ER 85-4938

Office of Legislative Liaison

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TO:		ACTION	INFO
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2.	DD/OLL		X
3.	Admin Officer		
4.	Liaison		
5.	Legislation		X
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	SUSPENSE		

Date

Action Officer:

Remarks:

8 Dec 87

Name/Date

STAT

EXECUTIVE SECRETARIAT

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	15	D/PERS				
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	17	D/OGI/DI		X		
	18	NIO/Econ		X		
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Remarks

To 12: Please have appropriate response prepared.

STAT

Executive Secretary

17 Dec 85

Date

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OMB

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

EXECUTIVE REGISTRY
85-4938

DEC 13 1985

MEMORANDUM FOR: DISTRIBUTION

FROM: Alton G. Keel, Jr.
Associate Director for
National Security and
International Affairs

SUBJECT: Impact of Offsets in Defense-Related Exports

Section 309 of the Defense Production Act (DPA) Amendments of 1984 mandates an annual report on the impact of offsets in defense-related exports on various aspects of the U.S. economy. The Office of Management and Budget (OMB), through a staff level interagency committee, has been coordinating the preparation of the first report that was due in mid-October, 1985. Executive Order 12521 sets forth the responsibilities of the various departments and agencies.

As you may know, there was a significant delay in transferring data collected from industry for this report from the International Trade Commission (ITC). As a result, the decision was made to delay submission of the report beyond the statutory date by approximately two months. The interagency committee has now completed the penultimate draft of the first report. This version includes an executive summary, which should be of special interest to senior reviewers.

Concerning legislative strategy for fiscal year 1987, OMB believes that the Administration position should be that Section 309 of the DPA Amendments should not be reenacted with the rest of the DPA. The argument would be that the present report demonstrates that offsets are not a significant problem and therefore future reports would be of little value. Such a position would obviate the need to collect data from industry during calendar year 1986. If Congress is determined to continue the reporting requirement next fall, a new data collection effort would be impractical in time for the second annual report.

The purpose of this memorandum is to secure policy level views on the committee product that is attached and the 1986 legislative strategy described above. Written comments must reach OMB by COB on December 20, 1985, as the report will be sent to the Congress during the following week.

Attachments

DISTRIBUTION

Interagency Comment/Clearance

Honorable Kenneth L. Adelman
Director, Arms Control and
Disarmament Agency

Honorable Julius W. Becton
Director, Federal Emergency
Management Agency

Honorable William Casey
Director, Central Intelligence
Agency

Honorable Fred C. Ikle
Under Secretary of Defense for
Policy

Honorable Thomas Moore
Member, Council of Economic
Advisers

Honorable David C. Mulford
Assistant Secretary of Treasury
for International Affairs

Honorable John M. Poindexter
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Under Secretary of State for
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Honorable Bruce Smart
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Policy

Wendy L. Gramm
Administrator for Information and
Regulatory Affairs

Bryce L. Harlow
Associate Director for Legislative
Affairs

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DEC 11 1985

Honorable Thomas P. O'Neill, Jr.
Speaker of the House of Representatives
Washington, D.C. 20515

Dear Mr. Speaker:

I am pleased to submit the first annual report on the impact of offsets in defense-related exports as required by Section 309 of the Defense Production Act Amendments of 1984. It consists of assessments of the impact of offsets in defense-related exports on the defense preparedness, industrial competitiveness, employment, and international trade position of the United States and provides other information as required by the statute.

This report was prepared by an interagency committee. As anticipated by the Conference Report accompanying the bill, the Office of Management and Budget (OMB) coordinated the work of this group. The President delegated the reporting responsibility under this section to the Director, Office of Management and Budget in Executive Order 12521.

This report is based, in part, on data submitted by 139 United States companies whose cooperation is greatly appreciated. The International Trade Commission collected this information on behalf of the interagency committee. The core assessments are primarily the work of the Departments of Defense, Commerce, and Labor, as shown in the Table of Contents. These departments and nine other Executive Branch agencies collaborated on the remainder of the text.

Sincerely yours,

James C. Miller III
Director

Enclosure

IDENTICAL LETTER SENT TO PRESIDENT OF THE SENATE

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DEC 1 1 1985

IMPACT OF OFFSETS IN DEFENSE-RELATED EXPORTS

December 1985

This report is published pursuant to Section 309 of the Defense Production Act Amendments of 1984 (P.L. 98-265). Inquiries and requests for additional copies should be addressed to Mr. Antonio Chavez of the Office of Management and Budget at (202)395-3664. Copies of the questionnaire used for the survey are also available upon request. Questions about sections of Part II may also be directed to the appropriate Department as listed in the Table of Contents.

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Executive Summary

This report on the impact of offsets in defense-related exports was prepared in response to the requirement in Section 309 of the Defense Production Act Amendments of 1984 (P.L. 98-265). Section 309 states:

> "Not later than 18 months after the date of the enactment of the Defense Production Act Amendments of 1984, and annually thereafter, the President shall submit . . . a report on the impact of offsets on the defense preparedness, industrial competitiveness, employment, and trade of the United States. Such report also shall include a discussion of bilateral and multilateral negotiations on offsets in international procurement and provide information on the types, terms, and magnitude of the offsets."

The effort to prepare an appropriate response to Section 309 began almost immediately after the DPA Amendments of 1984 were approved. After discussions within the Interagency Group on International Economic Policy, a separate staff level committee, chaired by OMB, was formed. This approach was anticipated by the Conference Report:

> "Since there is no clear lead agency in the Executive Branch on the subject of offsets, it is anticipated that the Office of Management and Budget will coordinate the efforts of the Executive Branch . . . in producing such reports."

Members of the working group represent the Departments of State, Treasury, Defense, Commerce, and Labor; the Federal Emergency Management Agency (FEMA); the Arms Control and Disarmament Agency (ACDA); the Central Intelligence Agency (CIA); the United States Trade Representative (USTR); and the National Security Council (NSC) staff. They meet under the unofficial title of Coordinating Committee on DPA 309 Reports. The Council of Economic Advisers (CEA) assisted by reviewing the draft report.

The following definition of offsets was adopted for this report.

> "Offsets include a range of industrial and commercial compensation practices required as a condition of purchase of military-related exports (i.e., either Foreign Military Sales (FMS) or commercial sales of defense articles and defense services, as defined by the Arms Export Control Act (AECA) and the International Traffic in Arms Regulations (ITAR)."

The various types of offsets are: coproduction, licensed production, subcontractor production, overseas investment, technology transfer, and countertrade (which includes barter, counter-purchase, or buy-back). Offsets in defense-related exports are frequently divided into direct and indirect classes. Direct offsets are contractual arrangements that involve goods and services

addressed in the sales agreement for military exports. Included among direct offsets are coproduction, licensed production, subcontractor production, overseas investment, and technology transfer. Indirect offsets are contractual arrangements that involve goods and services unrelated to the exports referenced in the sales agreement. Some forms of foreign investment, technology transfer, and countertrade are included among indirect offsets.

A database for this report was developed from responses to a questionnaire sent to U.S. industry. The list of questions, which was developed by the Coordinating Committee on DPA 309 Reports after extensive consultation with industry groups and formal public comment, was sent to 212 U.S. corporate entities including subsidiaries and subcontractors. The database covers five calendar years 1980-1984, and consists of four major elements: narrative responses to selected questions, sales information concerning the respondents, information on sales with offset obligations of over $2 million, and summary information on offsets of $2 million or less. For those offset obligations greater than $2 million, the database includes a breakdown of offset contracts executed during the reporting period.

The database reveals some interesting facts about the types, terms, and magnitude of offsets. For the defense-related exports covered by this database, offsets totalled $12 billion and sales totalled $22 billion. In the period 1980-1984, about $2.4 billion, or about 20 percent, of the offset obligations were implemented. Nearly 90 percent of the respondents to the survey stated that offsets were a necessary condition for the sale. Most of the offset obligations occurred in three product areas, namely aircraft, engines, and electronics. Most of the sales and related offset obligations were with either NATO countries or other countries with whom the U.S. has special defense security arrangements. Finally, the overall magnitude of offset obligations does not appear large in the context of either total exports by the companies reporting or in the context of the value of total military production by these companies.

Some U.S. foreign policy goals are traditionally pursued through arms transfer policy. Offsets can affect the nature of the arms transfer tool. Foreign policy objectives which are traditionally pursued with arms transfers include:

- o deterring aggression by enhancing the preparedness of allies and friends;
- o increasing the ability of the U.S. to project power;
- o supporting interoperability with the forces of friends and allies;
- o enhancing U.S. defense production capacity and efficiency; and
- o strengthening collective security arrangements.

The U.S. Government does not normally enter directly into offset agreements, and consequently there is little immediate effect of offsets on Government procurement.

World macroeconomic conditions make it difficult to isolate and measure the precise impacts of offsets on U.S. trade, employment, competitiveness, and defense preparedness. The size of defense-related offsets relative to the U.S. economy and relative to various sectors of the economy must be taken into consideration in any analysis of offsets. In this regard, the importance of defense-related offsets depends upon the frame of reference. The average annual value of defense-related offset obligations between 1980 and 1984 ($2.4 billion) is trivial relative to U.S. GNP ($3,125 billion), total U.S. exports ($217 billion), or exports of manufactured goods ($143 billion).

The workings of the international arms trade market are governed more by the objectives and policies of purchasing and selling governments than by traditionally defined market influences. This unique situation highlights the difficulties associated with trying to analyze international arms trade from a traditional "market economics" orientation. For this reason, the international arms market may be more accurately characterized as an arena of managed trade, than as a true market in which economic influences are the primary determinants of the terms a seller must offer to remain competitive.

Part II of this report consists of assessments of the effects of offsets in defense-related exports on the defense preparedness, industrial competitiveness, employment, and international trade position of the United States. These assessments are based in part on data collected from U.S. corporations concerning offset obligations incurred during the period 1980 through 1984. The general findings of these assessments are:

- Defense-related industries are characterized by a small number of government buyers who exert a disproportionate influence on the institutionalized market for defense products. Due to the "buyers'-market" situation, producers may have no choice but to accept the offsets requirements when demanded in order to obtain sales contracts. Consequently, policy alternatives typically used for industries that are closer to perfect competition may not be applicable to this case.

- Government-mandated offsets may introduce inefficiencies since the most efficient producer may not be the one to win a given contract. Rather, the producer who offers the best offset package may win the foreign business, despite the producer's efficiency or the appropriateness of its weapon system.

- Inefficiencies caused by offsets may also be passed to producer levels below prime contractors (i.e., to subcontractors) and could result in a multiplied effect.

- Offsets apply two opposing forces to short-run production costs (and hence weapon systems prices): (1) costs may be lowered by the increased size of production runs due to increased sales (assuming economies of scale exist); and (2) costs may be increased due to the expenses of countertrade commodity liquidation, foreign research and development investments, and higher foreign subcontracting prices.

- Long-run production costs are faced with opposing forces: (1) costs may be lowered by an increased number of producers both here and abroad (particularly in the case of rationalization, standardization, and interoperability (RSI) goals among NATO members); and (2) costs may increase if the amount and complexity of offsets demanded by purchasing nations increase over time.

- Offsets can be an effective foreign policy tool for both producing and purchasing nations. Consequently, the topic is both economically and politically sensitive.

The specific findings resulting from the four assessments are:

Concerning the impact of offsets on U.S. defense preparedness:

- In a majority of circumstances, offsets had either positive or no impact on the productivity of defense-related industries.

- Insofar as capacity utilization rates affect investment decisions, offsets appear to have had very little impact.

- Available evidence suggests that the profitability, and hence the strength, of defense-related industries has not been damaged by offsets.

- Available evidence suggests that no serious capacity problems are present. Surge difficulties that do exist can be traced to a number of causes, but generally not to offsets.

- Evaluation of the impact of offsets on subcontractors is difficult because data regarding both the negative effects (business lost due to offsets) and the positive effects (business which would have been lost had the offset not been offered to close the deal) are generally not known to the subcontractors.

Concerning the impact of offsets on U.S. industrial competitiveness:

- American defense base industries are often obligated to offer offsets in order to participate in and remain competitive in the international marketplace.

- Offsets are a factor in the competition for international defense sales, and are being used by foreign purchasing governments as a trade management tool for the purposes of preservation of foreign exchange, the targeted development of selected industrial sectors, and the enhancement of the capability of domestic industries through technology transfer.

- Offsets are increasing foreign competition, particularly at the subcontractor level. However, without offsets, U.S. industry faces the prospect of losing business.

- While offset-related sales of defense systems contribute to the marginal income of defense firms, the health of the industry depends primarily upon U.S. Government purchases.

Concerning the impact of offsets on U.S. employment:

- The employment effects of the sales exceed by far the adverse effects of offsets. Even when one considers the upper-bound estimates, the study finds that the positive effects of sales exceed the adverse effects of offsets by about 62,000 job opportunities.

- The effects of both sales and offsets are felt principally in the aerospace and avionics industries, industries that are fairly healthy by most standards.

- The above-named industries aside, the effects of offsets while widespread are small relative to total employment in any individual industry. This conclusion holds notwithstanding the fact that the study included under adverse effects offset arrangements that cannot realistically reduce domestic production and employment.

Concerning the impact of offsets on the U.S. trade position:

- The effects of military trade on the U.S. economy as a whole are likely to be close to zero, because any imbalances in such trade are likely to be counterbalanced by capital flows that effect both interest rates and exchange rates, thereby generating changes in domestic production and flows of goods and services.

- Under partial equilibrium analysis, the effect of sales and offsets is a net positive effect on the U.S. trade position in each of the five years covered by the DPA 309 survey.

- Under general equilibrium analysis, the U.S. trade balance is unaffected by defense-related offsets.

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DEC 11 1985

I. INTRODUCTION TO THE REPORT

Part I consists of a brief review of the legislation and a description of the Executive Branch process leading to this report, a list of definitions, a short history of the phenomenon and the Government's interest in it, an explanation of current United States policy, and a discussion of the foreign policy context and economic setting surrounding the issue. These sections provide the background for the analyses and other data required by the statute and the Conference Report accompanying the bill presented in Parts II and III.

A. The Legislation

Section 309 of the Defense Production Act (DPA) Amendments of 1984 (P.L. 98-265) approved April 17, 1984, reads:

> "Not later than 18 months after the date of the enactment of the Defense Production Act Amendments of 1984, and annually thereafter, the President shall submit ... a report on the impact of offsets on the defense preparedness, industrial competitiveness, employment, and trade of the United States. Such report also shall include a discussion of bilateral and multilateral negotiations on offsets in international procurement and provide information on the types, terms, and magnitude of the offsets."

The Conference Report on the DPA Amendments of 1984 (House Report 98-651) dated April 5, 1984, adds an additional requirement:

> "The conferees intend that information provided on the types, terms, and magnitude of the offsets in each report shall include the number of relevant offset agreements required by contracts, the total dollar amount of value of offsets required by such contracts, a breakdown of offsets by category of defense material or defense services involved in such contracts, and a breakdown of such offsets by recipient countries.
>
> "In addition, each report shall contain a summary of relevant Memoranda of Understanding between the United States and foreign countries which provide the official framework within which foreign offset commitments incurred in private sales can be fulfilled. Copies of actual Memoranda of Understanding involving such offsets shall be made available to the House and Senate Banking Committees upon request, after each report has been submitted by the President."

Since Section 309 was approved on April 17, 1984, two hearings have been conducted by the Subcommittee on Economic Stabilization of the House Committee on Banking, Finance, and Urban Affairs. The first, on May 22, 1984, included testimony by officials from the Office of the U.S. Trade Representative (USTR), the Department of Treasury, and the Department of Commerce. A second hearing on July 24, 1985, involved witnesses from the Departments of Defense and Commerce and the private sector. In addition, the Subcommittee on Oversight and Investigations of the House Committee on Energy and Commerce conducted a hearing on October 10, 1985, on offsets associated with foreign aircraft sales which included testimony by the International Trade Commission (ITC), the General Accounting Office (GAO), and the Departments of Commerce, Labor, and Defense.

B. Executive Branch Process

The effort to prepare an appropriate response to Section 309 began almost immediately after the DPA Amendments of 1984 were approved. After discussions within the Interagency Group on International Economic Policy, a separate staff level committee, chaired by OMB, was formed. This approach was anticipated by the Conference Report:

> "Since there is no clear lead agency in the Executive Branch on the subject of offsets, it is anticipated that the Office of Management and Budget will coordinate the efforts of the Executive Branch .... in producing such reports."

Members of the working group represent the Departments of State, Treasury, Defense, Commerce, and Labor, the Federal Emergency Management Agency (FEMA), the Arms Control and Disarmament Agency (ACDA), the Central Intelligence Agency (CIA), the USTR, and the National Security Council (NSC) staffs. They meet under the unofficial title of Coordinating Committee on DPA 309 Reports.

In addition to designing the report format and assigning writing responsibilities, the Coordinating Committee decided that a mandatory survey of U.S. corporations was necessary for the development of a database on offsets in defense-related exports. Consequently, the Coordinating Committee developed the data collection instrument, arranged for the questionnaire to be sent to industry by the ITC, and devised a scheme for processing the data that was sensitive to the business confidentiality of this information. The Coordinating Committee also undertook extensive discussions with individuals and groups representing the:

- o Aerospace Industries Association (AIA).
- o American League for Exports and Security Assistance (ALESA).
- o Defense Industry Offset Association (DIOA).

- o Defense Policy Advisory Committee on Trade (DPACT).
- o Department of Commerce Industry Sector Advisory Committee on Aerospace (ISAC #1).
- o Steering Committee of the Labor Advisory Committee for Trade Negotiations and Trade Policy (LSAC).
- o Electronics Industry Association (EIA).

In addition, two status report briefings were given to the staff of the House Subcommittee that initiated the legislation. As a group, the Coordinating Committee did not participate in the negotiations with other governments on the subject of offsets, which are summarized in Part III of this report. However, some committee members were involved in these discussions as representatives of their departments and agencies.

After operating informally for over a year, relationships among the various agencies were formalized by Executive Order 12521 of June 24, 1985:

> "The functions conferred upon the President by Section 309 of the Defense Production Act, as amended, with respect to the preparation and submission of reports to Congress concerning offsets shall be performed by the Director of the Office of Management and Budget (OMB). The Director may further delegate to the heads of executive departments and agencies responsibility for preparing and submitting for his review particular sections of such reports. The heads of executive departments and agencies shall, to the extent provided by law, provide the Director with such information as may be necessary for the effective performance of these functions."

Since the ITC was conducting a study very similar in terms of data requirements to the DPA 309 report, the decision was made in November 1984 to combine the data collection efforts in the interest of reducing the Government's demands on the private sector. In accordance with this agreement, the ITC was designated as the "central collection agency" for offset data by OMB's Office of Information and Regulatory Affairs, using its authority under the Paperwork Reduction Act. This assignment was reiterated in Executive Order 12521:

> "In order to ensure that information gathered pursuant to this authority shall be subject to appropriate confidentiality protections, the International Trade Commission, which previously has been designated a "central collection agency" in gathering this information under 44 U.S.C. 3509, is authorized, pursuant to Section 705 of the Defense Production Act, as amended, to collect the information required for compilation of the database to be used in the preparation of the first such report to Congress."

Notice of a proposed combined questionnaire was published in the Federal Register on December 4, 1984. After taking into account extensive comments by industry groups, a final questionnaire was mailed to U.S. companies on February 11, 1985, with responses due by the end of March. On April 12, 1985, OMB provided ITC with a computer format for tabulating the data for transmission to OMB. The purpose was to develop a database for use by those members of the Coordinating Committee charged with producing sections of this report.

At this juncture, a dispute developed as to the type of data ITC was to furnish OMB under the November arrangement. After lengthy negotiations, this issue was resolved after a formal demand was sent to the ITC on June 13, 1985. Consequently, on July 22, 1985, the ITC forwarded the agreed elements of the database in the specified format.

On October 3, 1985, the decision was made to delay submission of this first report beyond the statutory date. This action resulted primarily from the time lapse between receipt of the data from industry and its release by the ITC. Most of the analysis and writing for this report was accomplished in August-November, 1985. During December, the draft of this first report was reviewed and approved by senior Administration officials. The Coordinating Committee will be meeting soon to develop an approach to the next annual report which is due in October 1986.

C. Definitions

Since the offset phenomenon is a relatively new subject, there has been little research or literature and no agreed definitions on the topic. This difficulty was clearly outlined by Stephanie G. Neuman of Columbia University in an essay sponsored by ACDA which appeared in 1985 edition of World Military Expenditures and Arms Transfers.

> "Essentially, offsets in arms trade are arrangements which use some method of reducing the amount of currency needed to buy a military item or some means of creating revenue to help pay for it. ...Offsets often involve a reverse trade flow, under which the buyer's cost for a military purchase is at least partially compensated by the seller's acceptance of the buyer's products in return. The literature on such trade arrangements uses 'offset,' 'barter,' 'buy-back,' 'counterpurchase,' 'countertrade,' and 'compensation,' among other terms, often interchangeably, to the confusion and consternation of those who wish to understand the process."

In consultation with industry, the following definitions were developed for this report:

- Offsets -- A range of industrial and commercial compensation practices required as a condition of purchase of military related exports, i.e., either Foreign Military Sales (FMS) or commercial sales of defense articles and defense services, as defined by the Arms Export Control Act (AECA) and the International Traffic in Arms Regulations (ITAR). The various types of offsets are defined as follows:

- Coproduction -- Overseas production based upon government-to-government agreement that permits a foreign government or producers to acquire the technical information to manufacture all or part of a U.S.-origin defense article. It includes government-to-government licensed production. It excludes licensed production based upon direct commercial arrangements by U.S. manufacturers.

- Licensed production -- Overseas production of a U.S.-origin defense article based upon transfer of technical information under direct commercial arrangements between a U.S. manufacturer and a foreign government or producer.

- Subcontractor production -- Overseas production of a part or component of a U.S.-origin defense article. The subcontract does not necessarily involve license of technical information and is usually a direct commercial arrangement between the U.S. manufacturer and a foreign producer.

- Overseas investment -- Investment arising from the offset agreement, taking the form of capital invested to establish or expand a subsidiary or joint venture in the foreign country.

- Technology transfer -- Transfer of technology that occurs as a result of an offset agreement and that may take the form of: research and development conducted abroad; technical assistance provided to the subsidiary or joint venture of overseas investment; or other activities under direct commercial arrangement between the U.S. manufacturer and a foreign entity.

- Countertrade -- In addition to the types of offsets defined above, various types of commercial countertrade arrangements may be required. A contract may include one or more of the following mechanisms:

  -- Barter -- A one-time transaction only, bound under a single contract that specifies the exchange of selected goods or services for another of equivalent value.

  -- Counter-purchase -- An agreement by the initial exporter to buy (or to find a buyer for) a specific value of goods (often stated as a percentage of the value of the original export) from the original importer during a specified time period.

  -- Compensation (or buy-back) -- An agreement by the original exporter to accept as full or partial repayment products derived from the original exported product.

Countertrade may also arise, indirectly, through other mechanisms such as blocked currency, which is a foreign government action that prohibits hard currency payments to foreign companies.

Offsets in defense-related exports are frequently divided into direct and indirect classes.

- o Direct offsets -- Contractual arrangements that involve goods and services addressed in the sales agreement for military exports. Included among direct offsets are coproduction, licensed production, subcontractor production, overseas investment, and technology transfer.

- o Indirect offsets -- Contractual arrangements that involve goods and services unrelated to the exports referenced in the sales agreement. Some forms of foreign investment, technology transfer, and countertrade are included among indirect offsets.

D. A Short History

Although the concepts which underlie offset agreements are as old as barter itself, actual production of U.S. weapon systems in foreign countries began in Europe and Japan in the 1950's. Coproduction of U.S. equipment began with the T-33 aircraft in Japan in the 1950's and the F-86 aircraft later in that decade. In the years that followed, an increasing number of significant coproduction programs were undertaken within the North Atlantic Treaty Organization (NATO) as well as with Japan, Korea, and Taiwan. The largest program, the purchase of the F-16 by Norway, Denmark, Belgium, and the Netherlands for $2.8 billion (in 1975 dollars), involved these countries in the production of 10 percent of the value of the initial U.S. Air Force purchase of 650 aircraft, 15 percent of the value of all third country F-16 purchases from the United States, and 40 percent of the value of their own purchases from the U.S. Buyers were guaranteed that these offsets would total a minimum offset level of 58 percent of their initial purchase, and the U.S. Government was committed to seek a 100 percent offset by using third country sales of aircraft and other offset work of comparable technology.

These sales benefitted both the United States and the purchasing nations through increased exports of U.S. systems, enhanced standardization, second-source establishment, modernization of allied forces, and strengthened U.S. ties to the buyer countries. The net effects of offsets were less clear; to the extent that they helped promote the sale of U.S. systems in competition with foreign weapons, they may have had a positive impact. But early offset arrangements uncovered some drawbacks, such as the difficulty purchasing nations faced in establishing and maintaining efficient production lines for coproduction contracts. Weapon systems were often tailored to U.S. operational requirements and perhaps biased toward the use of domestic technology.

Such drawbacks led the European nations to require other types of offsets from the United States in addition to the coproduction of systems as compensation for the economic problems associated with weapon procurement. Research and development investment, technology transfer, foreign subcontracting, and indirect offsets were alternative methods of obtaining these additional offsets. More recently, codevelopment projects have allowed European nations and the United States to define system requirements jointly and perform system engineering while arranging for production in both the U.S. and Europe.

In 1975, the U.S. and Swiss governments signed a Memorandum of Understanding (MOU) guaranteeing 30 percent combined government and industry offsets on Switzerland's purchase of 72 F-5 aircraft for $400 million. Due to a Swiss decision to limit participation in large-scale coproduction of the F-5, additional offsets beyond coproduction were demanded. Strong pressure to fulfill the goals of this program by the Swiss and difficulties experienced by the U.S. Government in administering the project led to the most important U.S. policy decision on offsets in defense-related exports. The Department of Defense (DOD) decided not to obligate the U.S. Government to satisfy offset commitments or those for compensatory coproduction following the Swiss F-5 deal.

Since 1978, the responsibility for negotiating and satisfying offset commitments has rested solely on the commercial firms making the sales. Military sales agreements negotiated in the last ten years have typically served U.S. security interests. However, the number of offset obligations agreed to during this period has become a cause of concern. Recently, the form of weapon procurement agreements has changed as programs involving varying degrees of European participation with the U.S. in weapon systems development have been started and the use of licensed production and codevelopment has increased.

In 1982, the AIA and the EIA, at the suggestion of the Treasury Department staff, conducted a survey of their members' experiences in dealing with offset requirements. The results, published in May 1983, showed that for the period 1975 to June 30, 1981, 143 contracts involving offset commitments were reported. The total value of the contracts was $15.2 billion, and the total value of associated offset commitments was $9.55 billion. The greatest percentage of both totals represented sales of military aircraft. The largest recipient was Canada. The average period for implementation of offset commitments was seven and one-half years.

That survey, which was similar in purpose to the present report, was useful in suggesting a rough magnitude for offset commitments, the sectors and countries in which offsets were most frequently required, the relative frequency of use of the various forms of offsets, the role of the U.S. Government in offset transactions, and some industry views. It was, however, a small sample survey to which response was entirely voluntary. It did not request dates on which offset commitments were made, which might have permitted some conclusions about trends. Nor did it include questions dealing with the effects of offsets on

employment, subcontractors, or technology flows, since it was felt such issues would be too difficult to address in a voluntary survey and would have discouraged response.

Three other Government reports played a major role in raising the degree of consciousness about the subject of offsets in defense-related exports. These are an Analysis of Recent Trends in U.S. Countertrade (Report on Investigation No. 332-125), published in March 1982 by the ITC; the Report of the Department of Defense Task Group on International Coproduction/Industrial Participation Agreements, published in August 1983; and GAO Report NSIAD-84-102 of April 13, 1984, entitled Trade Offsets in Foreign Military Sales.

On October 25, 1985, the ITC released Assessment of the Effects of Barter and Countertrade Transactions on U.S. Industries (Report on Investigation No. 332-185) which was prepared in part from responses to the same questionnaire sent to industry in connection with this report. The ITC report, which covers a broader range of activities and uses a different set of definitions from this analysis, was produced in response to the ITC's own motion of June 11, 1984. There are some minor differences in interpretation of the defense-related offset data between the ITC paper and this report which are discussed in Part III.

E. United States Policy

The most important statement of U.S. policy on offsets in defense-related exports is a memorandum from then Deputy Secretary of Defense Charles Duncan on May 4, 1978. This memorandum noted the increased frequency of offset arrangements, designated management responsibility for evaluating and monitoring such agreements within the Department of Defense, and established the following basic "...policy with respect to compensatory coproduction and offset agreements with other nations....":

> "Because of the inherent difficulties in negotiating and implementing compensatory coproduction and offset agreements and the economic inefficiencies they often entail, DOD shall not normally enter into such agreements. An exception will be made only when there is no feasible alternative to ensure the successful completion of transactions considered to be of significant importance to United States national security interests (e.g., rationalization of mutual defense arrangements)."

The same document specifies that when compensatory agreements are necessary, they should:

- o be as broad as possible to obtain maximum credit for U.S. purchases of defense goods and services.
- o avoid offset targets whether stated in percentage or money terms.

- o be used to reduce administrative barriers to defense trade by all parties.
- o encourage equal competition between U.S. and foreign firms concerning bidding on contracts.
- o specify that the burden of fulfilling any commitment rests with the U.S. firms directly benefiting from the sale.

Section 42(b) of the AECA prescribes that appropriated funds may not be used to finance coproduction or licensed production of any defense article of U.S. origin outside the United States unless the Secretary of State notifies the Congress in advance of the effects of the proposed transaction on employment and production within the United States. The Defense Security Assistance Agency (DSAA) has established additional guidelines concerning the use of appropriated funds in connection with offset agreements. A significant portion of any item which is sold through a Foreign Military Sales (FMS) credit (loan or grant) program must be of U.S. origin unless otherwise approved by DSAA on the basis of carefully prescribed circumstances.

The most recent iteration of the Guidelines for FMS Loan Financing of Direct Commercial Contracts, issued on October 9, 1985, contains the following with respect to offsets:

> "Loan financing is discouraged for purchases containing offset provisions as a condition for securing the purchase. Offset provisions are agreements by the seller to make investments or procurements in a country other than the U.S., either concurrent with or subsequent to the purchase for which financing is being requested. No FMS loan funds will be authorized or disbursed to pay for mandatory direct offsets. Mandatory direct offsets are procurements of a foreign-made component required by the foreign government as a condition of sale, for incorporation or installation in a U.S.-produced end item being sold. While FMS loan funds will not be authorized for foreign-produced content resulting from mandatory direct offsets, such funding can be authorized for the U.S. content."

There are two classes of exceptions to the policies on offsets outlined above. The first concerns offset agreements already in force at the time the 1978 Duncan Memorandum was promulgated. U.S. Government guarantees were sometimes involved in these agreements, and those guarantees continued to be honored after Government policy changed. The most notable programs in this category were the Swiss purchase of the F-5, the F-16 coproduction program with our NATO allies, and the Australian program which involved the purchase of ships and other defense equipment. Of these, the Australian program has been the largest and the most complex. Under a commitment made in 1972, DOD recognized an obligation to provide up to 25 percent offsets through the Australian Industrial Participation for all Australian defense purchases from the United States.

The second class of exceptions involves an outright waiver of the rules, and this has happened in only one case. The FMS credit guidelines pertinent to Israel, a separate document effective August 8, 1985, includes the following paragraph.

> "There is an exception for Israel to direct offsets related to its commercial purchases. Direct offsets are procurements of an Israeli-made component required by the GOI as a condition of sale for incorporation or installation in a U.S.-produced item being sold. In all instances the item must be over 51 percent U.S. content, with final assembly in the United States. FMS credit funds normally cannot be used under subcontracts for operations and maintenance services, overhaul, translation services, warranties, training, storage, testing, and other services of this nature."

For the last several years, Israel has sought to require offsets in commercial contracts with American companies supplying goods and services that are financed by FMS credit appropriations. Prior to 1984, this Israeli policy was largely ignored by the United States Government as the dollar value was of minimal significance. As dollar value rose and U.S. Government cognizance of the problem increased, the need for a policy was recognized.

Consequently, for fiscal year 1984, Israel was allowed to take "directed offsets" on up to 15 percent of the total value of Israeli purchases of items on a commercial basis. This decision gave the Israelis over $225 million worth of offset business. For 1985, Israel was allowed to take a lesser amount in offsets, this time expressed as a specific dollar ceiling of $200 million rather than a percentage of purchases. The Administration plans to reduce this program again for fiscal year 1986 and a further reduction for fiscal year 1987, after which it will be terminated.

In the unique Israeli program, the term "directed offsets" means those activities that are termed Subcontractor Production in this report except for those items which are of Israeli origin, and are financed by grants from the FMS credit appropriation. Excluded from these limitations are offset requirements negotiated between Israel and U.S. corporations that are <u>not</u> financed by the U.S. Government.

On July 29, 1983, the USTR-chaired Trade Policy Staff Committee (TPSC) established a formal set of policy guidelines on Countertrade and Barter which, like offsets, condition the completion of an import transaction on a separate purchase or exchange of goods from the importing country. While explicitly not applicable to military sales offsets, these guidelines are applicable to civilian countertrade related to government-mandated defense-related offsets which are not directly contributing to U.S. national security goals.

"U.S. Government policy toward the private sector

i. The U.S. Government generally views countertrade, including barter, as contrary to an open, free trading system and, in the long run, not in the interest of the U.S. business community. However, as a matter of policy, the U.S. Government will not oppose U.S. companies' participation in countertrade arrangements unless such action could have a negative impact on national security.

ii. Since U.S. businesses must compete in an environment in which they are voluntarily or involuntarily confronted with countertrade, U.S. Government agencies may provide advisory and market intelligence services. However, U.S. Government officials should not promote the use of countertrade, including barter, and they should advise U.S. businesses that countertraded goods are subject to U.S. trade laws including quotas. This information should be provided to U.S. businesses by our embassies overseas, by Department of Commerce district offices, and by U.S. Government officials in Washington.

iii. When dealing with foreign government officials and foreign businessmen, U.S. Government officials will draw upon the guidance set in this section with regard to barter and countertrade, especially when these practices are mandated by governments.

iv. The U.S. Government will advise U.S. companies that countertraded goods imported into and sold in the United States are subject to U.S. trade laws. These statutes include Sections 201 and 406 of the Trade Act of 1974, providing import relief from injurious or disruptive imports as well as the antidumping and countervailing duty statutes.

v. The U.S. Government will continue to review financing for projects containing countertrade/barter on a case-by-case basis, taking account of the distortions caused by these practices.

U.S. Government policy towards foreign governments

i. The U.S. Government should continue to oppose Government-mandated countertrade.

ii. The TPSC subcommittee on antidumping and countervail should examine U.S. trade laws to ensure that they adequately cover countertraded goods. Most of these goods are disposed of in third country markets at present, but trade patterns may change in the future resulting in an influx of countertraded goods into the U.S.

iii. The U.S. Government should exercise caution in the use of its barter authority, reserving it for those situations which offer advantages not offered by conventional market operations.

iv. In the context of the trade debt link, the U.S. Government should explore what measures the IMF might take to discourage countertrade, and the U.S. Government should lend its support to these efforts.

v. The U.S. representative to GATT should consider raising the question of countertrade imposed by governments in the CG-18 and pursue the possibility of a working group on this subject in the GATT."

There is another special situation where the U.S. Government has established a policy concerning offsets in defense-related export trade. On June 14, 1985, the Administration proposed legislation establishing a new type of international procurement arrangement called a NATO Cooperative Project. This bill included a change to the AECA prohibiting offset demands on contracts pursuant to this new procurement scheme unless specified in the government-to-government agreement that establishes the cooperative project. The provision became law on August 8, 1985, and become effective on October 1, 1985. Section 27(c)(3), AECA, now contains this limitation:

"Such agreements shall provide that no requirements for work sharing or other industrial or commercial compensation in connection with such agreement shall be imposed by a participant that is not in accordance with such agreement."

Although the number of potential offsets that will be prohibited by this section is estimated to be very small, the fact that the potential problem was recognized and that there was a concrete Government response is evidence of increased sensitivity to the offset issue.

F. Foreign Policy Context

Some U.S. foreign policy goals are traditionally pursued through arms transfer policy. Offsets can affect the nature of the arms transfer tool. Foreign policy objectives which are traditionally pursued with arms transfers include:

- o Deter aggression by enhancing the preparedness of allies and friends -- Offsets are intended to enhance the preparedness of allies by supporting rationalization, standardization, and interoperability (RSI) but do not alter significantly the extent to which this foreign policy goal is advanced through arms transfers. Increased preparedness will take place regardless of extraneous industrial or financial conditions in the transaction if countries continue to invest in defense preparedness. However, in a broader sense, inefficient offsets can have the effect of reducing the total resources available for enhancing preparedness.

- o Increase the ability of the U.S. to project power -- Power projection capabilities are enhanced through arms transfers when such transfers are agreed to in whole or in part as consideration for the granting of basing

or access rights for U.S. forces on foreign soil. Offset arrangements are not primary factors with regard to this objective. On a secondary level, however, to the extent that acceptance of offsets is a condition without which the transfer cannot take place, (and without which advantages external to the sale itself, such a base or access rights would not be granted), offsets can have a bearing on U.S. power projection capabilities.

