

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) THE DEFENSE INDUSTRIAL BASE		5. TYPE OF REPORT & PERIOD COVERED
7. AUTHOR(s) Harold E. Bertrand Steven C. Mayer Anthony J. Provenzano		6. PERFORMING ORG. REPORT NUMBER LMI Task 76-2, Vol. II
9. PERFORMING ORGANIZATION NAME AND ADDRESS Logistics Management Institute 4701 Sangamore Road Washington, D. C. 20016		8. CONTRACT OR GRANT NUMBER(s) SD-321
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Director of Defense Research and Engineering (Procurement)		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (If different from Controlling Office)		12. REPORT DATE August 1977
		13. NUMBER OF PAGES 146
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) "A" - Approved for Public Release; Distribution Unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Profit, Profitability, Return, Investment, Risk, Assets, Equity, Foreign Military Sales, Market Demand, Capital, Stability, Investment Incentives, Defense Industrial Base, Erosion, Diversity, Trends, Demand, Productivity, Capacity, Salaries, Direct Costs, Industrial Survey.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The report represents a series of comparative analyses of predominantly de- fense oriented and commercially oriented companies. Heavy emphasis is placed on profitability analyses and capital investment trends from 1967 to 1974. Study includes the results of a survey on industry's attitude toward defense business, the analysis of direct and indirect costs, a market analysis of the defense market and an eight-year price growth of comparable defense and commercial products.		

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

THE DEFENSE INDUSTRIAL BASE

ADA 044 799

August 1977

Harold E. Bertrand
Steven C. Mayer
Anthony J. Provenzano

Prepared pursuant to Department of Defense Contract No. SD-321 (Task 76-2). Views or conclusions contained in this document should not be interpreted as representing official opinion or policy of the Department of Defense. Except for use for Government purposes, permission to quote from or reproduce portions of this document must be obtained from the Logistics Management Institute.

LOGISTICS MANAGEMENT INSTITUTE
4701 Sangamore Road
Washington, D. C. 20016

TABLE OF CONTENTS

	<u>Page</u>
LIST OF FIGURES	iv
LIST OF TABLES	v
 I. INTRODUCTION	 1
Background	1
Definitions	2
 II. TECHNICAL APPROACH	 5
Scope	5
Data Collection	7
Development of the DIB Industry Sample	8
Corporate Financial Data	8
Corporate Opinion Data	10
DoD/Services Data on Procurements	10
Defense-Related Employment	11
Other Sources	11
Data Validation	11
Methodology	11
Data Presentation	12
 III. TECHNICAL ANALYSES	 15
Profitability	15
Profit to Sales	15
Return on Investment (ROI)	20
Return on Equity (ROE)	22
Return on Assets (ROA)	26
Market Demand for Military Systems	29
Historical Demand	29
Stability and Predictability of the DoD Market	41
Industry's Expectations of Future DoD Demand	42
Sole Source vs. Competitive Contract Awards	43
Government-Owned Equipment	47

TABLE OF CONTENTS (Continued)

Capital Availability	50
Impact on DoD Business	50
Financing Costs	51
Progress Payments	53
Investment	53
General	53
Equipment Investment to Depreciation	54
Investment and Sales Relationships	56
DoD Policies and Practices	59
Profit Policy Based on Cost	62
Investment Preference and Policy	63
Labor and Production Capacity	63
Labor	63
Production	65
Military Equipment Costs	66
Trucks	67
Electronics	67
Tracked Vehicles	67
Aircraft	70
Ships	72
IV. FINDINGS AND CONCLUSIONS	75
Diversity of the DIB	75
Trends in Product Demand	76
Profitability of Defense Business	77
Investment in the DIB	79
DIB Perceptions of the Defense Customer	80
Productive Capacity of the DIB	82
Changing DIB Composition	83
Conclusions	83

APPENDICES

- A. DIB Survey
- B. Survey Responses
- C. Companies Invited to Participate in the DIB Study
- D. Command Procurement Data

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1.	Total Profit/Sales (Weighted)	17
2.	Defense Profit/Sales (Weighted)	18
3.	Commercial Profit/Sales (Weighted)	19
4.	Return on Investment (Weighted)	21
5.	Sales/Investment (Weighted)	23
6.	Return on Equity (Weighted)	24
7.	Debt/Equity (Weighted)	25
8.	Debt Plus Progress Payments/Equity (Weighted)	27
9.	Return on Assets (Weighted)	28
10.	Sales/Assets (Weighted)	30
11.	Relation Between Sales/Assets and Profit/Sales (1974)	31
12.	Military Procurement (Billions of Current Dollars)	38
13.	Military Procurement (Billions of 1967 Dollars)	40
14.	Defense Sales/Total Sales (Weighted)	49
15.	Average Cost of Borrowing (Unweighted)	52
16.	Investment in New Equipment/Depreciation (Weighted)	55
17.	Net Book Value of Equipment/Sales (Weighted)	57
18.	Comparison of Price Increases - Commercial & Military Trucks	68
19.	Comparison of Price Increases - Commercial & Military Electronics	69
20.	Comparison of Price Increases - Commercial & Military Heavy Tracked Vehicles	71
21.	Comparison of Price Increases - Commercial & Military Transport Aircraft	73
22.	Comparison of Price Increases - Commercial & Military Ships	74

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. DIB Financial Data Base Characteristics.	9
2. FTC SIC Codes Used in Study	10
3. Data Base Groupings.	13
4. A Comparison of Desired Minimum and Actual Profits (BT) on Sales.	16
5. A Comparison of Desired Minimum and Actual Return on Investment (BT)	20
6. Ratio of Government Equipment to Company Equipment	22
7. Total Military Procurements (Millions of Current Dollars)	33
8. Procurements for Foreign Sector (Millions of Current Dollars)	35
9. Indices for Military Procurement Analysis	39
10. Stability of Defense Business	41
11. Predictability of Defense Business	41
12. Average Deviation from Sales Trend Lines.	42
13. Cost of Doing Business	42
14. Defense Sales as Percentage of Total Sales	43
15. Percentages of Total Procurement (Competitive and Non-Competitive Contracts)	44
16. Contract Costs and Distribution (Current Dollars)	46
17. Contract Actions by Competitive Status (Contracts Larger than \$10K)	48
18. Interest Saved by Progress Payments as a Percentage of Renegotiable Sales.	53
19. Sales to Assets Ratios for Defense and Commercial Companies	58
20. Percentage of Total Sales Dollar for Commercial and Defense Products	64

LIST OF TABLES (Continued)

21.	Percentage of Capacity Utilization by Defense Orientation	65
22.	Percentage of Capacity Utilization by Predominant Product Line	65
23.	Causes of Excess Production Capacity.	66
24.	M60A1 Annual Unit Price	70
B-1.	Average Monthly Starting Salaries for Engineers	B-13
B-2.	Average Age of Employees	B-16
D-1.	Renegotiable Sales as a Percentage of Total Sales	D- 4
D-2.	Terminations	D- 6
D-3.	Material Lead Times (Weeks)	D- 8
D-4.	Production Lead Times (Weeks)	D- 8
D-5.	Priority Assistance Actions	D-10

I. INTRODUCTION

Background

DoD executives have categorized the sector of American industry from which DoD procures its military material requirements as the Defense Industrial Base (DIB). The DIB is normally defined as those companies that supply the material needs of the peacetime armed services. In wartime, the definition of the DIB is expanded to include all potential suppliers of war material. The data and analyses presented here, however, are limited to current suppliers; reserve, surge or total mobilization capacities that could be employed in the event of an outbreak of hostilities are not addressed.

The period covered by this study, 1967 through 1974, was characterized by strong inflation. At the same time, the increasing sophistication of weapon systems was also causing prices to increase. Additionally, some major weapon system procurement programs had to expand rapidly to overcome large inventory shortages and upgrade seriously obsolete equipment. The two most prominent such programs were the M60A1 tank program and the Navy's fleet modernization program. With limited fiscal resources, the expansion of such major procurement programs necessarily affected the others adversely.

It has become common practice in Government circles to label industry changes that prove adverse to DoD's achieving its procurement goals as "erosion". The term is used in the context of the criteria DoD uses to measure the progress of its programs—Performance, Schedule, and Cost. When DoD cannot meet its procurement objectives in a timely manner and at a reasonable price, erosion is said to exist.

Reaching judgments about erosion of the DIB is complex; too often such conclusions are formulated on the basis of problems encountered in a specific procurement, and the findings can be interpreted differently by DoD or by industry. For example, the Army's

inability to procure a sharply increased number of tank turrets and hulls in 1973 was, to DoD, a clear case of erosion. To industry, on the other hand, from which the Army had previously procured approximately 360 sets of tank castings annually on a level basis, it was simply sound business to convert excess foundry capacity to other products or divest themselves of the unused facilities.

We have sought in this study to find better criteria for determining the existence of erosion, through the analysis of financial, sales, investment, and labor data from over 100 Defense contractors. Information from various Government agencies, financial institutions, and such organizations as the National Industrial Conference Board supplemented these data. Opinions about the advantages and disadvantages of participation in the DIB were also obtained from the participating companies and selected financial institutions.

Throughout the period of rising inflation and increased weapon system sophistication from 1967 through 1974, DoD relied upon increased industrial productivity to offset the trend toward higher prices. Since productivity is primarily influenced by prudent capital investment, industry's investment for Defense business was targeted by DoD as a major area of investigation.

Definitions

The following definitions explain the type of data collected as well as the meaning of terms used throughout this report.

- | | |
|-------------------|--|
| Assets | - The net book value (NBV) of facilities, equipment, land and current assets |
| Commercial Sales | - Sales from contracts and purchase orders from all non-DoD sources, non-renegotiable sales, direct company to foreign country sales, and state and local government sales |
| Cost of Borrowing | - The annual interest paid by a company on its long-and short-term debt |

Cost of Capital	- Before-tax cost of capital computed on long- and short-term debt interest plus equity funding interest
Defense Sales	- Sales from contracts and purchase orders issued by DoD, including Foreign Military Sales (FMS), and from subcontracts flowing from prime Defense contracts
Depreciation	- As included in financial statements
Government-Furnished Property	- The estimated market value of Government-owned equipment in place in a company's facility and used during the year
High-Percent-Defense Companies	- Companies whose Defense sales were 45% or more of total sales (also referred to as Defense or Defense Oriented Companies)
Imputed Cost of Capital	- Total assets less progress payments times a "risk free" interest rate
Interest Expense	- As included in financial statements
Investment	- Stockholders' equity plus long-term debt
Investment Tax Credit	- The investment tax credit deducted from Federal Income Tax
Low-Percent-Defense Companies	- Companies whose Defense sales were 15% or less of total sales (also referred to as Commercial or Commercially Oriented Companies)
Other U. S. Government Sales	- Sales from contracts and purchase orders issued by the departments and agencies of the U. S. Government other than Defense, and from subcontracts flowing from such contracts
Profit	- Income before income-related taxes and investment credits, as reported on financial statements
Renegotiable Profit Before Taxes	- Profit calculated on the same basis as profit (see above), but only for those sales defined as renegotiable. Costs not otherwise allocated should be allocated between renegotiable and non-renegotiable sales consistent with procedures followed for Renegotiation Board submissions.
Renegotiable Sales	- That portion of total company sales (see below) which would be considered renegotiable on Renegotiation Board submissions (Form RB-1)
Renegotiable Sales from Prime Contracts	- That portion of renegotiable sales which would be reported on Line 1a of Form RB-1

Return on Assets (ROA)	- Before-tax profit on total company assets, i.e., equipment, facilities, land and current assets (progress payments included)
Return on Investment (ROI)	- Before-tax profit on stockholders' equity plus long-term debt
SIC Code	- Standard Industrial Classification Code, 1972 base
Short-Term Borrowing	- Those funds borrowed on a short-term (one year or less) basis (excludes long-term debt due in the current year)
Total Company Sales	- Sales reported in annual financial statement
Total Inventories	- The sum of Raw Material, Net Work in Process, and Finished Goods.
Unallowable Costs	- The aggregate of all costs defined as unallowable by Government regulations (e.g., Armed Services Procurement Regulation (ASPR), Fixed-Price Redeterminable (FPR) contracts), and by Government audit agencies, excluding interest expense. Costs not recoverable due to overruns on contracts are excluded.

II. TECHNICAL APPROACH

Scope

The scope of the DIB study was defined at the outset within specific limitations dictated by the intended application of the results, the time available to produce them, and the availability of data. The study was undertaken in support of the OASD(I&L)(DP) Profit Policy study (Profit '76), which was to

recommend changes in the Department of Defense profit policy to strengthen our competitive industrial base and reduce the cost of systems and hardware essential to our national security.¹

The DIB study was designed to assess "the overall financial strength and stability of the defense industry"² and to determine if the DIB, overall, was eroding.

The Profit '76 study was limited to a comparative financial analysis of Defense and commercial profit centers within companies. The DIB study addressed total corporate financial and investment performance and how it varied relative to total corporate sales derived from renegotiable Defense sales, and identified and quantified other indicators of change. The financial and investment performance of the commercially oriented companies in the study was considered the desired norm. For purposes of comparison, the FTC averages for all the companies of those studied in the SIC code range were displayed.

Since the results of the DIB study are to be used to shape recommendations for changes in DoD's general procurement policy, we considered the DIB as a whole. Any analysis of its ability to provide surge or mobilization capacity was necessarily precluded, because such an assessment could only be done on a product line basis.

LMI recognizes that specific serious procurement problems existed between 1967 and 1974. Such problems included: the unwillingness of certain key shipbuilders to accept

¹"Profit '76 Study Plan," OASD(I&L)(DP), 20 June 1975, p. 1.

²Ibid, p. 5.

shipbuilding contracts; protracted ship delivery schedules; the lack of foundry capacity to produce armored steel castings for tank hulls and turrets, as well as smaller castings for artillery breech blocks; the reluctance of gear manufacturers to bid production capability for ever decreasing numbers of helicopter transmission gears; the refusal of a primary radiator manufacturer to produce tank and cargo truck radiators; and the reduction of aircraft landing gear manufacturers to two firms. Some of these problems were caused by long unsettled contract payment disputes; others by years of DoD hardware procurements at a reduced level that would support only one or two suppliers economically, and still others by material shortages affecting both commercial and Defense suppliers. Solutions to these problems are outside the realm of a general DoD procurement policy; DoD is therefore handling them on a case-by-case basis.

A finite analysis of Defense and commercial producers by weapon system could not be made, due to the size of the study sample, the classification of DoD weapons procurements according to seven broad categories,³ and a requirement that no company's data could be displayed alone or in such a manner that it might be identified. For these reasons, and in keeping with the basic objective of assessing overall changes in the DIB, comparisons of Defense and commercial companies were made on a broader basis.

It was originally proposed that the sample of companies be made up primarily of second- and third-tier subcontractors, in view of speculation that this should be the greatest area of concern for DIB erosion. The prime subcontractors named by major weapon system manufacturers, however, turned out to be other major Defense contractors already in the sample. Many of the smaller firms identified were privately owned, and their owners did not wish to divulge financial data. Consequently, this study reflects the prime DoD contractors' financial and investment performance and their attitudes toward DoD business. Considering that the major concern of this study is overall changes in the

³ Aircraft, Missiles and Space, Ships, Tank/Automotive, Weapons, Ammunition, Electronics and Communications.

DIB, this is not a drawback. DoD's procurement policy, which lacks mandatory flow-through provisions, in fact affects prime contractors more than the others.

Data Collection

Since this study was to identify and quantify changes in the DIB that would affect DoD's ability to procure its material, industry had to be the primary source of data. Broad corporate data were available through financial institutions and industry associations, but detailed data for items such as investment for equipment had to be collected from industry. Other sources of data were: DoD, other Government agencies, financial institutions and certain private organizations. Specific non-DoD sources were: the Departments of Commerce and Labor, the Federal Trade Commission (FTC), the Securities and Exchange Commission (SEC), the Renegotiation Board, the College Placement Council, the National Industrial Conference Board, the placement offices of major technical and business universities, the McGraw-Hill Economic Research Division, and several industry associations based in Washington, D. C.

Early discussions with industry spokesmen revealed that most companies retained financial data in active files for from five to eight years. The data are then placed in archives and become costly to retrieve. This study was therefore based upon 1967 to 1974 data (1974 being the last year complete corporate data were available at the time of the collection effort).⁴ Only data previously prepared for audited reports, e.g., annual financial reports and Renegotiation Board submissions, were collected to spare industry the cost of auditing data specifically for this study.

Data for three key years, 1969, 1971 and 1974 were collected from questionnaires.⁵ The rationale was to provide three points for determining changes in the DIB: the most recent year for which financial data were available (1974), and the two years representing

⁴In general, corporate data used in this study represent calendar years, and DoD data represent Government fiscal years.

⁵See Appendix A for a sample questionnaire.

high (1969) and low (1971) DoD procurement activity. The reader is reminded that the period represented by our data includes the phase-out of the Vietnam War.

Development of the DIB Industry Sample. The companies asked to participate in the DIB survey were selected on the basis of several criteria. First, to represent the major weapons procurement categories, we selected companies with at least 10% of their prime Defense awards (\$100,000 minimum) in a single category. With this method, a company could be represented in more than one weapons category. Second, the sample was designed to reflect the 10-year (1965-1974) average percentage of total procurement for each weapon system category.⁶ Third, the percentage of small business awards approximated that averaged for total procurements from 1965 to 1974.⁷ (The ASPR 1.701.4 definition of small business was used.) Table 1 summarizes the financial characteristics of the DIB data base.

The names of the 290 companies⁸ invited to participate in the study came from the DoD Comptroller's list of all Defense contractors with total prime contract awards in FY 1974 of \$100,000 or more. Names of subcontractors were obtained from Program Offices, industry contacts, and Priorities Assistance lists. One hundred and one companies were represented in the final data base, 78 who responded to LMI's questionnaire and 23 for whom data were available from annual financial reports obtained from Investor's Management Sciences, Inc., and renegotiable sales reported on the Renegotiation Board's Form RB-1.

Corporate Financial Data. The eight-year corporate financial data came from three main sources: the 78 companies responding to our questionnaire, Investor's Management

⁶Source: Office of the Assistant Secretary of Defense (Comptroller).

⁷The manufacturing industry employment size standards of ASPR 1.701.4, 1 July 1976 were used.

⁸See Appendix C for a complete listing of companies solicited.

TABLE 1. DIB FINANCIAL DATA BASE CHARACTERISTICS

	Aircraft	Missiles & Space	Ships	Tank/ Auto	Weapons	Ammo	Electronics & Comm.	Totals
<u>Actual Procurement</u>								
10 Yr. Avg. (% of total)	34.0%	21.2%	9.7%	4.5%	2.0%	12.4%	16.2%	100 %
10 Yr. Avg. Dollars (MM)	\$7,441.8	\$4,552.7	\$2,067.6	\$1,006.7	\$443.2	\$2,803.8	\$3,518.6	\$21,834.4
FY 1974 (% of total)	31.2%	20.4%	17.8%	3.5%	1.9%	7.4%	17.8%	100 %
FY 1974 Dollars (MM)	\$6,480.7	\$4,335.5	\$3,704.4	\$ 724.5	\$392.2	\$1,535.4	\$3,697.4	\$20,760.2
<u>Solicited DIB Data Base</u>								
FY 1974 (% of total)	35.6%	18.8%	18.8%	7.2%	0.7%	5.5%	13.3%	100 %
FY 1974 Dollars (MM)	\$5,025.1	\$2,649.4	\$2,656.8	\$1,020.6	\$100.0	\$ 774.9	\$1,871.6	\$14,098.4
Business Interests Rep.	112	71	43	29	16	48	74	393
Business Int. (% of total)	28.6%	18.0%	10.9%	7.4%	4.0%	12.3%	18.9%	100 %
<u>Actual DIB Data Base</u>								
FY 1974 (% of total \$)	35.6%	24.7%	12.4%	5.0%	1.1%	4.8%	16.5%	100 %
FY 1974 Dollars (MM)	\$3,056.5	\$2,119.4	\$1,063.7	\$ 432.4	\$ 92.9	\$ 410.4	\$1,420.1	\$ 8,595.4
DIR % of FY 1974 Proc.	47.2%	50.2%	28.7%	59.7%	23.7%	26.1%	38.4%	41.4%
Business Interest Rep.	39	23	14	10	8	21	46	161
Business Int. (% of total)	24.2%	14.3%	8.7%	6.2%	5.0%	13.0%	28.6%	100 %

Sciences, Inc., and the Renegotiation Board. A fourth source, used for purposes of comparison, was the FTC. FTC corporate financial data were compiled for the FTC Standard Industrial Classification (SIC) Code groups represented in the study sample and are displayed throughout the study. The FTC SIC codes used are shown in Table 2.

TABLE 2. FTC SIC CODES USED IN STUDY

<u>SIC Codes</u>	<u>Industry</u>
39	Miscellaneous Manufacturing and Ordnance
38	Instruments and Related Products
37	Transportation Equipment
36	Electrical Machinery, Equipment and Supplies
35	Other Machinery
34	Other Fabricated Metal Products

Corporate Opinion Data. Corporate opinions on Defense business and investment practices and DoD procurement policies and practices were collected from LMI's questionnaire. Although the results of opinion surveys are often difficult to explain in light of related available hard data, we consider such findings important. Industry's perceptions of the DoD market and its policies and requirements frequently influence its decisions more than hard data. Survey data, when used in the report, are so identified.

DoD/Services Data on Procurements. Changes in the DIB were investigated by analyzing procurement data from DoD and the military services. Data on sole source and competitive contract awards were collected at the DoD level. Army, Navy and Air Force procurement data were collected at the procurement office level and were the basis of our analysis of production lead times, contract terminations and Priority Assistance actions.

Defense-Related Employment. Data on the ability of Defense oriented industries to hire scientists and managers were collected from eight engineering and seven business management schools.

Other Sources. Additional data required to complete various analyses were collected from The Conference Board, McGraw Hill, The College Placement Council, various industry associations based in Washington, D. C., as well as interviews with industry representatives.

Data Validation

All financial data submitted by industry for use in this study were validated in the following manner. The basic annual report data were compared to what was recorded by Investor's Management Sciences, Inc. Renegotiable sales data were compared to industry data submitted to the Renegotiation Board.

Frequent checks were made in the course of the analyses to determine if the results were truly representative of the data base or distorted by an abnormal corporate situation. As a result of these checks, data from three firms were deleted. Two of these firms were large, Defense oriented manufacturers with a recent history of heavy losses. The third was a very large commercially oriented firm, whose exceptionally profitable commercial operation dominated the results of that segment of our sample. The combined effects of the data from these three companies would have completely distorted any comparisons between the commercial and Defense groupings within the study sample.

Methodology

Since the purpose of the study was to identify and quantify indicators of change in the DIB, an acceptable norm had to be selected against which Defense industry data could be measured or compared. The low-percent-Defense (commercially oriented) segment of the study sample was chosen as the norm for several reasons.

- Commercial industries have no artificial constraints on profits such as prenegotiated profit levels or the threat of profit reduction through renegotiation.

- The competitive aspects of the commercial market generally force commercially oriented industries to strive for improved levels of productivity by prudent investment of available capital resources.
- Commercial product sales are more predictable through analysis and can be more easily influenced by advertising and pricing than Defense product sales.

Defense and commercially oriented firms were specifically compared with regard to:

- Profitability
- Capital investment patterns and preferences
- Capital turnover
- Ability to hire scientists and managers
- Capacity utilization
- Age of employees.

Data Presentation

Our data presentations are designed to allow the reader flexibility in assessing the information and in observing the impact of time, policies or attitudes on the indicators under analysis. The most frequently used format groups the data by the amount of the companies' total business derived from Defense renegotiable sales. This grouping permits comparisons between the commercial and Defense segments of the study sample, as well as in relation to the FTC averages and the averages of the total study sample. Financial data used in this report to assess profitability have been presented on a weighted basis. This was deemed to be the most feasible way of providing comparisons of the overall performance of the defense and commercially oriented companies in the sample. Also, on a selected basis, some of the data are displayed by company size or product line predominance. (See Table 3.)

TABLE 3. DATA BASE GROUPINGS

<u>Defense Business as Percentage of Total Business</u>		
<u>Defense Orientation</u>	<u>% of Total from Defense</u>	<u>No. of Companies</u>
Low	0-15%	46
Medium	15-45%	33
High	Over 45%	<u>22</u>
		101
<u>Company Size</u>		
<u>Company Size</u>	<u>Total Sales</u>	<u>No. of Companies</u>
Small	\$ 0 - \$ 50M	19
Medium	\$50M - \$300M	24
Large	Over \$300M	<u>58</u>
		101
<u>Product Line Predominance</u>		
<u>Prime Product Lines</u>	<u>Qualifying Criteria</u>	<u>Sample Distribution¹</u>
	Prime Reneg. Sales	
Aircraft	1) > 10% of prime sales in product line area	39
Missiles		23
Ships	2) 1), above, was > \$100,000	14
Tank/Automotive		10
Weapons	3) Company can be counted more than once for this category	8
Ammunition		21
Electronics & Communications		<u>46</u>

¹ A company was counted for each time it met the criteria in a product line area. Company financial were data apportioned by percentage attributed to each product.

III. TECHNICAL ANALYSES

Profitability

While the profitability of a firm or group of firms within the DIB is not in itself an indicator of erosion, a lack of such profitability could lead to erosion. Knowledge of the profitability of Defense business is necessary for an adequate understanding of the financial data¹ and other indicators of erosion discussed in this report. For this reason, the findings on profitability are presented first.

Companies invest their capital resources with the intent of earning a reasonable return. A number of financial measures such as profit on sales, return on investment (ROI), sales to assets (capital turnover), return on equity (ROE), and return on assets (ROA), when viewed collectively, define a company's degree of profitability.

Profit to Sales. One measure of profitability is the amount of profit earned on sales. An analysis of questionnaire data showed that each of the three groups set its minimum desired commercial profit at levels equal to or greater than its minimum desired Defense profit. The Defense oriented companies expressed a lower desired Defense profit, possibly because they better recognized the constraints contained in DoD's profit policy.

The actual profit rates earned by each group of companies (Table 4) show that: actual Defense profits have been substantially lower than desired; commercial profits have been below the stated minimums; and both Defense and commercially oriented companies have realized a much higher rate of profit from commercial sales than from Defense sales.

Profit to sales ratios were computed for the Defense and commercially oriented companies, as well as the average for the total study sample. For purposes of comparison,

¹All financial data used were before-tax (BT) data.

TABLE 4. A COMPARISON OF DESIRED MINIMUM AND ACTUAL PROFITS (BT) ON SALES

	Percentage of Profit (by Defense Orientation)		
	<u>Low</u>	<u>Medium</u>	<u>High</u>
<u>Desired Profit (BT)</u>			
Defense Sales	13.9	9.2	10.5
Commercial Sales	13.8	13.6	15.7
<u>Actual Profit (BT)</u>			
Defense Sales 1974/1967-1974 Avg. ¹	4.4/3.9	1.8/3.1	4.4/3.5
Commercial Sales 1974/1967-1974 Avg. ¹	9.8/9.5	7.3/6.0	5.5/5.8

¹Average Weighted Profit Rates

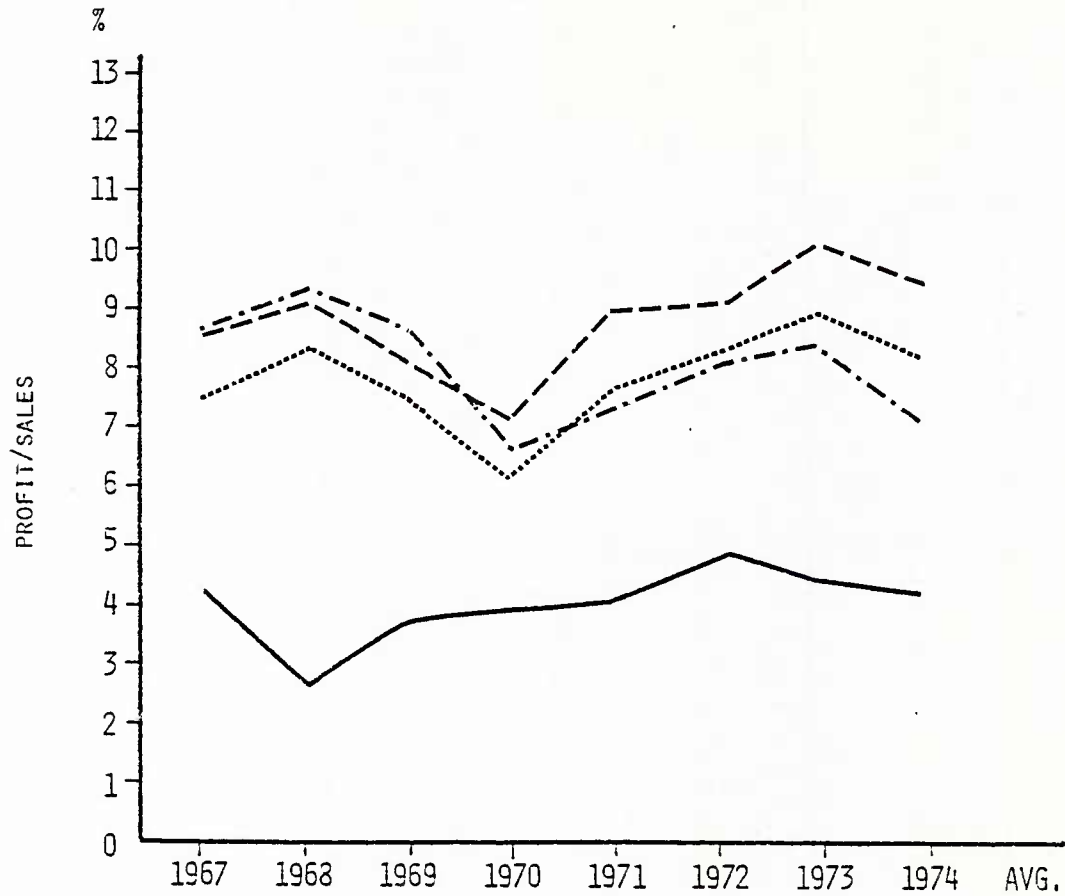
FTC total company (average) profit to sales data (labeled FTC-SEC in previous LMI studies) and Renegotiation Board (average) Defense profit to sales ratios were developed.²

Figure 1 shows the weighted profit to sales ratios for company business as a whole; Figure 2, profit to sales for Defense business; and Figure 3, profit to sales for commercial business.

