were requested.

Cased DRAMs

Presented in tables 48 and 49 are U.S. imports of cased DRAMs of 1 Meg and above and all cased DRAMs, by source and origin of DRAM dice. U.S. imports of cased DRAMs of 1 Meg and above and of all DRAMs, by quantity in units and bits, generally increased over the period of investigation. By value, U.S. imports of cased DRAMs of 1 Meg and above irregularly increased over the period of investigation; however, U.S. imports of all cased DRAMs fell irregularly from 1989 to 1991, but increased during the partial-year periods. The average bit value of U.S. imports of cased DRAMs of 1 Meg and above and of all DRAMs fell in all periods for which data were requested.

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[88] For more information concerning data coverage and the use of primary import data collected in this investigation rather than the use of official imports statistics see the section of this report entitled "U.S. Importers."

[89] ***.

Table 46
Uncased DRAMs≥1 Meg: U.S. imports, by sources, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented were reported by U.S. importers of uncased DRAMs. Eight of the firms that provided import data maintain fabrication and/or assembly facilities in the United States. Import data may not reconcile with inventory and shipment data. Firms cited "scrap, samples, returns, and theft" as reasons for the discrepancies. Imports from countries other than Korea consist of imports from the United Kingdom, Japan, Germany, Italy, and Singapore.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 47
Uncased DRAMs: U.S. imports, by sources, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented were reported by U.S. importers of uncased DRAMs. Eight of the firms that provided import data maintain fabrication and/or assembly facilities in the United States. Import data may not reconcile with inventory and shipment data. Firms cited "scrap, samples, returns, and theft" as reasons for the discrepancies. Imports from countries other than Korea consist of imports from the United Kingdom, Japan, Germany, Italy, and Singapore.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 48
Cased DRAMs≥1 Meg: U.S. imports, by sources and by origins of dice, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented are believed to account for greater than 95 percent of U.S. imports of cased DRAMs from Korea during 1991. When compared to official statistics, U.S. imports of cased DRAMs from countries other than Korea appear to represent approximately 60 percent of total imported units of cased DRAMs from countries other than Korea (see the section of this report entitled "U.S. Importers"). Import data may not reconcile with inventory and shipment data. Firms cited "scrap, samples, returns, and theft" as reasons for the discrepancies. Imports from countries other than Korea consist of imports from Japan, the United Kingdom, Germany, Taiwan, Italy, and Singapore.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 49
Cased DRAMs: U.S. imports, by sources and by origins of dice, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992
	Quantity (1,000 units)				
Korea:					
Korean dice	***	***	***	***	***
U.S. dice	0	0	0	0	0
3rd-source dice	***	***	***	***	***
3rd sources:					
Korean dice	***	***	***	***	***
U.S. dice	***	***	***	***	***
3rd-source dice	***	***	***	***	***
Total	351,563	397,762	368,735	280,939	292,236
	Quantity (billion bits)				
Korea:					
Korean dice	***	***	***	***	***
U.S. dice	0	0	0	0	0
3rd-source dice	***	***	***	***	***
3rd sources:					
Korean dice	***	***	***	***	***
U.S. dice	***	***	***	***	***
3rd-source dice	***	***	***	***	***
Total	233,250	353,115	522,792	375,838	621,438
	Value (1,000 dollars)				
Korea:					
Korean dice	***	***	***	***	***
U.S. dice	0	0	0	0	0
3rd-source dice	***	***	***	***	***
3rd sources:					
Korean dice	***	***	***	***	***
U.S. dice	***	***	***	***	***
3rd-source dice	***	***	***	***	***
Total	2,202,631	1,941,726	2,001,866	1,485,767	1,757,211
	Unit value (per million bits)				
Korea:					
Korean dice	***	***	***	***	***
U.S. dice	(2)	(2)	(2)	(2)	(2)
3rd-source dice	***	***	***	***	***
3rd sources:					
Korean dice	***	***	***	***	***
U.S. dice	***	***	***	***	***
3rd-source dice	***	***	***	***	***
Average	$9.44	$5.50	$3.83	$3.96	$2.83

[1] Data presented are believed to account for greater than 95 percent of U.S. imports of cased DRAMs from Korea during 1991. When compared to official statistics, U.S. imports of cased DRAMs from countries other than Korea appear to represent approximately 60 percent of total imported units of cased DRAMs from countries other than Korea (see the section of this report entitled "U.S. Importers"). Import data may not reconcile with inventory and shipment data. Firms cited "scrap, samples, returns, and theft" as reasons for the discrepancies. Imports from countries other than Korea consist of imports from Japan, the United Kingdom, Germany, Taiwan, Italy, and Singapore.

[2] Not applicable.

Note.--Bit figures have been truncated rather than rounded; however, bit totals and unit values were derived from the untruncated data. Unit values are calculated using data of firms supplying both quantity and value information.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Seven firms reported imports of Korean DRAMs scheduled for delivery after September 31, 1992. The firms reported a total of *** Korean DRAMs of 1 Meg and above delivered in the final 3 months of 1992.[90]

Total Subject Imports

Imports from Korea of memory modules that contain DRAMs of 1 Meg and above are also subject to this investigation. Such imports are presented in appendix C (table C-2).

Totals of imports from Korea subject to this investigation (i.e., DRAMs, VRAMs, and modules) are shown in table 50. Subject imports increased from 49.6 trillion bits ($459.8 million) in 1989 to 188.8 trillion bits ($676.5 million) in 1991. An increase was also reported from 124.0 trillion bits ($459.1 million) in January-September 1991 to 291.8 trillion bits ($786.2 million) in January-September 1992. Unit values (per million bits) fell in all periods from $9.27 in 1989 to $2.69 in January-September 1992.

U.S. Producers' Subject Imports

*** U.S. DRAM producers (i.e., ***) reported imports of cased DRAMs of 1 Meg and above and memory modules that contain these devices from Korea. Data concerning such imports are presented in table 51. The U.S. producers' subject imports accounted for *** percent of the quantity (in bits) of total subject imports in 1991.

* * * * * * *

U.S. Market Penetration by the Subject Imports

Cased DRAMs

Market penetration data, as presented in tables 52 and 53, are calculated from U.S. shipment data of U.S.-produced and imported cased DRAMs as submitted in response to Commission questionnaires. Data on shipments of "domestic" cased DRAMs were provided by all U.S. producers of uncased and cased DRAMs and are estimated to account for virtually all shipments of "domestic" cased DRAMs. Shipments of cased DRAM imports from Korea are from data submitted by 17 U.S. importers of Korean cased DRAMs. The data presented by these firms are estimated to account for greater than 95 percent of cased DRAM imports from Korea in 1991. Shipments of cased DRAM imports from countries other than Korea are from data submitted by 18 U.S. importers. The data provided by these firms are estimated to account for approximately 60 percent of cased DRAM imports from countries other than Korea (see the section of this report entitled "U.S. Importers").

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[90] *** of these firms also reported a total of *** Korean DRAMs of less than 1 Meg delivered in October and November 1992.

Table 50
Subject imports, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Quantity (billion bits)				
DRAMs≥1 Meg:					
Uncased	***	***	***	***	***
Cased	***	***	***	***	***
Modules containing DRAMs≥1 Meg	***	***	***	***	***
Total	49,595	97,109	188,782	124,045	291,816
	Value (1,000 dollars)				
DRAMs≥1 Meg:					
Uncased	***	***	***	***	***
Cased	***	***	***	***	***
Modules containing DRAMs≥1 Meg	***	***	***	***	***
Total	459,812	463,038	676,452	459,082	786,222
	Unit value (per million bits)				
DRAMs≥1 Meg:					
Uncased	***	***	***	***	***
Cased	***	***	***	***	***
Modules containing DRAMs≥1 Meg	***	***	***	***	***
Total	$9.27	$4.77	$3.58	$3.70	$2.69

[1] Data presented are believed to account for more than 95 percent of U.S. imports of cased DRAMs from Korea during 1991.
[2] Not applicable.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 51
U.S. producers' subject imports, by products and by sources, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] Data presented are from ***. No uncased imports of DRAMs from Korea were reported by U.S. DRAM producers. Import data may not reconcile with inventory and shipment data. Firms cited "scrap, samples, returns, and theft" as reasons for the discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 52
Cased DRAMs≥1 Meg: U.S. shipments of "domestic"[1] and "imported"[2] product as a share of apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*	*

[1] "Domestic" product includes U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location). The data presented for U.S. shipments of "domestic" cased DRAMs are from all known U.S. producers of uncased and cased DRAMs and are estimated to account for virtually all U.S. shipments of "domestic" products. Shipment data do not reconcile with inventory and production data. Firms cited "yield loss, scrap, samples, returns, and theft" as the reasons for the discrepancies.

[2] "Imported" product includes Korean-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and uncased DRAMs that are fabricated in countries other than the United States and Korea and are assembled in countries outside the United States. The data presented are from 26 U.S. importers of DRAMs. Reported U.S. imports of DRAMs from Korea are estimated to account for greater than 95 percent of total U.S. DRAM imports from Korea in 1991 and reported U.S. imports of DRAMs from all other countries are estimated to account for approximately 60 percent of U.S. DRAM imports from all other countries in the same period (see the section of this report entitled "U.S. Importers"). Shipment data do not reconcile with inventory and import data. Firms cited "scrap, samples, returns, and theft" as the reasons for the discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 53
Cased DRAMs: U.S. shipments of "domestic"[1] and "imported"[2] product as a share of apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*	*

[1] "Domestic" product includes U.S.-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and U.S.-assembled cased DRAMs (regardless of uncased DRAM fabrication location). The data presented for U.S. shipments of "domestic" cased DRAMs are from all known U.S. producers of uncased and cased DRAMs and are estimated to account for virtually all U.S. shipments of "domestic" products. Shipment data do not reconcile with inventory and production data. Firms cited "yield loss, scrap, samples, returns, and theft" as the reasons for the discrepancies.

[2] "Imported" product includes Korean-fabricated uncased DRAMs (regardless of cased DRAM assembly location) and uncased DRAMs that are fabricated in countries other than the United States and Korea and are assembled in countries outside the United States. The data presented are from 26 U.S. importers of DRAMs. Reported U.S. imports of DRAMs from Korea are estimated to account for greater than 95 percent of total U.S. DRAM imports from Korea in 1991 and reported U.S. imports of DRAMs from all other countries are estimated to account for approximately 60 percent of U.S. DRAM imports from all other countries in the same period (see the section of this report entitled "U.S. Importers"). Shipment data do not reconcile with inventory and import data. Firms cited "scrap, samples, returns, and theft" as the reasons for the discrepancies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The share of apparent U.S. consumption of cased DRAMs of 1 Meg and above held by imports of Korean cased DRAMs of 1 Meg and above, based on quantity in bits, rose from *** percent in 1989 to *** percent in 1991, and increased from *** percent in January-September 1991 to *** percent in January-September 1992. The comparable shares, based on value, increased from *** percent in 1989 to *** percent in 1991, and increased from *** percent in January-September 1991 to *** percent in January-September 1992.

The share of apparent U.S. consumption of all cased DRAMs held by Korean imports of cased DRAMs of 1 Meg and above, based on quantity in bits, increased from *** percent in 1989 to *** percent in January-September 1992. Based on value, the share rose from *** percent in 1991 to *** percent in January-September 1992.

Total Subject Imports

Imports from Korea of modules that contain 1 Meg or above DRAMs are also subject to this investigation. Data on consumption and market shares for such modules are presented in appendix C (table C-2). The market penetration figures for all subject imports from Korea are presented in tables 54 and 55.

The share of apparent U.S. consumption of cased DRAMs of 1 Meg and above and memory modules that contain such devices held by total subject imports, based on quantity in bits, rose from 18.7 percent in 1989 to 25.7 percent in 1991, and rose from 23.8 percent in January-September 1991 to 30.3 percent January-September 1992. By value, the share increased from 15.9 percent in 1989 to 20.6 percent in 1991, and increased from 18.9 percent in January-September 1991 to 25.4 percent in January-September 1992. The share of apparent U.S. consumption of all cased DRAMs and memory modules that contain such devices held by total subject imports, based on quantity in bits, rose from 14.2 percent in 1989 to 24.8 percent in 1991, and rose from 22.9 percent in January-September 1991 to 30.0 percent January-September 1992 (figure 1). By value, the share increased from 11.3 percent in 1989 to 19.7 percent in 1991, and increased from 18.0 percent in January-September 1991 to 25.0 percent in January-September 1992.

Table 54
Cased DRAMs≥1 Meg and memory modules that contain DRAMs≥1 Meg: Shares of apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Share of the quantity of U.S. consumption on the basis of bits (percent)				
U.S. shipments of LTFV imports:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total LTFV imports	18.7	21.9	25.7	23.8	30.3
U.S. shipments of other imports:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total other imports	***	***	***	***	***
U.S. shipments of "domestic" cased DRAMs	***	***	***	***	***
	Share of the value of U.S. consumption (percent)				
U.S. shipments of LTFV imports:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total LTFV imports	15.9	17.9	20.6	18.9	25.4
U.S. shipments of other imports:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total other imports	***	***	***	***	***
U.S. shipments of "domestic" cased DRAMs	***	***	***	***	***

[1] The data presented are from all known U.S. producers of uncased and cased DRAMs and are estimated to account for virtually all known U.S. shipments of "domestic" products. The data presented are also from 26 U.S. importers of DRAMs and DRAM memory modules. Reported U.S. imports of DRAMs and DRAM memory modules from Korea are estimated to account for greater than 95 percent of these imports from Korea in 1991 and reported U.S. imports of DRAMs and DRAM memory modules from all other countries are believed to account for approximately 60 percent of these imports from all other countries in the same period (see the section of this report entitled "U.S. Importers").

Note.--Bit figures have been truncated rather than rounded; however, shares were derived from the untruncated data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 55
All cased DRAMs and memory modules that contain all DRAMs: Shares of apparent U.S. consumption, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	Share of the quantity of U.S. consumption on the basis of bits (percent)				
U.S. shipments of LTFV imports (≥1 Meg):					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total LTFV imports	14.2	19.7	24.8	22.9	30.0
U.S. shipments of other imports:					
From Korea (<1 Meg):					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
From other countries:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total other imports	41.4	38.8	38.2	39.3	41.1
U.S. shipments of "domestic" cased DRAMs	44.5	41.5	36.9	37.8	28.9
	Share of the value of U.S. consumption (percent)				
U.S. shipments of LTFV imports (≥1 Meg):					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total LTFV imports	11.3	15.9	19.7	18.0	25.0
U.S. shipments of other imports:					
From Korea (<1 Meg):					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
From other countries:					
Cased DRAMs	***	***	***	***	***
DRAM memory modules	***	***	***	***	***
Total other imports	54.8	48.9	51.3	52.2	51.5
U.S. shipments of "domestic" cased DRAMs	33.9	35.2	29.0	29.8	23.4

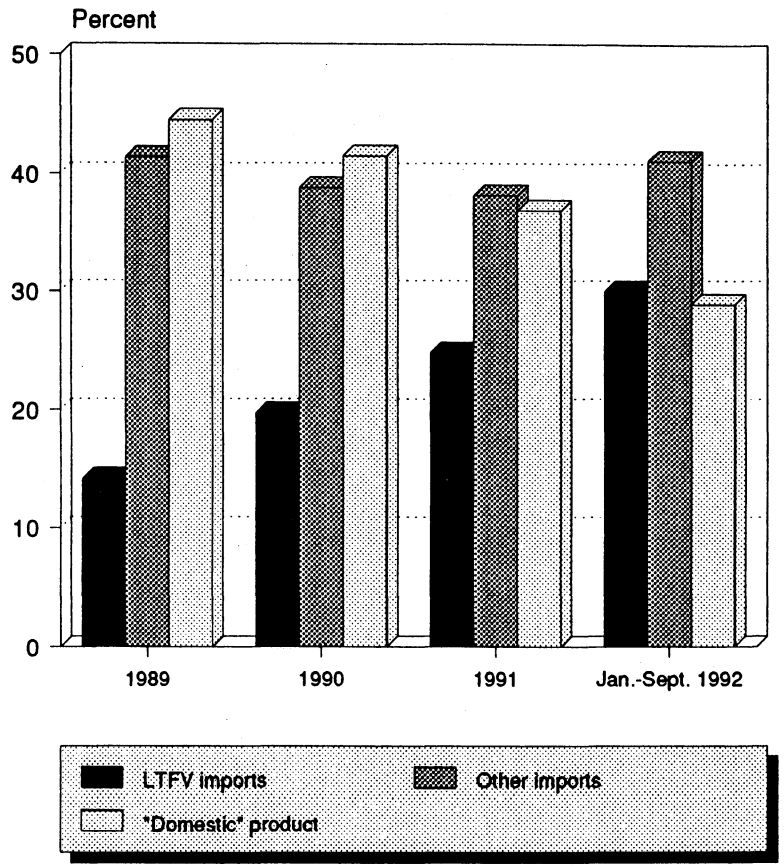
[1] The data presented are from all known U.S. producers of uncased and cased DRAMs and are estimated to account for virtually all known U.S. shipments of "domestic" products. The data presented are also from 26 U.S. importers of DRAMs and DRAM memory modules. Reported U.S. imports of DRAMs and DRAM memory modules from Korea are estimated to account for greater than 95 percent of these imports from Korea in 1991 and reported U.S. imports of DRAMs and DRAM memory modules from all other countries are believed to account for approximately 60 percent of these imports from all other countries in the same period (see the section of this report entitled "U.S. Importers").

Note.--Bit figures have been truncated rather than rounded; however, shares were derived from the untruncated data.

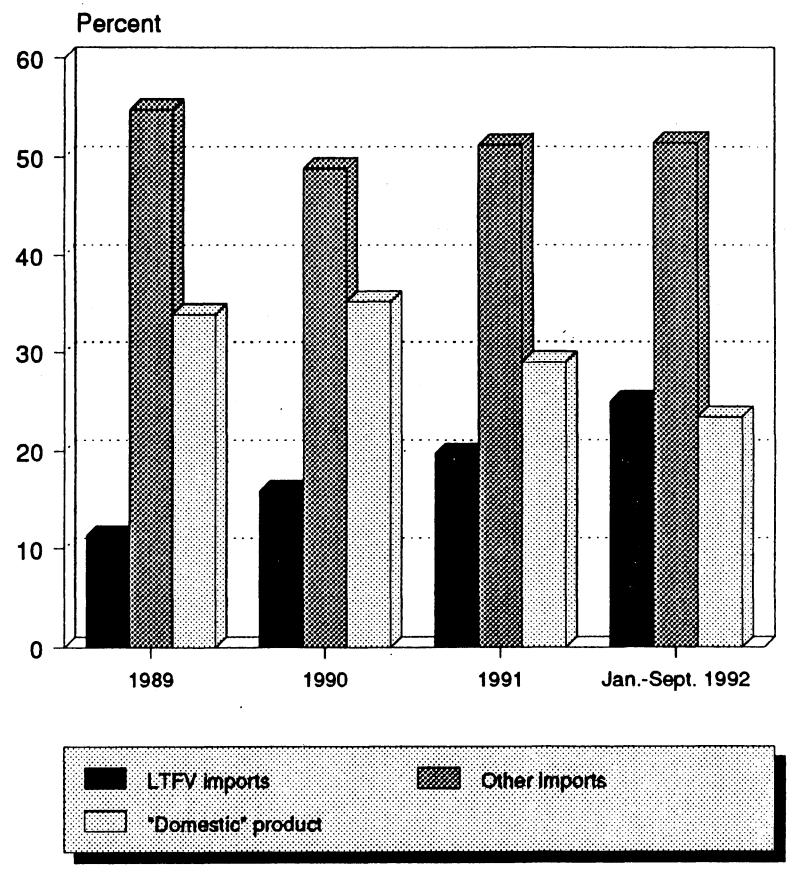
Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Figure 1: All cased DRAMs and memory modules: Shares of apparent U.S. consumption, 1989-91 and Jan.-Sept. 1992

On the basis of bits



On the basis of value



Source: Table 55.

Pricing and Marketing Considerations

DRAMs are used in a variety of products that require high-density, random access memory, such as computers, office automation equipment, telecommunication equipment, and consumer electronic products; therefore the demand for DRAMs depends upon the demand for these products.[91] Overall, the demand for DRAMs is said to have increased during the past 3 years.[92] The majority of DRAMs, about 70 to 80 percent, are used in personal computers.[93] Industry experts stated that changes in prices and quantities of personal computers (PCs) have affected the demand and price levels in the DRAM market during the past few years. Declining prices in the PC market have had two opposing effects on the prices of DRAMs. On the one hand, declining PC prices have stimulated the demand for PCs and, thus, increased the demand for DRAMs; this increased DRAM demand has helped keep DRAM prices strong. On other hand, declining PC prices have also caused PC suppliers to attempt to get lower prices for DRAMs.[94]

The DRAM industry follows a fairly predictable product life cycle that generally lasts several years. This is demonstrated by figure 2, which shows the life cycle of six generations of DRAMs. As each new DRAM is introduced to the market, selling prices and costs tend to be high. However, as the product moves from the introduction phase into the growth phase of the cycle, production costs and prices tend to fall because the producer is moving along the learning curve and is able to lower defects and increase yields.[95] As the product enters the maturity stage, costs are generally at the lowest level and prices continue to fall. In the DRAM industry it has been common that a new generation of DRAM enters the market as the previous one is in the growth or maturity phase. The competition between the two generations of DRAMs can also contribute to the fall in the price of the mature DRAM.

Suppliers that are first to enter the market (with a particular generation or density of DRAM) benefit from being able to capture part of the market where there is little competition; this often allows the supplier to charge a higher price and recoup some of its investment before prices begin to

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[91] The demand for DRAMs is often measured in bits rather than units. The main use of DRAMs is in computers; thus, most of the demand for DRAMs is derived from the demand for computers. A computer manufacturer is concerned with storing data in the most effective manner; therefore, it wants the most memory possible in the least amount of space. As a result, the demand for DRAMs is based on the number of bits.

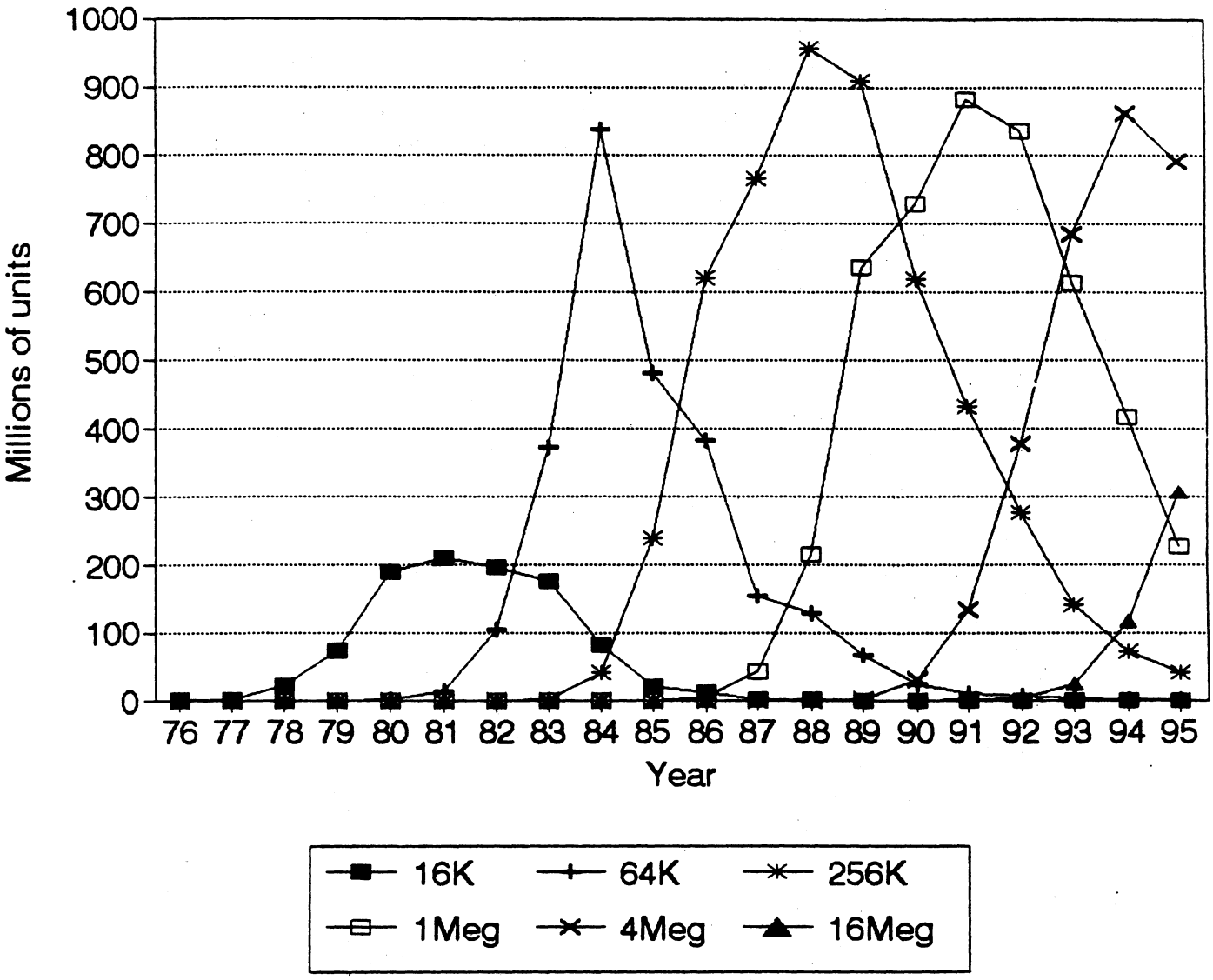
[92] Most suppliers, of both domestic and imported product, believe that demand has generally increased; several of these firms attributed this growth in demand to the increase in applications that require additional memory (e.g., software programs such as "Windows" or "OS/2").

[93] Transcript of the hearing, p. 46.

[94] Electronic News, Mar. 23, 1992, p. 8.

[95] In the growth phase, competition increases as new firms enter the market. Often competitors that enter the market after the initial introduction phase do so at a lower price than the market leaders due to perceived risks and uncertainties in the newcomers' quality. (Marketing Management, Analysis Planning, Implementation, and Control, Sixth Edition, Philip Kotler, p. 358).

Figure 2
Worldwide shipments and forecasts of future shipments of DRAMs, by DRAM densities, 1976-95



Source: Dataquest.

drop.[96] U.S producers and importers of the Korean product were asked to provide the dates at which they made their first commercial sale of each generation of DRAM, from 256K to 16 Meg DRAMs. The following tabulation presents information obtained from these firms.

* * * * * * *

As mentioned in the section of this report entitled "Channels of Distribution," DRAMs are sold to a variety of customers, including OEMs, franchise distributors, value-added or aftermarket resellers, and brokers or independent distributors. Available data for 1991 indicate some differences in the customer groups to which U.S. producers and Korean producers have sold DRAMs.[97]y While *** U.S. producer reported that at least *** percent of their sales in 1991 were made to OEMs,[98] *** of the three major Korean importers reported *** sales to OEMs.[99] The *** of the remainder of U.S. producers' sales in 1991 were made to franchise distributors; only *** firms reported sales to value-added or after-market resellers and *** reported sales to brokers/independent distributors. On the other hand, *** reported significant sales to value-added resellers (i.e., *** percent, respectively). *** importers reported sales to brokers/independent distributors, with *** reporting that sales to this customer group represented *** percent of its total DRAM sales in 1991.

Producers and importers generally agree that DRAM purchasers can be divided into three main classes. Tier one customers are the premium customers, most likely large OEM accounts. These customers are allegedly the most difficult to sell to because they are the most demanding with respect to quality. Because these firms often have relatively long qualification

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[96] During the preliminary investigation, respondents argued that Micron entered the 1 Meg DRAM market late, and, as a result, was forced to accept a lower price than other suppliers.

Petitioner discusses the concept of an "entry window;" this is defined to be the period during which: (a) the market for a particular generation is still expanding; and (b) firms that ultimately account for over 90 percent of the market are still entering. Petitioner argues that firms that enter at any time within the 3 year "entry window" can be expected to be extremely viable competitors in the market. Petitioner also argues that the major U.S. firms (i.e., Micron, NEC, and TI) all entered the DRAM market during the entry window (Petitioner's prehearing brief, App. B, p. B-1 and posthearing brief, app. B, p. 25).

[97] There appear to be some problems with the perception of defining customer groups. Some of the customers that were classified by U.S. producers as OEMs were classified as value-added resellers or brokers by the importers. Therefore, while there are reported differences in the customers to whom the producers and the importers sell DRAMs, this may be a function of different classifications of customers.

[98] *** reported that *** percent of its DRAM sales in 1991 were made to OEMs.

[99] The percentages of total sales accounted for by sales to OEMs in 1991 for Goldstar, Hyundai, and Samsung were ***.

processes, suppliers are sometimes able to get a premium price in the marketplace for sales to these customers. Customers in the second tier are slightly less demanding and tend to have shorter qualification processes. The third tier is the spot market, which has very few, if any, qualification procedures and relatively low prices.

Qualification procedures and time required to qualify vary significantly among customer groups. In general, large OEM accounts (tier one customers) have the most sophisticated qualification processes, which can take anywhere from a few weeks to 9 months to complete. These customers require extensive component testing, system qualification utilizing a supplier's product, and inspection of the supplier's facility.[100] Tier two customers, such as franchise distributors and value-added resellers, require a much less sophisticated qualification procedure; these customers generally test the product to verify operation. Tier three customers who purchase on a spot basis rarely have any type of formal qualification process.