- o Support interoperability with the forces of friends and allies -- The primary effect of offsets is negligible. To the extent that acceptance of offsets is a condition of sale, and that in the absence of a U.S. sale the customer would acquire equipment from another supplier which would not be interoperable with U.S. equipment, offsets can have a positive effect.

- o Enhance U.S. defense production capacity and efficiency -- To the extent that offsets involve the transfer of production to foreign customers that would otherwise have taken place in the U.S., American production capacity and efficiency probably are reduced. If the sale would not have occurred without the inclusion of offset arrangements, then offsets support this objective in that they allow some U.S. defense production/export to take place.

- o Strengthen collective security arrangements -- Offsets can enhance collective security arrangements by making purchasing governments better able to defend such arrangements on grounds other than security alone. Our NATO partner's concern about the essentially one-way flow of defense trade has given rise to the concept of the two-way street. To the extent that offsets lead to increased defense production in other NATO countries, they have the same effect as U.S. purchases of foreign manufactured defense goods. However, many offsets are taking the form of trade or investment in non-defense goods, making the contribution of offsets to the improvement of the defense trade balance problematic. In any case, foreign government leaders are better able to assert that the Alliance is truly mutually beneficial.

Offsets can alter the nature of arms transfers. Offsets can introduce rigidities and increased costs into the procurement process because they may prevent the supplier from obtaining needed commodities from the most cost-effective sources. They can cause a diversion of resources which may enhance military capability at the expense of efficient resource use. Viewed in political terms, offsets can be seen as a response to the concerns of allies over the arms trade imbalance.

Information on current foreign government policies pertaining to offsets in defense-related exports was gathered by a Department of Commerce survey of 26 U.S. Foreign Commercial Service Posts during the first four months of 1985. The responses suggest several trends in foreign government policies:

- o Military offsets have increasingly become a central factor in awarding military contracts by foreign governments.
- o The range and magnitude of offsets demanded by foreign governments has increased significantly in the last five years.
- o The nature of military offsets demanded has increasingly tended toward arrangements which include targeted technology transfer (direct and indirect) and production/management know-how.
- o Offset requirements also take the form of technical assistance to non-military industries selected for growth and development.
- o Foreign governments have begun to codify official policies and procedures concerning offsets in military trade.

G. Economic Setting

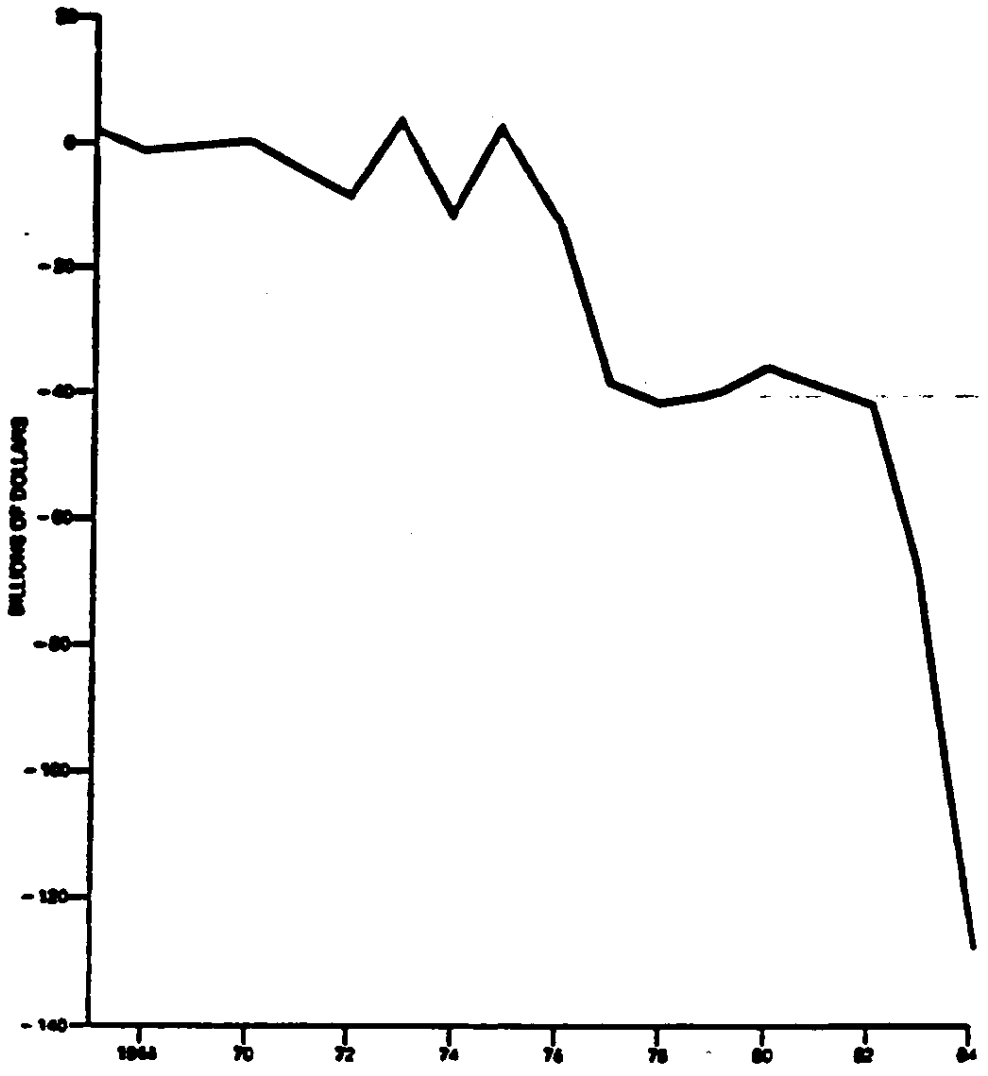
World macroeconomic conditions make it difficult to isolate and measure the precise impacts of offsets on U.S. trade, employment, competitiveness, and defense preparedness. "Global Competition," The Report of the President's Commission on Industrial Competitiveness, January 1985, found that during the last decade, the U.S. has become increasingly dependent on its competitiveness in international markets, for its continued economic growth and high standard of living. Approximately 20 percent of this nation's current industrial production is shipped to foreign markets, and almost 70 percent of goods the U.S. produces at home compete with foreign merchandise. U.S. imports and exports have more than doubled over the last ten years, and now U.S. international trade accounts for nearly 14 percent of GNP.

While becoming more dependent on foreign trade, the U.S. has also experienced a gradual but steady erosion in its ability to compete successfully in international and domestic markets. For example, the U.S. trade deficit has increased during the past 10 years. In 1984, U.S. merchandise imports exceeded $340 billion, while exports were more than $220 billion. Chart I.G.1 illustrates the significant downturn in the U.S. trade balance.

Despite an increase in the size of the world market, the U.S. share of world manufacturing exports has also declined both in terms of volume and value. Chart I.G.2 highlights this decline over the period 1962-1982.

CHART I.G.1

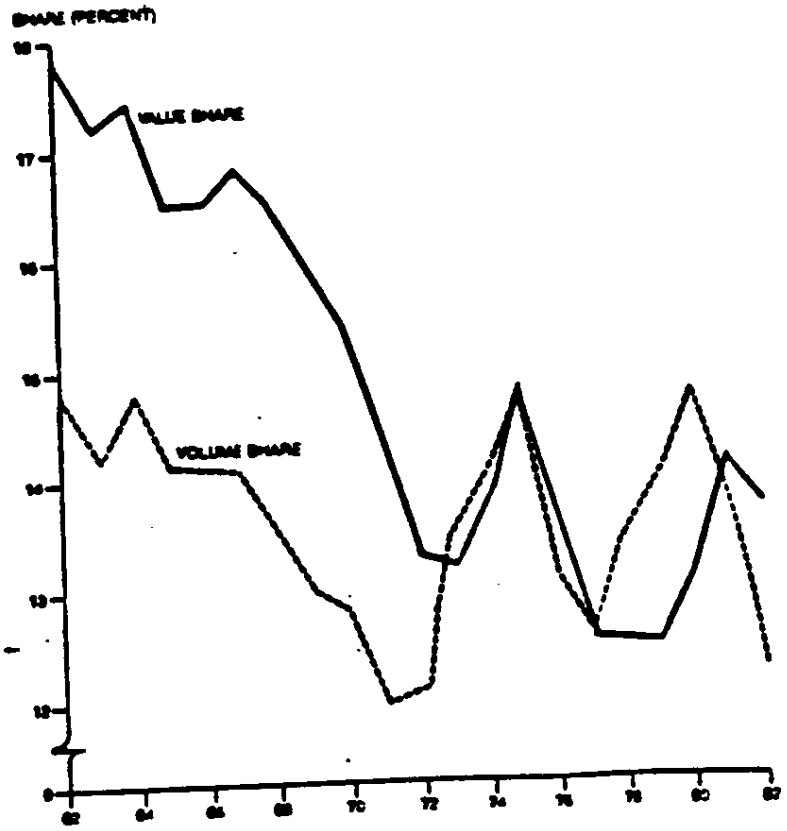
U.S. Merchandise Trade Balance, 1967-84
(billions of U.S. dollars)



Source: U.S. Department of Commerce, International Trade Administration.

CHART I.G.2

Export Share, U.S. Share of World Manufacturing Exports



SOURCE: Report of the President's Commission on U.S. Industrial Competitiveness, 1984.

In terms of value, the U.S. share has remained approximately 12 percent of the market in the period 1976-1984. Similarly, the U.S. volume share of exports has declined from 15 percent to 12 percent of the world market.

TABLE I.G.1

Free World Export Trade, 1975-1984
(in billions of estimated current dollars)

Year	Total Free World	United States	U.S. Share (in percent)
1965	$ 166.8	$ 27.5	16.5
1970	279.9	43.2	15.4
1975	791.2	107.7	13.6
1976	900.8	115.2	12.8
1977	1,023.5	121.2	11.8
1978	1,175.4	143.7	12.2
1979	1,492.8	181.9	12.2
1980	1,829.4	220.6	12.1
1981	1,804.1	233.6	12.9
1982	1,655.2	212.2	12.7
1983	1,619.4	200.5	12.4
1984	1,715.7	217.9	12.5

SOURCE: Department of Commerce, International Trade Indicators, and Economic Report of the President, 1984.

Using the country groupings contained in the World Development Report 1985, published by the International Bank for Reconstruction and Development (World Bank), the database developed for this report indicates the percentage of the value of sales going to developed countries during the 1980-1984 period to be 67 percent, while 77 percent of the value of offsets obligations were with these countries. Offsets have been increasingly used by these countries to serve economic and political purposes.

The size of defense-related offsets relative to the U.S. economy and relative to various sectors of the economy must be taken into consideration in any analysis of offsets. In this regard, the importance of defense-related offsets depends upon the frame of reference. The average annual value of defense-related offset obligations between 1980 and 1984 ($2.4 billion) is trivial relative to U.S. GNP ($3,125 billion), total U.S. exports ($217 billion), or exports of manufactured goods ($143 billion).

The importance of offsets to some high-technology sectors of the economy is more significant. The value of high-technology offset obligations under two definitions of high-technology industries is presented in Table I.G.4 together with exports and production in the corresponding categories. The narrow definition used below is the Department of Commerce "DOC 1" definition which includes drugs and medicine, computers and office machines, electrical equipment, aerospace products, and scientific, engineering, and medical instruments. In the narrow measure shown on Table I.G.4, offset obligations are the amounts implemented or fulfilled during 1980-1984. The broader definition (the Department of Commerce "Technology Intensive" definition) includes all of the products in the narrow category plus all other transportation equipment, machinery, and chemical products.

TABLE I.G.2
Average Annual Value of Defense-Related Offsets
Relative to High-Technology Exports and Production

($ in billions)

	Narrow Measure	Broad Measure
Average Offset Obligations	0.48	1.33
Average U.S. Exports	56.81	117.20
U.S. Production	330.21	730.25
Offsets/Exports	0.8%	1.1%
Offsets/Production	0.1%	0.2%

The industries in which offsets loom largest relative to U.S. production or U.S. exports are aircraft industries and engines and turbines. Even in these industries, offsets are still fairly small. Offset obligations are less than two percent of shipments and less than eight percent of exports in both industries.

TABLE I.G.3
Average Annual Value of Defense-Related Offsets Relative to
Exports and Production of Engines and Turbines and Aerospace Industries
($ in millions)

	Total Aircraft	Engines and Turbines
Average Offset Obligations	790	268
Average U.S. Exports	15,675	3,582
U.S. Production (1982)	61,877	13,997
Offsets/Exports	5.0%	7.5%
Offsets/Production	1.3%	1.9%

Defense-related offsets are much larger relative to trade in defense goods and services. The average annual value of defense-related offset obligations ($2.4 billion) is 19.4% of annual defense-related deliveries ($12.4 billion) in the 1980-84 period.

Offsets incorporate inefficiencies associated with the absence of a medium of exchange, such as increased transaction costs, and the time required for liquidation. These inefficiencies explain why those involved in an exchange of goods usually prefer cash, as opposed to taking back goods or to giving away part of the production such as in coproduction. Therefore, central to any discussion of offsets in defense-related exports is an understanding of the market and the motivations of U.S. corporate sellers and foreign government and international organization buyers for entering into an offset agreement.

H. The Market

As might be expected, one effect of offset programs has been to expand foreign defense industrial bases which, in turn, has increased the number of arms exporters. Two kinds of exporters are apparent: "industrial base" nations which manufacture weapons for export and the "subterranean market" countries which sell used arms to other countries. Arms producers fear that the expanded number of exporters will further increase competition in the arms market via larger and more complex offset arrangements. Moreover, offsets mandated by foreign governments have the potential of diverting business away from U.S. subcontractors and of establishing new foreign competitors over the long run.

The international arms market most closely resembles an oligopsony, in the sense that the market is characterized by a relatively small number of purchasers. The market also exhibits some characteristics of oligopoly, in the sense that it is also characterized by a relatively small number of sellers that also may exert a disproportionate influence on the workings of the market. The buyer in an international arms market is almost invariably a government. The seller is either a government, or a government-regulated private sector entity. Transactions are further complicated by the fact that some purchasing governments also function as sellers within the same market.

Consequently, the workings of the international arms trade market are governed more by the objectives and policies of purchasing and selling governments than by traditionally defined market influences. This unique situation highlights the difficulties associated with trying to analyze international arms trade from a traditional "market economics" orientation. For this reason, the international arms market may be more accurately characterized as an arena of managed trade, than as a true market in which economic influences are the primary determinants of the terms a seller must offer to remain competitive.

The objectives of a government making an arms purchase are far more complex than the basic objective of procuring arms at a cost-effective price. Considerations of the political acceptability of arms purchases from a foreign source, the maintenance and development of domestic defense and commercial industries, and preserving foreign exchange, are often overriding, if exogenous, considerations in the development of weapons procurement policies of purchasing governments. In like fashion, the export arms sale policy of the U.S. Government is influenced by foreign policy/national security considerations which often override economic efficiency.

Some forms of offsets (e.g., coproduction) have become a basic component of achieving defense sales and of furthering national policy goals for both foreign and U.S. governments. This fact has several connotations for the U.S. firms which engage in arms sales to foreign governments which require offsets. The selling corporation may be faced with both discretionary and non-discretionary choices in completing a defense sale: it can elect not to offer offsets, which may result in the loss of the sale; it can elect to offer offsets and proceed with the bargaining, in hopes of reaching an agreement which will both meet the requirements of the purchasing government, and serve its own interests; or, it may be obligated to provide offsets as an integral part of a foreign policy/national security objective.

II. ASSESSMENTS OF THE IMPACT OF OFFSETS

Part II consists of assessments of the effects of offsets in defense-related exports on the defense preparedness, industrial competitiveness, employment, and international trade position of the United States. These sections are based in part on data collected from U.S. corporations concerning offset obligations incurred during the period 1980 through 1984, a summary of which appears in Part III of this report.

The greatest barrier to analysis of defense-related offsets is the difficulty in determining the alternatives to offsets. Unless we have some idea of how affected industries would differ in the absence of offsets, it is difficult to answer any question along the lines of "How much higher (or lower) would aerospace exports (or employment, profits, etc.) be without offsets?"

The effect of defense-related offsets depends in part upon the extent to which the offset requirements are binding. In some cases, the offset agreements might be non-binding; they require U.S. companies to do nothing more than the U.S. would do in the absence of an offset agreement. An example of this might be an indirect offset agreement which requires that the U.S. import goods from the country purchasing the defense systems that it would import from the purchasing country or some other country even without the offset agreement. Offset agreements simply reallocate U.S. imports among source countries in this case. Offset agreements may also be nonbinding or only partially binding if the enforcement mechanism for the offset agreement is "best efforts." In this case, the U.S. company is under a moral obligation to try to fulfill the offset agreement, but is not subject to any contractual penalties should it fail to fulfill the agreement. In other cases, offset agreements might be completely binding; none of the goods and services purchased in the offset agreement would have been purchased in the absence of the offset agreement.

Countries demand defense-related offsets for a variety of reasons: perceived employment gains, changes in the industrial structure, national security, national prestige, domestic political, etc. In any case, countries are willing to spend more on foreign-designed defense goods in exchange for defense offsets. Conversely, if offsets were not possible, the importing countries would be willing to spend less on foreign-designed defense goods. This would unambiguously lower sales of U.S.-designed defense goods in cases where countries demand indirect offsets. The effect would be ambiguous in cases where countries demand direct defense offsets because total spending on defense goods would fall while the fraction of value accounted for by U.S. producers would rise. The market share of U.S.-designed defense products falls if offsets by U.S. firms are not possible.

The preceding discussion assumes that countries either obtain defense-related offset agreements from the U.S. or they reduce their foreign defense purchases. This neglects the alternatives of producing the defense-related goods domestically or purchasing the defense-related offset commodities from third country suppliers willing to enter into offset agreements. Both of these possibilities would lower the absolute level of U.S. defense exports, U.S. global market share in defense goods, and the global market share of U.S.-designed products.

A. Defense Preparedness (Department of Defense)

Some forms of offsets contribute to obtaining rationalization, standardization, and interoperability of American forces with those of its allies. Cooperative weapon production programs assist major alliance partners in creating a defense base that enables them to share in the defense of the alliance in which all are members.

Most offsets occur in the NATO nations, and the impact of offsets toward achieving U.S. national objectives is felt to the largest extent within NATO. The United States has followed a policy of maintaining the capability to produce any weapon system it purchases overseas. Although the offset policy of America's allies has generally been less demanding than this, the two-way flow of trade stemming, in part, from offsets has helped to build an industrial base in foreign nations which is often capable of sustaining the projection of U.S. power.

These benefits must be balanced against any potential adverse economic consequences of offset deals and against potential domestic industrial base erosion arising from offsets. In the defense arena, one possible negative effect is a loss of subcontractor work resulting from the granting of offsets for overseas production. However, this potential loss must be weighed against the benefits of being able to sell the weapon in the first place (which might not have been possible without offsets) and against the alliance and other foreign policy objectives which offsets fulfill.

Because of the Duncan Memorandum, the U.S. Government does not normally enter directly into offset agreements, and consequently there is little immediate effect of offsets on Government procurement. However, the general effect of offsets occurs in two areas. First, in the short run, weapon sales which are made possible because of participation in offset agreements tend to increase the length of production runs and, therefore, to lower unit costs. In this regard, a 1983 report entitled, Offset/Coproduction Requirements in Aerospace and Electronics Trade: Report of a Survey of Industry, the Department of the Treasury explained that three-fourths of survey respondents felt the sale would have been lost if offsets had not been offered. Moreover, nearly 90 percent of the DPA 309 database respondents felt that offsets were a necessary condition for the sale. However, it is possible that they may introduce inefficiencies which have the opposite effect.

Second, by creating new foreign manufacturers of arms, offsets have the long-run potential to alter procurement patterns by lowering the rate of growth and reducing the ultimate size of the United States' industrial base. For example, a 1984 U.S. Air Force study, Blueprint for Tomorrow, indicated that 75 percent of all foreign-sourced items used in the aerospace sector were supplied as a result of offset requirements. It is difficult to determine the extent to which this is due to offset deals alone, as opposed to reflecting a need to procure items which were in short supply or were non-competitive in the U.S. before the offset. However, the possibility also exists that if the sale requiring an offset had not been made, U.S. productive capacity in the sector producing goods for which offset items were substituted would have shrunk anyway due, for example, to depressed demand.

These items will be covered in greater detail in the sections which follow. However, it should be kept in mind that the period covered by the report was one of large fluctuations in the business cycle as well as substantial growth in the defense sector due to the military buildup initiated by the Reagan Administration. The effects of business cycle swings and the buildup were much longer than the effects of the offsets.

This section will discuss the relationship of offsets to defense-industry productivity, investment, profitability, surge capacity, foreign source dependency, and defense contractors. A brief summary of reverse technology transfers which may affect offsets concludes the discussion.

Relationship to Defense-related Industry Productivity

Since higher output affects productivity, offsets may have an impact on the productivity of defense-related industries. This occurs because of the relationship between longer production runs and learning curves. Over 40 percent of the prime contractor respondents to the questionnaire associated with this report and five percent of the subcontractor respondents indicated that sales agreements associated with offsets had a positive impact on their capacity and utilization rates. Typical respondent statements included the following: "The sales and offset agreements have caused more efficient utilization of existing plant and equipment with increased production", and, "The existence of this contract ensures the continuing economic utilization of...production capacity." Furthermore, none of the prime contractor respondents, and less than one percent of the subcontractor respondents said that these sales and related offsets agreements had a negative effect; however, nearly 50 percent of the prime and 89 percent of the subcontractor respondents said that these agreements had either no effect or an insignificant effect. These responses, therefore, support a conclusion that in the majority of circumstances, offsets had either positive or no impact on the productivity of defense-related industries.

Relationship to Defense-related Industry Investment

Table II.A.1 was constructed from data in the Defense Financial and Investment Review (DFAIR) published by the Department of Defense in June 1985.

TABLE II.A.1
Capital Expenditures
($ millions, adjusted for inflation)

Year	Defense-Related	Durable Goods
1975	365.3	13,937.4
1976	385.4	14,123.7
1977	500.2	17,042.8
1978	672.1	18,870.6
1979	827.3	19,854.5
1980	1,111.7	21,169.6
1981	1,239.9	22,162.4
1982	1,444.0	NA
1983	1,494.9	NA
Average Percentage Increase	19.26%	8.04%

Including data on both defense industries and durable goods industries provides a basis for comparison. Rather than using total manufacturing industries data, the category "durable goods" industries eliminated those industries not doing work comparable to that performed by defense contractors in the negotiated contract environment. The industry groups deleted were: stone, clay and glass products; primary metals industries; lumber and wood products, furniture and fixtures; and miscellaneous manufacturing industries. Because contracts with the shipbuilding industry contain different financing provisions and different pricing/profit mechanisms, they were eliminated from the category "defense-related" industries. Furthermore, data collected for services contracts was also deleted because it cannot be compared to data for durable goods manufacturers. Durable goods capital expenditures data for 1982 and 1983 were not available from the Census Bureau at the time of the DFAIR report.

The data reveal that not only has capital investment increased, but it did so at a substantially faster rate in defense-related industries than in durable goods manufacturing. DFAIR also analyzed the degree to which firms are replacing their assets. It found that defense contractors are replacing older equipment at a much faster rate since 1980 than they did from 1975 through 1979.

With regard to practical non-wartime plant and equipment capacity and utilization rates, responses to the industry questionnaire generally indicate that offset agreements had very little impact. Generally speaking, responses to the questionnaire sent to industry in connection with this report indicate that offset agreements had very little impact on their practical (non-wartime) plant and equipment capacity and utilization rates. Almost half of the prime contractor respondents and nearly 90 percent of the subcontractor respondents indicated that offsets either had no impact or only an insignificant impact. One of the prime contractor respondents and less than one percent of the subcontractor respondents said that offsets had a negative impact. Therefore, insofar as capacity and utilization rates affect investment decisions, offsets appear to have had very little impact.

Once again, over 40 percent of the prime contractor respondents, but only five percent of the subcontractor respondents, indicated that the sales agreements associated with the offsets had a positive impact on their capacity and utilization rates. Typical respondent statements included: "This sale agreement...avoided the elimination of...production capability" and "the existence of this contract ensures the continuing economic utilization of...production capacity". Only about five percent of the prime contractor respondents and less than three percent of subcontractor respondents said that the sales agreement actually caused them to increase their investment in plant and equipment.

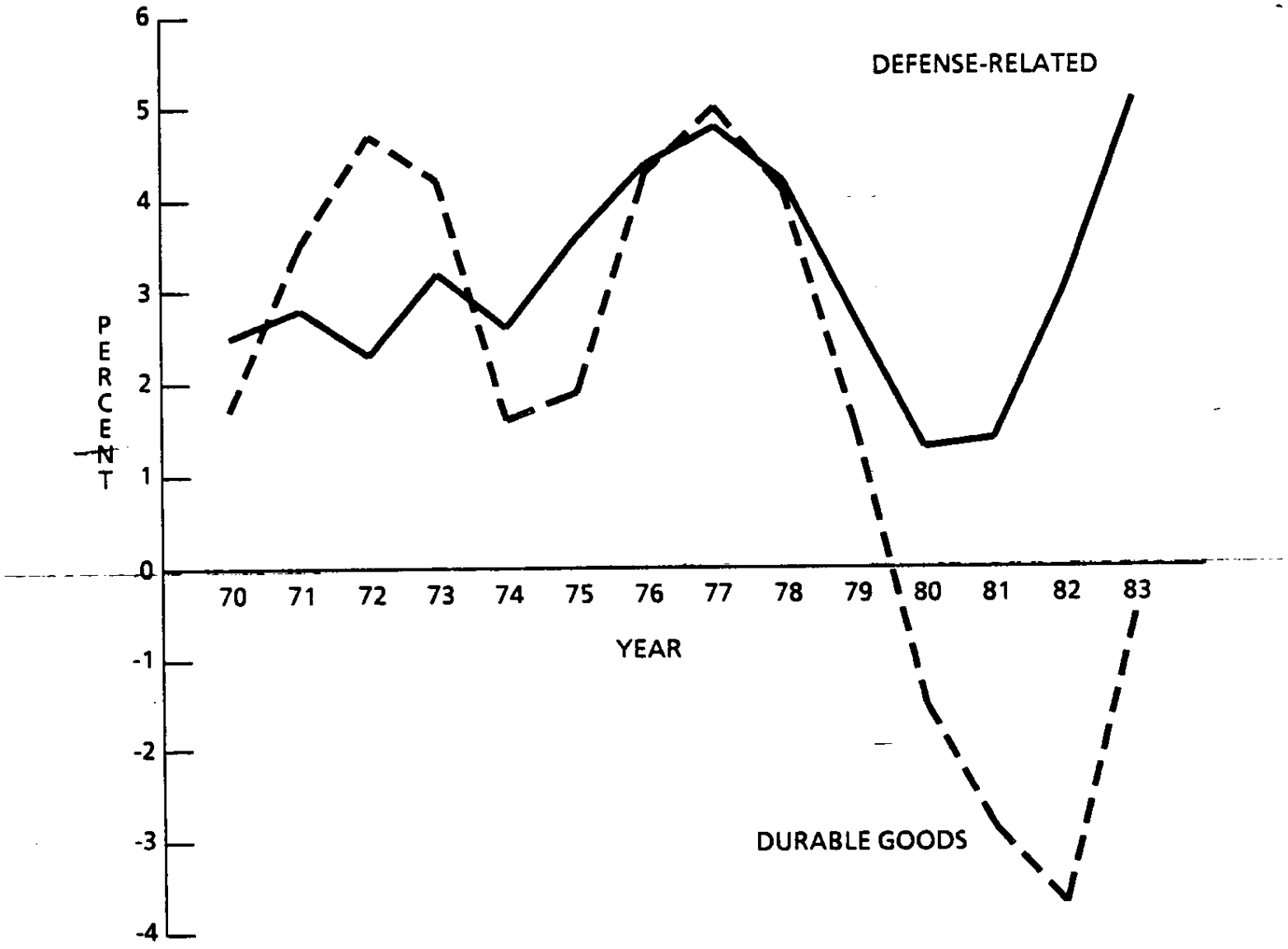
Against a backdrop of generally increasing rates of growth in defense-related industry capital investment shown in the DFAIR analysis, the DPA 309 database supports a conclusion that sales agreements and their resulting offsets are a relatively insignificant factor in the investment decisions of defense-related industries. However, profitability (to be discussed in the next section) is another important determinant of investment. If the inferences on profitability drawn from the DFAIR study are valid, then offsets, if necessary to make the sale, may have had a beneficial effect on defense-related industry profitability; and if this is indeed the case, then offsets may have had an indirect, but positive, impact on the investment decisions of these same industries. However, available data do not enable us to rigorously test the degree of these relationships.

Relationship to Defense-related Industry Profitability

Chart II.A.1 was constructed from DFAIR data and compares profit/sales of defense-related industries to that of comparable durable goods manufacturers. For the 10-year period 1970-1979, the average returns-on-sales were fairly close. For the recessionary period 1980-1983, however, durable goods manufacturers experienced substantial losses, while defense-related industry profitability declined only slightly.

CHART II.A.1

PROFIT/SALES



SOURCE: *Defense Financial and Investment Review*, June 1985, p. V-41.

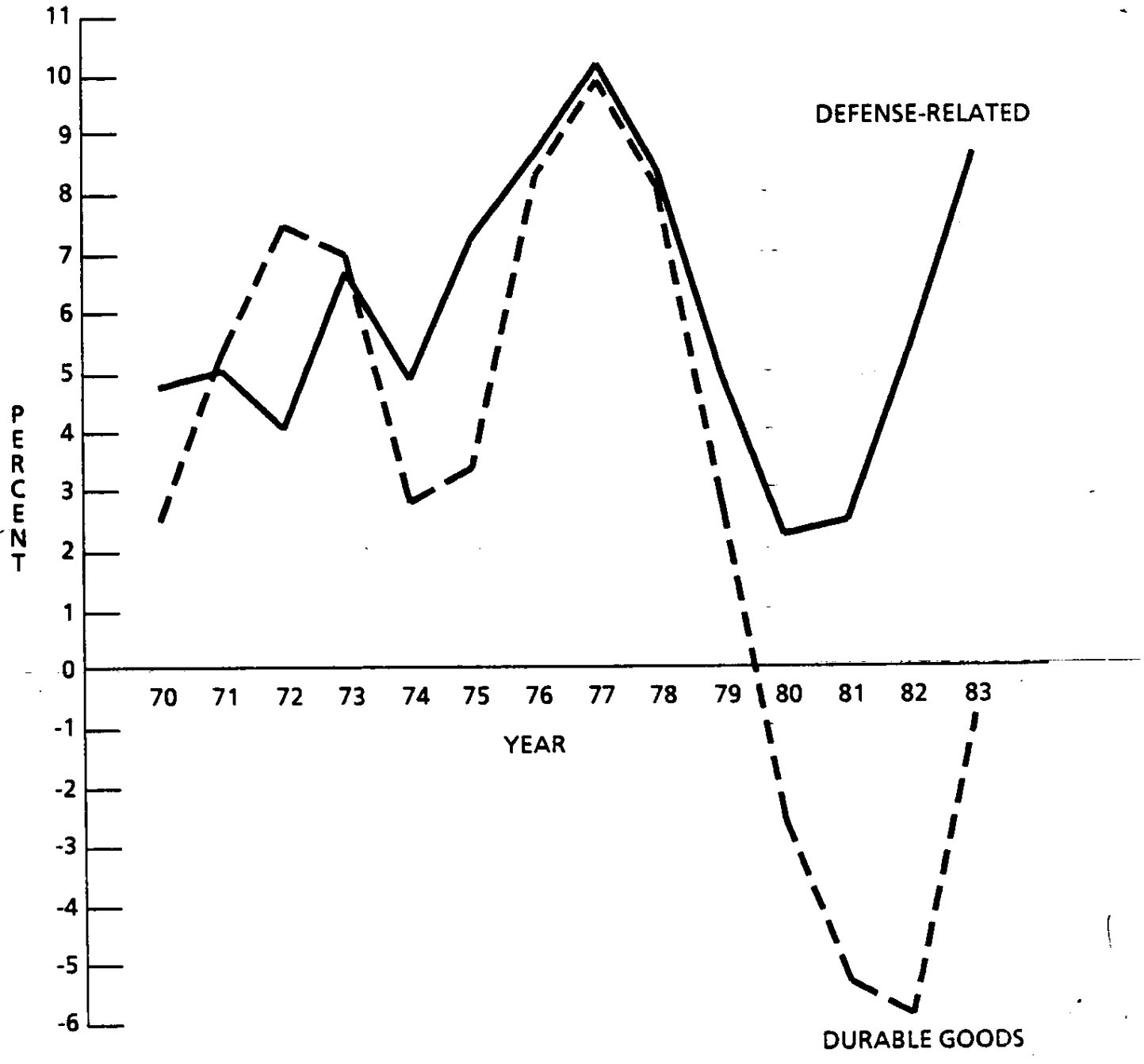
Chart II.A.2 compares profit/assets for both groups. The 10-year average returns are very similar; but again, during all recessionary periods but especially for the 1980-1983 period, durable goods manufacturers experienced significant losses while defense-related industries' return-on-assets declined only moderately. Both figures, therefore, show that profitability of defense-related businesses were somewhat similar to that of durable goods manufacturers during the 1970-1979 period, but substantially better during the 1980-1983 period.

As to the question of prime versus subcontractor profits, DFAIR indicates that profits on DOD subcontracts are slightly less than on DOD prime contract work. We have no evidence that offsets change this relationship, nor is there evidence that overall profit trends exhibited in the charts were substantially different between primes and subcontractors.

DFAIR concluded that defense industries were able to maintain their profitability primarily because of the increase in defense outlays and the decline in inflation. Nevertheless, DFAIR also concluded that profits from foreign military sales are even greater than they are on direct DOD sales. This supports the view that offsets, if necessary to make the sale in the first place, enhance defense industry profitability. Furthermore, as pointed out earlier, the 1983 Treasury study as well as the DPA 309 summary responses reported strong evidence that offsets are necessary to successfully close many defense deals. At the very least, therefore, available DFAIR evidence suggests that the profitability, and hence the strength, of defense-related industries has not been damaged by offsets.

CHART II.A.2

PROFIT/ASSETS



SOURCE: Defense Financial and Investment Review, June 1985, p. V-42.

Relationship to Wartime (Surge) Capacity

Approximately 50 percent of Department of Defense purchases of manufactured products and 70 percent of U.S. defense exports come from the aerospace sector. Hence, close scrutiny of aerospace industry can provide an understanding of the relationship of offsets to surge capacity.

Table II.A.2 shows the rates of capacity utilization for both prime and subcontractors in aerospace industries. These capacity figures are based on a 3x8x5 shift workweek (three eight-hour shifts per day for a five-day week). This type of workweek is normally used for planning high volume production because it permits the use of the sixth day for overflow work and the seventh day for maintenance, if required. The table presents these data in three ways: average capacity used on a 3x8x5 workshift, the range of capacity used across the plants surveyed, and capacity used by number of 1x8x5 workshifts worked.

As the table demonstrates, there is a great deal of excess capacity in the aerospace industry. Although this table does not show potential problems which may exist for specific products, capacity in the aerospace industry does not appear to be a problem. The DPA 309 database reveals that the military sector comprises only about one-fourth of total sales of companies reporting offset obligations, and the military export share amounts to less than four percent of the total sales of these companies. Offsets are a small part of subcontractor production; therefore, one would expect them to have little impact on capacity utilization.

TABLE II.A.2
1983 Aerospace Capacity Utilization by Functional Area

	Large Aircraft	Fighter/ Attack	Other Aircraft	Propulsion	Missiles
Fabrication	*42% **10-80	40% (25-66) ***1.5	26.5% (8-50) 1.0	57% (31-75) 1.6	43% (20-66) 1.3
Process/Paint	39% (9-80)	45% (25-60) 1.5	31.5% (8-70) 1.0	64% (28-100) 1.2	43% (20-66) 1.3
Assembly	41% (8-80)	40% (33-80) 1.5	27% (11-45) 1.0	51% (28-65) 1.2	43% (20-66) 1.3
Test and Check out	40% (22-80)	40% (20-75) 1.8	26% (11-45) 1.0	57% (28-65) 1.0	70% (40-100) 2.1

	Avionics	Materials	Structures
Fabrication	44.50% (4-90) 1.43		53% (27-81) 1.80
Process/ Paint	41.90% (25-60) 1.22	33% (11.42) 1.30	37% (12-75) 1.70
Assembly	38.60% (25-50) 1.20	Total Manufacturing Functions	32% (14-70) 1.40
Test and Check out	58.30% (40-81) 1.91		41% (18-70) 1.50

* Average percent capacity on a 3x8x5 shift basis.
** Range of percent capacity utilized on 3x8x5 shift basis.
*** Average number of shifts utilized on 1x8x5 basis.

Within the aerospace industry, offsets appear to have had a limited effect on surge capacity outside of the foreign-sourcing arena. Moreover, in the large aircraft sector, where business has been adversely affected by the drop in export sales resulting from financial problems of aircraft purchasers, the suggested corrective action made by the Air Force in the 1984 study, Blueprint for Tomorrow, was to seek innovative financing support, in both standard and non-standard transactions, to include countertrade and offset.