On an overall basis, the high-percent-Defense companies show lower average profit to sales ratios than companies with less than 15% Defense business. It should be noted, however, that Defense profit to sales ratios for the low-percent-Defense companies fluctuate more widely from year to year. This lends support to industry's claim that Defense business is less stable than commercial business. DoD should be concerned about this finding because low-percent-Defense companies accounted for almost as many of the

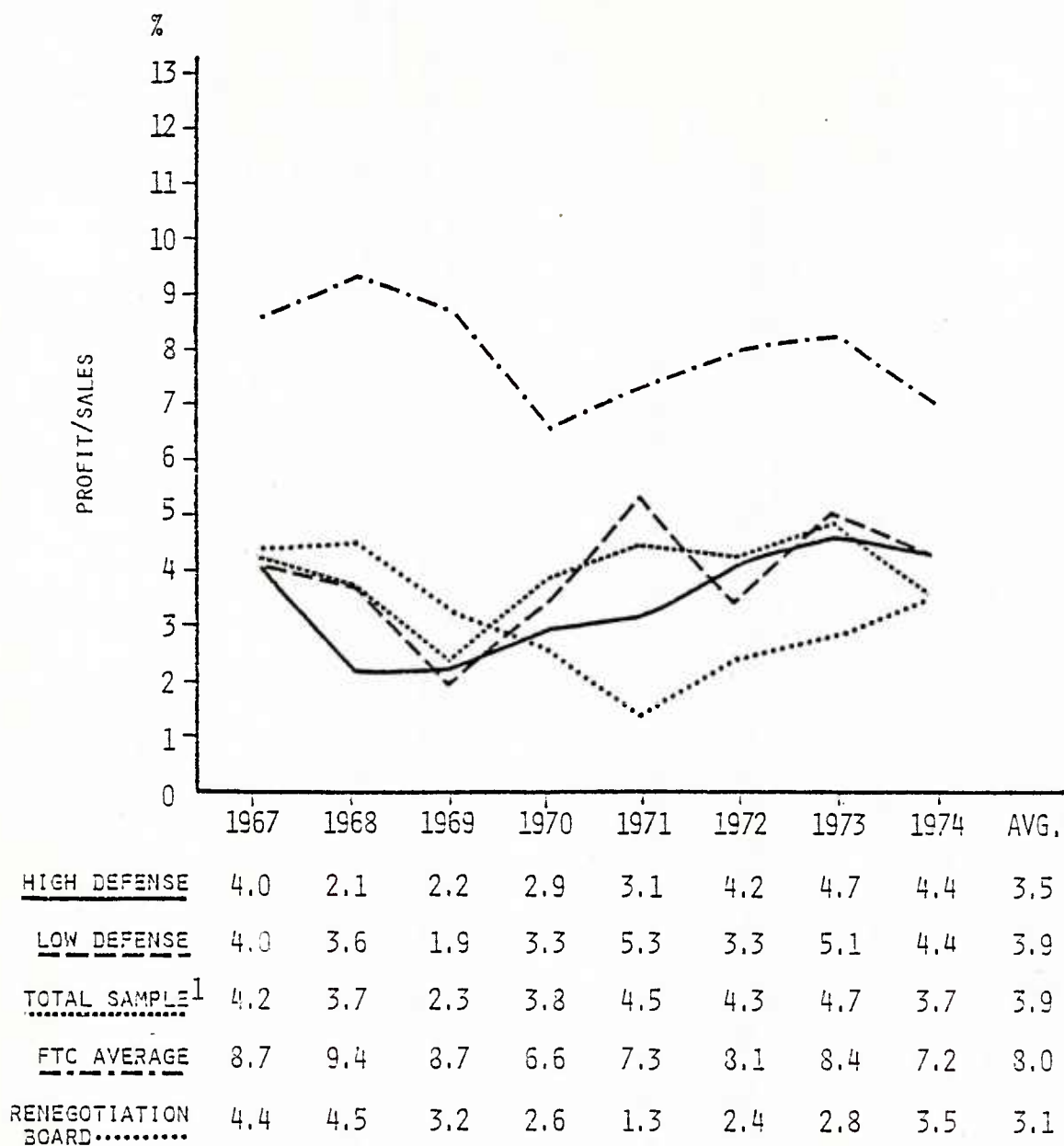
²For the medium Defense companies, all measures were computed but were not plotted because they did not add significantly to the analysis, and would have made the plots more cumbersome. The total sample data includes the medium category.

FIGURE 1. TOTAL PROFIT/SALES
(WEIGHTED)



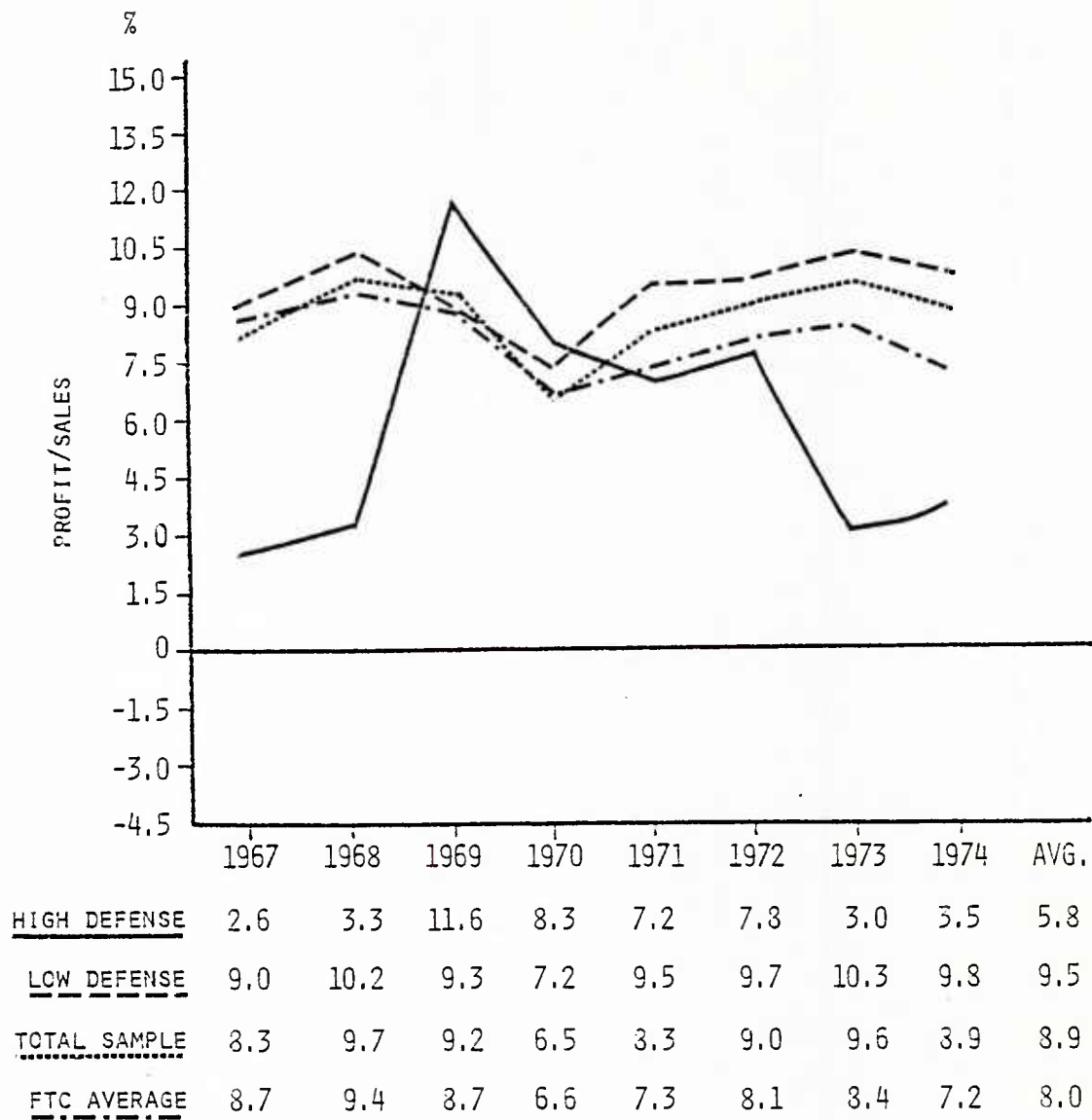
HIGH DEFENSE	4.2	2.6	3.7	3.8	4.0	4.8	4.4	4.2	4.2
LOW DEFENSE	3.6	9.2	8.2	7.1	9.0	9.2	10.1	9.5	8.9
TOTAL SAMPLE	7.5	8.3	7.5	6.1	7.7	8.3	8.9	8.2	7.9
FTC AVERAGE	8.7	9.4	8.7	6.6	7.3	8.1	8.4	7.2	8.1

FIGURE 2. DEFENSE PROFIT/SALES
(WEIGHTED)



¹ INSTANCES WHERE THE TOTAL SAMPLE CURVE IS OUTSIDE THE RANGE OF THE HIGH AND LOW DEFENSE CURVES ARE ATTRIBUTABLE TO THE MEDIUM DEFENSE COMPONENT OF THE TOTAL SAMPLE.

FIGURE 3. COMMERCIAL PROFIT/SALES
(WEIGHTED)



total prime and subcontract dollars in FY 1974 as did high-percent-Defense companies. Conversely, the data in Figure 3 show the commercial profits of the commercially oriented companies to be higher and more stable from year to year than the commercial profits earned by Defense-oriented companies.

Return on Investment (ROI). Another measure of profitability is ROI, which is defined as the return (profit) earned on stockholders' equity plus long-term debt. Since there was no way to distribute total investment between Defense and commercial projects within each company, ROI was based on total company data. Questionnaire responses were compared to the actual unweighted financial data, and, again, the stated minimum ROI objectives were greater. Defense oriented companies had lower ROIs although their desired targets were higher. (See Table 5.)

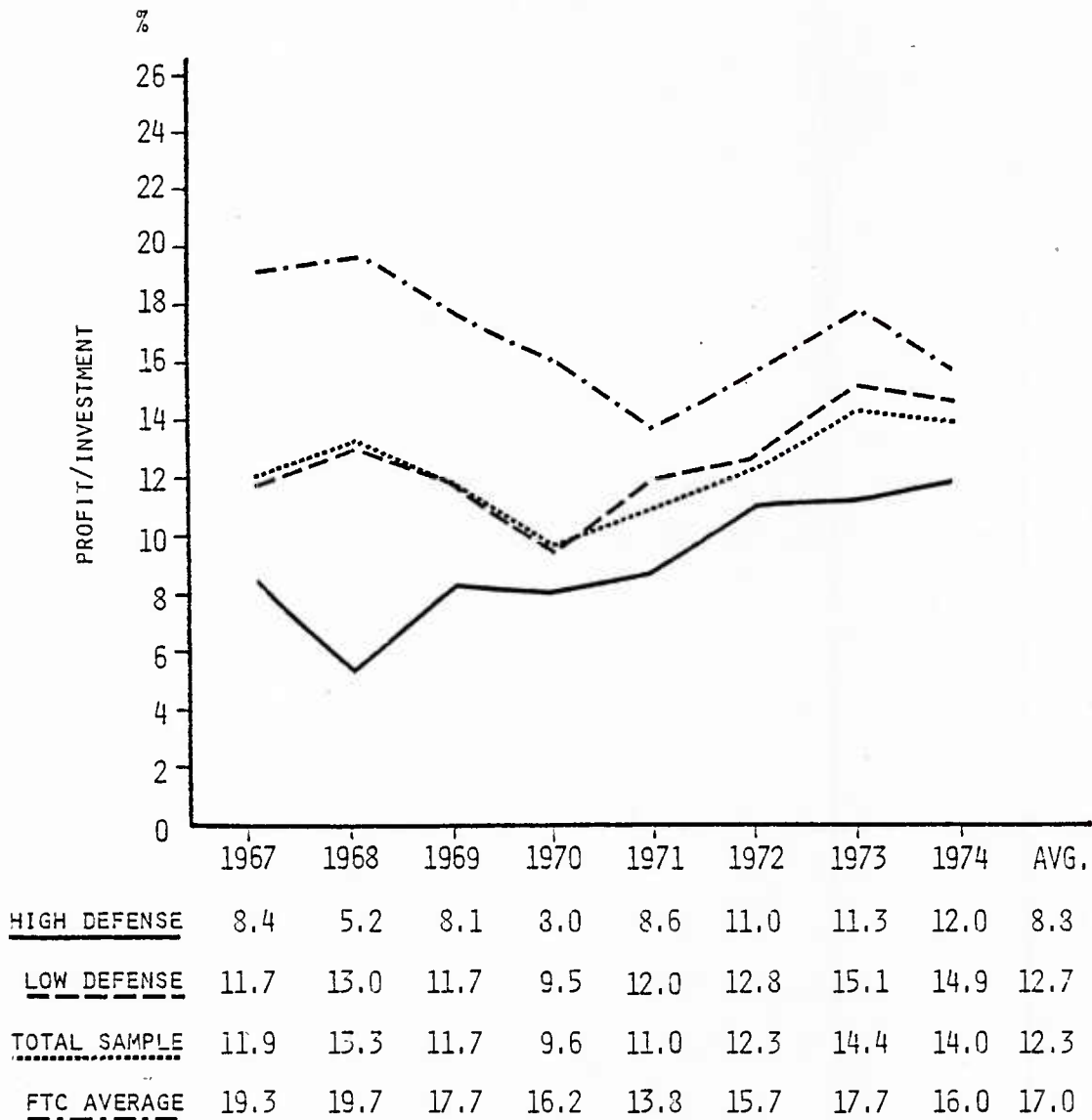
TABLE 5. A COMPARISON OF DESIRED MINIMUM
AND ACTUAL RETURN ON INVESTMENT (BT)

	ROI (by Defense Orientation)		
	<u>Low</u>	<u>Medium</u>	<u>High</u>
<u>Desired ROI (BT)</u>			
Defense	22.2	24.4	23.7
Commercial	23.2	27.9	26.9
<u>Actual ROI (BT)</u>			
Total Business 1974/1967-1974 Avg. ¹	14.9/12.7	10.4/10.8	12.0/8.8

¹Average weighted ROI rates.

As shown in Figure 4, the weighted ROI for high-percent-Defense companies was lower than that for low-percent-Defense companies throughout the 1967 - 1974 period. The small companies, as shown in Table 6, gain more from Government-furnished equipment because it represents a much larger share of the total equipment used. The

FIGURE 4. RETURN ON INVESTMENT
(WEIGHTED)



data in Table 6 are the ratios of the total acquisition cost of Government equipment held by companies in the DIB sample compared to the total book value of company-owned equipment.

TABLE 6. RATIO OF GOVERNMENT EQUIPMENT TO
COMPANY EQUIPMENT

<u>Company Size</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
Small	1.13	1.29	1.07	0.96	0.77
Large	0.09	0.09	0.08	0.08	0.06

A better understanding of ROI and its relation to profit on sales can be gained by considering the ratios which make up ROI.

$$\text{ROI} = \frac{\text{Profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Investment}} = \frac{\text{Profit}}{\text{Investment}}$$

Sales to investment ratios are shown in Figure 5.

It should be remembered that the weighted ROI and return on sales (ROS) for high-percent-Defense companies remained below those of low-percent-Defense companies as of the end of 1974. A manufacturer using ROI as his measure of profitability would favor investing in commercial rather than Defense-related plant and equipment.

Return on Equity (ROE). Return on equity (ROE) is a measure of the rate of return management is able to achieve for the owners. The results for the industry sample are shown in Figure 6.

Like ROI and ROS, the ROE for Defense companies shows some increase starting in the early 1970's. The increase in ROE was strongly influenced by the high debt to equity leverage used by Defense industries. In Figure 7, it can clearly be seen that the debt to equity ratio for high-percent-Defense companies is much higher than that for the low-percent-Defense group. While this ratio decreased slightly for Defense oriented companies, it remained fairly constant for the commercially oriented companies.

FIGURE 5. SALES/INVESTMENT
(WEIGHTED)

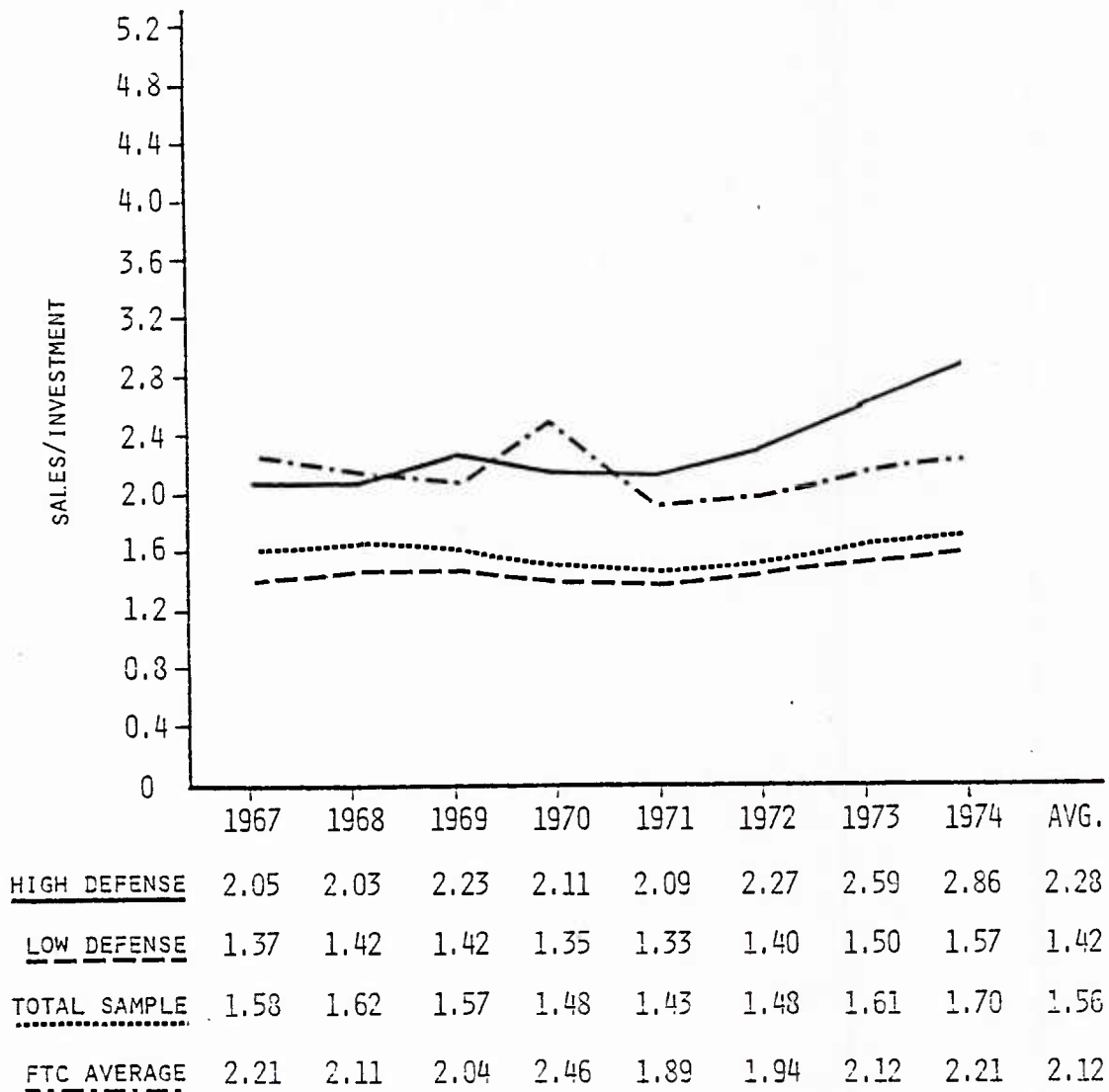


FIGURE 6. RETURN ON EQUITY
(WEIGHTED)

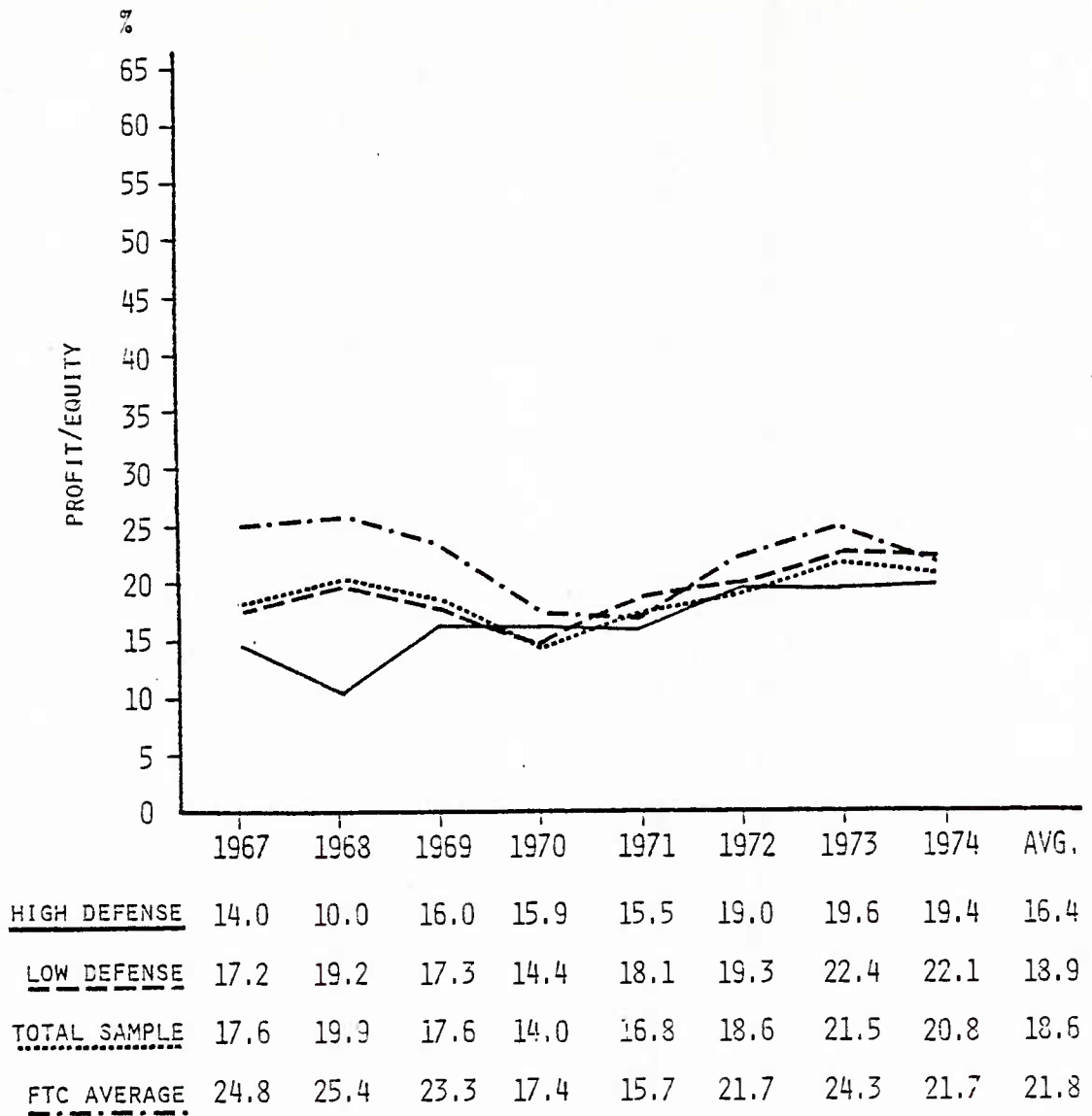
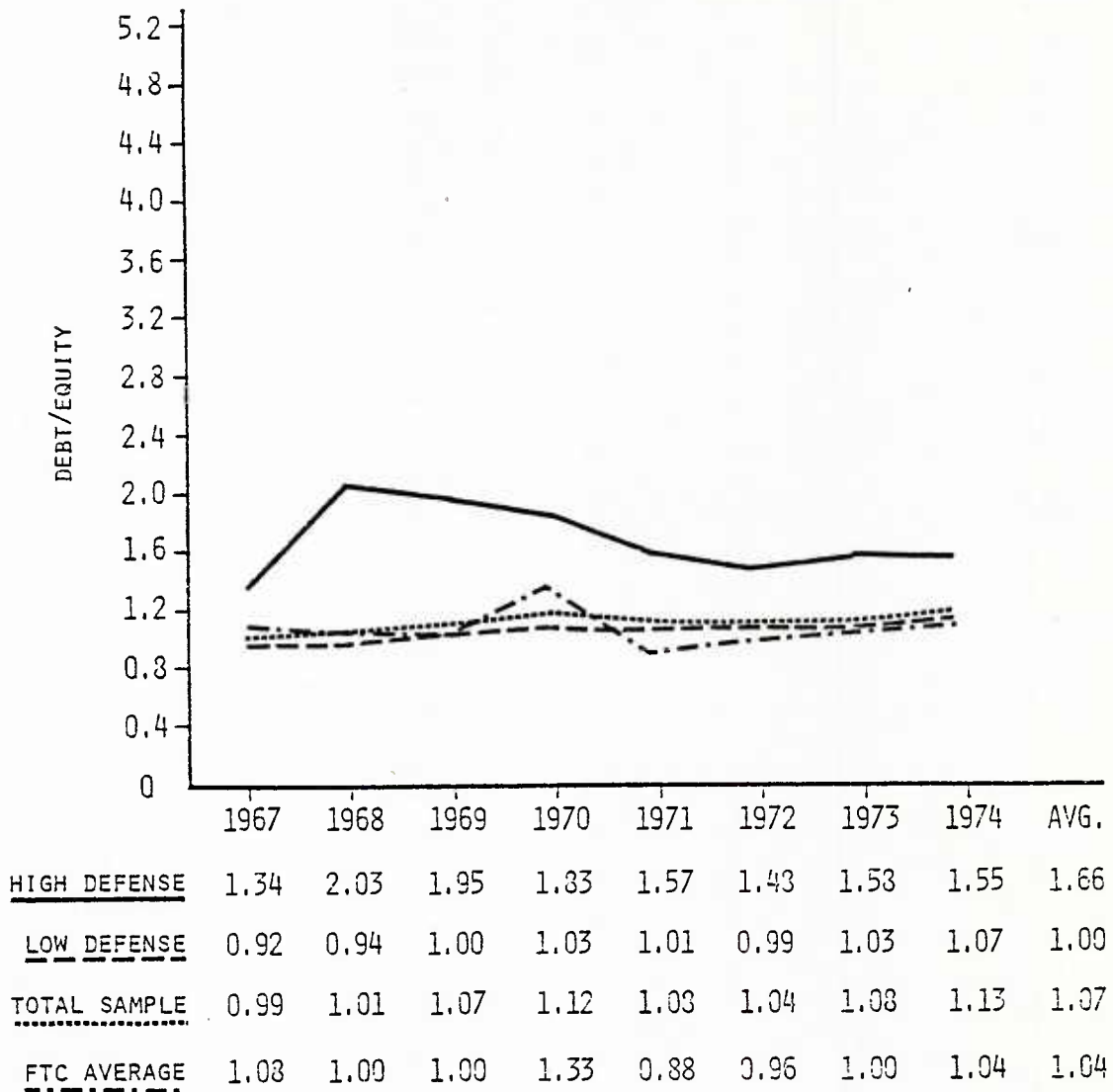


FIGURE 7. DEBT/EQUITY
(WEIGHTED)



The relationship of debt to equity shows the amount of financing supplied by lenders relative to that supplied by the owners. During periods when business is good, the greater the debt, the greater the profits available to the owners. However, if business is poor, the interest and principal payments must still be made, which diminishes profits and possibly equity.

The large amount of unliquidated progress payments available to Defense contractors reduces the need for debt or equity financing. When the value of progress payments is added to debt, the new ratio of debt plus progress payments to equity gives a better picture of the leverage available to the high- and low-percent-Defense groups. (See Figure 8.) A comparison of Figures 7 and 8 shows that the leverage of low-percent-Defense companies was changed only slightly, while the leverage of high-percent-Defense companies almost doubled.³

Return on Assets (ROA). The amount of profit earned on total company assets is an indicator of how well assets are being used. The ROA ratio, like ROI, develops through two other ratios:

$$ROA = \frac{\text{Profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} = \frac{\text{Profits}}{\text{Assets}} .$$

The ROAs for the high- and low-percent-Defense companies as well as for the total DIB sample and the FTC sample appear in Figure 9.

When deciding on the purchase and allocation of company assets, prudent management will favor the areas that have historically shown the best return. Based on the weighted ROA data depicted in Figure 9, the commercial sector appears to have outperformed the Defense sector. In all years except 1972, the average ROA for commercially oriented companies was higher.

³The debt to equity ratio for low-percent-Defense companies was based on a sample of 44 companies. When progress payments were included, the sample was reduced to 16 companies. The different samples for the low-percent-Defense group distort the analysis in that the debt to equity ratio including progress payments appears lower than the debt to equity ratio excluding progress payments. What is important, however, is that in both cases the ratios remained relatively close to 1.0 over the period.