In general, suppliers agreed that there are no substitute products for DRAMs.[101] Several suppliers reported that in a limited number of applications SRAMs or VRAMs can be used in place of DRAMs; however, these firms also stated that this would not be cost effective because SRAMs and VRAMs are significantly more expensive than DRAMs of a comparable speed.[102] One DRAM supplier, Goldstar, expects a substantial infringement into the DRAM market by competing technologies such as flash EPROMs or SRAMs.[103] According to Goldstar, this will occur because of increases in the number of smaller personal computers, such as laptops, notebooks, and palmtops, in the marketplace; these computers require much lower power consumption and better data retention than a conventional DRAM provides.[104]

Within the DRAM market, many technological and marketing changes have occurred during the past 3 years. The product range of DRAMs has diversified

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[100] *** reported that the qualification process could be as simple as a systems test where a device is plugged into a unit to determine the functionality. More extensive qualifications often require the following steps: (1) testing the DRAM on testing equipment, (2) environmental testing which includes temperature cycling, moisture resistance, life test, and infant mortality test, (3) inspection of enlarged photos of the die at various stages of production, and (4) actual system qualification where the product is run on the customer's system for several weeks to identify any failure problems.

*** estimated that approximately *** percent of its sales are made to customers that have extensive qualification procedures (i.e., those that take at least 30 days.

[101] Purchasers also generally agreed that there are no substitutes for DRAMs.

[102] In its posthearing brief, Micron reported that there are significant differences in the features of an SRAM that preclude it from being used as a replacement for a DRAM. These include differences in pin counts, functions, configuration of related parts, and cost. Petitioner also discussed differences in switching production from DRAMs to SRAMs and/or EPROMs (Petitioner's posthearing brief, pp. A.7-9).

[103] Transcript of the preliminary conference, p. 170.

[104] Transcript of the preliminary conference, pp. 169-170.

significantly with the emergence of new packages, faster speeds, and an increased number of configurations. Prices for DRAMs of the same density also vary depending on the speed of the DRAM, with faster products generally commanding higher prices. According to Micron, although different customers have different uses for the different speeds, there is some substitutability between the speeds; however, there are often price premiums for faster products that may limit the degree of substitution. Under normal circumstances, a faster product, i.e., a 70ns DRAM, could be used in an application that normally uses an 80ns or 100ns DRAM.[105] DRAMs are also sold in several different configurations. For example, a 1 Meg DRAM is available either as a "1 Meg by 1" or "256K by 4" configuration.[106] These differ only in the way in which data move in and out of the DRAM; the overall memory contained in each is 1 Meg.[107] Prices of a given density DRAM may vary slightly depending on the type of configuration.[108]

DRAMs are sold either as individual chips or as components in memory module packages (e.g., SIMMs), with the price of a DRAM memory module being higher than the sum of the individual DRAMs that it contains. Questionnaire responses indicate that the cost of the DRAMs accounts for *** percent of the total cost of the module.[109] Most U.S. and Korean suppliers sell DRAMs both as individual units and in modules. In 1991, between *** percent of each responding U.S. producer's total U.S. DRAM sales were made as individual units, with the remainder being sold as modules. Similarly, importers of Korean DRAMs reported that between *** percent of their total 1991 U.S. sales were sales of individual DRAMs. Most of the responding suppliers reported that sales of modules have increased since 1989 as PC manufacturers have shifted purchases from individual DRAMs to modules.

Another change in the marketing of DRAMs and DRAM memory modules is the increase in retail and corporate aftermarket sales of DRAMs.[110] This increase has been attributed to the desire of computer users to upgrade their existing machines and add extra memory. The slowdown in the overall economy during the past 2 years has spurred the growth in aftermarket sales of DRAMs; computer users have increasingly chosen to upgrade existing machines instead of spending money to purchase new machines. In addition, new software applications, such as Microsoft's Windows, require additional memory and,

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[105] Transcript of the preliminary conference, p. 72.

[106] The common configurations for the 4 Meg DRAM are "1 Meg by 4" and "4 Meg by 1."

[107] *** stated that both configurations are important parts of the DRAM market; however, different end uses may be better suited to one or the other type of configuration.

[108] While *** reported that there is only a slight, if any, difference in the prices of the different configurations, *** believe that there are price differentials.

[109] Previously, DRAM purchasers, particularly OEM accounts, assembled the single DRAMs into the SIMMs themselves; however, it has become increasingly common for the DRAM manufacturer to sell DRAMs as SIMMs.

[110] There has also been an increase in the number of computer manufacturers that sell on a mail-order basis. However, Micron does not believe that this has had an impact on the demand and/or pricing in the DRAM market (transcript of the preliminary conference, pp. 49-50).

thus, are contributing to the increasing presence of aftermarket sales of DRAMs.

DRAMs are sold on both a spot and contract basis. The percentage of total sales made on a contract basis during 1991 by U.S. producers varied greatly from firm to firm. These suppliers reported using contracts for between *** percent of their sales.[111] The three major importers of Korean DRAMs, Goldstar, Hyundai, and Samsung, reported that *** of their sales are made on a spot basis.[112] In general, contract sales are made to the larger OEM accounts and the process of entering into agreements varies somewhat from supplier to supplier.[113] ***.[114] However, as DRAM prices have fallen, ***.[115]

* * * * * * *

Suppliers are generally allowed more than one opportunity to quote on a particular order.[116] All but one U.S. producer reported that, while quoting is generally closed, they are often able to obtain information on competitive price levels.[117] Within a given contract, producers reported that there are usually not any specific provisions for automatic price increases or decreases; however, price is often negotiable.

DRAMs are priced on a per-unit basis and are sold on an f.o.b. basis to all customers. Some suppliers reported having price lists for their sales of DRAMs. These suppliers stated that they adhere to their price lists, while others stated that prices fluctuate so rapidly that a published price list cannot be followed. *** reported that it publishes a minimum price list that is updated several times per month or as required by market conditions.[118]

For sales to distributors, many DRAM suppliers use a policy that is known as "ship from stock and debit."[119] Suppliers generally have one price for all distributors; however, distributors often request discounts off this price in order to compete with other suppliers' offers to other distributors or other distributors' selling prices. A discount is usually requested after the distributor has already purchased the DRAMs for a given price. The distributor informs the DRAM supplier of the price at which it will be able to sell the product. If the DRAM supplier agrees, the distributor then sells the DRAM for the specified price. The supplier will then credit the distributor's account, thus lowering the price that the distributor actually paid for the

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[111] However, the majority of firms that use contracts reported that they do so *** of the time.

[112] ***.

[113] ***.

[114] ***.

[115] ***.

[116] ***.

[117] Although price levels may be discussed, names of specific suppliers are not revealed.

[118] ***.

[119] This policy is also referred to as "meet comp" or "price protection" credits. This policy has primarily applied to sales to distributors, but may have been used in some isolated instances for sales to OEMs. ***.

DRAMs.[120] Since this price adjustment is made after the product has been shipped to the distributor, suppliers may not actually record the sale until the distributor ships the product to its customer.

All but one supplier reported that transportation costs are not a significant factor in a customer's decision to purchase DRAMs. Although the supplier may sometimes arrange the transportation, the purchaser always pays for it. Freight costs account for less than 1 percent of the total delivered price of a DRAM. Because freight costs are not significant, DRAM suppliers can and do ship product throughout the entire United States. Leadtimes for delivery of DRAMs generally range from 1 day to 12 weeks. During the period for which information was requested, U.S. DRAM producers shipped their product as quickly as 1 day and as long as 26 weeks; importers of the Korean product reported that shipments were made within the range of 1 day to 16 weeks.[121]

Product Comparisons

Producers, importers, and purchasers were requested to discuss any differences between the domestic and Korean DRAMs that would explain price differences and purchasing patterns. Both product and market considerations were considered in responding. Comments provided by these firms regarding quality, product returns, reliability of supply, and availability are discussed below.

Available information indicates that there is disagreement as to whether domestic and Korean products are comparable in quality.[122] In general, five of the six responding U.S. producers stated that differences in quality between the U.S. and Korean products were not a significant factor in the firm's sale of DRAMs. *** reported some of its more demanding customers have found *** consistent quality and customer support to be an advantage over other suppliers' products. A former producer, ***, reported that the industry impression of the Korean product when it first entered the U.S. market was that the quality was inferior to that of the U.S. product; however, in recent months, the quality of the Korean product has improved and now rivals that of the domestic firms. Importers of Korean DRAMs reported more differences in the quality of the two products than the domestic firms did. *** reported that there were quality differences between the Korean DRAMs they supplied and those supplied by U.S. producers. *** reported that it has achieved quality levels on its 1 Meg and 4 Meg DRAMs that are equal to or better than those of well-established brand products.[123] *** stated that ***.[124] *** stated that

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[120] ***.

[121] ***.

[122] The quality of DRAMs is often measured by the failure rate. Product failures can make it particularly difficult for the smaller firms that purchase DRAMs to resell them. These firms often work on very small profit margins and product returns can often wipe out the small level of profit that they receive (transcript of the preliminary conference, pp. 108 and 117).

[123] ***.

[124] ***.

***.[125] While there are differing opinions among U.S. producers and importers, most purchasers reported that the quality of the Korean product is comparable to that of the domestic.

U.S. producers and importers were requested to estimate the percentage of their total DRAM sales in each year during 1989-91 that were accounted for by returns. While these numbers were *** for both U.S. and Korean product, the return rates of the Korean suppliers were *** than those of the U.S. producers.[126] At least half of the responding U.S. producers reported that returns accounted for *** of their total DRAM sales in each year. While one Korean supplier, *** reported that it had *** returns in any year, the other two reported that returns accounted for between *** percent of their total sales of DRAMs during 1989-91.

Suppliers were also asked to provide information on whether or not they had ever failed to qualify to supply DRAMs to a customer. Three U.S. producers, ***, reported that they did fail to qualify to supply DRAMs at some point during the period for which data were requested. These instances were limited and *** reported that they later qualified to supply DRAMs to the customers involved; *** reported that it is close to being requalified. *** also reported that they had failed to qualify to supply DRAMs. In the *** instances reported by ***, the failure to qualify was due to incompatibility between *** product and the customer's system; ***.[127] *** did not provide specific information concerning its failure to qualify.

Another factor that can affect prices and/or purchasing patterns is availability of product. Suppliers were asked whether they were ever unable to supply DRAMs to a customer (or potential customer) during January 1989-September 1992. Four of the seven responding U.S. producers reported that they had experienced problems delivering DRAMs during that time period. While two firms, ***, reported that supply problems were an infrequent occurrence,[128] *** reported that supply problems would occur on a large scale about once a year and would cause significant change to product and package mix (as well as volume adjustment). ***.

Prices and purchasing patterns can also be affected by policies such as "Buy American" requirements. In the case of DRAMs, three of the six responding U.S. producers reported that some of their customers require that the DRAMs be produced in the United States. These customers purchase DRAMs for military or other government contract applications; these sales account for a relatively small portion of total DRAM sales.

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[125] *** reported that it is common practice among the major semiconductor consumers to rate their suppliers through a vendor rating system; categories in this system usually include product quality, delivery, and service. ***.

[126] *** of the responding U.S. or Korean suppliers reported that they had any product recalls during the period 1989-91.

[127] ***.

[128] ***.

Price Trends

The Commission requested price and quantity data from U.S. producers and importers for their monthly spot and quarterly contract sales of DRAMs during January 1989-September 1992.[129] Only spot prices are discussed in this section; contract prices are presented in appendix H.[130] U.S. producers and importers were requested to submit separate pricing data for their sales to OEMs, franchise distributors, value-added resellers/aftermarket resellers, and brokers/independent distributors.[131] Product specifications for which pricing data were requested are as follows:[132]

Product 1: 1 Meg x 1, 70ns 1 Meg DRAM, SOJ[133]
Product 2: 1 Meg x 1, 80ns 1 Meg DRAM, SOJ
Product 3: 4 Meg x 1, 80ns 4 Meg DRAM, SOJ
Product 4: 1 Meg x 4, 80ns 4 Meg DRAM, SOJ
Product 5: 256 K x 4, 100ns 1 Meg VRAM, SOJ
Product 6: 1 Meg x 9 SIMM consisting of 9, 1 Meg x 1, 80ns 1 Meg DRAMs

Usable pricing data were received from five U.S. producers and seven importers of Korean DRAMs.[134] Reported pricing data accounted for approximately *** and *** percent of total shipments of U.S.-produced and Korean cased DRAMs, respectively, during 1991.[135]

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[129] Prices for DRAMs were requested on a monthly basis in order to capture the rapid changes in the market.

[130] Trends in contract sales prices to OEMs were similar to those of spot prices to OEMs.

[131] In several instances, DRAM suppliers reported that the total quantity shipped in a given month was negative. This is due to DRAM suppliers accepting return merchandise from their customers either for defective product or exchanges for different product. For example, ***.

In instances where the total quantity was negative, the quantity of the largest monthly sale was used to calculate the weighted-average price.

[132] Pricing data for product 5 (256 K VRAM) are presented in app. B and data for product 6 (DRAM module) are reported in app. C.

[133] SOJ ("small outline J-leaded" package) refers to a type of DRAM package. According to Micron this is one of the most common types of DRAM packaging.

[134] IBM reportedly sells some domestically produced DRAMs on the open market (transcript of the preliminary conference, pp. 174-175). It reported ***. ***.

[135] "Domestic" product includes DRAMs made from U.S.-fabricated dice that are assembled in the United States or third countries and DRAMs assembled in the United States that contain dice fabricated in third countries. There were no DRAMs that were fabricated in the United States and assembled in Korea; nor were there any that were fabricated in Korea and assembled in the United States.

Spot Sales of DRAMS

Sales to OEMs.[136]--In general, weighted-average prices for both domestic and Korean DRAMs sold to this customer group declined during the period January 1989 to September 1992 (tables 56 and 57).[137] Weighted-average domestic f.o.b. prices for product 1 declined *** percent from October 1989 to September 1992. Similarly, prices for product 1 imported from Korea also fell fairly steadily from May 1989 to September 1992, decreasing *** percent during that time.

Prices for U.S.-produced product 2 fell sharply (i.e., by *** percent) from March 1989 to September 1992, while prices for product 2 imported from Korea fell *** percent from January 1989 to September 1992.

U.S. producers' prices for product 3 decreased steadily during the period May 1991 to September 1992, falling *** percent during that time. Prices for product 3 imported from Korea also declined sharply during the period for which data were collected, falling *** percent from March 1990 to September 1992.

Domestic prices for domestic product 4 decreased significantly from May 1991 to September 1992, declining *** percent during that time. Prices for Korean product 4 decreased fairly steadily from July 1990 to September 1992, falling *** percent during that time.

Sales to Franchise Distributors.--As in the OEM market, prices for DRAMs sold to franchise distributors declined during the period January 1989 to September 1992 (tables 58 and 59).[138] Domestic f.o.b. prices for product 1 sold to franchise distributors declined *** percent from October 1989 to September 1992; final adjusted prices for domestic product 1 were *** than the initial f.o.b. prices, but had a *** decline, falling *** percent during that same time. F.o.b. prices for product 1 imported from Korea declined during the period for which data were collected, decreasing *** percent from July 1989 to September 1992.

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[136] As stated earlier, some producers and importers had difficulty classifying customers as OEMs or value-added resellers. Since both these types of firms perform similar functions (i.e., incorporate DRAMs into other products) and the prices they pay for DRAMs are similar, they are grouped together for purposes of discussion of price trends and comparisons.

[137] None of the responding DRAM suppliers reported using post-shipment discount policies for sales to OEMs; therefore, the initial f.o.b. and final adjusted prices are the same.

[138] As stated earlier, DRAM suppliers often reduce the prices of the DRAMs that they sell to their customers (particularly distributors) after the product has been sold and shipped to the customer. As a result, f.o.b. prices representing the initial price charged are not necessarily indicative of the actual price paid by the customer. U.S. producers and importers were requested to supply both their original f.o.b. prices and the final adjusted price, after all discounts have been applied. ***. If no post-shipment discounts were given, the initial f.o.b. price is the same as the final adjusted price. Comparisons are made between final adjusted prices as they reflect actual transaction prices.

Table 56
U.S. and Korean DRAMs: Weighted-average net f.o.b. selling prices and quantities of U.S.-produced and Korean products 1 and 2[1] sold to **OEMs**,[2] by months, January 1989-September 1992

Period	Product 1				Product 2			
	United States		Korea		United States		Korea	
	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Price Per unit	Quantity Units
	*	*	*	*	*	*		

[1] Product 1 is a 1 Meg by 1, 70ns, 1 Meg DRAM, SOJ. Product 2 is a 1 Meg by 1, 80ns, 1 Meg DRAM, SOJ.
[2] Includes prices for sales to both OEMs and value-added resellers.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 57
U.S. and Korean DRAMs: Weighted-average net f.o.b. selling prices and quantities of U.S.-produced and Korean products 3 and 4[1] sold to **OEMs**,[2] by months, January 1990-September 1992[3]

Period	Product 3				Product 4			
	United States		Korea		United States		Korea	
	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Price Per unit	Quantity Units
	*	*	*	*	*	*		

[1] Product 3 is a 4 Meg by 1, 80ns, 4 Meg DRAM, SOJ. Product 4 is a 1 Meg by 4, 80ns, 4 Meg DRAM, SOJ.
[2] Includes prices for sales to both OEMs and value-added resellers.
[3] No prices were reported for these products in 1989.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 58
U.S. and Korean DRAMs: Weighted-average net f.o.b. selling prices, final adjusted prices,[1] and quantities of U.S.-produced and Korean products 1 and 2[2] sold to **franchise distributors**, by months, January 1989-September 1992

*	*	*	*	*	*	*	

[1] Final adjusted prices refer to the price paid by the customer after all discounts have been made. In the DRAM market it is common for suppliers to discount product after it has already been sold and shipped to the customer; these policies, known as "ship from stock and debit" or "meet-comp" policies, are primarily, if not exclusively, used for sales to distributors. Both f.o.b. prices and final adjusted prices are displayed to display the level of discounts given.
[2] Product 1 is a 1 Meg by 1, 70ns, 1 Meg DRAM, SOJ. Product 2 is a 1 Meg by 1, 80ns, 1 Meg DRAM, SOJ.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 59
U.S. and Korean DRAMs: Weighted-average net f.o.b. selling prices, final adjusted prices,[1] and quantities of U.S.-produced and Korean products 3 and 4[2] sold to **franchise distributors**, by months, January 1990-September 1992

*	*	*	*	*	*	*	

[1] Final adjusted prices refer to the price paid by the customer after all discounts have been made. In the DRAM market it is common for suppliers to discount product after it has already been sold and shipped to the customer; these policies, known as "ship from stock and debit" or "meet-comp" policies, are usually used for sales to distributors. Both f.o.b. prices and final adjusted prices are displayed to demonstrate the level of discounts given.
[2] Product 3 is a 4 Meg by 1, 80ns, 4 Meg DRAM, SOJ. Product 4 is a 1 Meg by 4, 80ns, 4 Meg DRAM, SOJ.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Initial domestic f.o.b. prices for product 2 declined from January 1989 to September 1992, falling *** percent during that time period; final adjusted prices for this product (after all discounts) showed a greater decline, falling *** percent. Initial f.o.b. prices for product 2 imported from Korea decreased *** percent while final adjusted prices declined *** percent from February 1989 to September 1992.

U.S. producers' f.o.b. prices for product 3 decreased *** percent from June 1991 to September 1992; final adjusted prices declined *** percent during that time. F.o.b. prices for product 3 imported from Korea decreased steadily from May 1990 to August 1992, falling *** percent during that time period.

U.S. producers' initial f.o.b. prices for product 4 were *** percent lower in September 1992 than they were in March 1991; U.S. producers' final adjusted prices declined *** percent during that time. F.o.b. prices for product 4 imported from Korea declined fairly steadily from August 1990 to September 1992, falling *** percent during that time.

Sales to Brokers/Independent Distributors--Prices for sales of Korean DRAMs to this customer group were similar to those for other customer groups, as they generally declined fairly steadily (table 60). However, U.S. f.o.b. prices for product 1 *** during the *** months for which prices were reported.[139] F.o.b. prices for product 1 imported from Korea declined *** percent from July 1989 to September 1992.

U.S. f.o.b. prices for product 2 *** for the *** months for which they were reported. F.o.b. prices for product 2 imported from Korea decreased *** percent from March 1989 to September 1992.

Prices for sales of products 3 and 4 sold to brokers/independent distributors were only reported by importers of the Korean product. F.o.b. prices reported by these importers for product 3 declined *** percent from June 1990 to August 1992. Prices for product 4 imported from Korea decreased *** percent from July 1990 to September 1992.

Table 60
U.S. and Korean DRAMs: Weighted-average net f.o.b. selling prices and quantities of U.S.-produced and Korean products 1, 2, 3, and 4[1] sold to **brokers/independent distributors**, by months, January 1989-September 1992

* * * * * * *

[1] Product 1 is a 1 Meg by 1, 70ns, 1 Meg DRAM, SOJ. Product 2 is a 1 Meg by 1, 80ns, 1 Meg DRAM, SOJ. Product 3 is a 4 Meg by 1, 80ns, 4 Meg DRAM, SOJ. Product 4 is a 1 Meg by 4, 80ns, 4 Meg DRAM, SOJ.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

[139] *** reported prices for sales to brokers/independent distributors. ***.

Price Comparisons[140]

In the OEM market, 110 comparisons between U.S. f.o.b. prices and Korean prices were possible.[141] In 64 these comparisons, the Korean product was priced below the domestic product, with margins ranging from 0.2 to 54.5 percent (table 61). In 43 instances, the Korean product was priced above the domestic product; margins ranged from 0.1 to 16.2 percent. In the remaining three instances, the two products had the same price.

In the franchise distributor market, there were 80 instances in which domestic and Korean products could be compared. In 23 of these cases, the Korean product was priced below the domestic; margins ranged from 1.1 to 40.3 percent. The Korean product was priced between 0.4 and 66.8 percent higher than the domestic product in 56 instances. In the remaining instance, the two products had the same price.

Price comparisons were somewhat limited in the broker/independent distributor market. In 14 of the 17 instances where price comparisons were possible, the Korean product was priced below the domestic product, with margins ranging from *** percent. In the remaining 3 instances, Korean prices were between *** percent above those for the domestic product.

Table 61
U.S. and Korean DRAMs: Margins of under/(over)selling for sales of products 1, 2, 3, and 4 to **OEMs, franchise distributors, and brokers**, by months, January 1989-September 1992

(In percent)

*	*	*	*	*	*	*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

[140] Price comparisons for VRAMs and DRAM modules are presented in tables B-15 and C-10, respectively. For sales of VRAMs, the Korean product undersold the domestic product in 23 of 35 instances; margins ranged from 0.5 to 13.5 percent. In the remaining 12 instances, the price of the Korean product was between 2.1 and 14.2 percent higher than that of the domestic product. In the DRAM module market, the Korean product undersold the domestic product in 43 of the 60 instances where price comparisons were possible; margins ranged from 0.8 to 42.7 percent. In the remaining 17 instances, the Korean product was priced between 0.5 and 13.2 percent higher than the domestic product.

[141] As stated earlier, sales to OEMs and value-added resellers were combined. Therefore, these price comparisons include sales to both customer groups.

Purchaser Responses

The Commission sent questionnaires to over 150 firms believed to be purchasers of DRAMs and DRAM modules. Responses were received from 84 firms, of which 62 provided usable data.[142] During January 1989-September 1992, these firms purchased DRAMs, VRAMs, and DRAM modules either for resale or for use in the production of computers, DRAM and/or VRAM modules, memory boards, and data processing equipment. These firms accounted for approximately *** percent of U.S. shipments and *** percent of shipments of Korean product during January-September 1992. Information obtained from these purchasers is summarized below.

The purchasers reported buying DRAMs from a large number of suppliers, both domestic and foreign; in addition to all the U.S. and Korean producers, these firms also reported purchasing DRAMs from German, Japanese, and Taiwanese suppliers (see figure 3). Because many of these firms require that a supplier's DRAMs pass certain qualification procedures before they can be purchased,[143] virtually all purchasers reported that they are aware of the country of origin of the DRAMs that they purchase. However, only slightly more than half of the responding purchasers reported that their customers are aware of/interested in the country of origin of the DRAMs.

In the DRAM industry many firms that manufacture DRAMs also sell them to unrelated purchasers; as a result, many purchasers reported that they compete for sales to their customers with the manufacturers or importers from whom they purchase DRAMs.[144] Many firms reported that they change suppliers infrequently; however, several firms did report that they had changed suppliers in the past 3 years. Reasons given for changing suppliers include availability, compatibility with end products, reliability of supply, leadtimes, price, quality, service, and technology. In general, purchasers reported contacting two to three suppliers before making a purchase.[145]

Purchasers were asked to compare Korean suppliers' marketing efforts with those of the domestic DRAM suppliers. Areas of comparison include credit terms, service, warranties, sales techniques, and pricing policies. While many purchasers reported that there were no differences between the U.S. and Korean suppliers in these areas, some did mention differences. Several purchasers reported that it is often easier to get credit lines from Korean suppliers than from domestic suppliers. Similarly, some purchasers reported

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[142] Seventeen firms reported that they did not purchase DRAMs, VRAMs, or DRAM modules during the period January 1989-September 1992. The remaining firms did not respond to the Commission's questionnaire.

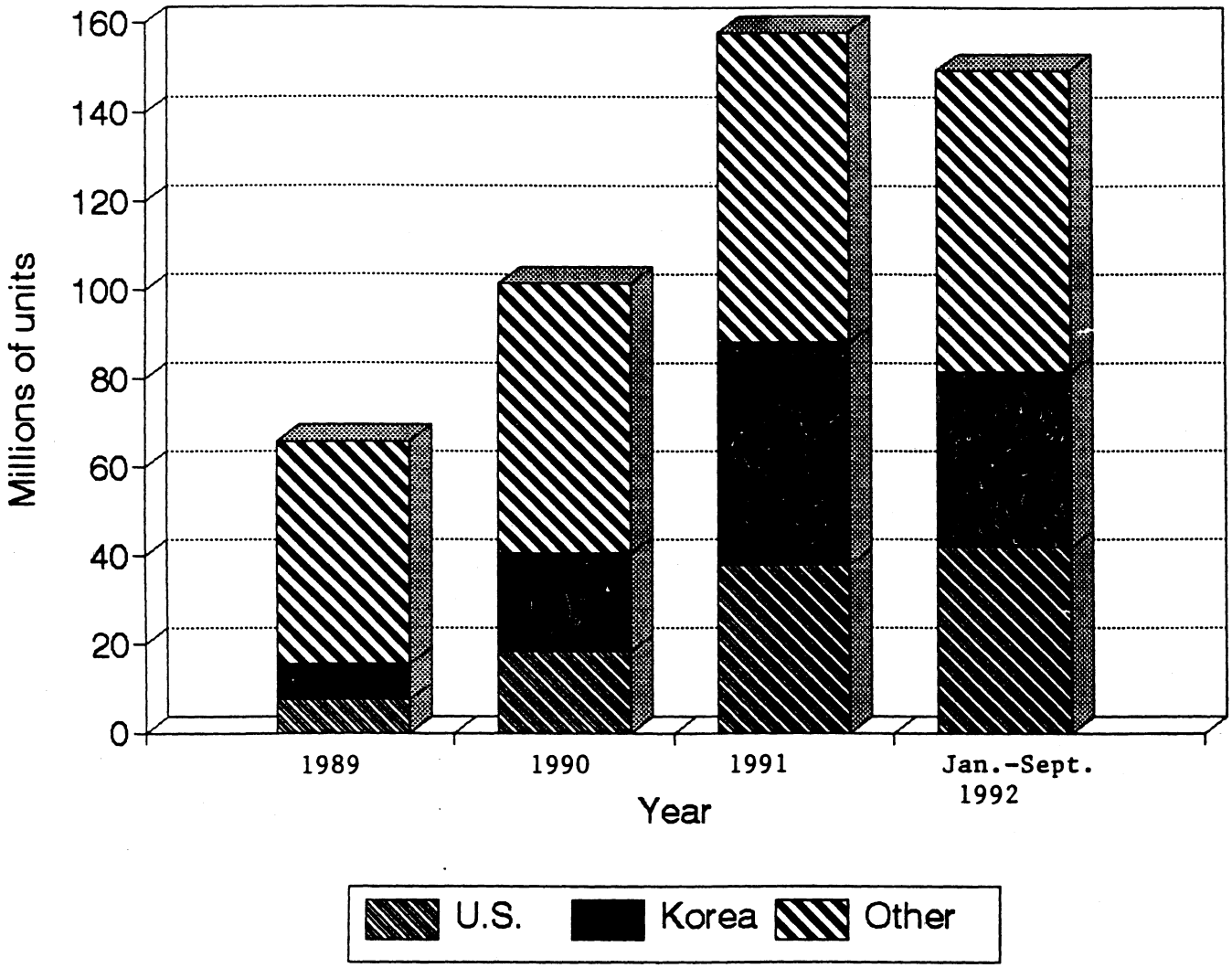
Of the 62 responding firms, 40 are OEMs, 11 are franchise distributors, 6 are value-added resellers, and the remaining 5 are brokers.

[143] Qualification procedures vary from firm to firm. However, OEMs generally have the most stringent requirements.

[144] Manufacturing or importing firms mentioned by purchasers as competitors include ***. ***.

[145] Franchise distributors reported that they only contact those firms with which they have franchise agreements.