When queried by the U.S. Air Force in late 1983, the materials sector of the aerospace group was the only sector which reported that it had been noticeably affected by offsets. This sector reported that offsets create foreign competitors for future procurement and force overseas technology flow. The following remedies for this situation were suggested by the same study:

- o Restrict flow of technology offshore as part of coproduction.
- o Improve list of restricted technologies by making it more specific.

The questionnaire sent to industry in connection with this report defined wartime (surge) capacity as the ability of a firm to double production within 12 months. Two-thirds of the prime contractor respondents to the questionnaire felt that offsets had either no effect or an insignificant effect on their surge capacity. Almost 28 percent felt that offsets had a beneficial effect because they allowed sales to occur, while less than three percent felt that offsets had a detrimental effect on their surge capacity.

Thus, although a number of factors have adversely affected the industrial base in the aerospace sector over the last few years, and although problems with the industrial base can lead to surge problems, for the aerospace sector at least, available evidence suggests that no serious capacity problems are present. Surge difficulties that do exist can be traced to a number of causes, but generally not to offsets.

Relationship of Offsets to Foreign Sourcing

Foreign sourced items are of concern because, depending on the source, they may affect the ability of the U.S. to sustain weapon production in time of war. According to Blueprint for Tomorrow, offsets are one reason that foreign-sourced items are used in the aerospace sector. Of these items, only eleven specific cases are sole source while the rest have some production capability located in the United States. Furthermore, foreign sourcing seems to follow the large offset contracts (Israel and the NATO countries are prominently featured) and Canada, which is part of the North American (U.S. and Canada) domestic industrial base, is a major participant.

However, when one considers the number of parts used in modern aircraft, the total number of foreign sourced items is very small. In addition, virtually all of this sourcing takes place in areas such as NATO or Israel where U.S. policy is to support a strong foreign industrial base. Similar foreign source data are available for Army procurements. Again, with very few exceptions, the NATO countries are the suppliers. There is no indication of the amount of this trade which is based on offsets.

Impact on Defense Contractors

The 1983 Treasury report cited subcontractor production as comprising 24.9 percent of the total offsets reported in its survey. The DPA 309 database yielded a slightly lower result -- 21.2 percent of offset obligations being subcontractor production. There are several reasons for the importance of subcontractor production in offsets. First, prime contractors are hesitant to make offset agreements which will ruin their markets over the long-term. Second, if the foreign country has the technological and production capabilities to do the work of the prime, one would assume that the foreign country would have built the weapon itself. As a corollary, most of the countries which demand offsets can only accomplish production tasks of a simpler nature (e.g., the type of task usually associated with subcontractors).

A review of where U.S. defense-related goods and services are sold demonstrates that most of the purchasers will not be capable of the sophisticated production techniques necessary to assume the role of a prime contractor. Note that the buyers fall into two general categories: NATO countries and the LDCs. While the LDCs cannot assume the role of the prime through offsets, it is obvious that the non-U.S. NATO countries, under many conditions, could assume this role. It is U.S. policy to encourage NATO in this endeavor, but the two-way defense trade statistics between the United States and other NATO countries demonstrate that the U.S. gains a good deal more in terms of trade from the relationship than other NATO countries do from the relationship with the United States. Concurrent with this, the United States maintains a policy of establishing domestic production capabilities for any major weapon system it purchases overseas. In fact, in those cases where the United States buys weapons from one of the NATO countries whose technology and productive capability could be a threat to our own prime contractors, the United States requires that it also be allowed to produce the weapons. This policy is used to keep our industrial base capable of supporting the weapons we use.

Table II.A.3 shows the U.S. balance of defense-related trade with NATO. Note that this trade currently flows in favor of the United States by a 2.8 to 1 ratio.

TABLE II.A.3
FY 1984 Defense-related Trade Balance Summary
(thousands of current dollars)

Country	Total U.S. Exports 1/	Total U.S. Imports 2/	From Foreign Subcontracts	DOD Computed FY 84 Ratio 3/
Belgium	202,826	114,139	10,545	1.78
Denmark	48,053	49,281	44,189	0.98
France	68,027	47,601	11,626	1.43
FRG	402,728	307,590	47,853	1.31
Italy	104,862	65,009	10,036	1.61
Luxembourg	1,561	1,486	--	1.05
Netherlands	485,798	38,975	28,529	12.46
Norway	230,897	43,743	20,794	5.28
Portugal	27,562	1,245	--	22.14
Spain	101,446	24,973	892	4.06
UK	1,595,714	492,865	84,794	3.24
Total Europe	3,259,474	1,186,907	259,258	2.75
Canada 4/	1,306,525	875,400	393,700	1.49
Total Europe Plus Canada	4,565,999	2,062,307	652,958	2.21

1/ Estimated totals of FMS and commercial exports licensed under the Arms Export Control Act. These totals represent the dollar value of Government and commercial sales on a delivery basis.

2/ Figures do not include subsistence, petroleum, construction, and support services awarded in FY 84.

3/ "Total U.S. Exports" divided by "Total U.S. Imports."

4/ Data provided by the Government of Canada; the figures were adjusted to reflect FY 1984 and converted into U.S. dollars using an exchange rate of 0.8073 for the months of October through December and an exchange rate of 0.7837 for January through September.

A major issue in defense trade is the impact of offsets on subcontractors. The amount of subcontractor work performed in the FY 1984 trade (II.A.6) with other NATO countries is assumed to be primarily due to offsets for the reasons already given. While having this amount of subcontracting done overseas has an obvious effect on the U.S. industrial base, several points should be remembered. First, the work done by other NATO countries is done in response to a U.S. policy to promote RSI. Table II.A.4 provides a wider context for this discussion of overseas defense subcontracts. Note that of the subcontractor work done by our NATO allies over half is done in Canada, a country that is part of the North American (U.S. and Canada) defense industrial base.

All other countries with significant amounts of subcontract work are either in NATO or reflect very specific foreign policy concerns.

Thus, these data show that the area of subcontracting, where one would expect offsets to have the major impact on U.S. defense industry, has experienced impacts in precisely the manner that one would have guessed, a priori, based solely on a rudimentary knowledge of our policies with regard to NATO and to Israel. These data do not support a conclusion that offsets affecting the defense industrial base have occurred in large numbers outside of the countries that are our major allies.

A model developed by the Department of Defense indicates that, in general, defense business comprise only a small portion of any sector's subcontractor activity. Offsets comprise an even smaller share. Evaluating the impact of offsets on subcontractors is difficult because data regarding both the negative effects (business lost due to offsets) and the positive effects (business which would have been lost had the offset not been offered to close the deal) are generally not known to the subcontractors themselves. In addition, a subcontractor from one sector may lose business while a subcontractor from another may gain -- all due to the same offset deal. In this case, the overall effect of the offset can only be measured by knowing the severity of industrial base degradation in the first instance compared to the enhancement of the base in the second. This information is, at best, subjective in nature and often inseparable from general economic conditions.

TABLE II.A.4
Overseas Distribution of Defense Subcontracts
(Fiscal Year 1984)

Region/Category	Country	Millions of Dollars	Percent of Total
NATO		$ 653.207	91.41
	Canada	393.700	55.09
	UK	84.794	11.87
	Denmark	44.189	6.18
	West Germany	47.853	6.70
	Netherlands	28.529	3.99
	Norway	20.794	2.91
	France	11.626	1.63
	Italy	10.036	1.40
	Belgium	10.545	1.48
	Spain	0.892	0.12
	Greece	0.249	0.03
OTHER OECD		29.177	4.08
	Australia	14.104	1.97
	Japan	8.273	1.16
	Switzerland	4.310	0.60
	Sweden	2.048	0.29
	Austria	0.442	0.06
NEWLY INDUSTRIALIZED		23.858	3.33
	Korea	0.680	0.10
	Taiwan	0.633	0.09
	Israel	20.675	2.89
	Hong Kong	1.022	0.14
	Singapore	0.528	0.07
	Mexico	0.320	0.04
DEVELOPING		8.367	1.17
	Saudi Arabia	5.491	0.77
	Philippines	0.225	0.03
	Kuwait	0.119	0.02
	El Salvador	0.101	0.01
	Egypt	0.018	<0.01
	Bahamas	0.315	0.05
	Barbados	0.032	<0.01
	Other	2.066	0.30
TOTAL		714.609	100

Respondents to the DPA 309 questionnaire indicated that 42.5 percent of the offset agreements created new foreign-source subcontractors or expanded existing foreign-source subcontractors for defense-related goods and services of U.S. firms. While the DPA 309 questionnaire sample of subcontractors is admittedly small, out of 130 respondents, none said they were displaced as a subcontractor after an offset was negotiated by the prime contractor.

Reverse Technology Transfers Which May Affect Offsets

The Department of Defense is beginning systematic efforts to enhance the flow of military technology from our allies. In the past, the U.S. was clearly dominant in most areas of technology significant to the military. However, the situation is changing today and warrants attention.

U.S. firms have considerable experience in dealing with West European industry, and they know its capabilities well. The overall American assessment is that the Europeans are equal to or ahead of U.S. military technology in only a limited number of areas; but there have been few comprehensive surveys of European technology, and this assessment warrants continued updating. The rate of improvement of Western technological advance has been steady, and it appears that over the next decade the number and range of areas where the Europeans are competitive will increase. There are also likely to be a growing number of areas where Europeans can successfully contribute to collaborative development of systems, and the NATO Cooperative Projects legislation enhances our ability to take advantage of this situation.

The Department of Defense has an ongoing Foreign Weapons Evaluation Program funded at $17 million in FY 1986. The objective of this program is to evaluate foreign weapons of NATO origin, which are in development or in service, that might be purchased or developed further for inclusion in the U.S. inventory. While the sums involved are small in relative terms, the results are significant in terms of reducing U.S. R&D costs, accelerating the introduction into service of new systems, promotion of standardization and interoperability of fielded systems with our allies, and achievement of procurement cost advantages.

In June 1984, the Defense Science Board Task Force on Industry-to-Industry International Armaments Cooperation between the U.S. and Japan published its findings and recommendations. It noted that because of the critical importance of Japan to U.S. defense interests in the Western Pacific, the U.S. has made available to Japan over the years its front-line weapons and, in many instances, the related defense technology, principally through licensed production programs. Furthermore, Japan has paid a high premium for this technology in order to build its long-term commercial objectives in aerospace. Continued transfer of advanced and sensitive U.S. defense technology is important to Japan. On the other hand, Japanese technologies are equal to those of the U.S. in many fields and, in some fields, superior, with no evidence of slow-down to

the "technological momentum." Thus, the time appears ripe for a more equal flow of technology in both directions.

There is a long history of Japanese practices which have made U.S. investment and joint ventures in Japan difficult. Yet, during 1983, the Nakasone Government took two important steps toward the release of critical Japanese technologies. The January statement by the Prime Minister allowed the export of "military" technology to the U.S., and the November 8 Exchange of Notes spelled out the concept for a broadened technological exchange of military technology for defense-related production.

One approach to developing technology cooperation is to convene meetings of technical experts in specific mission areas to assess the threat, the systems and technologies available to meet that threat, and the systems and technologies in development and needed for development in that specific mission area. The first two such groups with the Japanese have been established in the air defense and communications systems areas. The Department of Defense recently published a report on the Electro-Optics/Millimeter-Microwave industry in Japan, and worked out with the Japanese government procedures for the transfer of Japanese military technology to the U.S.

Japan has nearly reached agreement with the U.S. on the initial transfer of one item of Japanese military technology developed by the Japan Defense Agency's Technical Research and Development Institute. To enhance the two-way flow of technology, a U.S.-Japanese Joint Military Technology Committee will meet at least annually to discuss various aspects of military technology transfers between the two countries.

B. Industrial Competitiveness (Department of Commerce)

Traditionally, there has been concensus within the Western Alliance that some offsets, such as coproduction, are beneficial for security reasons. For example, during the early post-World War II period, arms transfers and offsets, particularly coproduction, played an important role in rebuilding the defense base infrastructures of our allies. More recently, NATO arms transfers and offsets have been promoted for military and economic objectives--to promote the NATO strategy of RSI and to make military hardware trade within the Alliance a "two-way street." The economic rationale is to provide our allies with an "equitable share" of weapon development and defense programs, rather than continuing to maintain the status quo (i.e., the U.S. being the dominant arms producer and exporter), as well as to meet foreign sales competition.

As shown in Table II.B.1, 88 percent of all corporations surveyed reported that their reason for engaging in offsets was that offsets proposals were required by the foreign purchasing government as a condition to complete the sales. Only 18.9 percent reported that their reason for engaging in offset sales was to provide a competitive advantage.

TABLE II.B.1
Reason for Engaging in Offsets

Reason	Number	Percent Response
Required by Foreign Government	108	88.5
Maintain Foreign Market Share	28	23.0
Competitive Advantage	23	18.9
Finance Firm's Exports	3	2.5
Pricing Mechanism	1	0.8
Protect Foreign Subsidiary	1	0.8
Repatriate Blocked Currency	0	0.0
All Other	23	18.9
Total Numbers of Responses	122	

NOTE: The companies were allowed to give more than one response; consequently, percentages do not add to 100.

This section investigates the effect of offset agreements on U.S. industrial competitiveness, and specifically on the aerospace industry.

Increasing Role of Offsets

"Competitiveness is the degree to which a nation can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously maintaining or expanding the real incomes of its citizens." -- "Global Competition," The Report of the President's Commission on Industrial Competitiveness, January 1985.

In the post-World War II environment, U.S. defense industries have dominated the international arms market. The U.S. consistently ranks first among free world participants in sales in the international weapons market, followed by France, the United Kingdom and West Germany, respectively. The U.S. continues to produce and export the highest quality military products in terms of price, reliability, performance, and support systems.

Coproduction of U.S. weapon systems in foreign countries began in the late 1950's and early 1960's. The NATO countries and Japan were the first to receive coproduction agreements, but the process soon spread to other developed countries including Australia and Switzerland. These early offset requirements focused on licensed production/coproduction related specifically to the weapon system purchased. The licensed production of the F-104G fighter plane to Western Europe (NATO), Canada, and Japan during the early 1960's is an example of such an arrangement.

Today, the practice of military offsets has spread to developing countries including Israel, South Korea, and Egypt. Requests for offsets by our allies are based on foreign government desires to maintain or expand domestic employment, develop a national defense industrial base, acquire modern technology and management techniques, and conserve foreign exchange. Furthermore, some offset agreements have spillover effects for the development and production of related defense products and increased efficiency and competitiveness in related commercial sectors.

The Canadian Government's 1980 decision to purchase the McDonnell Douglas/U.S. Navy F-18 fighter aircraft is a recent example. The Canadian offset requirements were designed to enhance specific domestic technology shortfalls for selected industries, to force investments in local industries which would not normally attract outside commercial investment, and to promote exports of selected local goods and services. The purchase by the Canadians incorporates offsets many of which are not directly related to the F-18 program. Under the agreement, Canada will receive technology and R&D/production facilities for the manufacture of jet engines, fiber optics, composite materials, and metals processing. In addition, McDonnell-Douglas agreed to assist Canadian firms in licensing programs from U.S. firms in wind energy, auto parts, health care products, and food processing.

While the U.S. defense industry maintains an overall advantage in many areas of competitiveness, the margin of advantage has narrowed in recent years. In some areas, foreign technical capabilities are now comparable, if not superior, to those of the U.S. As the President's Commission on Industrial Competitiveness points out, "foreign firms have increased the speed with which they adopt and commercialize technology developed in the U.S. and have also improved their ability to develop technology on their own." Technology transfer through some forms of offsets from the U.S. has played a role in this.

Concurrently, as the majority of U.S. defense contractors surveyed in connection with this report have noted, other factors are playing an increasingly important role in determining whether a defense-related sale is made or not. These factors include subsidized and enhanced manufacturing, subsidized sales financing, offsets offered, and political decisions.

Offset agreements have played a role in transferring technology and know-how to foreign companies who now compete successfully with U.S. firms for some defense contracts. Fabrique National (FN) Moteurs of Belgium, a jet engine producer, provides one such example. As part of an offset agreement during the 1960's for the Lockheed F-104G fighter plane, FN Moteurs manufactured turbine engine parts for U.S. prime contractors. In 1978, as part of the F-16 offset program, FN Moteurs coproduced F100 Pratt & Whitney engines and received new technology/capability in titanium welding/grinding and engine assembly and testing.

With experience from these two offset programs, FN Moteurs is now bidding for contracts on a competitive basis without the need for offsets from the prime contractor. Currently, FN Moteurs is manufacturing components for two additional Pratt & Whitney engines and is providing support to U.S. Air Force maintenance activities for the F100 engine.

Kongsberg Vapenfabrikk of Norway, another foreign firm which benefitted from the F-16 coproduction program, also signed a contract with Pratt & Whitney for producing components for a newly developed gas turbine engine. In addition, the firm recently signed a contract with General Electric to manufacture components for the F110 derivative fighter engine for installation on some versions of F-16 fighters for the U.S. Air Force and F-14 fighters for the U.S. Navy.

Another example of transferring technology and creating a new competitor is provided by DAF Special Products Corporation of the Netherlands. Before receiving the F-16 landing gear offset contract from General Dynamics in 1976, DAF was not involved in the aerospace business. Today, DAF competes for landing gear contracts on a worldwide basis and has been selected to produce landing gear for the Dutch Fokker 50 and the Fokker 100 commercial aircraft.

The Italian Government's development of the Aspide 1A multirole missile is another example of U.S. technology transfer increasing foreign competition. The Aspide missile was primarily designed and developed with the assistance of three licensed production agreements between the Raytheon Corporation and the Italian firm Selenia for the Sparrow III, Sparrow AIM-7E, and Sea Sparrow missiles. Under the agreements, Raytheon Corporation transferred technology, equipment, and know-how to Selenia and trained Italian engineers in the U.S. Selenia engineers then utilized the skills and technology gained from the U.S. to develop the Aspide missile. Many experts view the Aspide as a viable competitor to U.S. missile programs, slightly superior to the newer U.S. AIM-7F Sparrow air-to-air missile.

The increased competition that U.S. firms now face has been accompanied by increasing foreign government intervention in the world arms marketplace. As shown in Tables II.B.2 and II.B.3, data collected for this report indicates that foreign governments are the sole negotiator in concluding over 75 percent of all offset agreements. With respect to the sale phase of an offset agreement, foreign governments are the sole negotiator in two-thirds of all cases.

The U.S. Government also plays a role in the sale of weapons to foreign countries. However, DOD will not normally negotiate or implement the purchase of any item from a foreign country. Furthermore, in practice coproduction has always been treated as a special case under the Duncan memorandum. Although DOD may negotiate permission for coproduction by a foreign country, DOD normally may not enter into any agreement guaranteeing that such coproduction will in fact occur. Furthermore, the Duncan memorandum specifies that the DOD will not use its acquisition resources to guarantee the purchase of defense products

coproduced by a foreign country. The DPA 309 database indicates that the U.S. Government is rarely involved in negotiating offset agreements. It is, however, a party at 58 percent of all sales which involved offsets concluded in the 1980-1984 period by these corporations, and a party to over 22 percent of the offset arrangement that resulted from these sales. The high percent of U.S Government involvement in sales agreements is probably due to the fact that the questionnaire solicited information for FMS as well as commercial sales. By definition in an FMS arrangement, the U.S. Government does the actual selling of military goods.

TABLE II.B.2

Role of the Foreign Government in Offset Contracts

Role	Sale		Agreement		Implementation	
	Number	Percent	Number	Percent	Number	Percent
Sole Negotiator	76	66.1%	88	75.2%	29	34.5%
Active Participant	14	12.1%	19	16.2%	17	20.2%
Observer	2	1.7%	3	2.6%	5	6.0%
No Role	14	12.1%	11	9.4%	16	19.0%
Approval	15	13.0%	6	5.1%	21	25.0%
Other	6	5.2%	4	3.4%	6	7.1%
Total	115		117		84	

TABLE II.B.3
Parties to the Specified Agreements

Role	Sale		Agreement		Implementation	
	Number	Percent	Number	Percent	Number	Percent
U.S. Contractor	5	7.5%	6	9.5%	13	18.3%
Foreign Government-Owned Company	6	9.0%	11	17.5%	27	38.0%
Private Foreign Company	6	9.0%	13	20.6%	47	66.2%
U.S. Government	39	58.2%	14	22.2%	1	1.4%
Other	16	23.9%	28	44.4%	10	14.1%
Total	67		63		71	

NOTE: Percentages may not add to 100 since companies respondents were allowed to give more than one response to this question.

Most foreign purchasing governments devote significantly less money, as a percentage of GNP, to defense than the U.S. does. It is understandable, therefore, that they try to obtain maximum leverage from offset agreements in order to minimize the impacts of foreign exchange outlays for defense system purchases. The trend on the part of foreign purchasing governments is to use offsets to provide competitive advantages to native industries, encourage growth in targeted industries, and increase the standard of living within their economies. Offsets are also used to assist developing export industries to target desirable export markets, including the U.S. defense base.

One example of foreign government intervention in trade is the Australian Government's offsets policy. Established in 1970, Australian policy concerning offsets has undergone three reviews: in 1976, 1979, and 1984. A minimum of 30 percent offset is currently required with an emphasis on advanced technology transfer. The current program has two main objectives: to "broaden the capabilities of industries which are of technological or defense significance to Australia and to stimulate technological advancement in key Australian industries." One of the purposes of this emphasis on technology transfer is to provide Australian industry with increased competitive advantages in manufacturing processes. Moreover, there has been a recent tendency for the Australian Government to encourage purchases of Australian manufactured products similar in technology content to that of the products involved in the sales contract as required offsets.

The South Korean military offsets program is another example of government intervention and industrial targeting in international aerospace trade. According to the recently published ROK Ministry of National Defense General Guide for Korean Offset Program, the primary objective of the required offset program is to assist the ROK in "developing and expanding its manufacturing and industrial capability." The program's goal is to specifically obtain new technology, assist "under-utilized" sectors of industry, "selectively stimulate" sectors of the economy and create new employment. The 50 percent required offset level for government military imports is aimed in part at helping develop targeted Korean industries by providing new technology and employment.

U.S. Aerospace Competitiveness

In spite of the rise in foreign government-managed trade in the military sector, it should be noted that the U.S. continues to be competitive in the development of new and innovative product and process technologies. This allows the U.S. to achieve high productivity levels and represents a key competitive advantage for American military hardware. The aerospace industry is a leading example of a highly productive and competitive, high-technology U.S. industry.

Today, as a result of substantial investment by both public and private sources, the aerospace industry is one of the most technologically sophisticated and competitive industries in the U.S. The aerospace industry is also the dominant

sector in the U.S. defense industrial base, representing approximately 50 percent of Department of Defense purchases of manufactured products and 70 percent of U.S. defense exports. Because of its technological edge and defense significance, a healthy and competitive aerospace industry is important to the long-term economic, foreign policy, and national security goals of the United States.

United States aerospace exports act as an important balance to imports of foreign manufactured goods. In 1984, the aerospace sector provided the U.S. with a trade surplus of $10.2 billion. Exports in 1984 totalled $15.1 billion, while imports were only $4.9 billion (see Table II.8.4). The aerospace industry is characterized by a few major airframe, engine, missile, and space vehicle manufacturers which are supported by a vast network of specialized subcontractors and suppliers. The sector includes six four-digit Standard Industrial Classification (SIC) Code industries:

- o Aircraft (3721)
- o Aircraft Engines and Engine Parts (3724)
- o Aircraft Parts and Auxiliary Equipment, Not Elsewhere Classified (3728)
- o Guided Missiles and Space Vehicles (3761)
- o Guided Missile and Space Vehicle Propulsion Units and Propulsion Unit Parts (3764)
- o Guided Missile and Space Vehicle Parts and Auxiliary Equipment, Not Elsewhere Classified (3769)

(Two other industries that are closely associated with the aerospace industry, but classified elsewhere: electronic communications equipment (SIC 3662) and instrumentation (SIC 381 and 382). Their sales to aerospace firms generally are included in the sale of finished aerospace products produced in the six sectors shown above, except when shipped as replacement parts or exported for incorporation in foreign-built aerospace products).

These industries are aggregated into four areas for which statistical trends are illustrated: (1) civil aircraft, (2) military aircraft, (3) missiles, and (4) space:

- o Military aircraft sales increased from $11.4 billion in 1979 to $34.1 billion in 1984. (In constant 1972 dollars, they increased from $6.1 billion to $12.0 billion).

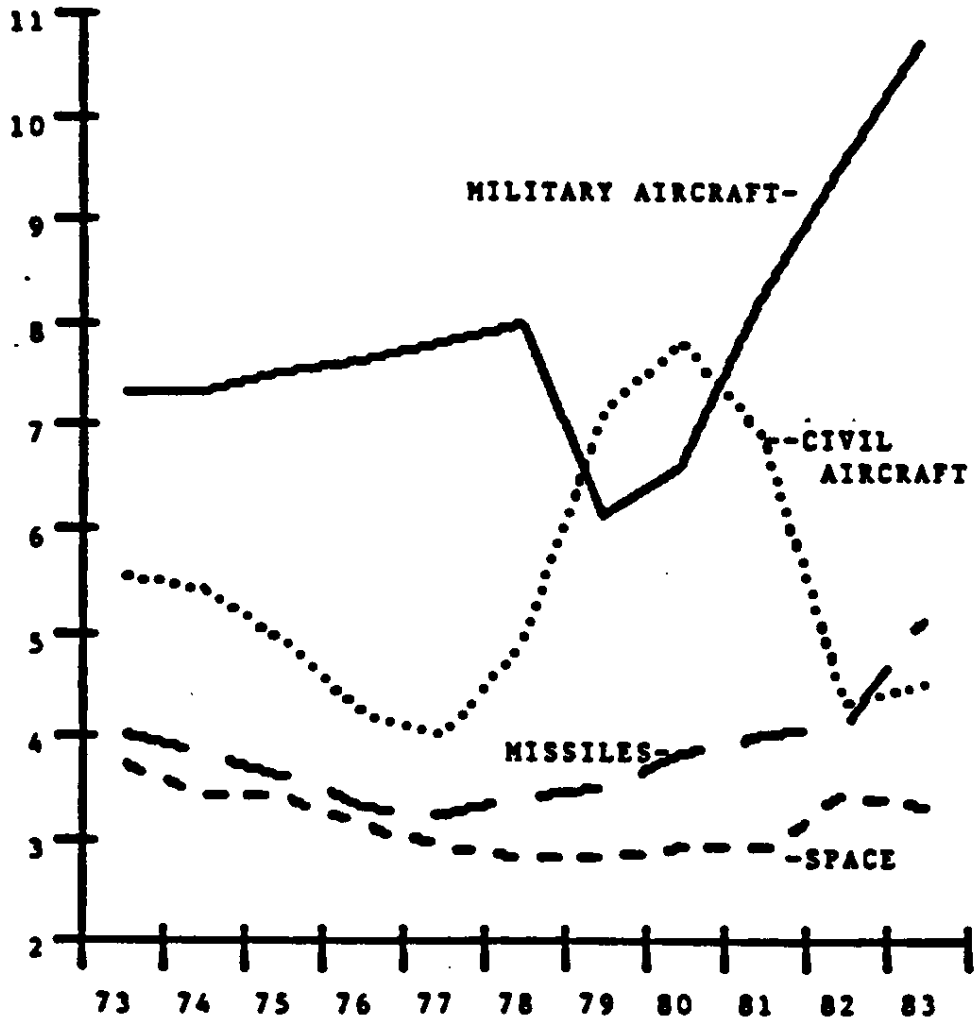
- Sales of missile systems, including propulsion units, increased from $5.3 billion in 1979 to $9.5 billion in 1984. (In constant 1972 dollars, the increase was from $2.8 billion in 1979 to $3.3 billion in 1984).

- U.S. space sales increased from $6.5 billion in 1979 to $15.4 billion in 1984. (In constant 1972 dollars, this was from $3.5 billion in 1979 to $5.4 billion in 1984).

- Sales of civil aircraft decreased from $13.2 billion in 1979 to $10.6 billion in 1984. (In constant 1972 dollars, the decrease was from $7.1 billion in 1979 to $3.7 billion in 1984). As noted above, the leading growth sector in aerospace sales is military aircraft. Charts II.B.1 and II.B.2 illustrate these statistics.

CHART II.B.1

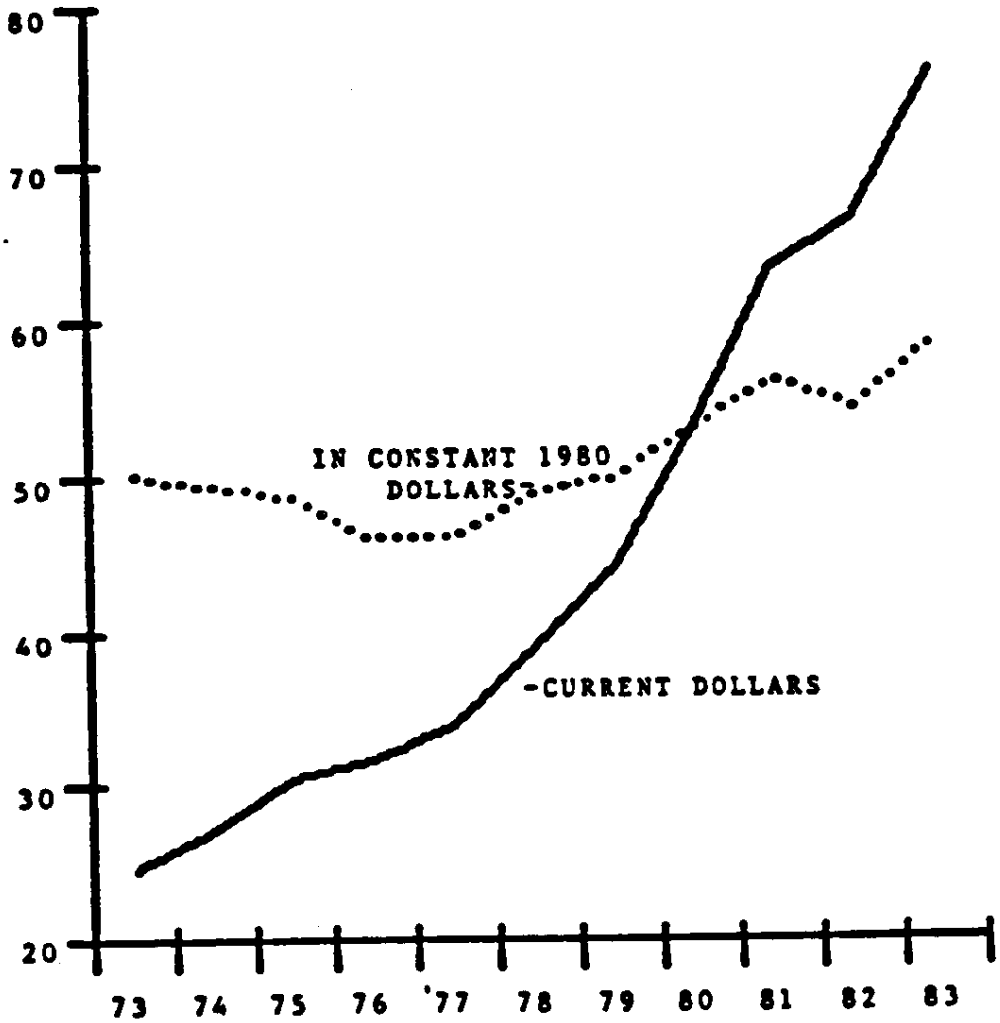
Aerospace Industry Segment Sales
(in billions of 1972 dollars)



SOURCE: AEROSPACE INDUSTRIES ASSOCIATION

CHART II.B.2

Total Aerospace Industry Sales
(in billions of dollars)



NOTE: 1980 CONSTANT DOLLARS USED FOR CONVENIENCE OF GRAPHING.

SOURCE: AEROSPACE INDUSTRIES ASSOCIATION

Since World War II, the technology and R&D-intensive aerospace sector has consistently generated trade surpluses. These surpluses have increased in the last 10 years despite the growing deficits in the overall U.S. trade balance. Table II.B.4 highlights the overall aerospace balance of trade for the period 1973 to 1984.

TABLE II.B.4

Total U.S. and Aerospace Balance of Trade
Calendar Years 1973-1984
($ in millions)

Year	Total U.S. Trade Balance	Aerospace Trade Balance	Aerospace Exports	Aerospace Imports
1973	1,222	4,360	5,142	782
1974	(2,996)	6,350	7,095	745
1975	9,630	7,045	7,792	747
1976	(7,786)	7,267	7,843	576
1977	(28,970)	6,850	7,581	731
1978	(33,541)	9,058	10,001	943
1979	(30,272)	10,123	11,747	1,624
1980	(27,336)	11,952	15,506	3,554
1981	(30,051)	13,134	17,634	4,500
1982	(35,182)	11,035	15,603	4,568
1983	(60,710)	12,619	16,065	3,446
1984	(110,932)	10,164	15,081	4,917

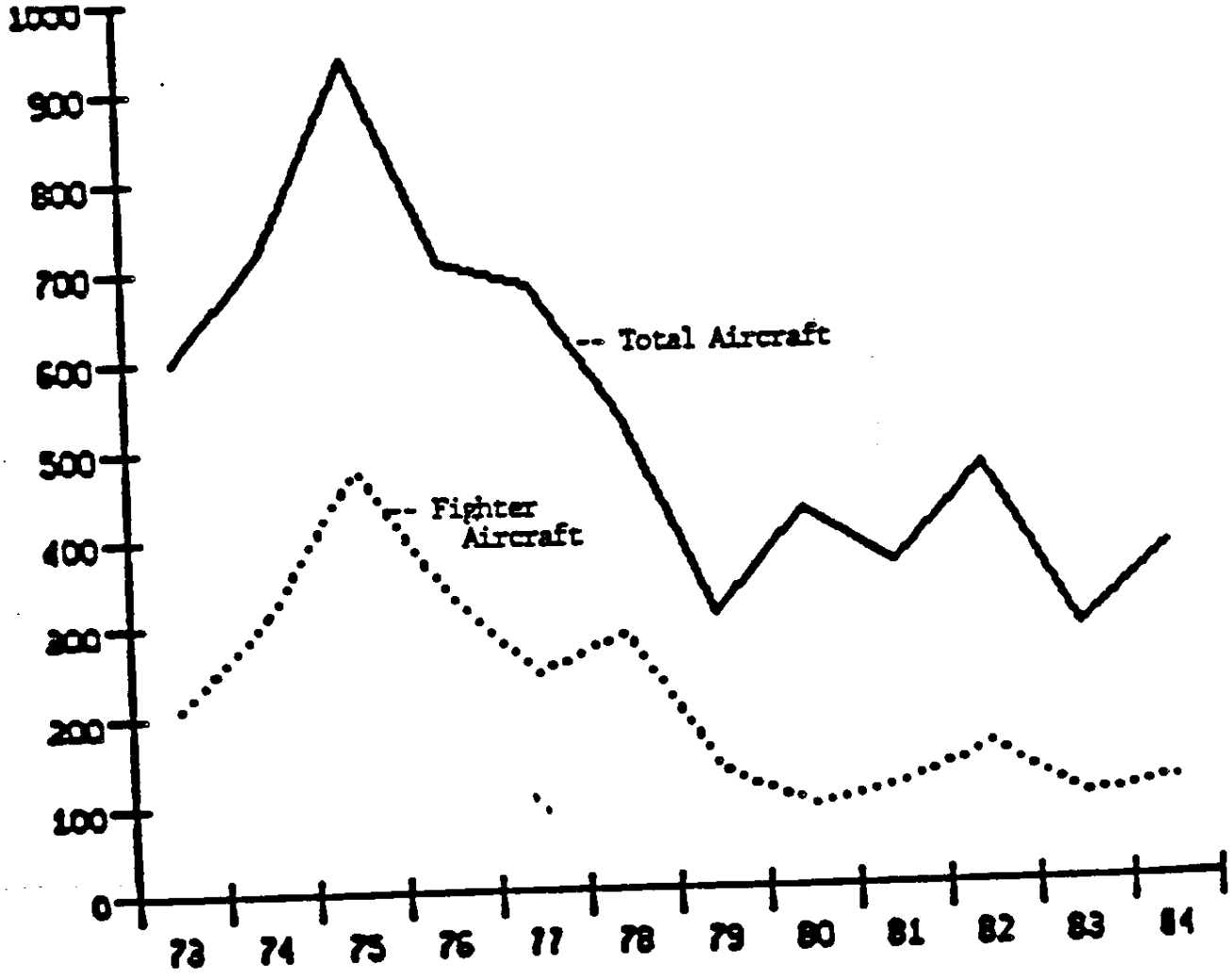
SOURCE: Bureau of the Census

The aerospace trade balance grew from $4.4 billion in 1973 to $10.2 billion in 1984. Concurrently, overall U.S. trade deteriorated from a $1.2 billion surplus to a $110.9 billion merchandise trade deficit.

Charts II.B.3 and II.B.4 present the export trends for total military aircraft and fighters from 1973 to 1984 in units and constant dollars.