FIGURE 8. DEBT PLUS PROGRESS PAYMENTS/EQUITY
(WEIGHTED)

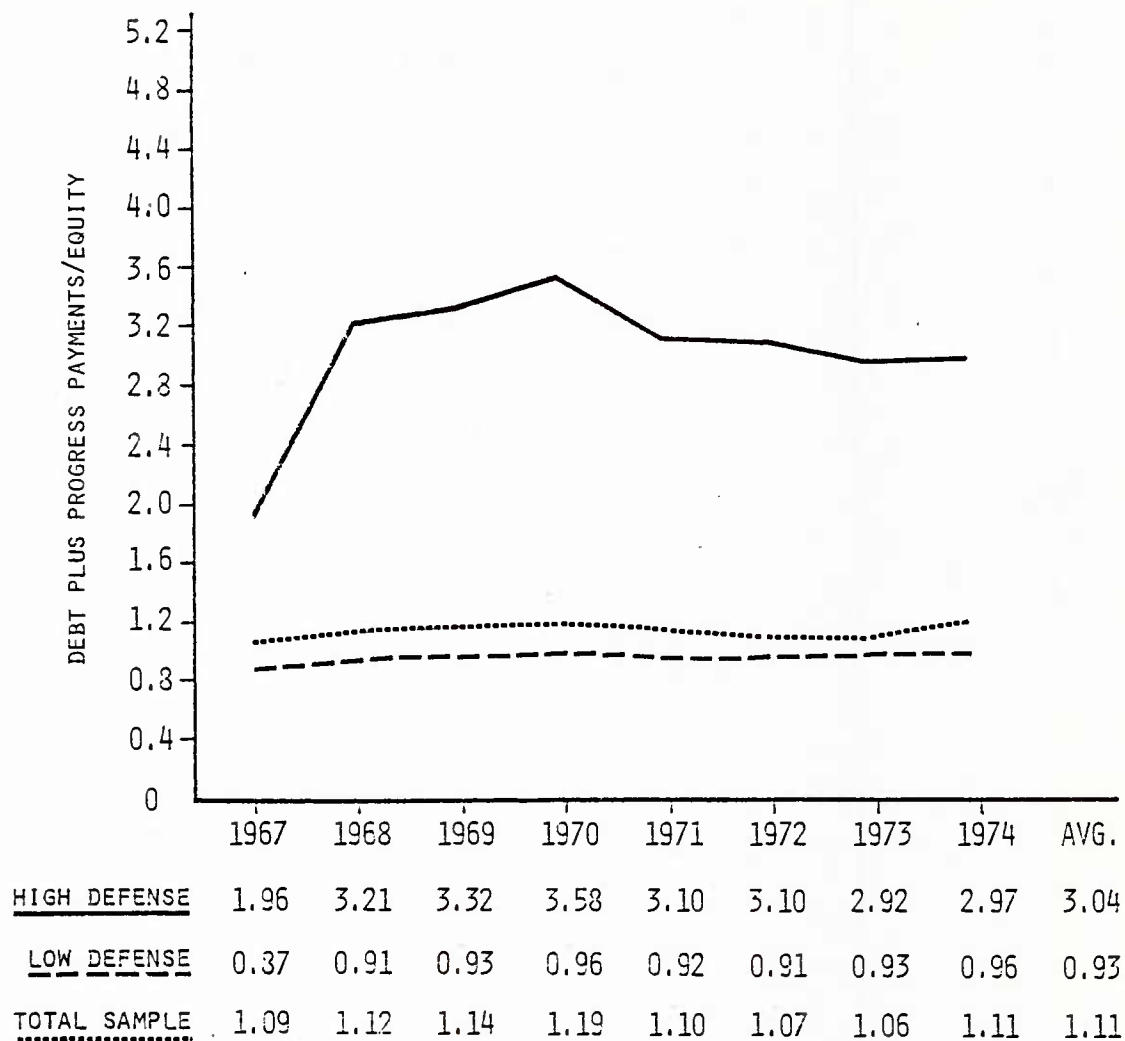
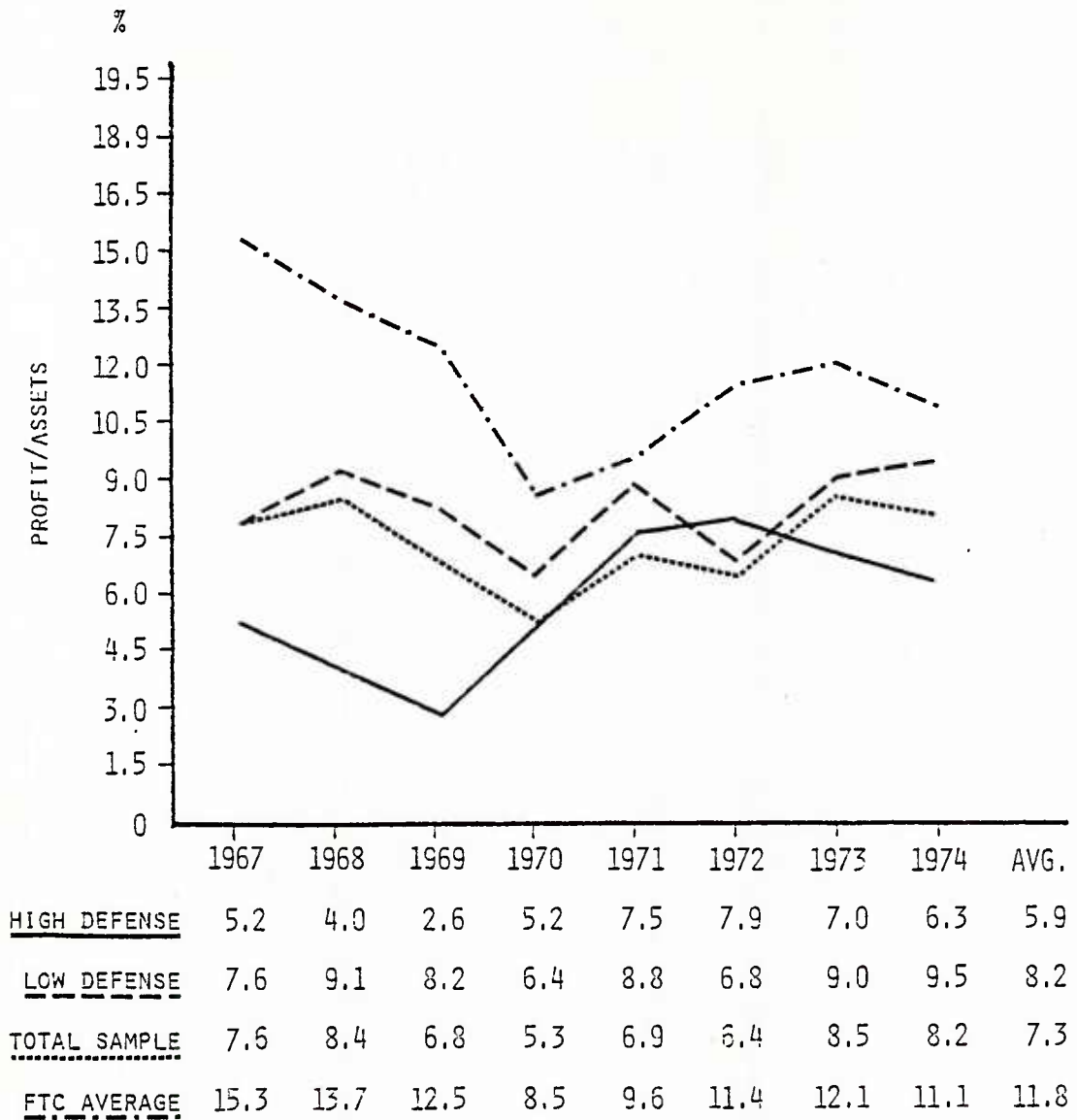


FIGURE 9. RETURN ON ASSETS
(WEIGHTED)



Most Defense contractors indicated that they had little control over the profit to sales rates. To achieve their corporate ROA objectives on Defense sales, they had to resort to close asset utilization management. The effect of such management shows that high-percent-Defense companies, as a group, generate a much higher sales to assets ratio. (See Figure 10.)

An interesting way to view the relationship between sales to assets and profit to sales, based on 1974 data, is shown in Figure 11. The figure shows that for companies operating at the same levels of ROI, the high-percent-Defense contractors generally have higher sales to assets ratios and lower profit to sales ratios than low-percent-Defense companies.

Market Demand for Military Systems

Normally, companies prefer to invest more heavily for product lines where demand is growing than for those where demand is decreasing. Similarly, they need to invest less for growth in productivity if their products face little or no competition.

Historical Demand. An analysis of capital investment in the DIB must start by considering the level of demand for Defense systems. This includes an examination of historical trends in procurement, as well as an evaluation of the projected level of demand.

The demand for military systems can be divided into two sectors: domestic and foreign. In the domestic sector, demand is measured by the level of prime contract awards for procurements in the seven major weapon systems categories.⁴ (See Table 7 for a detailed breakout of total military procurements by weapon system category for FYs 1967-1977.) The annual subtotal of these systems procurements represents about 62% of all military prime contract awards to business firms in the U. S. Of the remaining

⁴To allow comparison with the foreign procurement data, the Tank/Automotive and Weapons categories were combined into one Vehicles and Weapons category.

FIGURE 10. SALES/ASSETS
(WEIGHTED)

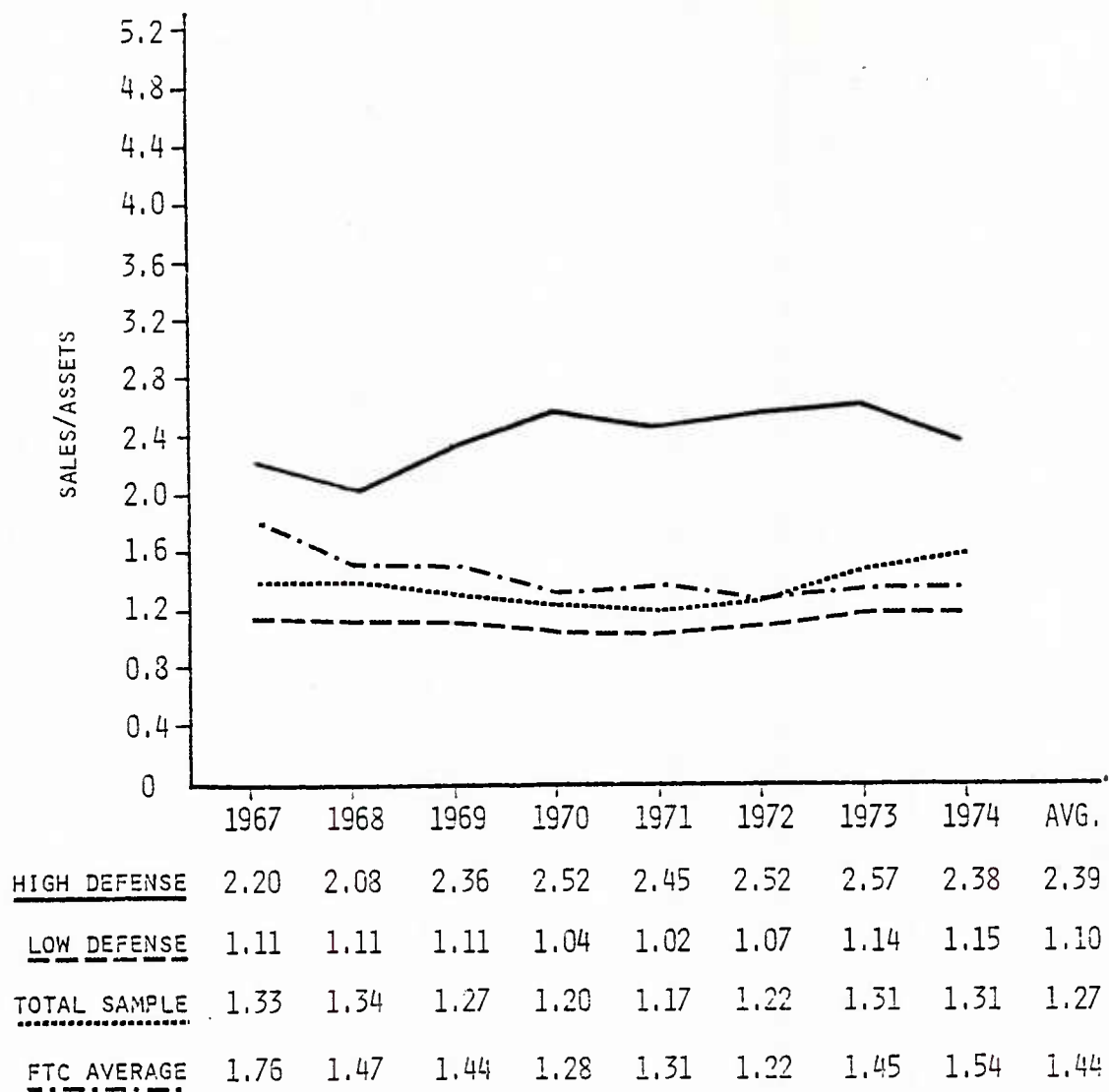
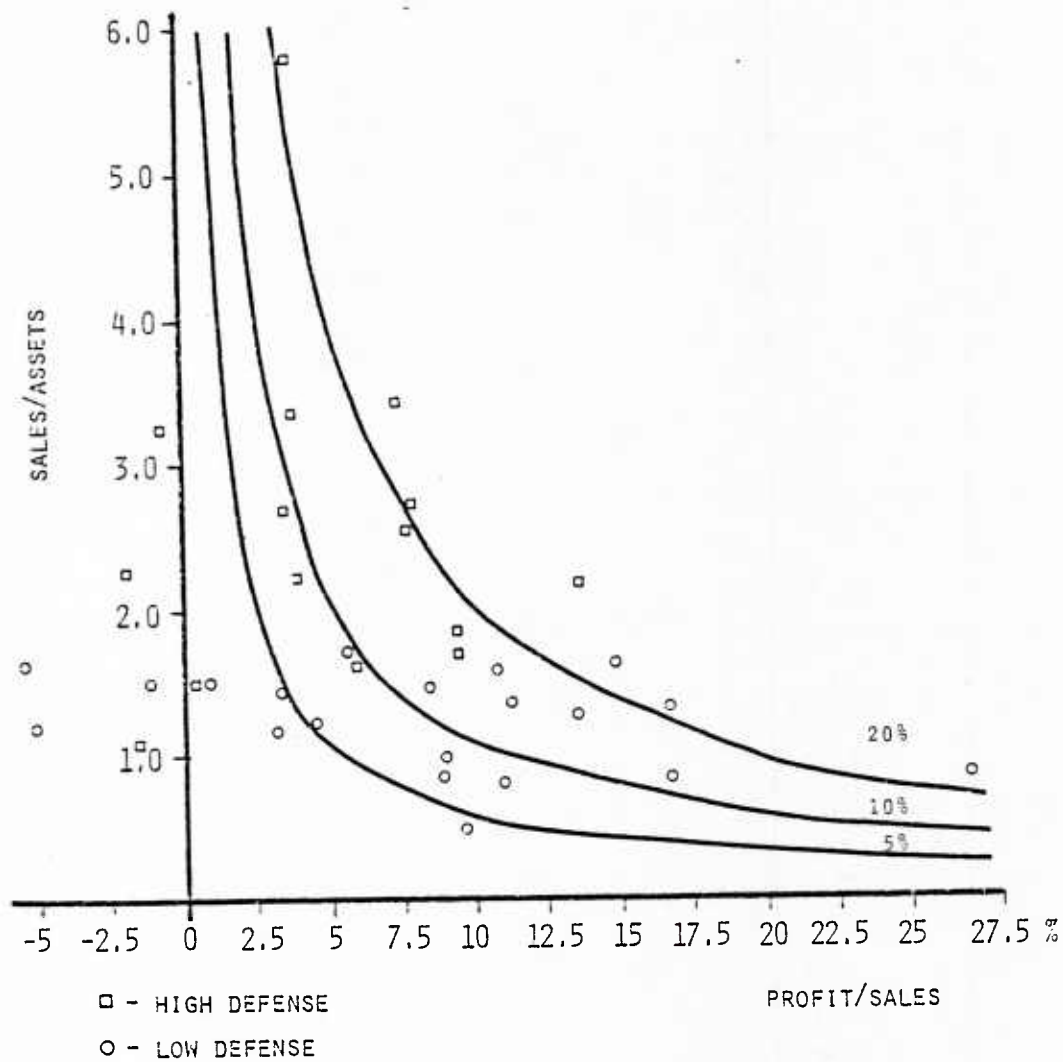


FIGURE 11. RELATION BETWEEN SALES/ASSETS AND
PROFIT/SALES (1974)



awards, approximately 8% are for services and 30% are for all other procurements including: textiles, clothing and equipage; fuels and lubricants; miscellaneous equipment; construction; and all procurements of less than \$10,000.

Foreign procurements of U. S. Defense systems are separated into three groups, defined by the Defense Security Assistance Agency (DSAA) as follows:

— Foreign Military Sales (FMS) - DoD sells required material and related services to eligible allied and friendly nations on both a cash and a credit basis. All sales are made in accordance with the provisions of the 1968 Foreign Military Sales Act, as amended; and appropriated funds are used to extend direct credit or guarantee privately obtained credit when such credit is needed by purchasing governments to facilitate their acquisition of essential military equipment and training.

— Military Assistance Program (MAP) Grant Aid - From FY 1950 through FY 1975, appropriated funds have been programmed under MAP for military equipment and related training provided to some 80 allied and friendly countries in accordance with the objectives, terms and conditions very specifically set forth in the Foreign Assistance Act of 1961, as amended, and predecessor legislation.

— Commercial Sales - These are direct sales from the manufacturing firm to the foreign purchaser, and must have the approval of the State Department.

See Table 8 for a detailed breakout of foreign sector procurements by weapon system category for FYs 1967 through 1975.

Some systems are also supplied to our allies from stocks of Excess Defense Articles. These articles are provided as Grant Aid in lieu of procuring new items. Excess Defense Articles distributed through Grant Aid programs were not included in this analysis since they were once procured by DoD for its own use and the procurements were so recorded in the year the contract was awarded.

FMS data were recorded for the year the order was placed, even though deliveries may extend over several years. This most closely approximates the data of contract awards for procurement of U. S. military systems. For MAP sales, programmed expenditures, rather than deliveries, were used. The values of annual deliveries were used for Commercial Sales, since they were the only data available. Commercial Sales deliveries have averaged about 12% of the FMS total. As the method of reporting

TABLE 7. TOTAL MILITARY PROCUREMENTS

(Millions of Current Dollars)

Fiscal Year	Market	Aircraft	Missiles	Ships	Vehicles & Weapons	Ammunition	Electronics	Total
1967	Domestic	9,677	4,333	2,048	2,055	3,554	4,160	25,827
	Foreign	819	145	333	327	171	157	1,952
	Total	10,496	4,478	2,381	2,382	3,725	4,317	27,779
1968	Domestic	9,470	4,732	1,943	2,095	4,513	3,727	26,480
	Foreign	740	205	39	311	188	157	1,641
	Total	10,210	4,937	1,982	2,406	4,701	3,884	28,121
1969	Domestic	8,317	5,239	1,457	1,601	4,852	3,762	25,227
	Foreign	1,257	373	38	287	158	140	2,253
	Total	9,574	5,612	1,495	1,888	5,010	3,902	27,480
1970	Domestic	6,596	4,785	1,629	1,314	3,020	3,160	20,504
	Foreign	703	172	111	245	203	313	1,747
	Total	7,299	4,957	1,740	1,559	3,223	3,473	22,251
1971	Domestic	6,896	4,454	2,495	1,134	2,143	3,061	20,185
	Foreign	1,573	219	96	456	307	186	2,836
	Total	8,469	4,673	2,591	1,590	2,450	3,247	23,021
1972	Domestic	7,551	4,973	2,277	1,001	2,583	3,700	22,085
	Foreign	2,696	315	107	546	374	181	4,219
	Total	10,247	5,288	2,384	1,547	2,957	3,881	26,304
1973	Domestic	6,140	4,429	2,115	978	2,247	3,539	19,447
	Foreign	2,910	940	112	229	346	185	4,721
	Total	9,040	5,369	2,227	1,207	2,593	3,724	24,168

TABLE 7. TOTAL MILITARY PROCUREMENTS (Continued)

(Millions of Current Dollars)

Fiscal Year	Market	Aircraft	Missiles	Ships	Vehicles & Weapons	Ammunition	Electronics	Total
1974	Domestic	6,481	4,226	3,704	1,117	1,535	3,697	20,760
	Foreign	5,065	838	1,244	1,678	1,004	365	10,194
	Total	11,546	5,064	4,948	2,795	2,539	4,062	30,954
1975	Domestic	6,700	4,595	3,536	1,387	1,294	4,671	22,184
	Foreign	3,766	1,917	2,092	1,022	1,508	319	10,625
	Total	10,466	6,512	5,628	2,409	2,802	4,990	32,809
1976	Domestic	8,451	3,667	4,561	1,606	1,587	1,562	21,434
	Foreign							8,200
	Total							29,634
197T	Domestic	1,804	728	645	329	297	353	4,156
	Foreign							2,000
	Total							6,156
1977	Domestic	11,226	4,675	7,110	1,723	2,318	2,248	29,310
	Foreign							6,900
	Total							36,210

TABLE 8. PROCUREMENTS FOR FOREIGN SECTOR

(Millions of Current Dollars)

Fiscal Year	Group	Aircraft	Missiles	Ships	Vehicles & Weapons	Ammunition	Electronics	Total
1967	FMS ¹	437	85	180	141	60	71	974
	MAP ¹	275	39	108	152	95	69	738
	Commercial	107	21	44	34	15	17	238
	Total	819	145	332	327	170	157	1,950
1968	FMS ¹	376	122	8	135	85	69	795
	MAP ¹	242	44	29	133	76	66	590
	Commercial	122	39	3	43	28	24	259
	Total	740	205	40	311	189	159	1,644
1969	FMS ¹	914	279	18	159	94	87	1,551
	MAP ¹	195	48	17	102	49	38	449
	Commercial	148	45	3	26	15	14	251
	Total	1,257	372	38	287	158	139	2,251
1970	FMS ¹	382	98	56	105	106	173	920
	MAP ¹	139	27	28	90	47	58	389
	Commercial	182	47	27	50	50	82	438
	Total	703	172	111	245	203	313	1,747
1971	FMS ¹	1,050	152	47	184	128	91	1,652
	MAP ¹	270	30	39	228	148	73	788
	Commercial	252	37	11	44	31	22	397
	Total	1,572	219	97	456	307	186	2,837
1972	FMS ¹	2,214	261	59	350	235	132	3,251
	MAP ¹	194	21	41	151	109	32	548
	Commercial	288	34	8	46	30	17	423
	Total	2,696	316	108	547	374	181	4,222

¹"Construction" deleted from FMS and MAP.

TABLE 8. PROCUREMENTS FOR FOREIGN SECTOR (Continued)

(Millions of Current Dollars)

Fiscal Year	Group	Aircraft	Missiles	Ships	Vehicles & Weapons	Ammunition	Electronics	Total
1973	FMS ¹	2,419	815	84	122	207	131	3,778
	MAP ¹	259	48	20	95	119	42	583
	Commercial	232	78	8	12	20	13	363
	Total	2,910	941	112	229	346	186	4,724
1974	FMS ¹	4,540	769	1,137	1,510	625	323	8,904
	MAP ¹	269	26	43	83	344	24	789
	Commercial	256	43	64	85	35	18	501
	Total	5,065	838	1,244	1,678	1,004	365	10,194
1975	FMS ¹	3,357	1,741	1,907	902	1,218	281	9,406
	MAP ¹	182	59	56	59	209	19	584
	Commercial	227	118	129	61	82	19	636
	Total	3,766	1,918	2,092	1,022	1,509	319	10,626

¹"Construction" deleted from FMS and MAP.

Commercial Sales was consistent throughout the period of the study, any possible aberrations resulting from the use of data based on deliveries as opposed to orders were considered insignificant.

DoD purchases of Defense systems prior to the early 1970's represented most of the Defense industry's sales of these items. In recent years, however, sales to foreign governments have come to represent a significant portion of total sales (approximately 32% in 1975). DoD demand alone can no longer be considered the final determinant of the market for military equipment.

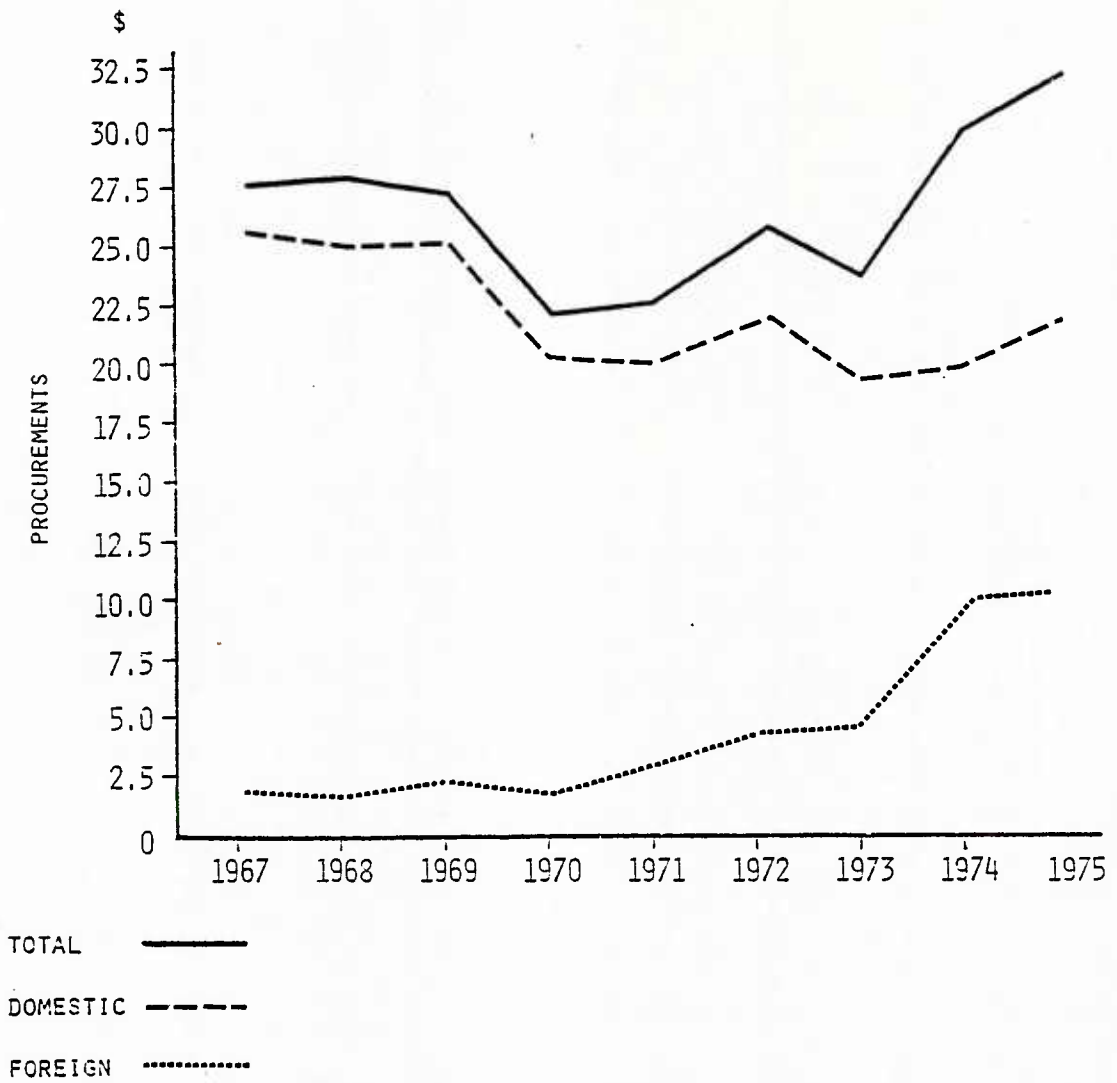
The level of prime contract awards for U. S. military equipment needs has generally declined since 1968. The FY 1975 awards of about \$22 billion are 16.2% below the 1968 level; when adjusted for inflation the decline is far greater. In constant 1967 dollars, U. S. prime Defense contract awards have declined from \$25.4 billion to \$12.2 billion, a drop of about 52%.⁵ (See Figure 12.)

Of U. S. procurements in the six weapon system categories, Ships showed the greatest increase as a percentage of the total prime contract awards. In 1967, only 8% of all awards were in the Ships category. By 1975 this figure had increased to 16%. This increase was almost enough to offset the effects of inflation. The greatest decline in the percentage of awards was in the Ammunition category. After reaching a 1969 peak of 19% of total procurements, it declined to just under 6% in 1975. The remaining categories retained approximately the same percentages of the total procurements for each year.

The foreign market has been far more volatile than the domestic one. Foreign demand for military equipment has grown rapidly from about 7.5% of U. S. demand in 1967 to 47% in 1975. The trend of foreign market demand is shown in Figure 12. The sharp upturn in 1974 is the result of a 100% increase in FMS in that year. MAP and commercial foreign sales have remained stable from 1967 to 1975.

⁵Based on Department of Commerce Implicit GNP Deflator for Federal Government Purchases. (See Table 6.)

FIGURE 12. MILITARY PROCUREMENT
(BILLIONS OF CURRENT DOLLARS)



SOURCE: DSAA, "FOREIGN MILITARY SALES AND MILITARY ASSISTANCE FACTS,"

The volatility of foreign market demand is demonstrated by the variations in yearly procurements for each weapon system category. The Aircraft category ranged from 40% to 65% of total foreign sector demand. All other categories ranged between 2% and 20%. In 1975, Ships, Missiles and Space, and Ammunition procurements were on the rise, while Electronics and Vehicles and Weapons declined. Ships had the largest and most rapid increase, rising from just over 2% of foreign sector demand in 1973 to 20% in 1975.

The overall view of demand for military systems in current dollars is shown in Figure 12 and in constant dollars in Figure 13. Table 9 shows the inflation indices used for developing Figure 13. While the increased foreign sector demand in the 1970's increased the weapon system demand in current dollars, the overall growth translates into a slight decrease when expressed in constant dollars.