Figure 3
Purchases of DRAMs, by sources, 1989-91 and January-September 1992



Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission

that the service and pricing policies of the Korean suppliers are superior to those provided by domestic firms.[146]

Purchasers were also asked to rank, in order of importance, the major factors considered in deciding from whom to purchase DRAMs.[147] Quality was mentioned most frequently as the number one factor considered, with 18 firms ranking it number one; price was ranked as the number one consideration by 12 firms. Other factors that were considered most important by a number of firms included availability and reliability of supply.[148] A majority of the responding franchise distributors reported that the most important consideration in their decision-making process is franchise agreements; these firms will only purchase DRAMs from suppliers with whom they have franchise agreements. Price, quality, and reliability of supply were mentioned most frequently as the second and third most important considerations in a purchasing decision.[149] Other factors that were mentioned as being important considerations in purchasing decisions include range of credit, delivery, existence of contracts, product line, service, and technology/investment.

Purchasers were asked to compare domestic and Korean DRAMs with respect to 12 different factors.[150] At least two-thirds of the responding purchasers reported that the domestic and Korean products were similar with respect to credit terms, compatibility with end products, delivery terms, low failure rates, quality, and service. A majority (i.e., over 50 percent) of purchasers reported that the Korean product was superior with regard to availability and delivery time. Purchasers also reported differences between the domestic and Korean DRAMs in the areas of price and reliability; a significant number of purchasers found the Koreans to have lower prices and better reliability.

Purchaser Prices

The Commission requested price and quantity data from purchasers of DRAMs, VRAMs, and DRAM modules for their purchases during the period January

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[146] Three purchasers also commented on the superiority of the Koreans with regard to product availability, particularly in the area of offering new generations of DRAMs. One firm added that Samsung supports older technologies longer than domestic firms do.

[147] Several firms ranked more than one factor as the number one consideration in a purchasing decision; these firms stated that the two factors were equally important.

[148] Ten firms reported that reliability was the most important consideration, while five ranked availability first. Other factors mentioned as the number one consideration in a purchasing decision include credit policies, compatibility with end products, customer approval, and service.

[149] Price was ranked second by 14 firms and third by 13 firms. Quality was rated second by eight firms and third by six firms. Finally, 11 firms ranked reliability second and 6 ranked it third.

[150] These factors are availability, credit terms, high credit lines, compatibility with end product, delivery time, delivery terms, failure rates, lowest failure rates, lowest price, product quality, reliability of supply, and service/technical support.

1991-September 1992. The products for which price data were requested are listed below and are the same as those collected from producers and importers.

Product 1: 1 Meg x 1, 70ns 1 Meg DRAM, SOJ
Product 2: 1 Meg x 1, 80ns 1 Meg DRAM, SOJ
Product 3: 4 Meg x 1, 80ns 4 Meg DRAM, SOJ
Product 4: 1 Meg x 4, 80ns 4 Meg DRAM, SOJ
Product 5: 256 K x 4, 100ns 1 Meg VRAM, SOJ
Product 6: 1 Meg x 9 SIMM consisting of 9, 1 Meg x 1, 80ns 1 Meg DRAMs

Usable price information was received from 34 purchasers and a summary of the information obtained is discussed below.

Purchase prices for all six products declined during the period for which data were collected; these declines were somewhat less severe than those demonstrated in the producer and importer data. This is due to the shorter time frame for which prices were collected from purchasers. However, price declines for U.S-produced product ranged from *** percent,[151] while purchase prices of Korean product declined by between *** percent. Purchase price data are presented in appendix J.

There were a total of 203 instances where domestic and Korean DRAM prices could be compared (tables J-1 to J-7, app. J). In 87 of these instances, the Korean product was priced below the domestic product, with margins ranging from 0.4 to 36.2 percent. In 110 instances, the Korean product was priced 0.1 to 57.1 percent above the domestic product. In the remaining six instances, the two products were priced the same.

Exchange Rates

Quarterly data reported by the International Monetary Fund indicate that from January-March 1989 through July-September 1992, the nominal value of the Korean won fluctuated, depreciating overall by 14.0 percent relative to the U.S. dollar (table 62).[152] Adjusted for movements in producer price indexes in the United States and Korea, the real value of the Korean currency depreciated 7.1 percent overall between January-March 1989 and the third quarter of 1992.

Lost Sales and Revenues from the Final Investigation

The Commission received lost sales and lost revenue allegations from *** U.S. producers, ***. The *** lost sales allegations totaled *** and involved approximately *** DRAMs allegedly purchased from Korean suppliers during January 1989-September 1992. These producers also alleged that they lost a total of *** in revenues on sales of *** DRAMs due to competition from Korean

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[151] ***.

[152] International Financial Statistics, Feb. 1993.

Table 62
Exchange rates:[1] Indexes of nominal and real exchange rates of the Korean won and indexes of producer prices in the United States and Korea,[2] by quarters, January 1989-September 1992

Period	U.S. producer price index	Korean producer price index	Nominal exchange rate index	Real exchange rate index[3]
1989:				
Jan.-Mar.....	100.0	100.0	100.0	100.0
Apr.-June.....	101.8	100.8	101.6	100.6
July-Sept.....	101.4	100.7	101.3	100.6
Oct.-Dec.....	101.8	101.2	100.7	100.1
1990:				
Jan.-Mar.....	103.3	101.8	98.1	96.7
Apr.-June.....	103.1	104.0	95.4	96.3
July-Sept.....	104.9	105.5	94.7	95.2
Oct.-Dec.....	108.1	108.2	94.7	94.8
1991:				
Jan.-Mar.....	105.9	109.8	93.9	97.3
Apr.-June.....	104.8	110.0	93.4	98.0
July-Sept.....	104.7	110.6	92.4	97.7
Oct.-Dec.....	104.8	111.5	89.9	95.7
1992:				
Jan.-Mar.....	104.6	112.3	88.4	95.1
Apr.-June.....	105.7	113.7	86.5	93.0
July-Sept.....	106.1	114.5	86.0	92.9

[1] Exchange rates expressed in U.S. dollars per Korean won.
[2] Producer price indexes--intended to measure final product prices--are based on period-average quarterly indexes presented in line 63 of the International Financial Statistics.
[3] The real exchange rate is derived from the nominal rate adjusted for relative movements in producer prices in the United States and Korea.

Note.--January-March 1989 = 100.

Source: International Monetary Fund, International Financial Statistics, February 1993.

DRAMs. Staff contacted 6 purchasers who accounted for 52 lost sales and 17 lost revenue allegations; a summary of the information obtained from these purchasers follows.

*** was named by *** in *** lost sales allegations and *** lost revenue allegations.[153] The lost sales allegations totaled approximately *** and involved *** 1 Meg and 4 Meg DRAMs and DRAM modules, while the lost revenue allegations totaled ***. *** denied the lost sales allegations and stated that *** has not purchased any Korean DRAMs. *** reported that *** purchases

[153] ***.

the vast majority of its DRAMs from U.S. suppliers;[154] the remainder was purchased from *** suppliers. He did not comment on the specific lost revenue allegations but did state that *** has lost business to lower-priced Korean imports. *** stated that Korean imports entered the DRAM market late and used price as an incentive to get customers to use their product. *** reported that suppliers and purchasers are generally aware of market prices; *** customers generally state the price (or range of prices) that they are willing to pay and the suppliers that are qualified to supply them. *** uses this information to purchase DRAMs from its suppliers for its customers. Finally, *** reported that *** believes that ***,[155] *** have been price leaders in the DRAM market.

*** alleged that it lost *** on sales of *** DRAMs and DRAM modules to ***. *** was also cited in *** lost revenue allegations which totaled *** and involved *** DRAMs and DRAM modules. *** could not confirm these allegations. *** stated that ***. Therefore, it was not possible that these sales were lost due to competition from Korean imports because *** has not purchased any DRAMs from Korean suppliers.[156] ***. According to *** buys parts from various suppliers and assembles them for its customers. *** was unable to state whether or not *** had ever purchased any Korean DRAMs. With respect to the lost revenue allegations, *** stated that it is a common practice to use market prices as a benchmark in price negotiations. *** purchasing habits are generally based on the needs of its customers. *** customers will indicate a general price range that is available and *** will use it as a guideline. *** also stated he has witnessed so called "fire sales" at the end of the month (i.e., selling DRAMs for low prices to reduce inventory); while *** mentioned *** as a practitioner of these tactics, he stated that several other suppliers also use them.

*** alleged that it lost *** in revenues on sales of *** DRAMs and DRAM modules to ***. *** also alleged that it lost sales on *** separate occasions to *** due to competition from Korean imports; these lost sales allegations totaled *** and involved *** DRAMs and DRAM modules. *** denied the lost sales allegations and stated that *** did not purchase any Korean DRAMs during the period for which data were collected. ***. With regard to the lost revenue allegations, *** was unable to confirm these specific allegations. However, *** stated that *** may have, at times, used market prices to get lower prices from its suppliers.

*** was named by *** in *** lost sales allegations involving *** valued at a total of ***. *** denied these specific allegations. According to *** did not purchase any Korean DRAMs or DRAM modules during the time alleged by ***. ***. *** reported that, during the period examined, *** experienced extreme pricing pressure on DRAMs due to the massive influx of foreign-produced product at extremely low prices. ***. Therefore, *** was only purchasing DRAMs from ***. *** added that if *** believes that it is not as competitive in the marketplace as other firms, *** will inform its *** suppliers.

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[154] ***.

[155] ***.

[156] However, both ***.

*** alleged that it lost a total of *** in revenues on sales of *** DRAMs to *** due to competition from Korean imports. *** could not recall these specific allegations but did provide information concerning the DRAM market. *** stated that *** does discuss the bids of competing firms with potential DRAM suppliers in order to get suppliers to lower their prices; however, *** also stated that he believes that Japanese suppliers have been the most aggressive with respect to DRAM prices. *** has purchased Korean DRAMs from *** and prices for these DRAMs have generally been at or above those for domestic DRAMs. *** stated that DRAMs from *** generally have lower prices and lower quality than DRAMs from *** or U.S. suppliers. Because quality is the most important factor in *** purchasing decision, it has not purchased any DRAMs from either Goldstar or Hyundai.[157] *** also commented that *** had difficulty obtaining sufficient quantities of DRAMs from its major suppliers in ***.[158]

*** was named in *** lost sales allegations totaling *** and involving *** DRAMs.[159] *** reported that *** had shifted some of its purchases from *** to Korean suppliers. However, the shift in purchases, was not due to price.[160] *** stated that *** pricing and delivery policies are very inconsistent, and because of this, it is difficult dealing with it as a supplier.[161] According to *** has usually been the price leader in the DRAM market. Furthermore, while both U.S. and Korean DRAM suppliers tend to lower prices at the end of the month to reduce inventories, *** believes that *** uses this practice frequently.

Lost Sales and Revenues from the Preliminary Investigation

The Commission received lost sales and lost revenue allegations from *** U.S. DRAM producers, ***. The 32 lost sales allegations totaled approximately *** and involved *** DRAMs allegedly purchased from Korean suppliers during the period January 1989 to March 1992.[162] The 57 lost revenue allegations totaled *** and involved *** DRAMs. Staff contacted *** purchasers who accounted for 18 of the allegations; a summary of the information obtained follows.

*** was named by *** in *** lost revenue allegations that totaled *** and involved *** DRAMs. *** stated that he was not sure if the price decreases in the market were caused by Korean suppliers. *** reported that *** is a difficult company to deal with and *** tend to cater to the few big computer companies rather than pursuing the business of smaller companies such as ***. *** stated that *** purchases Korean DRAMs because of better availability and more consistent supply. For ***, delivery and availability are very important. *** also added that *** has been very aggressive on

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[157] In its purchaser questionnaire response, *** reported that ***.

[158] ***.

[159] ***.

[160] However, in its purchaser questionnaire response, *** reported that price is the most important consideration in its purchasing decision and Korean suppliers are generally lower-priced.

[161] ***.

[162] ***.

price, particularly in the 1 Meg DRAM market. According to ***, it is a well known fact that *** tends to have "fire sales" on its products at the end of the month. *** purchases "shrink" DRAMs; these products are generally faster and lower-priced.[163]

*** alleged that it lost revenues on *** sales to *** allegedly due to competition from Korean products; these allegations involved *** DRAMs and totaled ***. *** provided information on his firm's purchases of DRAMs. *** stated that *** previously purchased DRAMs from *** and that during that time did not ask *** to lower its prices. *** reported that *** prices for its DRAMs are currently higher than other suppliers in the market. In the past few years, *** prices for DRAMs were generally a couple of percentage points above Korean prices. *** stated that *** stopped buying from *** because the price differential increased to 10-15 percent above Korean prices. According to ***, *** previously had a policy of cleaning out its inventory at the end of a month, usually at very low prices; however, in the past 4 or 5 months, *** has not followed this policy. *** also added that overall prices for DRAMs have dropped during the past few years but he did not feel that prices were dramatically lower than they normally would be.

*** named *** in *** lost sales allegations and *** lost revenue allegation. The *** lost sales allegations totaled *** and involved *** DRAMs, while the lost revenue allegation totaled *** and involved *** DRAMs. *** reported that ***; the majority of *** purchases are of *** DRAMs. *** stated that although *** has not purchased any Korean product, he is aware of the low prices that they offer in the marketplace. According to ***, all DRAM suppliers, ***, are reducing prices but U.S. and other suppliers are not keeping pace with the reductions in price of the Korean suppliers. *** also commented that *** has lost customers to Korean DRAM suppliers because of the low prices that they offer.

*** alleged that it lost revenues of *** on *** separate sales of *** DRAMs to *** due to competition from Korean products. *** stated that he has asked for lower prices from both *** and the Korean suppliers at different times, using the firm with the lowest price as the bargaining tool. *** reported that *** purchases DRAMs from *** and that all of these firms have had the lowest price at different times.[164] According to ***, all DRAM suppliers generally try to get rid of any extra inventory at the end of the month; therefore, firms with high end-of-month inventories will tend to sell DRAMs at low prices. *** stated that he often waits until the end of the month to purchase DRAMs in order to get the lower prices. *** also stated that *** service and the quality of its product have always been acceptable to ***; the only complaint that *** has is with ***.[165]

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[163] *** stated that companies are able to offer a faster product for a lower price because they are smaller and the producer can produce more of them on the same size silicon wafer.

[164] *** also commented that *** tends to be higher-priced than the firms from whom he purchases DRAMs.

[165] ***.

APPENDIX A

LIST OF PARTICIPANTS IN THE HEARING, FEDERAL REGISTER NOTICES, AND GLOSSARY OF INDUSTRY TERMS

CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject	:	DYNAMIC RANDOM ACCESS MEMORIES (DRAMs) OF ONE MEGABIT AND ABOVE FROM THE REPUBLIC OF KOREA
Inv. No.	:	731-TA-556 (Final)
Date and Time	:	March 18, 1993 - 9:30 a.m.

Sessions were held in connection with the investigation in the Main Hearing Room 101 of the United States International Trade Commission, 500 E St., S.W., Washington, D.C.

OPENING REMARKS	TIME ALLOCATIONS
Petitioner (Gilbert Kaplan - 5 Minutes)	5 Minutes
Respondents (Lawrence Walders, Spencer Griffith - 5 Min.)	5 Minutes

In support of Imposition of Antidumping Duties:

PANEL 1

TIME ALLOCATIONS

Hale and Door
Washington, D.C.
On behalf of

80 Minutes

Micron Technology, Inc.

James W. Garrett, President and Chief Operating Officer, Micron Technology

Reid N. Langrill, Vice President and Chief Financial Officer, Micron Technology

Eugene H. Cloud, Vice Presdient of Semiconductor Marketing, Micron Technology

William F. Finan, Economic Consultant
Technecon Analytic Research

Gilbert B. Kaplan)
)--OF COUNSEL
Paul W. Jameson)--

In Opposition to the Imposition of Antidumping Duties:	TIME ALLOCATIONS
PANEL 2	
Akin, Gump, Hauer & Feld Washington, D.C. On behalf of Samsung Electronics Co., Ltd. Samsung Semiconductor Co., Inc. W. Keith McDonald, Vice President, Sales & Marketing, Samsung Semiconductor, Inc. Dr. Seth T. Kaplan, Trade Resources Co. Richard D. Boltuck, Trade Resources Co. Spencer S. Griffith Nicholas D. Giordano --OF COUNSEL	80 Minutes
Graham & James Washington, D.C. On behalf of Hyundai Electronics Industries Co., Ltd. Hyundai Electronics America, Inc. Dr. Seth T. Kaplan, Trade Resources Co. Richard D. Boltuck, Trade Resources Co. Lawrence R. Walders Brian E. McGill --OF COUNSEL	
Donovan Leisure, Rogovin & Schiller Washington, D.C. On behalf of Goldstar Electron Co. Ltd. Goldstar Electron America Alan Portnoy, Executive Vice President Dr. Seth T. Kaplan, Trade Resources Co. Richard D. Boltuck, Trade Resources Co. Michael P. House Raymond Paretzky --OF COUNSEL	
PANEL 3	
Other Interested Person	
Patrick D. Chisholm, Consumer Ft. Belvoir, VA	5 Minutes

International Trade Administration

[A-580-812]

Preliminary Determination of Sales at Less Than Fair Value and Postponement of Final Determination: Dynamic Random Access Memory Semiconductors of One Megabit and Above From the Republic of Korea

AGENCY: Import Administration, International Trade Administration, Department of Commerce.

EFFECTIVE DATE: October 29, 1992.

FOR FURTHER INFORMATION CONTACT: John Beck, Office of Antidumping Investigations, Import Administration, International Trade Administration, U.S. Department of Commerce, 14th Street and Constitution Avenue, NW., Washington, DC 20230; telephone: (202) 482-3464.

PRELIMINARY DETERMINATION: We preliminarily determine that dynamic random access memory semiconductors of one megabit and above (DRAMs) from the Republic of Korea (Korea) are being, or are likely to be, sold in the United States at less than fair value, as provided in section 733 of the Tariff Act of 1930, as amended (the Act). The estimated margins are shown in the "Suspension of Liquidation" section of this notice.

Case History

Since the initiation of this investigation on May 12, 1992, (57 FR 21231, May 19, 1992), the following events have occurred.

On June 8, 1992, the U.S. International Trade Commission (ITC) issued an affirmative preliminary injury determination.

On June 30, 1992, the Department of Commerce (the Department) presented antidumping duty questionnaires to Goldstar Electron Co., Ltd. and Goldstar Electron America (Goldstar), Hyundai Electronics Industries Co., Ltd., and Hyundai Electronics America (Hyundai), and Samsung Electronics Co., Ltd. and Samsung Semiconductor, Inc. (Samsung). These three respondents accounted for at least 60 percent of the exports of DRAMs to the United States.

On July 15, 1992, the Department determined that Singapore would be the appropriate third country market for Hyundai. On July 13, 1992, petitioner alleged that Hyundai sold DRAMs in Singapore at prices below the cost of production. On July 28, 1992, the Department determined that it had reasonable grounds to believe or suspect that Hyundai had sold DRAMs in Singapore below cost, and therefore, initiated a cost investigation in accordance with section 773(b) of the Act. The Department issued Hyundai section D of the antidumping duty questionnaire on July 28, 1992. On August 20, 1992, the Department presented to Hyundai section E of the antidumping questionnaire, which concerns further manufacturing in the United States.

The respondents submitted sales questionnaire responses in July, August and September, 1992. The Department issued supplemental sales questionnaires in September, 1992. Respondents submitted the responses to these supplemental questionnaires in September and October, 1992. However, due to time constraints, the Department is not using these supplemental responses for purposes of the preliminary determination.

On September 3, 1992, petitioner requested that the Department postpone the preliminary determination until October 6, 1993, pursuant to 19 CFR 353.15(c). The Department granted this request on September 8, 1992 (57 FR 42544, September 15, 1992).

On September 30 and October 2, 1992, respondents requested that, in the event of an affirmative preliminary determination in this investigation, the Department postpone the final determination to 135 days after the date of the publication of the affirmative preliminary determination. See, the "Postponement of Final Determination" section of this notice.

On October 6, 1992, the Department postponed the preliminary

determination by 14 days (57 FR 46843, October 13, 1992). In accordance with 19 CFR 353.15(b), the Department found this investigation extraordinarily complicated due to certain issues regarding the cost information submitted by the three respondents. Also on October 6, 1992, the Department sent letters to the three respondents requesting additional cost information. On October 9, 1992, the three respondents submitted their responses to this letter. The Department considered these responses for its preliminary determination.

Scope of Investigation

For purposes of this investigation, DRAMs are all one megabit and above dynamic random access memory semiconductors, whether assembled or unassembled. Assembled DRAMs include all package types. Unassembled DRAMs include processed wafers, uncut die and cut die. Processed wafers produced in Korea but packaged in a third country are included in the scope; however, wafers produced in a third country and assembled or packaged in Korea are not included in the scope. The scope includes memory modules, such as Single In-Line Processing Modules (SIPs) and Single In-Line Memory Modules (SIMMs), that contain one megabit or above dynamic random access memory semiconductors that are assembled together and function as memory. Modules that contain other parts that are needed to support the function of memory are considered to be covered memory modules. Only those modules which contain additional items which alter the function of the module to something other than memory are not-covered modules. The scope also includes video random access memory VRAMs), as well as any future packaging and assembling of DRAMs.

On September 4, 1992, Apple Computer, Inc. (Apple) requested that the Department formally state that a certain product imported by Apple containing Korean DRAMs is not within the scope of investigation. On September 29, petitioner stated that it opposed this request. On September 28, 1992, Samsung requested that the Department modify the current scope of this investigation to exclude future generations of DRAMs. The Department is allowing all interested parties an opportunity to comment on these scope exclusion requests. Comments should be submitted in at least ten copies to the Assistant Secretary for Import Administration no later than November 19, 1992.

The DRAMs subject to this investigation are classifiable under subheadings 8473.30.4000, 8542.11.0001, 8542.11.0024, 8542.11.0026 and 8542.11.0034 of the Harmonized Tariff Schedule of the United States (HTSUS). Although the HTSUS subheadings are provided for convenience and customs purposes, our written description of the scope of this investigation is dispositive.

Period of Investigation

The period of investigation (POI) is November 1, 1991, through April 30, 1992.

Such or Similar Comparisons

We have determined that all products covered by this investigation constitute three such or similar categories of merchandise: (1) Dynamic random access memory semiconductor chips of one megabit and above; (2) video random access memory semiconductor chips of one megabit and serve; and (3) memory modules. Furthermore, we have made comparisons of merchandise in the United States, home market or third country based on identical sales only.

Fair Value Comparisons

To determine whether sales of DRAMs from Korea to the United States were made at less than fair value, we compared the United States price (USP) to the foreign market value (FMV), as specified in the "United States Price" and "Foreign Market Value" sections of this notice.

United States Price

For Goldstar, Hyundai and Samsung, we based USP on purchase price, in accordance with section 772(b) of the Act, when the subject merchandise was sold to unrelated purchasers in the United States prior to importation. Exporter's sale price (ESP) methodology, in those instances, was not otherwise indicated.

In addition, for Goldstar, Hyundai and Samsung, where certain sales to the first unrelated purchaser took place after importation into the United States, we also based USP on ESP, in accordance with section 772(c) of the Act.

For Goldstar and Samsung, because a value-added tax (VAT) was paid on home market sales but not on U.S. sales, we added to the U.S. selling price for the price-to-price comparisons the amount of the VAT that would have been collected if the export sales had been taxes. We recalculated this VAT to reflect that discounts, where appropriate, were granted on sales to the United States. Also for Goldstar and Samsung, because import duties are paid on raw material inputs used to produce DRAMs sold in the home market, we added to U.S. price the amount of duty that would have been collected if the merchandise had been sold in the home market. For all respondents, we recalculated credit to reflect the fact that discounts, where appropriate, were granted on sales to the United States. We made additional company-specific adjustments as follows:

A. Goldstar

For Goldstar, we calculated purchase price based on packed, f.o.b., f.c.a., or c.i.f. prices to unrelated customers in the United States. We made deductions, where appropriate, for foreign brokerage and handling, foreign inland insurance, air freight, and air insurance. Goldstar did not report imputed credit expenses. Instead, it reported as credit expenses only banking fees it incurred on certain sales transactions that were paid for by bank notes. Therefore, we imputed credit expenses for all purchase price sales using in our calculation, as best information available (BIA), the interest rate reported for ESP sales. In addition, we disallowed Goldstar's claimed VAT credit expense, as it did not take into account the savings gained from early payment of VAT by the customer.

We calculated ESP based on packed, ex-U.S. warehouse prices to unrelated customers in the United States. We made deductions, where appropriate, for discounts, rebates, foreign brokerage and handling, foreign inland insurance, air freight, air insurance, U.S. duties, U.S. inland freight, U.S. brokerage, credit expenses, warranty expenses, royalty payments, U.S. commissions, U.S. subsidiary packing and U.S. and Korean indirect selling expenses, including U.S. and Korean inventory carrying costs.

B. Hyundai

For Hyundai, we calculated purchase price based on packed, f.o.b. prices to unrelated customers in the United States. We made deductions, where appropriate, for foreign brokerage and handling. We recalculated U.S. credit to reflect the financing costs incurred by Hyundai on its direct sales to Singapore, rather than on its sales through its subsidiary in Singapore.

We calculated ESP based on packed, ex-U.S. warehouse prices to unrelated customers in the United States. We made deductions, where appropriate, for discounts, rebates, foreign brokerage, air freight, U.S. inland freight, insurance, merchandise processing, U.S. brokerage, repacking, credit expenses, commissions, royalties, bank charges, price protection expenses and U.S. and Korean indirect selling expenses.

including U.S. and Korean inventory carrying costs.

C. Samsung

For Samsung, we calculated purchase price based on packed, f.o.b., c&f, or c.i.f. prices to unrelated customers in the United States. We made deductions, where appropriate, for foreign brokerage and handling, foreign inland freight, foreign inland insurance, air freight, and air insurance. We treated U.S. banking charges as direct selling expenses for the preliminary determination since there was no narrative description of these charges.

We calculated ESP on packed, ex-U.S. warehouse prices to unrelated customers in the United States. We made deductions, where appropriate, for discounts, foreign brokerage and handling, foreign inland freight, air freight, air insurance, U.S. inland freight, U.S. brokerage, U.S. commissions, foreign banking charges, product liability premiums, credit expenses, royalty payments, advertising and sales promotion expenses, warranty expenses, U.S. subsidiary packing and U.S. and Korean indirect selling expenses, including inventory carrying costs. We treated U.S. banking charges as direct selling expenses for the preliminary determination since there was no narrative description of these charges.

Foreign Market Value

In order to determine whether there were sufficient sales of DRAMs in the home market to serve as a viable basis for calculating FMV, we compared the volume of home market sales of DRAMs to the volume of third country sales of DRAMs in accordance with section 773(a)(1)(B) of the Act. We found that the home market was viable for sales of DRAMs by Goldstar and Samsung. For Hyundai, the home market was not viable and, therefore, we based FMV on third country sales. We selected Singapore as the third country because the merchandise exported to Singapore was most similar to the merchandise exported to the United States, the volume of Hyundai's Singapore sales during the POI was the largest of any third country, and the marketing conditions of Singapore were comparable to those in the United States.

In a September 16, 1992, submission, Samsung urged the Department to treat its local letter of credit sales as export sales. Based on the practice established in the Final Determination of Sales at Less Than Fair Value: Color Picture Tubes from Korea (52 FR 44186, November 18, 1987), the Department has decided to treat Samsung's local letter of credit sales as export sales. To be consistent, the Department treated Goldstar's local letter of credit sales as export sales as well.

Based on petitioner's allegations that Goldstar and Samsung are selling DRAMs in Korea at prices below their cost of production (COP), and that Hyundai is selling DRAMs in Singapore at prices below its cost of production, the Department initiated COP investigations for the home market sales of Goldstar and Samsung and the third country sales of Hyundai. See, Initiation of Antidumping Duty Investigation: Dynamic Random Access Memory Semiconductors of One Megabit and Above from the Republic of Korea (57 FR 21231, May 19, 1992) and the July 28, 1992, memorandum from David L. Binder to Richard W. Moreland. The Department, therefore, initiated investigations to determine whether Goldstar, Hyundai and Samsung had home market or third country sales that were made at less than their respective COP.

If over 90 percent of a respondent's sales of a given model were at prices above the COP, we did not disregard any below-cost sales because we determined that the respondent's below-cost sales were not made in substantial quantities over an extended period of time. If between ten and 90 percent of a respondent's sales were at prices above the COP, we discarded only the below-cost sales. Where we found that more than 90 percent of respondent's sales were at prices below the COP, we disregarded all sales for that model and calculated FMV based on constructed value (CV). In such cases, we determined that the repondent's below-cost sales were made in substantial quantities and over an extended period of time.

In order to determine whether home market or third country prices were above the COP, we calculated the COP based on the sum of a respondent's cost of materials, fabrication, general expenses, and packing. We adjusted respondents' cost data as described below:

For Goldstar, the Department relied on the information submitted by the petitioner, as BIA, for the cost of manufacturing (COM) for four megabit products, adjusted by the company-specific yields in the petition, and on COM information from Goldstar's most recent response for the one megabit products. Because of differences between the profits earned on home market sales reported on the computer tape and the profit rate stated in the COP/CV submission for the class or kind of merchandise, the Department asked Goldstar to provide additional information. The COMs in the original response were not confirmed by the information presented in Goldstar's October 9 submission. Accordingly, we did not rely on the original submission. As BIA, for the one megabit's COM we used the October 9 submission, which we considered to be more reliable based on proprietary claims. In contrast, since Goldstar had made proprietary representations regarding the four megabit's COMs which were not confirmed by the October 9 submission, the Department used the petitioner's costs as BIA.