CHART II.B.3

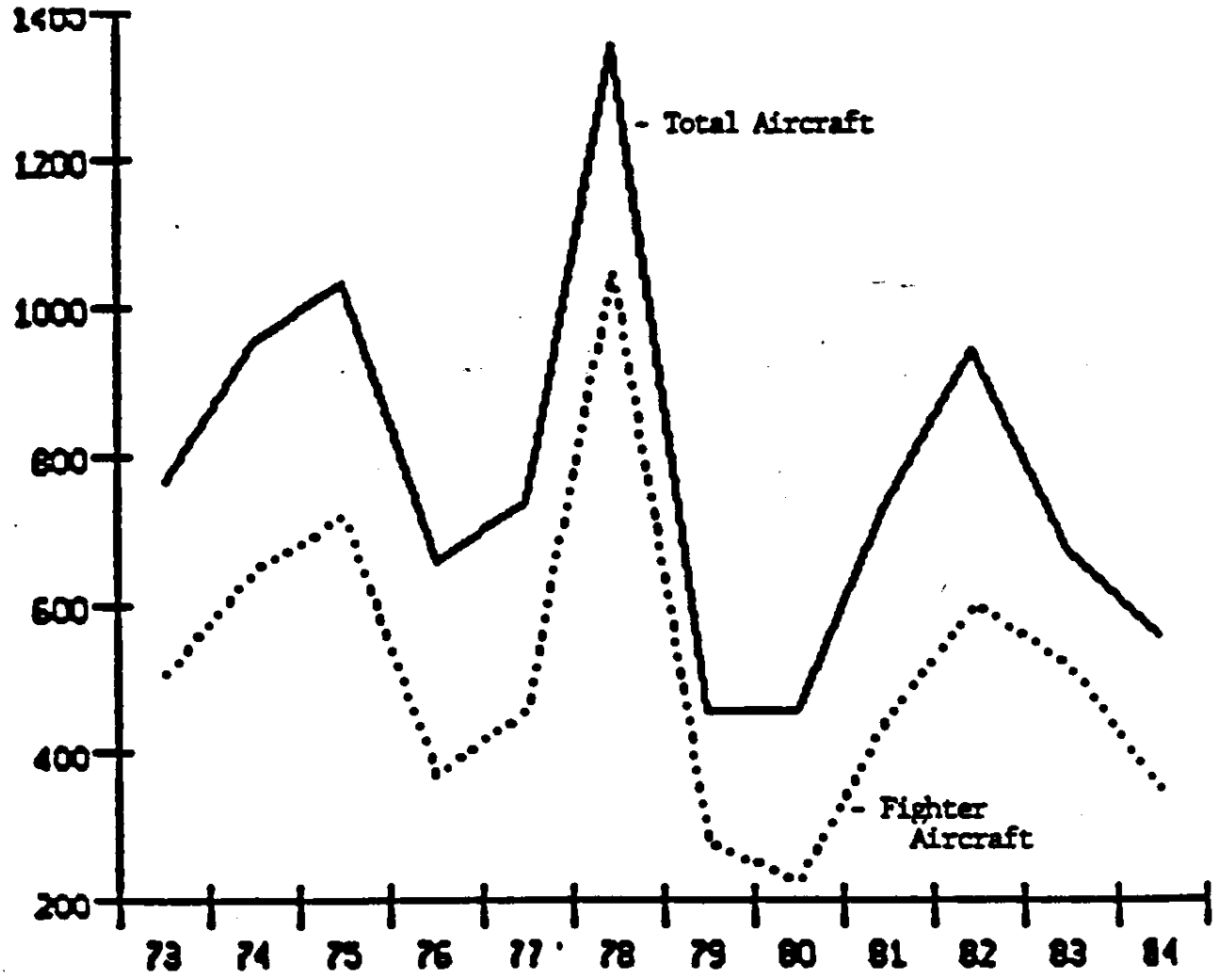
Export Quantity of Military Aircraft



Source: U.S. Department of Commerce, Bureau of the Census
Foreign Trade Statistics

CHART II.B.4

Export Value of Military Aircraft
(in millions of constant 1972 dollars)



Source: U.S. Department of Commerce, Bureau of the Census
Foreign Trade Statistics

The DPA 309 database indicate that offsets are a factor in the competition for military aerospace sales. Over 67 percent of the reported offset-related sales were conducted with industrialized nations, primarily those of NATO, Australia, and Japan. The largest volume of offset-related trade was with the nation of Israel. The clear majority of all offset obligations, 77 percent, were with these industrialized nations.

With respect to industry distribution, the majority of all military offset-related sales reported by the corporations surveyed were in the U.S. aerospace industry. In the 1980-1984 period, U.S. aerospace firms surveyed entered into sales agreements valued at $15.3 billion, or 68 percent of the total reported by all corporations surveyed (see Table II.B.5).

Offset obligations incurred by the U.S. aerospace industry as a result of these sales totalled $4.0 billion, of which $1.4 billion or 26 percent were implemented during 1980-1984 (see Table II.C.5 for implementations, Table III.A.4 for sales, and Table III.A.8 for offset obligations values). The figures suggest that offsets are a particularly pervasive influence in the competition for certain export sales of aerospace defense systems.

TABLE II.B.5

Total Aerospace Industry Military Export Sales and
Offset Obligations by Standard Industrial Classification
($ in millions)

Year		Standard Industrial Code 372	376	366	381	382	TOTALS
1980							
	Sales	5,473.3	130.7	430.1	0	0	6,034.1
	Offsets	1,597.9	523.3	3.1	0	0	2,124.3
	Percent	29.2%	400.3%	0.7%	--	--	35.2%
1981							
	Sales	3,014.5	34.4	0	0	0	3,075.9
	Offsets	991.4	6.3	0	0	0	997.7
	Percent	32.9%	18.4%	--	--	--	32.4%
1982							
	Sales	33.6	31.2	7.9	0	0	72.7
	Offsets	0.9	10.0	8.4	0	0	19.3
	Percent	2.7%	32.0%	106.3%	--	--	26.5%
1983							
	Sales	3,372.6	0	231.8	0	0	3,604.5
	Offsets	47.5	0	0.9	0	0	48.4
	Percent	1.4%	--	0.3%	--	--	1.3%
1984							
	Sales	2,050.2	258.0	161.3	0	27.3	2,496.8
	Offsets	767.8	7.1	45.9	0	5.5	826.3
	Percent	37.4%	2.7%	28.4%	--	20%	33.1%
GRAND TOTALS:							
	Sales	15,284					
	Offsets	4,016					
	Percent	26.3					

Table III.A.9 disaggregates military offset obligations by type. Two interesting patterns are evident. The first is that 40 percent of the offsets provided are direct offsets (i.e., relate directly to the production of the system purchased) in the form of coproduction, licensed production, direct subcontracting, and technology transfer. The second pattern of interest is that the largest category of offsets reported is "Indirect But Not Specified." These patterns suggest that foreign purchasers attempt to maximize the industrial benefits to their economies by insisting that the selling corporation transfer new technologies and production methods. The selling corporation, on the other hand, will make every effort to convince the foreign purchaser that "best efforts" on the part of the seller, whereby the purchaser's comparative advantages can be exploited rather than specifying particular dollar amounts of production, is in the long-term best interest and developmental needs of the purchasing country.

Economic Costs and Benefits

The extent to which offsets are a positive influence on U.S. industrial competitiveness is dependent upon the relative costs and benefits of the direct and indirect effects that offsets can be expected to produce. Analysis of the DPA 309 data and collateral sources indicates that offsets have had a mixed impact on U.S. industrial competitiveness. The correlations that may be drawn between offsets and potential positive and negative impacts on U.S. industrial competitiveness are by no means exact, but analysis of the available data and literature supports several observations on the effects of offsets. These include:

- To the extent that military offsets enable U.S. defense contractors to achieve export sales that would not be possible without offsets, they have made a positive economic contribution to the U.S., and may have reduced the cost of weapon systems to the U.S. military below what the cost would have been absent the military export.

- Direct offsets, in the form of coproduction, licensed production, direct subcontracting, and technology transfers, contribute to the production base of foreign-producing nations, and may have a potential long-run negative effect on some sectors of the U.S. defense industrial base.

- Offsets increase the total numbers of U.S. weapons that are produced. However, they do not in all cases reduce costs by increasing economies of scale. In fact, in some cases they increase the costs of U.S. weapons by dividing the production run (see the 1981 Multinational Coproduction of Military Aerospace Systems report by the Rand Corporation).

Defense-related export sales with offset-related agreements for U.S. industries in the 1980 to 1984 period, were over $22 billion. Offset obligations were over $12.3 billion during the five-year period. From an industrial competitiveness standpoint, the benefits of offset agreements are less clear cut. While the sales concluded by the companies surveyed will have the effect of substantially increasing the economic benefits to the U.S. as well as the corporations involved, they also generated offset obligations of $12.3 billion dollars. The DPA 309 data on the types of offsets to be provided to purchasing nations shows that about 36 percent of the offsets will be provided as coproduction, licensed production, and direct subcontracting (for the life of offset obligations, see Table III.A.9). These arrangements may in the long-run have some adverse impact on U.S. competitiveness and, considering the much smaller economies of the countries that will receive these benefits, these offsets may result in some contribution to their economic health and competitiveness.

In the aerospace sectors, the impact of offsets was even more pronounced. Offset-related aerospace sales totaled $17.6 billion in 1980-1984 period. While the income that will be generated by these sales is substantial, the magnitude of the offsets required is significant. The next table illustrates actual exports of military aerospace products. In the 1980 to 1984 period, total U.S. aerospace exports totaled $23.4 billion. The positive trade balance in military export sales during the period was $20.2 billion.

TABLE II.B.6
U.S. Military Aerospace Trade
($ in millions)

	Exports	Imports	Balance
1980	2,258	325	1,933
1981	4,322	591	3,731
1982	5,995	691	5,304
1983	5,470	519	4,951
1984	5,350	1,026	4,324
5-Year Total	23,395	3,152	20,243

SOURCE: Aerospace Industry Association

Offset obligations are implemented over a period of years (for aerospace sales-related offset obligations, the average implementation period is 13.9 years), which has the effect of reducing their overall value. In the long-term perspective, however, the type of offsets that are implemented may be a subject of concern. Direct offsets in the form of coproduction, licensed production, and direct subcontracting can have the negative effect of creating competitors. Coproduction agreements and licensed production can not only transfer the technology of the aircraft, but also the production and management skills and equipment necessary to establish at least partial production capability in the recipient nation. However, offsets can both create and inhibit competition.

The DPA 309 data indicate that the magnitude of coproduction, licensing production, and direct subcontracting offsets is substantial. Over 55 percent of offsets obligations have been in the form of direct coproduction, licensed production, and direct subcontracting. The coproduction and direct subcontracting figures are particularly relevant from an industrial competitiveness standpoint. At the end of 1984, over $1.4 billion in offsets had been implemented in these categories. Offset implementations account for slightly over 11 percent of the $12.3 billion in offset obligations incurred by all firms surveyed in the 1980-1984 period.

After an industry infrastructure is created in a purchasing nation, the foreign government is committed often at great cost to sustaining the industry, because the structural, economic, and political implications of losing the jobs associated with the infrastructure limit the foreign government's political options.

To evaluate the direct offsets properly, it is necessary to evaluate them in terms of overall trends in weapons system procurement and competitiveness. The overall trend in weapons production and procurement for the past 20 years has been one of procuring fewer weapons at greater per unit costs. Deliveries of fighter/attack aircraft to the U.S. Air Force have declined from over 563 units in 1972, to 397 in 1983. In the same period, constant dollar per unit costs have risen from an average of $2.06 million per aircraft in 1968 to over $14 million constant dollars per aircraft on average in 1983. Comparisons of individual aircraft constant dollar costs show an even greater growth in costs per unit. In 1972 for example, a first-line fighter/attack aircraft, like the F-4, cost approximately $2.4 million constant dollars. Today's aircraft are more capable and technically sophisticated than aircraft of the previous generation.

This trend has several negative connotations for U.S. defense industrial competitiveness. Because sophisticated weapons systems are becoming more expensive to develop and deploy, it is difficult to procure sufficient quantities of aircraft to achieve optimum economies of scale in production. This effectively reduces the buying power of dollars appropriated for defense. By reducing the number of aircraft procured each year (stretching out the

production schedule), non-recurring costs are reduced, but the fixed costs are spread over fewer units of aircraft each year, which increases both unit and total costs. The problem of maintaining an up-to-date inventory of military aircraft is considerably more difficult for the nations of the Western Alliance, which, even when competing as a consortium cannot hope to match the economies of scale of the U.S. economy.

Offsets are a key factor in reducing what foreign purchasing governments view as the high cost of purchasing the state-of-the-art aircraft and developing the technologically sophisticated production infrastructures required in today's competitive defense environment. The F-16 coproduction offset agreement with the nations of Belgium, Denmark, the Netherlands, and Norway provides a particularly well documented example. This agreement, which was concluded with a consortium called the European Participating Government (EPG) in 1975, is generally acknowledged to be one of the most significant offset agreements.

In early 1974, the NATO nations of Belgium, Denmark, the Netherlands, and Norway formed a consortium for the common purchase of fighters to replace their aging F-104G aircraft. The nations of Sweden, France, and the United States were invited to submit proposals to supply the aircraft. The Swedish entry, the Saab 37E Viggin was initially favored by Denmark, which already operated Saab aircraft. The French entry, the Dassault F1E had been previously considered for purchase by Belgium and the Netherlands.

The American entries, the YF-17 (the competitor to the F-16 prototype) and the YF-16 (later to be selected by the U.S. Air Force as the F-16), were a newer generation aircraft with decidedly superior performance, but the Air Force had yet to select which prototype would be slated for full-scale production. In January 1975, the Air Force announced its decision to produce the F-16. Within five months, the EPG consortium had announced its preference for the F-16. Central to the EPG decision were the terms offered by representatives of the U.S. Government during the negotiations which developed between January 1975 and June of the same year. The Memorandum of Understanding (MOU) that resulted from these negotiations set forth the basic principles that would govern the sale, including the stipulation that the Department of Defense would require the U.S. contractors to coproduce the F-16 with the EPG, thus extending the production run and promoting more efficient use of resources. These negotiations were concluded in June 1975.

Under the terms of a Memorandum of Understanding negotiated between the EPG and the United States Government, the nations of the EPG were to receive offsets totalling approximately 58 percent of the purchase price of the 348 F-16 aircraft to be delivered to these nations. These offsets were to be provided essentially through work on the F-16 itself, although provision was made for any shortfalls to be provided through alternative trade. In addition, the Department of Defense agreed to stipulate in the development and production ontracts between the EPG and the two U.S. prime contractors, General Dynamics and Pratt and Whitney, that the EPG nations would receive contracts for:

- o 10 percent of the procurement value of the 650 F-16s being purchased by the U.S. Air Force;
- o 40 percent of the purchase value of all F-16s purchased by the EPG; and
- o 15 percent of the purchase value of all "third country" sales of the F-16.

The coproduction program with the EPG was implemented relatively smoothly when compared to programs of similar sophistication. The implementation of agreed offsets for the initial purchase was also efficient. By 1981, the offsets provided to the EPG had reached a level of 52 percent of the value of the 348 aircraft to be purchased. The program had also provided a significant amount of work to the U.S. prime contractors involved. The net value of the U.S. portion of the work involved in providing the initial order of 348 F-16s to the EPG was $1.27 billion in 1975 dollars.

There have been numerous short-term gains for U.S. subcontractors who were able to participate in the program (i.e., those firms whose products were not coproduced for the EPG F-16 program). This has allowed an increase in production volumes by most of the participating U.S. contractors and a decrease in unit prices for the items produced. A 1981 study by the DOD/U.S. Air Force highlights these economic gains, with data obtained through a survey of F-16 contractors including General Dynamics, Marconi Avionics Limited, Singer/Kearfott Division, Pratt & Whitney Aircraft and Westinghouse Electric Corporation. Similarly, there were benefits gained through the sale of equipment, technology, and licensing fees that would not have been possible in the absence of the coproduction arrangement.

On the other hand, coproduction raised unit costs and reduced the effectiveness of both U.S. and EPG defense budgets. A Rand Corporation/U.S. Air Force study titled "Multinational Coproduction of Military Aerospace Systems" estimates that the F-16 fighters, coproduced in Western Europe, are approximately 35 percent more costly for the EPGs than purchasing the aircraft directly from the U.S. manufacturer. Similarly, there were costs to the U.S. Government and private industry due to smaller production runs, lost R&D recoupment charges and the procurement of subcomponents (10 percent of total U.S. manufactured aircraft) from more expensive European subcontractors.

The Rand Corporation estimated that the initial agreement with the EPG had the effect of increasing the system cost of the 650 F-16s built for the U.S. Air Force by 5 percent. The cost of offsets for U.S. follow-on orders (i.e., U.S. production of F-16s in excess of 650) was estimated at 8 percent of the system cost. However, this assumes that the alternative of having U.S. firms produce all of the aircraft without offsets would have been acceptable to the EPG. This is probably unrealistic. The real alternative might have been for the EPG to buy from European manufacturers, which would have significantly increased costs for both the EPG and U.S.

Of concern to U.S. industrial competitiveness is the long-term impact of the technology, including industrial process, procedures, and techniques transferred to our European allies. The EPGs acknowledge that despite the increased costs, the F-16 MOU enhanced their industrial technology and employment base, and improved their trade balances vis-a-vis the U.S.

One important selling point for the F-16 coproduction program, which may have long-term repercussions for U.S. industrial competitiveness, was the opportunities it offered the EPGs for future military/commercial work. Utilizing the skilled labor, invested capital, and technology transferred through the F-16 MOU, many EPG firms are expanding their marketing capabilities. Examples of new competitors to U.S. firms are cited below:

- o DAF of the Netherlands is competing for new landing gear contracts with the skills and technology transferred through the F-16 coproduction arrangement with the U.S.-based Menasco Corporation.

- o Kongsberg Vapenfabrikk of Norway is entering the commercial maritime gyrocompass market based on experience and technology transferred by U.S. corporations through the F-16 program.

- o The Netherlands, in part through the technology and skills gained through the F-16 program, is committed to participating in the recently announced European Fighter Aircraft Program.

The F-16 example should not lead one to conclude that on a net basis, the U.S. is worse off on coproduction cases in general.

Conclusions

There are several general conclusions to be drawn on the effect of offsets on U.S. industrial competitiveness. These are necessarily broad observations, due to the fact that, while offset magnitudes and frequencies of occurance have increased, most of the offset obligations incurred by U.S. defense export firms between 1980-1984 have yet to be implemented. Consequently, their full effects cannot yet be analyzed with a high degree of precision. Analysis of the available data and collateral sources supports the following general conclusions:

- o American defense base industries are often obligated to offer offsets in order to participate in and remain competitive in the international marketplace.

- o Offsets are a factor in the competition for international defense sales, and are being used by foreign purchasing governments as a trade management tool for the purposes of preservation of foreign exchange, the targeted development of selected industrial sectors, and the enhancement of the capability of domestic industries through technology transfer.

- o Offsets are increasing foreign competition, particularly at the subcontractor level. However, without offsets, U.S. industry faces the prospect of losing business.

- o While offset-related sales of defense systems contribute to the marginal income of defense firms, the health of the industry depends primarily upon U.S. Government purchases.

C. Employment (Department of Labor)

Except for outright grants, all purchases from the U.S., be they purchases of military equipment and services or civilian goods and services will, in the long run, be paid for by the foreign buyer in the form of goods and services of equal value. In the short run, such purchases can, of course, be made with loans, but then both the interest on such loans and the principal will have to be repaid in the form of goods and services. Thus, all sales abroad sooner or later generate "offsets," whether or not the "offsets" are provided for directly in a contract, as they are in the case of military sales.

This being the case, a complete assessment of the impact of offsets must, therefore, take account of the unique aspects of such offsets, if any, in addition to those that are present in imports and exports in general. Are there such unique factors, and if there are, is their impact quantifiable? The answers depend largely on the unique forces that are introduced when governments are more active participants in trade, as they are in the case of military goods and services.

The most significant difference that one can observe centers around possible differences in objectives. Unlike trade in general where each party seeks to maximize the gain from the trade, the U.S. Government has as its objective the maximization of the defense capability of the alliance or of the Western world as a whole as well as the defense capability of the U.S. Given this objective, the United States might, for example, be willing to subsidize a greater share of Western defense R&D than it otherwise would. It might also be willing to bear other economic costs, such as higher per unit production costs inherent in coproduction agreements or in other kinds of offsets.

Similar considerations apply to the role played by foreign governments in the contract negotiations. Here, the government is the actual buyer of the military equipment and/or services. These purchases are therefore likely to involve political considerations as well as considerations of economy and efficiency. Among other things, foreign governments may have as their objectives domestic job creation and the acquisition of technology, in addition to, or perhaps in conflict with, their objectives of defense costs minimization. Such goals too may modify the terms of trade, the form of payments, and the international distribution of defense production.

However, contracts which involve offsets are signed, by and large, by private U.S. firms, not by the U.S. Government. Thus, the hypothesized differences are likely to emerge only to the extent that U.S. Government and foreign government participation can influence or modify the terms of trade. These and like considerations, or the tradeoffs they imply, are beyond the scope of this assessment. Accordingly, this examination of the impact of offsets is limited to the forces that are at play in international trade in general. Of course, these forces influence the levels of general well being, not just the levels of employment in any given country. But this assessment will concentrate on the impact of such trade on domestic employment.

Economic reasoning alone would lead one to associate foreign military sales with positive domestic employment effects and offsets to such sales with negative domestic employment effects. However, the magnitudes of both the positive and negative effects and, therefore, of the net effects of such sales will depend on, among other things, the labor intensity of goods and services that enter into these trades.

In this connection, it is important to note that sales and offsets can generate substantial employment effects even when their net employment effect is zero (i.e., when the positive effects of extra sales abroad equal the negative effects of offsets). Even in such instances, there may be substantial transfer costs which are incurred by workers dislocated from industries that are in competition with those producing the offsets. Such private costs are rarely, if ever, cancelled out by the gains in the industries that experience increases in employment. For this reason, this assessment will address the distributive effects of sales and offsets in addition to the gains and losses in overall employment. It should be remembered, however, that the distributive effects too are likely to be affected by the magnitude of the gains or losses in net employment.

Similarly, declines in employment opportunities are likely to be less costly than are declines in actual employment. This is true because a failure to expand employment, unlike an actual decline, does not impose dislocation costs. For these and other reasons, the estimation of the employment effects of sales and offsets requires, first of all, a knowledge of the levels and trends in dollar expenditures on the various categories of goods and services involved in military sales and offsets.

More importantly, the estimates depend on what assumptions one makes about the quantity of military trade in the absence of offsets. Sales that are made only when coupled with offsets can directly generate positive net domestic employment effects. The only exception to this rule are sales that are linked to offsets whose employment effects are equal to or exceed those involved in the original military sale. Thus, the estimation of the employment effects depends not only on the types of goods and services entering into the sales and offsets, but also on a knowledge of the probability of such sales in the absence of offsets. This

probability will in turn depend, in part, on the availability of substitute (foreign) sources of supply of military hardware.

Finally, the magnitude and indeed the direction of the employment effects will depend on a number of macroeconomic factors. Among such factors are the changes, if any, in the patterns of trade in other sectors of the economy, following or resulting from the original sales and offset arrangements. This point was highlighted earlier when it was pointed out that any sale abroad (export) must, in the long run, generate return flows of equal dollar value. These so-called "indirect" effects are likely to follow changes in the balance of trade and the concomitant changes in exchange rates or in interest rates induced by changes in the capital flows between the countries in question.

Domestic employment will, of course, also be influenced by changes in total demand for defense goods and services that are induced by changes in their prices. It is reasonable to assume, for example, that offset arrangements are likely to increase the costs of defense equipment produced in any single country. This result can be expected to follow the reduced scale of production which if coupled to fixed defense outlays would reduce the defense purchases and therefore the defense capabilities of the U.S. Of course, such a reduction may be more than compensated for by the increased defense capabilities of our allies. This would occur if offsets enable our allies to spend more on defense than without offsets, notwithstanding their negative effects on the per unit cost of production. The employment and welfare effects of total defense outlays or of shifts in outlays between defense and nondefense are beyond the scope of this analysis.

Similarly, this assessment does not address the question of profitability of defense production in the presence and absence of offsets. It is reasonable to assume, for example, that military sales abroad are profit-maximizing even when coupled to offsets. Otherwise, such offset arrangements would not form part of the contract. This also assumes that such contracts are entered into voluntarily (i.e., that they are not the result of Governmental coercion). Even such profit-maximizing arrangements, however, may generate direct negative employment effects, at least in industries that are in competition with those producing the offsets. Moreover, certain types of offsets, such as those involving technology transfers, may generate employment effects that will last long past the period of the initial contract. These long-term effects will, among other things, depend on the availability of alternative (non-U.S.) weapons technology and the rate of development of such technology abroad in the absence of offsets. Due to the lack of reliable data in these areas, a comprehensive examination of such long-term effects, too, are beyond the scope of this study.

This section attempts to estimate the employment effects of such sales and offsets under several alternative assumptions. Because of the uncertainties involved and because of the shortcomings in the data used in the analysis, the derived estimates are, at best, tentative and must be used with caution.

Methodological and Measurement Issues

The theoretical considerations explored above provide a framework for the estimation of the effects of military sales and offsets on domestic production and employment. They do not, by themselves, provide the basis for the quantification of these effects. Specific estimates can be derived in only one of two ways. The first and most direct way is to estimate U.S. employment that is associated with the production of the goods and services that are involved in military sales and offsets. The second method is less direct. It involves a model which estimates the employment effects on the basis of the dollar amounts that are involved in sales and their associated offsets. However, for a variety of both data and methodological shortcomings discussed below both of these approaches generate highly imprecise estimates. For these reasons, the reader is advised to use these estimates with caution. These derived figures are interpreted as indicative more of the direction of the employment effects rather than as quantitative estimates of the true effects.

The first method referred to above relies on corporate estimates of the number of employees that are required to produce the equipment and services for their foreign sales and/or offsets. By their very nature, such estimates are likely to be imprecise. In this connection, it must be remembered that military sales involve mostly major weapons systems that were developed for the U.S. military services. The contracts on both domestic and foreign sales of such equipment are fulfilled over extended periods of time and the foreign sales generally involve extensions of the length of the production runs rather than specific additions to the work force. This being the case, the manufacturer is often unable to provide a precise estimate of the employment impact of given sales.

Precise estimates of the employment impact of offsets are even more difficult to derive. For one, offsets often involve foreign rather than domestic subcontractors. Also, offsets generally are implemented over longer periods than are sales, and some contracted offsets are never implemented. This is the case for at least a fraction of the so-called "best effort" offsets.

Finally, corporations that enter into sales agreements are able to estimate their own employment effects. They are unlikely to know the secondary employment effects (i.e., the effects on firms that produce and supply the whole range of inputs used by the prime contractors. In any event, prior to the current DPA 309 survey, there were no such estimates of the employment effects of military sales and offsets. The estimates generated from this survey which are reported later on in this chapter are subject to the above-mentioned limitations and are therefore extremely imprecise.

The second or indirect method of estimation is subject to somewhat different but equally severe limitations. Such estimates must begin with reliable information on trade, or rather with information about incremental changes in the dollar amounts involved in sales and offsets. The second step in this process requires

the translation of dollar changes in trade into actual or potential changes in domestic production. This step is important because the domestic employment effects, if any, can arise only from changes in domestic production.

In this connection, it is worth noting that not all changes in the dollar amounts of sales and offsets impact on domestic production. For instance, U.S. sales of equipment produced by a foreign subsidiary do not generate changes in domestic production. Similarly, offsets which take the form of indirect foreign investment are unlikely, at least in the short and intermediate runs, to translate into specific changes in domestic production and employment. Finally, the third step in the process translates or links changes in domestic production into concomitant changes in domestic employment.

Of the three steps involved in the indirect method of estimation, the first, namely the estimates of the dollar amounts of sales and offsets, is the simplest one and the easiest to implement. It is also likely to generate the most accurate figures. These figures are generated from contractual data supplied by corporations included in the DPA 309 survey.

The second step, that of translating sales and offset data into domestic production effects, involves making several assumptions. For instance, excluded from the DPA 309 survey were sales made by foreign subsidiaries and offset obligations undertaken by foreign subcontractors. In addition, this study classifies offset obligations on the basis of their potential impact on production in either U.S. export- or import-competing industries as well as on the basis of indirect offsets which are unlikely to impact on domestic production at all, at least not in the short or intermediate runs. All of these assumptions and classifications introduce potential errors in the final estimates.

The third and final step in this process, that of linking assumed production changes to employment effects, is the most complex of the three and relies more on faith than on science. It is therefore likely to introduce the greatest amount of imprecision into the derived estimates. This step employs the input-output (I-O) tables produced by the Department of Commerce and used by the Departments of Commerce and Labor, as well as a number of other agencies. These tables, produced once about every five years, show the relationship between dollar amounts of final output and the various inputs used in that year to generate that output. These tables show the labor content of dollar outputs by industry.

Unlike the survey responses, the input-output approach has the virtue of including the secondary (i.e., supplying industries), in addition to the primary labor inputs or requirements. They thus enable one to estimate the indirect labor requirements as well as the direct labor requirements of given dollar production levels. Unfortunately, these tables were not designed to reflect the changes in labor use or in employment that result from a given

increase or decrease in production (i.e., the marginal labor requirements), which is needed to estimate the employment effects of given military sales and their associated offsets. This distinction between the amounts of labor involved in a given level of production and the change in the labor input that results from or that follows a given change in output is especially important in the case of the changes in military sales and offsets. In this case, the normal problems of the use of the I-O tables are magnified.

For example, a major problem with the use of the I-O matrix to predict employment changes or effects resulting from production changes is the implicit assumption that changes in inputs, including labor, are proportional to changes in output. This is unlikely to be the case in many production processes, in particular in the production of military equipment. What is involved here is extensive research and development of a weapon system which is to be produced for the U.S. military. This involves extensive R&D outlays and activity as well as the design and establishment of factories and lines of production for the number of units that are budgeted for the U.S. forces. These are fixed expenditures of inputs, including labor, that are unlikely to be affected by additional orders placed by foreign purchasers. Of course, many of these expenditures, such as those on capital formation, are excluded even from the average figures of the I-O tables. Even so, changes in output are unlikely to require proportional changes in inputs. In addition, the proportionality assumption denies the existence of economies of scale.

This problem gets compounded in the estimation of the secondary employment effects. Here, the implicit assumption involved in the use of this model is that the industries producing inputs for the primary industry are affected in proportion to their average contributions that they made prior to the change in final output. This is unlikely to hold even in the simple and most direct relationship between the production of, say, raw steel and iron ore. Even here, a change in output of raw steel may not induce a proportionate change in the production of iron ore, let alone in employment in the iron ore mining industry, at least not in the short run, for both iron ore and labor can and are often inventoried.

The proportionality assumption is even less likely to hold in the case of changes in the sales of final goods, such as military fighter aircraft. First, a change in production of fighter aircraft may not lead to a change in employment in the aircraft industry as a whole, especially not when this change happens to occur at the time of an opposing change in demand for military cargo planes or for civilian aircraft. The given change in demand for fighter planes is even less likely to have a comparable effect on employment in, say, the rubber industry that produces tires for fighter aircraft but whose output is used in many other industries in addition to the aircraft industry as a whole, let alone the military fighter aircraft industry.

Finally, the proportionality assumption is least likely to hold in the case of trade in military hardware. As was suggested above, unlike goods in general, extra sales of military hardware often lead to extensions of the production runs of already developed and produced weapon systems. These extensions are of finite length until replacement or newer weapon systems are developed. Given the substantial fixed costs involved in their development and in the setting up of initial production runs, marginal extensions of these runs cannot possibly require proportionate increases in inputs, including the input of labor.

In addition, the use of the I-O matrix assumes implicitly that the sales and offsets generate effects in the industries in question and that there are no balancing effects elsewhere in the economy resulting from such things as changes in exchange rates, capital flows, and so forth. This is equivalent to assuming that increases in sales produce equal increases in domestic GNP, whereas increases in offsets result in equal declines in domestic GNP. This is unlikely to be the case since, among other things, all increases in sales (exports) must be paid for with increased offsets (imports), at least in the long run. Such reasoning implies that as far as the economy at large is concerned, the employment effects of sales and offsets on the affected industries are likely to be balanced with opposing employment effects in the rest of the economy. These latter effects are not accounted for in the I-O approach. As a consequence, these estimates can at best be regarded as estimates of the effects on the industries directly affected by sales and offsets, not as the employment effects of such sales and offsets on the U.S. economy as a whole.

For these and other reasons, this report presents the estimates derived by both the direct and indirect methods described above. The estimates derived by these two estimates should bracket the actual effects in the industries in question. However, the employment effects on the economy at large are likely to be smaller than the lowest of our derived estimates. This conclusion is supported by theoretical considerations as well as by several major studies of the impact of changes in trade patterns on overall domestic employment.

The Estimation of Employment Effects of Sales and Offsets

As discussed above, the estimates of the employment effects of sales and offsets are derived either from the DPA 309 survey estimates of the changes in employment that resulted from these sales and offsets or from the employment effects of the same sales and offsets as derived from the I-O tables. The raw data for these two sets of estimates are provided by the DPA 309 survey. Prior to the development and presentation of those estimates, however, it is necessary to recall that both of the methods employed in this study generate biased estimates of the employment effects in the industries affected by the sales and offsets. But the second set of estimates, those produced by the I-O method, cannot and should not be considered as representing the upper limit of the actual employment effects. In fact, the data from the same survey reveal that the upper limits of the actual effects are likely to equal only about one-third

the effects estimated by means of the I-O tables. The same data plus knowledge of the direction of the biases suggest that the lower limits of the actual employment effects are likely to be in the neighborhood of those derived from the industry responses to the DPA 309 survey, the first method of estimation.

Industry Estimates of Employment Effects

With the above considerations in mind, the row labeled "sales" in Tables II.C.1 and II.C.2 present the estimates of the employment effects, by industry, of military sales derived from the industry survey responses. The estimates in the sales rows of both of these tables are generated from the same set of responses. However, several of the responses (those representing about $292 million of sales implementations, or about 3.5 percent) were too vague to determine whether they represented the average employment effects for each year of the life of the contracts or whether they represented estimates of the total employment effects. These responses are assumed to reflect the total employment effect in the figures reported in the sales rows of Table II.C.1 and the annual employment effects in the figures reported in the sales rows of Table II.C.2. The figures in these two tables show that the employment effects of the added domestic production generated by sales agreements concluded during the period 1980-1984 were 29,212 or 33,117 job opportunities, depending on the interpretation given the imprecise responses. In addition, of the eight three-digit SIC industries affected by these sales, 81 percent (Table II.C.1) and 74 percent (Table II.C.2) of the gains in job opportunities occurred in the aircraft industry.

The estimates presented in Tables II.C.1 and II.C.2 are based on responses which are likely to contain errors of measurement, possibly sizable errors of measurement. These errors are likely to be present notwithstanding the retrospective nature of many of our survey responses. These responses are based on industry estimates derived in mid-1985 of the employment effects of sales and offset agreements concluded during the years 1980 through 1984. However, there is no a priori reason to believe that the errors of measurements in this survey are significantly greater than those present in other government surveys, including census employment and manufacturing surveys. Given the rather large sample, the random errors of measurement can be expected to cancel one another, leaving the estimates of the average employment effects presented in Tables II.C.1 and II.C.2 fairly stable and reliable, though subject to the reservations discussed below.