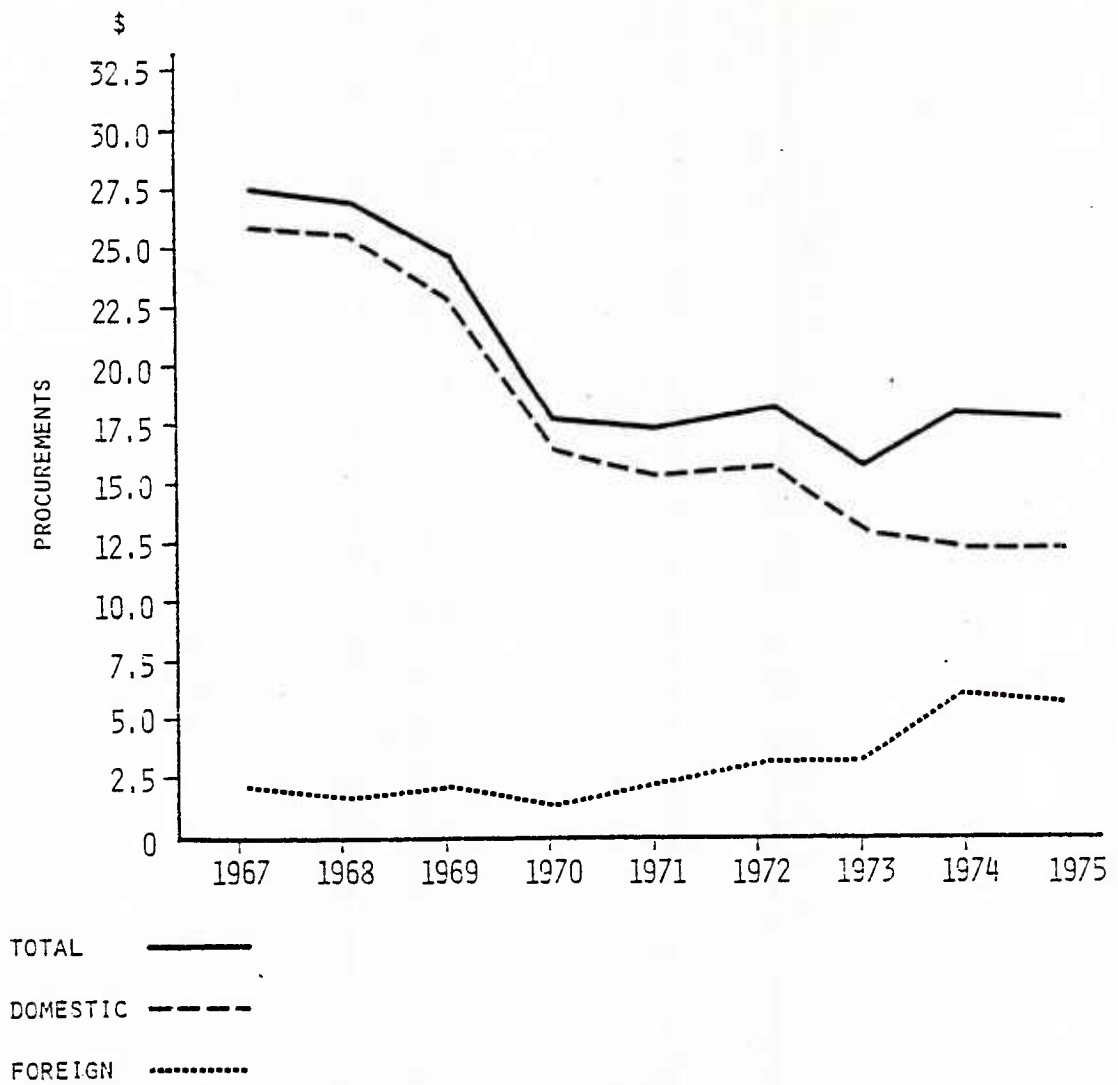
TABLE 9. INDICES FOR MILITARY PROCUREMENT ANALYSIS

<u>Year</u>	<u>Price Indices</u>	<u>Year</u>	<u>Price Indices</u>
1967	100	1975	181.1
1968	104.1	1976	192.9
1969	110.7	1977	205.2
1970	123.0	1978	209.5
1971	132.4	1979	222.4
1972	141.3	1980	234.1
1973	153.0		244.0
1974	170.2		

Sources: 1967 - 1975: Implicit GNP Deflator for Federal Government Purchases of Goods and Services -
DOC Survey of Current Business

The percentage of total demand represented by each weapon system category is very similar to that of the domestic sector. The percentage breakout of the total procurement

FIGURE 13. MILITARY PROCUREMENT
(BILLIONS OF 1967 DOLLARS)



of systems by each category has held fairly constant; Aircraft was consistently the highest, between 32% and 39% of the total; Missiles accounted for approximately 20%; Ships increased from 9% in 1973 to 17% in 1975; Ammunition has declined steadily since 1969; Electronics and Vehicles and Weapons held at about 15% and 7% respectively.

Stability and Predictability of the DoD Market. To determine industry's confidence in its Defense sales, the DIB questionnaire asked whether it felt its Defense market was more, equally, or less stable and predictable than its commercial one. In general, the response was pessimistic. (See Tables 10 and 11.)

TABLE 10. STABILITY OF DEFENSE BUSINESS

(by Defense Orientation)

<u>Compared To Commercial Business, Defense Business Is:</u>	<u>Low</u>	<u>High</u>
More Stable	3.6%	18.2%
Equally Stable	25.0	50.0
Less Stable	71.4	31.8

TABLE 11. PREDICTABILITY OF DEFENSE BUSINESS

(by Defense Orientation)

<u>Compared to Commercial Business, Defense Business Is:</u>	<u>Low</u>	<u>High</u>
More Predictable	7.1%	15.0%
Equally Predictable	21.4	45.0
Less Predictable	71.4	40.0

The assumption was made that industry's views on stability and predictability should be related to the companies' year-to-year Defense sales movements. The annual Defense sales for each company were plotted and a trend line calculated. The deviations from the trend line for each year's Defense and commercial sales were calculated, as well as the overall standard deviations for each company. The results are shown in Table 12.

TABLE 12. AVERAGE DEVIATION FROM SALES TREND LINES¹

	<u>Commercial</u>	<u>Defense</u>	<u>Def:Comm.</u>
High % Defense	.2500	.1224	0.49
Low % Defense	.0709	.1833	2.59
Large Companies	.1074	.1423	1.32
Small Companies	.0953	.1624	1.70

¹A statistical F test (Chi squared deviates) was performed. The results verified that the sample size was valid and the results significant.

Industry was also asked to rank the total cost of doing Defense business, both at the prime and subcontract level, as compared to that of doing commercial business. On a ranked basis, the results were as shown in Table 13.

TABLE 13. COST OF DOING BUSINESS

	<u>Ranked Weights</u>
DoD Prime Contracts	147
DoD Subcontracts	118
Commercial Contracts	50

Industry's Expectations of Future DoD Demand. A five-year review was made of the amount of total sales derived from Defense sales for companies sampled. The data, displayed in Table 14 showed Defense sales percentages of total sales declined for all the companies. The reader is reminded that the decline was caused by increases in the value of commercial sales booked by the companies.

In the questionnaire, industry was asked whether it expected the Defense share of its total business to increase, stay the same or decline over the next five years. The results

TABLE 14. DEFENSE SALES AS PERCENTAGE OF TOTAL SALES

<u>Defense Orientation</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
Low	9.5	8.2	5.7	5.4	4.8
High	83.8	83.1	83.1	81.2	78.1
Total Sample	19.8	17.2	16.1	13.2	11.8

were that 70% of the low and 65% of the high-percent-Defense companies expected their Defense business to decline as a percentage of total business.

Sole Source vs. Competitive Contract Awards. Comparisons were made of the dollar amounts of DoD competitive and non-competitive contracts from 1967 to 1974. Since it is DoD policy to encourage competition, a reduction in the number of competitive contracts and an increase in sole source awards might indicate that fewer companies are actively seeking DoD business. If this is the case, companies that produce Defense goods under sole source contracts do not have an incentive to improve their efficiency and need not invest in the most efficient Defense-related equipment. Instead, they can invest more heavily in equipment to produce goods for the commercial sector, where competition may be greater.

Contract data, both competitive and non-competitive, were stratified by cost and by year for FYs 1967 - 1974. The amount of dollar expenditures for competitive and non-competitive contracts, within each cost category, are presented as a percentage of total DoD procurement. (See Table 15.)

The data show that competitive procurements for all contract actions valued at \$10,000 and over have decreased from about 35% of the total in 1967 to 29% in 1974. The greatest decrease was in the categories ranging from \$10,000 to \$5 million. Although there are some annual fluctuations, the overall trend is downward. There does not appear to be any appreciable change in the number of competitive contracts valued from \$5 million to \$10 million. For contract actions over \$10 million, fluctuations in competitive contract percentages were too small to judge trends.

TABLE 15. PERCENTAGES OF TOTAL PROCUREMENT (COMPETITIVE AND NON-COMPETITIVE CONTRACTS)

FISCAL YEAR	\$10K - \$100K		\$100K - \$1M		\$1M - \$5M		\$5M - \$10M		Over \$10M		Total	
	C*	N/C**	C	N/C	C	N/C	C	N/C	C	N/C	C	N/C
1967												
% of Total Procurement	6.8	5.1	9.7	9.9	9.1	13.1	2.6	6.0	6.9	21.2	35.1	55.3
% Competitive	57		50		41		30		25		39	
1968												
% of Total Procurement	5.7	5.2	8.6	10.5	8.2	13.3	2.4	6.9	7.8	23.0	32.7	58.9
% Competitive	52		45		39		26		25		36	
1969												
% of Total Procurement	5.4	5.8	7.9	10.9	8.3	12.7	2.6	7.8	6.9	22.8	31.1	6.0
% Competitive	48		42		40		25		23		34	
1970												
% of Total Procurement	5.5	6.1	7.2	10.7	7.9	11.9	3.1	7.6	9.8	20.6	33.5	56.9
% Competitive	47		40		40		29		32		37	
1971												
% of Total Procurement	5.0	6.0	6.8	10.3	7.8	11.6	2.9	6.5	8.7	24.0	31.2	58.4
% Competitive	46		40		40		31		27		35	
1972												
% of Total Procurement	4.9	6.3	7.1	10.3	7.1	11.6	2.5	5.3	8.2	27.2	29.8	60.7
% Competitive	44		41		38		32		23		33	
1973												
% of Total Procurement	5.5	6.7	7.0	10.6	7.5	11.4	2.9	6.4	6.7	24.3	29.6	59.4
% Competitive	45		40		40		32		22		33	
1974												
% of Total Procurement	5.3	6.7	6.2	10.4	6.0	11.8	2.4	6.8	8.9	24.8	28.8	60.5
% Competitive	44		37		34		26		28		32	

* C - Competitive

** N/C - Non-Competitive

In an effort to view the extent to which competitive actions in each category were affected by the level of procurement activity, competitive contract values were calculated as a percentage of total procurement expenditures (competitive and non-competitive) within each category and aggregated for all procurement actions above \$10,000. As Table 15 shows, there were significant decreases in the level of competitive contracting in the \$10K to \$100K and \$100K to \$1M ranges. Competitive dollar awards fell from 57% to 44% and from 50% to 37% in these two categories. Competitive awards in the \$1M to \$5M category remained relatively constant. Procurements of \$5M to \$10M dropped from 30% competitive in 1967 to 25% competitive in 1969, and then gradually increased to a maximum level in 1972 and 1973. Competitive contracts valued above \$10M consistently made up about 25% of DoD's total weapons procurements. The reduction in competitive contracts valued at \$5M and below, the contracts most likely to go to small contractors and commercially-oriented companies, accounted most heavily for the decrease in the overall number of competitive awards from 39% to 32%.

Some further insight into changes in competition for contracts of various size can be found by examining the average dollar values of DoD contracts and the total number of contract actions during FYs 1967-1974. (See Table 16.) The most significant rise in the average contract cost occurred in the over \$10M category, the average increase being about \$1.2M. The average contract in the \$5M to \$10M category increased about 4.5%. This is only one-half of the total change, however.

During the same eight-year period, the total number of contract actions decreased. The largest reductions, in absolute terms, occurred in the three categories representing the lower-value contracts. There was less of a reduction in actions involving costs of \$5M to \$10M, and an even smaller reduction in actions involving costs of over \$10M. The increases in the average contract expenditures and number of contract actions of the two highest cost categories reflects the shift in DoD expenditures to total system procurement contracts.

TABLE 16. CONTRACT COSTS AND DISTRIBUTION

(Current Dollars)

	\$10K-\$100K	\$100K-\$1M	\$1M-\$5M	\$5M-\$10M	\$10M & over
1967					
Average Contract Cost (000s)	\$ 27.1	\$ 265.8	\$1,934.9	\$6,542.1	\$25,578.9
Number of Contracts	191,173	32,085	4,991	570	475
1968					
Average Contract Cost (000s)	\$ 27.1	\$ 270.3	\$1,966.7	\$6,447.3	\$26,301.4
Number of Contracts	173,056	30,182	4,627	617	501
1969					
Average Contract Cost (000s)	\$ 26.9	\$ 265.1	\$1,893.8	\$6,392.7	\$24,152.0
Number of Contracts	169,974	29,068	4,538	662	500
1970					
Average Contract Cost (000s)	\$ 26.7	\$ 257.9	\$1,887.7	\$6,421.1	\$23,897.0
Number of Contracts	149,294	23,798	3,598	570	437
1971					
Average Contract Cost (000s)	\$ 26.9	\$ 255.1	\$1,907.1	\$6,124.3	\$25,304.7
Number of Contracts	136,071	22,156	3,340	507	430
1972					
Average Contract Cost (000s)	\$ 27.4	\$ 258.2	\$1,938.3	\$6,400.5	\$24,840.9
Number of Contracts	146,771	24,111	3,422	432	509
1973					
Average Contract Cost (000s)	\$ 27.5	\$ 249.5	\$1,861.0	\$6,097.5	\$24,540.1
Number of Contracts					
1974					
Average Contract Cost (000s)	\$ 27.5	\$ 253.4	\$1,891.9	\$6,684.0	\$26,742.4
Number of Contracts	158,752	23,891	3,431	500	458

In summary, the contract award data show a decrease in the number and size of competitive contract awards in the \$10K to \$1M range. The average contract of over \$10M has increased. The decrease in the number of competitive actions was accompanied by an increase in non-competitive awards. (See Table 17.) The results of reducing the numbers of available competitive awards would be:

- More contractors would have to rely heavily on subcontract work.
- Companies would have to seek new business elsewhere, i.e., the commercial market.
- There would be a reduction in opportunity for new companies to enter the DIB.

As evidence that corporate expansion is being dominated by commercial sales, Figure 14 shows the declining percentage of total corporate sales represented by Defense sales. The overall decline may not appear to be dramatic, but DoD should be concerned about the decline of the low-percent-Defense companies' Defense sales. With such sales down to 4.8% of total sales, these firms could abruptly drop their Defense business without seriously affecting their total financial performance.

Government-Owned Equipment

The availability of Government-owned production equipment and facilities for use by Defense contractors reduces their incentive (and need) to invest. Consistent with a DoD policy to reduce its holdings of production capital assets, the DIB sample showed a reduction in the acquisition value of DoD-owned equipment from \$864 million in FY 1971 to \$843 million in FY 1975.

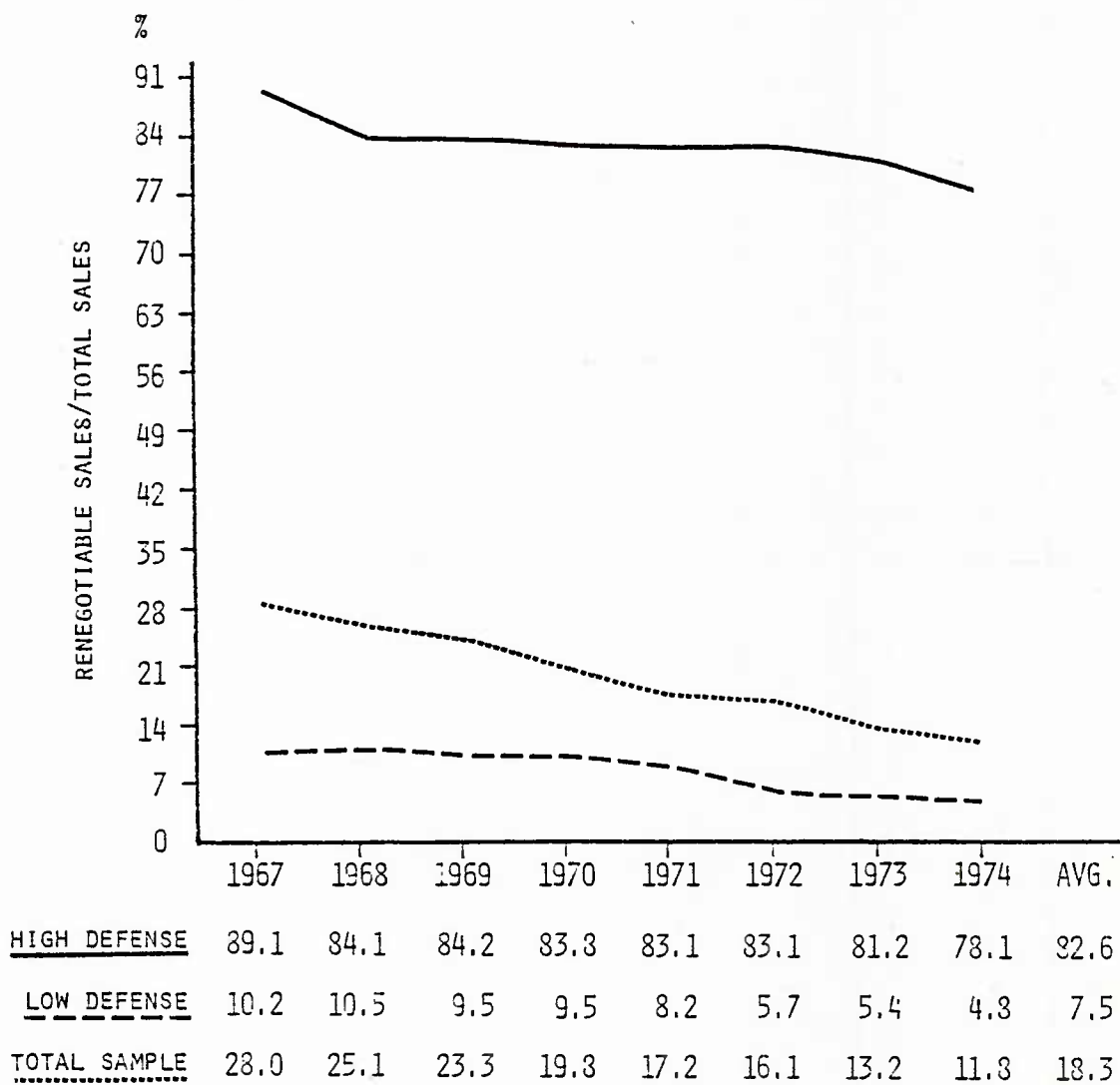
The Defense Supply Agency (DSA) showed an overall reduction in total industry holdings of DoD production equipment for the same period from about \$2.05 billion to nearly \$1.68 billion. While the dollar value of the DoD-owned equipment has been dropping, it still represents a significant number of pieces of equipment and does influence industry's investment decisions.

TABLE 17. CONTRACT ACTIONS BY COMPETITIVE STATUS
(Contracts Larger than \$10K)

	<u>FY 1967</u>	<u>FY 1974</u>	<u>Absolute Change</u>	<u>Percent Change</u>
<u>Negotiated:</u>				
<u>Competitive Actions</u>	100,395	58,886	-41,509	-41.3%
<u>Total Competitive Dollars (M)</u>	\$ 9,824	\$ 7,617	-\$2,207	-22.5%
<u>Non-Competitive Actions</u>	97,688	106,773	+9,085	+9.3%
<u>Total Non-Competitive Dollars (M)</u>	\$ 24,004	\$ 22,061	-\$1,943	-8.1%
<u>Formally Advertised (IFBs):</u>				
<u>Actions</u>	31,271	21,373	-9,898	-31.7%
<u>Total Dollars (M)</u>	\$ 5,425	\$ 2,817	-\$2,608	-48.1%

Source: LMI/OASD(Comptroller)

FIGURE 14. DEFENSE SALES/TOTAL SALES
(WEIGHTED)



In an effort to approximate the book value of Government-owned equipment employed by Defense contractors, a number of companies in the DIB sample were contacted. Each was asked to depreciate the Government equipment and facilities in use, on the same basis as its own, and to estimate a comparable net book value (NBV). It was found, due to the age of the equipment, that the NBV for those items would be quite low.⁶ However, industry estimated that about half the useful life of the equipment remained.

Much of the DoD-owned equipment is classified as special purpose tooling, for which the Government has removed industry's risk in recovering the investment. This also removes industry's incentive to replace the equipment with its own. In cases where industry has purchased such equipment, it usually has been to avoid utilization accountability to the Defense Contract Audit Agency (DCAA) and to increase the company's flexibility in equipment usage for commercial production.

Capital Availability

Impact of DoD Business. Contractors were asked if their DoD business made it easier or more difficult to obtain funds from lending institutions. As a group, 6% thought DoD business made it easier, 16% said more difficult, and the majority, 78%, believed there was no difference.

Categorized by percentage of Defense business, 93% of the low-percent-Defense companies said such business had no effect on their borrowing ability and 7% felt it made borrowing more difficult. Of the high-percent-Defense companies, half found DoD business made borrowing easier, one-third said it made no difference, and the remaining 17% said Defense work caused them difficulties.

Highly Defense oriented companies had the largest percentage of responses in the "easier" and "more difficult" categories. This finding suggests that in the past lending institutions heavily considered additional factors when deciding to finance Defense

⁶Vintage Study 1975, U. S. Army Production Equipment Agency, Rock Island, Illinois, gives an insight into the age of this equipment.

oriented contractors. However, a recent survey of lending institutions by the Conference Board indicates that, in the future, Defense industries will find it more difficult to secure both long and short-term loans.⁷

Financing Costs. Interest rates paid by Defense oriented contractors increased from 5.4% in 1967 to 8.9% in 1974. Following a similar pattern, the rate paid by commercially oriented contractors moved from 5.0% to 8.3%. The data are plotted in Figure 15. The consistently higher rate for Defense oriented companies may reflect the bankers' assessment of the risks in Defense work.

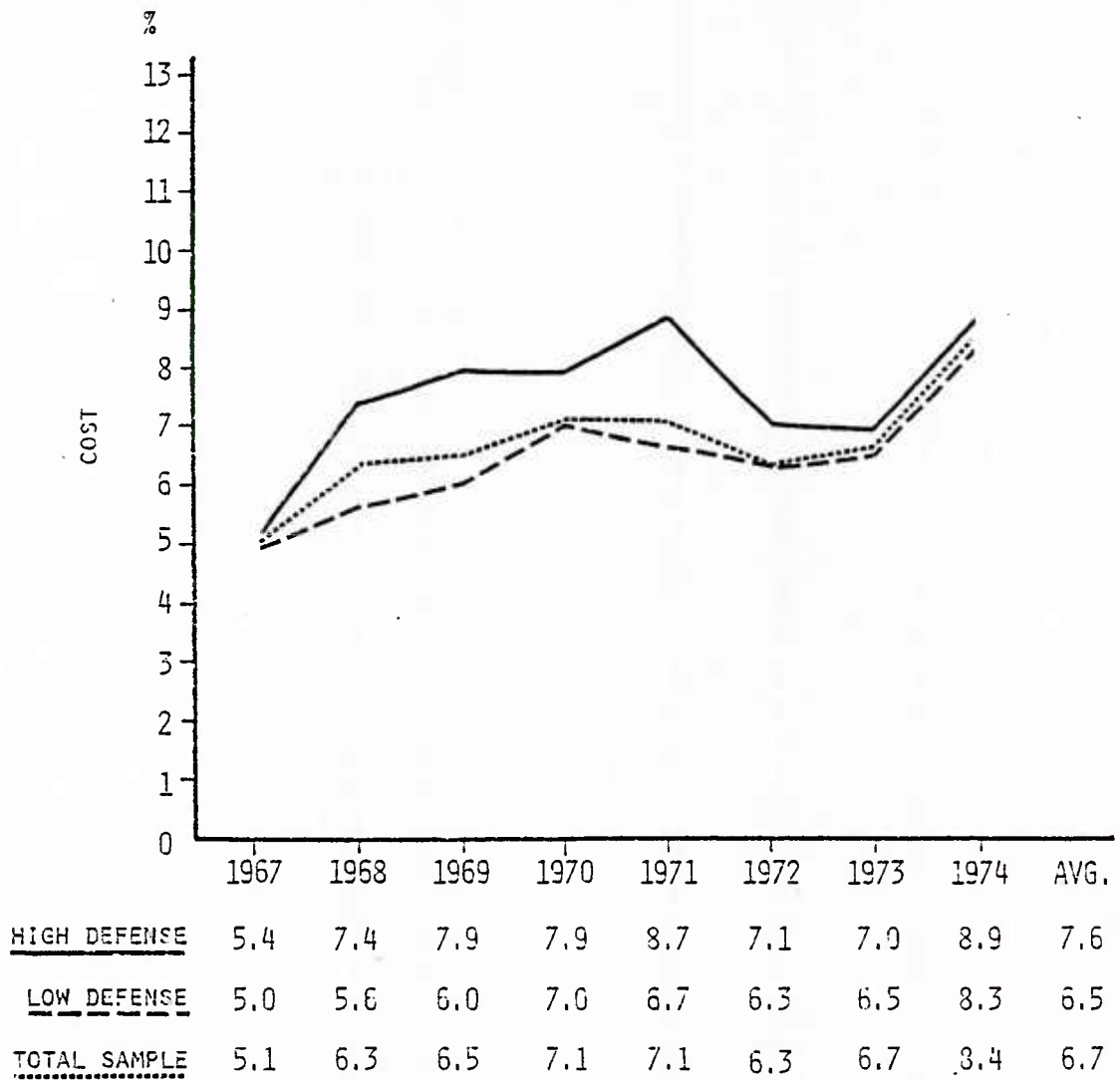
The general upward trend of interest paid by high-percent-Defense companies has been similar to that paid by low-percent-Defense companies and reflects the overall activity in the money market. Also, the 1970-1974 reduction in the price of Defense oriented company stocks has been so great that any equity financing that could have been raised would have been very costly.

The Conference Board survey of 56 financial institutions, referred to above, uncovered the following reasons for assigning a higher risk factor to Defense contractor loans:

- Uncertainty about the fulfillment of present Defense contracts and the prospect of future ones
- Profits that are too low in relation to the risks to long-term viability faced by Defense contractors
- Limited product lines and over-reliance on a single customer on the part of Defense firms
- The propensity of some contractors to "buy-in"
- DoD policies, procurement regulations and tactics, especially excessive management and policy and specification changes in mid-contract

⁷The Defense Industry: Some Perspectives From The Financial Community, Conference Board Report 693 (New York: The Conference Board, 1976).

FIGURE 15. AVERAGE COST OF BORROWING
(UNWEIGHTED)



- The less certain position of Defense subcontractors relative to the major primes.

Progress Payments. Progress and advance payments play an important role in reducing the amount of borrowed capital required by contractors. Companies in the DIB sample were asked to estimate the average percentage of their contract values received in progress and advance payments for various sources of business. The results were: 16.5% received on commercial contracts, 49.2% on DoD subcontracts, and 52.3% on DoD prime contracts.

Progress payments paid by DoD for work performed on Defense contracts reduce the need to borrow funds. The impact of progress payments can be seen by calculating the amount of interest that would have been paid had the money been borrowed from a lending institution, and expressing this amount as a percentage of total renegotiable sales. (See Table 18.)

TABLE 18. INTEREST SAVED BY PROGRESS PAYMENTS
AS A PERCENTAGE OF RENEGOTIABLE SALES

	<u>1967</u>	<u>1974</u>
Low-Percent-Defense Companies	0.5	1.4
High-Percent-Defense Companies	0.9	2.2

The increase in the impact of progress payments is caused by the high-percent-Defense companies' having a greater percentage of their total business from Defense contracts and the 1972 increase in progress payments from 70% to 80%.

Investment

General. As the study progressed, it became evident that one likely sign of erosion in the DIB would be a trend by industry toward underinvestment. Such a trend would result in labor-intensive operations, increased production time and eventually, unnecessarily high procurement costs. Since prudent investment in capital equipment is the key to promoting growth in productivity, which in turn influences prices, LMI's

analysis of investment focused on indicators which might provide evidence of Defense industry's underinvestment. The Defense oriented firms' investment patterns were therefore compared to those of the commercially oriented firms in the DIB sample, on the assumption that investment for maximum production efficiency would take place in the highly competitive commercial sector.