For all other costs, *e.g.*, interest, research & development, general & administrative, the Department relied on Goldstar's submitted COP and CV data except in those cases where it appeared that these costs were not appropriately quantified and/or valued:

1. We adjusted research & development expenses, since it appeared that the amount used by Goldstar may not have included all research and development expenses incurred with respect to the products under investigation;
2. We included an amount related to the amortization of deferred exchange losses, since this cost was not included by the company;
3. We revised interest expense using Goldstar's audited financial statements for the year ended December 31, 1991, since the calculation submitted by Goldstar was based on unaudited and incomplete financial statements; and
4. We included an amount for general and administrative expenses related to Goldstar's parent corporate headquarters.

For Hyundai, the Department relied on the submitted COP and CV information, except in the following instances where the costs were not appropriately quantified or valued:

1. An amount for severance payments was included in the COM based on Hyundai's financial statements, since severance payments were not included in Hyundai's reported labor costs;
2. A calculation for an adjustment made by Hyundai to its COM related to the "Construction in Progress" account was not provided, and the methods used to account for the amount of interest from this account was not in accordance with GAAP (thus, the Department included as part of depreciation, an amount based on Hyundai's financial statements);
3. We rejected an adjustment made by Hyundai to its COM related to its off-spec merchandise, since this adjustment

was not specific to each product and the calculation did not use a comparable basis for the quantity of off-spec non off-spec products;

4. We included an amount for the amortization of deferred exchange losses based on Hyundai's financial statements, since this cost was not included by Hyundai;

5. We included an amount for research & development based on Hyundai's financial statements, since the amount submitted by Hyundai did not include general research & development and did not include all research & development expenses valued in accordance with GAAP;

6. We rejected the amount of interest income used by Hyundai as an offset to interest expenses, since Hyundai stated that the amount was calculated based on its financial statements and because the information from the statements did not support the amount of the interest income; and

7. We included an amount for general and administrative expenses based on Hyundai's financial statements, since the reported general and administrative expenses were not reconciled to the financial statements.

For Samsung, the Department relied on the information submitted by the petitioner, as BIA, for the COM, adjusted by the company-specific yields in the petition. As with Goldstar, Samsung reported differences between the profits earned on home market sales on the computer tape and the profit rate stated in the COP/CV submission for the class or kind of merchandise. Thus, the Department requested additional information from Samsung.

While Samsung furnished data in response to this request, it changed the methodology used to determine profit from the methodology used for the initial submission. Because of this change in methodology, the Department could not use the information provided by Samsung regarding its profit calculation as support for the response.

Moreover, Samsung's initial submission presented other issues related to the completeness of the COP/CV information. For example, although requested, Samsung:

1. Did not state whether the COM reported in the submission was the same as the value reported in Samsung's finished goods inventory records (thus, the Department could not determine whether the reported COP/CV mirrored the company's records);

2. Did not provide requested information concerning purchases from related companies (thus and the Department could not rely on the accuracy of the COP/CV's material costs);

3. Did not provide the amount of import duties included in the COP/CV (thus, the Department could not determine whether the amounts included in the COP/CV were comparable with the amount claimed as duty-drawback);

4. Did not state whether the costs related to its leased equipment had been included in the COP/CV calculation, although the company did state that leased equipment was used to manufacture the product (thus, the Department could not rely on the completeness of the fixed overhead); and

5. Did not state whether severance payments were included as part of the labor costs (thus, the Department could not rely on the completeness of the labor costs).

For all other costs, *e.g.*, interest, research & development, general & administrative, the Department used Samsung's data except in the following cases when it appeared that these costs were not appropriately quantified and/or valued:

1. We included an amount for the amortization of deferred exchange losses, based on Samsung's financial statements, since this cost was not included by Samsung;

2. We included an amount for general and administrative expenses, based on Samsung's financial statements, since the general and administrative expenses were not reconciled to the financial statements;

3. We revised interest expense to reflect the amount reported on Samsung's financial statements, and to exclude certain interest income used as an offset to interest expense; and,

4. We lagged COP/CV data by one fiscal quarter because the response appeared to reflect costs incurred during the POI instead of the costs of the merchandise sold during the POI.

For CV to purchase price comparisons, we made circumstance-of-sale adjustments, where appropriate, for bank charges, royalty payments, advertising and credit expenses. For Samsung, we added to CV U.S. commissions and deducted the weighted-average home market indirect selling expenses, including advertising and inventory carrying costs, up to the amount of U.S. commissions, in accordance with 19 CFR 353.56(b)(1). For Hyundai, we deducted from CV third country commissions and added U.S. indirect selling expenses capped by the third country commissions in accordance with 19 CFR 353.56(b)(1).

For CV to exporter's sales price comparisons, we made deductions, where appropriate, for credit expenses, royalty payments, bank charges and advertising. We also deducted from CV the weighted-average home market or third country indirect selling expenses, including, where appropriate, advertising and inventory carrying costs, up to the amount of indirect selling expenses, in accordance with 19 CFR 353.56(b)(2) and, where appropriate, commissions incurred on U.S. sales, in accordance with 19 CFR 353.56(b)(1).

For home market or third country price to purchase price comparisons, pursuant to section 773(a)(4)(B) and 19 CFR 353.56(a)(2), we made circumstance of sale adjustments, where appropriate, for credit expenses, royalty payments, bank charges and advertising. For Goldstar and Samsung, we also made a circumstance of sale adjustment for the difference between VAT on home market sales and that which would have been collected on U.S. sales if the export sales had been taxed. For all respondents, we deducted home market or third country packing costs and added U.S. packing costs.

For home market or third country price to ESP comparisons, we made deductions, where appropriate, for credit expenses, royalty payments, bank charges and advertising. We also deducted from FMV the weighted-average home market or third country indirect selling expenses, including, where appropriate, advertising and inventory carrying costs, up to the amount of indirect selling expenses and commissions incurred on U.S. sales, in accordance with 19 CFR 353.56(b)(1). For Goldstar and Samsung, we also made a circumstance of sale adjustment for the difference between VAT on home market sales and that which would have been collected on U.S. sales if the export sales had been taxed. For all respondents, we deducted home market or third country packing costs and added U.S. packing costs. We made additional, company-specific adjustments as follows:

A. Goldstar

For Goldstar, we calculated FMV based on delivered prices to unrelated customers in the home market. We made deductions for inland freight and inland insurance.

B. Hyundai

For Hyundai, we calculated FMV based on FOB Kimpo Airport or ex-Singapore-warehouse prices to unrelated customers in the third country. We made deductions for discounts.

rebates, air freight, insurance, brokerage, and third country inland freight. For home market price to purchase price comparisons, we deducted third country commissions and added U.S. indirect selling expenses capped by the third country commissions, in accordance with 19 CFR 353.56(b)(2).

C. Samsung

For Samsung, we calculated FMV based on delivered prices to unrelated customers in the home market. We made deductions for inland freight. For home market price to purchase price comparisons, we added to FMV U.S. commissions and deducted the weighted-average home market indirect selling expenses, including advertising and inventory carrying costs, up to the amount of U.S. commissions, in accordance with 19 CFR 353.56(b)(1).

Currency Conversion

We made currency conversions based on the official exchange rates in effect on the dates of the U.S. sales as certified by the Federal Reserve Bank.

Verification

As provided in section 776(b) of the Act, we will verify the information used in making our final determination.

Critical Circumstances

Petitioner alleges that "critical circumstances" exist with respect to imports of DRAMs from the Republic of Korea. Section 733(e)(1) of the Act provides that critical circumstances exist if we determine that there is a reasonable basis to believe or suspect that:

(A)(i) There is a history of dumping in the United States or elsewhere of the class or kind of merchandise which is the subject of the investigation, or

(ii) The person by whom, or for whose account, the merchandise was imported knew or should have known that the exporter was selling the merchandise which is the subject of the investigation at less than its fair value, and

(B) There have been massive imports of the class or kind of merchandise which is subject of the investigation over a relatively short period.

We normally consider either an outstanding antidumping order in the United States or elsewhere on the subject merchandise, or margins of 25 percent or more sufficient to impute knowledge of dumping under section 733(e)(1)(A) of the Act. Petitioner has provided information concerning an antidumping duty investigation on DRAMs from Korea being conducted by the European Community (E.C.). The E.C. issued its preliminary determination in June of this year, subsequent to the POI in the instant investigation. We have determined that this is not sufficient to impute knowledge under section 733(e)(1)(A)(i) of the Act, as an antidumping duty order has not yet been issued by the E.C.

With regard to Hyundai, since the preliminarily-determined dumping margin is less than 25 percent, we cannot impute knowledge of dumping under section 733(e)(1)(A)(ii) of the act. Therefore, in accordance with section 733(e)(1)(A) of the Act, we preliminary determine that, for Hyundai, critical circumstances do not exist with respect to imports DRAMs from Korea. For Goldstar and Samsung, because the preliminarily-determined dumping margins exceed 25 percent, in accordance with section 773(e)(1)(A)(ii) of the Act, we determine that knowledge of dumping existed for DRAMs from Korea.

For Goldstar and Samsung, in determining whether there have been massive imports of DRAMs, we relied upon the compnay-specific export data submitted by the companies. Based on our analysis of the monthly shipment data submitted by Goldstar and Samsung, we preliminarily determine that imports of DRAMs have not been massive over a relatively short period of time. Therefore, we find that the requirements of section 733(e)(1)(B) of the Act have not been met and that critical circumstances do not exist with respect to Goldstar and Samsung.

Therefore, in accordance with section 733(e)(1) of the Act, we preliminarily determine that critical circumstances do not exist with respect to imports of DRAMs from the Republic of Korea.

Suspension of Liquidation

In accordance with section 733(d)(1) of the Act, we are directing the Customs Service to suspend liquidation of all entries of DRAMs from Korea that are entered, or withdrawn from warehouse, for consumption on or after the date of publication of this notice in the Federal Register. The Customs Service shall require a cash deposit or posting of a bond equal to the estimated preliminary dumping margins, as shown below. This suspension of liquidation will remain in effect until further notice.

Producer/manufacturer/exporter	Weighted-average margin percentage
Goldstar Electron Co., Ltd. and Goldstar Electron America	52.41
Hyundai Electronics Co., Ltd. and Hyundai Electrons America	5.99
Samsung Electronics, Ltd. and Samsung Semiconductor, Inc.	87.40
All others	81.88

ITC Notification

In accordance with section 733(f) of the Act, we have notified the ITC of our determination. If our final determination is affirmative, the ITC will determine before the later of 120 days after the date of this preliminary determination or 45 days after our final determination whether these imports are materially injuring, or threaten material injury to, the U.S. industry.

Postponement of Final Determination

As stated above, in accordance with 19 CFR 353.20(b), respondents who account for a significant portion of the merchandise covered by this proceeding have requested that, in the event of an affirmative determination, the Department postpone the final determination. We find no compelling reason to deny the request. Accordingly, we are postponing the date of the final determination until not later than 135 days after the date of publication of this notice.

Public Comment

In accordance with 19 CFR 353.38, case briefs or other written comments in at least ten copies must be submitted to the Assistant Secretary for Import Administration no later than January 19, 1993, and for rebuttal briefs no later than January 26, 1993. In accordance with 19 CFR 353.38(b), we will hold a public hearing, if requested, to afford interested parties an opportunity to comment on arguments raised in case or rebuttal briefs. Tentatively, the hearing will be held on February 2, 1993, at the U.S. Department of Commerce, 14th Street and Constitution Avenue, NW., Washington, DC 20230. Parties should confirm by telephone the time, date, and place of the hearing 48 hours before the scheduled time.

Interested parties who wish to request a hearing, or to participate if one is requested, must submit a written request to the Assistant Secretary for Import Administration, U.S. Department of Commerce, room B-099, within ten days of the publication of this notice. Requests should contain: (1) The party's name, address, and telephone number; (2) the number of participants; and (3) a

list of the issues to be discussed. In accordance with 19 CFR 353.38(b), oral presentations will be limited to issues raised in the briefs.

The determination is published pursuant to section 733(f) of the Act and 19 CFR 353.15(a)(4).

Dated: October 20, 1992.

Alan M. Dunn,

Assistant Secretary for Import Administration.

[FR Doc. 92-26290 Filed 10-28-92; 8:45 am]

BILLING CODE 3510-DS-M

[Investigation No. 731-TA-556 (Final)]

Drams of One Megabit and Above From the Republic of Korea

AGENCY: United States International Trade Commission.

ACTION: Institution and scheduling of a final antidumping investigation.

SUMMARY: The Commission hereby gives notice of the institution of final antidumping investigation No. 731-TA-556 (Final) under section 735(b) of the Tariff Act of 1930 (19 U.S.C. 1673d(b)) (the Act) to determine whether an industry in the United States is materially injured, or is threatened with material injury, or the establishment of an industry in the United States is materially retarded, by reason of imports from the Republic of Korea (Korea) of dynamic random access memories (DRAMs) of one megabit and above,[1] currently covered by statistical reporting numbers 8473.30.4000, 8542.11.0001, 8542.11.0024, 8542.11.0026, and 8542.11.0034 of the Harmonized Tariff Schedule of the United States (HTS) Annotated for statistical reporting purposes.[2]

For further information concerning the conduct of this investigation, hearing procedures, and rules of general application, consult the Commission's Rules of Practice and Procedure, part 201, subparts A through E (19 CFR part 201), and part 207, subparts A and C (19 CFR part 207).

EFFECTIVE DATE: October 29, 1992.

FOR FURTHER INFORMATION CONTACT: Mary Messer (202-205-3193), Office of Investigations, U.S. International Trade Commission, 500 E Street SW., Washington, DC 20436. Hearing-impaired persons can obtain information on this matter by contacting the Commission's TDD terminal on 202-205-1810. Persons with mobility impairments who will need special assistance in gaining access to the Commission should contact the Office of the Secretary at 202-205-2000.

SUPPLEMENTARY INFORMATION:

Background

This investigation is being instituted as a result of an affirmative preliminary determination by the Department of Commerce that imports of DRAMs of one megabit and above from Korea are being sold in the United States at less than fair value within the meaning of section 733 of the Act (19 U.S.C. 1673b). The investigation was requested in a petition filed on April 22, 1992, by counsel on behalf of Micron Technology, Inc. Boise, ID.

Participation in the Investigation and Public Service List

Persons wishing to participate in the investigation as parties must file an entry of appearance with the Secretary to the Commission, as provided in § 201.11 of the Commission's rules, not later than twenty-one (21) days after publication of this notice in the Federal Register. The Secretary will prepare a public service list containing the names and addresses of all persons, or their representatives, who are parties to this investigation upon the expiration of the period for filing entries of appearance.

Limited Disclosure of Business Proprietary Information (BPI) Under an Administrative Protective Order (APO) and BPI Service List

Pursuant to § 207.7(a) of the Commission's rules, the Secretary will make BPI gathered in this final investigation available to authorized applicants under the APO issued in the investigation, provided that the application is made not later than twenty-one (21) days after the publication of this notice in the Federal Register. A separate service list will be maintained by the Secretary for those parties authorized to receive BPI under the APO.

Staff Report

The prehearing staff report in this investigation will be placed in the nonpublic record on March 2, 1993, and a public version will be issued thereafter, pursuant to § 207.21 of the Commission's rules.

Hearing

The Commission will hold a hearing in connection with this investigation beginning at 9:30 a.m. on March 18, 1993, at the U.S. International Trade Commission Building. Requests to appear at the hearing should be filed in writing with the Secretary to the Commission on or before March 9, 1993. A nonparty who has testimony that may aid the Commission's deliberations may request permission to present a short

[1] For purposes of Commerce's investigation, DRAMs include all 1 Meg and above dynamic random access memory semiconductors, whether assembled or unassembled. Assembled DRAMs include all package types. Unassembled DRAMs include processed wafers, uncut dice, and cut dice. Processed wafers produced in Korea but packaged in a third country are included in the scope; however, wafers produced in a third country and assembled or packaged in Korea are not included in the scope. The scope also includes memory modules, such as single in-line processing modules (SIPs) and single in-line memory modules (SIMMs), that contain 1 Meg or above dynamic random access memory semiconductors that are assembled together and function as memory. Modules that contain other parts that are needed to support the function of memory are considered to be covered memory modules. Only those modules containing additional items that alter the function of the module to something other than memory are not-covered modules. The scope also includes video random access memories (VRAMs), as well as any future packaging and assembling of DRAMs (57 FR 49068).

[2] Prior to 1991, the subject product was covered by statistical reporting numbers 8473.30.4000, 8542.11.0035, and 8542.11.0002 of the HTS Annotated.

statement at the hearing. All parties and nonparties desiring to appear at the hearing and make oral presentations should attend a prehearing conference to be held at 9:30 a.m. on March 11, 1993, at the U.S. International Trade Commission Building. Oral testimony and written materials to be submitted at the public hearing are governed by §§ 201.6(b)(2), 201.13(f), and 207.23(b) of the Commission's rules.

Written Submissions

Each party is encouraged to submit a prehearing brief to the Commission. Prehearing briefs must conform with the provisions of § 207.22 of the Commission's rules; the deadline for filing is March 12, 1992. Parties may also file written testimony in connection with their presentation at the hearing, as provided in § 207.23(b) of the Commission's rules, and posthearing briefs, which must conform with the provisions of § 207.24 of the Commission's rules. The deadline for filing posthearing briefs is March 26, 1993; witness testimony must be filed no later than three (3) days before the hearing. In addition, any person who has not entered an appearance as a party to the investigation may submit a written statement of information pertinent to the subject of the investigation on or before March 26, 1993. All written submissions must conform with the provisions of § 201.8 of the Commission's rules; any submissions that contain BPI must also conform with the requirements of §§ 201.6, 207.3, and 207.7 of the Commission's rules.

In accordance with §§ 201.16(c) and 207.3 of the rules, each document filed by a party to the investigation must be served on all other parties to the investigation (as identified by either the public or BPI service list), and a certificate of service must be timely filed. The Secretary will not accept a document for filing without a certificate of service.

Authority: This investigation is being conducted under the authority of the Tariff Act of 1930, title VII. This notice is published pursuant to § 207.20 of the Commission's rules.

Issued: November 6, 1992.

By order of the Commission.

Paul R. Bardos,

Acting Secretary.

[FR Doc. 92-27366 Filed 11-10-92; 8:45 am]

BILLING CODE 7020-02-M

DEPARTMENT OF COMMERCE

International Trade Administration

[A-580-812]

Final Determination of Sales at Less Than Fair Value: Dynamic Random Access Memory Semiconductors of One Megabit and Above From the Republic of Korea

AGENCY: Import Administration, International Trade Administration, Department of Commerce.

EFFECTIVE DATE: March 23, 1993.

FOR FURTHER INFORMATION CONTACT: John Beck, Office of Antidumping Investigations, Import Administration, International Trade Administration, U.S. Department of Commerce, 14th Street and Constitution Avenue NW., Washington, DC 20230; telephone: (202) 482-3464.

FINAL DETERMINATION:

Background

Since publication of the affirmative preliminary determination on October 29, 1992 (57 FR 49006), the following events have occurred.

The respondents in this investigation, Samsung Electronics Co., Ltd., and Samsung Semiconductor, Inc. (Samsung), Hyundai Electronics Industries Co., Ltd., and Hyundai Electronics America (Hyundai), and Goldstar Electron Co., Ltd., and Goldstar Electron America (Goldstar), requested a public hearing on November 2, 6, and 9, 1992, respectively. On November 9, 1992, petitioner in this investigation, Micron Technology, Inc., requested to participate in the public hearing. We also received letters requesting to participate in the hearing from Apple Computer, Inc. (Apple), AST Research, Inc. (AST), Compaq Computer Corporation (Compaq), Digital Equipment Corporation (Digital), and the Korean Semiconductor Industry Association (KSIA).

We conducted verification of the cost portions of the questionnaire responses for the three respondents between November 4 and 23, 1992, in Korea, and on November 13 and 14, 1992, in Japan (for Samsung's related suppliers). We conducted verification of the sales portions of the questionnaire responses for the three respondents between November 9 and 18, 1992, in Korea, on November 13 and 14, 1992, in Singapore (for Hyundai's third-country sales), and between November 19 and 24, 1992, in California.

Interested parties submitted comments regarding the scope of this proceeding between October 13, 1992, and January 19, 1993. We received comments from petitioner, respondents, and the following interested parties: (1) AnTel; (2) Apple; (3) AST; (4) Compaq; (5) Digital; (6) Hewlett-Packard Company (Hewlett-Packard); (7) Motorola, Inc. (Motorola); and, (8) Texas Instruments Inc. (TI).

Case briefs were filed on January 26 and 27, 1993, by petitioner, respondents and the following interested parties: (1) Apple; (2) Compaq; (3) Digital; (4) Hewlett-Packard; and (5) Motorola. Rebuttal briefs were filed on February 2 and 3, 1993, by petitioner, respondents and the following interested parties: (1) Apple; (2) AST; (3) Compaq; and (4) Hewlett-Packard. A public hearing was held on February 2 and 3, 1993.

Hyundai and Goldstar submitted revised sales tapes that corrected clerical errors discovered at verification on January 26 and February 12, 1992, respectively. On February 22, 1992, Samsung submitted a revised sales and cost tape that corrected clerical errors discovered at verification.

Scope of Investigation

In our preliminary determination, we invited all interested parties to comment on the scope exclusion requests received prior to the preliminary determination. We received comments

on the scope of the investigation as noted in the "Background" section of this notice. The comments submitted by the parties concerned whether the following merchandise is included within the scope of the investigation: (1) Future generations of DRAMs; (2) memory boards containing Korean DRAMs; (3) removable, separable memory modules placed on motherboards; and, (4) the Korean DRAM content of defective memory products reimported into the United States for repair or replacement. We have determined that: (1) Future generations of DRAMs are within the scope; (2) memory boards are within the scope, while boards that have a function other than memory, such as video graphic adapter (VGA) boards/cards are outside the scope; (3) removable memory modules contained in motherboards are within the scope, unless the importer certifies that neither it, nor a party related to it or under contract to it, will remove the modules after importation into the United States; and, (4) merchandise reimported for repair or replacement is outside the scope. For a detailed discussion of our determinations regarding the scope issues, see a March 15, 1993, memorandum from Acting Deputy Assistant Secretary Moreland to Acting Assistant Secretary Spetrini.

The products covered by this investigation are dynamic random access memory semiconductors (DRAMs) of one megabit and above from the Republic of Korea. For purposes of this investigation, DRAMs are all one megabit and above dynamic random access memory semiconductors, whether assembled or unassembled. Assembled DRAMs include all package types. Unassembled DRAMs include processed wafers, uncut die and cut die. Processed wafers produced in Korea but packaged, or assembled into memory modules, in a third country are included in the scope; however, wafers produced in a third country and assembled or packaged in Korea are not included in the scope.

The scope of this investigation includes memory modules. A memory module is a collection of DRAMs the sole function of which is memory. Modules include single in-line processing modules (SIPs), single in-line memory modules (SIMMs), or other collections of DRAMs whether unmounted or mounted on a circuit board. Modules that contain other parts that are needed to support the function of memory are covered. Only those modules which contain additional items which alter the function of the module to something other than memory, such as video graphics adapter (VGA) boards and cards, are not included in the scope.

The scope of this investigation also includes video random access memory (VRAMs), as well as any future packaging and assembling of DRAMs.

The scope of this investigation also includes removable memory modules placed on motherboards, with or without a CPU, unless the importer of motherboards certifies with the Customs Service that neither it, nor a party related to it or under contract to it, will remove the modules from the motherboards after importation.

The scope of this investigation does not include DRAMs or memory modules that are reimported for repair or replacement.

The DRAMs subject to this investigation are classifiable under subheadings 8473.30.4000, 8542.11.0001, 8542.11.0024, 8542.11.0026 and 8542.11.0034 of the Harmonized Tariff Schedule of the United States (HTSUS). Although the HTSUS subheadings are provided for convenience and customs purposes, the written description of the scope of this investigation is dispositive.

Period of Investigation

The period of investigation (POI) is November 1, 1991, through April 30, 1992.

Such or Similar Comparisons

We have determined that the products covered by this investigation constitute three categories of such or similar merchandise: (1) Dynamic random access memory semiconductor chips of one megabit and above; (2) video random access memory semiconductor chips of one megabit and above; and (3) memory modules. Furthermore, in accordance with 19 CFR 353.58 of the Department's regulations, we compared U.S. sales to home market or third country sales made at the same level of trade. Where we were unable to match sales at the same level of trade, we made comparisons across levels of trade.

Fair Value Comparisons

To determine whether sales of DRAMs from Korea to the United States were made at less than fair value, we compared the United States price (USP) to the foreign market value (FMV), as specified in the "United States Price" and "Foreign Market Value" sections of this notice.

United States Price

For Goldstar, Hyundai and Samsung, we based USP on purchase price, in accordance with section 772(b) of the Tariff Act of 1930, as amended (the Act), when the subject merchandise was sold to unrelated purchasers in the United States prior to importation and when exporter's sale price (ESP) methodology was not otherwise indicated.

In addition, for Goldstar, Hyundai and Samsung, where certain sales to the first unrelated purchaser took place after importation into the United States, we based USP on ESP in accordance with section 772(c) of the Act.

For Goldstar and Samsung, because a value-added tax (VAT) was paid on home market sales but not on U.S. sales, we added to the U.S. selling price, for price-to-price comparisons, the amount of the VAT that would have been collected if the export sales had been taxed. Because no VAT was paid on Hyundai's third country sales, we did not make this adjustment to Hyundai's selling price. For Goldstar and Samsung, we recalculated this VAT, where appropriate, to reflect the fact that discounts were granted on sales to the United States. Also for Goldstar and Samsung, because import duties were paid on raw material inputs used to produce DRAMs sold in the home market, we added to USP the amount of duty that would have been collected if the merchandise had been sold in the home market. For all respondents' U.S. sales, except Goldstar's purchase price sales, we recalculated credit, where appropriate, to reflect the fact that discounts were granted on sales to the United States. Goldstar granted no discounts on its purchase price sales. However, for purchase price sales Goldstar did not report imputed credit expenses. Instead, it reported credit costs actually incurred which were verified by the Department. Therefore, we did not recalculate credit for Goldstar's purchase price sales (*see* Comment 18 in the "Analysis of Comments Received" section of this notice).

We made additional, company-specific adjustments as follows:

A. Goldstar

For Goldstar, we calculated purchase price based on packed, f.o.b., f.c.a., or c.i.f. prices to unrelated customers in the United States. We made deductions, where appropriate, for foreign brokerage and handling, foreign inland insurance, air freight, and air insurance. In addition, we disallowed Goldstar's claimed VAT credit expense, because we find that there is no statutory or regulatory basis for making such an adjustment. (see Comment 19).

We calculated ESP based on packed, ex-U.S. warehouse prices to unrelated customers in the United States. We made deductions, where appropriate,

for discounts, rebates, foreign brokerage and handling, foreign inland insurance, air freight, air insurance, U.S. duties, U.S. inland freight, U.S. brokerage, credit expenses, warranty expenses, royalty payments, U.S. commissions, U.S. subsidiary packing and U.S. and Korean indirect selling expenses, including inventory carrying costs. For certain sales Goldstar reported no date of payment as the firm had not yet received payment for these sales. As best information available (BIA), we have used the longest period calculated between date of shipment and date of payment for Goldstar's other ESP sales to calculate the credit period when the payment date was missing. We recalculated Korean inventory carrying costs to include an additional inventory holding period discovered at verification.

B. Hyundai

For Hyundai, we calculated purchase price based on packed, f.o.b. prices to unrelated customers in the United States. We made deductions, where appropriate, for foreign brokerage and handling. Hyundai granted no discounts on its purchase price sales. Therefore, no adjustment for discounts was made. We recalculated U.S. credit to reflect the financing costs incurred by Hyundai on its direct sales to Singapore, rather than on its sales through its subsidiary in Singapore.

We calculated ESP based on packed, ex-U.S. warehouse prices to unrelated customers in the United States. We made deductions, where appropriate, for discounts, rebates, foreign brokerage, air freight, U.S. inland freight, U.S. duty, insurance, merchandise processing, U.S. brokerage, U.S. subsidiary packing, credit expenses, commissions, royalties, bank charges, price protection expenses and indirect selling expenses, including inventory carrying costs.

For DRAMs that were further manufactured into memory modules after importation, we deducted all value added in the United States, pursuant to section 772(e)(3) of the Act. The value added consists of the costs of the materials, fabrication, and general expenses associated with the portion of the merchandise further manufactured in the United States, as well as a proportional amount of profit or loss attributable to the value added. Profit or loss was calculated by deducting from the sales price of the memory module all production and selling costs incurred by the company for the memory module. The total profit or loss was then allocated proportionately to all components of cost. Only the profit or loss attributable to the value added was deducted. In determining the costs incurred to produce the memory module, we included: (1) materials, (2) fabrication, and (3) general expenses, including selling (SG&A), and interest expenses.

C. Samsung

For Samsung, we calculated purchase price based on packed, f.o.b., c&f, or c.i.f. prices to unrelated customers in the United States. We made deductions, where appropriate, for foreign brokerage and handling, foreign inland freight, foreign inland insurance, air freight, and air insurance. Samsung granted no discounts on its purchase price sales. Therefore, no adjustments for discounts was made. In the preliminary determination we treated U.S. banking charges as direct selling expenses since there was no narrative description of these charges and the charges appeared to be directly related to the sales. The parties have not challenged our treatment of this expense and we are continuing to treat it as a direct selling expense.

We calculated ESP based on packed, ex-U.S. warehouse prices to unrelated customers in the United States. We made deductions, where appropriate, for discounts, foreign brokerage and handling, foreign inland freight, air freight, air insurance, U.S. inland freight, U.S. brokerage, U.S. commissions, foreign banking charges, product liability premiums, credit expenses, royalty payments, advertising and sales promotion expenses, warranty expenses, U.S. subsidiary packing and U.S. and Korean indirect selling expenses, including inventory carrying costs. We continue to treat U.S. banking charges as a direct selling expense.