TABLE II.C.1
Direct Employment Impact of Military Sales and Offsets:
Based on Responses by Prime Contractors Holding Contracts with Offset Obligations Greater than $2 Million

Imprecise Responses Interpreted as Total Employment Effect

(Number of Job Opportunities)

SIC	Industry Description	Category	1980	1981	1982	1983	1984	Total
239	Miscellaneous Fabricated Textile Products	Offsets	0	0	0	0	-3	-3
348	Ordnance and Accessories Except Vehicles and Guided Missiles	Sales	0	0	22	66	149	237
351	Engines and Turbines	Sales	0	113	205	143	123	584
		Offsets	0	-16	-30	-21	-18	-85
		Net	0	97	175	122	105	499
366	Communication Equipment	Sales	246	445	327	461	606	2,085
		Offsets	-81	-147	-103	-88	-81	-500
		Net	165	298	224	373	525	1,585
367	Electronic Components and Accessories	Sales	0	70	149	127	353	699
		Offsets	0	-29	-82	-87	-67	-265
		Net	0	41	67	40	286	434
371	Motor Vehicles and Motor Vehicle Equipment	Sales	0	0	177	321	224	722
372	Aircraft and Parts	Sales	2,244	4,776	4,139	4,935	7,565	23,659
		Offsets	+20	-263	-519	-369	-662	-1,793
		Net	2,264	4,513	3,620	4,566	6,903	21,866
376	Guided Missiles and Space Vehicles and Parts	Sales	102	227	204	163	195	891
		Offsets	0	-4	-7	-5	-8	-24
		Net	102	223	197	158	187	867
379	Miscellaneous Transportation Equipment.	Sales	21	40	28	59	187	335
737	Computer and Data Processing Services..	Offsets	0	0	-26	-47	-33	-106
	TOTALS	Sales	2,613	5,671	5,251	6,275	9,402	29,212
		Offsets	-61	-459	-767	-617	-872	-2,776
		Net	2,552	5,212	4,484	5,658	8,530	26,436

TABLE II.C.2
Direct Employment Impact of Military Sales and Offsets:
Based on Responses by Prime Contractors Holding Contracts with Offset Obligations Greater than $2 Million

Imprecise Responses Interpreted as Employment Per Year

(Number of Job Opportunities)

SIC	Industry Description	Category	1980	1981	1982	1983	1984	Total
239	Miscellaneous Fabricated Textile Products	Offsets	0	0	0	0	-33	-33
348	Ordnance and Accessories Except Vehicles and Guided Missiles	Sales	0	0	103	320	528	951
351	Engines and Turbines	Sales	0	113	205	143	123	584
		Offsets	0	-16	-30	-21	-18	-85
		Net	0	97	175	122	105	499
366	Communication Equipment	Sales	246	445	426	640	738	2,495
		Offsets	-81	-147	-103	-88	-81	-500
		Net	165	298	323	552	657	1,995
367	Electronic Components and Accessories	Sales	0	70	149	127	353	699
		Offsets	0	-29	-88	-99	-75	-291
		Net	0	41	61	28	278	408
371	Motor Vehicles and Motor Vehicle Equipment	Sales	0	0	177	321	224	722
372	Aircraft and Parts	Sales	2,244	4,776	4,259	5,248	7,892	24,419
		Offsets	+20	-263	-542	-411	-691	-1,887
		Net	2,264	4,513	3,717	4,837	7,201	22,532
376	Guided Missiles and Space Vehicles and Parts	Sales	102	227	204	163	195	891
		Offsets	0	-4	-7	-5	-8	-24
		Net	102	223	197	158	187	867
379	Miscellaneous Transportation Equipment.	Sales	150	277	199	418	1,312	2,356
737	Computer and Data Processing Services..	Offsets	0	0	-26	-47	-33	-106
	TOTALS	Sales	2,742	5,908	5,722	7,380	11,365	33,117
		Offsets	-61	-459	-796	-671	-939	-2,926
		Net	2,681	5,449	4,926	6,709	10,426	30,191

Aside from random errors, the employment data generated from the DPA 309 survey contain several biases which are likely to either under or overestimate the total employment effects of military sales and offsets. To begin with, the corporate responses to the survey request to "briefly describe the domestic employment impact on your firm of (a) the sales agreement and (b) the resulting offset obligation" will only generate the direct employment effects. This question is unlikely to elicit responses on the employment effects in industries which supply inputs to the firms in the survey (i.e., the indirect employment effects). To this extent, the estimates presented in the sales rows of Tables II.C.1 and II.C.2 systematically understate the total employment effects of military sales agreement concluded during this five-year period.

A second downward bias in the estimates is due to non-responses, as well as to responses which were subjective in nature. The latter group of responses did not provide quantitative estimates of the employment effects, though 57 of them indicated that the employment effects of these sales were positive.

The importance of these non-responses plus the subjective responses is revealed by a comparison of the sales implementation figures presented in Tables II.C.3 and II.C.4. These show, respectively, the dollar value of all sales implementations (Table II.C.3) and the sales implementations of firms which provided definitive estimates of their employment effects (Table II.C.4). The difference in these two sets of figures, or about $1.6 billion, represents about 16.1 percent of the sales agreements implemented during the years 1980-1984, inclusive. This difference is likely to lead to a proportionate underestimation of the employment effects, assuming that the labor intensity involved in the production for non-response sales equaled, on the average, the intensity for firms which provided definitive estimates of their sales employment effects.

Similarly, firms which had sales that included offset obligations of less than $2 million were not asked to provide employment estimates, either for those sales or for the resulting offset obligations. As a consequence, the estimates of the employment impact of such sales are not included in the sales row of Tables II.C.1 and II.C.2.

On the other hand, the estimates included in these two tables contain at least one upward bias concerning the direct employment effects of sales with offset obligations of $2 million or more. This bias arises from the fact that the firms included in the sample are limited to those which signed, what were presumably, profitable military sales contracts, notwithstanding the resulting offset obligations. If the responses contain a bias, they are likely to overstate the positive employment effects of the sales and understate the negative effects of the offsets.

TABLE II.C.3
Military Sales Implementations for Contracts with Offset Obligations Greater than $2 Million:
All Survey Respondents

(thousands of current dollars)

SIC	Industry Description	1980	1981	1982	1983	1984	Total
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	3,785	20,376	37,721	54,672	116,554
351	Engines and Turbines	0	169,492	307,114	214,400	392,755	1,083,762
366	Communication Equipment	50,320	91,178	64,576	83,421	119,515	409,010
367	Electronic Components and Accessories	53,334	126,544	141,700	178,795	306,441	806,815
371	Motor Vehicle and Motor Vehicle Equipment	0	3,504	37,844	61,501	43,643	146,492
372	Aircraft and Parts	640,376	1,513,039	1,453,054	1,542,996	1,983,110	7,132,575
376	Guided Missiles and Space Vehicles and Parts	15,292	31,736	30,291	28,308	54,468	160,094
379	Miscellaneous Transportation Equipment	4,080	8,773	7,662	19,549	60,195	100,259
737	Computer and Data Processing Services	0	0	1,525	2,764	1,929	6,219
	Miscellaneous	0	0	0	0	4,450	4,450
	TOTAL	763,402	1,948,050	2,064,144	2,169,454	3,021,179	9,966,229

TABLE II.C.4
Military Sales Implementations for Contracts Which Gave Numerical Labor Impact Estimates

(thousands of current dollars)

SIC	Industry Description	1980	1981	1982	1983	1984	Total
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	0	5,761	18,462	33,707	57,931
351	Engines and Turbines	0	70,200	127,200	88,800	137,871	424,071
366	Communication Equipment	49,712	90,076	63,807	80,555	106,127	390,276
367	Electronic Components and Accessories	3,042	24,362	49,041	47,147	62,434	186,026
371	Motor Vehicle and Motor Vehicle Equipment	0	0	31,495	57,068	39,840	128,403
372	Aircraft and Parts	632,433	1,492,115	1,431,172	1,514,282	1,934,781	7,004,783
376	Guided Missiles and Space Vehicles and Parts	4,762	12,656	16,971	16,878	19,496	70,763
379	Miscellaneous Transportation Equipment.	4,080	8,773	6,662	19,549	60,195	100,259
	TOTAL	694,028	1,698,181	1,733,110	1,842,741	2,394,450	8,362,511

The net effect of these opposing biases is uncertain. We can state that they exclude the indirect employment effects, but are likely to overstate the direct effects of the sales for which the firms provided definitive employment estimates.

Finally, the figures reported in the sales row of Tables II.C.1 and II.C.2 are meant to represent the lower bound estimates of the positive employment effects of the sales alone, not the lower bound estimates of the combined transactions of sales and resulting offsets. These net employment effects depend on several other factors, including the assumptions one makes about the likelihood of such sales in the absence of the contractually linked offset obligations. These factors will be explored in greater detail below, in conjunction with the presentation of the employment estimates derived by means of the I-O tables. At this stage, it seems reasonable to derive the net effects of such sales by subtracting the estimates of the effects of offsets reported in the offset rows from those estimates reported in the sales rows of Tables II.C.1 and II.C.2 above. The offsets often affect industries other than those benefiting from the sales. For this reason, the employment effects of offsets affecting industries other than those benefiting from the sales are subtracted from the total sales effect to obtain the total net employment effect.

In the estimates of the effects of offsets, the biases discussed in conjunction with the sales data are all present, and are indeed magnified. In the case of offsets, the firms assessing the employment effects have an incentive to understate rather than overstate them as was the case with sales. The change in direction of this bias suggests that we should consider the industry estimates of the employment effects of offsets as the lower bound estimates of the actual effects. In other words, the actual effects of offsets are likely to be greater than those recorded in the offset row of Tables II.C.1 and II.C.2.

Unlike the sales, where most of the production effects were experienced by the prime contractors (the principal respondents to the DPA 309 survey), the offsets may have had an impact on a large number of subcontractors. As a consequence, the estimates of the employment effects that are derived from this survey are likely to understate the actual effects. In the case of offsets, for example, the survey responses understate the direct as well as the indirect employment effects by significant amounts. In the case of sales, this particular bias led to the underestimation of the indirect employment effects only.

The non-response rate to the employment question was substantially greater in the case of offsets than in the case of sales. This is apparent from a comparison of the figures in Tables II.C.5 and II.C.6 with those in Tables II.C.3 and II.C.4 above. Table II.C.5 shows the dollar amounts of offset implementations affecting a number of industries. Collectively they amount to slightly more than $2.4 billion for the period 1980-1984. Table II.C.6 shows that the dollar value of offset implementations for which firms provided definitive employment estimates was about $788 million, or about 33 percent of

the total. This means that value wise about two-thirds of the firms with offset obligations did not or were unable to provide estimates of their employment effects. The comparable figure for sales was only about 16 percent.

In part, this difference between sales and offsets is explained by the greater difficulty in estimating the employment effects of offsets, especially since a substantial fraction of offsets, over 43 percent, is associated with "best-effort" agreements which are non-binding. These offset agreements may never be fully implemented and may, therefore, have fewer, if any, domestic employment consequences. In part, however, the smaller percentage of responses may reflect the prime contractors inability to estimate the employment consequences of offsets that are implemented by other firms. This factor would tend to introduce a greater downward bias in the estimates for offsets than for sales.

Prior to proceeding with the second method of estimation, the reader should note that the particular biases apply only to the first method of estimation. Thus, the conclusion that the net employment effects in Tables II.C.1 and II.C.2 are likely to overstate the actual effects is a conclusion about the lower bound estimates of these effects, not about the actual employment effects which will lie somewhere in between those derived here and those derived by the second method.

Employment Effects Derived From I-O Tables

The virtue of the first method of estimation is that it relies on a firm's knowledge of its own production process in its derivation of the estimates of the employment effects of specific sales and offsets. Were it not for the bias arising from the firm's inability to estimate the indirect employment effects, this would be the preferred method to generate the estimates. Given these limitations, a second method is used, though this method too has many biases of its own. Fortunately, the biases associated with these two methods generally work in opposite directions. This may result in a bracketing of the actual employment effects. In addition, the data provided by the survey enables us to narrow the range of estimates provided by these two methods by a considerable amount.

TABLE II.C.5
Offset Implementations Based on Actual Implementations
of Contracts with Offset Obligations Greater than $2 Million

(thousands of current dollars)

SIC	Industry Description	1980	1981	1982	1983	1984	Total
339	Miscellaneous Primary Metal Products..	0	2,697	1,997	1,378	1,072	7,144
344	Fabricated Structural Metal Products..	0	43	0	17	19	79
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	0	104	14,186	61,026	75,316
349	Miscellaneous Fabricated Metal Products	0	0	912	2,356	11,273	14,541
351	Engines and Turbines	10,000	19,685	7,263	31,972	50,371	119,291
354	Metalworking Machinery and Equipment ..	0	0	13,000	7,000	8,000	28,000
356	General Industrial Machinery and Equipment	0	667	1,404	10,718	12,266	25,055
357	Office Computing and Accounting Machines	1,600	159	1,692	4,682	0	8,133
362	Electrical Industrial Apparatus	1,000	2,000	0	0	766	3,766
366	Communication Equipment	1,354	6,414	28,931	19,868	49,786	15,233
367	Electronic Components and Accessories..	45,166	54,337	78,379	88,066	198,170	464,118
369	Miscellaneous Electrical Machinery Equipment and Supplies	0	1,295	167	10,963	6,333	18,758
371	Motor Vehicles and Motor Vehicle Equipment	0	0	2,892	6,185	3,826	12,903
372	Aircraft and Parts	90,610	256,648	134,946	248,710	435,420	1,166,334
376	Guided Missiles and Space Vehicles and Parts	14,296	38,795	38,510	38,970	1,242	131,813
381	Engineering Lab Scientific and Research Instruments	0	0	0	0	10,246	10,246
384	Surgical Medical and Dental Instruments and Supplies	0	0	0	0	20,000	20,000

(continued)

(Table II.C.5 -- continued)

SIC	Industry Description	1980	1981	1982	1983	1984	Total
399	Miscellaneous Manufacturing Industries.	0	0	215	78	11,636	11,929
505	Metals and Minerals Except Petroleum Export/Import Wholesale	0	0	0	7,811	7,514	15,325
701	Hotels, Motels, and Tourist Courts	0	3,300	4,750	1,700	8,250	18,000
737	Computer and Data Processing Services..	5,000	4,150	657	2,184	2,764	14,755
807	Medical and Dental Laboratories	0	0	0	0	8,556	8,556
899	Services Not Elsewhere Classified	741	2,255	1,251	968	996	6,211
509/ 519	Miscellaneous Goods Export/Import Wholesale	400	3,100	1,100	700	20,000	25,300
	Miscellaneous (See table 15)	743	3,780	13,969	18,331	49,704	86,527
	TOTAL	170,910	402,525	336,889	518,543	988,186	2,417,053

TABLE II.C.6
Offset Implementations Based on Actual Implementations
for Contracts Which Gave Numerical Labor Impact Estimates

(thousands of current dollars)

SIC	Industry Description	1980	1981	1982	1983	1984	Total
339	Miscellaneous Primary Metal Products..	0	2,697	1,997	1,378	1,072	7,144
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	0	0	11,718	30,499	42,217
349	Miscellaneous Fabricated Metal Products	0	0	912	2,346	10,669	13,927
351	Engines and Turbines	10,000	19,685	7,263	31,972	28,168	97,088
354	Metalworking Machinery and Equipment ..	0	0	13,000	7,000	8,000	28,000
356	General Industrial Machinery and Equipment	0	0	831	1,954	1,590	4,375
362	Electrical Industrial Apparatus	0	0	0	0	766	766
366	Communication Equipment	1,354	6,414	28,931	19,868	49,786	106,353
367	Electronic Components and Accessories..	178	27,091	21,170	32,052	41,529	122,020
369	Miscellaneous Electrical Machinery Equipment and Supplies	0	0	0	0	46	46
371	Motor Vehicles and Motor Vehicle Equipment	0	0	2,892	6,185	4,100	13,177
372	Aircraft and Parts	10	58,503	59,782	65,410	101,953	285,658
376	Guided Missiles and Space Vehicles and Parts	0	186	372	0	0	558
381	Engineering Lab Scientific Research Instruments	0	0	0	0	10,436	10,436
399	Miscellaneous Manufacturing Industries.	0	0	530	78	11,587	12,195
505	Metals and Minerals Except Petroleum Export/Import Wholesale	0	0	0	7,811	7,514	15,325
701	Hotels, Motels, and Tourist Courts	0	100	0	0	24	124
737	Computer and Data Processing Services..	0	58	0	2,598	3,729	6,385
899	Services Not Elsewhere Classified	741	2,255	1,267	545	1,021	5,829
	Miscellaneous	552	2,095	1,843	3,099	9,202	16,791
	TOTAL	12,835	119,084	140,790	194,014	321,691	788,414

The strength of the second method lies in its ability to estimate the indirect as well as the direct employment effects. But it achieves both of these tasks in a round-about manner, requiring the introduction of a number of assumptions, each subject to significant error. This method begins with the dollar amounts involved in the sales obligations and offset implementations provided by the individual respondents to the DPA 309 survey. These dollar values do not, however, translate directly into employment effects. For one, the dollar amounts spent in different industries will generate different employment effects depending, among other things, on the quantities of labor (the labor intensities) required to produce their respective products. Though presumably known by the individual respondents, these labor-output relationships are available to outsiders only on an industry wide basis. This requires the estimation of sales and offset obligations incurred by industries, not those incurred by firms.

The dollar values of sales obligations incurred by industries are presented in Table II.C.7. The figures in this table show that during the period 1980-1984, the firms in the sample concluded foreign sales agreements amounting to about $22.4 billion. They also show that nearly 64 percent of the agreements were signed by firms in the aircraft industry alone and that about 89 percent of the sales agreements involved just three industries; engines and turbines, electronic components and accessories, and aircraft and parts. These percentages are based on the sub-total of sales which had offset obligations of $2 million or more, the only sales for which the industrial distribution is available.

The second step in this process involves the estimation of dollar expenditures streams which more nearly parallel the annual production levels. This is necessary because the total dollar sales figures provided by respondents are implemented over many years, sometimes over periods lasting more than 20 years. The far distant sales do not, however, affect current or near-term production. By extension, the total sales figures do not properly reflect the near-term employment effects. The sales implementation figures were not, unfortunately, provided by the firms in the sample. Estimates of these figures are presented in Table II.C.8.

TABLE II.C.7
Dollar Value of Military Sales Obligations, by Year and Industry: All Respondents

(thousands of current dollars)

SIC	Industry Description	1980	1981	1982	1983	1984	Total
SALES with Offset Obligations of Greater than $2 Million:							
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	32,347	115,542	72,126	155,327	375,342
351	Engines and Turbines	0	1,448,652	0	0	1,784,412	3,233,064
366	Communication Equipment	430,085	0	7,896	231,845	161,324	831,150
367	Electronic Components and Accessories	455,850	255,588	171,365	399,532	945,166	2,227,501
371	Motor Vehicles and Motor Vehicle Equipment	0	29,949	269,189	0	0	299,138
372	Aircraft and Parts	5,473,301	3,014,521	33,563	3,372,845	2,050,245	13,944,480
376	Guided Missiles and Space Vehicles and Parts	130,700	34,420	31,201	0	258,005	454,326
379	Miscellaneous Transportation Equipment	34,870	11,800	0	114,308	259,688	420,666
737	Computer and Data Processing Services	0	0	13,037	0	0	13,037
	Miscellaneous	0	0	0	0	38,038	38,038
	SUBTOTAL	6,524,806	4,827,277	641,793	4,190,656	5,652,205	21,836,730
SALES with Offset Obligations of Less Than $2 Million:							
	SUBTOTAL	72,600	125,700	69,000	140,500	155,700	563,500
TOTAL		6,597,406	4,952,977	710,793	4,331,156	5,807,905	22,400,230

TABLE II.C.8
Estimated Military Sales Implementation Values by Year and Industry

(thousands of current dollars)

SIC	Industry Description	1980	1981	1982	1983	1984	Total
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	3,843	20,825	38,699	56,044	119,411
351	Engines and Turbines	0	172,110	313,881	219,958	402,607	1,108,557
366	Communication Equipment	50,879	92,586	65,999	85,583	122,513	417,561
367	Electronic Components and Accessories	53,927	128,499	144,822	183,430	314,128	824,806
371	Motor Vehicles and Motor Vehicle Equipment	0	3,558	38,678	63,095	44,738	150,069
372	Aircraft and Parts	647,496	1,536,409	1,485,069	1,582,996	2,032,856	7,284,825
376	Guided Missiles and Space Vehicles and Parts	15,462	32,226	30,959	29,041	55,834	163,522
379	Miscellaneous Transportation Equipment	4,125	8,909	7,831	20,056	60,705	102,626
737	Computer and Data Processing Services	0	0	1,559	2,835	1,978	6,372
	Miscellaneous (See table 15)	0	0	0	0	4,562	4,562
	TOTAL	771,890	1,978,139	2,109,623	2,225,693	3,096,965	10,182,310

The sales implementation figures presented in Table II.C.8 were derived on the basis of the assumption that actual payments on all sales agreements will be made over a period which equals the average contractual implementation period, or over a period of about 7.4 years. The figures are also based on the assumption that within the initial five-year period, the patterns of production and deliveries on sales will parallel those of offsets. The latter distributions were provided by the respondents to the DPA 309 survey. Thus, sales agreements concluded in 1980 were assumed to be fully implemented by the end of May of 1987 and about 69 percent implemented by the end of 1984, the final year for which detailed data are available and, therefore, the final year of the study. Also, under these assumptions, sales agreements concluded in 1981 will be fully implemented by the end of May of 1988 and only about 58 percent implemented by the end of 1984. If these assumptions are accurate, only about $10.2 billion of the $22.4 billion worth of sales agreements concluded during 1980-1984 were implemented during this period.

The $10.2 billion figure includes the estimated implementations of sales agreements with offset obligations of less than $2 million. These implementations too will generate extra production and employment during 1980-1984. These sales were distributed across industries on the basis of the observed industrial distribution of sales with offset obligations of $2 million. The latter data were provided by the respondents to the DPA 309 survey.

The final step in this method is the estimation of the employment effects across industries. This is achieved by means of I-O and labor requirements tables, which provide estimates of both the direct and indirect employment effects of dollar expenditures in domestic industries. These estimates are recorded in the two parts of Table II.C.9. Part one of this table shows the direct employment effects and part two the total effects, including the effects in industries that supply inputs to those involved in the sales. These figures show that military sales during 1980-84 generated about 110,000 additional job opportunities in the industries involved in the sales and a total of about 249,000 opportunities overall. They also show, not unlike Tables II.C.1 and II.C.2, that 70 percent or more of the job opportunities occurred in the aircraft industry alone.

However, the figures in Table II.C.9 also reveal that the effects estimated by means of the I-O tables are much higher than, indeed are a multiple of, those derived by the first method (i.e., those presented in Tables II.C.1 and II.C.2. In fact, even the direct employment effects of these sales are on the average, over three times as large in the second method than in the first method of estimation, about 110,000 versus about 29,000 or 33,000 job opportunities in Tables II.C.1 and II.C.2.

TABLE II.C.9
Direct and Total Employment Effects of Military Sales by Industry: All Respondents

(Number of Job Opportunities)

SIC	Employment Effect/ Industry Description	1980	1981	1982	1983	1984	Total
Direct Employment Effect							
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	38	181	244	342	805
351	Engines and Turbines	0	1,394	2,637	1,848	3,181	9,059
366	Communication Equipment	722	1,222	838	1,018	1,323	5,124
367	Electronic Components and Accessories	1,030	2,287	2,462	2,715	4,115	12,609
371	Motor Vehicles and Motor Vehicle Equipment	0	29	294	410	268	1,002
372	Aircraft and Parts	8,676	19,051	17,078	16,147	18,702	79,655
376	Guided Missiles and Space Vehicles and Parts	156	348	56	470	73	1,103
379	Miscellaneous Transportation Equipment	50	102	80	148	444	824
737	Computer and Data Processing Services	0	0	38	65	44	147
	Miscellaneous (See table 15)	0	0	0	0	61	61
	TOTAL	10,635	24,471	23,664	23,065	28,554	110,389
Total Employment Effect							
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	97	494	700	936	2,227
351	Engines and Turbines	0	4,096	7,408	4,839	8,334	24,677
366	Communication Equipment	1,669	2,768	1,907	2,277	2,977	11,598
367	Electronic Components and Accessories	2,125	4,793	5,228	5,888	9,078	27,112
371	Motor Vehicle and Motor Vehicle Equipment	0	92	971	1,407	926	3,396
372	Aircraft and Parts	19,101	41,176	37,424	35,143	40,860	173,704
376	Guided Missiles and Space Vehicles and Parts	345	699	703	894	1,072	3,713
379	Miscellaneous Transportation Equipment	111	221	180	337	956	1,806
737	Computer and Data Processing Services	0	0	49	81	55	1,855
	Miscellaneous (See table 15)	0	0	0	0	122	122
	TOTAL	23,351	53,943	54,363	51,566	65,317	248,540

In interpreting the estimates derived by this second method, the reader should recall the earlier discussion of the upward biases introduced by this method, especially in the estimation of the indirect employment effects of sales and offsets. These biases are largely responsible for the refusal on the part of many experts and agencies to use this method for the derivation of the employment effects of exports and imports. This study, too, would not use this method were it not for the fact that the industry estimates included in Tables II.C.1 and II.C.2 exclude a number of sales and are unable to capture the indirect employment effects. Therefore, the data shown in Tables II.C.1 and II.C.2 are also highly unreliable. Fortunately, information provided by the DPA 309 survey on the direct employment effects can be used to estimate the size of what is probably the most significant bias in the estimates derived by means of the I-O tables. This information is used below to calculate the upper bounds of the actual employment effects of sales and offsets.

These adjustments or scalars are derived from a comparison of the estimates derived by the first method with those derived by the second method which are reported in Tables II.C.9 and II.C.10. For purposes of this comparison, the sum of the responses provided by the firms in the sample represent the sum of their estimates of their direct employment effects only, and those only for the sales by the limited number of firms which provided quantitative estimates of their employment effects. This interpretation is made in order to eliminate the downward bias in the firms' estimates arising from their exclusions of the indirect effects and from non-responses. This also assumes that the firms responding to the employment question know more about their own output-labor ratios than do the I-O tables, especially since the firms are estimating the employment effects of specific sales and offsets rather than the effects of their entire output, as is the case in the I-O tables.

Under the above assumptions, the estimates provided by the firms must be viewed as upper limit estimates of the direct employment effects in the firms which provided definitive employment effects. These are "upper limits" because the residual biases are positive (i.e., the responding firms have an incentive to overstate the positive employment effects of their sales, notwithstanding the resulting offset obligations).

This reasoning suggests that the upper bounds of the total employment effects, inclusive of the indirect effects, can be estimated by adjusting the estimates derived by method two downward. This is done on the basis of the ratio of the estimates of method one to those of method two derived for the direct employment effects of the identical sales only. Estimates of these employment effects are presented in Table II.C.10 and the above mentioned ratios are 0.323 and 0.367 for Tables II.C.1 and II.C.2. The adjusted figures, though substantially lower than those derived by means of the I-O tables, still represent the upper bounds of the actual employment effects of the sales. This is true because the residual biases are positive and because the upward biases of the I-O method are substantially greater in the case of the indirect than they are in the case of the estimates of the direct employment effects.

TABLE II.C.10

Direct Employment Impact from Military Sales Implementations for Contracts Which Gave Numerical Labor Impact Estimates

(Number of Job Opportunities)

SIC	Industry Description	1980	1981	1982	1983	1984	Total
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	0	50	116	206	372
351	Engines and Turbines	0	569	1,068	746	1,089	3,472
366	Communication Equipment	706	1,189	810	959	1,147	4,809
367	Electronic Components and Accessories	58	434	834	698	818	2,841
371	Motor Vehicles and Motor Vehicle Equipment	0	0	239	371	239	849
372	Aircraft and Parts	8,475	18,502	16,458	15,446	17,800	76,681
376	Guided Missiles and Space Vehicles and Parts	48	137	31	273	25	514
379	Miscellaneous Transportation Equipment	49	100	78	145	433	806
	TOTALS	9,336	20,930	19,569	18,754	21,757	90,345

The adjusted upper bound estimates together with the lower bound estimates of the net employment effects are presented in Table II.C.13. Prior to their presentation, however, it is worthwhile to examine the estimates of the adverse employment effects of offset derived by method two (i.e., by means of the I-O tables). The dollar values of offsets implementations during the period 1980-1984 are presented in Table II.C.11. The employment effects derived from these values by means of the I-O tables are presented in Tables II.C.12-A and II.C.12-B.

Though organized somewhat differently, the employment effects of offsets were derived in the same manner as were those for sales. In the case of offsets, both the dollar figures in Table II.C.11 and the employment estimates in Tables II.C.12-A and II.C.12-B are organized on the basis of their potential impact on either exporting industries, import competing industries, or on possibly other domestic industries, if at all. Thus, offsets which involve coproduction, licensed production and sub-contractor production are viewed as reducing the exports from the U.S. They do this by reducing the dollar values of the sales. Countertrade, on the other hand, is an indirect offset, and a form of barter, which is likely to affect import competing industries. Since many of the industries both export and import, the two groups will contain many of the same industries, though some of them will differ. The overlap is especially likely to occur in the case where the sales and offsets data are classified by rather broad 3-digit SICs. Finally, there is a group of offsets, such as indirect foreign investment and technology transfers whose effects on near term domestic production and employment are impossible to measure.

This three-fold classification of offsets is a useful one in that it helps one differentiate among several types of employment effects generated by offsets. The category of offsets labeled "exports", for example, is likely to reduce the dollar value of foreign sales. By itself, this reduction will decrease the rate of growth of employment in the industries affected by these sales. By definition such sales reductions do not lead to actual worker dislocations. For this group, then, both the approximately 20,000 direct and about 43,000 total job opportunities estimated here may be interpreted as reductions in the growth of job opportunities rather than as job losses. Employment in these industries may, of course, rise or fall, but such changes will be the result or other factors, such as declines or increases in domestic demand. The contribution of a decline in foreign sales alone will simply be a reduction in the rate of growth of employment, not an actual employment decline.

Countertrade, on the other hand, results in imports into the U.S. and is therefore likely to affect the actual employment in import competing industries. Employment in these industries too will be affected by many other factors which are operating at the same time. But the impact of this category of offsets, taken by itself, will be to reduce employment rather than merely to decrease the rate of growth of employment, as is the case with the export category of offsets. This means that the approximately 7,000 direct and 11,000 job opportunities estimated for this category of offsets could involve actual dislocations.

TABLE II.C.11
Estimated Offset Implementations by Type: Exports, Imports, and Domestic Production

(thousands of current dollars)

SIC	Offset Type/ Industry Description	1980	1981	1982	1983	1984	Total
Offset Type: Exports							
339	Miscellaneous Primary Metal Products.	0	2,697	1,997	1,378	1,072	7,144
344	Fabricated Structural Metal Products.	0	3,650	0	1,443	1,613	6,706
348	Ordnance and Accessories Except Vehicle and Guided Missiles	0	0	104	14,186	61,026	75,316
349	Miscellaneous Fabricated Metal Products	0	0	0	0	10,377	10,377
351	Engines and Turbines	10,000	19,685	7,263	9,422	48,840	95,210
356	General Industrial Machinery and Equipment	0	0	831	1,954	1,590	4,375
357	Office Computing and Accounting Machines	1,600	159	1,692	4,682	0	8,133
362	Electrical Industrial Apparatus	1,000	2,000	0	0	766	3,766
366	Communication Equipment	1,354	1,990	28,249	19,868	49,786	101,247
367	Electronic Components and Accessories	43,788	62,919	95,109	91,726	221,054	514,328
369	Miscellaneous Electrical Machinery Equipment and Supplies	0	1,455	188	12,320	7,117	21,080
371	Motor Vehicles and Motor Vehicle Equipment	0	0	1,348	3,169	533	5,050
372	Aircraft and Parts	72,291	151,389	117,578	145,827	220,936	707,351
376	Guided Missiles and Space Vehicles and Parts	585	621	1,390	970	1,242	4,808
399	Miscellaneous Manufacturing Industries	0	0	168	78	4,023	4,270
737	Computer and Data Processing Services	5,000	4,150	657	2,184	2,764	14,755
807	Medical and Dental Laboratories	0	0	0	0	9,106	9,106
899	Services Not Elsewhere Classified ...	741	2,255	1,251	968	996	6,211
	Miscellaneous	123	1,366	4,144	1,965	3,227	10,827
	SUBTOTAL	136,482	254,337	261,970	312,141	646,069	1,610,999

(continued)

(Table II.C.11 -- continued)

SIC	Offset Type/ Industry Description	1980	1981	1982	1983	1984	Total
Offset Type: Imports							
349	Miscellaneous Fabricated Metal Products	0	0	1,690	4,365	1,660	7,714
351	Engines and Turbines	0	0	0	22,550	1,485	24,035
354	Metalworking Machinery and Equipment.	0	0	16,807	9,050	10,343	36,200
356	General Industrial Machinery and Equipment	0	667	573	8,764	10,676	20,680
367	Electronic Components and Accessories	0	1,857	979	3,556	4,878	11,270
372	Aircraft and Parts	0	0	0	0	30,000	30,000
399	Miscellaneous Manufacturing Industries	0	0	47	0	7,623	7,670
505	Metals and Minerals Except Petroleum Export/Import Wholesale	0	0	0	7,811	7,514	15,325
701	Hotels, Motels, and Tourist Courts	0	3,300	4,750	1,700	8,250	100
451	Air Transportation Certificated Carriers	0	3,200	4,750	1,700	8,950	35,800
509/ 519	Miscellaneous Goods Export/Import Wholesale	3,301	25,584	9,078	5,777	165,059	208,800
	Miscellaneous	430	1,681	8,605	15,970	34,869	62,255
	SUBTOTAL	3,731	36,289	47,279	81,242	291,307	459,849

(continued)

(Table II.C.11 -- continued)

SIC	Offset Type/ Industry Description	1980	1981	1982	1983	1984	Total
Offset Type: Domestic Production							
351	Engines and Turbines	0	0	0	0	189,546	189,546
366	Communication Equipment	0	4,424	682	0	0	5,106
367	Electronic Components and Accessories	18,991	5,149	3,660	22,381	33,829	84,010
371	Motor Vehicles and Motor Vehicle Equipment	0	0	1,544	3,016	3,293	7,853
372	Aircraft and Parts	29,097	137,566	33,082	134,187	236,093	570,025
376	Guided Missiles and Space Vehicles and Parts	13,711	38,174	37,120	38,000	0	127,005
381	Engineering Lab Scientific and Research Instruments	0	0	0	0	10,246	10,246
384	Surgical Medical and Dental Instruments and Supplies	0	0	0	0	20,000	20,000
	Miscellaneous	232	804	1,282	1,450	14,274	18,041
	SUBTOTAL	62,030	186,117	77,370	199,034	507,280	1,031,832
TOTAL, All Offset Types		202,243	476,743	386,619	592,417	1,444,656	3,102,680

TABLE II.C.12-A
Direct Employment Effects of Offsets by Type: Exports, Imports, and Domestic Production

(Number of Job Opportunities)

SIC	Offset Type/Industry Description	1980	1981	1982	1983	1984	Total
Offset Type: Exports							
339	Miscellaneous Primary Metal Products	0	29	22	14	9	73
344	Fabricated Structural Metal Products	0	49	0	19	21	90
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	0	1	89	372	463
349	Miscellaneous Fabricated Metal Products	0	0	0	0	86	86
351	Engines and Turbines	92	159	61	79	386	777
356	General Industrial Machinery and Equipment	0	0	9	19	14	42
357	Office Computing and Accounting Machines	24	2	23	62	0	111
362	Electrical Industrial Apparatus	15	26	0	0	9	50
366	Communication Equipment	19	26	359	236	538	1,178
367	Electronic Components and Accessories	836	1,120	1,617	1,358	2,896	7,827
369	Miscellaneous Electrical Machinery Equipment and Supplies	0	15	2	113	62	192
371	Motor Vehicles and Motor Vehicle Equipment	0	0	10	20	3	34
372	Aircraft and Parts	1,005	1,953	1,411	1,560	2,099	8,028
376	Guided Missiles and Space Vehicles and Parts	9	8	18	11	12	58
399	Miscellaneous Manufacturing Industries	0	0	3	1	53	56
737	Computer and Data Processing Services	143	110	16	50	62	380
807	Medical and Dental Laboratories	0	0	0	0	321	321
899	Services Not Elsewhere Classified	19	55	28	19	19	140
	Miscellaneous (See table 15)	3	33	70	26	47	180
	SUBTOTAL	2,165	3,586	3,649	3,678	7,009	20,087

(continued)

(Table II.C.12-A -- continued)

SIC	Offset Type Industry Description	1980	1981	1982	1983	1984	Total
Offset Type: Imports							
349	Miscellaneous Fabricated Metal Products	0	0	21	48	16	86
351	Engines and Turbines	0	0	0	205	13	218
354	Metalworking Machinery and Equipment	0	0	254	127	129	510
356	General Industrial Machinery and Equipment	0	8	7	95	104	214
367	Electronic Components and Accessories	0	37	19	59	72	187
372	Aircraft and Parts	0	0	0	0	309	309
399	Miscellaneous Manufacturing Industries	0	0	1	0	130	131
505	Metals and Minerals Except Petroleum Export/Import Wholesale	0	0	0	145	127	272
701	Hotels Motels and Tourist Courts	0	182	246	52	376	856
451	Air Transportation Certification Carriers	0	35	0	9	60	103
509/ 519	Miscellaneous Goods Export/Import Wholesale	74	519	181	107	2,789	3,671
	Miscellaneous (See table 15)	12	14	28	95	216	364
	SUBTOTAL	86	795	757	942	4,341	6,920
Offset Type: Domestic Production							
351	Engines and Turbines	0	0	0	0	3,052	3,052
366	Communication Equipment	0	58	9	0	0	67
367	Electronic Components and Accessories	363	92	62	331	443	1,291
371	Motor Vehicles and Motor Vehicle Equipment	0	0	12	20	20	51
372	Aircraft and Parts	404	1,775	397	1,436	2,243	6,255
376	Guided Missiles and Space Vehicles and Parts	200	519	468	426	0	1,613
381	Engineering Lab Scientific and Research Instruments	0	0	0	0	126	126
384	Surgical Medical and Dental Instruments and Supplies	0	0	0	0	222	222
	Miscellaneous	3	11	17	51	38	120
	SUBTOTAL (See table 15)	971	2,455	965	2,263	6,143	12,796
	TOTALS, all offset types	3,222	6,836	5,370	6,882	17,493	39,803

TABLE II.C.12-B
Total Employment Effects of Offsets by Type: Exports, Imports, and Domestic Production