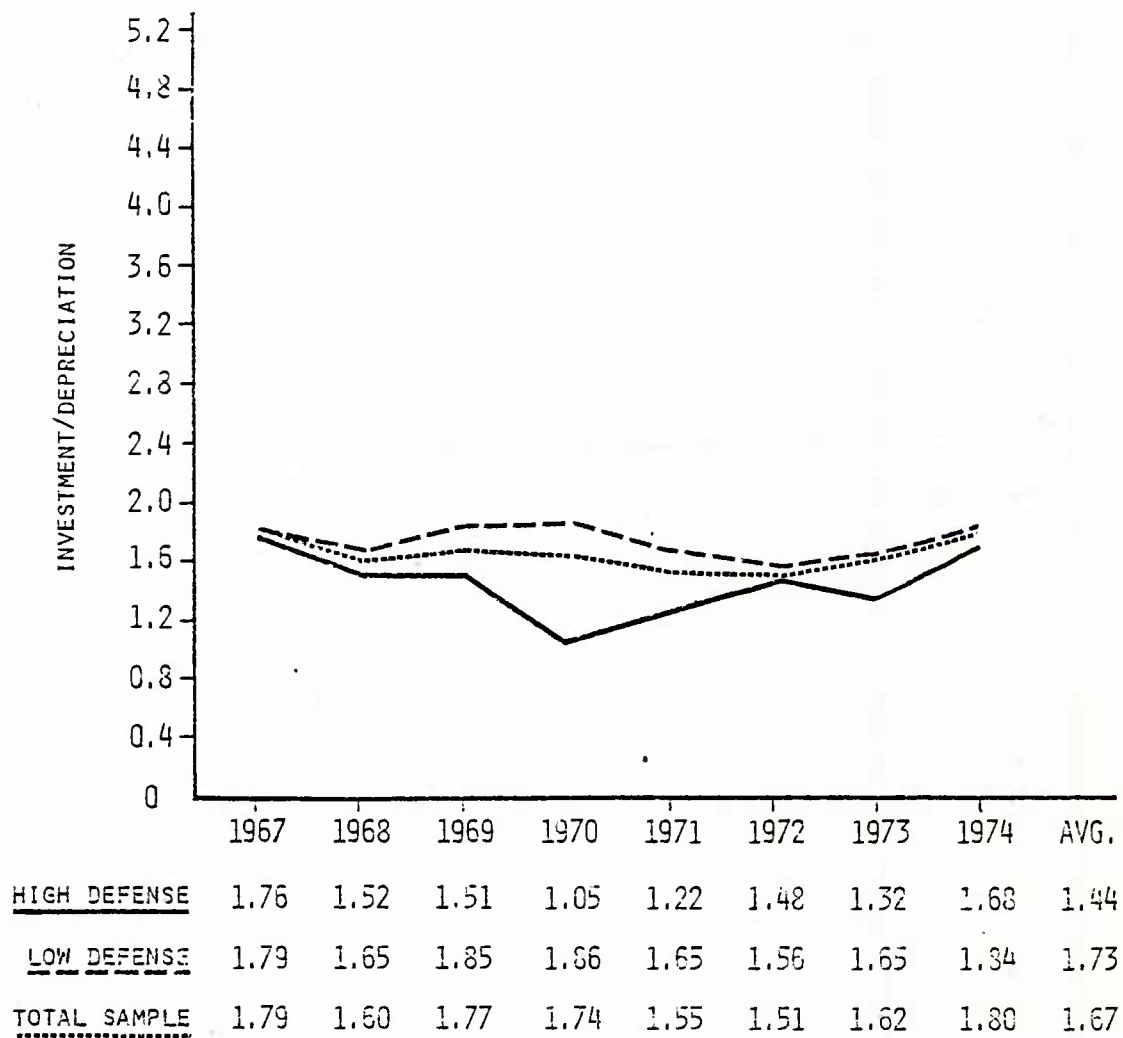
Equipment Investment to Depreciation. The extent to which companies have invested in new equipment was measured by computing the ratio of new equipment investment to equipment depreciation. The underlying assumptions were:

- Competition forces commercially oriented firms to use modern cost-saving production equipment.
- Reasonably efficient Defense producers would have equipment investment to depreciation ratios approximating those of commercial industry.
- The ratio of equipment investment to depreciation would be a reasonable indicator of Defense industries' efforts to foster productivity growth.

The data in Figure 16 show that Defense industries invested at a lower rate for new equipment than did commercially oriented industries. The decline in 1970 and 1971 is understandable if one assumes that the heavy investment in the late 1960's was tied to programs that were cancelled or reduced in the early 1970's. However, a continued lower ratio of investment to depreciation could become a matter of concern for several reasons.

First, every Defense company contacted during this study stated that it used an accelerated depreciation schedule for equipment, either sum of the digits or double declining balance. Defense production equipment has IRS class life averages of six to eight years for special and test equipment, and 12 years for standard production equipment. (A pending Treasury Department action will set all aerospace equipment life at 10 years.) While the useful life of the equipment often exceeds the class life, retaining the equipment to or beyond its class life minimizes or eliminates the equipment's contribution to cash flow generated by depreciation.

FIGURE 16. INVESTMENT IN NEW EQUIPMENT/DEPRECIATION
(WEIGHTED)



Second, the longer a piece of equipment is retained, the greater the spread between its original cost and its replacement cost. During times of high inflation, like the 1970's, the cost spread becomes more pronounced.

Third, there is a possibility that the lower replacement rate for Defense firms might be related to capacity. Although Defense firms have had capacity utilization rates lower than those of the commercial ones in the sample, the available data show both groups to have large amounts of available capacity.

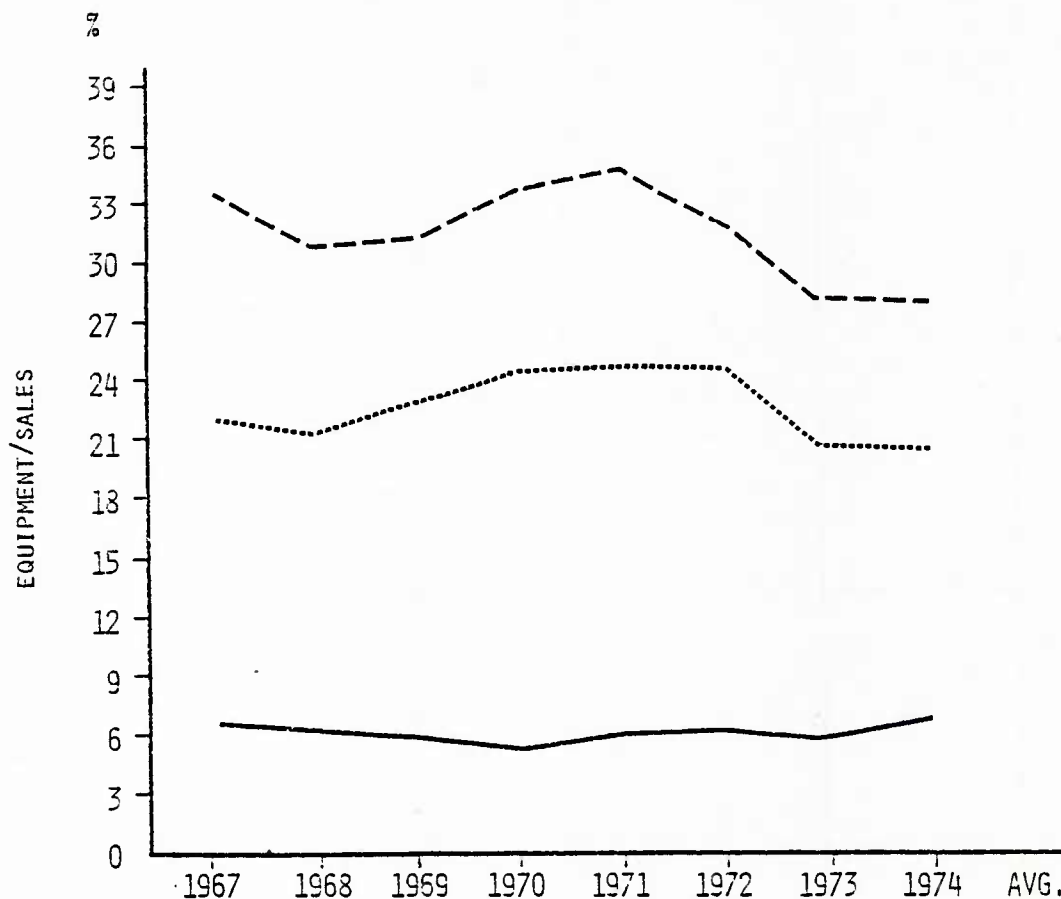
Fourth, the availability of Government-owned equipment and the direct expensing of program-peculiar equipment probably does contribute to Defense firms' having a lower investment to depreciation ratio. Also, the reluctance of the Government to be more generous in sharing the benefits of cost-saving investments undoubtedly has an impact. If the goal of the DoD is to have an efficient base from which to procure its hardware needs, Figure 16 indicates there is room for further improvement.

Investment and Sales Relationships. While the end items produced by commercial and Defense industries differ in application, the production processes for similar pieces of equipment are the same. Electronics, automotive, aircraft, personal arms, and basic ship structures are all produced in the same fashion. Therefore, over a broad sample of companies and products, there should be a relationship between the value of the equipment used to produce the goods and their sales price.

The NBV equipment to sales ratios for the study sample were computed and plotted as a function of the companies' percentage of Defense business relative to total business. (See Figure 17.) Over the period of the DIB sample, the NBV of the commercially oriented companies' equipment, as a function of sales, was about six times that of the high-percent-Defense companies.

The equipment to sales ratio, while dramatic, may not be a totally accurate representation of the facts. For example, some high-percent-Defense companies make

FIGURE 17. NET BOOK VALUE OF EQUIPMENT/SALES
(WEIGHTED)



	1967	1968	1969	1970	1971	1972	1973	1974	AVG.
<u>HIGH DEFENSE</u>	6.2	5.8	5.6	4.8	5.9	5.9	5.5	6.3	5.7
<u>LOW DEFENSE</u>	33.6	31.2	31.6	34.0	34.8	32.5	27.9	27.5	31.3
<u>TOTAL SAMPLE</u>	22.4	21.1	22.9	24.6	24.9	23.8	20.5	20.4	22.4

heavy use of Government-owned facilities. Also, because of the uncertainty of Defense contracts or the limited need for a specific piece of equipment, Defense firms prefer to lease equipment, which is then directly charged, within ASPR guideline limitations, against a contract. An analysis was therefore made of the sales to assets ratio.

The classic definition of sales to assets is total sales divided by the NBV of plant, equipment and current assets. However, in light of the use of Government-owned facilities (GOF) and leased equipment, a more accurate ratio would be sales to total assets employed.

To compute this ratio accurately, leased equipment costs had to be capitalized. IRS guidelines were followed. Equipment annual lease costs were multiplied by three, facilities lease costs by ten. The NBV of Government-owned facilities was computed in the following way. The acquisition cost of Government-owned plant and equipment was obtained from the Defense Industrial Plant and Equipment Center (DIPEC), Memphis, Tennessee. The firms using the equipment and facilities were contacted to confirm the acquisition values of the plant and equipment, the average age of the equipment, and the method of depreciation and class life used by the companies on their own plant and equipment. The NBV was then computed. The final equation used was:

$$\frac{\text{Total Company Sales}}{\text{Current Assets} + \text{NBV Plant \& Equip.} + \text{NBV Govt. Plant \& Equip.} + 3 \times \text{Equip. Lease} + 10 \times \text{Facilities Lease.}}$$

The results of the computations are shown in Table 19.

TABLE 19. SALES TO ASSETS RATIOS FOR
DEFENSE AND COMMERCIAL COMPANIES
(1974/1967-1974 Avg.)

	<u>Defense</u>	<u>Commercial</u>
Sales to Assets (S/A)	2.38/2.39	1.15/1.10
S/A + Capitalized Lease	1.64/1.78	1.13/1.04
S/A + Capitalized Lease & GOF	1.39/1.42	1.13/1.04

The data show the progression of the ratios from a strict sales to assets ratio to a ratio of sales to total assets utilized. The spread between the Defense and commercial company ratios can be explained by either or both of the following reasons:

- Defense firms use less equipment to manufacture their goods and therefore are more labor-intensive.
- The average age of Defense production equipment is greater than that of its commercial counterparts.

To summarize, the data in Figures 16 and 17 would indicate that Defense industries are maintaining their profitability by limiting their investments in equipment. In doing so, they are continuing to use equipment that is aging faster economically than that used by commercial industries. This practice is likely to result in increasingly labor-intensive operations and higher prices for DoD goods.

DoD Policies and Practices

Industry was asked if DoD policies and practices contributed to its reluctance to invest in labor saving/cost reducing equipment, and to identify the policies and practices it considered most detrimental. All respondents said DoD policies made investment for Defense production less attractive. Ninety-one percent felt Defense investments were less attractive than commercial investments, and the remaining 9% ranked Defense investments as equally attractive. LMI's questions and the companies' answers are reproduced below:

- Q. If the DoD were to implement the following policies, would it cause you to increase your capital investment program? Please rank your "Yes" answers. (Answers a - f were supplied in the questionnaire.)

	<u>Percent 'Yes' Response</u> ⁸	<u>Weighted 'Yes' Response</u> ⁹
a. Increasing negotiated profit rates on all new contracts by 1 to 2 percentage points.	86.6%	1,324
b. Allowing interest	86.6	1,214
c. Allowing accelerated depreciation	91.0	1,028
d. Allowing imputed cost of capital in lieu of interest	82.1	970
e. Allowing savings from investment in cost-saving equipment to continue to be realized on subsequent contracts	77.6	764
f. Allowing as a termination cost the undepreciated portion of program-peculiar production assets	71.0	449
Q. List, in order of priority, the 4 or 5 DoD procurement policies or practices which you believe are the most detrimental to DoD's objective of having a high productivity, responsive industrial base. (Industry wrote in the answers to this question.)		
Top eight policies, in descending order, from the total sample (numbers in () are ranking totals):		
1. Excessive administrative and technical control; too much Government interference with company management (3107)		
2. Exclusion of interest from allowable costs; limits on Independent Research and Development (IR&D), Bid and Proposal (B&P) and lease costs (1378)		
3. Limited profit levels (1311)		
4. Procurement practices such as "Best and Final" offers, buying-in, restricting bidding to "qualified bidders" only and the taking of excessive bidding and negotiating time on contracts (1058)		

⁸Each company answered "yes" or "no" to a. through f. The 86.6% after a. means 86.6% responded "yes."

⁹Weighted 'Yes' Responses = Sum of squared weights: Ranking 1 equaled weight 6, 2 = 5, 3 = 4, etc.

5. Single-year procurements. Industry is forced to put up its own capital for long lead time items which will be needed if procurements are approved
(997)
6. Not allowing cost savings from investments, design improvements, etc. to accrue to the contractor through subsequent contracts, coupled with inadequate depreciation for new investments, especially Cost Accounting Standard (CAS) 409.
(677)
7. Renegotiation
(619)
8. Rigged procurements, sole source procurements, labeling competitive procurements "negotiated."
(369)

The companies that are predominantly prime contractors cited DoD's being restricted to single-year procurements (no. 5) as their number two problem. Profit limitations were ranked first by missile and ship builders, second by tank and weapons manufacturers and fifth by aircraft manufacturers. A very close second for shipbuilders was DoD's not allowing cost savings to accrue through future contracts. The tank-associated manufacturers were concerned with flow-down procedures and inadequate inflation compensation.

- Q. List, in order of priority, five actions DoD could take which would result in your making greater corporate investment in cost-saving industrial equipment and modernization of facilities in the performance of defense contracts.
(Industry supplied the answers.)

From the overall sample, the most frequently listed suggested changes were (numbers in () are ranking totals):

1. Eliminate ASPR XV disallowances thereby allowing interest, imputed cost of capital, and a greater recovery of IR&D, and modify the allowability of leases on facilities and EDP equipment
(1181)
2. Increase profit levels
(1107)
3. Allow accelerated depreciation (not CAS 409), permit the write-off of contract-peculiar equipment against the initial contract, and provide tax incentives for investment
(880)

4. Allow the contractor to retain a greater share of cost savings resulting from investments, better designs, new developments, etc.
(392)
5. Use multi-year contracting
(264)
6. Provide termination protection for contractors
(195)
7. Eliminate administrative complexity in CAS regulations and excessive and redundant financial controls.
(185)

When viewed by product line predominance, the only major change appeared in the shipbuilders' recommendation that the holdback levels be reduced. Holdbacks have resulted in large claims that have remained unsettled for years.

Profit Policy Based on Cost. DoD's current profit policy is a cost-based policy, which computes the profit allowed on a contract, based on the Weighted Guidelines (WGL), as a percentage of the contractor's cost to develop and/or produce the procured item. If the contractor is able to reduce the cost of production and earns a profit greater than negotiated, the excess profit is subject to renegotiation and refund to the Government. Should the contractor incur overruns, he must absorb them out of profit.

Industry was asked if investment should be used to determine profit/fee under the WGL and, if so, to what extent. Seventy-two percent of the companies responding agreed that investment should be considered and should account for an average of 24.2% of the calculated profits. When asked if the current WGL were sufficiently flexible to provide adequate profits, approximately 70% said "No." Furthermore, 35% of the contractors said the WGL tended to depress negotiated profits.

The above industrial responses, as well as others quoted in this report, should indicate to DoD that one incentive for cost reducing investment would be to move away from a cost-based profit policy.¹⁰

¹⁰Subsequent to LMI's survey, DoD issued a new Defense Procurement Circular, DPC-76-3, dated 1 September 1976. DPC-76-3 amends the Weighted Guidelines to permit up to 10% of the profit negotiated on a contract to be based on the contractor's new investment in equipment and facilities.

Investment Preference and Policy. To determine investment preference, companies were asked if they were more willing to invest in facilities and equipment for commercial or for Defense work. More than 70% of all respondents expressed a greater willingness to support commercial business; less than 2% favored Defense investments. The data were also broken out by high-, medium- and low-percent-Defense contractors. Not a single high- or low-percent-Defense company stated a greater willingness to invest for Defense business. High-percent-Defense companies, however, were the largest percentage (43%) expressing an equal desire to invest in either area. Only 12% of the low-percent-Defense companies expressed the same attitude.

In a related question, companies were asked if DoD policies made investment in equipment for Defense business more attractive than for commercial business. The responses were all negative. Stated as a function of a company's Defense business, 77% of the high-percent-Defense and 97% of the low-percent-Defense companies thought DoD policies made investment in Defense-related equipment less attractive. The balance rated Defense and commercial investments as being equally attractive.

Labor and Production Capacity

Labor. One result of inadequate capital investment for any firm would be an increased reliance on labor. The data in the previous sections of this report show Defense oriented companies' investment in equipment to be lower than that of commercially oriented ones. One would therefore expect Defense industry's labor costs to be higher.

The respondents to our industry survey were asked to provide a breakdown of their commercial and Defense sales dollar by: direct material and related subcontracts, direct labor, indirect labor, and other.

The results are tabulated in Table 20.

An initial observation for each product group indicates that the high-percent-Defense companies have significantly higher direct and indirect labor costs as compared

TABLE 20. PERCENTAGE OF TOTAL SALES
DOLLAR FOR COMMERCIAL
AND DEFENSE PRODUCTS

	<u>Defense Orientation</u>		
<u>Commercial Products</u>	<u>Low</u>	<u>Med.</u>	<u>High</u>
Direct Material & Related Subcontracts	34.2	36.6	36.8
Direct Labor	12.1	14.0	19.1
Indirect Labor	9.9	11.0	18.1
Other	43.8	38.4	26.0
<u>Defense Products</u>			
Direct Material & Related Subcontracts	30.2	35.7	33.8
Direct Labor	14.3	21.3	21.2
Indirect Labor	10.1	12.2	15.2
Other	45.4	30.8	29.8

to low-percent-Defense firms. It is interesting to note that the median group of companies showed the only significant labor cost difference between its commercial and Defense product breakouts. This may be because they are forced to participate more actively in both sectors and hence their accounting is not biased towards one market.

It is not the intent of this analysis to imply that Defense industries are so under-invested that their labor costs are almost 50% higher than those of commercially oriented firms. Many Defense firms are integrators of other manufacturers' end items. Defense programs are also heavy consumers of engineering talent and Defense procurement specifications require endless numbers of quality control inspections and final product tests. It is assumed that some portion of the labor difference does represent individuals in these functions. However, because these functions are also performed on commercial products and on Defense products produced by commercially oriented firms, it is assumed that they are not the only reasons for Defense industries' higher labor costs.

Production. As a companion issue, and because of GAO's interest in available capacity in Defense industries, the companies answering the questionnaire were asked to provide capacity utilization data assuming a 2-8-6 peak capacity (2 shifts, 8 hours, 6 day week). The results, as a function of the companies' percentage of Defense business and as a function of weapon system product predominance, are shown in Tables 21 and 22.

TABLE 21. PERCENTAGE OF CAPACITY
UTILIZATION BY DEFENSE
ORIENTATION
(Based on 2-8-6 = 100%)

<u>Years</u>	<u>Low</u>	<u>Med</u>	<u>High</u>
1969	69.8	65.6	67.3
1971	65.2	58.2	50.8
1974	65.4	62.8	56.0

TABLE 22. PERCENTAGE OF CAPACITY
UTILIZATION BY PREDOMINANT
PRODUCT LINE
(Based on 2-8-6 = 100%)

<u>Year</u>	<u>A/C</u>	<u>Miss.</u>	<u>Ships</u>	<u>T/A</u>	<u>Ammo.</u>	<u>Elec.</u>
1969	72.2	66.2	76.7	51.2	65.6	64.6
1971	60.6	56.3	60.5	49.7	46.3	55.8
1974	61.3	61.3	71.3	39.0	48.7	62.0

Other than saying that excess capacity does exist, that there is more of it in Defense-oriented firms than in commercial firms, and that no group had returned, as of 1974, to its 1969 level, no hard conclusions can be drawn from these data. There may be a relationship between available capacity and equipment investment, but sufficient data were not available to explore this possibility.

Companies were asked to state the major causes of excess capacity in their production facilities. As one would expect, the lack of production orders was the dominant factor. A full breakout of company responses is presented in Table 23.

TABLE 23. CAUSES OF EXCESS PRODUCTION CAPACITY

	<u>Defense Orientation</u>		
	<u>Low</u>	<u>Med</u>	<u>High</u>
Lack of Production Orders	59.5	72.2	63.3
Retooling Cycle	5.7	0.0	2.3
Non-Availability of Material, Parts, or Supplier	13.1	5.8	9.9
Planned Idle	6.5	15.2	11.8
Technologically Obsolete	1.3	0.0	0.0
Shortage of Labor	5.9	6.0	4.3
Other	7.0	0.8	8.3

Military Equipment Costs

Many factors in the economy have the same effect on the prices of both Defense and commercial goods. Therefore, not all changes in the prices for military hardware can be attributed to DIB erosion. For purposes of a price analysis, it was assumed that no erosion had taken place in the civilian industrial base. To differentiate between price changes possibly caused by erosion of the DIB and those due to general market forces, price changes for Defense goods were compared to those for similar commercial goods, with prices expressed in the form of indices.

Price data were analyzed for products in the following areas: trucks, electronics, tracked vehicles (armored vehicles and heavy tractors), aircraft, and ships. All data are in the form of indices for the years 1967 to 1974.

Trucks. Truck prices rose steadily from 1967 through 1973, with the prices of military vehicles generally rising faster than their commercial counterparts. In 1974, the price increases were more pronounced, particularly for military vehicles.

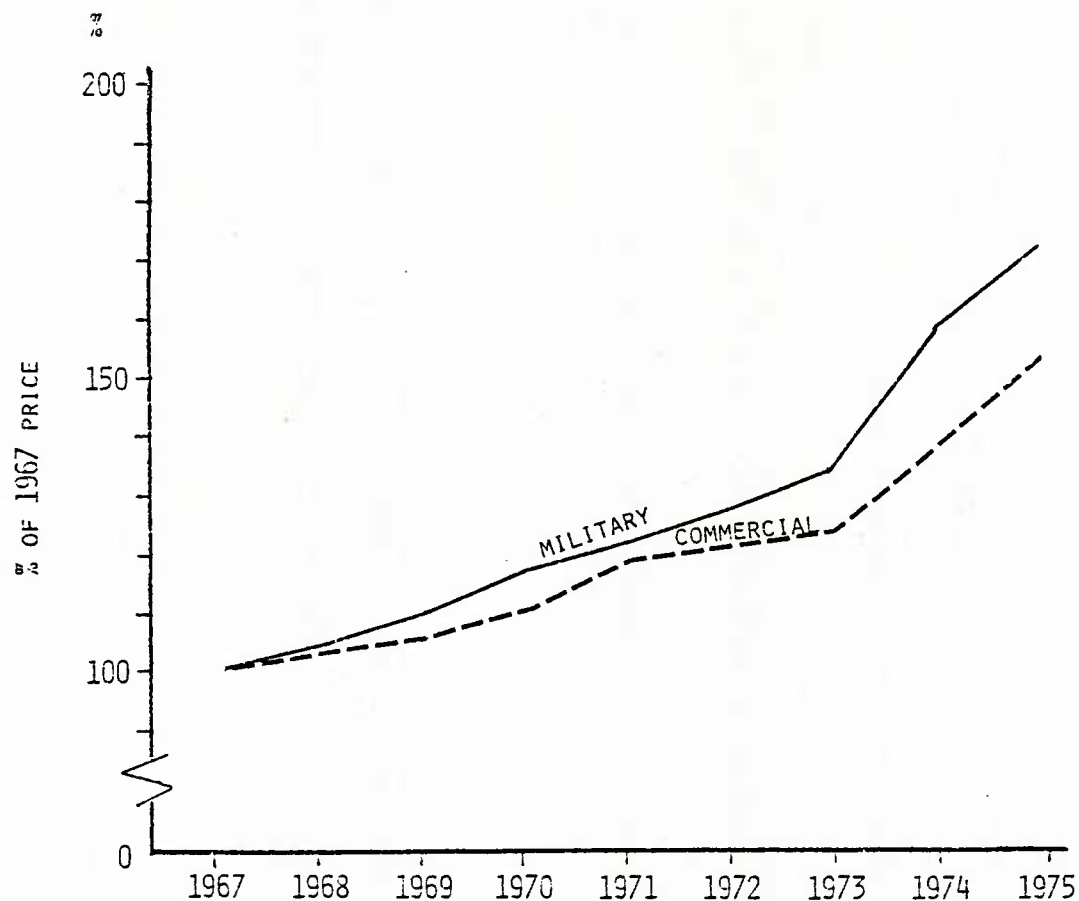
Rapid inflation in 1974, aggravated by shortages of materials, was probably responsible for the sharp rise in all truck prices. Operations in the military and civilian automobile industries are closely related, but DoD's requirements are often satisfied as an inverse function of meeting the needs of civilian buyers. TARCOM reported that there are fewer producers willing to do Defense work when there is a high demand for civilian vehicles. Conversely, the number of potential Defense suppliers increases as civilian demand decreases. This may account for the relative improvement in the military truck price situation in 1975, a year when civilian demand dropped off drastically. (See Figure 18.)

The gradual increase in military truck prices compared to civilian vehicles could indicate a gradual erosion of the DIB. If this were true, the erosion would not be due to an overall lack of efficient production facilities, but would stem from an automotive industry preference to sell its goods in the civilian sector.

Electronics. The widening gap between military and civilian electronics components intensified from 1971 to 1973 and then slowed somewhat during 1974. (See Figure 19.) The sharp rise in electronic prices since 1971 is probably not caused by DIB erosion. The requirements of sophisticated weapon systems often necessitate high research and development costs that are reflected in product prices. Because commercial components are frequently offshoots of military projects, they do not have such high research and development costs and can be sold at lower prices. The prices of military electronics are also likely to increase faster to meet more demanding and costly military specifications and testing procedures.

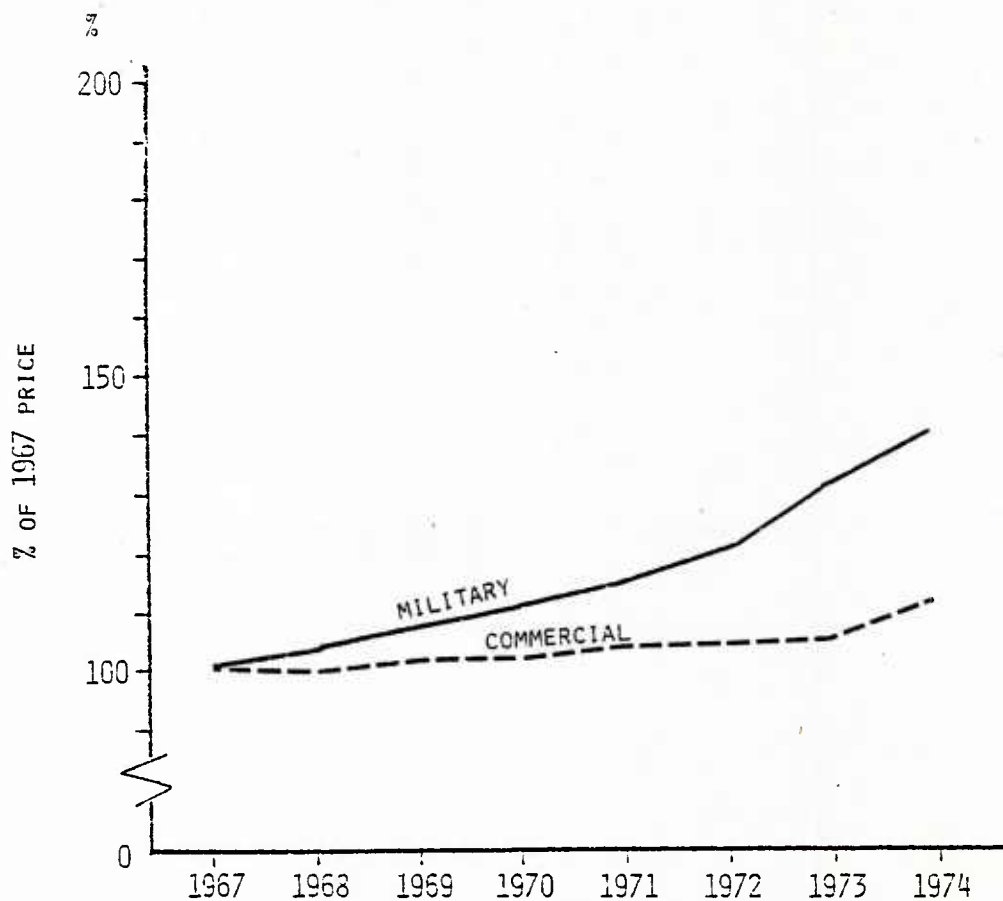
Tracked Vehicles. Military combat vehicle prices are dominated by the M60A1 tank and the M113 armored personnel carrier (APC). Our analysis was therefore based on these

FIGURE 18. COMPARISON OF PRICE INCREASES
COMMERCIAL & MILITARY TRUCKS
(1967 = 100 PERCENT)



NOTE: THE COMMERCIAL TRUCK INDEX IS A BLS INDEX FOR MOTOR TRUCKS WITH A GVW OF LESS THAN 10,000#. THE MILITARY TRUCK INDEX IS A BLS INDEX FOR GENERAL PURPOSE TACTICAL VEHICLES.