Foreign Market Value

In order to determine whether there were sufficient sales of DRAMs in the home market to serve as a viable basis for calculating FMV, we compared the volume of home market sales of DRAMs to the volume of third country sales of DRAMs in accordance with section 773(a)(1)(B) of the Act. We found that the home market was viable for sales of DRAMs by Goldstar and Samsung. For Hyundai, the home market was not viable and, therefore, we based FMV on third country sales. We selected Singapore as the third country because the merchandise exported to Singapore was most similar to the merchandise exported to the United States, the volume of Hyundai's Singapore sales during the POI was the largest of any third country, and the marketing conditions of Singapore were comparable to those in the United States. See 19 CFR 353.49(b).

In the preliminary determination, the Department treated Goldstar's and Samsung's local letter of credit sales as export sales. However, based on further analysis, we have concluded these sales are home market sales (*see* Comment 9 in the "Analysis of Comments Received" section of this notice). For Goldstar, we have included in the price of these sales the amount of duty that would have been charged to home market customers had these DRAMs remained in Korea. For Samsung, these sales were not reported in the home market sales listing. Due to the fact that the treatment of these sales remained an issue until it was too late for the Department to request a revised home market sales listing from Samsung, we are not including these sales in our analysis. However, in future administrative reviews, we will require that Samsung report all of its local letter of credit sales as home market sales.

Since Goldstar sold DRAMs to related parties in the home market, we examined those sales to determine if they were made at arm's length. To conduct this test, we compared the gross unit prices of sales to related and unrelated customers net of all movement charges, direct and indirect selling expenses, value-added tax and packing. Based on the results of that test, we discarded from Goldstar's home market database all related party sales not made at arm's length.

As stated in our preliminary determination, the Department initiated investigations to determine whether Goldstar and Samsung made home market sales at less than their respective costs of production (COP), and whether Hyundai had third-country sales at less than COP.

If over 90 percent of a respondent's sales of a given model were at prices above the COP, we did not disregard any below-cost sales because we determined that the respondent's below-cost sales were not made in substantial quantities. If between ten and 90 percent of a respondent's sales of a given model were at prices below the COP, and such sales were over an extended period of time, we discarded only the below-cost sales. Where we found that more than 90 percent of respondent's sales were at prices below the COP, and such sales were over an extended period of time, we disregarded all sales for that model and calculated FMV based on constructed value (CV). No evidence was presented to indicate that below COP prices would permit recovery of all costs within a reasonable

period of time in the normal course of trade.

In order to establish that below cost sales were made over an extended period of time, we performed the following analysis on a product-specific basis: (1) If a respondent sold a product in only one month of the POI and there were sales in that month below the COP, or (2) if a respondent sold a product during two months or more of the POI and there were sales below the COP during two or more of those months, then below-cost sales were considered to have been made over an extended period of time.

In order to determine whether home market or third country prices were below the COP, we calculated the COP based on the sum of a respondent's cost of materials, fabrication, general expenses, and packing. We adjusted respondents' cost data as described below:

For Goldstar, the Department relied on the submitted COP and CV information, except in the following instances where the costs were not appropriately quantified or valued:

1. We reclassified certain capitalized costs from R&D and construction in progress to current costs of production;
2. We recomputed Goldstar's R&D costs based on the ratio of its total semiconductor R&D incurred during 1991 to its total semiconductor cost of sales for 1991;
3. We revised Goldstar's general and administrative (G&A) expense calculation to include total general R&D expense incurred during 1991;
4. We revised interest expense using Goldstar's audited financial statements for the year ended December 31, 1991;
5. We included amounts related to gains and losses on foreign currency translation in general expenses; and
6. We lagged cost of manufacture for the length of time it takes Goldstar to assemble and final test a DRAM, and for the average number of days die stock and finished goods remained in inventory during the POI.

For Hyundai, the Department relied on the submitted COP and CV information, except in the following instances where the costs were not appropriately quantified or valued:

1. We reclassified certain capitalized fixed assets from the construction in progress account and recalculated the depreciation expense to be included in current costs of production;
2. We rejected an adjustment made by Hyundai to its cost of manufacturing (COM) related to its off-spec merchandise, since this adjustment was not specific to each product and the calculation did not use a comparable basis for the quantity of off-spec and non-off-spec products;
3. We included in G&A an amount for the 1991 exchange losses which Hyundai deferred in its financial statements;
4. We recomputed Hyundai's research and development (R&D) percentage based on the ratio of total semiconductor R&D expense incurred during 1991 to total semiconductor cost of sales for 1991;
5. We lagged costs for the length of time it takes Hyundai to assemble and final test a DRAM, and for an estimate of the average number of days die stock and finished goods remained in inventory during the POI; and
6. We revised interest expense to reflect the proportional amount incurred by the semiconductor business.

For Samsung, the Department relied on the submitted COP and CV information except in the following instances where costs were not appropriately quantified or valued:

1. We adjusted material costs to include exchange losses;
2. We revised depreciation expense to reflect costs based on the asset's acquisition cost allocated on a straight line basis over the assets useful life;
3. We recalculated R&D costs to reflect the current costs incurred for all semiconductors;
4. We revised general expenses to include foreign exchange translation losses; and,
5. We revised interest expense to reflect the proportional amount incurred by the semiconductor business.

For CV to purchase price comparisons, for all respondents, we made circumstance-of-sale adjustments, where appropriate, for bank charges, royalty payments, advertising and credit expenses. For Samsung, we added to CV U.S. commissions and deducted the weighted-average home market indirect selling expenses, including advertising, up to the amount of U.S. commissions, in accordance with 19 CFR 353.56(b)(1). For Hyundai, we deducted from CV third-country commissions and added U.S. indirect selling expenses up to the amount of the third-country commissions in accordance with 19 CFR 353.56(b)(1).

For CV to ESP comparisons, for all respondents, we made deductions, where appropriate, for credit expenses, royalty payments, bank charges and advertising. We also deducted from CV the weighted-average home market or third-country indirect selling expenses, including, where appropriate, inventory carrying costs. We limited this adjustment by the amount of indirect selling expenses incurred on U.S. sales, in accordance with 19 CFR 353.56(b)(2) and, where appropriate, the amount of commissions incurred on U.S. sales, in accordance with 19 CFR 353.56(b)(1).

For home market or third-country price to purchase price comparisons, pursuant to 19 CFR 353.56(a)(2), for all respondents, we made circumstance-of-sale adjustments, where appropriate, for credit expenses, royalty payments, bank charges and advertising. For Goldstar and Samsung, we also made a circumstance-of-sale adjustment for the difference between VAT on home market sales and that which would have been collected on U.S. sales if the export sales had been taxed. For all respondents, we deducted home market or third-country packing costs and added U.S. packing costs.

For home market or third country price to ESP comparisons, for all respondents, we made deductions, where appropriate, for credit expenses, royalty payments, bank charges and advertising. We also deducted from FMV the weighted-average home market or third-country indirect selling expenses, including, where appropriate, inventory carrying costs, up to the amount of indirect selling expenses and commissions incurred on U.S. sales, in accordance with 19 CFR 353.56(b). For Goldstar and Samsung, we also made a circumstance-of-sale adjustment for the difference between VAT on home market sales and that which would have been collected on U.S. sales if the export sales had been taxed. For all respondents, we deducted home market or third country packing costs and added U.S. packing costs. We made additional, company-specific adjustments as follows.

A. Goldstar

For Goldstar, when we calculated FMV based on delivered prices to unrelated customers in the home market, we made deductions for inland freight and inland insurance.

B. Hyundai

For Hyundai, when we calculated FMV based on third country, f.o.b. Kimpo Airport or ex-Singapore warehouse prices to unrelated customers in the third country, we made deductions for discounts, rebates, air freight, insurance, brokerage, and third country inland freight. For third-country price to purchase price comparisons, we deducted third-country commissions and added U.S. indirect selling expenses up to the amount of third-country commissions, in accordance with 19 CFR 353.56(b)(1). We have reclassified as commissions certain expenses Hyundai characterized as

rebates, based on our findings at verification. In addition, we disallowed the inclusion of common advertising expenses in indirect selling expenses because we found at verification that the majority such expenses were incurred for sales outside Singapore.

C. Samsung

For Samsung, when we calculated FMV based on delivered prices to unrelated customers in the home market, we made deductions for inland freight. For home market price to purchase price comparisons, we added to FMV U.S. commissions and deducted the weighted-average home market indirect selling expenses, including inventory carrying costs, up to the amount of U.S. commissions, in accordance with 19 CFR 353.56(b)(1).

Currency Conversion

We made currency conversions based on the official exchange rates in effect on the dates of the U.S. sales as certified by the Federal Reserve Bank.

Verification

As provided in section 776(b) of the Act, we verified information provided by respondents by using standard verification procedures, including on-site inspection of the manufacturers' facilities, the examination of relevant sales and financial records, and selection of original source documentation containing relevant information.

Analysis of Comments Received

General Issues

Comment 1: Micron claims that in addition to the unresolved problems noted by the Department in the preliminary determination several new and significant problems were discovered during verification. Petitioner points to the numerous problems outlined in the verification report and argues that the Department must use BIA.

Petitioner claims that Hyundai failed verification because the Department could not rely on Hyundai's financial statements to confirm product specific COPs and because of numerous other problems. Pointing to other investigations, *e.g.*, Antifriction Bearings (Other than Tapered Roller Bearings) from Germany, 54 FR 18992 (May 3, 1989) where the inability to tie worksheets to company documents resulted in the use of BIA, petitioner contends that the Department should follow its prior practice and not use Hyundai's response at all. If used, the Department must make adjustments for all the areas in which Hyundai failed verification.

For Goldstar, petitioner alleges that the verification of a certain product's COP was not adequate and that BIA must be used for this product. See also Comment 21.

Since much of Samsung's cost data could not be verified or the costs were understated, petitioner claims that the COP and CV data must be rejected or, if not, fully restated using BIA.

Hyundai argues that it did not fail verification and that it was fully cooperative in every phase of the proceeding. Hyundai states that the facts in the Antifriction Bearings from Germany investigation are unlike the facts in this case and that BIA is not proper when a respondent provides a complete response to the best of its knowledge.

Goldstar contends that BIA is not warranted, that the company cooperated at every stage of the investigation, and that the Department completely verified the COP related to the particular product as well as every cost and production aspect of Goldstar's manufacturing.

Samsung argues that BIA should not be used because: 1) the verification report reflects that Samsung's cost reconciled completely to Samsung's normal cost accounting system; 2) the Department found no discrepancies between Samsung's submitted costs and the actual data verified; 3) although the Department's report lists "certain issues for consideration," each of those issues relates solely to theoretical methodological issues rather than to the validity of the underlying data; and 4) the specific issues listed by petitioner justifying use of BIA are all groundless.

DOC Position: The Department's review of the nature and the complexities of the COP issues for the three respondents indicates that although there were some issues related to the adequacy of the verification, others were theoretical methodological issues. In those instances where we found insufficient verification support, we relied on BIA. For the theoretical methodological issues, as appropriate, the costs were recalculated to quantify or value that particular cost element. See the following comments for specific adjustments.

Comment 2: Petitioner argues that the purpose of the Department's COP and CV analyses is to approximate as closely as possible the actual costs associated with the production of the subject merchandise. Thus, costs such as general expenses, including interest expenses, must be allocated to the COP. The petitioner claims that although interest expense may generally be allocated based on cost of sales, in prior cases the Department has used a number of different methods to allocate interest expenses as dictated by the facts of those cases. Petitioner argues that Hyundai's and Samsung's methods, *i.e.*, interest expense allocated by cost of sales, should not be used because this methodology does not consider salient facts. Petitioner argues that, since semiconductor production is an extremely capital intensive business, relative to the cost of other inputs and in comparison with other lines of business in which the firms are engaged, the Department should allocate interest expenses based on fixed assets.

Hyundai argues that the petitioner's claim that interest expense should be allocated on the basis of fixed assets: (1) Is contrary to standard Department practice; (2) would distort Hyundai's financing costs; and, (3) is not in accordance with the directions contained in the questionnaire, which specifically directed respondents to allocate interest expense on the basis of cost of sales. Additionally, Hyundai claims that not all assets are financed with borrowing and that even though a business line such as semiconductors may have a relatively high fixed asset value, it may also generate large amounts of cash, as variable costs are low.

Samsung states that the Department's longstanding and consistent policy is to base financing expenses on the cost of goods sold and that the cases petitioner has cited are isolated instances in which the Department subsequently reversed itself in administrative reviews. Further, Samsung argues that in prior semiconductor cases the Department has used the consolidated or combined cost of goods sold.

DOC Position: The Department generally accepts interest expense allocated by the cost of sales because that methodology often approximates the interest expense related to the production of the investigated merchandise. However, the Department has used other allocation methodologies when the facts of particular cases have required a change. After reviewing the facts in this case, we have found that for Samsung and Hyundai, a larger proportion of total fixed assets are related to the semiconductor line of business than to other lines of business. While the Department acknowledges that not all assets are financed through borrowings, it also recognizes that funds obtained from debt and equity are fungible and that the method used to finance the purchase of an asset is not relevant to the appropriate allocation

basis. For these companies, because of this disproportional amount of fixed assets related to semiconductors, allocation of interest expense based on cost of sales would not appropriately recognize the expense related to the capital investment necessary for semiconductors compared to the other lines of business. Thus, the Department reallocated interest expense on the basis of proportional fixed assets to account for these facts.

Comment 3: Petitioner states that the methodology used by the respondents to account for certain exchange rate gains and losses, *i.e.*, capitalization and amortization over three to five years, does not identify the effects of the change with the period in which the gains and losses occurred. Thus, this method would identify such gains and losses with sales in future periods. Petitioner also argues that although Korean generally accepted accounting principals (GAAP) may permit this practice, for antidumping purposes, the Department must calculate a COP for the period under investigation. In order to accomplish this in the past, the Department has not always accepted the investigated country's GAAP. See Offshore Platforms Jackets and Piles from the Republic of Korea 51 FR 11788 (April 7, 1986), where the exchange gains and losses were expensed in the year in which they occurred.

Goldstar argues that the Department should not make an adjustment to cost for the amortized gains and losses on foreign currency translation because these costs are not actual but unrealized costs based on outstanding foreign currency monetary assets and liabilities. Accordingly, there is no outflow of funds from the company. Also, Goldstar states that including the gains and losses would not be in accordance with long-standing policy since: (1) Goldstar had not identified them with the product; (2) it would be a departure from the company's own accounting treatment; and (3) there is no reason to believe the costs are understated.

Hyundai and Samsung agree with Goldstar and add that these gains and losses are hypothetical and that only amounts over five percent of the stock of the company are deferred. They argue that the amount under five percent is expensed by the company.

DOC Position: In determining the COP for the POI, the Department includes all costs incurred during the POI. If losses are deferred to some future time, the costs would not be appropriately matched to the sales of the company during the POI.

In reply to respondents' contention that there is no outflow of funds for these losses and that these losses and gains are hypothetical, the Department notes that pursuant to Korean GAAP: (1) Only that portion of the loss or gain over 5 percent is deferred; and (2) the portion of the loss under 5 percent of equity is recognized in the current period. The fact that the amount under 5 percent of equity is expensed confirms that Korean GAAP considers these losses to be real even if there is no outflow of funds. The Department has, therefore, recognized the amount of the exchange gains and losses incurred during the period, whether expensed or deferred, and included them in current G&A.

Comment 4: Petitioner claims that the Department should allocate all R&D costs related to semiconductors to the total COM of semiconductors to determine the R&D related to DRAMs. Arguing that both future generation DRAM R&D and current non-DRAM semiconductor R&D provide benefits to the subject merchandise and to other semiconductors, petitioner maintains that R&D cannot be identified with a specific product. Additionally, petitioner argues that although Korean GAAP permits a company to amortize R&D expenses, such a practice does not meet the needs of the antidumping statute. In the semiconductor agreement, petitioner states that the Department recognized that semiconductor R&D had to be treated in a special manner and allocated current semiconductor R&D over the COM of semiconductors. Petitioner argues that the current expenses must be borne by current revenues and points out that U.S. GAAP does not permit the capitalization and amortization of R&D because of the high failure rate and the uncertainty of the successful development of products and lacks of measurability of the future benefits from the R&D.

Hyundai maintains that the Department should accept Hyundai's practice of amortizing R&D costs since it is in accordance with Korean GAAP. Hyundai argues that Korean GAAP more accurately reflects product specific costs than U.S. GAAP since it more closely matches the R&D and the product. Additionally, Hyundai argues that R&D should be identified with each product, as the Department stated in the Final Determination of Erasable Programmable Read Only Memory Semiconductors from Japan (51 FR 39680) (EPROMS) (*i.e.*, when the Department can identify specific costs with a product, the Department should do so).

Goldstar emphasizes that amortization of R&D is more logical since R&D for a new product is a long-term investment, the return on which is realized over the period of the product's useful life. Goldstar claims that the Department recognized this accounting method in other Korean investigations and in 64K Dynamic Random Access Memory Components from Japan (54 FR 15943, April 20, 1986) (64K DRAMs).

Samsung argues that its method should be accepted by the Department. First, it is consistent with Samsung's financial statements. Second, the Department has accepted the amortization of R&D in previous semiconductor and other cases. Third, it is consistent with the matching principle and the life cycle in the DRAM industry. Finally, amortizing product-specific R&D is consistent with International Accounting Standard Number 9.

DOC Position: Semiconductors present unique problems related to R&D. Because the general underlying technology is the same for all semiconductor products, the benefits from the results of R&D, even if intended to advance the design or manufacture of a specific product, provide an intrinsic benefit to other semiconductor products. It is impossible to measure the extent to which R&D benefits one semiconductor product relative to another. Thus, identification of specific R&D costs with any one product causes overstating or understating of these costs in relation to the benefits that product derived from the total R&D expenditures for semiconductors. Capitalizing and amortizing of the R&D costs on a product specific basis over a period of time approximating its commercial life exacerbates the problem because R&D costs can never be assigned to the proper product or time.

Due to the rapid technological changes and the continuing introduction of more advanced products typical of the semiconductor industry, R&D must be conducted on a constant basis by these companies for the development of new products and the advancement of current products. Technological changes and improved manufacturing methods will have application to both current and future generations of the product. Thus, we have used the current expenditure of R&D allocated by the cost of sales for semiconductors to calculate the R&D related to DRAMs.

Contrary to the respondents' claims that their methodology is in accordance with Korean GAAP, this is not the case. While Korean GAAP capitalizes R&D and amortizes it over a three- to five-year period, it does not identify R&D with a specific product nor does it amortize R&D over the commercial life

of the product, thus, in many instances full amortization occurs prior to the introduction of the product in the marketplace.

Comment 5: Because of the delay between input sourcing and final output, petitioner argues that the Department should lag costs so that foreign market sales are matched to costs as calculated in the previous quarter.

Goldstar claims that it maintains finished goods inventory for a very short period of time and its cumulative process cost accounting system incorporates the correct lag for work in process. Goldstar states that the Department should therefore compare sales during each quarter with the COP for that same quarter.

Hyundai contends that the Department should not lag its costs. Its process cost accounting system accurately captures the COP at each stage of manufacture and moves these forward into the next process.

Samsung argues that the Department should not lag its costs. Samsung contends that its process cost accounting system captures the cost of production at each stage of manufacture as the DRAM moves through the production process.

DOC Position: We agree with petitioner in part. For Goldstar and Hyundai, we lagged costs for the length of time it takes for assembly and final test, and for the average inventory holding periods, in order to capture the appropriate costs of the reported sales. The lag time is less than a quarter.

Although Samsung's cost accounting system appropriately accumulated costs as its products flow from one stage of production to another this did not account for the time finished products remain in inventory. Therefore, we lagged Samsung's submitted costs only to reflect the time spent in inventory.

Comment 6: Petitioner claims that respondents' interest expense should not be offset by short-term interest income because they failed to demonstrate that short-term interest income was related to the operations of the company.

Goldstar argues that its interest expense ratio must be adjusted for the proportion of current to total liabilities, or short-term debt to total debt, to assure that only expenses associated with current liabilities are included in financial expenses. Both Goldstar and Samsung argue that they demonstrated the source and nature of their short-term interest income.

Hyundai argues that all of its interest income is directly linked to its manufacturing operations. Further, Hyundai asserts that, at verification, it demonstrated that the interest income was earned on bank deposits and compensating balances.

DOC Position: We agree with respondents in part. Interest expense may be offset by interest accruing from certain types of temporary, short-term investments related to the current operations of the company as long as it has been verified. During verification, the respondents supported their respective claims of short-term interest income. Accordingly, the calculated amount was offset against interest expense. However, the Department includes interest expenses related to short-term activities and the portion of interest expense related to the cost of financing a company's overall permanent long-term assets. Contrary to Goldstar's contention, the Department does not limit the inclusion of financial expenses to that incurred on liabilities related to operations.

Company Specific Issues

Goldstar

Comment 7: Petitioner states that the Department should reject Goldstar's response and use BIA due to the number of errors discovered during verification. Petitioner further argues that if the whole response is not rejected, the Department should use BIA for unreported sales discovered at verification. Petitioner states that BIA should be the highest single margin calculated for any U.S. sales transaction by any respondent.

Goldstar states that it properly reported all home market and U.S. sales. Goldstar further argues that petitioner's remaining sales issues are either incorrect or trivial and that Goldstar fully disclosed to the Department all clerical errors prior to verification.

DOC Position: We agree with Goldstar. We do not believe that the limited number of errors discovered at verification renders Goldstar's response unusable. The omitted sales found at verification accounted for only a small portion of total sales and we have no reason to believe that such sales were intentionally left out of the sales listing. Therefore, we have accepted Goldstar's response, with adjustments based on our findings at verification, which are addressed separately in this section of the notice.

Comment 8: Petitioner argues that the Department should treat all of Goldstar's local letter of credit (local l/c) DRAM sales as U.S. sales since evidence from verification shows that these products were eventually sold in the United States.

Goldstar states that it properly reported local l/c sales of DRAMs destined for the United States as U.S. sales.

DOC Position: We agree with Goldstar. We found at verification that certain, but not all, local l/c sales of DRAMs were ultimately destined for the United States. Goldstar knew the ultimate destination and that such DRAMs were not being substantially transformed into non-subject merchandise. Goldstar reported these sales as U.S. sales, and we have treated them as such for purpose of the final determination. See Comment 9 for a discussion of Goldstar's other l/c sales.

Comment 9: Goldstar argues that its local l/c sales to Korean original equipment manufacturers (OEMs) should be treated by the Department as home market sales. For these sales, Goldstar states that it does not know the ultimate export destination of the finished products, and that these finished products are not within the class or kind of merchandise subject to this investigation.

DOC Position: We agree with Goldstar. In our preliminary determination, we treated all local letter of credit sales to OEMs in Korea for all respondents as export sales, in response to a request made by Samsung. However, based on a further analysis of this issue, we believe that these sales are more appropriately considered to be home market sales, since Goldstar does not know the ultimate export destination of the merchandise, and the merchandise that is exported is not within the class or kind of merchandise subject to this investigation. Therefore, we are treating these sales as home market sales for all respondents.

Comment 10: Petitioner argues that since Goldstar did not accurately report its home market inventory carrying charges by device type, and since there is a significant differential between the inventory-periods for different types, the Department should use as BIA in calculating inventory charges the longest inventory period for all U.S. sales and the shortest inventory period for all home market sales.

Goldstar maintains that its methodology for reporting inventory carrying charges is reasonable and should be accepted. Goldstar further argues that applying the inventory periods suggested by petitioner would result in virtually no impact on the margin calculations since the inventory periods apply equally to both home market and U.S. sales.

DOC Position: We agree with Goldstar. After a review of Goldstar's questionnaire responses as well as the

information discovered at verification, we believe that Goldstar's methodology for reporting inventory carrying charges accurately reflects its expenses, and we have accepted these charges as reported.

Comment 11: Petitioner contends that the Department should reject Goldstar's calculation of indirect selling expenses, since it combined and reallocated ASIC and non-ASIC services fees when Goldstar's own accounting records split these expenses.

Goldstar states that its calculation of indirect selling expenses is accurate. Goldstar argues that a service fee was common to ASIC and non-ASIC only during November and December, 1991. Goldstar stated that it was only during these months that it combined and reallocated this fee based on the number of employees.

DOC Position: We agree with Goldstar. Based on information reviewed at verification, we believe that the indirect selling expenses reported by Goldstar are accurate.

Comment 12: Petitioner argues that the Department should use the average inventory carrying transit period that it calculated for two sample months at verification to calculate U.S. inventory carrying charges.

Goldstar argues that its average inventory period calculated for shipment from Korea to the United States was reasonable. Goldstar further stated that if the Department finds some adjustment is warranted, the average number of days should be used.

DOC Position: We agree with petitioner. Using our calculation of the inventory carrying transit period for two sample months, which we performed at verification, we adjusted inventory carrying costs. As BIA, we included the inventory carrying period calculated for November and December, 1991 in the calculation of U.S. inventory carrying costs because: (1) Goldstar was unable to support its reported figure; (2) the Department calculated a larger inventory carrying period in a month that Goldstar claimed was representative of the POI; and (3) the inventory carrying period calculated for November and December represented one third of the POI.

Comment 13: Petitioner argues that the Department should include an amount in COM for certain module royalty payments made by Goldstar, since these amounts were not included in the COM.

Goldstar argued that it listed these royalty payments as a selling expense. Goldstar further stated that the Department must ensure that these royalties are not double counted in the COM.

DOC Position: We are treating these royalty payments as selling expenses and have made sure that these payments are not included in the COM.

Comment 14: Goldstar states that the Department should assign constructed value according to the date the merchandise was shipped, not the date the merchandise was sold. Goldstar argues that CV reflects production costs, which correlate with the shipment of a product, not the sale of a product.

Petitioner argues that such a procedure would be contrary to the Department's practice and therefore should not be undertaken.

DOC Position: We agree with petitioner. In accordance with 19 CFR 353.50(b), the Department calculates CV according to the date the merchandise was sold, and Goldstar has provided no justification for deviation from that practice.

Comment 15: Goldstar argues that the Department should not include inventory carrying costs in its calculation of constructed value for purchase price sales, as these expenses are adjusted only for ESP sales.

DOC Position: We agree with Goldstar and have not included these costs in the calculation of constructed value for purchase price sales.

Comment 16: Goldstar states that the Department should match sales in the U.S. and home markets at comparable levels of trade. Goldstar argues that the record establishes that in both the U.S. and home markets Goldstar sold to both original equipment manufacturers and distributors which are two distinct levels of trade. Goldstar maintains that: (1) The Department verified that Goldstar made sales at two distinct levels of trade; and (2) the Department's regulations and longstanding administrative practice require that sales be compared at the same level of trade.

Petitioner states that the Department is not required to make comparisons at the same level of trade. Petitioner also states that the Department should not consider this point since a correlation coefficient test provided by petitioner demonstrates only a weak correlation between both prices and selling expenses and level of trade.

DOC Position: We agree with Goldstar and, where possible, have compared products at the same level of trade for all respondents, in accordance with 19 CFR 353.58. For models where we were unable to match sales at the same level of trade, we made comparisons regardless of the level of trade. Goldstar made no effort to quantify a level-of-trade adjustment; therefore, we did not make such an adjustment.

Comment 17: Goldstar argues that the Department should exclude Goldstar's sales of merchandise which were off-specification from its margin calculation.

Petitioner argues that Goldstar's off-spec sales to the United States should be included in its margin calculations. Petitioner states that Goldstar will continue to produce off-spec devices in the future and the market for these devices is well-established and constant.

DOC Position: We agree with petitioner. We see no reason why these sales should be excluded from our analysis. This merchandise is within the scope of this investigation; therefore, we kept these sales in our margin calculations.

Comment 18: Goldstar states that the Department double-counted Goldstar's credit expense on purchase price transactions by making an additional adjustment for imputed credit expenses. Goldstar maintained that it fully reported all credit expenses actually incurred for purchase price sales in its response. Therefore, Goldstar argued that the Department should not adjust for any additional credit expenses on purchase price transactions in its final determination.

DOC Position: Based on the information obtained at verification, we have determined that the credit expenses for purchase price sales reported by Goldstar were its actual credit expenses and have therefore not included imputed credit expenses for purchase price sales in our calculations.

Comment 19: Goldstar states that the Department should make a circumstance-of-sale adjustment for Goldstar's credit expenses for advance tax payments. Goldstar argues that it incurred an expense whenever it made advance value-added tax payments to the Korean government before payment of the tax was received from the customer. Goldstar maintains that the Department verified this payment and an adjustment will conform with the Department's past practice.

DOC Position: We disagree with Goldstar and are not allowing the VAT credit adjustment. As explained in the Final Determination of Sulfur Dyes, including Sulfur Vat Dyes, from the United Kingdom, 58 FR 3253 (January 8 1993) (Sulfur Vat Dyes), we find that there is no statutory or regulatory basis for making such an adjustment. While we recognize that there may be an opportunity cost associated with the prepayment of VAT, that fact alone is not a sufficient basis for the Department to make an adjustment in price-to-price

comparisons. Therefore, we have not made one here.

Comment 20: Goldstar states that the Department should use the revised computer tape file layout for ESP packing costs.

DOC Position: We agree with Goldstar and have done so.

Comment 21: Petitioner contends that Goldstar failed verification of certain merchandise because Goldstar: (1) Did not adequately support the merchandise's beginning work in process (BWIP); (2) did not calculate the production quantities on the correct yield rate; and (3) did not document certain allocation methodologies. Petitioner concludes that if the number of units over which costs are allocated is incorrect, it becomes irrelevant whether the overall costs themselves are correct or verified. Therefore, because the costs were allocated based on an incorrect production quantity, petitioner argues that the Department must resort to using petitioner's information as BIA.