SIC	Offset Type/Industry Description	1980	1981	1982	1983	1984	Total
Offset Type: Export							
339	Miscellaneous Primary Metal Products	0	70	53	33	23	180
344	Fabricated Structural Metal Products	0	107	0	42	42	191
348	Ordnance and Accessories Except Vehicles and Guided Missiles	0	0	2	257	1,013	1,272
349	Miscellaneous Fabricated Metal Products	0	0	0	0	242	242
351	Engines and Turbines	271	469	171	207	1,011	2,129
356	General Industrial Machinery and Equipment	0	0	22	46	34	103
357	Office Computing and Accounting Machines	61	6	63	169	0	300
362	Electrical Industrial Apparatus	32	58	0	0	18	108
366	Communication Equipment	44	60	816	528	1,210	2,659
367	Electronic Components and Accessories	1,725	2,347	3,433	2,944	6,388	16,838
369	Miscellaneous Electrical Machinery Equipment and Supplies	0	40	5	306	169	519
371	Motor Vehicles and Motor Vehicle Equipment	0	0	34	70	11	115
372	Aircraft and Parts	2,125	4,027	2,939	3,208	4,397	16,697
376	Guided Missiles and Space Vehicles and Parts	17	16	34	21	24	113
399	Miscellaneous manufacturing Industries	0	0	6	2	115	123
737	Computer and Data Processing Services	181	139	20	62	77	480
807	Medical and Dental Laboratories	0	0	0	0	375	375
899	Services Not Elsewhere Classified	25	73	36	26	25	184
	Miscellaneous (See table 15)	4	44	130	47	77	302
	SUBTOTAL	4,487	7,454	7,766	7,970	15,252	42,930

(continued)

(Table II.C.12-B -- continued)

SIC	Offset Type/Industry Description	1980	1981	1982	1983	1984	Total
Offset Type: Imports							
349	Miscellaneous Fabricated Metal Products	0	0	48	110	38	196
351	Engines and Turbines	0	0	0	487	31	518
354	Metalworking Machinery and Equipment	0	0	439	216	224	879
356	General Industrial Machinery and Equipment	0	17	15	204	226	463
367	Electronic Components and Accessories	0	71	36	117	143	367
372	Aircraft and Parts	0	0	0	0	588	588
399	Miscellaneous Manufacturing Industries	0	0	2	0	225	226
505	Metals and Minerals Except Petroleum Export/Import Wholesale	0	0	0	210	187	397
701	Hotels Motels and Tourist Courts	0	213	287	60	433	993
451	Air Transportation Certificated Carriers	0	62	0	15	107	185
509/519	Miscellaneous Goods Export/Import Wholesale	105	747	259	155	4,110	5,376
	Miscellaneous (See table 15)	16	18	38	151	360	583
	SUBTOTAL	121	1,128	1,123	1,727	6,674	10,773
Offset Type: Domestic Production							
351	Engines and Turbines	0	0	0	0	5,269	5,269
366	Communication Equipment	0	132	20	0	0	152
367	Electronic Components and Accessories	748	192	132	718	978	2,769
371	Motor Vehicles and Motor Vehicle Equipment	0	0	39	67	68	174
372	Aircraft and Parts	855	3,659	827	2,952	4,698	12,992
376	Guided Missiles and Space Vehicles and Parts	402	1,012	921	825	0	3,159
381	Engineering Lab Scientific and Research Instruments	0	0	0	0	279	279
384	Surgical Medical and Dental Instruments and Supplies	0	0	0	0	536	536
	Miscellaneous (See table 15)	7	17	29	62	56	171
	SUBTOTAL	2,013	5,013	1,967	4,624	11,884	25,500
	TOTALS, all offset types	6,621	13,595	10,857	14,321	33,810	79,203

TABLE II.C.13-A
Estimated Range of Total Employment Effects of Sales and Offsets, 1980-1984 Inclusive

(Number of Job Opportunities)

SIC	Industry Description	UPPER BOUND VIA SCALAR 1 Table 9 Effect of Sales	Table 12B Effect of Offsets	Net Effects	LOWER BOUND Table 1 Net Effects	UPPER BOUND VIA SCALAR 2 Table 9 Effect of Sales	Table 12B Effect of Offsets	Net Effects	LOWER BOUND Table 2 Net Effects
339	Miscellaneous Primary Metal Products		58	-58			66	-66	
344	Fabricated Structural Metal Products		62	-62			70	-70	
348	Ordnance and Accessories Except Vehicles and Guided Missiles	719	411	308	237	817	467	350	951
349	Miscellaneous Fabricated Metal Products		141	-141			161	-161	
351	Engines and Turbines	7,971	2,557	5,414	499	9,056	2,905	6,151	499
354	Metalworking Machinery and Equipment		284	-284			323	-323	
356	General Industrial Machinery and Equipment		182	-182			207	-207	
357	Office Computing and Accounting Machines		97	-97			110	-110	
362	Electrical Industrial Apparatus		35	-35			40	-40	
366	Communication Equipment	3,746	908	2,838	1,585	4,256	1,032	3,224	1,995
367	Electronic Components and Accessories	8,746	6,452	2,294	434	9,950	7,330	2,620	408
369	Miscellaneous Electrical Machinery Equipment and Supplies		168	-168			190	-190	
371	Motor Vehicles and Motor Vehicle Equipment	1,097	93	1,004	722	1,246	106	1,140	722
372	Aircraft and Parts	56,106	9,779	46,327	21,866	63,749	11,111	52,638	22,532
376	Guided Missiles and Space Vehicles and Parts	1,199	1,057	142	867	1,363	1,200	161	867
379	Miscellaneous Transportation Equipment	583		583	335	663		663	2,356
381	Engineering Lab Scientific and Research Instruments and Supplies		90	-90			102	-102	
384	Surgical Medical and Dental Instruments and Supplies		173	-173			197	-197	
399	Miscellaneous Manufacturing Industries		113	-113			128	-128	
451	Air Transportation Certificated Carriers		60	-60			68	-68	
505	Metals and Minerals Except Petroleum Export/Import Wholesale		128	-128			146	-146	
701	Hotels, Motels and Tourist Courts		321	-321			364	-364	
737	Computer and Data Processing Services	60	155	-95	-106	68	176	108	-106
807	Medical and Dental Laboratories		121	-121			138	-138	
899	Services Not Elsewhere Classified		59	-59			68	-68	
509/519	Miscellaneous Goods Export/Import Wholesale		1,736	-1,736			1,973	-1,973	
	Miscellaneous (See table 15)	39	341	-302	-3	45	388	-343	-33
	TOTAL	80,278	25,582	54,696	26,436	91,214	29,068	62,146	30,191

TABLE II.C.13-B
Net Total Employment Effect of Military Sales and Offsets, 1980-84

(Number of Job Opportunities)

SIC	Industry Description	Lower Bounds Reported in Survey Table 1	Lower Bounds Reported in Survey Table 2	Upper Bounds I-O Estimates Adjusted by Scalar 1	Upper Bounds I-O Estimates Adjusted by Scalar 2
	Industries With Gains				
372	Aircraft and Parts	21,866	22,532	46,327	52,638
351	Engines and Turbines	499	499	5,414	6,151
366	Communication Equipment	1,585	1,995	2,838	3,224
367	Electronic Components and Accessories	434	408	2,294	2,620
371	Motor Vehicles and Motor Vehicle Equipment	722	722	1,004	1,140
379	Miscellaneous Transportation Equipment	335	2,356	583	663
348	Ordnance and Accessories	237	951	308	350
376	Guided Missiles and Space Vehicles	867	867	142	161
	Industries With Losses				
509, 519	Miscellaneous Goods Export/Import Wholesale			-1,736	-1,973
701	Hotels, Motels			-321	-364
354	Metalworking Machinery			-284	-323
356	General Industrial Machinery			-182	-207
384	Surgical Medical Dental Instruments			-173	-197
369	Miscellaneous Electrical Machinery and Equipment			-168	-190
349	Miscellaneoud Fabricated Metal Products			-141	-161
505	Metals and Minerals Export/Import Wholesale			-128	-146
807	Medical and Dental Laboratories			-121	-138
399	Miscellaneous Manufacturing			-113	-128
357	Office Computing and Accounting Machines			-97	-110
737	Computer and Data Processing Services	-106	-106	-95	-108
381	Engineering, Lab, Scientific Instruments			-90	-102
	All Other (under 100 job opportunities each)			-565	-654
	TOTAL, All Industries	26,436	30,191	54,696	62,146

Finally, the third category of offsets, the one labeled "domestic production" incorporates offsets whose impact on, at least, short-term domestic production may be negligible. Their estimated employment effects presented in Tables II.C.12-A and II.C.12-B (about 13,000 direct and about 26,000 total) are therefore fictitious. By "fictitious" we mean that we have no basis for assuming that these estimates, or any other estimates represent the adverse employment effects of indirect offsets. This is true because offsets, such as indirect foreign investment, are likely to enhance the long-run productive capacity of foreign nations. What we do not know, however, is when the increased output will occur or whether such increased output will ever reach the U.S. Thus, such offsets may never affect the domestic production in these industries and therefore their employment.

These estimates are reported here because this study assumes that all three categories of offsets will affect production and, therefore, employment in specific domestic industries. The industry distributions for the first two categories are derived from survey responses. The distribution for the third category of offsets was estimated on the basis of the assumption that the domestic industries affected by them are the same as the foreign industries which benefited from them. In any event, the assumption that indirect offsets, such as indirect foreign investments, have adverse short-term production and employment effects is likely to lead to a significant overstatement of these effects because know their true effects are unknown.

The same bias is introduced with the assumption that all offsets of less than $2 million and those assumed by domestic subcontractors will have the same implementation period and industrial distribution as do those of over $2 million. This assures that the effects of such offsets are not excluded from the employment estimates. But this assumption automatically attributes adverse domestic effects to all "best-effort" offsets and to some other offsets whose domestic effects, if any, are unknown. The overstatement of these effects can be seen by such survey responses as "the impact from the offset was negligible. This was a best effort obligation and no offset orders were placed." Again, this particular assumption overestimates the adverse effects of offsets, thereby assuring that this method will generate truly upper-bound estimates.

Finally, the employment effects of offsets generated by method two are derived on the basis of the assumption that they are totally produced abroad (i.e., that their production has no U.S. content). This assumption ignores the fact that in the case of military equipment, at least, the offsets are likely to be produced with significant input from the U.S. This assumption too leads to the overestimation of the adverse domestic effects of offsets.

With these considerations in mind, a comparison of Tables II.C.9 and II.C.12-A and II.C.12-B reveal, first of all, that the positive employment effects of sales exceed by far the adverse employment effects of offsets. This is true, notwithstanding the substantially greater positive biases in the estimation of the effects of offsets than of sales. This parallels the direction of the two effects found in method one, though not their magnitudes.

Also, though the total employment effects of offsets are much smaller than those of sales, they are distributed over many more industries than are those of sales. This is true, notwithstanding the fact that the industry category "miscellaneous" contains all three-digit industries whose estimated employment effects for the entire five-year period of 1980-1984 was below 100. In this connection, it is worth noting that the 100 employee criteria used here is based on the estimates derived by method two, not the ones representing the upper limits of the actual employment effects. A listing of the industries grouped in the "miscellaneous" categories for sales and offsets is given in Table II.C.15 below. This suggests that with the exception of several industries, especially the aircraft and parts industry, the employment effects of offsets, though widespread, are not substantial when compared with the actual employment levels in these industries. This last point takes on special force because the estimates derived by method two exceed even the upper bounds of the actual employment effects by a factor of about 3. The upper-bound estimates of the employment effects are presented in Table II.C.13-A. These estimates are derived, as discussed earlier, by applying the scalars based on Tables II.C.1 and II.C.2 to the estimates derived from the second method (i.e., by means of the I-O tables. This table also records the lower bound estimates of the net employment effects shown in Tables II.C.1 and II.C.2 above. Together, these figures reveal the estimated range of the employment effects of sales and offsets during the period 1980-1984.

Table II.C.13-B is a reorganization of only the net effects listed in Table II.C.13-A. This table subdivides the industries into those which had a net increase in job opportunites and those which had a net decrease in job opportunities. Within each of these categories, the industries are listed by order of magnitude of the job opportunities involved. The industry category "All Other" includes the miscellaneous category plus some other small three-digit industries which were listed separately. This was done for presentational purposes.

Table II.C.13-A shows that as far as specific industries are concerned, few such industries have both upper and lower bound estimates. This is due to the fact that only a fraction of the respondents provided quantitative estimates of their employment effects. This was a rather large fraction when viewed in terms of the dollar amounts involved in the sales, but a smaller fraction when viewed in terms of the number of individual transactions. Since the lower bound estimates are based on the industry estimates, fewer industries will have lower bound estimates than upper bound estimates. In this connection, the reader should recall that the estimates derived by method two require only dollar amounts or expenditure information by industry. Because of these factors, the relevant upper and lower bound estimates for most of the industries should be viewed in terms of average limits for all industries combined, or in terms of the total net effects of method two and method one. These show that the overall employment effects of sales and offsets combined were either between about 55,000 and about 26,000 job opportunities or between about 62,000 and about 30,000 opportunities.

The number of industries affected by offsets exceeds the number benefiting from sales. This means that under each of the two scalars in Table II.C.13-A the net employment effects in many industries will simply be equal to the negative numbers reflecting the adverse effects of offsets alone. These numbers were subtracted from the total estimates for sales. Thus, the total figures are more reflective of the net effects than are the separate industry figures. The industry figures are presented to show the range of industries that are affected by sales, offsets, or both.

The entries in Table II.C.13-A marked by asterisks show larger employment effects for the lower bound than they do for the upper bound estimates. These should be ignored or are to be regarded as having the same lower and upper bound estimates. These inversions are the result of using scalars which were estimated from the totals rather than from the industry specific figures. This was done because some of the industry specific figures were based on extremely small sample sizes which would have rendered them statistically unreliable. In addition, the scalars were derived from a comparison of the estimates for sales on both the sales and offsets data. This was done for essentially similar reasons. In this case, because the non-response rate was higher for offsets than for sales. However, the use of the sales scalars on offset data increases the upper limit estimates of the adverse effects of offsets, thereby reducing somewhat the magnitudes of the positive net effects.

Finally, the estimates in Table II.C.13-B are net employment effects for the entire five-year period. The annual figures will, of course, vary with the levels of sales and offset activity but they will be substantially below those recorded in Table II.C.13-A. This strengthens the conclusion that the employment effects of sales and offsets, while not insignificant, are not large, when compared with the effects of all U.S. exports and imports or with the levels of employment in these specific industries. The major exception to this rule is the aircraft industry.

The industry employment figures are shown in Table II.C.14. In addition, the employment estimates highlighted in Table II.C.13-B are those of the net effects, or of the effects of sales minus those of the resulting offsets. This particular exposition does not differentiate between net effects that resulted from sales that would have taken place even in the absence of offsets and those that were made only because of the offsets. In either case, the net employment effects on the industries in question are the positive effects of the sales minus those of the offsets.

However, some argue that the distinction between necessary and unnecessary offsets is a crucial one for the understanding of the offset problem, although why any unnecessary offsets should form part of the sales agreements is difficult to comprehend. In any event, according to this reasoning, the positive effect of the sales could have been much greater than they are, if only the prime contractors had been able to sell for cash. This search for the underlying reasons for offsets was, in fact, responsible for eliciting such information from respondents to the DPA 309 survey. Over 80 percent of the firms stated that the resulting offsets were necessary either for the sale or for competitive reasons.

TABLE II.C.14
Annual Average Monthly Employment in Industries Effected by Military Sales and Offsets, 1980-1984

(All Employees in Thousands)

SIC	Industry Description	1980	1981	1982	1983	1984
2334&339	Miscellaneous Primary Metal Products	50.1	49.1	43.6	40.4	44.8
344	Fabricated Structural Metal Products	513.3	506.5	453.8	421.6	436.5
348	Ordnance and Accessories Except Vehicles and Guided Missiles	63.4	67.1	65.1	67.3	75.9
349	Miscellaneous Fabricated Metal Products	253.8	252.4	229.3	214.4	228.9
351	Engines and Turbines	135.2	133.1	114.6	104.2	114.5
354	Metalworking Machinery and Equipment	373.1	362.7	314.0	277.7	305.6
356	General Industrial Machinery and Equipment	323.7	322.6	287.3	252.5	273.3
357	Office Computing and Accounting Machines	432.2	459.7	472.9	487.1	526.1
362	Electrical Industrial Apparatus	239.9	238.7	206.6	195.2	206.0
366	Communication Equipment	547.4	556.7	569.4	573.1	616.6
367	Electronic Components and Accessories	553.6	557.3	558.2	578.7	672.7
369	Miscellaneous Electrical Machinery Equipment and Supplies	152.1	148.5	143.8	146.2	156.0
371	Motor Vehicles and Motor Vehicle Equipment	788.8	788.7	699.3	753.7	860.1
372	Aircraft and Parts	652.3	645.5	601.1	578.3	595.9
376	Guided Missiles and Space Vehicles and Parts	111.3	122.7	131.1	140.5	155.3
379	Miscellaneous Transportation Equipment	38.1	38.9	42.1	46.9	51.1
381	Engineering Lab Scientific and Research Instruments and Associates	76.8	80.2	80.2	75.8	79.5
384	Surgical Medical and Dental Instruments and Supplies	155.5	159.5	161.1	167.9	171.9
399	Miscellaneous Manufacturing Industries	134.5	131.8	127.2	124.0	128.6
451&452	Air Transportation Carriers	404.0	404.0	393.0	402.4	434.7
505	Metals and Minerals Except Petroleum Export/Import Wholesale	151.6	152.6	140.1	129.7	137.4

(continued)

(Table II.C.14 -- continued)

SIC	Industry Description	1980	1981	1982	1983	1984
509/519	Miscellaneous Goods Export/Import Wholesale	595.5	599.8	571.1	579.9	607.0
701	Hotels, Motels and Tourist Courts	1,037.1	1,076.4	1,092.8	1,131.1	1,225.5
737	Computer and Data Processing Services	304.3	336.6	364.7	415.9	473.7
807	Medical and Dental Laboratories	*104.7	*107.5	109.5	111.6	113.2
899	Services Not Elsewhere Classified	133.9	135.9	129.0	130.5	133.7

* Unofficial Unpublished Estimated.
Source: "Supplement to Employment and Earnings," Bureau of Labor Statistics. Various Issues.

A basic issue is what domestic production and employment would be if all current sales could have been made on a purely cash basis, i.e., without contractually linked offsets. These will, of course, also depend on macroeconomic factors, but even when these factors are ignored, there are sound reasons for believing that military sales abroad will generate "offsets", whether or not such "offsets" are part of the sales contracts. This conclusion follows from the fact that military goods, not unlike other goods, must be purchased from the U.S. with our currency. These dollars can be acquired in only one of four ways. They can be acquired as gifts (grants), through loans, through returns on investments in the U.S., and finally and most importantly through the sale of goods to the U.S. (i.e, through "offsets" in the broader sense of the word).

Since most of the military sales that involve offsets are made to economically advanced countries, the first method of dollar acquisition is not significant. Furthermore, the dollars that are acquired by means of loans will generally have to be repaid, and such repayments will ultimately require the sale of goods to the U.S. Such sales to the U.S. are "offsets." Thus, with the exception of outright grants and with possible differences in timing, all sales abroad are in a sense coupled to "offsets", in the long run to 100 percent "offsets."

Thus, the more relevant question for us is whether the offsets that are directly linked to sales contracts are exchanged on different terms than are more generally traded goods and services. This question cannot be answered with precision. What can be answered with a great deal of confidence is that generally traded goods are more likely to be traded on the basis of comparative advantage than are those contractually linked to offsets. This also suggests that the industry mix of general imports is likely to differ from those revealed in Tables II.C.11, II.C.12, and II.C.13. But these are second order effects. And the principal issue then becomes one that centers around which set of industries will experience changes in job-opportunities rather than on the number of job opportunities affected by offsets.

This formulation of the problem also puts in proper perspective the issue of technology transfers. The question is whether contractually linked offsets are more likely to generate technology transfers than will more general forms of trade. This question too cannot be answered with precision. However, it is hard to conceive that U.S. manufacturers would voluntarily transfer the kind of technology that would weaken their future competitive position. Even, if they were willing to do so, permission to transfer, say, design technology, is systematically denied by the Departments of Defense and Commerce. Evidence in support of these propositions is found in the fact that the development of major weapon systems, by principal competitors has not benefitted from offsets. Such weapon systems, it must be remembered, require huge R&D outlays and their technologies have a finite lifetime. The issue of competitiveness centers more around the ability of competitor countries to form consortia, thereby enlarging the scale of operation and reducing per unit costs, than it does on technology acquired through offsets.

Certain types of offsets may, of course, contribute to the transfer of production technology and to the transfer of technology for the production of components. There is indeed some evidence that such transfers do take place. What is not clear, however, is whether such transfers are greater than those that occur in general trade, especially in connection with the operations of multinationals. From the point of view of the estimation of future competitiveness of U.S. firms, one would also have to consider whether such technology could be acquired elsewhere or could and would ultimately be developed by the very countries demanding offsets.

The final question in this section is the reliability of the information generated by the DPA 309 survey. Economic reasoning aside, the quality of the estimates derived cannot be any better than the quality of the data upon which they rest. The estimates are based on a sufficiently large and representative sample. This conclusion is supported by independent data on military exports published by both ACDA and the Department of Defense.

For example, the firms in the sample reported that their collective military sales for exports equaled about $36.6 billion during the period of 1980 through 1983. These figures are, of course, for all military exports, including those that are not linked to offsets. This figure compares favorably with the military export statistics of about $35 billion published by ACDA. Thus, with the exception of a minor difference which could be accounted for by definitional differences, the two sources report comparable figures. In any event, the ACDA figures suggest that, at least, as far as sales are concerned, the sample includes the major firms involved in such trade, not just a few random observations.

The quality of the sample aside, the estimates are limited to the impact of sales agreements that were both signed and implemented during the five-year period of 1980 through 1984. They exclude the implementations during this period of contracts that were signed prior to 1980 and the portions of the contracts signed between 1980 and 1984 that are to be fulfilled after 1984. However, the effects of the excluded implementations can be estimated by multiplying all the employment estimates by the ratio of obligations to implementations during the period 1980-1984. This approximation is a fairly close one, if there is no trend in the data, especially if there is no trend in the ratio of sales to offsets. This is in fact the case. That is, the ratio of sales to offsets during the five-year period for which there are data does not display any systematic trend.

TABLE II.C.15
Industries Grouped Into Miscellaneous Category by Type of Transaction

SALES

179	Miscellaneous Special Trade Contractors
344	Fabricated Structural Metal Products
349	Miscellaneous Fabricated Metal Products
362	Electrical Industrial Apparatus
382	Measuring and Controlling Instruments

OFFSETS TYPE: EXPORT

239	Miscellaneous Fabricated Textile Products
282	Plastic materials and Synthetic, Resins Synthetic, Rubber Synthetic and Other Man-Made Fiber
332	Iron and Steel Foundries
335	Rolling Drawing and Extruding and Nonferrous Metals
336	Nonferrous Foundries Castings
346	Iron and Steel Forgings
355	Special Industry Machinery Except Metalworking Machines
365	Radio and Television Receiving Equipment Except Communication Types
383	Optical Instruments and Lenses
451	Air Transportation Certificated Carriers
769	Miscellaneous Repair Shops and Related Services
891	Engineering Architectural and Surveying Services

OFFSETS TYPE: IMPORT

109	Miscellaneous Metal Ores
179	Miscellaneous Special Trade Contractors
252	Office Furniture
275	Periodicals Publishing and Printing
279	Service Industries for the Printing Trade
284	Soap Detergents and Cleaning Preparations Perfumes Cosmetic
289	Miscellaneous Chemical Products
307	Miscellaneous Plastic Products
332	Iron and Steel Foundries
342	Cutlery Hand Tools and General Hardware
348	Ordnance and Accessories Except Vehicles and Guided Missiles
353	Construction Mining and Materials Handling Machinery and Equipment
359	Miscellaneous Machinery Except Electrical
366	Communication Equipment
369	Miscellaneous Electrical Machinery Equipment and Supplies
371	Motor Vehicles and Motor Vehicle Equipment

(continued)

(Table II.C.15 -- continued)

373	Ship and Boat Building and Repairing
379	Miscellaneous Transportation Equipment
381	Engineering Lab Scientific and Research Instrument
382	Measuring and Controlling Instruments
386	Photographic Equipment and Supplies
391	Jewelry silverware and Plated Ware
458	Fixed Facilities and Services Related to Air Transportation
506	Electrical Goods Export/Import Wholesale
508	Machinery Equipment and Supplies Export/Import Wholesale
516	Chemicals and Allied Products Export/Import Wholesale
517	Petroleum and Petroleum Products Export/Import Wholesale
519	Miscellaneous Nondurable Goods Export/Import Wholesale
737	Computer and Data Processing Services
762	Electrical Repair Shops
769	Miscellaneous Repair Shops and Related Services
781	Motion Picture Production and Allied Services
891	Engineering Architectural and Surveying Services

OFFSETS TYPE: DOMESTIC PRODUCTION

282	Plastic Materials and Synthetic, Resins Synthetic, Rubber Synthetic and Other Man-made Fiber
344	Fabricated Structural Metal Products
348	Ordnance and Accessories Except Vehicles and Guided Missiles
399	Miscellaneous Manufacturing Industries
701	Hotels, Motels and Tourist Courts
737	Computer and Data Processing Services
739	Miscellaneous Business Services
769	Miscellaneous Repair Shops and Related Services
833	Job Training and Vocational Rehabilitation Services
899	Services Not Elsewhere Classified

Conclusions

This section estimated the domestic employment effects of offsets in defense-related exports. The study was able to put sales and offsets in proper perspective and to generate a range of estimates within which the true employment effects of such activities are likely to fall. Throughout, this section was responsive to congressional and other concerns about the potential adverse effects of offsets on employment in a number of U.S. industries, including industries that are unrelated to those that benefit from the sales. The principal findings are:

1. The employment effects of the sales exceed by far the adverse effects of offsets. Even when considering the upper-bound estimates, the analysis finds that the positive effects of sales exceed the adverse effects of offsets by about 62,000 job opportunities (see Table II.C.13).

2. The effects of both sales and offsets are felt principally in the aerospace and avionics industries, industries that are fairly healthy by most standards.

3. The effects of offsets while widespread are small relative to total employment in any individual industry. This conclusion holds notwithstanding the fact that the analysis included offset arrangements that cannot realistically reduce domestic production and employment. This conclusion holds even when one compares the adverse effects of offsets for the entire five-year period of 1980-1984, with actual employment in any single year (compare Tables II.C.13 and II.C.14).

These findings are based on the conventional view that sales generate positive domestic employment effects but that offsets generate negative effects. This dichotomy implies that the U.S. could continue to sell its military goods abroad for cash ad infinitum. No nation can carry on such trade for any extended period of time. Thus, even in the absence of contractually linked offsets, U.S. sales abroad, including military sales, would generate return flows of goods to the U.S. of comparable value. In normal international exchanges, the types of goods received in return are likely to be those in which foreign nations have a comparative advantage. This suggests that in the absence of formal offset requirements, the adverse effects of imports are likely to be felt by U.S. industries that are already in decline, rather than by those in which the U.S. has a comparative advantage, such as in aerospace.

In addition, it is important to note that all of the estimates in this analysis refer to job opportunities, not to actual employment. The distinction between these two concepts is important. For example, actual employment in an industry can rise while the estimates in this paper show a negative effect of offsets on job opportunities, and visa versa. This is true because this section analyzes the unique effects of sales and offsets as though the effects of all other forces that impinge on actual employment were zero.

However, other forces are constantly at work, forces that work parallel with or in opposition to those of the sales and offsets. Actual employment in any given industry may rise or fall at the same time that this study's estimates show net negative or positive effects.

Thus, these estimates should not be interpreted as reflective of the problems that are associated with worker dislocations. From this rather narrow point of view, the presence of offsets may be beneficial. They may be beneficial in that they help channel the adverse job opportunity effects of offsets toward industries that are relatively healthy or expanding, requiring few, if any, actual dislocations. In a more general sense, such tie-in sales cannot help but be efficient.

Finally, this analysis estimated the employment effects, in particular, on industries rather than on the U.S. economy as a whole. The employment effects of military trade on the U.S. economy as a whole are likely to be close to zero. This is true because any imbalances in such trade are likely to be counterbalanced by capital flows that affect both interest rates and exchange rates, thereby generating changes in domestic production and flows of goods and services.

D. International Trade

The Implications of the Labor Analysis for the Trade Section

The trade implications of the DPA 309 survey can be summarized as follows: the sales represent increased U.S. exports, while the offsets can represent a reduction of U.S. exports or an increase in U.S. imports. Sales are in fact U.S. exports of military goods which generate the traditional "gains" of any sale, such as increased production, favorable employment effects, and enhanced growth.

The data from the DPA 309 survey was in such a form that production effects resulting from sales needed to be estimated. The production flows of sales are reported in Table II.C.8. These dollar values represent the increase in U.S. exports resulting from sales of military goods. This totalled just over $10 billion for the period 1980 through 1984, with the industries of Aircraft and Engines accounting for 82.4 percent of the total estimated export value.

It is useful to group offsets into three categories: offsets which reduce U.S. exports, offsets which increase U.S. imports, and a category for all other types of offsets. The values for these three groups are shown in Table II.C.11. The combined value of these offsets totals $3.1 billion. The "export" group accounts for 52 percent of the total, the "domestic production" (i.e., all other offsets) accounts for 33 percent, and "import" is the smallest group accounting for 15 percent of the total.

Appropriate Economic Theory

This assessment examines the impact of defense-related offsets on international trade in two steps. In the first step, the impact of offsets on international trade is examined as if any imbalance in supply and demand created by the offsets had no effect on the rest of the economy. This step is a partial-equilibrium analysis. In the second step, the impact of any offset-generated imbalance in supply and demand on the rest of the economy is examined. This is a general-equilibrium analysis.

These types of analysis are appropriate to two different sets of questions about the impact of defense-related offsets. The partial-equilibrium analysis is adequate to answer most questions about the initial impact of defense-related offsets on companies or workers in the industries directly affected by offsets. The employment section of this report contains an extensive partial-equilibrium analysis of the direct impact of defense-related offsets on employment. The employment analysis forms the basis for much of the partial-equilibrium assessment in this section.

The general-equilibrium analysis is appropriate for questions about the impact of offsets on the economy as a whole, the trade balance, general welfare, and the international competitiveness of U.S. products not directly affected by defense-related offsets. The general-equilibrium analysis is more abstract and technically complex than the partial equilibrium analysis and does not provide information on those industries or workers directly affected by offsets.

Partial Equilibrium Considerations

The dollar values of offsets are as reported in Table II.C.11. As a starting point, it is useful to think of the Export Group as representing the dollar value of goods that would have been exported, but which are assumed to have been lost due to offset arrangements. Similarly, the Import Group can at first be thought of as dollars which have been used for imports but which otherwise would have been used to purchase domestically produced goods. The Domestic Production Group raises a problem because effects of the offset implementations of this group are unknown. The transferring of technology or of foreign investment contains an implication for competitiveness or a reduction in funds for some other use, but just how and, more importantly, when the effects actually occur are very difficult questions to answer. Thus, in line with a presentation that will err on the side of overemphasis, the Domestic Production data will be treated as representing dollar values of lost U.S. production, either due to an increase in imports or lost export sales.

The dollar value of the Import Group represents an overestimation of lost U.S. production due to increased imports. First, the offset may result in what was previously imported from Country A now being imported from Country B. The effect on domestic production from the changed sourcing is probably negligible.

Second, even when the imports represent reduced U.S. production, it will be of an amount less than the reported figures. The domestic production most likely would involve the use of imported materials just as the current foreign production incorporates U.S. content. Thus, if U.S. production would have been greater without these offset arrangements, so would the U.S. content of certain inputs in those imports.

As mentioned in other parts of the report, offset obligations may in fact never actually be implemented. This is due to the fact that in a number of instances the implementation of the offset agreement relies on the "best effort" of the contractor to fulfill the obligation. Under such arrangements, the contractee may decide that despite their best efforts, they are unable to fulfill the offset obligation and no offset is ever implemented. In the DPA 309 database, 44 percent of the various offset arrangements made in connection with the sales involved offsets that were "best effort." These total $3.3 billion of the total offset obligations of $12.1 billion. Some fraction of these offsets will in fact never occur. Thus, the figures reported in Table II.C.11 are probably overstated in terms of the likely contribution of offsets to export reduction and/or import addition.

To the extent that these comments apply to Table II.C.11, there are "best effort" offset arrangements also contained in those contracts involving offsets of less than $2 million. For that group, we have only the obligations, not the schedule of implementations. All obligations are assumed to take place and are spread over the period 1980 through 1984 as described in the labor section. Based on the results described above for the "greater than $2 million group," the figures of Table II.C.11 are probably overestimates.

Similarly, some contracts enabled the seller to liquidate the offset obligation rather than fulfill it as specified. Liquidation damages could also result if the obligation were not fully implemented. The effect of the seller liquidating the offset obligation will have a different effect on the general issues of competitiveness, labor impacts, and trade effects, than if the obligation was fulfilled, for example, via the importation of some manufactured goods. Liquidating the offset arrangement effectively turns the transaction into a sale with no offsets at a lower price than the original contract value involving offsets.

The database shows that 37 percent of the various offset arrangements contained provisions for the payment of "liquidated damages." These offsets represent $7.9 billion, or 65.6 percent of total offset obligations. Thus, the composition of the trade effects (i.e., export-reducing or import-increasing) may, in fact, turn out to be less than that reflected in the offset obligations. Again, these comments apply to that unknown part of offset obligations included in Table II.C.11 that come from the "less than $2 million group" of obligations.

For the purposes of categorization, while all indirect offsets which are countertrade are treated as displacing U.S. production, it should be kept in mind that some of the goods offered in countertrade will not displace or increase the competition with domestically produced goods. This is true since such arrangements may in fact displace other foreign-produced goods. In this light, countertrade can alter the country of origin of imports rather than necessarily reduce domestic production.

Offsets also need to be considered in the framework of the original sale contract. Offsets exist because the purchasing government required the offset as a condition of sale. From data cited in other parts of this report, there is no question that from the seller's point of view, over 80 percent of sales would not have been made if offsets had not been offered. Thus, for the sales covered by this survey, offsets were a necessary component of the sale. The impact on competitiveness, employment, and trade from losing these sales is not estimated directly by this report. Nevertheless, the result of the labor section allows one to estimate the positive employment effects that did in fact take place as a result of the sales.

As shown in Table II.C.8 and II.C.11, one can compute the overall direction of trade that resulted from the sales and offsets implemented over the 1980 through 1984 period. These yearly figures are reported in Table II.D.1.

TABLE II.D.1
Direction of Trade
(billions of current dollars)

	1980	1981	1982	1983	1984
Sales (+exports)	0.77	1.98	2.11	2.23	3.10
Offsets					
(-exports)	-0.14	-0.26	-0.26	-0.31	-0.65
(-imports)	-0.00	-0.04	-0.05	-0.08	-0.29
(-"other")	-0.06	-0.19	-0.08	-0.20	-0.51
Net Trade	0.57	1.50	1.72	1.63	1.65

The effect of the sales and offsets is a net positive effect on trade in each of the five years covered by the DPA 309 survey. These net effects are calculated under the assumption that all other economic policies would have remained unchanged had these sales not taken place. That is of course a major simplifying assumption, but it nevertheless allows for analysis of the impact of offsets involved.

General Equilibrium Considerations

The proposition that the merchandise trade balance is determined by international financial flows (capital flows) is widely held among economists specializing in international trade and finance. The international financial flows are in turn determined by the savings and investment behavior and the government budget deficit of a nation. This proposition implies that any shift in the trade balance which does not affect the savings, investment, or government deficit must be offset by an equal but opposite movement in some other components of the trade balance.

This proportion refers only to the overall merchandise trade balance of a country and not to individual bilateral balances or commodity groups. Changes in individual bilateral trade balances may occur as a result of a shift in trade patterns, but the sum of all bilateral trade balances is not changed by any forces which do not also change the savings, investment, or deficit-spending behavior of the country.

The principal assumption in support of this proposition is that exchange rates are relatively free to adjust to changing trade and financial patterns, and international financial flows are allowed to determine exchange rates. An alternative assumption, that central banks can intervene effectively to change exchange rates but do so in order to reach a target level of the merchandise trade balance, can also be used to justify this proposition. In both cases, the trade balance is determined by financial forces: market demand for and supply of financial assets in one case and central bank intervention in the other. In either case, any change in one component of the trade balance which does not affect savings or investment must be offset by an equal and opposite change in some other component of the trade balance. Under some assumptions, this will include changes in interest rates which will have second order effects on savings, investment, output, and trade.

The only international monetary regimes which are clearly incompatible with the proposition are fixed exchange rate systems and exchange rate systems where successful central bank intervention is used to reach goals other than target levels of the trade balance or smoothing trends in exchange rates without altering the underlying trends. In either of these cases, a central bank is willing and able to break the link between trade and financial balances by either providing or absorbing enough funds to offset any imbalance with its own financial resources. When this link is broken, there are no general equilibrium repercussions to a partial equilibrium event like defense-related trade.

Most of the available evidence favors the proposition that the U.S. merchandise trade balance is not significantly affected by movements in its individual components. The U.S. dollar floats against the currencies of most of its major trading partners, and the U.S. does not, in general, intervene in foreign exchange markets. When it does intervene (as in the third quarter of 1985), it

is to achieve a target level of trade balance or to stabilize the exchange rate around an otherwise stable trend. Furthermore, there is strong evidence that exchange rate intervention for any purpose other than smoothing very short-run fluctuations is ineffective unless the intervention is financed in a way that changes the savings and investment behavior of the economy.