FIGURE 19. COMPARISON OF PRICE INCREASES
COMMERCIAL & MILITARY ELECTRONICS
(1967 = 100 PERCENT)



NOTE: COMMERCIAL ELECTRONICS INDEX IS THE BLS INDEX FOR ELECTRICAL COMPONENTS AND ACCESSORIES, No. 1178. THE MILITARY ELECTRONIC INDEX IS BASED ON PROPRIETARY CORPORATE DATA.

vehicles. The annual production levels for the M60 varied widely, resulting in substantial changes in the average annual prices. In order to obtain meaningful data, only data on procurements for purchases of 150 units or more were used. The movements in tank and APC prices were then compared to a price index for industrial crawler tractors of 200 HP and more, which were determined to be the closest comparable commercial product. (See Figure 20.)

The M60 tank program is a good example of how significant changes in the levels of production can affect prices and efficiency. Although the price of the M60 increased by the same factor as did large commercial crawler tractors, during the period 1967 through 1975, the annual fluctuations in the tank's unit price were considerable.

TABLE 24. M60A1 ANNUAL UNIT PRICE
(\$000's)

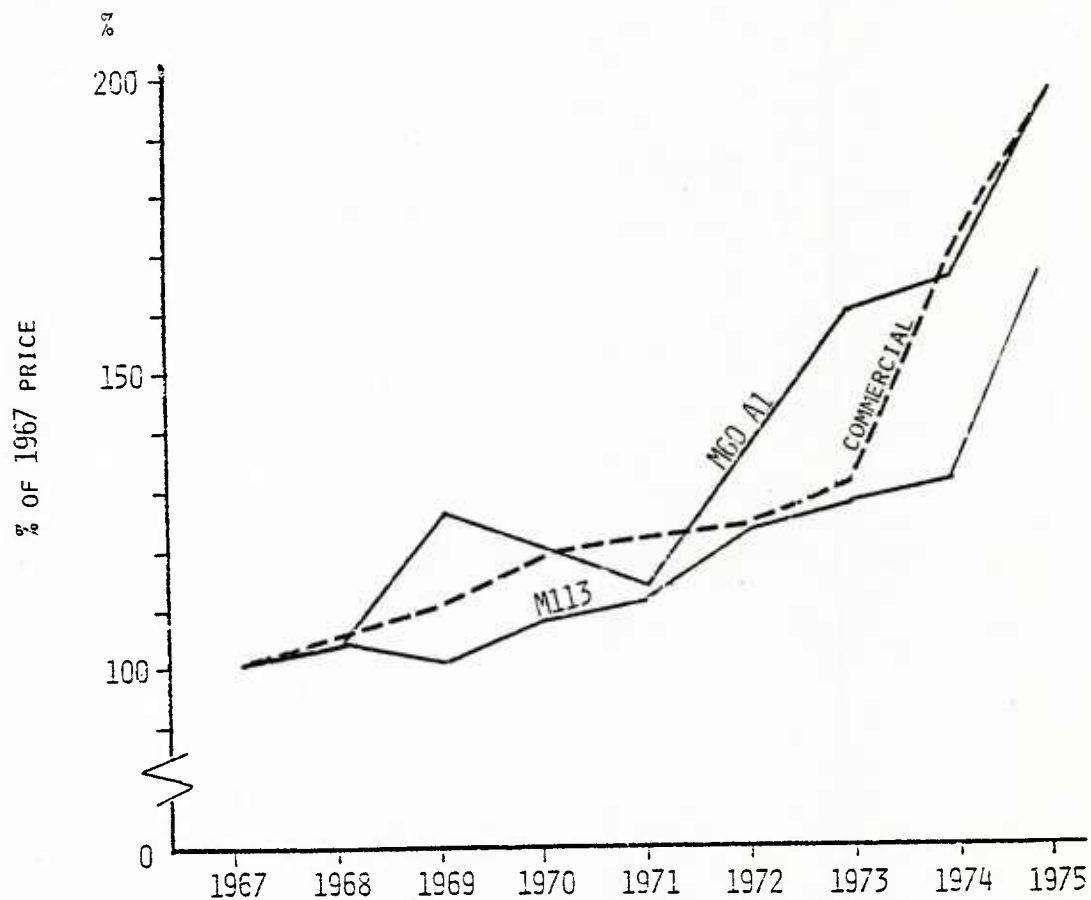
	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Avg. Unit Price	--	\$199	\$242	\$233	\$217	\$335	\$309	\$322	\$384
Number Produced	--	300	117	300	300	90	166	493	439

This sharp increase in price resulted when certain fixed costs had to be applied to fewer units. The data highlight the problems caused by restricting DoD to single-year procurements.

Aircraft. Transport aircraft is the only category where civilian and military aircraft are comparable in terms of system and price. Other military aircraft are designed to fill specific military missions and include unique sophisticated electronics and weapons packages. Furthermore, the prices of transport aircraft are more sensitive to changes over time and provide the best basis to observe changes in the DIB.

No price indices for either commercial or military transport aircraft were available from industry or the Government. As a result, we developed an index based on the prices

FIGURE 20. COMPARISON OF PRICE INCREASES
COMMERCIAL & MILITARY HEAVY TRACKED VEHICLES
(1967 = 100 PERCENT)



SOURCE: COMMERCIAL TRACTORS, BLS; M60A1 DATA FROM U.S. ARMY TARCOM
M113 INDEX FROM FMC CORP.

for the military C-130 and three commercial aircraft produced during the period 1970-1974. The results are shown in Figure 21.

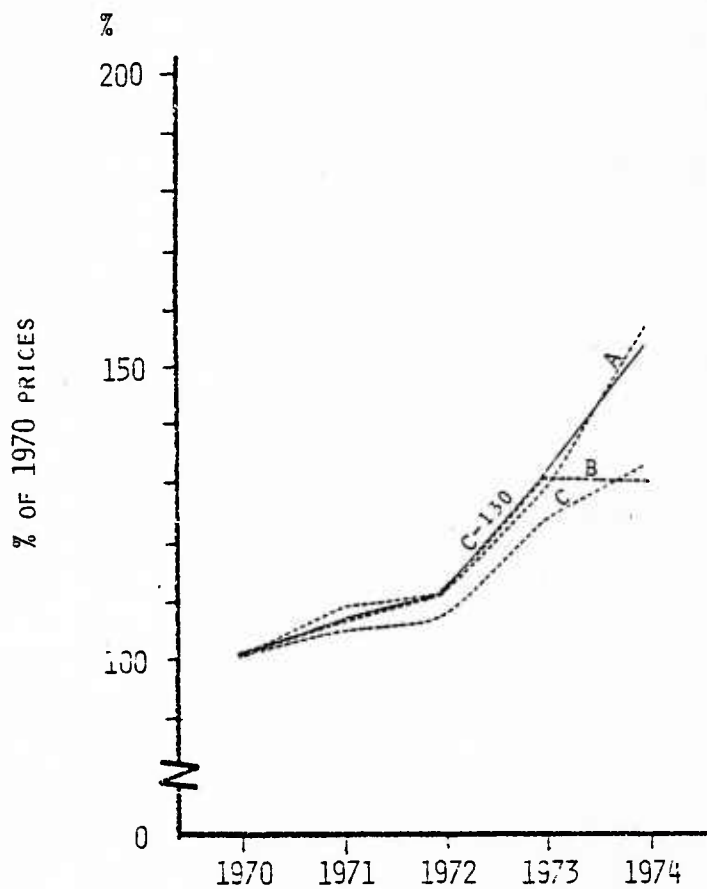
From 1970 through 1973, the average unit price of the C-130 increased at about the same rate as did the prices for commercial transports, indicating that the cost to produce military transports changed at the same rate as the commercial aircraft costs. In 1974, the prices of the C-130 and one of the commercial aircraft increased at a much faster rate than the other two commercial transports. However, there are insufficient data at this time to identify the cause of the increases.

Ships. The prices for military ships increased more rapidly than for civilian ships during the late 1960's. Since then, however, prices have increased at about the same rate. A sharp rise in prices did take place in 1974, and probably was caused by substantial increases in the costs of steel and skilled labor used in both civilian and military shipbuilding. (See Figure 22.)

While available price data do not indicate a significant difference in the productivity associated with either type of ship construction, other data presented in this study suggest that significant problems do exist in both commercial and Defense shipbuilding.

In summary, the available data do show that Defense equipment prices have increased at a greater rate than the prices of corresponding commercial items. The data do not definitely connect these increases to DIB erosion, yet it is possible that greater investment activity by the Defense industry could have kept such increases closer to the level of those in commercial industry.

FIGURE 21. COMPARISON OF PRICE INCREASES
COMMERCIAL & MILITARY TRANSPORT AIRCRAFT
(1970 = 100 PERCENT)



COMMERCIAL AIRCRAFT: A, B, C -----

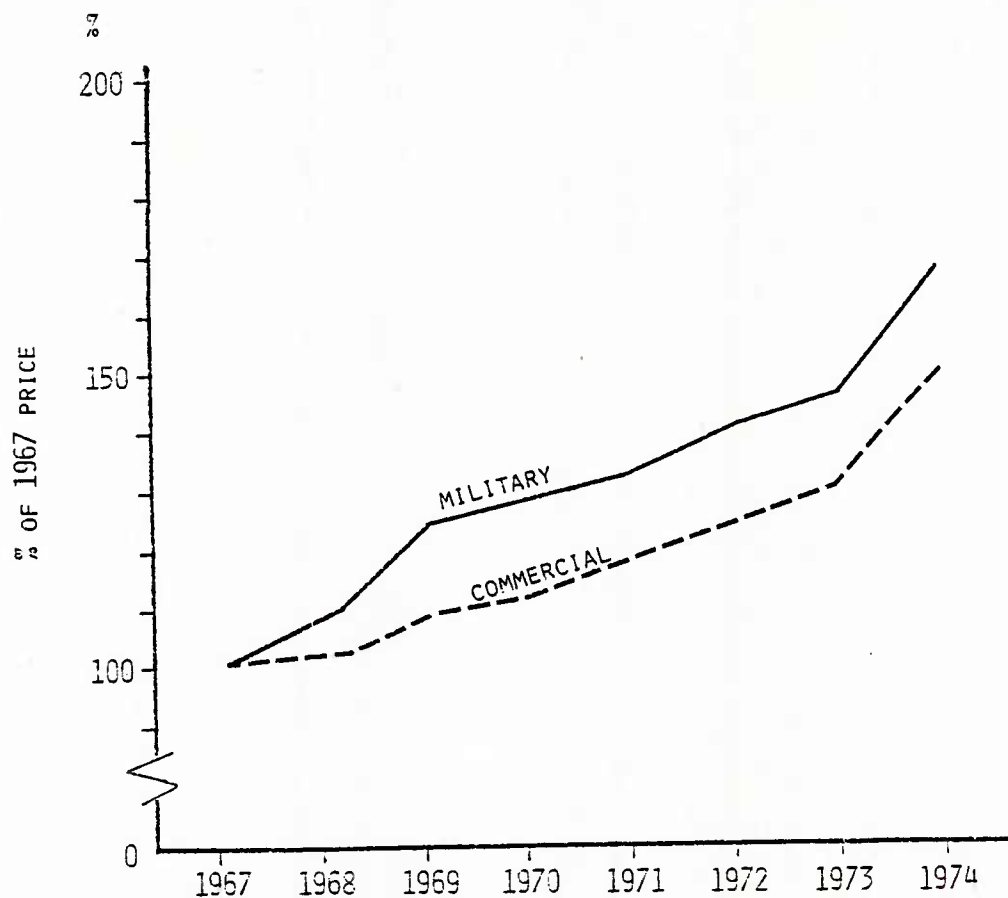
MILITARY AIRCRAFT: C-130 ———

SOURCE: COMMERCIAL INDICES BASED ON PROPRIETARY INDUSTRY DATA;
MILITARY AIRCRAFT DATA SUPPLIED BY OFFICE OF THE
COMPTROLLER, U.S. AIR FORCE.

FIGURE 22. COMPARISON OF PRICE INCREASES

COMMERCIAL & MILITARY SHIPS

(1967 = 100 PERCENT)



SOURCES: COMMERCIAL DATA SUPPLIED BY BLS; MILITARY DATA SUPPLIED BY U.S. NAVY.

IV. FINDINGS AND CONCLUSIONS

Diversity of the DIB

The DIB is not homogeneous. There are marked differences in the structure of its component sectors, such as Ships, Aircraft, and Ammunition; companies within a sector can differ substantially with respect to such factors as size, investment policy, and diversity of product mix. Still, those companies deriving the majority of their sales from Defense business do exhibit similar behavior, which contrasts significantly with that of companies deriving only a minor share of their sales from the DoD.

Companies whose business is derived mostly from commercial sales constitute an important part of the DIB; approximately 50% of the Defense hardware procurement dollar goes to such contractors. Those companies, however, regard Defense orders primarily as supplements to their principal markets. They are unlikely to adjust their business strategies significantly in response to changes in Defense procurement requirements and regulations. In general, commercially oriented companies' interest in Defense sales depends on the overall level of business activity. They may seek additional DoD business to employ otherwise unused capacity in times of economic stagnation or recession. In good times, though, if they perceive the costs or difficulties of doing business with DoD as excessive or procurement regulations as onerous, they may strive to minimize Defense sales or even drop out of the DIB altogether. Data on the number of companies that have taken the latter course were not available, but the percentage of Defense business done by commercially oriented companies, relative to total sales, dropped from more than 10% in 1967 to less than 5% in 1974.

High-percent-Defense contractors normally do not have that option. Their existence is dependent on orders from the Defense customer. Although their corporate objectives are in theory similar to those of other private companies, their behavior is significantly

different. Frequently, they will accept a low ROI, or even a non-catastrophic loss, to maintain or increase Defense sales. Moreover, the efforts of Defense oriented companies to diversify their markets over the period covered by this report have not seemed markedly successful overall. Their commercial sales rose only from 16% to 22% of total sales between 1968 and 1974.

Since high-percent-Defense companies must be sensitive to changes in DoD procurement incentives and penalties in order to survive, they are the element of the DIB on which DoD leverage can most effectively be exerted on such matters as capital investment for enhanced productivity and reduced cost. Incentives must, however, be tailored to the differing problems of the various sectors and even to specific members of the DIB.

Trends in Product Demand

In the DIB, as in all economic sectors, the volume of present and forecast product demand is one of the most significant factors influencing management decisions. On an overall basis, the demand trend has been unfavorable for the period covered by this report, partially as a result of the termination of combat operations in Indochina. In current dollars, a 16% drop in the value of DoD prime contracts from 1968 through 1974 was more than offset by a sharp rise in FMS. However, that was also a period of marked inflation, with price index rising from 100 to 163 between 1968 and 1974. In constant dollars, the change appears decidedly different—a decline of more than 30%.

- The 30% decline in demand did not occur uniformly across all sectors of the DIB. The share of total awards represented by Ships doubled from 8% to 16% between 1967 and 1975, and the increase in their dollar value virtually offset the impact of inflation. In contrast, Ammunition procurements declined precipitously in both current and constant dollars as a result of the end of the Vietnam War. Ammunition awards represented 19% of total procurements in 1969, but only 6% in 1975. Aircraft, Missiles, Vehicles, Weapons,

and Electronics procurements all experienced slight growth in current dollar value as a consequence of increased foreign demand; but their constant dollar trend has been downward.

- Demand for military hardware has been volatile over the period covered by this report. This is especially so for foreign sales, in which procurements in the Ships category jumped from 2% to 20% of total foreign demand between 1973 and 1975. However, the DoD market has also experienced significant shifts over relatively brief periods. For example, Ships procurements rose in terms of current dollars from \$2.1 billion in FY 1973 to \$3.5 billion in FY 1975. Ammunition procurements declined from \$2.2 billion in FY 1973 to \$1.3 billion in FY 1975.

- Seventy-one percent of the low-percent-Defense contractors surveyed indicated that, on an overall basis, Defense business was less stable and less predictable than commercial business. That perception was attested by analysis of the deviation of annual sales from sales trend lines for the companies. The average deviation of their commercial sales from the trend line was approximately 7%, while for Defense sales it exceeded 18%.

- A substantial majority of both high- and low-percent-Defense contractors (64% and 70%, respectively) expect the Defense share of their total business to decline over the next five years.

Profitability of Defense Business

This analysis of the profitability of Defense business is the latest in a series of Logistics Management Institute (LMI) examinations on that subject.¹ It focuses on ROI and ROA, as well as Return on Sales. Each of the previous studies indicated lower profitability on Defense business than on commercial business and raised questions about

¹Study of Profit or Fee Policy, LMI Task 62-14, 15 January 1973 (AD 472965).
Defense Industry Profit Review, Vols. I and II, LMI Task 66-25, November 1967 (AD 664700, 664701).
Defense Industry Profit Review, LMI Task 69-1, March 1969 (AD 685071).
Defense Industry Profit Review - 1968 Profit Data, LMI Task 69-27, March 1970 (AD 703303).

the willingness of investors to continue risking their funds in the DIB. The results of this study generally support the findings of its predecessors.

- The commercially oriented companies indicated they sought approximately 14% return on Defense sales before taxes - just as they did for commercial business. In contrast, the high-percent-Defense contractors anticipated no more than 10.5%. Actually, both groups achieved approximately the same result, 3.5 to 4% return on Defense sales.

- The total profit to sales ratios achieved by the high-percent-Defense manufacturers averaged only slightly more than 4%, in comparison with nearly 9% for the low-percent-Defense firms.

- ROI for the Defense oriented businesses was lower than that for the commercially oriented ones in each year. Over the whole period, the former averaged 8.8% in comparison to 12.7% for the latter.

- The rate of return earned on total company assets (ROA) also indicates that the commercially oriented firms did better. In all years except 1972, the ROA for this group was higher than that of the high-percent-Defense contractors. Over the entire period, the former averaged an 8.2% ROA in comparison with 5.9% for the latter.

- Within the Defense-dominated sector, both the ROI and ROA of small companies were much higher than those earned by the large companies (in fact, frequently exceeding the return achieved by commercially oriented concerns). That difference appears to be attributable largely to heavy utilization of Government-owned equipment by small Defense oriented firms.

- In general, a prudent management policy favors utilization of currently available assets for production of low profit items and reserves new investment for those areas that have historically shown the best ROI and ROA. The examination of sales to assets ratios indicates that high-percent-Defense contractors practice close asset management. As a

group, they generated more than double the sales to assets ratio of the low-percent-Defense firms (2.39 as contrasted to 1.10).

Investment in the DIB

As in all manufacturing activities, prudent investment in capital goods is the key to increased productivity in the DIB. Nevertheless, substantial evidence exists that Defense oriented contractors have in fact invested in new equipment at a lower rate than their commercially oriented counterparts during the period covered by this report.

- In every year from 1967 through 1974, commercially oriented concerns had a higher ratio of new equipment investment to equipment depreciation than did companies with high percentages of Defense sales. When averaged over the entire period, the difference was 17%.

- The ratio of equipment net book value to sales for commercially oriented concerns exceeded that for high-percent-Defense companies by a wide margin. Even after adjustments reflecting the latter's use of Government-owned facilities and leased equipment, there was still a spread in favor of the commercially oriented firms.

- More than 70% of the companies surveyed expressed greater willingness to make capital investment in commercial business than in Defense business. Less than 2% preferred investment in Defense work.

- Data from the industry survey indicate that high-percent-Defense companies may be considerably more labor-intensive than commercially oriented companies. A breakdown of the sales dollar among material, direct labor, indirect labor and other costs shows the labor costs of the high-percent-Defense manufacturers to be nearly a third greater than those experienced by the commercially oriented companies. Some portion of this difference may be attributable to the special costs of doing Defense business, such as elaborate quality control inspections and tests. Still, the fact that the labor spread between high and low-percent-Defense manufacturers is almost as large for their

commercial products as for their military items suggests a difference in corporate attitudes toward capital/labor trade-offs.

- Recent DoD action to provide profit incentives under the provisions of Defense Procurement Circular (DPC) 76-3² may stimulate contractor interest in cost-reducing investment for Defense production. It seems likely, however, that further policy initiatives along the lines suggested in Investment Policy for Cost Reduction,³ will be required, in order to protect the contractor adequately against the risks of incurring high fixed charges in the face of relatively unstable and unpredictable demand.

DIB Perceptions of the Defense Customer

The responses to LMI's questionnaire revealed that, in general, the DIB considers the Defense customer a difficult client, who often uses his monopsonistic powers inefficiently and unfairly to the detriment of industry's interests and ultimately of those of the Government itself. These perceptions may be at least partially erroneous, but there is no reason to suspect their sincerity. The presumably more dispassionate money managers surveyed for LMI by The Conference Board also took a negative view of Defense as a customer, strongly favoring investment in commercially oriented firms.⁴ The more important observations made in response to LMI's questionnaire are summarized in the following paragraphs.

- Companies doing Defense business incur much Government interference in their management as well as the imposition of excessive and expensive administrative and technical controls. In this connection, industry estimated that the cost of doing Defense business, at both the prime and subcontract levels, is more than twice as great as that associated with commercial contracts.

²See Profit '76 Summary Report, Department of Defense, 7 December 1976.

³Report on LMI Task 76-9, 30 December 1976.

⁴The Defense Industry: Some Perspectives from the Financial Community, Conference Board Report 693 (New York: The Conference Board, 1976).

- The uncertainty of future business as a result of single-year funding was of particular concern to high-percent-Defense contractors. They stated that they were denied planning visibility while being forced to risk their own capital for long lead time items that would be needed only if anticipated procurements materialized. Seventy-eight percent of all industrial respondents felt that Defense business was riskier than commercial business. Two-thirds of the Defense procurement officials queried in connection with the Profit '76 study agreed with them.⁵

- The low profitability of Defense business was another recurrent theme. Sixty-nine percent of the questionnaire respondents said that the Weighted Guidelines (WGL) approach⁶ is not sufficiently flexible to provide adequate profit. More than a third of them reported that the WGL, as generally applied, tend to depress negotiated contractor profit; 46% said that they have no effect; and only 19% stated that they increased profit.

- All industrial respondents believed that the cost-based DoD procurement system pressured Government contracting officers to keep negotiated profit down. A substantial majority of the Government contracting officers surveyed agreed with that view.

- Closely allied to the profitability issue were industry grievances over the Armed Services Procurement Regulation non-allowability of certain costs, such as interest. In addition, it was claimed that depreciation allowances for new investments were inadequate and that industry was often denied an adequate share of cost-savings from investment in productivity.

- Industry also cited a number of procurement practices which it perceived as unfair: permitting buying-in, restricting bids to "qualified bidders," violating constraints on access to contractor information in competitive procurements, using excessively long periods to evaluate proposals and to negotiate contracts, and calling for "Best and Final Offers."

⁵Profit '76 Summary Report, Exhibit II, Pages III-24 to III-31.

⁶Armed Services Procurement Regulation 3-808.

So long as the DIB holds such views, members who can will lessen their reliance on the Defense market. It should also be anticipated that they will be hesitant to incur, at their own risk, substantial fixed charges for new investment in capital goods for Defense work.

Productive Capacity of the DIB

In the face of declining Defense hardware demand, below-average profitability and the litigious relationship that has prevailed between the Government and significant elements of the DIB, it would be surprising if corporate decision-makers had not striven to diversify into more rewarding fields or, in some cases, to cease competing for Defense business. This has already occurred to some degree among low-percent-Defense contractors.

There is also no question that the departure of some companies from the DIB can pose, or already has posed, procurement problems for the military services. For example, after M-60 tank hull and turret production facilities had been cut back to conform to a 30-unit per month procurement program, the Army experienced great difficulty in inducing contractors to expand their foundry capacities enough to increase production to 100 units per month to compensate for the losses resulting from the 1973 Arab-Israeli War. As a last resort, the Army had to fund equipment to activate unused foundries under the constraints of the Environmental Protection Agency and the Occupational Safety and Health Administration. This added significantly to the cost of the M-60 tank program.

It would be unreasonable to expect any company to maintain facilities and a skilled labor force at its own expense to meet a possible surge requirement or an increase in demand which is suspect of being short-lived. If the Government wishes to maintain excess capacity in the DIB as a hedge against the uncertainty of future requirements, it must expect to pay a premium for that insurance.

In actuality, from 1967 to 1974 there was considerable unused capacity in all segments of the DIB except Ships.⁷ Moreover, the shipbuilding industry's new commercial orders have diminished to such an extent that there may be substantial excess capacity for all but nuclear ship construction by 1978 or 1979. Manufacturers in the Aircraft, Missiles, and Electronics categories indicated a 61-62% utilization rate, those in the Ammunition category 49%, and those in the Tank/Automotive category 39%, on the basis of a peak capacity of two eight-hour shifts, six days a week.

Changing DIB Composition

High-percent-Defense manufacturers have tried to expand into the commercial marketplace, but have had little success in doing so. They still rely on the Armed Services for nearly 80% of their business and derive some additional portion of their revenues from direct foreign sales of military items. In contrast, the commercially oriented companies in the DIB drastically reduced their dependence on Defense business from 10.5% of their total sales in 1968 to less than 5% in 1974.

Defense business has thus become more concentrated in the high-percent-Defense companies. The trend might well continue because companies with low market shares can more easily entertain the option of withdrawing from the market when problems arise. And special procurement problems, such as those in the tank forgings case, have been more common among low-percent-Defense firms.

Conclusions

1. The uniform application of a single set of procurement policies, incentives, and penalties across the diverse spectrum of corporations comprising the DIB is likely to produce less than optimal results.

2. Firms deriving the greater part of their resources from Defense procurement contracts are the portion of the DIB that can most effectively be influenced by changes in

⁷See, for example, Joint Department of Defense/Office of Management and Budget Aircraft Industry Capacity Study, DW 77-1, January 1977.

Defense procurement incentives and penalties. Despite their articulated dissatisfaction with the profitability of their Defense business, they represent a stable element. There are indications that, on an overall basis, their primary interest lies in maintaining or increasing their sales in the Defense market rather than achieving a high return on sales.

3. Procurement policies designed to stimulate greater participation in the DIB by commercially oriented firms should be based on the recognition that these concerns will seek or avoid Defense business according to conventional economic considerations – particularly the relative profitability of Defense business in comparison to their commercial sales. They are unlikely to make significant adjustments in their business strategies to conform to Defense procurement objectives and regulations.

4. The decline in Defense procurement demand from 1967 to 1974 has unavoidably had an adverse effect on the interest of commercially oriented firms in Defense contracts.

5. The low profitability of Defense business relative to that of commercial sales has motivated low-percent-Defense contractors to concentrate on expansion of their commercial markets.

6. Companies dependent for their survival on Defense contracts manage their assets closely and limit new investment as a hedge against the uncertainties of future Defense business. Their response to the investment incentives of DPC 76-3 is likely to be passive without adequate protection against the risk of incurring new fixed charges in the face of what they perceive as relatively unstable and unpredictable demand.

7. Perceived ineffectiveness and inequity in implementation of procurement policy diminish confidence in the Defense procurement process and foster an adversarial DoD/Industry relationship. An example is reaction to the Weighted Guidelines, which a majority of DIB companies believe to be applied so as to be counterproductive or of no effect in assuring adequate profitability.

8. Because of declining and unstable demand, low profitability, and industry perception of the DoD as a difficult customer, some erosion of the DIB has been inevitable. One sign of this erosion is the low rate of DIB investment in productivity-enhancing capital goods. The consequent reliance on labor-intensive manufacturing techniques probably has had an adverse effect on the costs of Defense systems.

9. Sufficient capacity to meet programmed demand still exists in most sectors of the DIB, but profit-motivated concerns cannot be expected to maintain, at their own risk, a capability for infrequent and temporary surges in production. If any of the Military Services needs to insure itself against such contingencies, it must expect to pay the premium.

10. The most ominous indicator of possible further erosion of the DIB is the fact that commercially oriented concerns now rely on Defense contracts for only 4.8% of their total sales. So small a share of total business could be dropped without significant impact on corporate financial performance in the event of poor Defense business profitability or other dissatisfaction with defense customers.

APPENDIX A. DEFENSE INDUSTRIAL BASE SURVEY

INTRODUCTION

This survey is a part of the Department of Defense Profit '76 Study which examines DoD's procurement, finance, and profit policies. The data obtained will be used by the Logistics Management Institute (LMI) under its contract to assess the strength and weaknesses of the Defense Industrial Base (DIB). A reply from your company, as one of 245 statistically selected companies, is considered critical to proper representation of your industry group as well as the DIB as a whole. However, your response is voluntary.

Note that your company is not identified on this survey except through an LMI Control Number. Your submission will be available only to the DIB study team within LMI. Only aggregated data in support of LMI findings and conclusions will be disclosed to the DoD. Your completed questionnaire will be destroyed after the data are extracted, or if you prefer, returned to you.

This survey is in two parts--a questionnaire and a data spread sheet entitled "Defense Industrial Base Survey: Corporate Financial Data." Most of the financial data requested on the spread sheet are already in your prepared financial reports or prior government submittals. Our preference is for actual data but when such data are not available, experienced judgment (estimates) will suffice. Please return the completed survey forms to LMI within two weeks of receipt or, at the latest, by February 9, 1976, along with copies of your 1974 and 1969 annual reports.

Mr. Harold E. Bertrand or, in his absence, Mr. Perkins Pedrick, at LMI, telephone (301) 229-1000, are available to respond to any questions you may have about the survey.

The survey has been approved by the U. S. Office of Management and Budget. The OMB approval number is 22-S75009.