Goldstar claims that it correctly calculated its BWIP based on its audited 1991 financial statements, and that the yield rates were calculated from accurate and verified production quantities. Therefore, Goldstar contends that the costs were allocated over correct quantities. Also, Goldstar states that: (1) The value of manufacturing costs capitalized as construction in progress (CIP) and R&D during the first six months of 1991 reconciled to its 1991 financial statements; (2) the amounts capitalized were accurate and justified, and (3) certain allocation methodologies were not questioned by the Department.

DOC Position: The Department determined the total COM incurred for production of the subject merchandise during the first six months of 1991 based on the audited financial statements, and verified the production quantities. However, while the amount of manufacturing costs capitalized as CIP and R&D may be tied to company documentation, the Department does not agree that these costs should be capitalized. These costs are more appropriately identified as current costs of production because they include the component costs of manufacture, *i.e.*, materials, labor, and overhead, which should be expensed as incurred. Therefore, the Department reclassified the manufacturing costs capitalized as CIP and R&D to current costs of production.

Comment 22: Goldstar claims that the equivalent units of production factors (EUs) used in its calculation of the costs of the merchandise's work in process (WIP) during the POI were verified to be accurate and part of its normal accounting system.

Petitioner argues that Goldstar provided insufficient documentary support for the EUs used in its cost calculation.

DOC Position: We agree with Goldstar. The EUs used by Goldstar for allocating production costs between WIP and cost of sales (COS) were verified by the Department. Although the EUs used by Goldstar for its submission departed from its 1991 normal accounting system, we verified that Goldstar's methodology provided an accurate reflection of its costs.

Comment 23: Goldstar argues that it correctly calculated its per-unit royalty expenses by dividing royalty expenses incurred in a quarter by the quantity of production for the same quarter and including the resultant amount in COM.

Petitioner argues that Goldstar's method of allocating royalties paid during the POI over POI production understated the royalties that accrued to the DRAMs produced during the POI.

DOC Position: We agree with Goldstar. Goldstar correctly included technological royalties in COM; therefore, no adjustment was made. Moreover, there is no evidence on the record indicating that Goldstar's methodology of allocating quarterly royalty amounts by quarterly production quantities during the POI was distortive.

Comment 24: Goldstar contends that the Department improperly used the interest expense of Goldstar instead of its parent company in the preliminary determination and unjustifiably refused to verify the consolidating workpapers prepared for the Department's use. Goldstar also argues that the Department's rejection of the parent's consolidated statement because it was unaudited and incomplete is not dispositive since the Department has previously accepted unaudited statements and has verified the consolidating workpapers. Goldstar states it could not provide audited consolidated statements because they do not exist.

Petitioner maintains that the Department does not invariably use the financial results of the consolidated company to determine interest expense and emphasizes that Goldstar's interest expense should be used rather than the unaudited figures for the consolidated group of companies because the latter would distort Goldstar's true financing costs. Petitioner counsels the Department to continue to disregard the unaudited consolidated financial statements of the parent.

DOC Position: The Department agrees with petitioner. Absent detailed testing usually associated with an audit, the Department cannot rely on the statements as submitted. Goldstar's contention that at verification it offered to consolidate the parent with other companies it initially excluded does not overcome the fact that substantial audit procedures would have been required before the Department could be assured that the statements were adequately presented. The Department does not perform an audit at verification; rather, verification relies on audited records.

Therefore, we relied on Goldstar's audited financial statements for calculating interest expenses, not its parent's unaudited consolidated statement.

Comment 25: Goldstar argues that it appropriately reported material costs exclusive of losses and gains on foreign exchange transactions related to material purchases, because, in accordance with Korean GAAP, these costs are treated as non-operating gains and losses in its normal cost accounting system. Additionally, Goldstar claims that if the Department were to adjust its costs by including foreign exchange transaction gains or losses in COM rather than in general expenses, the resulting COPs and CVs would remain virtually unchanged.

DOC Position: We disagree with Goldstar. Foreign exchange losses arising from the purchase of raw materials should be included in material cost because this is a component of the COM. However, we have not reclassified these losses from general expenses to COM as it would have no impact on the submitted costs.

Comment 26: Goldstar argues that the amortization of stock and debenture issue costs should be excluded from the interest expense calculation.

DOC Position: We disagree. The Department considers the costs incurred to obtain funds to be part of the normal financing needs of the company. It is longstanding Departmental policy to include financing costs in calculating COP and CV.

Comment 27: Goldstar argues that the R&D of Goldstar Information and Communication, Inc. should not be included in Goldstar's COP. Goldstar purchased the semiconductor division with its related assets and liabilities from Goldstar Information and Communication, Inc., which had already expensed its R&D in its normal accounting system. Therefore, the R&D should not now be amortized and included in Goldstar's COP.

DOC Position: We agree with Goldstar. See also comment 4.

Comment 28: Goldstar argues that we should use the R&D costs as computed

in its response. The firm claims that it correctly computed R&D on a quarterly basis, by dividing its annual amortized R&D expenses for each product line by four and allocating the quarterly amounts over each quarter's cost of sales for each respective product line.

DOC Position: We disagree with Goldstar. In this case, allocating amortized R&D over a product line does not account for overlapping benefits. Thus, we have allocated all semiconductor R&D over semiconductor cost of goods sold. See also comment 4.

Hyundai

Comment 29: Hyundai argues that the basis for FMV should be weighted-average monthly prices. Hyundai also argues that the sales below cost test be performed on the basis of monthly sales and monthly costs. Hyundai believes this is necessary to reflect the declining production costs and the price declines in both the U.S. and Singapore markets during the POI.

Hyundai argues that the Act requires that U.S. prices be compared with contemporaneous home market (or third country) prices. It further argues that the Department is inconsistent in applying a six-month weighted average for investigations and a monthly weighted average for administrative reviews. Hyundai states that the Department has previously tested price stability over time and the variance between annual and monthly prices to determine the appropriateness of annual, as opposed to monthly, averages. Hyundai also states that in the price variance test, the Department determined that annual averages would be representative if more than 90 percent of the home market sales were made at monthly average prices within 10 percent of the annual average price. Hyundai states that it has applied the same two tests to its third country sales database. According to Hyundai, the results of this analysis support the contention that monthly averages are required for this investigation.

Petitioner also states that in applying the price variance test, weighting sales on a quantity basis is more appropriate than weighting by sales value, as done by Hyundai.

DOC Position: We agree with Hyundai. Based on our analysis, we find that monthly weighted average prices for FMV are more representative of Hyundai's pricing than POI averages. We examined the time-price correlation and observed a consistent downward trend in both U.S. and Singapore prices over the POI.

We also examined price variance. Our analysis of respondent's information shows that during the POI a significant number of the third-country sales were made at monthly average prices that vary from the POI average prices. Consequently, where FMV was based on third-country price, we used monthly weighted average FMVs.

Comment 30: Hyundai claims that during the POI, it made a very limited number of sales of so called obsolete models in the United States and Singapore and that the Department should drop such sales from its analysis. Hyundai states that the Department's recently revised policy for disregarding below cost sales caused all third country prices for obsolete models to be disregarded. Hyundai claims that including the sales of obsolete models will distort its normal pricing policies.

As an alternative to excluding these U.S. sales, Hyundai argues for adjusting the below cost test so that third country obsolete models remain in the calculation of FMV. Specifically, Hyundai states that the Department's recent practice of applying only the model-specific "micro" test of the "10–90–10 rule" is inappropriate because it alters the administration of the below cost test of the statute so that small volumes of obsolete models are no longer included in FMV. Respondent further states that once a product is obsolete, all sales of this product are below cost since demand turns to its replacement product. Hyundai also states that the legislative history of section 773 of the Act allows for inclusion of obsolete sales.

DOC Position: We disagree with Hyundai. Although the legislative history of the statute indicates that sales of "obsolete" merchandise at less than cost would be disregarded from the below cost test, we do not consider the merchandise in question to be obsolete. First, the original product is interchangeable with its newer "replacement" model. It serves the same purpose and has the same characteristics as the new product. Second, although these original models were made using a different production process than the new model, because the physical characteristics of the original models are the same as the new models, this difference does not justify classifying the former as "obsolete."

Comment 31: Hyundai states that the Act requires that the U.S. price be reduced by the amount of any increased value resulting from further manufacture of the imported merchandise before the sale to an unrelated party. Hyundai claims that profit should only be allocated to U.S. value-added based on the value-added performed by Hyundai's subsidiary, HEA, in the United States, rather than on the total value added in the United States. Hyundai states that profit is included in the price paid to the unrelated subcontractor which performs the further manufacturing. Hyundai argues that the profit on the value added by an unrelated subcontractor should not be included in the Department's adjustment of USP.

Petitioner requests that the Department allocate profit to Hyundai's U.S. operations. Petitioner states that the accepted profit allocation to U.S. value-added is an apportionment of profit from an individual sale into two parts: The portion resulting from the value added in the U.S. and the portion resulting from the production of the merchandise itself. Petitioner further states that the profitability of the subcontractor is irrelevant.

DOC Position: We agree with petitioner. The fact that the unrelated subcontractor performing further manufacturing earned a profit is irrelevant. The price paid by HEA for the subcontracting services was a cost to HEA and we considered it as such in calculating our profit adjustment.

Comment 32: Hyundai argues that the Department should make an inventory carrying cost adjustment to Hyundai's U.S. price only with respect to DRAMs held in inventory to be sold as finished products, and not with respect to those held in inventory to be further manufactured into modules. Respondent holds that in accordance with the Act, only those expenses associated with selling rather than producing the subject merchandise are intended to be deducted.

Petitioner argues that the Department should continue to calculate inventory carrying costs for all of Hyundai's U.S. sales. Petitioner states that Hyundai incurred an opportunity cost for inventorying finished goods regardless of whether there was any further manufacture at a later date.

DOC Position: We agree with respondent. Our determination in Antifriction Bearings, 56 FR 31692, addressed the opportunity cost of holding inventory in both markets, and also addressed the issue of work-in-progress, which is analogous to the DRAMs to be incorporated into modules. Since these DRAMs are parts of unfinished goods, our inventory carrying cost adjustment is limited to DRAMs sold as finished products.

Comment 33: Hyundai states that the Department incorrectly deducted Hyundai's direct selling expenses from ESP. Hyundai argues that the Department should have added the

direct selling expenses incurred on ESP sales to FMV.

DOC Position: We disagree with Hyundai. In accordance with section 772(e) of the Act, we correctly deducted selling expenses from ESP.

Comment 34: Petitioner contends that, with regard to one of the purchase price transactions the Department reviewed at verification, the Department found that the merchandise that was ordered by the customer was not the merchandise that was actually shipped. In its response, Hyundai reported the model number of the merchandise that was shipped. Petitioner claims that, since the price of the merchandise that was ordered is higher than the merchandise that Hyundai shipped, the Department should use the higher prices for these transactions when calculating FMV.

DOC Position: We disagree with petitioner. We found at verification that Hyundai properly reported the sales prices of the merchandise that was shipped. The fact that Hyundai shipped to the customer merchandise that was different than the customer had ordered originally is irrelevant.

Comment 35: Petitioner argues that the Department should reject third country indirect selling expenses. Petitioner asserts that Hyundai allocated certain common selling expenses on a space allocation basis and that the company does not allocate these expenses in its accounting records. Petitioner claims that the Department's standard practice is to use a company's own expense accounting for submission purposes unless it is contrary to generally accepted accounting principles. Petitioner claims that a reclassification of expenses such as the one in question is disingenuous and it requests that Hyundai's third country indirect selling expenses should be disallowed in their entirety.

Hyundai states that its allocation methodology is accurate and reasonable. It also states that because they are general expenses, they are only allocated for the purposes of responding to the Department's questionnaire.

DOC Position: We disagree with petitioner. For purposes of responding to the Department's questionnaire, Hyundai allocated certain indirect selling expenses common to all divisions of the company to the divisions involved in selling the subject merchandise on the basis of the office space occupied by those divisions. Although Hyundai does not allocate these selling expenses to different divisions in its accounting records, we determined that, for purposes of responding to the Department's questionnaire, the allocation by space was a reasonable method for estimating the portion of certain common selling expenses attributable to the divisions involved in the sale of the subject merchandise.

Comment 36: Petitioner requests that the Department subtract one month from Hyundai's reported date of sale since Hyundai incorrectly reported shipment dates as sale dates. Petitioner states that Hyundai appears to consider a change in the date of shipment as a significant enough change to warrant a reporting date basis which does not reflect the date upon which price and quantity are fixed. Petitioner points to a section of the Department's verification report that discusses a shipment date change as an illustration of a change in the terms of sale. Petitioner states that such a change does not constitute a change in the essential terms of sale. Based on this information, petitioner suggests that verification exhibit DOS–1, listing the percentage of Hyundai's orders for which there were changes in the terms of sale, is artificially inflated. Petitioner requests that, as BIA, the Department lag all sales by one month.

Respondent argues that petitioner has based its argument on only one sample, and that with respect to even that sample, price and quantity did in fact change. Hyundai cites the Department's verification report and the extent to which the Department went to examine changes in the terms of sale. Respondent also states that petitioner's argument is based on speculation.

DOC Position: We disagree with petitioner. The Department thoroughly examined Hyundai's methodology for determining date of sale during verification and found no major discrepancies with respondent's data.

Comment 37: Petitioner requests that the Department treat warranty expenses as direct selling expenses. Petitioner states that the Department's verification report shows that all U.S. warranty expenses were assigned to a particular division of the company, and none to the semiconductor division, in Hyundai's general ledger. However, the report also states that the Department did not examine individual claims to see if any were, in fact, related to semiconductors. Petitioner requests that since no direct evidence was provided to show that these expenses are incurred only in relation to sales of non-subject merchandise, the Department should, as BIA, assign all U.S. warranty expenses to sales of subject merchandise as direct selling expenses.

Hyundai states that the Department verified that all of the warranty expenses incurred by Hyundai related to the other division of the company that is not involved in the sale of subject merchandise. Hyundai states that the Department reviewed the general ledger and examined all after-service or warranty expenses.

DOC Position: We disagree with petitioner. The Department examined warranty expenses at verification. We found no warranty expenses directly attributable or related to sales of the subject merchandise. Therefore, we treated Hyundai's warranty expenses as indirect selling expenses.

Comment 38: Hyundai argues that the cost verification report does not reflect the accuracy of Hyundai's data because of misleading statements and "suggested conclusions." It claims that the Department traced the data submitted in its questionnaire response to total costs and allocation bases, and to the financial statements. Additionally, they point out that the allocation bases used for the submission were also used for the financial statements and that the financial statements are reliable.

DOC Position: The Department lists "Issues for Consideration" in its verification reports to alert all parties to its concerns. Quantification of the magnitude of errors or the effect of differences in methodology may be part of the discussion of these issues. In no way should these issues be construed to be conclusions. The Department reaches its final positions only after considering all parties' comments.

Comment 39: Petitioner argues that the verification shows that Hyundai significantly understated the amount of construction in progress that should have been reclassified. Petitioner states that there is no indication that the COM and spare parts were included in the COP and that the entire amount of the CIP should be reclassified and allocated over production during the POI.

Petitioner also argues that because there was a difference in the depreciation used by Hyundai for existing and reclassified assets and the depreciation which would have resulted based on the useful life of those assets, the Department should recalculate the total depreciation.

Hyundai argues that the Department overstated the impact of the costs which were not reclassified for its response. The firm claims that the effect of any errors found at verification regarding the reclassification of the machinery and equipment (M&E) was minimal. Hyundai points out that the Department's recalculation of depreciation had a number of methodological flaws because, although it was based on the asset ledger value, it did not account for: (1) M&E which was used only for a partial year; (2) M&E

which was fully depreciated during 1991; and (3) salvage value of the assets.

DOC Position: For the response, Hyundai reclassified certain M&E from the CIP account to the fixed asset ledger account. This M&E, although entered into production, had not been transferred to the fixed asset ledger and depreciated. Additionally, Hyundai increased the depreciation for other M&E already on its fixed assets ledger, but for which depreciation had not been calculated. When we tested the reclassification of M&E from the CIP account to the fixed asset account, we noted a substantial number of discrepancies in our sample. Furthermore, the reclassification of only that M&E over a certain value was not appropriate, since this method excluded from reclassification a significant amount of M&E below that threshold. Therefore, the information on the asset ledger is not reliable, and we have based Hyundai's depreciation on BIA.

Comment 40: Hyundai claims that the Department has concluded erroneously that the amount paid by Hyundai for the construction of facilities by a related company covered only the direct cost incurred by that company.

DOC Position: The amount of the adjustment would have no impact on the depreciation amount. Therefore, we made no adjustment.

Comment 41: Hyundai argues that contrary to the Department's verification report, exchange gains and losses on purchases of materials used to manufacture the product under investigation have never been included as part of the COP. Additionally, Hyundai states that they were not instructed to include such gains or losses as part of the material costs nor do normal accounting standards consider such exchange fluctuations as part of material costs. Hyundai claims that the Department should follow its standard practice of including exchange gains and losses as part of general expense.

DOC Position: The Department's questionnaire specifically indicates that all expenses associated with obtaining materials should be included as part of the reported cost of materials. Although the questionnaire includes some specific examples of material costs, material costs are not limited to the examples provided. Contrary to Hyundai's assertion, the Department has in prior cases included exchange gains and losses related to obtaining materials as part of the material costs, see, *e.g.*, Man-Made Fiber Sweaters from the Republic of Korea, 55 FR 32859 (August 10, 1990). Although some companies' cost accounting might include such costs as part of general expenses, the focus of the Department's analysis is the cost of production of a specific product, rather than the overall financial results of the company.

Comment 42: Hyundai states that for its submission, the company expensed all interest incurred during the POI, including interest which had been capitalized in the company's official accounts because: (1) The company believes that capitalization of interest expense is not automatically authorized by U.S. GAAP; (2) interest capitalization is contrary to the Department's standard practice of not specifically identifying interest expenses with assets or product lines due to the fungibility of financing costs; and (3) the capitalization of interest, if properly calculated, would result in a lower cost than reported by Hyundai.

DOC Position: The Department reviewed the nature of the assets in the CIP and agrees with Hyundai that the interest expense that was part of the CIP should not have been capitalized. Interest expense is capitalized when the assets are being constructed by the company. The assets in Hyundai's CIP account were machinery and equipment waiting to be placed into the production process.

Therefore, the Department agrees with Hyundai and we included this interest as part of the interest expense calculation.

Comment 43: Hyundai argues that the cost verification report significantly overstates the company's R&D costs. First, Hyundai believes that the Department inappropriately included the fabrication costs of an assembly and test division which are capitalized and should not be assigned to semiconductor production. Second, Hyundai argues that including the historical lump sum expenditures for R&D performed under contract amounts to double-counting. Third, Hyundai declares that using the cost-of-goods-sold (COGS) figure from the financial statements to allocate R&D is inappropriate since the COM for each model has been increased significantly. Fourth, Hyundai believes that the calculation of Hyundai's U.S. subsidiary's semiconductor R&D expense is incorrect. Fifth, Hyundai asserts that machinery and equipment for the R&D department is appropriately classified as part of the CIP account.

DOC Position: With respect to Hyundai's argument that the fabrication costs of an assembly and test division are capitalized, this information was not disclosed at verification and, in fact, is inconsistent with information which was discussed at verification. As BIA, we have included these costs in our calculation of R&D.

We agree with Hyundai's second argument regarding the possible double-counting of lump sum expenditures. Since the repayment of these costs is treated as royalty on sales we have not included these costs in the R&D calculation.

We agree with Hyundai's assertion that the COGS information presented in the financial statement is significantly understated. In order to calculate the R&D percentage applicable to semiconductors, we adjusted COGS for certain of the items included in the CIP account.

Hyundai's argument regarding the calculation of its U.S. subsidiary's semiconductor R&D expense is erroneous. Prior to this final determination the Department had not prepared a calculation of the semiconductor R&D expense. However, the Department's cost verification report provided a mathematically correct comparison of Hyundai's U.S. subsidiary semiconductor R&D to Hyundai's costs. Finally, contrary to Hyundai's assertion, M&E which are in use is not appropriately considered to be CIP, since they are completed and in use.

Comment 44: Petitioner reasons that Hyundai's reported off-spec adjustments to its costs are distortive and needlessly complicated. Petitioner further asserts that off-spec merchandise should be treated in a manner consistent with the way the company treats it in the normal course of business.

Hyundai maintains that the Department should adopt its proposed off-spec merchandise adjustment. Hyundai notes that petitioner fails to provide any support to show how allocating actual costs to produce off-spec merchandise would be distortive. Hyundai further explains that off-spec merchandise costs more than prime product since it incurs additional retesting costs.

DOC Position: We agree with petitioner and have removed from Hyundai's reported costs the off-spec merchandise adjustment prepared by Hyundai for purposes of this antidumping investigation. Absent specific evidence that the company's normal cost accounting system fails to adequately capture a product's COP we will rely on that cost information. We have therefore treated the off-spec merchandise in a manner consistent with respondent Hyundai's normal cost accounting methodology.

Samsung

Comment 45: Petitioner states that Samsung was required to report information about its second U.S. sales subsidiary, including that firm's selling expenses, and did not. Therefore, petitioner argues that since Samsung did not report this information, the Department should reject Samsung's response and use BIA.

Samsung argues that it fully disclosed its relationship with the company in question in its questionnaire responses and, therefore, BIA should not be used.

DOC Position: We agree with Samsung that this company was adequately described in Samsung's section A questionnaire response and, based on this description, we determined that it was not necessary to request additional information regarding the company.

Comment 46: Petitioner argues that Samsung should use 1991 payments for a royalty expense as the best estimate of 1992 payments, rather than report them as zero until the 1992 settlement is reached. Petitioner contends that a potential liability existed for Samsung, and Samsung opted to ignore this liability completely.

Samsung stated that the Department should not impute payments for the royalty expense to 1992 sales. Samsung argued that: (1) It is under no legal obligation to pay a royalty for 1992 sales; (2) no actual expenses have been incurred for these sales; (3) the fact that expenses may be incurred is merely speculative; and (4) any adjustment for royalty expenses should be made in subsequent administrative reviews.

DOC Position: We agree with Samsung that it would not be reasonable to make an adjustment for royalty expenses which were not actually incurred, and may not be incurred, and we have not done so.

Comment 47: Petitioner contends that since Samsung did not report its air freight expenses on the basis of weight, as incurred, the Department should, as BIA, increase all U.S. air freight expenses by the margin of error found at verification. Petitioner states that in accordance with long-standing Departmental practice, expenses should be reported on the same basis as they were incurred.

Samsung states that its methodology for calculating air freight expense is reasonable and is not distortive. Samsung contends that air freight was allocated based on value to be consistent with the allocation methodology for other movement expenses and to avoid distorting per-unit expenses since invoice weights may not be accurate. Samsung also maintains that a value-based allocation overstates air freight expense.

DOC Position: We agree with Samsung and are not increasing its U.S. air freight expenses. For the reasons stated by Samsung, we find that Samsung's allocation methodology provides an accurate reflection of its air freight expenses.

Comment 48: Petitioner argues that the Department's calculation of the weighted-average second royalty expense for its constructed value selling expenses is incorrect and should be recalculated.

Samsung counters that the Department's calculation of the weighted-average second royalty expense for constructed value selling expenses is correct. Samsung argues that petitioner used the wrong sales tape in making its calculations.

DOC Position: We agree with Samsung and have not recalculated the weighted-average second royalty expense.

Comment 49: The petitioner claims that the Department cannot accept the depreciation expense Samsung used for its response, and must instead use BIA. Petitioner states that when Samsung changed its depreciation method from double-declining balance to straight-line, it calculated depreciation on an incorrect basis instead of the retroactively adjusted basis. Furthermore, petitioner argues that Samsung used the total useful life instead of the remaining useful life of the asset.

Samsung argues that its depreciation is fairly stated and that it comes directly from the financial statements which are prepared in accordance with Korean GAAP and audited by a C.P.A. firm. They note that the Department has consistently rejected past attempts to recalculate depreciation expense for a dumping response in a manner different from those reported in the financial statements.

Samsung contends that its methods of depreciation, *i.e.*, straight-line and double-declining balance, used before and after the change in 1991 are permissible and commonly used by companies reporting under U.S. GAAP. Samsung states that a change in accounting principle is allowed under any GAAP. Samsung notes that Korean GAAP and international standards do not require companies to retroactively adjust for an accounting change and that, at the time Samsung made the change, it was permissible under Korean GAAP to base depreciation on the useful life of the assets as opposed to the remaining useful life of the assets. Samsung claims that it used the useful life because at the time of the change, the products manufactured in existing production facilities would have a longer commercial life than expected, and the company would be receiving income over a longer period of time. Therefore, Samsung stated that in order to match the depreciation expenses with the income generated, the useful life of the assets had to be extended.

DOC Position: The fact that the company made an accounting change in the methods used by the company for depreciation, *i.e.*, straight line versus double-declining balance, is not at issue. At issue is the basis and the means used to effect the change.

Generally, the Department relies on the information presented in the company's financial statements and on the country's GAAP when such methods are not distortive for calculating the costs of production. However, in this case, the Department found that the basis used for the financial statement, even if stated in accordance with Korean GAAP at the time of the change, would be distortive for purposes of our antidumping analysis.

In changing its method of depreciation from double-declining to straight-line, Samsung did not retroactively restate the basis of the asset but instead used the net book value of the asset as of the date of restatement. The use of the net book value of the asset as of the date of restatement did not attribute the cost of the asset on a consistent basis over the life of the asset. Therefore, disproportionally greater costs were attributed to products manufactured before the change than subsequent to the change.

Samsung used the total useful life of the assets instead of the remaining useful life of the assets when it changed its method of calculating depreciation. For example, a four-year-old asset at the time of the change, with a useful life of five years, could be extended for another five years. Although, Samsung states that this was in accordance with Korean GAAP at the time of the change, Samsung did not provide any support for this claim. Samsung's argument, that it extended the useful life of the assets because the products' commercial life was longer than anticipated, is not valid because the assets may be used for a number of different products each with varying commercial lives and/or may be replaced during the commercial life of any one of these products.

Therefore, the Department did not rely on the depreciation used by Samsung in its submission but instead recalculated it by restating the basis of

the asset based on BIA. See March 11, 1993, Calculation Adjustment Memorandum to Marie E. Parker from Richard C. Lutz for a detailed discussion of the calculation.

Comment 50: Petitioner argues that Samsung was not billed for installation and maintenance costs for its equipment. Petitioner argues that Samsung's submission should be adjusted to account for this understatement of cost.

Samsung argues that all appropriate installation charges were included in its reported equipment costs, as recorded in its books. Samsung states that the installation costs were performed by the equipment vendor as part of the original purchase agreement.

DOC Position: After reviewing the purchase contracts, sales invoices and purchase orders related to equipment purchases, we do not find any evidence that Samsung did not pay the installation costs.

Comment 51: Micron argues that depreciation costs were understated because the entity which constructed part of Samsung's fabrication facility did not charge Samsung a price which was higher than COP.

Samsung argues that the company which constructed its fabrication facilities was not a related party or a member of its chaebol.

DOC Position: In reviewing the verification exhibits, specifically, shareholder lists of the two companies, the Department noted that the company which constructed its fabrication facility is not related to Samsung as defined by the Act. Accordingly, there is no basis for adjusting Samsung's depreciation expenses to account for the construction of the fabrication facility.

Comment 52: Petitioner contends that Samsung failed to provide all of its semiconductor R&D as requested by the Department. Petitioner states that Samsung only provided R&D information for one facility. Petitioner states that as BIA the Department should apply the ratio of expenses incurred at the one facility to all of Samsung's semiconductor operations.

Samsung argues that all R&D expenses have been appropriately calculated. Samsung claims that it correctly reported amortized product development expenses over a three-year period, in accordance with Korean GAAP, its financial statements, the matching concept in accounting theory, and International Accounting Standard Number 9. Samsung also argues that the Department has historically amortized R&D expenses in those cases where it has played a critical role in the development of the product.

Furthermore, Samsung contends that it correctly excluded product-application specific expenditures because the micro products are entirely different from the memory products and therefore, no R&D overlap is possible. Samsung also argues that the Department requires product-specific allocation of R&D.

Finally, Samsung claims that it reasonably accounted for all R&D incurred for the subject merchandise by using an activity-based costing allocation methodology.

DOC Position: For the R&D methodology used in this investigation, see Comment 4. As Samsung did not provide all of the requested R&D for its semiconductor product line (DRAM & non-DRAM), the Department used BIA for purposes of determining Samsung's R&D expenditures. BIA was based upon the information submitted by petitioner. See March 11, 1993, Calculation Adjustment Memorandum to Marie E. Parker from Richard C. Lutz for a detailed discussion.

Comment 53: Petitioner claims the material costs reported by Samsung in its submission are suspiciously low because the Department found that the reported per unit material cost did not reconcile to the Bill of Materials. Petitioner also claims that the explanation given by Samsung for the irreconcilability of the reported per unit material costs makes no sense. Therefore, petitioner argues that the material costs should be adjusted.

Samsung argues that the Department verified the accuracy of the per unit material costs at verification, and that the Department reconciled these expenses to the company records, which themselves demonstrate that Samsung's accounting system fully tracks and absorbs the cost incurred for materials from purchase to production and ultimately to the financial statements. Also, during verification, the company explained that the Bill of Materials is a guide for purchasing and not an absolute standard which outlines the specific amount of materials tracked by device in the cost accounting system.