The proposition that international financial flows are the principal determinants of the total merchandise trade balance implies that defense-related offsets have no effect on the trade balance. The proposition does imply that the imbalance in demand and supply seen in the partial equilibrium analysis is countervailed by a decline or rise in the value of the dollar which corrects the imbalance.

The impact of trade in defense-related offsets on other components of the trade balance can be estimated by the use of a computable-general-equilibrium model of the U.S. trade balance. This model allocates the impact of trade in defense-related goods and the defense-related offsets between reduced U.S. exports in other commodities and increased U.S. imports of other commodities. The parameters of this model are the price elasticities of demand for U.S. imports and U.S. exports and the price elasticities of supply for U.S. exports and U.S. imports. All of these parameters have been the subject of intensive estimation efforts for decades and a large set of good estimates is available for each parameter. The model for this assessment uses an unweighted average of those elasticity estimates presented by M. Goldstein and M.S. Khan which is applicable to the U.S. Goldstein and Khan's survey, "Income and Price Effects in Foreign Trade" is published in The Handbook of International Economics, Vol. 2, (North-Holland, 1984).

This model depends on the size of the partial equilibrium effect of offsets. To the extent that that impact is overstated as a result of the extreme assumptions used in deriving it, the general equilibrium impact shown in the tables below is overstated. If the partial equilibrium impact of offset-related trade on the trade balance is reduced (e.g., by the use of less extreme assumptions), the general equilibrium impact shown in Table II.D.2 should be reduced by roughly the same proportion, assuming that the total trade balance is unaffected by movements in its components.

TABLE II.D.2
Impact of Offsets on Trade -- Upper-Bound Estimates (Model I)
($ in billions)

	Sales	Offsets	Net Effect
Annual Imports	$0.376	$0.227	$0.603
Annual Exports	$0.376	$0.227	$0.603
Value of the Dollar	+0.68%	-0.21%	+0.47%

The effect of defense-related offsets under this proposition is an increase in both imports and exports and a slight appreciation of the dollar. Changing the elasticity parameters of the model has almost no effect on these results as shown in Table II.D.3. A lower partial equilibrium estimate of defense-related trade and offsets would lower imports, exports, and the effect on the exchange rate by the same proportion, but it would still leave the trade balance unchanged.

The price elasticity of demand for U.S. imports has been the subject of intensive disaggregated estimation efforts, and these disaggregated estmates allow the allocation of increased imports between sectors of the economy under the assumption that differences in import supply elasticities are minor. Similar detail is not available for changes in exports. These disaggregated elasticities are also unweighted averages from Goldstein and Khan's survey.

TABLE II.D.3
Changes in Import Volume of All Other (Non-Offset Related) Commodities

Sector	Sales	Offsets	Net Effect
Agriculture	0.06%	-0.02%	0.04%
Minerals and Other Raw Materials	0.02%	-0.02%	0.04%
Fuels	0.03%	-0.01%	0.02%
Manufactures	0.16%	-0.05%	0.11%

If none or only part of the partial-equilibrium shock is offset by changes in other imports and exports, defense-related offsets can have an effect on the total trade balance. This state of affairs can only occur if exchange rates are fixed or if central banks intervene successfully in exchange rate markets in order to achieve some goal unrelated to the trade balance. This produces effects which lie somewhere between the partial equilibrium effects and the general equilibrium effects shown above.

The exchange rates of most major U.S. trading partners float against the dollar. Most of the obvious intervention by central banks in these countries is oriented either toward preserving stable exchange rates relative to a currency other than the dollar or toward a target level of the trade balance. Both types of intervention are consistent with the first proposition (that the total trade balance is unchanged by movements in components such as offsets).

Currencies pegged to the value of the dollar (e.g., Egypt and Hong Kong) will not display any exchange rate adjustment or (if some additional assumptions are made) compensating shifts in trade in other commodities. The partial equilibrium effect carries through unmodified in this case. This case is not important for this analysis because no offset agreements with countries pegged to the dollar in the sample were implemented during the period 1980-84.

There are a large number of agreements which were implemented during the period with countries whose exchange rate policies fall somewhere between floating or pegged to the ECU (which floats against the dollar) and pegged to the dollar. These include countries with currencies pegged to a composite index of several currencies (Norway, Sweden, and Singapore) and countries engaged in managed floating (Spain, South Korea, Yugoslavia, Israel, and Turkey). It is unreasonable to assume that defense-related offsets have a one-for-one effect on the trade balance of these countries, but it is possible that there is some effect. Some offset agreements were implemented with groups of countries, some of which allowed exchange rates to float and some of which did not (e.g., agreements with NATO; Belgium, Denmark, the Netherlands, and Norway; and Denmark and Norway). The floating exchange rate countries and the European Monetary System countries account for 67.7 percent of defense-related offsets and 44.1 percent of offset-related sales.

In order to generate an upper-bound estimate of the general equilibrium impact of defense-related offset trade under the assumption that the trade balance is affected by defense-related sales and offsets, offset implementations with all countries pegging the exchange rate to a composite index or engaging in managed floating are assumed to be unaffected by exchange rate adjustment. Half of the value of sales and offset implementations is affected by exchange rate readjustment for sales and offsets to groups of countries which combine countries with floating and pegged or managed exchange rates. The impact of defense-related offsets under these assumptions is shown in Table II.D.4, assuming that the total trade balance is affected by movements in its components.

TABLE II.D.4
Impact of Sales and Offsets on Trade -- Upper-Bound Estimates (Model II)
($ in millions)

	Maximum Net Effect	Net Effect (without Norway and Sweden)
Annual Imports	200	900
Annual Exports	660	350
Value of the Dollar	+0.16%	+0.22%

This version of the model shows a maximum increase in the trade balance of just under one-half of a billion dollars per year as a result of defense-related offsets and the offset-related sales. Removing Norway and Sweden from the group of countries treated as having exchange rates pegged to the dollar reduces this impact on the trade balance to $156 million.

Both estimates are implausibly large upper bounds for a variety of reasons. Many of the countries which are treated as having exchange rates pegged to the dollar are clearly not pegged to the dollar. Norway and Sweden peg their exchange rates to an index of currencies in which the dollar has little if any weight, and both countries' currencies displayed substantial variation against the dollar during the 1980-84 period. The second column in Table II.D.4 shows the effect of treating these exchange rates as floating against the dollar. A similar case could be made for many of the other countries treated here as pegged to the dollar (e.g., Israel, Greece, and Turkey). Removing these from the set of exchange rates rated as pegged to the dollar reduces the impact of defense-related trade and offsets on the trade balance to almost zero. This increases the impact on the exchange rate to roughly the same size as it is under the proposition that the trade balance is unaffected by movements in its components.

Another source of overestimation is the fact that the estimate is based on an implausibly large partial-equilibrium effect. The sources of bias in this estimate are discussed at length in the labor section and in the partial-equilibrium discussion of this section. It should be noted that the overestimation in the partial equilibrium impact and an overestimation implicit in the general equilibrium model are cumulative; a mild overestimate of each component produces a much more extreme overestimate of the total effect.

Finally, there is a good theoretical case to be made for the idea that these offset arrangements have no long-run impact on the trade balance under any exchange rate regime. This would be consistent with the earlier tables and the proposition that the trade balance is unaffected by defense-related offsets. The details of this case are arcane and are beyond the scope of this assessment.

III. OTHER INFORMATION ABOUT OFFSETS

Part III consists of three separate kinds of information requested in the statute and the related Conference Report. These are the types, terms, and magnitude of offsets, a discussion of bilateral and multilateral negotiations on offsets, and a listing of associated government-to-government Memoranda of Understanding.

A. Types, Terms, and Magnitude

The DPA 309 database was developed from responses to a questionnaire sent to U.S. industry by the ITC. The list of questions, which was developed by the Coordinating Committee on DPA 309 Reports after extensive consultation with industry groups and formal public comment, was sent to 212 U.S. corporate entities including subsidiaries and subcontractors. The questions on offsets in military-related export sales were part of a larger questionnaire which also solicited data for the ITC's study of civilian countertrade which was also underway at the time. This questionnaire was announced for public comment in the Federal Register on December 4, 1984, approved for mailing on February 11, 1985, and responses were due on March 29, 1985.

On April 12, 1985, OMB, acting on behalf of the Coordinating Committee, provided the ITC with a computer format and other instructions for tabulating the responses from industry. The data and narrative responses were made available to OMB on July 22, 1985. OMB did not receive the industry prepared responses nor any indication as to which corporations responded and which did not. Three elements of the database itself, the names of selling companies, and the names of programs and competitors remain in the possession of the ITC. OMB accepted these limitations after extended discussions with the ITC which was reacting to industry concerns about confidentiality of the business sensitive data. The absence of company identification information by the writers of this report makes verification of the information impossible. This arrangement also seriously complicates any future data collection to update the data base should this step be deemed necessary in connection with another annual report.

The DPA 309 database covers five calendar years 1980-1984, and consists of four major elements: narrative responses to selected questions, sales information concerning the respondents, information on sales with offset obligations of over $2 million, and summary information on offsets of $2 million or less. For those offset obligations greater than $2 million, the database includes a breakdown of offset contracts executed during the reporting period. This detailed information provides the principal basis for measuring the economic impact of offsets during the five years covered by this report. The DPA 309 database is held by OMB and is available only to agencies charged with preparing analyses for this report.

The questionnaire sent to industry included certain questions requiring narrative answers, as well as the statement that these narratives would be shared by all Government agencies involved in preparation of the DPA 309 reports. These questions requested corporate views on issues such as the impact of offsets on domestic employment, peacetime and wartime military production capacity, impact on subcontractors, market expansion, and non-military production capacity. Copies of these responses as compiled by the ITC, with company, program and competitor names deleted, were distributed to all members of the Coordinating Committee in August 1985.

The database includes sales data from the 139 consolidated corporations responding to the questionnaire. A comparison of the total military export sales reported by the companies in the database with the arms export figures in the annual report of the Arms Control and Disarmament Agency (ACDA) on "World Military Expenditures and Arms Transfers 1985" (page 127) confirms that the DPA 309 survey captured the universe of U.S. arms exports in the period covered by this report.

TABLE III.A.1
Arms Exports
($ in billions)

	1980	1981	1982	1983	Total
ACDA Figures	6.5	8.6	9.3	10.3	34.7
DPA 309 Survey	6.9	8.9	10.3	10.4	36.5

TABLE III.A.2
Total Sales of Companies Responding to the Questionnaire
($ in millions)

	1980	1981	1982	1983	1984
Military Sales:					
Domestic	43,891	52,663	64,543	78,002	88,190
Export	6,952	8,903	10,300	10,401	11,154
Subtotal	50,847	61,568	74,838	88,404	99,343
Military as % of All Sales ...	12.9%	14.2%	17.3%	18.3%	17.7%
Export Share of Military Sales	13.7%	14.5%	13.8%	11.8%	11.2%
Non-Military Sales					
Domestic	266,704	292,505	282,384	312,421	358,693
Export	69,770	73,106	67,279	69,580	72,353
Subtotal	339,213	368,759	352,441	390,666	440,125
Export Share of Non-Military Sales	20.6%	19.8%	19.1%	17.8%	16.4%
Total Sales	393,323	434,520	431,785	484,154	560,250

Note: Figures may not add to totals shown due to rounding.

Table III.A.2 reveals that the companies responding to the questionnaire have a greater volume of sales in the non-military area. However, the percent that military sales comprise of the total sales increased steadily from 12.9 percent in 1980 to 17.7 percent in 1984. During the same period, the export share of military sales decreased steadily from over 13 percent in 1980, 1981, and 1982 to 11.8 percent in 1983, and 11.2 percent in 1984. In the non-military sector, export sales as a percent of all non-military sales also decreased; but, the rate of decline in exports accelerated, dropping from 20.6 percent in 1980 to 16.4 percent in 1984.

TABLE III.A.3
Total Sales of Companies Reporting Offset Obligations
($ in millions)

	1980	1981	1982	1983	1984
Military Sales:					
Domestic	34,957	42,340	52,223	62,780	70,411
Export	6,335	8,403	9,779	9,792	10,639
Subtotal	41,299	50,744	62,000	72,573	81,050
Military as % of All Sales	20.2%	22.3%	27.2%	27.1%	26.8%
Export Share of Military Sales	15.3%	16.6%	15.8%	13.5%	13.1%
Non-Military Sales					
Domestic	125,913	137,164	132,884	155,568	180,928
Export	31,823	33,875	27,964	28,808	28,817
Subtotal	160,479	174,188	163,625	193,040	218,825
Export Share of Non-Military Sales	19.8%	19.4%	17.1%	14.9%	13.2%
Total Sales	204,176	227,632	228,230	268,286	302,609

Note: Figures may not add to totals shown due to rounding.

Concerning trends in offset practices, a more informative analysis is possible by reviewing sales and export volume of the companies in the survey that reported offset obligations. The sales data for this set of companies reveals that the greatest volume of sales is in the non-military sector, as was the case for the broader sample. However, in contrast to the larger group of companies providing sales data, this group shows a larger and increasing proportion of such sales. Concerning export sales, the data for this group of companies show that in both the military and non-military sectors, the percent of export sales decreased between 1980 and 1984. In the military sector, the exports as a

percent of military sales increased from over 15 percent in 1980 to 13.1 percent in 1984. In the non-military sector, exports as a percent of sales dropped more precipitously from about 20 percent in 1980 to slightly over 13 percent in 1984.

Data on Table III.A.3 indicate that companies have been able to retain a greater share of the export market for military goods as compared to the share in the non-military sector. One reason for this may be that industry sales do not vary as much over the business cycle as consumer goods. What is clear from the data is that military sales continued to increase, although at a declining rate between 1980 and 1984: 22.9 percent from 1980 to 1981, 22.2 percent from 1981 to 1982, 17.1 percent from 1982 to 1983, and 11.7 percent from 1983 to 1984. By contrast, the non-military sector shows greater swings in annual growth rates: 8.5 percent from 1980 to 1981, -6.1 percent from 1981 to 1982, 17.8 percent from 1982 to 1983, and 13.4 percent from 1983 to 1984.

As indicated earlier, there are two data files on offsets per se, one consisting of extensive information about sales with offset obligations of over $2 million and another with summary data about offset obligations of $2 million or less. The file of larger offset obligations includes data on 120 sales by 30 companies. Data elements include the contract value of sales and the face value of offset obligations, the value of offset commitments actually fulfilled during the 1980-1984 time period, years of sales and offset implementation, U.S. role in sales, countries involved, type of offsets, and products involved in sales and offset contracts by three-digit SIC code. The file on offset obligations of less than $2 million has 221 sales by 35 companies and includes values of the sales and related offsets, year of sale, implementation period, and countries involved. The total number of companies reporting offset sales was 43. Of these, 24 companies reported sales with offsets of greater than $2 million as well as offsets of $2 million or less; 11 companies reported having made sales with offset obligations of less than $2 million only; and 8 companies reported having made sales involving offsets of greater than $2 million.

The sales with offset obligations in the database relate to only a few product groups. Table III.A.4 displays the value of the products sold and the year of such sales between 1980 and 1984. The three product groups that account for most of the value of all the sales made are aircraft (63.9 percent), engines (14.8 percent), and electronics (10.2 percent).

Tables III.A.5, III.A.6, and III.A.7 show the value of export sales which were tied to offset obligations, the purchasing countries, offset obligations implemented and the percentages these measures represent. These data reveal several interesting trends. First, the total value of sales with offset obligations has decreased slightly from 1980 to 1984, with a particularly low value of sales in 1982. Over the five-year period, the value of total sales involved in offset obligations amounted to about $22 billion, while offset obligations incurred amounted to over $12 billion; yet offset obligations incurred as a result of these same sales that were actually fulfilled during that time period amounted to slightly over $2 billion.

It should be noted that the values for offset obligations represent the total obligation values as reported. These are offset obligation values associated with each of the sales reported by the companies. Some companies reported that a significant amount of offset obligations were incurred before sales contracts were actually signed, especially for sales contracts concluded during 1980. The analysis for this report takes into account all offset obligations credited by the seller to a sale concluded between 1980 and 1984, regardless of when the offset obligation was incurred. In its report of October 1985, the ITC excluded offset obligations that were signed prior to or after the reporting period of 1980-84, even though they were credited by the survey respondents to a sales agreement that was signed during 1980-1984. Therefore, the ITC understated the value of offset obligations.

The value of offset obligations implemented represents about 11 percent of sales and about 20 percent of obligations incurred during the time period covered in this database. Moreover, U.S. companies spread deliveries of products sold over a seven-year period (weighted average using dollar value of sale), while offset obligations were spread over twelve years for implementation (weighted average using dollar value of offset). Given the small percent of offset obligations satisfied, it appears that U.S. companies attempt to stretch out the actual implementation of offset agreements. The reasons for such delaying tactics probably stem from companies' desire to lessen the impact of any costs associated with offset obligations. It is reasonable to expect that companies choose to defer implementation until the real value of offset obligations has decreased.

Concerning the products involved in offset agreements, most are in the same product groups as those products being sold by U.S. companies. The dollar value and products involved in obligations follows essentially the same pattern as the products sold. Namely, offset obligations in aircraft, engines, and electronics account for about 50 percent of the dollar value of obligations. The list of products involved, however, includes a few more product groups, thus implying that purchasing governments are forging offset agreements for either direct overseas production or other purposes such as investment, countertrade, or technology transfer.

TABLE III.A.4
Sales Values by Year
(Sales with offsets greater than $2 millions)
($ in millions)

Industry	1980	1981	1982	1983	1984	Total	% of Sales
Metal Products ..	0	0	0	0	7.3	7.3	0.0
Ordnance	0	32.3	115.5	72.1	155.3	375.3	1.7
Fabricated Metals	0	0	0	0	1.0	1.0	0.0
Engines	0	1448.7	0	0	1784.4	3233.1	14.8
Communications Equipment	430.1	0	7.9	231.8	161.3	831.2	3.8
Electronics	455.9	255.6	171.4	399.5	945.2	2227.5	10.2
Motor Vehicles ..	0	29.9	269.2	0	0	299.1	1.3
Aircraft	5473.3	3014.5	33.6	3372.8	2050.2	13944.5	63.8
Guided Missiles..	130.7	34.4	31.2	0	258.0	454.3	2.0
Transport Equipment	34.9	11.8	0	114.3	259.7	420.7	1.9
Measuring Instrument	0	0	0	0	27.3	27.3	0.1
Computer Services	0	0	13.0	0	0	13.0	0.0
Miscellaneous ...	0	0	0	0	2.4	2.4	0.0
TOTAL	6524.8	4827.3	641.8	4190.7	5652.2	21836.7	100.0

TABLE III.A.5
Value of Sales and Average Periods
of Implementation by Country, 1980-1984
($ in millions)

Country	1980	1981	1982	1983	1984	Total	Average Implementation (Months) *
Sales with offset obligations greater than $2 million:							
Australia ...	117.0	2813.7	383.9	12.6	39.3	3366.5	92.5
Belgium	0	0	0	110.9	0	110.9	24.0
Canada	2496.8	58.8	0	0	76.6	2632.1	98.4
Denmark	8.2	0	7.9	3.6	3.9	23.6	44.4
Egypt	0	0	0	213.0	0	213.0	54.0
Greece	0	0	0	3.4	0	3.4	13.0
Israel	893.1	796.2	35.4	310.5	2128.2	4163.4	94.0
NATO	2188.2	0	0	0	0	2188.2	77.4
Netherlands..	5.2	603.1	29.4	0	303.4	941.1	81.1
New Zealand..	38.0	0	0	0	0	38.0	36.0
Norway	29.9	7.9	0	45.4	42.4	125.5	44.0
Philippines..	0	0	0	63.2	0	63.2	11.0
Singapore ...	0	0	0	217.0	0	217.0	60.0
South Korea..	400.0	0	0	0	116.7	516.7	62.5
Spain	34.9	11.8	21.5	2749.0	89.0	2906.1	78.5
Sweden	0	275.0	0	33.4	0	308.4	22.7
Switzerland..	158.0	52.7	31.2	0	0	241.9	45.8
Turkey	0	0	0	0	1893.2	1893.2	140.6
United Kingdom	0	0	0	89.1	176.6	265.7	80.3
Yugoslavia ..	0	0	0	18.8	0	18.8	40.6
France, Italy	0	120.4	0	0	0	120.4	67.0
Denmark, Norway	0	0	94.3	0	0	94.3	50.0
Belgium, Denmark, Norway, Netherlands.	155.5	87.7	38.2	320.8	783.0	1385.2	37.8
SUBTOTAL	6524.8	4827.3	641.8	4190.7	5652.2	21836.7	88.8
Sales with offsets of $2 million or less:							
SUBTOTAL	72.6	125.7	69.0	140.5	155.7	563.5	
TOTAL SALES..	6597.4	4953.0	710.8	4331.2	5807.9	22400.2	

Note: Figures may not add to totals shown due to rounding.

* Weighted by $ value, in months.

TABLE III.A.6
Value of Offset Obligations and Average Periods
of Implementation by Country, for Sale Years 1980-1984
($ in millions)

Country	1980	1981	1982	1983	1984	Total	Average Implementation (Months) *
Sales with offset obligations greater than $2 million:							
Australia ...	20.8	1014.4	112.4	3.1	5.9	1156.7	152.6
Belgium	0	0	0	99.5	0	99.5	84.0
Canada	2714.6	34.6	0	0	61.4	2810.6	215.7
Denmark	8.2	0	1.1	4.5	0.8	14.6	47.6
Egypt	0	0	0	13.5	0	13.5	66.0
Greece	0	0	0	3.4	0	3.4	84.0
Israel	276.2	228.6	8.2	58.5	905.9	1477.4	115.6
NATO	291.6	0	0	0	0	291.6	102.1
Netherlands..	3.2	702.0	12.0	0	280.3	997.5	107.6
New Zealand..	1.2	0	0	0	0	1.2	36.0
Norway	10.8	3.1	0	14.9	42.4	71.2	83.7
Philippines..	0	0	0	0.1	0	0.1	31.6
Singapore ...	0	0	0	45.0	0	45.0	56.0
South Korea..	125.0	0	0	0	31.1	156.1	50.1
Spain	7.7	2.6	15.4	2334.0	44.3	2404.0	126.9
Sweden	0	570.0	0	33.7	0	603.7	233.3
Switzerland..	158.0	30.0	4.0	0	0	192.0	56.8
Turkey	0	0	0	0	1071.0	1071.0	126.7
United Kingdom	0	0	0	17.8	206.2	224.0	107.9
Yugoslavia ..	0	0	0	5.7	0	5.7	55.4
France, Italy	0	54.0	0	0	0	54.0	67.0
Denmark, Norway	0	0	16.7	0	0	16.7	50.0
Belgium, Denmark, Norway, Netherlands.	29.1	17.0	11.2	14.3	274.9	346.6	109.5
SUBTOTAL	3646.4	2656.4	181.1	2648.0	2924.1	12056.0	147.4
Sales with offsets of $2 million or less:							
SUBTOTAL	187.2	20.4	13.6	24.3	36.1	281.7	
TOTAL OFFSETS	3833.7	2676.8	194.7	2672.3	2960.2	12337.7	

Note: Figures may not add to totals shown due to rounding.

* Weighted by $ value, in months.

TABLE III.A.7
Value of Offsets Implemented by Country,
(Offsets greater than $2 million)
1980-1984
($ in millions)

Country	1980	1981	1982	1983	1984	Total
Australia	6.2	7.3	31.8	33.4	42.9	121.6
Belgium	0	0	0	0	0	0
Canada	55.9	201.0	85.8	181.8	261.3	785.8
Denmark	0	0	0	0.6	0.9	1.6
Egypt	0	0	0	0	0	0
Greece	0	0	0	0	0	0
Israel	49.3	30.8	45.0	60.0	228.1	413.1
NATO	30.0	61.8	55.5	49.2	37.0	233.4
Netherlands	0.4	58.9	60.3	93.9	79.5	293.1
New Zealand	0	0.2	0.3	0.5	0.4	1.3
Norway	0	3.6	4.6	4.6	17.3	30.1
Philippines	0	0	0	0	8.1	8.1
Singapore	0	0	0	0	0	0
South Korea	0	0	0	7.9	10.5	18.4
Spain	0	2.7	2.0	3.7	105.1	113.5
Sweden	0	0.7	0.6	9.7	13.5	24.4
Switzerland	0	1.6	22.4	20.3	39.5	83.8
Turkey	0	0	0	0	3.0	3.0
United Kingdom	0	0	2.8	17.4	91.8	111.9
Yugoslavia	0	0	0	0	1.1	1.1
France, Italy	0	17.6	5.6	16.3	10.5	50.0
Denmark, Norway	0	0	12.1	5.4	0	17.6
Belgium, Denmark, Norway, Netherlands	29.1	16.2	8.4	13.9	37.9	105.5
TOTAL	170.9	402.5	336.9	518.5	988.2	2417.1

TABLE III.A.8
Value of Offset Obligations by SIC and Year
($ in millions)

SIC Titles	1980	1981	1982	1983	1984	Total
Miscellaneous Metal Ores.	6.3	0	0	0	0	6.3
Office Furniture	0	0	0	5.0	0	5.0
Iron and Steel Foundries.	6.3	0	0	0	0	6.3
Miscellaneous Primary Metal Products	6.3	0	0	0	0	6.3
Ordnance & Accessories Except Vehicles and Guided Missiles	0	0	27.1	4.5	81.0	112.6
Miscellaneous Fabricated Metal Products	10.2	0	0	0	9.0	19.2
Engines & Turbines	388.7	578.0	0	5.5	370.0	1342.2
Special Industry Machinery Except Metalworking ...	0.5	0	0	0.9	9.7	11.2
Office Computing & Accounting Machines ...	9.0	0	0	0	0	9.0
Refrigeration and Service Industry Machinery	0	0	0	17.8	0	17.8
Miscellaneous Machinery Except Electrical	6.3	0	0	0	0	6.3
Electric Lighting & Wiring Equipment	0	0	0	0	16.3	16.3
Communication Equipment..	3.1	0	8.4	0.9	45.9	58.4
Electronic Components and Accessories	253.8	472.1	35.3	45.3	405.9	1212.4
Motor Vehicles & Motor Vehicle Equipment	0	9.4	0	0	0	9.4
Aircraft & Parts	1597.9	991.4	0.9	47.5	767.8	3405.5
Guides Missiles & Space Vehicles & Parts	523.3	6.3	10.0	0	7.1	546.7
Miscellaneous Manufacturing Industries	190.7	4.3	3.3	113.0	61.3	372.6
Machinery Equipment & Supplies Export-Import Wholesale	6.3	0	0	2.0	0	8.3
Miscellaneous Durable Goods Export-Import Wholesale	465.0	0	0	0	0	465.0

(continued)

(TABLE III.A.8 -- continued)

SIC Codes	1980	1981	1982	1983	1984	Total
Miscellaneous Nondurable Goods Export-Import Wholesale	6.3	0	0	0	0	6.3
Computer & Data Processing Services ...	9.4	0.1	4.2	22.5	0	36.2
Miscellaneous Business Services	35.0	0	0	0	0.6	35.6
Engineering Architectural & Surveying Services ..	0	0	0	0	5.0	5.0
*Electronic Components & Accessories & Aircrafts & Parts	0.9	0	0	44.0	0	44.9
*Air Transportation Certificated Carriers & Motion Picture Production & Allied Services	0	0	0	273.0	0	273.0
*Miscellaneous Durable & Nondurable Goods Export-Import Wholesale	0	0	0	2017.0	0	2017.0
+Miscellaneous SICs	6.9	2.0	4.3	3.9	18.9	35.9
oUnspecified	114.5	592.7	87.6	45.1	1125.7	1965.6
TOTALS	3646.4	2656.3	181.1	2648.0	2924.1	12056.0

* Questionnaire respondents submitted offset data for a combination of two SIC codes.
+ SIC codes with singular yearly entries of less than $5 million were combined under this heading.
o Questionnaire respondents did not submit SIC codes with offset values under this category.

Note: Figures may not add to totals shown due to rounding.

With regard to offset obligations implemented during the time period covered in this report, the trend for industries follows the same pattern as for sales and obligations. As shown on Tables III.A.8 and II.C.5, aircraft, engines, and electronics are the product groups accounting for over 50 percent of the dollar value of offset obligations implemented during the time period. More notable, however, is that the total value of all implemented agreements from 1980-1984 amounts to about $2.4 billion as compared to the over $12 billion in offset obligations.

Additional insights on the offset practices by the U.S. companies reporting for this database are possible by reviewing the value and the type of offsets (Table III.A.9) that these companies agreed to during the reporting period. Almost half, or 46.7 percent or $5.6 billion, of offset obligations are in the Indirect but not Specified category. The next largest amounts are in the Direct Coproduction and Direct Subcontractor Production categories implying coproduction in the same products involved in the sales agreement. By contrast, of the offset commitments implemented, a third was in Direct Subcontractor Production as shown on Table III.A.10.

Concerning U.S. companies' practices in entering into offset agreements, another indicator available in the database is the degree to which companies will be held liable for monetary damages in the event of not complying with the terms of the agreement or whether companies can satisfy the agreement by showing "best efforts" in completing the agreement. Table III.A.11 indicates the value of liquidated damages as well as best efforts by the products involved in the offset. Clearly, the largest percent of obligations in the amount of $8.4 billion are in the liquidated damages category. The data also show, however, that U.S. companies negotiate agreements that allow them some latitude in completing obligations through their best efforts and for which there is no penalty levied against the companies.

TABLE III.A.9
Value and Percent of Offset Obligations by Type and Year
($ in millions)

Offset Type	1980	1981	1982	1983	1984	Total	% of Total
Direct Coproduction ..	54.9	1069.1	43.3	45.3	577.0	1789.7	14.8
Direct Licensed Production	0	0	15.8	4.8	41.4	61.9	0.5
Direct Subcontractor Production	899.4	854.1	13.3	73.8	727.1	2567.7	21.3
Direct Technology Transfer	0	0	3.4	6.2	7.3	16.9	0.1
Direct but not Specified	224.1	6.6	7.1	16.6	76.8	331.2	3.6
Indirect Foreign Investment	0	0	0	0	39.5	39.5	0.3
Indirect Technology Transfer	0	12.6	0	22.0	0.7	35.3	0.3
Indirect Countertrade	584.3	332.6	7.3	137.7	177.2	1239.1	10.3
Indirect but not Specified	1765.0	319.8	2.8	2321.5	1217.6	5626.7	46.7
Not Yet Specified	0	9.4	88.0	20.0	52.4	169.7	1.4
Contractually Bound not to Disclose	75.0	0	0	0	4.2	79.2	0.7
National Security Classified	0	0	0	0	2.7	2.7	0.0
*Unspecified	43.8	52.1	0	0	0.5	96.3	0.8
TOTALS	3646.4	2656.3	181.1	2648.0	2924.1	12056.0	100.0

* Questionnaire respondents did not indicate the type of offset, although dollar values of the offset obligations were provided.

Note: Figures may not add to totals shown due to rounding.

TABLE III.A.10
Value and Percent of Offset Obligations
Implemented Type and Year
($ in millions)

Offset Type	1980	1981	1982	1983	1984	Total	% of Total
Direct Coproduction..	39.1	116.8	123.5	128.6	132.9	540.9	22.4
Direct Licensed Production	0	0	0	22.6	18.6	41.2	1.7
Direct Subcontractor Production	81.3	106.0	107.4	125.0	424.6	844.3	34.9
Direct Overseas Investment	0	0	0	0	9.8	9.8	0.4
Direct Technology Transfer	0.1	5.0	1.2	0.1	0.4	6.7	0.3
Direct but not Specified	0.2	0.2	0	1.0	1.4	2.8	0.1
Indirect Foreign Investment	0	0	0.1	0	30.0	30.1	1.2
Indirect Technology Transfer	0.2	0.2	1.7	3.8	13.4	19.3	0.8
Indirect Countertrade	0.8	13.5	34.5	70.5	140.6	259.9	10.8
Indirect but not Specified	49.1	158.6	66.6	164.6	204.0	642.9	25.8
Not Yet Specified ...	0	0	0	0	0	0	0.0
Contractually Bound not to Disclose	0	0	0	0	0	0	0.0
National Security Classified	0	0	0	0	0.2	0.2	0.0
*Unspecified	0.2	2.2	1.9	2.4	12.2	18.9	0.8
TOTALS	170.9	402.5	336.9	518.5	988.2	2417.1	100.0

* Questionnaire respondents did not indicate the type of offset, although dollar values of the offset obligations were provided.

Note: Figures may not add to totals shown due to rounding.

TABLE III.A.11
Value of Offset Obligations
by Method of Enforcement and Industry
($ in millions)

Product Category	Unspecified	Best Efforts	Liquidated Damages	Total
Miscellaneous Metal Ores	6.3	0	0	6.3
Office Furniture	0	0	5.0	5.0
Iron and Steel Foundries	6.3	0	0	6.3
Miscellaneous Primary Metal Products	6.3	0	0	6.3
Iron and Steel Forgings	0	5.7	0	5.7
Ordnance & Accessories Except Vehicles and Guided Missiles	0	63.6	49.0	112.6
Miscellaneous Fabricated Metal Products	0	10.2	9.0	19.2
Engines & Turbines	0	638.7	703.5	1342.2
Special Industry Machinery Except Metalworking	5.6	75.5	0	11.2
Office Computing & Accounting Machines	0	9.0	0	9.0
Refrigeration and Service Industry Machinery	0	17.8	0	17.8
Miscellaneous Machinery Except Electrical	6.3	0	0	6.3
Electric Lighting & Wiring Equipment	0	0	16.3	16.3
Communication Equipment	5.7	1.1	51.6	58.4
Electronic Components & Accessories.	16.8	622.1	573.5	1212.4
Miscellaneous Electrical Machinery Equipment and Supplies	5.7	0	0	5.7
Motor Vehicles & Motor Vehicle Equipment	0	9.4	0	9.4
Aircraft & Parts	89.0	1031.5	2285.0	3405.5
Guided Missiles & Space Vehicles & Parts	10.0	6.7	530.0	546.7
Measuring and Controlling Equipment.	5.7	0	0	5.7
Miscellaneous Manufacturing Industries	6.3	249.5	116.9	372.6
Machinery Equipment and Supplies Export-Import Wholesale	6.3	0	2.0	8.3
Miscellaneous Durable Goods Export-Import Wholesale	0	0	465.0	465.0
Miscellaneous Nondurable Goods Export-Import Wholesale	6.3	0	0	6.3
Computer & Data Processing Services	0	13.7	22.5	36.2

(continued)

(TABLE III.A.11 -- continued)

Product Category	Unspecified	Best Efforts	Liquidated Damages	Total
Miscellaneous Business Services	35.0	0.6	0	35.6
Engineering Architectural & Surveying Services	0	5.0	0	5.0
Electronic Components & Accessories & Aircrafts & Parts	0	0.9	44.0	44.9
Air Transportation Certificated Carriers & Motion Picture Production & Allied Services	0	0	273.0	273.0
Miscellaneous Durable & Nondurable Goods Export-Import Wholesale	0	0	2,017.0	2,017.0
Miscellaneous SICs	2.8	8.0	10.8	18.9
Unspecified	98.4	641.1	1,226.0	1,965.6
TOTAL	315.6	3,340.1	8,400.3	12,056.0

In summary, the DPA 309 database reveals some interesting facts about the types, terms, and magnitude of offsets. For the defense-related exports covered by this database, the offset totalled $12 billion and sales totalled $22 billion. In the period 1980-1984, about $2.4 billion, or about 20 percent, of the offset obligations were implemented. Most of the offset obligations occurred in three product areas, namely aircraft, engines, and electronics. Given that most of the sales and related offset obligations were with either NATO countries or other countries with whom the U.S. has special defense security arrangements, the trend in offsets involving some form of coproduction arrangements may result from these countries' desires to acquire high technology capability in the overall production of the weapons systems they are purchasing from U.S. producers. Finally, the overall magnitude of offset obligations, does not appear large in the context of either total exports by the companies reporting or in the context of the value of total military production by these companies.

B. Bilateral and Multilateral Negotiations

Discussions with other governments on the subject of offsets in military trade have been undertaken on two fronts. The Office of the United States Trade Representative has taken the lead with respect to the overall negotiations. The Department of State handled the discussions with Israel.

Legal Authority

Under the Constitution, the power to regulate commerce with foreign nations resides with the Congress, while the President has the consitutional power to make treaties with the advice and consent of the Senate. Section 309 of the DPA neither mandates negotiations on defense-related offsets, provides specific authority for the President to enter into such negotiations, nor provides for domestic implementation/enforcement of any agreements reached. However, under the United States trade agreements program, the Trade Agreements Act of 1934 and successor legislation has augmented the authority of the President to enter into and enforce trade agreements to reduce both tariff and non-tariff barriers to trade.

The current authority to negotiate agreements limiting non-tariff trade-distorting measures was extended by the Trade Agreements Act of 1979 and expires January 3, 1988. Under this authority, the President could negotiate agreements related to military offsets as a trade distortion. Any such agreements must be submitted to the Congress for approval under the expedited procedures contained in the Trade Act of 1974 before these agreements and domestic enforcement provisions could enter into effect for the United States.