Please complete the following.

Point of contact for LMI inquiries regarding data supplied in questionnaire:

Name: _____ Title: _____

Telephone No. _____

Disposition of Response: Destroy ☐ Return ☐

DEFENSE INDUSTRIAL BASE SURVEY

DEFINITIONS OF TERMS

In the definitions listed below, sales and profits are annual, using each company's fiscal year. Investment amounts are as of the end of each company's fiscal year.

- (1) Total Company Sales - Sales reported in annual financial statement.
- (2) Defense Sales - Sales from contracts and purchase orders issued by the Department of Defense, including Foreign Military Sales (FMS), and from subcontracts flowing from prime defense contracts.
- (3) Other U. S. Government Sales - Sales from contracts and purchase orders issued by Departments and Agencies of the U. S. Government other than Defense, and from subcontracts flowing from such contracts.
- (4) Commercial Sales - Sales from contracts and purchase orders from all other sources, to include direct company to foreign country sales and state and local government sales.
- (5) Renegotiable Sales - That portion of total company sales (see 1, above) which would be considered renegotiable on your renegotiation submission (Form RB-1).
- (6) Renegotiable Sales from Prime Contracts - That portion of renegotiable sales (5, above) which would be reported on Line 1a. of Form RB-1.
- (7) Profit - Income before income-related taxes and investment credits as reported on financial statements.
- (8) Renegotiable Profit Before Taxes - Profit calculated on the same basis as profit (see 7, above) but only for those sales defined as renegotiable. Allocation of costs between renegotiable and non-renegotiable sales not otherwise allocated should be done consistent with those procedures used by you in your Renegotiation Board submission.
- (9) Government Equipment in Use - The estimated market value of government-owned equipment in place in your facility and used during the year.
- (10) Short Term Borrowing - Those funds borrowed on a short-term (one year or less) basis. Exclude long term debt due in the current year.
- (11) Unallowable Costs - The aggregate of all costs defined as unallowable by government regulations (e.g., ASPR, FPR), and by government audit agencies, excluding interest expense. This should not include costs not recoverable due to overruns on contracts.

- (12) Total Inventories - The sum of Raw Material, Net Work in Process, and Finished Goods.
- (13) Interest Expense - As included in financial statements.
- (14) Depreciation - As included in financial statements.
- (15) Return on Investment (ROI) - Return before tax. Investment is to include equity plus long-term debt.
- (16) Imputed Cost of Capital - Total assets less progress payments times a "risk free" interest rate.
- (17) SIC Code - Standard Industrial Classification Code, 1972 base.
- (18) Investment Tax Credit - The investment tax credit deducted from Federal Income Tax.

DEFENSE INDUSTRIAL BASE SURVEY

1. To your knowledge on what portion of your DoD contracts over the past 5 years has the Weighted Guidelines (WGL) been applied by Government personnel? _____% (Annual Average) Has it been increasing _____, decreasing _____, or staying about the same _____?

2. What do you consider to be your long-term minimally acceptable pre-tax profit in each of the following categories: (assume inflation to be less than 6 percent)?

As % of Sales

- a. _____% on defense work
b. _____% on commercial work

As % ROI

- c. _____% on defense work
d. _____% on commercial work

3. If your company's profit minimums (as indicated in Question No. 2, above) for defense are different than for commercial work, please explain why they differ.

(continue on back of this page if necessary)

4. Your defense market is more _____, equally _____, less _____ stable than your commercial market.

5. Your defense business is more _____, equally _____, less _____ predictable than your commercial business.
6. What differences, if any, are there in your profit policy when you negotiate with your subcontractors under (a) defense contracts, and (b) commercial contracts?
- _____
- _____
- _____
7. DoD policies make investment in industrial equipment for your defense business more _____, equally _____, less _____ attractive than for commercial business.
8. Is your company's return on capital criteria used to justify new investments for defense business different from that for commercial business?
- No _____ Yes _____ If yes, explain.
- _____
- _____
- _____
- _____
9. Has your DoD business made it easier _____, no effect _____, more difficult _____, to obtain funds from financial institutions?
10. Is your corporation more _____, equally _____, less _____ willing to invest in facilities and equipment to support commercial work than defense work?
11. On the average what percentage of a total contract's value is financed by progress and advance payments for each of the following types of contracts
- a. _____% on your commercial contracts,
- b. _____% on your defense prime contracts, and
- c. _____% on your defense subcontracts

12. If the DoD were to implement the following policies, would it cause you to increase your capital investment program? Please rank your "Yes" answers.

	<u>Yes</u> (rank)	<u>No</u>
a. Allowing interest	_____	_____
b. Allowing imputed cost of capital in lieu of interest	_____	_____
c. Allowing accelerated depreciation	_____	_____
d. Increasing negotiated profit rates on all new contracts by 1 to 2 percentage points	_____	_____
e. Allowing as a termination cost the undepreciated portion of program-peculiar production assets	_____	_____
f. Allowing savings from investment in cost-saving equipment to continue to be realized on subsequent contracts.	_____	_____

13. Please provide your planned capital investment program (in dollars) for the years shown and your estimate of the defense portion.

	<u>FY75</u>	<u>Def %</u>	<u>FY76</u>	<u>Def %</u>	<u>FY77</u>	<u>Def %</u>
a. Production equipment	_____	_____	_____	_____	_____	_____
b. Facilities	_____	_____	_____	_____	_____	_____
c. Other equipment	_____	_____	_____	_____	_____	_____

14. List, in order of priority, the 4 or 5 DoD procurement policies or practices which you believe are the most detrimental to DoD's objective of having a high productivity, responsive industrial base.

15. List, in order of priority, five actions DoD could take which would result in your making greater corporate investment in cost-saving industrial equipment and modernization of facilities utilized in the performance of defense contracts.

(continue on back of this page if necessary)

16. From your line of business reporting information, please provide the percentage of total company sales for the 4 or 5 most significant areas of business (as defined by 4 or 5 digit SIC Codes) for your defense and commercial business.

	<u>1969</u>		<u>1971</u>		<u>1974</u>	
	<u>SIC</u>	<u>%</u>	<u>SIC</u>	<u>%</u>	<u>SIC</u>	<u>%</u>
	Commercial		Commercial		Commercial	
a.	_____	_____	_____	_____	_____	_____
b.	_____	_____	_____	_____	_____	_____
c.	_____	_____	_____	_____	_____	_____
d.	_____	_____	_____	_____	_____	_____
e.	_____	_____	_____	_____	_____	_____
f.	Other Commercial	_____	Other Commercial	_____	Other Commercial	_____
	Defense		Defense		Defense	
g.	_____	_____	_____	_____	_____	_____
h.	_____	_____	_____	_____	_____	_____
i.	_____	_____	_____	_____	_____	_____
j.	_____	_____	_____	_____	_____	_____
k.	_____	_____	_____	_____	_____	_____
l.	Other Defense	_____	Other Defense	_____	Other Defense	_____
Total		<u>100%</u>		<u>100%</u>		<u>100%</u>

17. Please provide the following as percentages of total company sales. Actual data is preferred. If estimated please note by (e).

	<u>1969</u>	<u>1971</u>	<u>1974</u>
a. Defense	_____	_____	_____
b. Other Government	_____	_____	_____
c. Commercial	_____	_____	_____
Total Sales	100%	100%	100%

18. Over the next 5 years the company expects to have _____% of its business from Defense, prime and subcontracts.

19. What percent of your sales dollar is:

<u>COMMERCIAL</u>			
	<u>1969</u>	<u>1971</u>	<u>1974</u>
a. Direct material, and related subcontracts	_____	_____	_____
b. Direct labor	_____	_____	_____
c. Indirect labor	_____	_____	_____
d. Other	_____	_____	_____
Total	<u>100%</u>	<u>100%</u>	<u>100%</u>

<u>DEFENSE</u>			
	<u>1969</u>	<u>1971</u>	<u>1974</u>
e. Direct material, and related subcontracts	_____	_____	_____
f. Direct labor	_____	_____	_____
g. Indirect labor	_____	_____	_____
h. Other	_____	_____	_____
Total	<u>100%</u>	<u>100%</u>	<u>100%</u>

20. Which of the following criteria do you use in determining rewards (e.g., salary increases, bonuses, promotions) for your executives and managers? Please rank.

- a. Success in Developing Staff _____
- b. Volume of Sales _____
- c. Return on Investment _____
- d. Profit as Percent of Sales _____
- e. Other _____
- f. Other _____

21. For the years 1969, 1971 and 1974 please provide the average age of employees in each of the following employee classifications:

	<u>1969</u>	<u>1971</u>	<u>1974</u>
a. Engineering & Scientific	_____	_____	_____
b. Salaried Production	_____	_____	_____
c. Hourly Production	_____	_____	_____

22. Please list the actual number of positions available at the start of each year (P), the separations (S) and additions (A) throughout the year for:

	<u>1969</u>			<u>1971</u>			<u>1974</u>		
	<u>P</u>	<u>S</u>	<u>A</u>	<u>P</u>	<u>S</u>	<u>A</u>	<u>P</u>	<u>S</u>	<u>A</u>
a. Engineering & Scientific	_____	_____	_____	_____	_____	_____	_____	_____	_____
b. Salaried Production	_____	_____	_____	_____	_____	_____	_____	_____	_____
c. Hourly Production	_____	_____	_____	_____	_____	_____	_____	_____	_____

23. Please identify any DoD procurement policies or practices which you believe have caused any of your defense suppliers to cease competing for your defense business:

24. Have your defense subcontractors/suppliers obtained increasing _____, same _____ lower _____ profit/fee rates from you compared to 10 years ago?
25. Have your defense subcontractors/suppliers obtained greater _____, same _____ lower _____ financing (advance and/or progress payments, etc.) from you over the past 5 years?
26. Have your defense subcontractors/suppliers obtained lower _____, same _____ higher _____ risk contracts (cost-reimbursement, escalation clauses, etc.) from you over the past 5 years?
27. Have you had to initiate any incentive programs to stimulate investments or bidding by your suppliers? Yes _____ No _____ If so, what kind:
- _____
- _____
- _____
28. List the top four parts, supply or material categories for which you currently have an inadequate number of suppliers. What were the top 4 one year ago?
- | | Now | | One Year Ago |
|----|-------|----|--------------|
| a. | _____ | e. | _____ |
| b. | _____ | f. | _____ |
| c. | _____ | g. | _____ |
| d. | _____ | h. | _____ |
29. For purposes of this study, peak production capacity is being defined as two shifts, eight hours each, six days per week, utilizing your existing facilities and major equipment, retaining your current product mix, assuming an unlimited labor pool. Under this definition at what percent of peak capacity did you operate for the following years:
- a. 1969 _____% b. 1971 _____% c. 1974 _____%

30. If the 1974 utilization rate was less than 100%, please indicate the reasons below by percent.
- a. Lack of production orders _____ %
 - b. Retooling cycle _____ %
 - c. Nonavailability of material, parts or supplies _____ %
 - d. Planned idle _____ %
 - e. Technologically obsolete _____ %
 - f. Shortage of labor _____ %
 - g. Other _____ %
31. What percentage of your business comes from subcontracts? a. less than 10% _____.
b. 10 - 49% _____. c. 50% or more _____.
32. Please rank the following for total cost of doing equivalent business. Rank most costly as #1: a. DoD Prime _____; b. DoD Subcontract _____; c. Commercial _____.
33. Do you subscribe to any service for the purpose of keeping current on Defense procurement policy? Yes _____. No _____.
34. Should Investment be used in determining negotiated profit/fee under the WGL? Yes _____ No _____
35. If yes, what percentage of the total negotiated profit/fee do you recommend to be based on investment? _____ %
36. Negotiated profit rates for each contractor should be negotiated on an annual basis rather than on a contract-by-contract basis. Agree _____ Disagree _____
37. Defense business has greater _____, same _____, lower _____ cost risk than your commercial business.
38. Your realized profits on FFP defense contracts are higher _____, same _____, lower _____ than those on cost-type defense contracts.

39. The profits negotiated on your current contracts were primarily affected by (Rank 1, 2, 3): prior negotiations (____); prior technical/production performance (____); Other _____
40. The DoD procurement system puts much pressure on government contracting officers to keep negotiated profits down. Agree _____ Disagree _____
41. The current Weighted Guidelines approach is _____, is not _____ sufficiently flexible to provide adequate profits to the majority of contractors.
42. The Weighted Guidelines tend to increase _____, have no effect _____, depress _____ negotiated contractor profits.
43. DPC 107 (Contractor Capital Employed Policy) was too complicated to implement at the working level. Agree _____ Disagree _____ Don't know _____
44. If DPC 107 was applied, your defense profits would increase _____, decrease _____, stay the same _____ Don't know _____
45. DoD requirements for your products, in units, have declined _____, remained the same _____, increased _____, over the past 5 years.
46. The technical complexity of your products procured by the DoD has declined _____, remained the same _____, increased _____ over the past 5 years.

DEFENSE INDUSTRIAL BASE SURVEY: CORPO

FORM 10-68-11
2-70 20-20-11-11

	1	2	3	4	5	6
	Units	1967	1968	1969	1970	1971
1. Total Company Sales	\$					
2. Total Renegotiable Sales ¹	\$					
3. Renegotiable Sales from Prime Contracts	\$					
4. % of Renegotiable Sales Resulting from DoD Contracts ⁴	%					
5. % of Renegotiable Sales Resulting from Sole Source DoD Contracts ⁴	%					
6. Profit Before Income Related Taxes (Total)	\$					
7. Renegotiable Profit Before Taxes ³	\$					
8. Total Unallowable Costs Excluding Interest Expense ³	\$					
9. Net Book Value - Equipment	\$					
10. Net Book Value - Facilities & Land	\$					
11. Annual Depreciation - Equipment	\$					
12. Annual Depreciation - Facilities	\$					
13. Annual Investment in Equipment	\$					
14. Annual Investment in Facilities	\$					
15. Annual Lease Cost - Equipment Not Capitalized (Not in item 9)	\$					
16. Annual Lease Cost - Facilities & Land Not Capitalized (Not in item 10)	\$					
17. Government Equipment in Use ³	\$					
18. Total No. of Employees	Nos.					
19. Total No. of Engrs. & Scientists	Nos.					
20. Total No. of Production Employees	Nos.					
21. Short Term Borrowing	\$					
22. Unliquidated Progress Payments by U.S. Govt. ⁵	\$					
23. Total Inventories	\$					
24. Total Current Assets	\$					
25. Total Current Liabilities	\$					
26. Long Term Liabilities	\$					
27. Total Stockholders Equity	\$					
28. Interest Expense	\$					
29. Price of Common Stock, Hi/Low	\$/S	/	/	/	/	/
30. Earnings Per Share	\$					

Footnotes:

1. Report \$'s in 000's.
2. Where applicable data should be consistent with annual financial statements.
3. See Definitions.
4. Estimate.
5. On your company's balance sheet unliquidated progress payments are: a reduction to inventory; increase to Current

APPENDIX B. SURVEY RESPONSES

Appendix B presents additional questionnaire data. It has three sections: (1) a comparison between the responses to LMI's questions about DoD policies and Defense business and the opinions of Defense procurement personnel surveyed by Coopers & Lybrand (C&L) as part of the Profit '76 Study, (2) data on the contractor-subcontractor relationship, and (3) personnel survey data.

Opinions of Industry and Defense Procurement Personnel

A number of questions in the DIB survey were designed to complement questions asked of Defense procurement personnel by C&L as part of the Profit '76 Study. The questions pertained to DoD policies and Defense business in general and were used to compare the attitudes of those responsible for negotiating and administering Defense contracts with the attitudes of those competing for and performing on those contracts.

Many of LMI's questions were exact duplicates of the ones asked by C&L. Others were included to investigate related issues that would support or better define the industry viewpoint. The following questions and responses are loosely divided into four groups: WGL, profit and profitability, DPC 107, and market conditions and relationships with subcontractors. The question numbers correspond to those used in the LMI and C&L surveys.

Weighted Guidelines

- LMI Q. 1: To your knowledge, on what portion of your DoD contracts over the past 5 years has the Weighted Guidelines (WGL) been applied by government personnel? ____% (Annual Average). Has it been increasing ____, decreasing ____, or staying about the same ____?

<u>Comment</u>	<u>Companies (%)</u>	<u>Avg. % of DoD contracts to which the WGL have been applied</u>
Increasing	16%	36%
Decreasing	9%	36%
Same	75%	42%

The majority of contractors stated that the percentage of their contracts to which the WGL were applied had remained constant. However, the percentages varied widely from one contractor to the next. Values of 0 to 100% were reported and no pattern was apparent.

- LMI Q. 34: Should capital investment be used in determining negotiated profit/fee under the WGL?

<u>Yes</u>	<u>No</u>
72%	28%

- C&L Q. 30: Contractor capital investment should be more significantly rewarded under the WGL.

<u>Agree</u>	<u>Disagree</u>
60%	13% ¹

- LMI Q. 35: If yes, what percentage of the total negotiated profit/fee do you recommend be based on investment?

<u>Avg. %</u>
24.2

There is excellent agreement between the Government procurement personnel and industry, with both groups strongly favoring significant rewards for capital investment.

¹ Where percentages do not add to 100, the balance of companies responding checked a 'no opinion', 'no comment' or 'don't know' box. These are not shown. This note applies throughout the balance of Appendix B.

Profits and Profitability

- LMI Q. 36:
C&L Q. 13:

Negotiated profit rates for each contractor should be negotiated on an annual basis rather than on a contract-by-contract basis.

	<u>Agree</u>	<u>Disagree</u>
LMI	15%	85%
C&L	6%	91%

- LMI Q. 41:
C&L Q. 21:

The current Weighted Guidelines approach is sufficiently flexible to provide adequate profits to the majority of contractors.

	<u>Agree</u>	<u>Disagree</u>
LMI	31%	69%
C&L	67%	23%

- LMI Q. 42:

The Weighted Guidelines tend to increase, have no effect, depress negotiated contractor profits.

<u>Increase</u>	<u>No Effect</u>	<u>Depress</u>
19%	46%	35%

- C&L Q. 17:

The Weighted Guidelines tend to depress negotiated contractor profits.

<u>Agree</u>	<u>Disagree</u>
25%	56%

- LMI Q. 40:
C&L Q. 23:

The DoD procurement system puts much pressure on government contracting officers to keep negotiated profits down.

	<u>Agree</u>	<u>Disagree</u>
LMI	100%	0%
C&L	59%	26%

- LMI Q. 37: Defense business has greater, same, lower cost risk than your commercial business.

<u>Greater</u>	<u>Same</u>	<u>Lower</u>
78%	10%	12%

- C&L Q. 54: Contractors view defense business to be a higher risk than commercial business.

<u>Agree</u>	<u>Disagree</u>
68%	17%

- LMI Q. 38: Your realized profits on FFP defense contracts are higher, same, lower than those on cost-type defense contracts.

<u>Higher</u>	<u>Same</u>	<u>Lower</u>
62%	17%	21%

A breakout by the percentage of total company sales derived from Defense, and by product line makes this distribution clearer.

Percentage of Defense Business (Percentage of companies responding)

	<u>Low</u>	<u>Medium</u>	<u>High</u>
Higher	59%	44%	80%
Same	15%	31%	10%
Lower	26%	25%	10%

Product Line Predominance (Percentage of companies responding)

	<u>Air-craft</u>	<u>Mis-siles</u>	<u>Ships</u>	<u>Tank/Auto</u>	<u>Wea-pons</u>	<u>Ammo</u>	<u>Elec-tronics</u>
Higher	50%	57%	67%	50%	0%	60%	67%
Same	25%	14%	17%	0%	100%	0%	24%
Lower	25%	28%	17%	50%	0%	50%	9%

C&L provided a breakout by three major procurement areas (ships, aircraft, and missiles) for all questions. The breakout for C&L Q. 18 is presented here for comparison to the LMI product line breakout.

	<u>Ships</u>	<u>Aircraft</u>	<u>Missiles</u>
Agree	54%	75%	71%
Disagree	16%	11%	8%
- LMI Q. 39: The profits negotiated on your current contracts were primarily affected by (Rank 1, 2, 3): prior negotiations; prior technical/production performance; other.			
	<u>Prior Negotiations</u>	<u>Prior Technical/ Production Performance</u>	<u>Govt's Policy Toward Profit Guidelines</u>
Weighted ² Ranking ²	112	98	25

As expected, Defense procurement personnel and industry personnel did not agree on some of these issues. Industry respondents indicated that the WGL were inflexible and tended to depress negotiated profits. Procurement personnel expressed exactly the opposite opinion. Both groups, however, agreed that the procurement system pressures contracting officers to limit negotiated profits.

DPC 107

- LMI Q. 43: DPC (Contractor Capital Employed Policy) was too complicated to implement at the working level.
C&L Q. 31:

	<u>Agree</u>	<u>Disagree</u>	<u>Don't Know</u>
LMI	70%	5%	26%
C&L	60%	13%	25%

²Each response was assigned a weighted ranking. A simple weighting scheme was used giving each '1' ranking a weight of 3, each '2' ranking a weight of 2, and each '3' ranking a weight of 1. The weighted ranking for each response is the sum of the individual weights for that response.

- LMI Q. 44: If DPC 107 was applied, your defense profits would increase, decrease, stay the same, don't know.

<u>Increase</u>	<u>Decrease</u>	<u>Same</u>	<u>Don't Know</u>
8%	12%	9%	71%

Procurement and industry personnel agreed that DPC 107 was too complicated to implement. The most significant finding was that 71% of industry respondents and 45% of the DoD procurement personnel did not know what the effects of DPC 107 would be.

Market Conditions and Relationships to Subcontractors

- LMI Q. 45: DoD requirements for your products, in units, have declined, remained the same, increased, over the past 5 years.

<u>Declined</u>	<u>Same</u>	<u>Increased</u>
53%	97%	38%

- LMI Q. 7: DoD policies make investment in industrial equipment for your defense business more, equally, less attractive, than for commercial business.

<u>More Attractive</u>	<u>Equally Attractive</u>	<u>Less Attractive</u>
0%	9%	91%

A further breakout of LMI Q. 7 by percentage of total sales derived from Defense business shows that only those companies with high Defense interests are at all attracted to Defense investment (23% found Defense investment as attractive as commercial investment; the remaining 77% found Defense investment less attractive). The low and medium-percent-Defense companies all found Defense investment less attractive than commercial investment.

- LMI Q. 46: The technical complexity of your products procured by the DoD has declined, remained the same, increased over the past 5 years.

	<u>Declined</u>	<u>Same</u>	<u>Increased</u>
	37%	13%	84%

- C&L Q. 53: If there has been a decline in competition, a major reason is: fewer but more technically complex equipment procurements.

	<u>Agree</u>	<u>Disagree</u>
	84%	10%

- LMI Q. 24: Have your defense subcontractors/suppliers obtained increasing, same, lower profit/fee rates from you compared to 10 years ago?

	<u>Increasing</u>	<u>Same</u>	<u>Lower</u>
	21%	59%	21%

- LMI Q. 25: Have your defense subcontractors/suppliers obtained greater, same, lower financing (advance and/or progress payments, etc.) from you over the past 5 years?

	<u>Greater</u>	<u>Same</u>	<u>Lower</u>
	42%	52%	6%

- LMI Q. 26: Have your defense subcontractors/suppliers obtained lower, same, higher risk contracts (cost-reimbursement, escalation clauses, etc.) from you over the past 5 years?

	<u>Lower</u>	<u>Same</u>	<u>Higher</u>
	20%	53%	27%

- LMI Q. 27: Have you had to initiate any incentive programs to stimulate investments or bidding by your suppliers? If so, what kind?

<u>Yes</u>	<u>No</u>
35%	65%

- C&L Q. 51: There has been a significant decline in the number of competitive contractors.

<u>Agree</u>	<u>Disagree</u>
55%	23%

- C&L Q. 57: There is a threat of continued erosion of capacity among the producers of items you procure.

<u>Agree</u>	<u>Disagree</u>
55%	23%

Some of the comments included with the above questions offered additional information about the environment in which Defense contractors operate. Decreased DoD requirements for products and increased technical complexity of those products in demand have had an effect over the past several years. Technical complexity has also contributed to the decline in subcontract competition, but industry's relationship to its subcontractors seems to be excellent.

Contractor - Subcontractor Relationship

Both LMI's and C&L's surveys dealt with the contractor-subcontractor relationship. Several of the questions presented below have been mentioned in the previous section, but they are repeated here in a somewhat different context. Aside from developing a picture of the relationship between contractor and subcontractor, such questions might uncover evidence of erosion at the subcontract level. The causes of such erosion might be linked to the unique situation of subcontracting to a DoD contractor. If so, it is possible that specific problem areas could be identified and dealt with at the prime contract policy level.

- LMI Q. 6: What differences, if any, are there in your profit policy when you negotiate with your subcontractors under (a) defense contracts, and (b) commercial contracts?

No Difference: 81%

For those respondents indicating a difference in profit policy when negotiating with subcontractors (19%), the responses are presented below, based on 100% for the group.

Difference

If progress payments are involved, more favorable pricing is expected.	16.8%
Negotiations with commercial subcontractor are for price only.	16.8%
More latitude in commercial work.	16.8%
Profit constraints on Defense work.	16.8%
Government forces companies to work at profit rather than competing in the market.	16.8%
Must evaluate cost and pricing data and negotiate price.	8.0%
On negotiated procurements, lacking sufficient competition, suppliers may refuse government-imposed limitations on profits.	8.0%

These answers must be considered rather insignificant, in light of the 81% who answered "no difference." The responses do, however, indicate areas where differences in profit negotiations may occasionally arise.

- LMI Q. 23: Please identify any DoD procurement policies or practices which you believe have caused any of your defense suppliers to cease competing for your defense business.

<u>Response</u>	<u>No. Times Cited</u>	<u>% of Total</u>
Compliance with CAS Regulations	22	16%
Government regulations and related red tape, and administrative paper	21	15%
None	17	12%
Compliance with technical specifications	16	11%
Disclosure of accounting and price data	13	9%
Inadequate profit margins	12	9%
ASPR Audit Clause	7	5%

The responses are fairly well distributed; only the top seven have been presented. The remaining 23% of the responses are distributed among several policy suggestions, of which none totaled more than 3%. This broad distribution is indicative of the problems of dealing with lower-tier erosion, since no single solution appears to be universally acceptable.

- LMI Q. 24: Have your defense subcontractors/suppliers obtained increasing, same, lower profit/fee rates from you compared to 10 years ago?

<u>Increasing</u>	<u>Same</u>	<u>Lower</u>
21%	59%	21%

- LMI Q. 25: Have your defense subcontractors/suppliers obtained greater, same, lower, financing (advance and/or progress payments, etc.) from you over the past 5 years?

<u>Greater</u>	<u>Same</u>	<u>Lower</u>
42%	52%	6%

- LMI Q. 26: Have your defense subcontractors/suppliers obtained lower, same, higher risk contracts (cost-reimbursement, escalation clauses, etc.) from you over the past 5 years?

<u>Lower</u>	<u>Same</u>	<u>Higher</u>
20%	53%	27%

- LMI Q. 27: Have you had to initiate any incentive programs to stimulate investments or bidding by your suppliers? If so, what kind?

<u>Yes</u>	<u>No</u>
35%	65%

<u>Response</u>	<u>% of Total 'Yes' Count</u>	<u>'Yes' Response</u>
Long-Term Ongoing Volume Levels	4	15%
Higher Profits	4	15%
Cost Reimbursement	4	15%
Escalation Provisions	3	11%
Increased Quantity Commitments	3	11%
Increased Progress Payments	3	11%

Again, only the top responses have been presented. The remaining 22% were distributed among many programs, none of which received a significant percentage response.

The preceeding questions point up the problem of identifying policies to benefit the lower-tier contractors. Their difficulties are diverse and do not stem from a universal policy or procedure.

Personnel Data

The ability of Defense firms to attract top science and engineering graduates has been suggested as a possible indicator of DIB erosion. To explore this possibility, LMI contacted several leading engineering and management schools. Graduates of such schools are offered the widest choice of positions, and are the most suitable group to indicate both shifts in demand (as reflected by numbers and types of offers) and shifts in employment preferences (as reflected by number and types of positions accepted). The following schools were contacted:

<u>Engineering and Science</u>	<u>Management</u>
Stanford	Stanford
Berkeley	Berkeley
UCLA	UCLA
Cal. Tech.	NYU
U. of Mich.	Harvard
Ga. Tech.	U. of Mich.
MIT	(Northwestern)
Cornell	

The data needed to analyze employment trends for these graduates were of two kinds:

- Hard Data - numbers of graduates in each discipline and degree level, numbers of interviews requested by students, numbers of company interviews on campus, numbers of offers, and salary ranges
- Qualitative Data - information from interviews with placement directors concerning attitudes of students, trends in job availability, and attractiveness of Defense-related jobs as compared to other employment possibilities.

For the hard data, a breakout between Defense and commercially oriented companies was requested wherever possible. Difficulties resulted because records did not differentiate between Defense and commercial companies and because the distinction was ambiguous for many firms. In a number of cases, statistics by industry (i.e., aerospace, auto, electronics, petroleum, etc.) were available, but they were generally incompatible from school to school, due to different bases of compilation and varied record-keeping practices. An examination of several data items revealed no significant trends in recruiting activity, job acceptances, or enrollment in certain disciplines. In most cases, data were insufficient to draw conclusions because of a lack of continuity across years and schools. Despite these problems, some inferences were possible and they are discussed further below.

Salary data from the College Placement Council provided national averages of starting salaries for graduates with bachelor's degrees. Additional salary information was found in two Engineers Joint Council publications,³ which in conjunction with information from interviews with university placement officers provided a basis for analysis.

³Engineers' Salaries (Special Industry Report) - 1974, 301-74 (New York: November 1974).

Professional Income of Engineers - 1974, 302-74 (New York: November 1974).