Samsung questions the validity of the Department's material cost reasonableness test in its verification report because of the effects that production quantities could have on its results and because of the appropriateness of the basis which the Department used in its calculations.

DOC Position: In comparing the selected bill of materials to the submitted material cost, no significant distortion was noted. Therefore, with respect to this issue, no adjustment was made to Samsung's cost.

Comment 54: Samsung contends that, as found at verification, all related party transactions were made at prices above total COP, including selling, general, and administrative expenses (SG&A), and argues, therefore, that we should accept them. Moreover, the company argues that it would be inappropriate to rely upon the financial statements of the parties to determine if a loss/gain was made on the sale from these related companies.

DOC Position: We agree with Samsung. In reviewing the transactions between Samsung and its related entities, we found none that were made below the COP. Accordingly, we made no adjustment to Samsung's cost data with regard to this issue.

Comment 55: Samsung contends that it accounted for foreign exchange gains or losses for its purchases made in foreign currency because the difference in the amount recorded for purchases and the amount paid is fully accounted for in the non-operating section of the income statement. Samsung states that such gains or losses are also reported as general expenses in the submission. Samsung states that this methodology is in accordance with Korean GAAP and is typical of manufacturers worldwide, as it is virtually impossible to account for these gains or losses on a transaction-specific basis.

DOC Position: Although the company may have included the net exchange gain or loss in its general expenses and allocated this amount as part of general expense for the submission, this methodology may not appropriately account for the product costs because the exchange transactions relate specifically to the subject merchandise and not all products produced by Samsung. See Sweaters from Korea (55 FR 32659, August 10, 1990) and Fresh Cut Flowers from Colombia (55 FR 20491, May 17, 1990). In this case the Department found that foreign exchange losses which related directly to the DRAMs were not attributed to the cost of DRAMs. Rather, Samsung has allocated these costs to all products. Therefore, we have made an adjustment to the materials costs for exchange rate fluctuations noted during the POI. In order to avoid double counting, we reduced the general expense amount by the amount added to material cost.

Critical Circumstances

Petitioner alleges that "critical circumstances" exist with respect to imports of DRAMs from the Republic of Korea. Section 735(a)(3) of the Act provides that critical circumstances exist if we determine that:

(A) (i) There is a history of dumping in the United States or elsewhere of the class or kind of merchandise which is the subject of the investigation, or

(ii) The person by whom, or for whose account, the merchandise was imported knew or should have known that the exporter was selling the merchandise which is the subject of the investigation at less than its fair value, and

(B) There have been massive imports of the class or kind of merchandise which is subject of the investigation over a relatively short period.

We normally consider whether there has been an outstanding antidumping order in the United States or elsewhere on the subject merchandise in determining whether there is a history of dumping. We normally consider margins of 25 percent or more, in the case of purchase price sales, or margins of 15 percent or more in case of ESP sales, sufficient to impute knowledge of dumping. Petitioner has provided information concerning an antidumping duty investigation on DRAMs from Korea being conducted by the European Community (E.C.). The E.C. issued its preliminary determination in June of this year, subsequent to the POI in the instant investigation. We have determined that this is not sufficient to establish a history of dumping under section 735(a)(3)(A)(i) of the Act, as an antidumping duty order has not yet been issued by the E.C.

With regard to all respondents, since the final dumping margins are less than 15 percent, we cannot impute knowledge of dumping under section 735(a)(3)(A)(ii) of the act. Therefore, in accordance with section 735(a)(3) of the Act, we determine that critical circumstances do not exist with respect to imports of DRAMs from Korea.

Suspension of Liquidation

In accordance with section 733(d)(1) of the Act, we are directing the U.S. Customs Service to continue to suspend liquidation of all entries of DRAMs from Korea, as defined in the "Scope of Investigation" section of this notice, that are entered, or withdrawn from warehouse, for consumption on or after October 29, 1992, which is the date of publication of our preliminary determination in the Federal Register.

The Customs Service shall require a cash deposit or posting of a bond equal to the estimated amount by which the FMV of the merchandise subject to this investigation exceeds the U.S. price, as shown below. This suspension of liquidation will remain in effect until further notice.

Producer/manufacturer/exporter	Weighted-average margin percentage
Goldstar Electron Co., Ltd. and Goldstar Electron America	4.57
Hyundai Electronics Co., Ltd. and Hyundai Electronics America	7.19
Samsung Electronics Co., Ltd. and Samsung Semiconductor, Inc	.74
All others	3.19

ITC Notification

In accordance with section 735(d) of the Act, we will notify the ITC of our determination. The ITC will make its determination whether these imports materially injure, or threaten material injury to, a U.S. industry within 45 days of the publication of this notice. If the ITC determines that material injury or threat of material injury does not exist, the proceeding will be terminated and all securities posted as a result of the suspension of liquidation will be refunded or cancelled.

However, if the ITC determines that such injury does exist, we will issue an antidumping duty order directing Customs officers to assess an antidumping duty on DRAMs from Korea entered, or withdrawn from warehouse, for consumption on or after the date of suspension of liquidation, equal to the amount by which the foreign market value of the merchandise exceeds the United States price.

Notification to Interested Parties

This notice also serves as the only reminder to parties subject to administrative protective order (APO) of their responsibility covering the return or destruction of proprietary information disclosed under APO in accordance with 19 CFR 353.34(d). Failure to comply is a violation of the APO.

This determination is published pursuant to section 735(d) of the Act (19 U.S.C. 1673d(d)), and 19 CFR 353.20(a)(4).

Dated: March 15, 1993.

Joseph A. Spetrini,

Acting Assistant Secretary for Import Administration.

[FR Doc. 93-6553 Filed 3-22-93; 8:45 am]

BILLING CODE 3510-DS-P

UNITED STATES DEPARTMENT OF COMMERCE
International Trade Administration
Washington, D.C. 20230

APR 21 1993

A-580-812
Investigation
Public Document

Honorable Don E. Newquist
Chairman
International Trade Commission
500 E Street, S.W.
Washington, D.C. 20436

Re: Amended Final Determination of Sales at Less Than Fair Value: Dynamic Random Access Memory Semiconductors of One Megabit and Above from Korea

Dear Mr. Chairman:

Pursuant to clerical error allegations submitted by petitioner and respondents to the Department of Commerce (the Department) concerning the final determination of sales at less than fair value in the above-referenced investigation, the Department has amended its final determination. This letter is to advise you of this amended final determination.

Based on a reexamination of information used in the final determination, the Department still determines that dynamic random access memory semiconductors of one megabit and above from the Republic of Korea are being, or are likely to be, sold in the United States at less than fair value within the meaning of the Tariff Act of 1930, as amended (19 U.S.C. 1673d). However, the Department has calculated revised final antidumping margins for Hyundai Electronics Co., Ltd. (Hyundai) and Samsung Semiconductor Co., Ltd. (Samsung). The margin for Goldstar Electron Co., Ltd. (Goldstar) did not change. The "All Others" rate did change. The original final margins published in the Federal Register and the revised final margins are as follows:

	Original	Revised
Goldstar	4.97%	4.97%
Hyundai	7.19%	11.45%
Samsung	0.74%	0.82%
"All Others"	3.19%	3.89%

If you have any questions regarding this amended final determination, please contact me at (202) 482-1768.

Sincerely,

Richard W. Moreland
Acting Deputy Assistant Secretary
for Investigations
Import Administration

GLOSSARY[1]

Access time: Time interval between the instant that a piece of information is sent and the instant it returns.

ASIC: Application-Specific Integrated Circuit. An integrated circuit designed for one narrow use.

Binary: Numbering system using two as a base and requiring only two symbols (0 and 1).

Bipolar: One of two types of transistors and integrated circuits; the other is metal oxide semiconductor (MOS). Bipolar devices are faster than MOS devices but usually more difficult to make.

Bit: Short for "Binary Digit." The smallest piece of data (a "1" or "0") that a computer recognizes. Combinations of 1s and 0s are used to represent characters and numbers.

Byte: A number of bits, usually eight, that represent one numeric or alphabetic character.

Capacitance: The property of a circuit element that permits it to store an electrical charge.

Cell: A tiny area within the memory array that stores a bit in the form of an electrical charge.

Chip: A single piece of semiconductor material onto which specific electrical circuits have been fabricated; refers to a semiconductor that has not yet been packaged. Also called "die."

Clean room: A confined area in which the humidity, temperature, particulate matter, and contamination are precisely controlled within specified parameters.

CMOS: Complementary Metal Oxide Semiconductor. An integrated circuit structure that incorporates N-channel (negative charge carriers) and P-channel (positive charge carriers) metal oxide semiconductor (MOS) transistors within the same silicon substrate.

CPU: Central Processing Unit. The computer module in charge of retrieving, decoding, and executing instructions.

Die: A single piece of semiconductor material onto which specific electrical circuits have been fabricated; refers to a semiconductor that has not yet been packaged. Also called "chip."

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[1] Compiled principally from Peter Van Zant, Microchip Fabrication: A Practical Guide to Semiconductor Processing, McGraw-Hill, 1990; Semiconductor Industry Association, Semiconductor Technology: Workshop Conclusions, 1993; Micron's Annual Reports; and Commission publications.

Diode: A semiconductor component that allows electricity to flow only in one direction.

DIP: Dual In-Line Package. A chip package with leads extending along two opposite edges of the package.

DRAM: Dynamic Random Access Memory. A type of memory device which can store digital information. "Dynamic" means that the device's memory cells need to be periodically recharged. Information stored in the memory cells, as a positive or negative charge, can be accessed randomly (as opposed to serially).

ECL: Emitter-Coupled Logic. A type of microelectronic circuit design that is noted for its extremely fast switching speeds.

EEPROM: Electronically Erasable Programmable Read Only Memory. A type of EPROM that can be erased and reprogrammed using electricity.

EPROM: Erasable Programmable Read Only Memory. A type of memory device that can be erased and reprogrammed. Accordingly, such devices are more properly characterized as "read mostly" since, although the stored charges are read (accessed) far more frequently than they are erased and reprogrammed, they nonetheless have this capability. EPROMs retain stored information indefinitely, requiring no recharging (as distinguished from DRAMs). As commonly used, the term EPROM refers to a device that can be erased using ultraviolet light and reprogrammed using electricity; the term EEPROM refers to a device that can be erased and reprogrammed using electricity.

Etch: Removal of material from a substrate by chemical or physical means.

Gigabit: One billion (actually 1,073,741,824) bits of information.

IC: Integrated Circuit. A complete electronic circuit composed of two or more interconnected active components, such as diodes or transistors, and fabricated on a single semiconductor substrate, usually silicon.

Kilobit: One thousand (actually 1,024) bits of information.

Leads: The metal "feet" on a packaged semiconductor chip.

Lithography: The transfer of a pattern or image from one medium to another, as from a mask to a wafer.

Logic: The circuits used to control operation of integrated circuit devices.

LSI: Large Scale Integration. Refers to chips with between 5,000 and 100,000 components each.

Mask: A glass pattern for a layer of the wafer used in the photolithography process.

MCU: Microcontroller Unit. Same as microcontroller.

Megabit: One million (actually 1,048,576) bits of information.

Microcontroller: An integrated circuit consisting of memory, logic, and other circuitry that is designed to perform a limited number of preset circuit functions.

Microprocessor: An integrated circuit consisting of memory, logic, and other circuitry that can be programmed to perform many different circuit functions.

Module: A packaging arrangement consisting of chips mounted on a printed circuit board. Modules are less susceptible to damage during installation than individual chips and require less board space.

MOS: Metal Oxide Semiconductor. One of two types of transistors and integrated circuits; the other is bipolar.

MPU: Microprocessor Unit. Same as microprocessor.

Package: A container for a die (generally plastic or ceramic) that provides protection and external connections.

PC Board: Printed Circuit Board. The board(s) used in electronic systems onto which semiconductor components are connected.

Photolithography: The process used to transfer a pattern or image from a mask to a wafer. The process uses a photosensitive emulsion and light.

PLCC: Plastic Leaded Chip Carrier. A type of chip package.

RAM: Random Access Memory. A type of circuitry used in memory integrated circuits. Compared with other types of memory circuitry, RAM provides the fastest capabilities for storing and retrieving digital information. However, RAM circuits are not suited to certain applications because, unlike circuits based on read only memory (ROM) circuitry, they need to be connected to a source of electrical power to retain stored information. They are thus characterized as "volatile" memory circuits.

ROM: Read Only Memory. A type of circuitry used in memory integrated circuits. ROM circuits are designed only to give back prestored information. This information is specifically designed into the chip memory array during fabrication. Unlike random access memory (RAM) circuitry, ROM circuits store information permanently and do not need to be recharged. They are thus characterized as "nonvolatile" memory circuits. However, they provide slower capabilities for storing and retrieving information than RAM circuits.

Semiconductor/semiconductor device: An electronic device whose main functioning part is made from a material (usually silicon, the "semiconductor") whose conductivity ranges between that of a conductor and that of an insulator. Semiconductor devices achieve amplification and rapid on-off switching by moving electronic charges along controlled paths inside a solid block of semiconductor material (hence the name "solid state").

Shrink: Reduction in die (chip) size.

Silicon: A nonmetallic element used in the semiconductor industry as a substrate for multiple layers of material, built to form electrical circuits. Silicon is grown from a crystal to form a cylinder-shaped "log." Slicing the logs into sections about 1/40 of an inch thick creates bare wafers.

SIMM: Single In-Line Memory Module. A high-density DRAM package consisting of two or more chip carriers soldered to a single printed circuit board. SIMMs provide an upgrade vehicle for future generations of DRAMs.

SOJ: Small Outline J-bend. A memory chip package used for surface mounting on printed circuit boards.

SRAM: Static Random Access Memory. An integrated circuit similar to a DRAM, but which does not require constant refreshing or recharging. Primarily used for caching (storing and keeping the most frequently used information readily accessible).

Transistor: A semiconductor device that uses a stream of charge carriers to produce active electronic effects. The name was coined from the electrical characteristic of "transfer resistance."

VRAM: Video Random Access Memory. A DRAM derivative that has multiple access ports instead of one. Primary uses are to enhance and accelerate graphics applications.

Wafer: A thin disk (or slice) of silicon on which many separate chips (dice) can be fabricated and then cut into individual dice.

Yield: Number of working (as opposed to defective) chips (dice) produced on each wafer compared to the maximum possible.

ZIP: Zigzag In-Line Package. A memory chip package that stands on its side and has zig-zagged leads along one side.

APPENDIX B

VRAM INFORMATION OBTAINED IN THE INVESTIGATION

U.S. PRODUCERS

The Commission sent DRAM producers' questionnaires requesting data on VRAM operations to 11 firms identified in the preliminary investigation as U.S. DRAM producers. The Commission also sent DRAM producers' questionnaires to 31 additional firms identified as possible participants in the U.S. VRAM market by industrial directories and the preliminary investigation record. Thirty-one firms responded that they did not produce VRAMs in the United States and seven firms did not respond to the Commission's request for information. Of the 11 known U.S. producers of DRAMs, *** produced uncased VRAMs in the United States and *** produced cased VRAMs in the United States. These four U.S. VRAM producers also produced other DRAMs and are believed to account for all U.S. VRAM wafer fabrication and assembly.

Presented in the following tabulation are the four known U.S. firms that reported uncased or cased VRAM production during the period for which data were collected in this investigation and each firm's share (based on units) of total 1991 U.S. production of uncased and cased VRAMs (in percent).

* * * * * * *

U.S. IMPORTERS

The Commission sent importers' questionnaires to approximately 150 U.S. firms identified as possible U.S. importers of VRAMs by ***, by the preliminary investigation record, and by industrial directories. Ten firms provided information on their U.S. imports of VRAMs. Of the 10 importing firms that responded to the Commission's request, 2 reported VRAM imports from Korea[1] and 8 reported VRAM imports from sources other than Korea. No imports of uncased VRAMs from Korea were reported and no U.S. VRAM producers reported VRAM imports from Korea. Imports from countries other than Korea consist of imports from Japan, Singapore, and Italy. Import data provided in the questionnaire responses are estimated to account for greater than 95 percent of U.S. imports from Korea in 1991 and approximately 60 percent of U.S. imports from countries other than Korea in the same period (see the section in the body of this report entitled "U.S. Importers").

VRAM SUMMARY DATA

Summary data concerning uncased and cased 1 Meg and above and all VRAMs are presented in tables B-1 through B-4. These data are calculated based on data reported by U.S. producers and importers of VRAMs. The data presented are in terms of bits because they are believed to be less affected by differences in product mix than are data reported in terms of units. Trade data may not reconcile with shipment and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for the reconciliation discrepancies. Capacity and capacity utilization information is not presented because this information was not provided.

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[1] ***. Only the 1 Meg and above Korean VRAM imports are within the scope of Commerce's investigation.

Table B-1
Uncased VRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992[1]

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

[1] U.S. producers' data presented are believed to account for all VRAM wafer fabrication performed in the United States. Import data were provided by ***. No U.S. uncased VRAM imports from Korea were reported.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-2
Uncased VRAMs≥1 Meg: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992[1]

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

[1] U.S. producers' data presented are believed to account for all VRAM wafer fabrication performed in the United States. Import data were provided by ***. No U.S. uncased VRAM imports from Korea were reported.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-3
Cased VRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992[1]

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

[1] U.S. producers' data presented are believed to account for all uncased and cased VRAM production performed in the United States. Import data are estimated to account for more than 95 percent of imports from Korea in 1991 and approximately 60 percent of imports from countries other than Korea in the same period (see the section in the body of this report entitled "U.S. Importers").

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-4
Cased VRAMs≥1 Meg: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992[1]

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

[1] U.S. producers' data presented are believed to account for all uncased and cased VRAM production performed in the United States. Import data are estimated to account for more than 95 percent of imports from Korea in 1991 and approximately 60 percent of imports from countries other than Korea in the same period (see the section in the body of this report entitled "U.S. Importers").

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

INCOME-AND-LOSS DATA

Operations on all VRAMs

The VRAM operations of U.S. producers are shown in table B-5. Net sales fluctuated throughout the period of investigation as sales of under 1 Meg VRAMs declined and sales of 1 Meg and above VRAMs increased. Quantities sold, as shown in table B-6, also fluctuated throughout the period, as did average unit sales values.

The companies realized ***. The companies incurred ***.

Selected income-and-loss data for all VRAMs, by firm, are presented in table B-7. ***.

Table B-5
Income-and-loss experience of U.S. producers[1] on their operations producing all VRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] The producers are ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-6
Income-and-loss experience (on a per-VRAM basis) of U.S. producers[1] on their operations producing all VRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept-- 1991	1992
*	*	*	*	*	*

[1] The producers are ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-7
Income-and-loss experience of U.S. producers[1] on their operations producing all VRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] The producers are ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Operations on 1 Meg and above VRAMs

The 1 Meg and above VRAM operations of U.S. producers are shown in table B-8. Net sales increased throughout the period of investigation from *** in 1989 to *** in interim 1992. Quantities sold, as shown in table B-9, also increased throughout the period. Average unit sales values dropped *** from *** in 1990 to *** in 1991 and dropped again, ***, to *** in interim 1992. The combined companies ***.

Selected income-and-loss data for 1 Meg and above VRAMs, by firm, are presented in table B-10. *** are the only reporting producers of 1 Meg and above VRAMs. ***.

Table B-8
Income-and-loss experience of U.S. producers[1] on their operations producing 1 Meg and above VRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-9
Income-and-loss experience (on a per-VRAM basis) of U.S. producers[1] on their operations producing 1 Meg and above VRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-10
Income-and-loss experience of U.S. producers[1] on their operations producing 1 Meg and above VRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

ABILITY OF KOREAN PRODUCERS TO GENERATE EXPORTS AND THE AVAILABILITY OF EXPORT MARKETS OTHER THAN THE UNITED STATES

The Commission requested information regarding Korean operations producing VRAMs. Korean VRAM data were provided by Goldstar and Samsung. ***. Data received by the Commission on Korean uncased and cased VRAM operations are presented in tables B-11 through B-14. The data are believed to account for all Korean exports of VRAMs to the United States from January 1989 to September 1992.

VRAM PRICE TRENDS

The Commission requested price and quantity data from U.S. producers and importers for their monthly spot and quarterly contract sales of VRAMs during January 1989-September 1992. U.S. producers and importers were requested to submit separate price data for their sales to OEMs, franchise distributors, value-added resellers/aftermarket resellers, and brokers/independent distributors. Product specifications for which VRAM pricing data were requested are as follows: 256K x 4, 100ns 1 Meg VRAM, SOJ. Usable VRAM pricing data were received from two U.S. producers and one importer of Korean VRAMs. VRAM pricing data are presented in table B-15.

Table B-11
Uncased VRAMs: Korean production,[1] inventories, capacity utilization, and shipments, 1989-91, January-September 1991, January-September 1992, and projected 1992-93[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	*	*	*	*	*	*	*

[1] Production data presented for uncased VRAMs represent the successful fabrication of VRAM dice. Production data may not reconcile with shipment and inventory data. Firms cited "scrap and theft" as reasons for the discrepancies.
[2] Data presented are believed to account for all Korean production of VRAMs from January 1989 to September 1992.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-12
Uncased VRAMs≥1 Meg: Korean production,[1] inventories, capacity utilization, and shipments, 1989-91, January-September 1991, January-September 1992, and projected 1992-93[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	*	*	*	*	*	*	*

[1] Production data presented for uncased VRAMs represent the successful fabrication of VRAM dice. Production data may not reconcile with shipment and inventory data. Firms cited "scrap and theft" as reasons for the discrepancies.
[2] Data presented are believed to account for all Korean production of VRAMs from January 1989 to September 1992.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-13
Cased VRAMs: Korean production,[1] inventories, capacity utilization, and shipments, 1989-91, January-September 1991, January-September 1992, and projected 1992-93[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	*	*	*	*	*	*	*

[1] Production data presented for cased VRAMs represent the successful assembly of cased VRAMs. Production data may not reconcile with shipment and inventory data. Firms cited "scrap and theft" as reasons for the discrepancies.
[2] Data presented are believed to account for all Korean production of VRAMs from January 1989 to September 1992.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-14
Cased VRAMs≥1 Meg: Korean production,[1] inventories, capacity utilization, and shipments, 1989-91, January-September 1991, January-September 1992, and projected 1992-93[2]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	*	*	*	*	*	*	*

[1] Production data presented for cased VRAMs represent the successful assembly of cased VRAMs. Production data may not reconcile with shipment and inventory data. Firms cited "scrap and theft" as reasons for the discrepancies.
[2] Data presented are believed to account for all Korean production of VRAMs from January 1989 to September 1992.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table B-15
U.S. and Korean VRAMs: Weighted-average net f.o.b. selling prices and quantities of U.S.-produced and Korean product 5 (1 Meg VRAM), by customer group and by months, January 1989-September 1992[1]

	*	*	*	*	*	*	*

[1] There were no sales of product 5 to value-added resellers or brokers/independent distributors.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

APPENDIX C

DRAM MEMORY MODULE INFORMATION OBTAINED IN THE INVESTIGATION

U.S. PRODUCERS

DRAM module assemblers' questionnaires were sent to the 11 known U.S. producers of DRAMs. Of these 11 firms, *** produced DRAM memory modules in the United States during the period for which data were requested in this investigation.[1] All of the U.S. DRAM producers that also produced DRAM memory modules in the United States provided information concerning the modules.[2]

DRAM module assemblers' questionnaires were also sent to approximately 150 additional firms that were identified as possible U.S. DRAM memory module assemblers. Sixty-three firms responded that they did not assemble DRAM memory modules during the period for which data were requested, and 59 firms did not respond to the Commission's request. Nineteen firms indicated that they assembled DRAM memory modules from purchased DRAMs or on a toll basis during the investigation period, but only seven firms responded to the Commission's request for data.[3] The data provided by module assemblers that do not also produce DRAMs are believed to account for a small percentage of the total DRAM memory module assembly performed by such assemblers in the United States.[4]

Presented in the following tabulation are the U.S. DRAM module producers that reported information in response to the Commission's request and their share of total reported U.S. DRAM module production in 1991 (in percent):

* * * * * * *

U.S. IMPORTERS

Importers' questionnaires were sent to approximately 150 firms identified as possible importers of DRAM memory modules. Seventy-five firms responded that they did not import DRAM memory modules during the period for which data were requested and 56 firms did not respond to the Commission's request. Twenty firms reported DRAM memory module imports and eight firms (***) reported imports of DRAM memory modules that contain 1 Meg and above DRAMs from Korea.

---

[1] ***.

[2] The worldwide market share of DRAM modules held by manufacturers of both DRAMs and modules is estimated to be 70 percent. The remaining 30 percent is held by manufacturers of modules that do not also produce DRAMs. "The Merchant Market for DRAM Modules," Semiconductor Product Planning Service, In-Stat Services, pp. 51-53.

[3] ***.

[4] There are a large number of smaller firms of this type that frequently enter and exit the industry since it is one that requires little technical expertise and capital. Transcript of the hearing, pp. 100-101.

DRAM MEMORY MODULE SUMMARY DATA

Summary data concerning all DRAM memory modules and memory modules containing 1 Meg and above DRAMs are presented in tables C-1 and C-2, respectively. These tables are based on data as reported by U.S. producers and importers of DRAM memory modules. The data presented are in terms of bits because they are believed to be less affected by differences in product mix than are data reported in terms of units. Trade data may not reconcile with shipment and inventory data. Firms cited "yield loss, scrap, samples, returns, and theft" as reasons for the reconciliation discrepancies. Capacity and capacity utilization information is not presented because, for most DRAM memory module assemblers, the estimation of these data was not meaningful.

Table C-1
All DRAM memory modules: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992[1]

(Quantity=billion bits, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

[1] All of the U.S. DRAM producers that also produced DRAM memory modules in the United States provided data. Seven additional firms that assembled DRAM memory modules from purchased DRAMs also provided data. These seven assemblers are believed to account for a small percentage of the total DRAM memory module assembly performed by such assemblers in the United States. Twenty firms reported imports of DRAM memory modules.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-2
Modules containing DRAMs≥1 Meg: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992[1]

(Quantity=billion bits, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

[1] All of the U.S. DRAM producers that also produced DRAM memory modules in the United States provided data. Seven additional firms that assembled DRAM memory modules from purchased DRAMs also provided data. These seven assemblers are believed to account for a small percentage of the total DRAM memory module assembly performed by such assemblers in the United States. Twenty firms reported imports of DRAM memory modules during the period for which data were requested.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

INCOME-AND-LOSS DATA FOR DRAM MEMORY MODULES

Operations on All DRAM Memory Modules

The operations of U.S. producers on all DRAM memory modules are shown in table C-3. The data include five DRAM producers[5] and seven purchasers[6] of DRAMs for installation in modules. Net sales ***. As shown in table C-4, ***.

* * * * * * *

Table C-3
Income-and-loss experience of U.S. producers[1] on their operations producing all DRAM memory modules, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] The producers are ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-4
Income-and-loss experience of U.S. producers[1] on their operations producing all DRAM memory modules, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] The producers are ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

[5] The DRAM producers are ***.

[6] The firms that produced memory modules from purchased DRAMs and their fiscal yearends are ***. ***.

Operations on Memory Modules Containing DRAMs of 1 Meg and Above

The operations of U.S. producers on memory modules containing 1 Meg and above DRAMs are shown in table C-5. Net sales ***. The companies followed the same trend as for all modules, ***. As shown in table C-6, ***.

* * * * * * *

Table C-5
Income-and-loss experience of U.S. producers[1] on their operations producing memory modules containing DRAMs of 1 Meg and above, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] The producers are ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-6
Income-and-loss experience of U.S. producers[1] on their operations producing memory modules containing DRAMs of 1 Meg and above, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*

[1] The producers are ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission

The companies that do not also produce DRAMs (***) comprised *** percent of total reported net sales of modules containing DRAMs of 1 Meg and above in 1991. Each of these companies, ***, reported that they either do toll work for other companies or have toll work done by other companies or both. The ratio of the cost of DRAMs to total cost of goods sold for each company for memory modules containing DRAMs of 1 Meg and above in 1991 was ***. ***.

The companies that also produce DRAMs reported their ratio of DRAMs to total cost of goods sold in 1991 for memory modules containing DRAMs of 1 Meg and above as follows: ***.

Research and Development Expenses

Research and development expenses for the producers of DRAM memory modules[7] are shown in the following tabulation (in thousands of dollars):

* * * * * * *

Capital Expenditures

Capital expenditures for the producers of DRAM memory modules[8] are shown in the following tabulation (in thousands of dollars):

* * * * * * *

ABILITY OF KOREAN PRODUCERS TO GENERATE EXPORTS AND THE AVAILABILITY OF EXPORT MARKETS OTHER THAN THE UNITED STATES

The Commission requested information regarding Korean operations producing DRAM memory modules. Responses to this request were provided by Goldstar, Hyundai, and Samsung. Data received by the Commission on Korean DRAM memory module operations are presented in tables C-7 and C-8. It is not known whether there are any other DRAM memory module assemblers in Korea that export to the United States.

Presented in the following tabulation are the three Korean producers and their shares of exports to the United States of memory modules that contain DRAMs of 1 Meg and above (in percent):

* * * * * * *

[7] The producers are ***.
[8] The producers are ***. ***.