Separate constitutional and legislative authority exists for regulating the foreign transfer of military goods, related services and technology for national security, or foreign policy reasons.

Application of GATT

The General Agreeement on Tariffs and Trade (GATT) is the principal international body concerned with negotiating the reduction of trade barriers and with international trading relations. The GATT is both a code of rules and a forum in which countries can discuss and overcome their trade problems and negotiate to expand world trading opportunities. The GATT entered into force in 1948, and more than 85 governments, which together account for more than four-fifths of world trade, are currently signatories.

The original GATT document contains several exceptions, including a broadly worded "Security Exceptions" article. Article XXI, among other things, exempts the actions taken by the Contracting Parties with respect to "ammunition and implements of war...for the purpose of supplying a military establishment" from the obligations contained in the other GATT articles.

Over the past 30 years, the GATT's activities and its legal instruments have been expanded in response to major shifts in the global economic structure. In the last major round of multilateral negotiations which concluded in 1979, agreement was reached on a new Government Procurement Code, a sector which heretofore had not been subject to the GATT disciplines. This code provides for national, non-discriminatory treatment with respect to governments signatory to

this code and to those specific agencies of those governments as agreed among the signatories. While some defense agencies are covered by this code, including the U.S. Department of Defense, "procurement indispensable for national security or for national defense purposes" is excepted from coverage under Part VIII of the code.

Another separate code, the Agreement on Trade in Civil Aircraft, which went into effect in 1980, provides for freer trade in this sector among signatories by eliminating the duties on all civil aircraft, their engines, and parts. This code also provides that purchases of covered products be based "only on a competitive price, quality, and delivery basis." While the purchasing country can, under this code, require that the supplier entertain bids "on a competitive basis" from local suppliers for those components for which the aircraft seller was inviting bids from outside suppliers, the intent of this section is to preclude offsets.

As part of the New Round of multilateral trade negotiations the United States has proposed several areas currently covered by GATT rules that need strengthening. These areas include dispute settlement, agriculture, safeguards, and non-tariff barriers. In addition, it has been generally recognized that the GATT needs to expand its rules to areas not now covered, including trade in services. In an area directly related to military offsets, the Government Procurement Code, there are already ongoing efforts to expand the entity and product coverage, as well as extending the participation in these agreements. In the area of investment, the United States has been seeking to establish effective discipline over such trade-distortive measures as local content and export performance requirements. While governmental actions, services, and procurements, seized with national defense, are not currently under consideration as targets for GATT modification, improved discipline in related areas of governmental activity could ameliorate some of the possible negative impacts of military offsets for civilian goods, particularly through countertrade requirements.

OECD Activities

The OECD, the Organization for Economic Cooperation and Development, has recently completed a study of Countertrade: Developing Country Practices. While this issue originally arose in the context of East-West trade, where countertrade has long been a significant attribute, the U.S. Government has encouraged the OECD to examine the issue of countertrade more generally. It is anticipated that the countertrade issue will continue to be a subject of multilateral examination within this organization.

Environment for Negotiations

Increased demands by foreign governments for offsets to purchases of U.S. arms and the possible negative impact of the demands on the U.S. industrial base and trade interests have become an increasing concern to the Administration, Congress, and American defense industries and their suppliers. However, in order to move this "concern" to the negotiation stage with a reasonable opportunity that these negotiations lead to a timely and successful result, certain conditions must usually be met. These include:

- o Clear identification of the problem.
- o Articulation of central and collateral issues surrounding the problem.
- o Available factual information to support analysis of the problem.
- o The susceptibility of the problem to an internationally negotiated solution.
- o Minimal conflict between an acceptable solution to a specific problem and other Governmental policy goals.
- o Agreement within the Government on the nature of the problem and on a negotiated solution.
- o Similar recognitions by key foreign negotiating partners.
- o Support by the private sector for the Government's approach to negotiated resolution.
- o Availability of appropriate negotiating leverage.
- o Realizable mutual benefits to negotiation participants.
- o An enforceable target outcome to an agreement among all significant negotiating participants.

Without specific itemization, it is clear that not all the conditions have been met that are necessary to develop a negotiating mandate on this subject. There are, as discussed in the preceding body of this report, apparent conflicts between the political/military goals of the U.S. Government, related policies such as the "two-way street" and the RSI concepts, and possible negative implications of increasing offsets on the mobilization base and the commercial interests of military contractors, their suppliers, and other domestic industries affected by offsets. The observation from the offset survey data that almost all the military sales and offsets, by value, were to those governments with which the U.S. either has formal mutual defense agreements or strong security interests, underlines this concern.

Defense contractors have indicated some support for a multilateral negotiated response to offsets over unilateral action. However, they have also expressed concern about the coverage and enforceability of any resulting agreement. They have also pointed out that defense-related exports, even accompanied by offset agreements, have additional benefits for the U.S. economy and the Defense Department in terms of net marginal increments to exports, reductions in unit production costs, and the spreading of overhead expenses.

Foreign Consultations

Taking into account the above factors, the USTR, with the concurrence and participation of the relevant departments and agencies, undertook consultations with foreign governments, both through the permanent embassy delegations to these governments and a special delegation dispatched for this purpose from Washington. This delegation held working level meetings in London, Paris, and Bonn, with appropriate government officials from the ministries involved in the offset issue.

The U.S. officials informed the foreign governments of the concern within the United States regarding offsets and described the analysis underway within the U.S. Government and the report mandate contained within the DPA. Three types of offset transactions were distinguished by U.S. officials:

- o those negotiated among private firms on a strictly commercial basis;
- o those which enhance mutual security by contributing directly to RSI or "two-way street" in arms trade;
- o those which result from the requirements of purchasing governments as a condition for concluding a sale, but do not contribute to mutual security and preparedness goals.

Emphasis was placed on the third type of offset transaction and non-military offsets to military sales as posing potential problems because they were usually demanded for commercial or industrial policy reasons. The current U.S. Government policies with regard to this type of offset was explained, and the foreign governments were asked to share their information and concerns on this issue and whether future explorations of these topics was of interest to those governments.

None of the foreign governments consulted had addressed the economic implications of military offsets or were engaged in an information gathering effort to the extent of that then engaged in by the U.S. Government. While the requirements for incoming offsets were centrally managed by most of the governments, the meeting of foreign offset requirements by military goods-selling governments was largely the responsibility of the selling company incurring the offset obligation. To the extent that the governments were

involved in offsets, the management of the issue was generally lodged in the military procurement and sales agencies as opposed to the economic and trade agencies of those governments. Without exception, each government was concerned about any unilateral change in the offsets policies of the U.S. Government. Lastly, most governments were willing to discuss the substantive aspects of the issue at a future time when more information would be available to both parties.

Discussions with Israel

Under the leadership of the Department of State, the United States has for some time pressed for Israeli agreement to phase out the special arrangements whereby Israel is permitted to negotiate "directed offsets" with its U.S. suppliers under contracts paid for with U.S. foreign aid appropriations. The Government of Israel has argued that these unique arrangements are important in establishing relationships between U.S. defense industry and Israeli defense firms and for the purpose of increasing production by such firms.

After the first Joint Security Assistance Planning (JSAP) group meetings in November 1984, the United States sent a letter to the Government of Israel which informed them of U.S. concerns over the adverse effects of offsets and a U.S. desire to phase offsets out by the end of Fiscal Year 1987. In reply, Israel took the position that the "directed offsets" program is "critical to maintaining the strength of our defense industries and solidifying its ties with the U.S. DOD."

During the second JSAP, in July 1985, the U.S., while acknowledging the importance that Israel attached to offsets, reiterated that "directed offsets" set a troublesome precedent for the U.S. and proposed to phase them out before Fiscal Year 1988. In response, Israel asserted that offsets are critical to the Israeli Defense Forces readiness and should be maintained at current levels or increased. Negotiations on this point have continued with no resolution as of November 1985.

C. Memoranda of Understanding

The list that follows summarizes the Memoranda of Understanding (MOUs) signed between the United States and foreign countries that provide the basis for the fulfillment of offset commitments. Generally, an MOU is an umbrella agreement which describes the way government-to-government business is implemented. It identifies the authorities for actions without being the authority itself. Such authority would be contained within an implementing agreement, whereas an MOU is merely a statement of principle, identifying the financial arrangements of a transfer of arms. Some general reasons for the use of MOUs are the program's:

- o large dollar value.
- o high visibility.

- o political controversy.
- o long life.
- o numerous implementing agreements.
- o complexity.
- o mixture of government-to-government and commercial transfers.

Additionally, MOUs are often used to identify the relationships and responsibilities of the participants in a program.

MOUs may or may not be used for acquisition, licensed production, or coproduction at the discretion of the parties involved and do not necessarily include offsets. When used, MOUs give the dollar value of the entire program as if it were completed within the U.S. A dollar value of offsets within each program is not specified and is typically difficult if not impossible to extract from the total dollar value. Acquisition, licensed production, or coproduction agreements may be fulfilled either through commercial or FMS sales, and the majority of FMS sales do not have an MOU. Consequently, the following list which was provided by the Department of Defense is neither a complete record of all arms transfers nor a complete list of all offset agreements. For a number of agreements, the quantity listed for an MOU is projected and may not represent the quantity actually delivered or produced.

Symbols used on the following pages:

- * Quantity has not yet been determined.
- ** Item was procured by competitive bid.

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Australia	76mm ammo			TDP	1978		None		USN
	45MOD Elec Prim			TDP	1979		None		USN
	50 Caliber Cartridge, Tracer M17	200,000	0.21	FMS	Feb 79	Lake City AAP Independence, MO	None	Sec. of Defense	USA
	50 Caliber Cartridge, Ball M33	800,000	0.80	FMS	Feb 79	Lake City AAP Independence, MO	None	Sec. of Defense	USA
	Link, Metallic Belt, M9	1,000,000	0.05	FMS	Feb 79	Wells Marine, Inc. Costa Mesa, CA	None	Sec. of Defense	USA
	F/A-18		2,700.00	MOU	Sept 80	McDonnell Douglas	None		USN
	20mm Phalanx			TDP	1981	Gen.Dyn/Gen.Elec	None		USN
	FFG (Frigates)		650.00				None		USN
Austria	M60A1 to M60A3 Conversion Kit	120	19.8	FMS	Apr 79	**	None	Sec. of Defense	USA
Belgium	F-16 A/B Aircraft	44	1,000	MOU/ FMS	Jun 75 Feb83(LOA)	Gen Dyn	None		USAF
	Rckt Mtr 2.75 in	10,400	0.80	FMS	Feb 76	Northrop	France	Dir, DSAA	USAF
	Rckt Mtr 2.75 in	2,324	0.20	FMS	Feb 76	Northrop	Spain	Dir, DSAA	USAF
	Rckt Mtr 2.75 in	22,228	2.00	FMS	Dec 76	Northrop	Netherlands	Dir, DSAA	USAF
	Rckt Mtr 2.75 in	3,000	0.30	FMS	Feb 77	Northrop	Australia	Dir, DSAA	USAF
	Rckt Mtr 2.75 in	30,000	2.70	FMS	Mar 77	Northrop	Saudi Arabia	Dir, DSAA	USAF
	Rckt Mtr 2.75 in	2,000	0.20	FMS	Apr 77	Northrop	Spain	Dir, DSAA	USAF
	Rckt Mtr 2.75 in	15,072	1.40	FMS	Nov 77	Northrop	Netherlands	Dir, DSAA	USAF

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Canada	Cartridge, 7.62mm, M43-Primer	*	*	FMS	Aug 78	Lake City AAP Independence, MO	None	Dir, DSAA	USA
	Cartridge 50 Cal, Spotter-Tracer; M48A2	*	*	FMS	Aug 78	Lake City AAP Independence, MO	None	Dir, DSAA	USA
	Cartridge, 105mm, Illum, M314A3	*	*	FMS	Aug 78	Longhorn AAP Marshall, TX	None	Dir, DSAA	USA
	Cartridge, 105mm, Smoke HC BE M84	*	*	FMS	Aug 78	Pine Bluff Ars Pine Bluff, AK	None	Dir, DSAA	USA
	Projectile, 155mm, Illum M485A2	*	*	FMS	Aug 78	Longhorn AAP Marshall, TX	None	Dir, DSAA	USA
	Projectile, 155mm, Smoke Green, BE M116A1	*	*	FMS	Aug 78	Pine Bluff Ars Pine Bluff, AK	None	Dir, DSAA	USA
	Projectile, 155mm, Smoke Red, BE M116A1	*	*	FMS	Aug 78	Pine Bluff Ars Pine Bluff, AK	None	Dir, DSAA	USA
	Projectile, 155MM, Smoke Yellow, BE M116A1	*	*	FMS	Aug 78	Pine Bluff Ars Pine Bluff, AK	None	Dir, DSAA	USA
	Fuse, MT M565	*	*	FMS	Aug 78	**	None	Dir, DSAA	USA
	Fuse, M732	*	*	FMS	Aug 78	Lone Star AAP Texarkana, TX	None	Dir, DSAA	USA
	Grenade, Hand, Smoke M18	*	*	FMS	Aug 78	Pine Bluff Ars Pine Bluff, AK	None	Dir, DSAA	USA
	Igniter, Fuse, M60	*	*	FMS	Aug 78	**	None	Dir, DSAA	USA
	Firing Device, Demolition M8	*	*	FMS	Aug 78	**	None	Dir, DSAA	USA
	Firing Device, M142	*	*	FMS	Aug 78	Produced outside Continental U.S.	None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Canada	Warhead, 2.75 RKT, Smoke WP M156	*	*	FMS	Aug 78	**	None	Dir, DSAA	USA
	Fuze, M427	*	*	FMS	Aug 78	**	None	Dir, DSAA	USA
	Grenade, Hand, Fragmentation, M67	*	*	FMS	Aug 78	Lone Star AAP Texarkana, TX	None	Dir, DSAA	USA
	Firing Device, M1 Delay Type (8-12 min)	*	*	FMS	Aug 78	Not in production	None	Dir, DSAA	USA
	Firing Device, M1 Delay Type (45-115 min)	*	*	FMS	Aug 78	Not in production	None	Dir, DSAA	USA
	Firing Device, M1 Delay Type (100-280 min)	*	*	FMS	Aug 78	Not in production	None	Dir, DSAA	USA
	TOW, Guided Missile, Surface Attack, HE	*	*	FMS	Jun 78	Hughes Aircraft Calver City, CA	None	Dir, DSAA	USA
	TOW, Guided Missile, Surface Attack, Practice	*	*	FMS	June 78	Hughes Aircraft Calver City, CA	None	Dir, DSAA	USA
	TOW, Blast Simulator Assembly	*	*	FMS	Jun 78	State Co. Frederick, CO	None	Dir, DSAA	USA
	TOW, Missile Simulator Round	*	*	FMS	Jun 78	? Van Nuys, CA	None	Dir, DSAA	USA
	Cartridge, 105mm, Tank Smoke WP-T, M416	*	*	FMS	Dec 78	Pine Bluff Ars	None	Dir, DSAA	USA
	Projectile 5in/54 Caliber HC MK 108 Mod 1	*	*	FMS	Feb 79	Landsdown Co Morton, PA	None	Dir, DSAA	USA
	Projectile 5in/54 AAC, M61 Mod 1	*	*	FMS	Feb 79	Landsdown Co Morton, PA	None	Dir, DSAA	USA
	Projectile 5in/54 Caliber BL-P/T MK 92 Mod 4	*	*	FMS	Feb 79	Landsdown Co. Morton, PA	None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Canada	Dummy Projectile 5in/54 Caliber MK6 Mod 1	*	*	FMS	Feb 79	Landsdown Co. Norton, PA	None	Dir, DSAA	USA
	Dummy Projectile Charge 5in/54 Caliber	*	*	FMS	Feb 79	Landsdown Co. Norton, PA	None	Dir, DSAA	USA
	Charge Propelling 5in/38 & 5in/54 Caliber Clearing MK 65 Mod 0	*	*	FMS	Feb 79	Landstown Co. Norton, PA	None	Dir, DSAA	USA
	Signal, Smoke and Illum. Marine MK 66 Mod 0 Red	*	*	FMS	Feb 79	Naval Weapons Center, Crane, IN	None	Dir, DSAA	USN
	Marker, Location, Marine MK 27 Mod 0 Submarine Yellow Flare White Smoke (in As Is Condition)	*	*	FMS	Feb 79	Naval Weapons Center, Crane, IN	None	Dir, DSAA	USN
	Marker, Location Marine MK 28 Mod 0 Submarine Green dye (in As Is Condition)	*	*	FMS	Feb 79	Naval Weapons Center, Crane, IN	None	Dir, DSAA	USN
	Charge Demolition MK 8 Mod 0 Flexible Linear 70% Comp A-3 30% Aluminum Powder	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Cartridge Impulse MK 104 Mod 0 F/Training Tower use only	*	*	FMS	Feb 79	?	None	Dir, DSAA	USN
	Cartridge, Life Raft Vital F/Multi-engined A/C Life Raft Ejection, Inflation, Walter Kidde	*	*	FMS	Feb 79	Walter Kidde Co Maryland	None	Dir, DSAA	USN
	Cartridge, Impulse MK 105 Mod 0 F/A WQ-13 Sonar Guillotine	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Canada	Cartridge Impulse F/SH-3A CH-198 UH-34E Series Aircraft Talley P/N 1013-40 or CAD Inc P/N 070020 (Source Control Dwg 2518431)	*	*	FMS	Feb 79	Not in Production	None	Dir, DSAA	USN
	Container Demolition Charge MK 1 Mod 0 Empty (in As Is Condition)	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 2 Mod 0 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 2 Mod 1 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 1 Mod 0 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 7 Mod 1 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 7 Mod 2 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 7 Mod 3 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 7 Mod 4 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USNN
	Container Demolition Charge MK 7 Mod 5 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 7 Mod 6 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 7 Mod 7 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Canada	Container Demolition Charge MK 7 Mod 8 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Container Demolition Charge MK 8 Mod 1 Empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Bomb GP MK 82 Mod 1 500 lb empty	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	Bomb GP MK 82 Mod 1 500 lb Explosive	*	*	FMS	Feb 79	Naval Ammunition Depot, McAlester, OK	None	Dir, DSAA	USN
	Signal Smoke and Illum. Marine MK 13 Mod 0	*	*	FMS	Feb 79	Naval Weapons Systems, Crane, IN	None	Dir, DSAA	USN
	Projectile 5in/54 Caliber VT Non-Frag MK 101 Mod 0 MK 64 Mod 0 Projectile Body, MK 73 Mod 10 SD Fuse	*	*	FMS	Feb 79	Landsdown Co. Morton, PA	None	Dir, DSAA	USN
	Projectile 5in/54 Caliber VT Non-Frag MK 100 Mod 0 MK 64 Mod 0 Projectile Body, MK 73 Mod 11 NSD Fuse	*	*	FMS	Feb 79	Landsdown Co. Morton, PA	None	Dir, DSAA	USN
	Charge Propelling 5in/54 Caliber Full MK 67 Mod 3 Steel Case MK 9 Primer MK 45 Mod 1 Polyurethane Plug	*	*	FMS	Feb 79	Landsdown Co. Morton, PA	None	Dir, DSAA	USN
	Charge Propelling 52/54 Caliber Reduced Steel Case MK 9 Primer MK 153 Mod 0 Cork Plug	*	*	FMS	Feb 79	Naval Ammunition Depot, McAlester, OK	None	Dir, DSAA	USN
	Charge Assembly Demolition MK 138 Mod 1 Block Type Comp C	*	*	FMS	Feb 79	**	None	Dir, DSAA	USN
	M7 Bayonet	84999	0.94	LOA	1984	Imperial Knife	None		USA
	FBA (AWACS) See FRG								

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Denmark	RAM (See FRG)			MOU	Mar 79				
	RAM (See FRG)			MOU	Apr 85				
	F-16A/B (See EFG)			MOU/ FMS	Jun 75				
Egypt	105mm Tank Ammo		37.0	MOU	1979		None		USA
EFG	F-16	348	5,300.0	MOU/ FMS	May 75	General Dynamics	Yes	Dir, State	USAF
Federal Republic of Germany	AIM-9L	8,800	519	MOU	Oct 77	Raytheon	800 Italy 800 Norway 2500 UK	Dir, Defense Research, & Eng.	USN
	Ribbon Bridge		15	FMS	Jul 77	Consolidated Diesel Electric	NATO	Dir, DSAA	USA
	5in Rolling Air Frames		1,300		1975		None		USN
	MODFLIR	8,341	568	MOU	1978	Texas Instruments	NATO	Dir, Def. Research, & Eng.	USA
	AWACS (w/Canada)	18	1,826	MOU	Dec 78	Boeing	None	Sec. of Defense	USAF
	STINGER	10,000	852	MOU	1983	General Dynamics	None		USA
	Mission Equip. Package for Advanced Attack Helicopter	250	18	MOU	Aug 84	Martin Marietta	U.S.	Dir, DSAA	USA
	RAM Weapon System (Development)	N/A	233	MOU	Mar 79	General Dynamics	N/A		USAF
	RAM Weapon System (Production)	7,100 missiles 73 launchers		MOU	Apr 85	General Dynamics	Yes		USAF
Greece	Components Conversion of M48A1 to M48A5 Tank	55 each	11.76	FMS	Dec 76		None	Dir, DSAA	USA
	Cartridge 50 Caliber Spotter Tracer M48A2	100,000	0.20	FMS	May 76		None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Greece	Cartridge, 90mm, Tank HE M71, Fuze, PDM557	10,000	1.12	FMS	Jan 77		None	Dir, DSAA	USA
	Cartridge, 90mm, HEAT-T, M431A2	10,000	2.36	FMS	Jun 77	Not in Production	None	Dir, DSAA	USA
	Cartridge, 90mm, HEAT, M371A1, w/ Fuse M530	62,500	12.63	FMS	Sep 77		None	Dir, DSAA	USA
	Rifle, 90mm, M67	1,500	12.08	FMS	Dec 77	Not in Production	None	Dir, DSAA	USA
	Cartridge, 57mm, M306A1 TP, w/ Fuse, PD	*	*	FMS	Apr 78	Not in Production	None	Dir, DSAA	USA
	Cartridge, 60mm, Illum, M83A3, w/ Fuse	*	*	FMS	Apr 78	Longhorn AAP	None	Dir, DSAA	USA
	Cartridge, 90mm, APC-T, M82	*	*	FMS	Apr 78	Not in Production	None	Dir, DSAA	USA
	Cartridge, 90mm, HE-T Composition B, XM591	*	*	FMS	Apr 78	Not in Production	None	Dir, DSAA	USA
	Projectile, 155mm, Illum, M485A2	*	*	FMS	Apr 78	Iowa AAP	None	Dir, DSAA	USA
	Charge, Prop. 8in M2 White Bag	*	*	FMS	Apr 78	Indiana AAP	None	Dir, DSAA	USA
	Cartridge, 105mm, M84A1	*	*	FMS	Apr 78	Pine Bluff Ars	None	Dir, DSAA	USA
	Cartridge, 105mm, M314A3	*	*	FMS	Apr 78	Longhorn AAP	None	Dir, DSAA	USA
	Cartridge, 105mm, M67TP-T	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge, 106mm, M344, HEAT	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge, 106mm, M346A1, HEP-T	*	*	FMS	Apr 78		None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Greece	Cartridge 105mm, Tank WP-T, Smoke, M416	6,500	1.38	FMS	Apr 78	Pine Bluff Ars	None	Dir, DSSA	USA
	Cartridge, 105mm, Tank TP-T, M467	1,700	2.45	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge 105mm, Tank APDS-S, M392A2	10,000	7.40	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge, 105mm, Tank HEAT-T, M456	30,000	13.68	FMS	Apr 78	Milan AAP	None	Dir, DSAA	USA
	Cartridge, 205mm, Tank HEP-T, M393A2	19,000	3.06	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge 57mm, M307, HEAT w/fuse, PL, F/Rifles M18, M18A1	*	*	FMS	Apr 78	Not in Production	None	Dir, DSAA	USA
	Projectile 8in M106 HE without fuse	*	*	FMS	Apr 78	Cornhusker AAP Grank Island, NB	None	Dir, DSAA	USAA
	Cartridge, 75mm, Blank M337A1	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge, 75mm, M309, w/ fuse, PD, M51A4, .05 second delay	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge, 75mm, HEAT M310, w/fuse, BD, M62A1	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge, 75mm, HE, M309A1, w/fuse MTSQ, M500A1	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge, 75mm, APC-T M61	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Cartridge, 81mm, HE, M43A1	*	*	FMS	Apr 78		None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Greece	Cartridge, 81mm, Illum, M301A3, w/fuse, Time	*	*	FMS	Apr 78	Longhorn AAP	None	Dir, DSAA	USA
	Charge Propelling 175mm, MB, M86A2, w/ Additive jacket and M82 Primer	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Charge, Propelling, 175mm, GB, M124	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Projectile, 175mm, HE M437A2	*	*	FMS	Apr 78		None	Dir, DSAA	USA
	Prop Charge 155mm, M119A1	2,000	.25	FMS	Jun 78	Indiana AAP	None	Dir, DSAA	USA
	Barrel, 81mm, M29 or 29A1	*	*	FMS	Nov 78	Watervliet Ars	None	Dir, DSAA	USA
	Bridge Floating Raft Set, Light Tactical	60	4.36	FMS	Jan 79	No principal producer	None	Dir, DSAA	USA
	Cartridge, 105mm, HEP-T, M393A2	*	*	FMS	Jun 79		None	Dir, DSAA	USA
	Cartridge, 105mm, HEAT-T, M456	*	*	FMS	June 79	Milan AAP	None	Dir, DSAA	USA
	M48 Tank Spare Parts	*	*	FMS	Oct 79	Not in Production	None	Dir, DSAA	USA
	Components for Conversion of M48A1 to M48A3	110	18.48	FMS	May 80	No Principal Producer	None	Dir, DSAA	USA
	Components for Conversion of M48A3 Tank	102	30.48	FMS	Sep 81	No Principal Producer	None	Dir, DSAA	USA
	M47/M48 Tank Spare Parts	*	*	FMS	Jul 81	Not in Production	None	Dir, DSAA	USA
	T132E1, T136, T107, T84 T85E1 Track Shoe	*	*	FMS	Feb 81	**	None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Israel	Piston Signal AN-M8	Up to 200	*	FMS	Jan 76	Not in Production	None	Dir, DSAA	USA
	Sight, Infinity	40	.01	FMS	Mar 76	Not in Production	None	Dir, DSAA	USA
	Add On Stabilization Kit for M60A1 Tank	125	1.38	FMS	Jul 76	Honeywell	None	Dir, DSAA	USA
	Telescope Panoramic	150 over 5 years	.69	FMS	Jul 76	Not in Production	None	Dir, DSAA	USA
	Mount, Tank Periscope M118	60/yr, 5 yrs	.06/yr	FMS	Nov 77	Not in Production	None	Dir, DSAA	USA
	Ring Assembly, Slipring for M60A1 Tank	80/yr 400/5yrs	.22	FMS	Dec 77	**	None	Dir, DSAA	USA
	Elevation Assy M140 Gun Mount	250	12.77	FMS	Mar 81	Ralcon Inc.	None	Dir, DSAA	USA
	F-16C/D		425	FMS	Aug 83	General Dynamics	None		USAF
Italy	M109G SP Howitzer	258	41.10	MOU	1973	Bowen, McLaughlin, York	None	Sec. of Defense	USA
	M109 SP Howitzer Vehicle for Conversion to M109G Configuration	32	16	Amend. to MOU	Aug 76	Bowen, McLaughlin, York	None		USA
	Fuse, PD, M572	20,000	.30	FMS	Feb 78	Milan AAP Milan, TX	None	Dir, DSAA	USA
	M113A1 Italian Modified	300	39	DSAA Letter	Apr 78	FMC Corp	None	Dep.Dir, DSAA	USA
	M113 APC	4,949	159.5	MOU	63/78	FMC Corp	Li,Tk,SA, GR,Is	Dir, DSAA	USA
	Fuse, PD, M739	140,000	3.2	FMS	Apr 80	Hamilton Technology, Inc.	None		USA
	AIM-9L (with Norway, UK)	1,314		Suppl. to MOU	Mar 83	Raytheon	Denmark, Netherlands, Spain		USN

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Japan	I-Hawk SAM		766	MOU	1979	Raytheon	None	Chief, MDAO Japan	USA
	AH-1S Helicopter			MOU	1982	Hughes, BHTI	None		USA
	P-3C ASW Weapon System	45		MOU	Jun 78	Lockheed	None		USN
	P-3C Update III		3,200	MOU	1982	Lockheed	None		USN
	M110A2 SP Howitzer			MOU	1982	Bowen, McLaughlin, York	None		USA
	AIM-9L Missile	2,020	240	FMS/ MOU	1982	Naval Weapons Center, Raytheon	None		USN
	MK46 Torpedo		290	MOU	1982	Aerojet Electro Systems Co.	None		USN
	HAWK SA Missile			MOU	67/83	Raytheon	None		USA
	MK 182 Mod 1			TDP	1983		None		USN
	MK 193 Mod			TDP	1983		None		USN
	AN/SQQ-30 Mine				1983	General Electric	None		USN
	F-15 (Supercedes Jun 78 MOU	155		MOU	Dec 84	General Dynamics	None	Sec. of Defense	USAF
	PATRIOT Air Defense Missile System	1645 mals 35 fire unit		MOU	Dec 84	Raytheon	None		USAF
Korea	Components, maintenance of Truck, Cargo, 5 ton, M813	2	.08	FMS	May 78	AM General Corp	None	Dir, DSAA	USA
	Components, maintenance of truck, Dump, 5 ton, M817	62	3.24	FMS	May 78	AM General Corp	None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Korea	Components, maintenance of Truck, Tractor, 5 ton M818	156	6.40	FMS	May 78	AM General Corp	None	Dir, DSAA	USA
	Components, maintenance Truck, Wrecker, 5 ton M816	46	4.28	FMS	May 78	AM General Corp	None	Dir, DSAA	USA
	Components, maintenance Tank M48A1	190	21	FMS	May 78	Not in Production	None	Dir, DSAA	USA
	2.75in Rocket Launcher M1158A1	Unlimited	—	Amend MOU	Oct 77	Colt Inc.	None	Chief, JUSMAG Korea	USA
	M-16 Rifle	324,000	103	Amend MOU	Oct 77		None		USA
	ROK Indigenous Tank	*	*	MOU	Jul 78	Not Determined	None	Sec. of Defense	USA
	F-5E/F	68	74.40	LOA	Nov 80	Northrop	None	Dir, DSAA	USAF
	SEA ASROC			TDP	1981		None		USN
	GP Mk84 ArBomb			TDP	1982		None		USN
	Mk57 Mine Mod 0			TDP	1982		None		USN
	Mk83 Bomb Fuse			TDP	1982		None		USN
	Mk403 SUP Fuse			TDP	1983		None		USN
	5in Rocket Motor MK22			TDP	1983		None		USN
	M109 SP Howitzer	272	217	MOU	1983	Bowen, McLaughlin, York	None	Dir, DSAA	USA
	LST Newport Class			TDP	1984		None		USN
	XKI Tank	710	*	MOU	Sep 84	Future Agreement	None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
NATO	Law-I	225,700	11	TIA	1964		None		USA
	Law-II	129,240	5.2	LOA	1968		None		USA
	Law-III	836,398	36	Letter	1969		Yes		USA
	SEASPARROW Missile		450	MOU	1973	Raytheon	None		USN
	M483A1 Shell			MOU	1980		Yes		USA
	HAWK ELIP			MOU	68/80	Raytheon	None		USA
	AN/TSQ-73 Missile Minder System	Up to 29	146.7	MOU	Feb 81	Litton/Lone Star AAP, TX	None		USA
Netherlands	M109 SP Howitzer I	134	18.1	MOU	1966	Bowen, McLaughlin, York	None		USA
	F-16A/B (See EFG)				1975				
	Torpedo Launcher MK1 Mod 0 (Conf)	40	.02	FMS	Jul 77	Not in Production	None	Dir, DSAA	USN
	Projectile, 155mm Smoke WP, M110A2	4,000	.20	FMS	Jan 79	Longhorn AAP Marshall, TX	None	Dir, DSAA	USA
	Projectile, 155mm HE, M107	29,224	3.36	FMS	Jan 79	Louisiana AAP Shreveport, LA	None	Dir, DSAA	USA
	M109 SP Howitzer II	86	61	FMS	1979	Bowen, McLaughlin, York	None		USA
	M-483A 155mm Improved Conventional Munition	Unlimited	—	MOU	Oct 80	Mississippi AAP Bay St. Louis, MI	NATO	Dir, Defense Research & Eng.	USA
	7TSQ M577 Fuse	Unlimited	—	MOU	Oct 80	Kansas AAP Parsons, KS	None		USA
	F-16A/B	111	2,000		Dec 80	General Dynamics	None	Dir, DSAA	USAF

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Norway	F-16A/B (See EPG)				1975				
	Cartridge, 20mm, TP M55A2	*	*	FMS	Sep 76	Lake City AAP Independence, MO	None	Dir, DSAA	USA
	Cartridge, 20mm, HEI M56A4	*	*	FMS	Sep 76	Lake City AAP Independence, MO	None	Dir, DSAA	USA
	Ribbon Bridge	*	*	FMS	Jun 77	Consolidated Diesel Electric	None	Dir, DSAA	USA
	AIM-9L (See Italy)				Mar 83				
Philippines	Magazine 7.62 Cartridge	100,000	.14	FMS	Jul 78	**	None	Dir, DSAA	USA
	Fuse, PD, M557	75,000/yr	.90/yr	FMS	Jul 78	Milan AAP Milan, TX	None	Dir, DSAA	USA
	Signals XM167, XM166,	10,000 of	.31/yr	FMS	Jul 76	Not in Production	None	Dir, DSAA	USA
Singapore	Mortar Trainer M32A1	4	.01	FMS	Jun 76	Watervliet ARS Watervliet, NY	None	Dir, DSAA	USA
	40mm M203 Grenade Launcher (with Thailand)	10,000	3.63	FMS	Feb 78	Colt Industries Hartford, CT	None	Dir, DSAA	USA
	Mk106 HE Mod 2			TDP	1983		None		USN
	Mk 106 TP Mod 1			TDP	1983		None		USN
Spain	Fuse, PD, M557 and Rooster, M125A1	100,000	2.2	FMS	Jul 80	Borlova Sys. & Inst. Corp., Valley Stream NY	NATO	Dir, Defense Research & Eng.	USA
	AV-8B Aircraft		378			McDonnell Douglas	None		USN
	F/A-18		140			McDonnell Douglas	None		USN
Sweden	Ribbon Bridge	*	*	FMS	Jul 76	Consolidated Diesel Electric	None	Dir, DSAA	USA

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
Switzerland	F-5E/F	72	350	MOU	Mar 76	Northrop/General Electric	None	Sec. of Defense	USAF
	DRAGON	/11550	/191	FMS/ MOU	78/81	McDonnell Douglas Kollsman Inst. Co. Raytheon	None		USA
	F-5E/F	42	308	Amend MOU	Oct 80	Northrop/General Electric	None	Sec. of Defense	USAF
	M109A1B SP Howitzer	207	128	MOU	1981	Bowen, McLaughlin, York	None	Dir, DSAA	USA
	TOW-2 Missile	12,000 mis 400 launch	>175	MOU	Aug 84	Hughes Aircraft	None (Some exceptions to FMG)		USA
Taiwan	F-5E/F	242	667	FMS	73/79	Northrop/General Electric	None	Dir, DSAA	USAF
	ZUNI Rocket 2A1 MIP	3,000/yr	2.7	FMS	Jul 79	Naval Ammunition Depot, OK	None	Dir, DSAA	USN
	5in/38 Caliber Cannon Projectile	2,726	2.7	FMS	Jul 79		None	Dir, DSAA	USN
	ZUNI			TDP	1983	NAD, OK	None		USN
	LST-1056 BP			TDP	1983		None		USN
Thailand	40mm M203 Grenade Launcher (See Singapore)				Feb 78			State Dept. Letter	
Turkey	2.75in Rocket	54	1.5	FMS	1972				USA
	Mounting Kit Vehicle for TOW Missile System		.32	FMS	Sep 77	**	None	Dir, DSAA	USA
	Air Tech Data			TDP	1981				USN

COUNTRY	ITEM	QUANTITY	$ VALUE (millions)	BASIS	DATE	U.S. COMPANY	THIRD COUNTRY SALES	APPROVAL	SERVICE
United Kingdom	TOW Roof Mounted Sight	100	50	MOU	Oct 78	Hughes Aircraft	Yes	Dir, Defense Research & Eng.	USA
	TOW HRMS	165	96	MOU	1978	Hughes Aircraft	None		USA
	Mk137 SRBOC L		.15	TDP	1979		None		USN
	AV-8B Harrier	60	1,500	MOU	Jun 81		None		USN
	Mk35 Safety Arm Device			TDP	1983		None		USN
	AIM-9L (See Italy)				Mar 83				
	Materials for Ocean Surveillance Information System	Enough for One System		MOU	Nov 84		None	Dir, DSAA	USN
DE VFL	Cartridge, 20mm TP	550,000	1.46		Sep 84	Lake City AAP	None		USA

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