A look at salaries in several industries will indicate the prevailing supply/demand relationships. Table B-1 shows the average starting salaries of chemical, mechanical, electrical, and aeronautical engineers in each of four industries: petroleum, automotive, electronics, and aerospace.

TABLE B-1. AVERAGE MONTHLY STARTING SALARIES
FOR ENGINEERS

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Petroleum	\$920	\$930	\$960	\$1010	\$1180
Automotive	885	910	940	990	1095
Electronics	880	890	930	980	1080
Aerospace	870	880	910	980	1080

The yearly rates of increase for the past five years have been quite consistent. The industries have also maintained the same ranking over that time.

One reason offered for the lower salaries in aerospace is the level of employment. In June 1975, the number of engineers and scientists employed in aerospace had dropped 28% below the 1968 level, and a decrease of an additional 3% was forecast for June 1976.⁴ The decreased demand for aerospace engineers has created a buyer's market and kept salaries down. It is interesting to note that a cross-over point in salary rankings occurred between 1964 and 1968. Prior to 1964, salaries in aerospace were higher than in the petroleum and chemical industries. This period of high salaries coincided with a period of rapid growth in aerospace, and supports the proposition that salary is a primary indicator of the supply-demand relationship.

Interviews with placement officers revealed several consistent views on the Defense hiring atmosphere. The anti-war sentiments of many college students had virtually no

⁴ Aerospace Research Center, Aerospace Industries Association of America, Inc., "Aerospace Industry Employment, December 1968 - June 1976" (New York: October 1975), p. 1.

effect on the ability of Defense firms to hire engineers. It was the liberal arts students, not the engineering and science students, who protested the presence of certain firms on campus.

The perceived lower job security in Defense work has had much more effect on Defense hiring than the anti-war protests. The extent and duration of recent lay-offs in the aerospace industry have caused many graduating engineers and scientists to question its stability. Berkeley's Career Planning and Placement Center "Annual Report" for 1972-73 stated:

Aerospace firms up and down the West Coast have been extending job offers in numbers. However, when given a choice (i.e., multiple job offers) the candidates tended to shy away from this industry, always quoting job security as the reason. In addition, several young alumni, presently employed in aerospace, have notified us of their desire to seek engineering opportunities in other industries.⁵

The 1973 - 1974 "Annual Report" stated:

Aerospace firms continued this year, as last, to extend numerous offers, but students again demonstrated hesitation to accept these offers, and tended to accept other employers when they had a choice.⁶

It must be pointed out that this instability is primarily characteristic of aerospace firms, and is not associated with other sectors of Defense production and research. In addition, the diversification of many Defense producers offers some protection against fluctuations in the availability of Government contracts. Nevertheless, the problem of job security does affect the potential of some Defense firms to attract top graduates, particularly in aerospace.

There was unanimous agreement among the placement officers interviewed that one of the most positive aspects of Defense industry jobs is the opportunity to work on projects involving state-of-the-art technologies. The rate of technological innovation is far greater in Defense work than in most commercial work. This is particularly true in

⁵Office of Placement Services (Berkeley: University of California), p. 2.

⁶Office of Placement Services (Berkeley: University of California), p. 3.

aerospace, and is a strong attraction for engineering and science graduates. The technologically advanced nature of Defense work has thus helped offset its perceived instability.

In general, the placement officers felt that Defense firms had remained fairly competitive in attracting engineers and scientists. They agreed that aerospace firms may experience greater difficulty in hiring because of poor job security. Nevertheless, aerospace and other Defense firms recruited regularly at all campuses surveyed, and students regularly accepted employment with these firms. Most placement officers indicated that Defense hiring was an important part of total placements.

At one leading eastern engineering school, 32% of the graduates at all degree levels for the academic year 1974-75 were hired either by firms accepting Government contracts or by laboratories funded directly by the Government. Of the remaining 68%, 55% went to purely commercial firms, 11% to the uniformed services, and 2% to non-profit institutions. Although these data represent only one school, they do indicate the importance of Defense hiring at top engineering schools.

Data from business schools could not be analyzed in terms of a Defense-commercial distinction. Their statistics are generally broken out by functional classification (i.e., auditing, accounting, finance, marketing, etc.) and by industry classification (i.e., accounting, advertising, finance, government, manufacturing, real estate, etc.). The industry classifications are much broader than those used by the engineering placement offices, e.g., all manufacturing is usually one classification. Because of the homogeneity of business school graduates, there is little interest on the part of business school placement personnel to identify industries by any more specific categories.

The business school placement officers did not indicate a lack of Defense hiring. In fact, some schools experienced regular recruiting and hiring by several heavily Defense oriented companies. Applicable data on hiring trends are lacking, however.

In a related effort, LMI asked companies to provide the average age of employees in three categories: Engineering and Scientific, Salaried Production, and Hourly Production, for the years 1969, 1971 and 1974. These data are displayed below by the percentage of Defense breakdown for the companies reporting.

TABLE B-2. AVERAGE AGE OF EMPLOYEES

<u>Defense Orientation</u>	<u>Engr. & Sci.</u>			<u>Salaried Prod.</u>			<u>Hourly Prod.</u>		
	<u>69</u>	<u>71</u>	<u>74</u>	<u>69</u>	<u>71</u>	<u>74</u>	<u>69</u>	<u>71</u>	<u>74</u>
Low	40	40	41	41	42	43	41	41	42
Med.	35	38	38	36	38	40	37	40	38
High	38	39	41	38	39	43	36	38	41

The most significant increase in age occurred in the hourly production employees working for high-percent-Defense companies. This resulted from the lack of any major hiring programs and work force cutbacks based on seniority.

Another question asked companies to rank the following criteria used in determining rewards (e.g., salary increases, bonuses, promotions) for executives and managers.

- Success in Developing Staff
- Volume of Sales
- Return on Investment
- Profit as Percent of Sales
- Other _____

The overall responses are listed below in descending order of rank, weighted according to the sum of squares method described previously.

<u>Responses</u>	<u>Times Listed</u>	<u>Ranking Weight</u>
ROI	48	259
Profit on Sales	50	252
Success in Developing Staff	50	192
Volume of Sales	48	185
Overall Performance	16	94
Asset Turnover	4	22
Meeting Specific Operating Objectives	3	15
Profit & Contribution	3	14
Expense Control	3	13

APPENDIX C. COMPANIES INVITED TO PARTICIPATE IN THE DIB STUDY

The following 290 companies were asked to participate voluntarily in the DIB study. Of this number, 104 responded. Since LMI's policy was to restrict the knowledge of which companies responded to the study team, the respondents are not identified. We again extend our deepest appreciation to the 104 companies for the time and effort so generously contributed to this study.

1. ABEX Corp.
2. Action Mfg. Co.
3. Advance Gear & Machine Corp.
4. Advanced Structures & Technology
5. Aerojet General
6. Aeroking, Inc.
7. Aeroquip Corp.
8. Aerosonic Corp.
9. Aerospace Corp.
10. Aircraft Supplies
11. A. J. Industries, Inc.
12. Alabama Drydock and Shipbuilding Co.
13. Alcoa
14. All American Ind. Corp.
15. Allegheny Metal Stamping Co., Inc.
16. AMBAC Industries, Inc.
17. Amerace Corp.
18. AMF, Inc.
19. American Air Filter Company, Inc.

20. American Electronics Labs
21. American Gear & Pinion Corp.
22. American Metal Bearing Co.
23. American Standard
24. A M General
25. Ampex Corp.
26. Amron Corp.
27. AMS Mfg., Inc.
28. Andrea Radio Corp.
29. Apple, W. A., Mfg. Co.
30. ARGO Systems, Inc.
31. Arkwin Industries, Inc.
32. ARMCO Steel Corp.
33. ARO Corp.
34. Arrowsmith Tool & Mfg.
35. Associated Aerospace Activities, Inc.
36. Associated Spring Corp.
37. Astronautics Corp. of America
38. ATI Industries
39. Automation Industries
40. AVCO Corp.
41. Babcock & Wilcox Co.
42. Baldwin Electronics
43. Bath Industries
44. Beech Aircraft Corp.
45. Bell & Howell Corp.
46. Bendix Corp.

47. Berteau Corp.
48. Bethlehem Steel Corp.
49. B. F. Goodrich Co.
50. Bird-Johnson Co.
51. Blaw-Knox Co.
52. Boeing Co.
53. Boland Marine and Manufacturing Corp.
54. Borg-Warner Corp.
55. Bowen Machine Prod.
56. Brooks & Perkins, Inc.
57. Brunswick Corp.
58. Bulova Watch Co., Inc.
59. Bunker-Ramo Corp.
60. Burroughs Corp.
61. Bush Universal
62. Cadillac Gage Co.
63. Caterpillar Tractor
64. CCI Corp.
65. Celmar Mfg. Co.
66. Centron Corp.
67. Cessna Aircraft Co.
68. Chamberlain Mfg. Co.
69. Chromaloy-America Corp.
70. Chrysler Corp.
71. Cincinnati Electronics Corp.
72. Clymer Machine Co.

73. Colt Industries, Inc.
74. Computer Sciences Corp.
75. Conic Corp.
76. Conrac Corp.
77. Consolidated Diesel Corp.
78. Control Data Corp.
79. Courter Inc.
80. Cubic Corp.
81. Curtiss-Wright Corp.
82. Cutler-Hammer
83. Dayron Corp.
84. Delaval Turbine
85. Delavan Mfg. Co.
86. Dell Industries
87. Diamond Antenna & Microwave Corp.
88. Digital Equipment Corp.
89. Donovan Construction
90. Ducommon Inc.
91. Dynalectron Corp.
92. Dynamics Corp. of America
93. Dynell Electronics
94. E. A. Industrial Corp.
95. Eastern Rotorcraft
96. Eastman Kodak Co.
97. E. I. duPont de Nemours and Co.
98. Electronic Communications Inc.
99. Eldic Corp.

100. Emerson Electric Co.
101. Entron, Inc.
102. ESB, Inc.
103. ESCO Corp.
104. ESL, Inc.
105. Esmark, Inc.
106. E-Systems, Inc.
107. Etowah Manufacturing Co., Inc.
108. Fairchild Camera and Instrument Corp.
109. Fairchild Industries
110. Fansteel, Inc.
111. Fisher Engineering
112. FMC Corp.
113. Ford Motor Co.
114. Fourdee, Inc.
115. Galbraith Pilot Marine Co.
116. Gary Aircraft Corp.
117. General Dynamics
118. General Electric
119. General Instrument
120. General Motors Corp.
121. General Tele. & Elec.
122. Glenair, Inc.
123. Goodyear Aerospace
124. Gould, Inc.
125. Grimes Mfg. Co.
126. Grumman Corp.

127. Gulf and Western Industries, Inc.
128. Gyrodyne Corp.
129. Hamilton-Technology
130. Harris Corp.
131. Harsco Corp.
132. Hathaway Instruments, Inc.
133. Hazeltine Corp.
134. Heckethorn Manufacturing Co.
135. Hercules, Inc.
136. Hewlett Packard Co.
137. Hi Shear Corp.
138. Hoffman Electron. Corp.
139. Holt Instrument Laboratories, Inc.
140. Honeywell, Inc.
141. Houdaille Ind., Inc.
142. Hughes Aircraft
143. Hydrosystems Inc.
144. IBM
145. ILC Industries, Inc.
146. Infrared Ind., Inc.
147. Ingersol-Rand Co.
148. Intercontinental Mfg. Co. (Sub. of AAI)
149. Int'l. Nickel Co., Inc.
150. Int'l. Tel. & Tel.
151. Interstate Electronics
152. Itek Corp.
153. Jackes-Evans Mfg. Co.

154. Jet Electronics & Technology, Inc.
155. Kaiser Industries Corp.
156. Kaman Corp.
157. KDI Precision Prod.
158. Kelsey-Hayes Co.
159. Kidde, Walter & Co.
160. Kings Point Mfg. Co., Inc.
161. Kisco Co., Inc.
162. Kollmorgen Corp.
163. Kollsman Instrument
164. Koppers Co., Inc.
165. Kuras-Alterman Corp.
166. Lear Siegler, Inc.
167. Leslie Co.
168. Litton Industries
169. Lockheed
170. Loral Corp.
171. Lord Corp.
172. LTV
173. Lukens Steel Co.
174. Magnavox Co.
175. Maremont Corp.
176. Martin-Marietta Corp.
177. MB Associates
178. McDonnell-Douglas
179. McGraw-Edison Co.
180. Medico Industries

181. Menasco Mfg. Co.
182. Midland-Ross Corp.
183. Miller Holzwarth, Inc.
184. Mine Safety Appliances
185. Minowitz Mfg. Co.
186. Moog, Inc.
187. Morris Industries
188. Motorola, Inc.
189. Murdock Machine & Engr. Co. of Utah
190. Napco Industries
191. Nash Engineering Co.
192. National Cash Register Corp.
193. National Forge
194. Natl. Presto Ind., Inc.
195. Natomas Co.
196. Norfolk Shipbldg. & DryDock Corp.
197. Norris Industries
198. Northrop Corp.
199. Olin Corp.
200. Omark Industries
201. Optic Electronic Corp.
202. Optical Coating Labs
203. Oregon Metallurgical
204. Oro Mfg. Co.
205. Oshkosh Truck Corp.
206. Pacific Corp.
207. Pacific Scientific Co.

- 208. Parker Hannifin Corp.
- 209. Perkin Elmer Corp.
- 210. Philadelphia Gear Corp.
- 211. Phillip Morris, Inc.
- 212. Pioneer Recovery Sys.
- 213. Pneumo Corp.
- 214. PPG Industries, Inc.
- 215. Quality Controlled Stamping, Inc.
- 216. Raymond Precision, Inc.
- 217. Raytheon Co.
- 218. RCA Corp.
- 219. Reflectone, Inc.
- 220. Rexnord, Inc.
- 221. Ridge Instrument Co.
- 222. Riker-Maxson Corp.
- 223. Rockwell Int'l.
- 224. Rohr Industries
- 225. Ronson Corp.
- 226. Royal Industries
- 227. Rubber Fabricators
- 228. Ruoff & Sons, Inc.
- 229. Ryerson, John T. E., & Sons
- 230. Sanders Assoc., Inc.
- 231. Signal Companies, Inc.
- 232. Simmonds Precision Products
- 233. Simplex Wire & Cable
- 234. Singer Co.

- 235. SKF Industries
- 236. Smiths Industries
- 237. Spaco, Inc.
- 238. Spartan Corp.
- 239. Sperry Rand Corp.
- 240. Spinks Industries
- 241. SS Products, Inc.
- 242. Stanley Aviation Corp.
- 243. Stanray Corp.
- 244. Stencel Aero Engineering Corp.
- 245. Stewart & Stevenson Svcs., Inc.
- 246. Stewart Warner Corp.
- 247. Studebaker-Worthington, Inc.
- 248. Sunstrand Corp.
- 249. Susquehanna Corp.
- 250. Switlik Parachute Co.
- 251. Talley Industries
- 252. Teledyne, Inc.
- 253. Teleflex, Inc.
- 254. Temtex Industries, Inc.
- 255. Tenneco, Inc.
- 256. Terry Corp. of Conn.
- 257. Texas Instruments
- 258. Textron, Inc.
- 259. Thermal Sys., Inc.
- 260. Thiokol Chemical Corp.
- 261. Timex Corp.
- 262. Timken Co.

- 263. Todd Shipyards Corp.
- 264. Torrington Co.
- 265. Tracor, Inc.
- 266. Transamerica Corp.
- 267. Transco Products, Inc.
- 268. Trans-Sonics, Inc.
- 269. TRW, Inc.
- 270. UMC Industries
- 271. Union Carbide Corp.
- 272. Uniroyal, Inc.
- 273. United Industrial Corp.
- 274. United Technology
- 275. U. S. Steel Corp.
- 276. Varian Associates
- 277. Walworth Co.
- 278. Warren Pumps, Inc.
- 279. Watkins-Johnson Co.
- 280. Weatherby/Nasco, Inc.
- 281. Western Electric
- 282. Western Gear Corp.
- 283. Western Union
- 284. Westinghouse Electric Corp.
- 285. White Consolidated Industries
- 286. White Motor Co.
- 287. Whittaker Corp.
- 288. Williams Research Corp.
- 289. Wyman Gordon Co.
- 290. Xerox Corp.

APPENDIX D. COMMAND PROCUREMENT DATA

Procurement data from a sample of Military Department procurement commands were used to assess DIB erosion. The data included information about DoD's perception of industry attitudes toward Defense business, contract terminations, and production lead times.

Data were collected from commands in each Service. The major problem encountered was the inability of many commands to document their procurement activities prior to 1973. In certain cases, relevant historical data were obtained from headquarters' components in Washington. The results of the analyses of the quantitative data were supported by the observations of experienced procurement personnel interviewed in the field.

DoD's Perception of Industry Attitudes

Erosion of the DIB will affect DoD's ability to get an adequate number of suppliers to provide goods and services. The level of interest industry has in selling to DoD is reflected in the number of competitive and non-competitive contracts that DoD lets and industry's responsiveness to requests for proposals (RFPs). The type of contracts and number of responses are influenced by market conditions as well as DoD's procurement policies. This section will discuss industry's responsiveness to DoD procurements and some of the factors affecting industry attitudes towards dealing with DoD.

Quantitative data obtained from almost all commands concerning responsiveness to RFPs were limited to FY 1975. Army data from previous years were reportedly sent to U. S. Army Materiel Development and Readiness Command (DARCOM), and the local command records were destroyed. However, the records could not be located at DARCOM either. A thorough assessment of industry's responsiveness to RFPs over an

extended period of time was thus impossible, but interviews with procurement personnel did yield some useful insights.

The data and the interviews did not indicate that DoD was having widespread problems in obtaining a satisfactory number of responses to RFPs. One reason for this is a revised procedure for selecting companies to receive RFPs. The commands now try to limit the mailing of RFPs to companies which are known suppliers of an item and have previously expressed an interest in receiving RFPs for specific procurements. As a result, the responses have increased significantly relative to the number of requests sent out.

According to our interviews, the major suppliers of goods and services to DoD generally represent a stable base for Defense procurements. Still, several of these companies were reported to have reduced their dealings with DoD in recent years. Most of the cutbacks were attributable to problems with DoD, but other factors, such as the level of economic activity, the rate of inflation, and EPA and OSHA requirements were also cited.

For example, the Tank Automotive Materiel Readiness Command (TARCOM) found that the number of suppliers willing to participate in TARCOM procurements fluctuated inversely with the level of activity in the auto industry. When the economy slows and auto manufacturers have fewer orders, they seek work from TARCOM. As the civilian economy increases the demand for automotive equipment, the companies focus their efforts on satisfying these needs. This fluctuation has not caused serious problems for larger DoD procurements.

Industry's removal of some production facilities from the Defense base has affected the M60 tank program, however. During the 1960's, TARCOM procured tank hull and turret castings from two companies, General Steel and Blaw Knox. Each operated two foundries, one for the production of hulls and another for turrets. In 1971, General Steel stopped making turrets, and by 1973 had ceased production of hulls. Blaw Knox continued to make both, consolidating operations at one foundry. (The Pittsburgh foundry was shut

down because it could not meet EPA and OSHA regulations and standards.) By 1973, the Army's tank procurement program had been stabilized at approximately 30 units per month for more than six years.

After the 1973 Israeli-Arab war, demand for U. S. replacement and FMS M60's required an increase in production to over 100 units per month. The Army could not induce Blaw Knox to expand its capacity, nor could it attract other suppliers for turrets and hulls. The Army therefore agreed in 1975 to spend \$17.5 million to refit a Blaw Knox foundry for additional turrets and hulls. Another contract was let to refit a foundry to supply smaller armor castings (mainly breech blocks). The net result was a substantial cost increase for the M60 tank program. The problems encountered in increasing production resulted from erosion to the base caused by an extended period of reduced DoD demand.

The Army Munitions Command (ARMCOM) also reported a reduction in the number of contractors interested in producing munitions in both company facilities and Government-Owned Contractor-Operated (GOCO) plants. The primary cause of disenchantment with ARMCOM was the over-obligation of \$250 million of prior years' monies under contract, which meant that ARMCOM could not pay its contractors. The situation was finally resolved in late 1976, when Congress authorized the Army to use current year money to settle outstanding claims. However, the ARMCOM experience encouraged companies to seek more work in the commercial sector and less in the military. Industry was also reluctant to take firm-fixed-price contracts with no inflation escalation provisions.

Other deterrents to industry's bidding cited by ARMCOM personnel were: the end of the Vietnam conflict, which caused certain large companies to think that the ARMCOM market for their Defense products would decrease substantially; the fact that ARMCOM work was a small portion of these companies' total business and generated much bad publicity; and the high capital investment required for GOCO ammunition plants. If these

problems are not solved, ARMCOM will continue to have difficulties in finding enough suppliers to meet its needs economically.

Shipbuilding problems abound in both the Defense and commercial sectors. A decline in the number of orders for commercial ships, coupled with hundreds of millions of dollars of unsettled claims on Navy contracts, has jeopardized the financial viability of most shipbuilding companies. The Department of Commerce reported that a large number of major shipbuilders would be forced out of business if ship orders were not increased. At the same time, shipbuilding contractors have become more cautious in undertaking new Navy business; this reduction in bidding has unfortunately occurred just when the Navy was planning to increase its shipbuilding program.

In summary, the reluctance of shipbuilders to work on Navy projects has been attributed to: a high level of financial risk, fluctuations in demand that hinder economic production, long and involved negotiations, Government interference, difficulties in obtaining some components and materials, and long-overdue shipbuilding payment claims. Since shipbuilding programs are large and take several years to complete, many have not recovered from the losses incurred by the rapid inflation of the early 1970's. Other major problems cited by industry were: a shortage of skilled labor, increasing labor and material costs, and keen foreign competition.

The market demand for DoD products also affects industry's attitude toward Defense business. An analysis was made of the Defense business contribution to the total business of the companies in our sample by computing the ratios of their renegotiable sales to total sales. An eight-year comparison of the mix of Defense and commercial business is shown in Table D-1.

TABLE D-1. RENEGOTIABLE SALES AS A PERCENTAGE
OF TOTAL SALES

<u>Defense Orien- tation</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>% Reduct. Reneg. Sales</u>
High	85.1	80.7	81.3	81.7	78.7	78.5	78.2	76.2	-10.5
Medium	52.1	50.1	57.9	41.9	39.9	36.2	33.2	28.8	-44.6
Low	15.6	15.0	12.2	10.5	9.2	7.4	6.4	5.6	-64.1

These data show that the high-percent-Defense companies continue to do business with DoD from a relatively stable base. The low and medium-percent-Defense contractors are better able to shift their activities into the commercial market. To place Table D-1 data in proper perspective, an analysis was made of the absolute dollar sales from commercial and Defense sales, which showed commercial sales to be growing faster than Defense sales declined. Defense market stability for the high-percent-Defense contractors was attributed to their involvement in long-term, large programs.

Terminations as an Indicator of Erosion

Contracts may be terminated by DoD for convenience, generally its own, or for default, when a company fails to meet its obligations to provide specific goods or services. For the majority of the procurement commands surveyed, the number of terminations for convenience and default declined, with one notable exception—TARCOM. See Table D-2 below. The details behind this increase were not identifiable in conversations with TARCOM personnel.

Terminations for convenience are not directly indicative of problems with suppliers, but an analysis of them is useful, because DoD occasionally will terminate for convenience when it appears that a supplier will default. DoD thus avoids the time-consuming and costly litigation which would result from the company's challenge of a termination by default. Terminations for convenience are also used to protect a potentially useful supplier from the heavy financial penalties usually incurred as a result of defaulting on a contract. Unfortunately, no data are available that indicate how many terminations for convenience could have been terminations for default. Instead, a survey was made of a number of DoD commands to see if there was an overall trend in the number of terminations for convenience. (See Table D-2.)

An increase in the number of contract terminations for default could be an indication of erosion of the DIB. Such an increase could mean that qualified firms were not responding to RFPs and that DoD was therefore forced to contract with less qualified

TABLE D-2. TERMINATIONS

<u>Command</u>	<u>I.C.</u>	<u>FY71</u>	<u>FY75</u>
TARCOM:	Convenience	26	145
	Default	10	21
AVSCOM:	Convenience	461	17
	Default	22	2
NAVSHIP:	Convenience	37*	21
	Default	2	2
ECOM:	Convenience	58	9
	Default	18	11
MICOM:	Convenience	217	19
	Default	29	30
TECOM:	Convenience	5	3
	Default	7	5
SAMSO:	Convenience	14	9
	Default	0	0
AFLC:	Convenience	N/A**	N/A
	Default	164***	329
AFSC:	Convenience	45	36
	Default	N/A	N/A

* FY'72

** Not Available

*** FY'73

ones or that the less qualified firms were underbidding (honestly or in an effort to get business) the more qualified ones, leading to more frequent contract defaults. With the exception of the Air Force Logistics Command (AFLC), the commands surveyed showed no general increase in default terminations.

From 1973 to 1975, terminations for default by AFLC doubled from 164 to 329. Some of this increase can be attributed to difficulties with long lead time items, which resulted in duplicate orders, some of which were terminated when suppliers were unable to obtain the materials they needed. An interesting fact is that about 94% of AFLC's

contracts involved costs of less than \$10,000, indicating that most terminations involved small contractors.

DARCOM, which shows a slight reduction in terminations for default, reported that most such actions were directed against small contractors. In 1971, DARCOM had 147 terminations for default. Of these, 107 involved contracts valued below \$100,000.¹ In 1975, it had 120 terminations for default, 115 of which involved small businesses. These data supported statements by Army procurement officers that terminations for default rarely involved large companies supplying the major portions of DoD programs.

One reason given for fewer defaults on large contracts is the Government's willingness to work with a major supplier in averting such a situation. Cooperation is considered prudent in light of potential high costs and delays resulting from changing contractors on a large program, particularly if production is under way. Also, the Government is more willing to work with a company that has consistently provided good performance when it is undergoing what appear to be temporary difficulties.

Production Lead Times as an Indicator of Erosion

Production lead time is a measure of the time between an agreement to manufacture an item and its completion. A producer's lead time is a function of his ability to get necessary materials and his capacity to make use of them. The ability of both Defense and commercial firms to obtain supplies is affected by their overall availability and the demand for them.

An analysis of production lead times for Defense-related equipment and supplies was made on the assumption that erosion of the DIB would result in significant increases in production lead times. Production schedules would be difficult to maintain if a large number of suppliers left the DIB, operated at reduced levels of efficiency, or diverted materials/items in short supply to the commercial sector.

¹From 1971 to 1975, DARCOM changed reporting classifications. Data showed that lower-valued contracts mostly reflected small business activity.

The results of this analysis are shown below in Tables D-3 and D-4. Although the strength of the DIB is a function of industry's ability to respond to DoD's needs, long lead times can occur independently of it. In 1974, for example, lead times for basic materials increased because of shortages that affected all industries. (See Table D-3.) The effect of these shortages is shown in the increased production lead times for selected manufactured items in Table D-4.

TABLE D-3. MATERIAL LEAD TIMES (WEEKS)

	<u>April 72</u>	<u>Dec 74</u>
Steel	11.6	36.8
Aluminum	11.4	27.3
Titanium	-	56.7
Magnesium	-	29.0
Chemicals	6.8	14.8
Electrical	13.8	33.1

TABLE D-4. PRODUCTION LEAD TIMES (WEEKS)

<u>Products</u>	<u>FY72</u>	<u>FY73</u>	<u>FY74</u>	<u>FY75</u>
Integrated Circuits	12	20	36	30
Capacitors	20	30	50	40
Resistors	20	30	50	40
Diodes	20	24	50	30
Tubing	9	20	32	16
Premium Skins	15	30	52	30
Plate	9	20	52	32
Extrusions	18	20	26	50
Forgings	16	30	48	52

As steel shortages became a major concern, industry attributed the problem to inadequate production facilities and shortages of iron. The scarcity of iron was due to large exports of iron ore and iron scrap as well as shortages of coking coal. Coal supplies were limited, in part, because of environmental restrictions. At the same time, the demand for coal jumped because it was used to meet fuel needs created by the oil embargo. The situation was complicated by a shortage of available railroad cars to ship the coal and iron ore.

The Defense Supply Agency reported a similar set of circumstances affecting aluminum production. In 1974, the industry was apparently still suffering the effects of a power shortage the year before. Production facilities were inadequate, due to the higher costs of complying with environmental regulations, and the curtailment of plans for expansion because of low rates of return on investment. In addition, aluminum scrap, as well as some catalysts, were more difficult to obtain.

Short supplies also affected the chemical and electronics industries during 1974. Production facilities apparently were not major problem areas for either industry. The oil crisis presented major difficulties for the chemical suppliers, since many of their products, such as plastics, synthetic rubber, and synthetic fibers, were made from petroleum. All are important to manufacturers of Defense goods. Within the electronics industry, there was heavy competition for components between manufacturers of commercial and Defense electronics equipment.

The deterioration of supply availability quickly became synergistic. The complexities of the marketplace are such that the finished product of one firm is an input to another, and shortages in one area soon ripple throughout the market.

Government contractors' success in obtaining goods from their suppliers can be measured by the number of Priority Assistance Act actions. The Priority Assistance Act enables the Government to force suppliers to fill Defense orders before commercial ones. Table D-5 below is a five-year summary of Priority Assistance actions by four commands. In general, the number of such actions undertaken in 1974 was much greater than it had been three years earlier. This increase, however, coincided with industrywide shortages in basic materials and the resulting longer production lead times. As the state of the economy improved in 1975, both Priority Assistance actions and the length of lead times were reduced.

TABLE D-5. PRIORITY ASSISTANCE ACTIONS

<u>Command</u>	<u>FY71</u>	<u>FY72</u>	<u>FY73</u>	<u>FY74</u>	<u>FY75</u>
AVSCOM	240	234	206	284	221
TARCOM	N /A*	N /A	N /A	170	39
JAMAC**	180	235	436	773	294
DARCOM	N /A	165	631	406	62

* Not Available

** Tri-service aircraft production support program