Table C-7
All DRAM memory modules: Korean production,[1] inventories,[2] capacity utilization, and shipments,[3] 1989-91, January-September 1991, January-September 1992, and projected 1992-93[4]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	*	*	*	*	*	*	*

[1] Production data presented for DRAM memory modules represent the successful assembly of DRAM memory modules.
[2] Inventory data consist of finished goods inventory of DRAM memory modules.
[3] Shipment data consist of shipments, net of returns, made in the period during which the product was shipped.
[4] Data presented are believed to account for all of the three Korean DRAM producers' DRAM memory module production from January 1989 to September 1992. It is not known, however, whether there are any other Korean DRAM memory module assemblers that export to the United States.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-8
Memory modules containing DRAMs≥1 Meg: Korean production,[1] inventories,[2] capacity utilization, and shipments,[3] 1989-91, January-September 1991, January-September 1992, and projected 1992-93[4]

Item	1989	1990	1991	Jan.-Sept.-- 1991	Jan.-Sept.-- 1992	Projected-- 1992	Projected-- 1993
	*	*	*	*	*	*	*

[1] Production data presented for DRAM memory modules represent the successful assembly of DRAM memory modules.
[2] Inventory data consist of finished goods inventory of DRAM memory modules.
[3] Shipment data consist of shipments, net of returns, made in the period during which the product was shipped.
[4] Data presented are believed to account for all of the three Korean DRAM producers' DRAM memory module production from January 1989 to September 1992. It is not known, however, whether there are any other Korean DRAM memory module assemblers that export to the United States.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. PRODUCERS' IMPORTS

*** was the only U.S. DRAM memory module assembler that reported imports of subject DRAM memory modules from Korea. Data concerning its imports of DRAM memory modules from Korea are presented in table C-9.

Table C-9
DRAM memory modules that contain 1 Meg and above DRAMs: U.S. producers' imports from Korea, 1989-91, January-September 1991, and January-September 1992[1]

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
*	*	*	*	*	*	*

[1] Data presented were provided by ***, the only U.S. DRAM memory module assembler that reported imports of the subject DRAM memory modules from Korea. *** was identified by *** as the Korean producer of the modules.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

DRAM MEMORY MODULE PRICE TRENDS

The Commission requested price and quantity data from U.S. DRAM memory module assemblers and importers for their monthly spot and quarterly contract sales of DRAM memory modules during January 1989-September 1992. U.S. producers and importers were requested to submit separate price data for their sales to OEMs, franchise distributors, value-added resellers/aftermarket resellers, and brokers/independent distributors. Product specifications for which DRAM memory module pricing data were requested are as follows: 1 Meg x 9 SIMM consisting of 9, 1 Meg x 1, 80ns 1 Meg DRAMs. DRAM memory module pricing data are presented in table C-10.

Table C-10
U.S. and Korean DRAMs: Weighted-average net f.o.b. selling prices, quantities, and margins of under/(over)selling of U.S.-produced and Korean product 6 (DRAM modules) for sales to OEMs,[1] franchise distributors, and brokers, by months, January 1989-September 1992

*	*	*	*	*	*	*

[1] Includes prices for sales to both OEMs and value-added resellers.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

APPENDIX D

DATA CONCERNING DRAMS, BY DENSITIES

THE U.S. MARKET

The data presented in tables D-1 through D-10 are certain summary data concerning uncased and cased DRAMs (including VRAMs) for each density reported separately. Capacity and employment data are not presented because these data were not provided for each density.

The DRAM financial data presented in subsequent tables are for each density of DRAM reported separately, but do not include VRAMs. Financial data concerning VRAMs are included in appendix B.

Table D-1
Uncased DRAMs<256K density: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-2
Uncased 256K DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-3
Uncased 1 Meg DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-4
Uncased 4 Meg DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-5
Uncased 16 Meg DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-6
Cased DRAMs<256K density: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-7
Cased 256K DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-8
Cased 1 Meg DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-9
Cased 4 Meg DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-10
Cased 16 Meg DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values are per million bits, period changes=percent, except where noted)

	Reported data					Period changes			
				Jan.-Sept.--					Jan.-Sept.
Item	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
	*	*	*	*	*	*	*		

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

INCOME-AND-LOSS DATA FOR DRAMS

Operations on DRAMs of under 1 Meg

The under 1 Meg DRAM operations of U.S. producers are shown in table D-11. Net sales ***. Quantities sold, as shown in table D-12, ***. The average unit sales value ***. The unit sales value ***.

The companies realized ***. The operating income (loss) margins were ***.

Selected income-and-loss data for under 1 Meg DRAMs, by firm, are presented in table D-13. ***.

Table D-11
Income-and-loss experience of U.S. producers[1] on their operations producing under 1 Meg DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991[2]	1992
*	*	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.
[2] Certain amounts are higher in interim 1991 than the year of 1991 because some of the companies have fiscal years ending Mar. 31, 1992; such data are included in 1991.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-12
Income-and-loss experience (on a per-DRAM basis) of U.S. producers[1] on their operations producing under 1 Meg DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991[2]	1992
*	*	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.
[2] Certain amounts are higher in interim 1991 than the year of 1991 because some of the companies have fiscal years ending Mar. 31, 1992; such data are included in 1991.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-13
Income-and-loss experience of U.S. producers[1] on their operations producing under 1 Meg DRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991[2]	1992
	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.
[2] Certain amounts are higher in interim 1991 than the year of 1991 because some of the companies have fiscal years ending Mar. 31, 1992; such data are included in 1991.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Operations on 1 Meg DRAMs

The 1 Meg DRAM operations of U.S. producers are shown in table D-14. The net sales value ***. Quantities sold, as shown in table D-15, ***. However, the average unit sales value ***. The quantities sold ***. The unit sales value ***.

The companies realized ***. ***.

Selected income-and-loss data for 1 Meg DRAMs, by firm, are presented in table D-16. ***.

Table D-14
Income-and-loss experience of U.S. producers[1] on their operations producing 1 Meg DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-15
Income-and-loss experience (on a per-DRAM basis) of U.S. producers[1] on their operations producing 1 Meg DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. Unit values were computed for those companies having net sales and may not be derivable from the data presented. The DRAM data presented do not include VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-16
Income-and-loss experience of U.S. producers[1] on their operations producing 1 Meg DRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Operations on 4 Meg DRAMs

The 4 Meg DRAM operations of U.S. producers are shown in table D-17. The net sales value ***. Quantities sold, as shown in table D-18, ***. However, the average unit sales value ***. The quantities sold ***. The unit sales value ***.

The companies incurred ***. ***.

Selected income-and-loss data for 4 Meg DRAMs, by firm, are presented in table D-19.

* * * * * * *

Table D-17
Income-and-loss experience of U.S. producers[1] on their operations producing 4 Meg DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-18
Income-and-loss experience (on a per-DRAM basis) of U.S. producers[1] on their operations producing 4 Meg DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. Unit values were computed for those companies having net sales and may not be derivable from the data presented. The DRAM data presented do not include VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table D-19
Income-and-loss experience of U.S. producers[1] on their operations producing 4 Meg DRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Operations on 16 Meg DRAMs

The 16 Meg DRAM operations of U.S. producers are shown in table D-20.

* * * * * * *

Table D-20
Income-and-loss experience of U.S. producers[1] on their operations producing 16 Meg DRAMs, by firms, fiscal years 1989-91, January-September 1991, and January-September 1992

(1,000 dollars)

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Operations on Over 16 Meg DRAMs

The over 16 Meg DRAM operations of U.S. producers are shown in table D-21. ***.

Table D-21
Income-and-loss experience of U.S. producers[1] on their operations producing over 16 Meg DRAMs, fiscal years 1989-91, January-September 1991, and January-September 1992

(1,000 dollars)

Item	1989	1990	1991	Jan.-Sept.-- 1991	1992
	*	*	*	*	*

[1] The producers are ***. The DRAM data presented do not include VRAMs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

APPENDIX E

CERTAIN SUMMARY DATA

Table E-1
Uncased DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

Item	Reported data			Jan.-Sept.--		Period changes			
	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	Jan.-Sept. 1991-92
U.S. consumption quantity:									
Amount	***	***	***	***	***	***	***	***	***
Producers' share[1]	***	***	***	***	***	***	***	***	***
Importers' share:[1]									
Korea (≥1 Meg)	***	***	***	***	***	***	***	***	***
Korea (<1 Meg)	***	***	***	***	***	***	***	***	***
Other sources	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
U.S. consumption value:									
Amount	***	***	***	***	***	***	***	***	***
Producers' share[1]	***	***	***	***	***	***	***	***	***
Importers' share:[1]									
Korea (≥1 Meg)	***	***	***	***	***	***	***	***	***
Korea (<1 Meg)	***	***	***	***	***	***	***	***	***
Other sources	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
U.S. importers' imports from--									
Korea(≥1 Meg):									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***
Korea<1 Meg:									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***
Other sources:									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***
All sources:									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
U.S. producers'--									
Average capacity (1,000 wafers)	1,291	1,558	1,575	1,149	1,226	+22.0	+20.7	+1.1	+6.7
Wafer starts (1,000 wafers)	1,241	1,393	1,416	1,070	1,043	+14.1	+12.2	+1.7	-2.5
Capacity utilization[1]	96.1	89.4	89.9	93.1	85.1	-6.2	-6.7	+0.5	-8.1
Production quantity	132,574	202,399	322,594	230,352	321,726	+143.3	+52.7	+59.4	+39.7
U.S. shipments:									
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Export shipments:									
Quantity	***	***	***	***	***	***	***	***	***
Exports/shipments[1]	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Inventory/shipments[1]	***	***	***	***	***	***	***	***	***
Production workers	4,655	4,150	4,340	4,290	3,710	-6.8	-10.8	+4.6	-13.5
Hours worked (1,000s)	9,382	8,676	9,056	7,474	6,121	-3.5	-7.5	+4.4	-18.1
Total comp. ($1,000)	145,544	148,474	164,844	132,793	119,518	+13.3	+2.0	+11.0	-10.0
Hourly total compensation	$15.51	$17.11	$18.20	$17.77	$19.52	+17.3	+10.3	+6.4	+9.9
Productivity (million bits/hour)	14.1	22.7	35.4	30.8	52.6	+151.5	+61.0	+56.2	+70.5
Unit labor costs	$1.10	$0.76	$0.51	$0.58	$0.37	-53.3	-31.5	-31.9	-35.9

[1] 'Reported data' are in percent and 'period changes' are in percentage-points.

Note.--Period changes are derived from the unrounded data. Because of rounding, figures may not add to the totals shown. Unit values and other ratios are calculated using data of firms supplying both numerator and denominator information. Part-year inventory ratios are annualized.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table E-2
Uncased DRAMs≥1 Meg: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

Item	Reported data					Period changes			
				Jan.-Sept.,--					Jan.-Sept.
	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	1991-92
U.S. consumption quantity:									
Amount	***	***	***	***	***	***	***	***	***
Producers' share[1]	***	***	***	***	***	***	***	***	***
Importers' share:[1]									
Korea	***	***	***	***	***	***	***	***	***
Other sources	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
U.S. consumption value:									
Amount	***	***	***	***	***	***	***	***	***
Producers' share[1]	***	***	***	***	***	***	***	***	***
Importers' share:[1]									
Korea	***	***	***	***	***	***	***	***	***
Other sources	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
U.S. importers' imports from--									
Korea:									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***
Other sources:									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***
All sources:									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
U.S. producers'--									
Average capacity (1,000 wafers)	***	***	***	***	***	***	***	***	***
Wafer starts (1,000 wafers)	***	***	***	***	***	***	***	***	***
Capacity utilization[1]	***	***	***	***	***	***	***	***	***
Production quantity	***	***	***	***	***	***	***	***	***
U.S. shipments:									
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Export shipments:									
Quantity	***	***	***	***	***	***	***	***	***
Exports/shipments[1]	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Inventory/shipments[1]	***	***	***	***	***	***	***	***	***
Production workers	***	***	***	***	***	***	***	***	***
Hours worked (1,000s)	***	***	***	***	***	***	***	***	***
Total comp. ($1,000)	***	***	***	***	***	***	***	***	***
Hourly total compensation	***	***	***	***	***	***	***	***	***
Productivity (million bits/hour)	***	***	***	***	***	***	***	***	***
Unit labor costs	***	***	***	***	***	***	***	***	***

[1] 'Reported data' are in percent and 'period changes' are in percentage-points.

Note.--Period changes are derived from the unrounded data. Because of rounding, figures may not add to the totals shown. Unit values and other ratios are calculated using data of firms supplying both numerator and denominator information. Part-year inventory ratios are annualized.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table E-3
Cased DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

Item	Reported data			Jan.-Sept.--		Period changes			
	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	Jan.-Sept. 1991-92
U.S. consumption quantity:									
Amount	248,298	392,049	618,216	436,499	728,376	+149.0	+57.9	+57.7	+66.9
Producers' share:[1]									
U.S. dice cased in--									
Korea	0	0	0	0	0	(2)	(2)	(2)	(2)
United States	***	***	***	***	***	***	***	***	***
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
3rd-source dice cased in United States	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
Importers' share:[1]									
Korean dice (≥1 Meg) cased in--									
Korea	***	***	***	***	***	***	***	***	***
United States	0	0	0	0	0	(2)	(2)	(2)	(2)
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
Korean dice (<1 Meg) cased in--									
Korea	***	***	***	***	***	***	***	***	***
United States	0	0	0	0	0	(2)	(2)	(2)	(2)
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
3rd-source dice cased in--									
Korea (≥1 Meg)	0	0	0	0		(4)	(2)	(2)	(2)(5)
Korea (<1 Meg)	***	***	***	***	***	***	***	***	***
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
U.S. consumption value:									
Amount	2,892,008	2,223,663	2,451,510	1,802,268	2,151,591	-15.2	-23.1	+10.2	+19.4
Producers' share:[1]									
U.S. dice cased in--									
Korea	0	0	0	0	0	(2)	(2)	(2)	(2)
United States	***	***	***	***	***	***	***	***	***
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
3rd-source dice cased in United States	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
Importers' share:[1]									
Korean dice (≥1 Meg) cased in--									
Korea	***	***	***	***	***	***	***	***	***
United States	0	0	0	0	0	(2)	(2)	(2)	(2)
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
Korean dice (<1 Meg) cased in--									
Korea	***	***	***	***	***	***	***	***	***
United States	0	0	0	0	0	(2)	(2)	(2)	(2)
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
3rd-source dice cased in--									
Korea (≥1 Meg)	***	***	***	***	***	***	***	***	***
Korea (<1 Meg)	***	***	***	***	***	***	***	***	***
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
U.S. importers' imports from--									
Korea (Korean dice≥1 Meg):									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***

See footnotes at end of table.

Table E-3--Continued
Cased DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

Item	Reported data			Jan.-Sept.--		Period changes			
	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	Jan.-Sept 1991-92
U.S. importers' imports from--									
3rd sources (Korean dice≥1 Meg):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
Korea (Korean dice<1 Meg):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
3rd sources (Korean dice<1 Meg):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
Korea (3rd-source dice≥1 Meg):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
Korea (3rd-source dice<1 Meg):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
3rd sources (3rd-source dice):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
Korea (U.S. dice):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
3rd sources (U.S. dice):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
All sources:									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
U.S. producers'--									
Average capacity (1,000 units).....	166,583	169,945	162,937	127,276	118,191	-2.2	+2.0	-4.1	-7.1
Production (1,000 units)...	148,604	149,218	151,303	118,195	103,993	+1.8	+0.4	+1.4	-12.0
Capacity utilization[1].....	89.2	87.8	92.9	92.9	88.0	+3.7	-1.4	+5.1	-4.9
Production quantity.....	54,613	101,926	167,504	124,159	170,312	+206.7	+86.6	+64.3	+37.2

See footnotes at end of table.

Table E-3--Continued
Cased DRAMs: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

Item	Reported data			Jan.-Sept.--		Period changes			
	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	Jan.-Sept. 1991-92
U.S. producers'--									
U.S. shipments o U.S.-cased DRAMs, by dice-fabrication origin:									
Quantity:									
Korean dice	***	***	***	***	***	***	***	***	***
U.S. dice	***	***	***	***	***	***	***	***	***
3rd-source dice	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
Value:									
Korean dice	***	***	***	***	***	***	***	***	***
U.S. dice	***	***	***	***	***	***	***	***	***
3rd-source dice	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
Unit value:									
Korean dice	***	***	***	***	***	***	***	***	***
U.S. dice	***	***	***	***	***	***	***	***	***
3rd-source dice	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
Export shipments:									
Quantity	***	***	***	***	***	***	***	***	***
Exports/shipments[1]	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Inventory/shipments[1]	***	***	***	***	***	***	***	***	***
Production workers	1,727	1,636	1,676	1,520	1,389	-3.0	-5.3	+2.4	-8.6
Hours worked (1,000s)	3,671	3,522	3,485	3,006	2,702	-5.1	-4.1	-1.1	-10.1
Total comp. ($1,000)	50,851	49,233	49,944	42,354	41,160	-1.8	-3.2	+1.4	-2.8
Hourly total compensation	$13.85	$13.98	$14.33	$14.09	$15.23	+3.5	+0.9	+2.5	+8.1
Productivity (units/hour)	13.4	27.0	46.3	39.7	57.2	+246.6	+102.1	+71.4	+43.9
Unit labor costs	$1.04	$0.52	$0.31	$0.35	$0.27	-70.1	-50.1	-40.2	-24.9

[1] 'Reported data' are in percent and 'period changes' are in percentage-points.
[2] Not applicable.

Note.--The term '3rd source' refers to countries other than Korea and the United States. Period changes are derived from the unrounded data. Because of rounding, bit figures and shares may not add to the totals shown. Unit values and other ratios are calculated using data of firms supplying both numerator and denominator information. Part-year inventory ratios are annualized.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table E-4
Cased DRAMs≥1 Meg: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

Item	Reported data			Jan.-Sept.--		Period changes			
	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	Jan.-Sept. 1991-92
U.S. consumption quantity:									
Amount	187,373	351,647	597,182	419,096	720,378	+218.7	+87.7	+69.8	+71.9
Producers' share:[1]									
U.S. dice cased in--									
Korea	0	0	0	0	0	(2)	(2)	(2)	(2)
United States	***	***	***	***	***	***	***	***	***
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
3rd-source dice cased in United States	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
Importers' share:[1]									
Korean dice cased in--									
Korea	***	***	***	***	***	***	***	***	***
United States	0	0	0	0	0	(2)	(2)	(2)	(2)
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
3rd-source dice cased in--									
Korea	***	***	***	***	***	***	***	***	***
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
U.S. consumption value:									
Amount	1,995,253	1,934,552	2,322,531	1,693,718	2,106,553	+16.4	-3.0	+20.1	+24.4
Producers' share:[1]									
U.S. dice cased in--									
Korea	0	0	0	0	0	(2)	(2)	(2)	(2)
United States	***	***	***	***	***	***	***	***	***
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
3rd-source dice cased in United States	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
Importers' share:[1]									
Korean dice cased in--									
Korea	***	***	***	***	***	***	***	***	***
United States	0	0	0	0	0	(2)	(2)	(2)	(2)
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
3rd-source dice cased in--									
Korea	***	***	***	***	***	***	***	***	***
3rd sources	***	***	***	***	***	***	***	***	***
Subtotal	***	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***	***
U.S. importers' imports from--									
Korea (Korean dice):									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***
3rd sources (Korean dice):									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***
Korea (3rd-source dice):									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***
3rd sources (3rd-source dice):									
U.S. shipments quantity	***	***	***	***	***	***	***	***	***
U.S. shipments value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory qty	***	***	***	***	***	***	***	***	***

See footnotes at end of table.

Table E-4--Continued
Cased DRAMs≥1 Meg: Summary data concerning the U.S. market, 1989-91, January-September 1991, and January-September 1992

(Quantity=billion bits, except where noted, value=1,000 dollars, unit values and unit labor costs are per million bits, period changes=percent, except where noted)

Item	Reported data			Jan.-Sept.--		Period changes			
	1989	1990	1991	1991	1992	1989-91	1989-90	1990-91	Jan.-Sept. 1991-92
U.S. importers' imports from--									
Korea (U.S. dice):									
U.S. shipments quantity..	0	0	0	0	0	(2)	(2)	(2)	(2)
U.S. shipments value.....	0	0	0	0	0	(2)	(2)	(2)	(2)
Unit value.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Ending inventory qty.....	0	0	0	0	0	(2)	(2)	(2)	(2)
3rd sources (U.S. dice):									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory qty.....	***	***	***	***	***	***	***	***	***
All sources:									
U.S. shipments quantity..	***	***	***	***	***	***	***	***	***
U.S. shipments value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
U.S. producers'--									
Average capacity (1,000 units).....	***	***	***	***	***	***	***	***	***
Production (1,000 units)...	***	***	***	***	***	***	***	***	***
Capacity utilization[1].....	***	***	***	***	***	***	***	***	***
Production quantity.....	***	***	***	***	***	***	***	***	***
U.S. shipments of U.S.-cased DRAMs, by dice-fabrication origin:									
Quantity:									
Korean dice.....	***	***	***	***	***	***	***	***	***
U.S. dice.....	***	***	***	***	***	***	***	***	***
3rd-source dice.....	***	***	***	***	***	***	***	***	***
Total.....	***	***	***	***	***	***	***	***	***
Value:									
Korean dice.....	***	***	***	***	***	***	***	***	***
U.S. dice.....	***	***	***	***	***	***	***	***	***
3rd-source dice.....	***	***	***	***	***	***	***	***	***
Total.....	***	***	***	***	***	***	***	***	***
Unit value:									
Korean dice.....	***	***	***	***	***	***	***	***	***
U.S. dice.....	***	***	***	***	***	***	***	***	***
3rd-source dice.....	***	***	***	***	***	***	***	***	***
Total.....	***	***	***	***	***	***	***	***	***
Export shipments:									
Quantity.....	***	***	***	***	***	***	***	***	***
Exports/shipments[1].....	***	***	***	***	***	***	***	***	***
Value.....	***	***	***	***	***	***	***	***	***
Unit value.....	***	***	***	***	***	***	***	***	***
Ending inventory quantity..	***	***	***	***	***	***	***	***	***
Inventory/shipments[1].....	***	***	***	***	***	***	***	***	***
Production workers.....	***	***	***	***	***	***	***	***	***
Hours worked (1,000s).....	***	***	***	***	***	***	***	***	***
Total comp. ($1,000).....	***	***	***	***	***	***	***	***	***
Hourly total compensation..	***	***	***	***	***	***	***	***	***
Productivity (units/hour)..	***	***	***	***	***	***	***	***	***
Unit labor costs.....	***	***	***	***	***	***	***	***	***

[1] 'Reported data' are in percent and 'period changes' are in percentage-points.
[2] Not applicable.

Note.--The term '3rd source' refers to countries other than Korea and the United States. Period changes are derived from the unrounded data. Because of rounding, bit figures and shares may not add to the totals shown. Unit values and other ratios are calculated using data of firms supplying both numerator and denominator information. Part-year inventory ratios are annualized.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

APPENDIX F

UNIT PRODUCTION COSTS AND SOURCES

* * * * * * *

APPENDIX G

COMMENTS RECEIVED FROM U.S. PRODUCERS ON THE IMPACT OF IMPORTS OF 1 MEG AND ABOVE DRAMS FROM KOREA ON THEIR GROWTH, INVESTMENT, ABILITY TO RAISE CAPITAL, AND/OR EXISTING DEVELOPMENT AND PRODUCTION EFFORTS

The Commission requested U.S. producers to describe any actual or anticipated negative effects of imports of 1 Meg and above DRAMs from Korea on their growth, investment, ability to raise capital, or existing development and production efforts, including efforts to develop a derivative or more advanced version of the product.

* * * * * * *

The remaining responses were as follows:

Actual Negative Effects

* * * * * * *

Anticipated Negative Effects

* * * * * * *

Influence of Imports on Capital Investment

* * * * * * *

APPENDIX H

CONTRACT PRICES FOR SALES TO ORIGINAL EQUIPMENT MANUFACTURERS

Table H-1
U.S. and Korean DRAMs: Weighted-average contract prices, total quantities, and margins of under/(over)selling for sales of products 1 and 2 to OEMs, by quarters, January 1990-September 1992

Period	Product 1		Product 2				
	United States		United States		Korea[1]		
	Price	Quantity	Price	Quantity	Price	Quantity	Margin
	Per unit	Units	Per unit	Units	Per unit	Units	(Percent)
1990:							
Jan.-Mar....							
Apr.-June...							
July-Sept...							
Oct.-Dec....							
1991:							
Jan.-Mar....	*	*	*	*	*	*	*
Apr.-June...							
July-Sept...							
Oct.-Dec....							
1992:							
Jan.-Mar....							
Apr.-June...							
July-Sept...							

[1] ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table H-2
U.S. and Korean DRAMs: Weighted-average contract prices, total quantities, and margins of under/(over)selling for sales of products 3, 4, and 6 to OEMs, by quarters, January 1990-September 1992

Period	Product 3		Product 4		Product 6				
	United States		United States		United States		Korea[1]		
	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Margin
	Per unit	Units	Per unit	Units	Per unit	Units	Per unit	Units	Percent
1990:									
Jan.-Mar....									
April-June..									
July-Sept...									
Oct.-Dec....									
1991:									
Jan.-Mar....	*	*	*	*	*	*	*		
April-June..									
July-Sept...									
Oct.-Dec....									
1992:									
Jan.-Mar....									
April-June..									
July-Sept...									

[1] ***.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

APPENDIX J

PURCHASE PRICE DATA

Table J-1
DRAMs: Weighted-average net f.o.b. purchase prices, total quantities, and margins of under/(over)selling of U.S.-produced and Korean products 1 and 2 purchased by OEMs, by months, January 1991-September 1992[1]

Period	Product 1					Product 2				
	United States		Korea			United States		Korea		
	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Margin Percent	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Margin Percent
	*	*	*	*	*	*	*			

[1] Product 1 is a 1 Meg by 1, 70ns 1 Meg DRAM and product 2 is a 1 Meg by 1, 80ns 1 Meg DRAM.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table J-2
DRAMs: Weighted-average net f.o.b. purchase prices, total quantities, and margins of under/(over)selling of U.S.-produced and Korean products 3 and 4 purchased by OEMs, by months, January 1991-September 1992[1]

Period	Product 3					Product 4				
	United States		Korea			United States		Korea		
	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Margin Percent	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Margin Percent
	*	*	*	*	*	*	*			

[1] Product 3 is a 4 Meg by 1, 80ns 4 Meg DRAM and product 4 is a 1 Meg by 4, 80ns 4 Meg DRAM.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table J-3
DRAMs: Weighted-average net f.o.b. purchase prices, total quantities, and margins of under/(over)selling of U.S.-produced and Korean products 1 and 2 purchased by franchise distributors, by months, January 1991-September 1992[1]

Period	Product 1					Product 2				
	United States		Korea			United States		Korea		
	Price	Quantity	Price	Quantity	Margin	Price	Quantity	Price	Quantity	Margin
	Per unit	Units	Per unit	Units	Percent	Per unit	Units	Per unit	Units	Percent
			*	*	*	*	*	*	*	

[1] Product 1 is a 1 Meg by 1, 70ns 1 Meg DRAM and product 2 is a 1 Meg by 1, 80ns 1 Meg DRAM.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table J-4
DRAMs: Weighted-average net f.o.b. purchase prices, total quantities, and margins of under/(over)selling of U.S.-produced and Korean products 3 and 4 purchased by franchise distributors, by months, January 1991-September 1992[1]

Period	Product 3					Product 4				
	United States		Korea			United States		Korea		
	Price	Quantity	Price	Quantity	Margin	Price	Quantity	Price	Quantity	Margin
	Per unit	Units	Per unit	Units	Percent	Per unit	Units	Per unit	Units	Percent
			*	*	*	*	*	*	*	

[1] Product 3 is a 4 Meg by 1, 80ns 4 Meg DRAM and product 4 is a 1 Meg by 4, 80ns 4 Meg DRAM.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table J-5
DRAMs: Weighted-average net f.o.b. purchase prices, total quantities, and margins of under/(over)selling of U.S.-produced and Korean products 1 and 2 purchased by value-added resellers, by months, January 1991-September 1992[1]

Period	Product 1					Product 2				
	United States		Korea			United States		Korea		
	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Margin Percent	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Margin Percent
	*	*	*	*	*	*	*			

[1] Product 1 is a 1 Meg by 1, 70ns 1 Meg DRAM and product 2 is a 1 Meg by 1, 80ns 1 Meg DRAM.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table J-6
DRAMs: Weighted-average net f.o.b. purchase prices, total quantities, and margins of under/(over)selling of U.S.-produced and Korean products 3 and 4 purchased by value-added resellers, by months, January 1991-September 1992[1]

Period	Product 3					Product 4				
	United States		Korea			United States		Korea		
	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Margin Percent	Price Per unit	Quantity Units	Price Per unit	Quantity Units	Margin Percent
	*	*	*	*	*	*	*			

[1] Product 3 is a 4 Meg by 1, 80ns 4 Meg DRAM and product 4 is a 1 Meg by 4, 80ns 4 Meg DRAM.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table J-7
DRAMs: Weighted-average net f.o.b. purchase prices, total quantities, and margins of under/(over)selling of U.S.-produced and Korean products 1, 2, and 3 purchased by brokers/independent distributors, by months, January 1991-September 1992[1]

Period	Product 1					Product 2					Product 3				
	United States		Korea			United States		Korea			Unites States		Korea		
	Price	Quantity	Price	Quantity	Margin	Price	Quantity	Price	Quantity	Margin	Price	Quantity	Price	Quantity	Margin
	Per unit	Units	Per unit	Units	Percent	Per unit	Units	Per unit	Units	Percent	Per unit	Units	Per unit	Units	Percent
	*	*	*	*	*	*	*	*	*	*					

[1] Product 1 is a 1 Meg by 1, 70ns 1 Meg DRAM, product 2 is a 1 Meg by 1, 80ns 1 Meg DRAM, and product 3 is a 4 Meg by 1, 80ns 4 Meg DRAM.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.