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DOCUMENTED
BRIEFING

The Department of Defense and Its Use of Small Businesses

An Economic and Industry Analysis

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Prepared for the Office of the Secretary of Defense

Approved for public release; distribution unlimited



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PREFACE

This briefing summarizes research the RAND Corporation performed for the Office of Small and Disadvantaged Business Utilization in the Office of the Secretary of Defense. This is part of an ongoing RAND project entitled “Analyzing Department of Defense (DoD) Contracting Practices and Policies to Support Small and Disadvantaged Businesses and DoD Transformation.” It should be of interest to personnel involved in effectively meeting small business policy and to contracting personnel seeking to improve small business utilization.

This research was conducted within the Acquisition and Technology Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Department of the Navy, the Marine Corps, the defense agencies, and the Defense Intelligence Community. Correspondence regarding this briefing should be sent to the project leaders, Nancy Moore, at nancy_moore@rand.org, or Elaine Reardon, at elaine_reardon@rand.org.

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ABBREVIATIONS

CBP	County Business Pattern
D&B	Dun & Bradstreet
DoD	Department of Defense
FPDS	Federal Procurement Data System
FY	fiscal year
NAICS	North American Industry Classification System
R&D	research and development
SADBU	Small and Disadvantaged Business Utilization
SBA	Small Business Administration

Outline

- ***Data Overview***
- **Small Business Activity in the Economy**
- **Department of Defense Spending**
- **Summary**

This briefing was produced as part of a larger project on “Analyzing Department of Defense (DoD) Contracting Practices and Policies to Support Small and Disadvantaged Businesses and DoD Transformation” for the Office of Small and Disadvantaged Business Utilization (SADBU). SADBU requested that the RAND Corporation examine DoD data on small business procurement spending and compare them to data on the prevalence of small businesses in the economy. The goal was to establish an empirical foundation for thinking about DoD’s small and disadvantaged business contracting practices and policies. The briefing contains the results of our analysis of federal procurement spending data and Economic Census data on industry and firm size in the economy.

Introduction

- **The Department of Defense (DoD) spent almost \$209 billion in direct purchases from commercial enterprises in FY03**
- **Congress set a goal that 23 percent of all direct purchases should go to small businesses**
- **DoD is the single largest purchaser in the federal government: It is key to achieving this small business goal**

The federal government actively seeks to foster participation by small and disadvantaged businesses in its contracting efforts. The Business Opportunity Development Act of 1988 (Public Law 100-656, Section 502) established the formal numerical goal that no less than 20 percent of overall direct federal procurement contract awards go to firms certified as small by the Small Business Administration (SBA).¹ The goal was raised to 23 percent in 1997 as part of the Small Business Reauthorization Act of 1997 (Section 603). There are periodic efforts in Congress to raise the goal even higher.

As the single largest purchaser in the federal government (comprising more than 65 percent of federal spending), DoD is key to achieving small business policy objectives. DoD awarded \$187.5 billion in prime contracts in FY03. These purchases spanned a broad array of goods and services, including weapon systems and their associated spare parts and repairs; research and development; and food, clothing, and janitorial services. Of that \$187.5 billion, 22.4 percent went to small businesses, up from 21.2

¹ There are similar, although considerably lower, goals for women-owned, minority-owned, and service-disabled veteran-owned small firms.

percent the previous year.² The sheer number of dollars involved means that DoD has an enormous impact on the government's ability to reach its overall 23 percent goal, and thus the department, in particular among federal agencies, receives a lot of attention regarding whether it reaches this 23 percent goal itself.

² These statistics can be found online at www.acq.osd.mil/sadbu/statistics/goals.htm (as of October 2005). Foreign military sales are excluded from the calculation of procurement spending, as per official regulations.

Research Objectives

- **The Office of Small and Disadvantaged Business Utilization (SADBU) within DoD asked RAND to help it consider ways to help achieve the 23 percent goal**
- **RAND analyzed data on DoD spending and spending by the rest of the government, as well as small business patterns in the broader economy**

DoD is understandably concerned about its ability to reach the 23 percent target. The goal of our analysis was to suggest potentially fruitful areas for DoD outreach to small businesses. We did so by comparing DoD spending by industry and firm size with data on industry and firm size in the U.S. economy, to establish how prevalent small businesses are in different industries of interest to DoD. We explored the extent to which industries that supply DoD are dominated by large firms, leaving little scope for small business spending, and industries in which it appears DoD may be able to target more spending to small businesses. We also try to gauge the extent to which small firms in an industry rely on DoD contract dollars. A common concern in thinking about small business set-asides and other policy levers intended to provide opportunities for small firms is that these small firms are in some sense propped up by government spending and would be unable to survive and compete in the absence of these contracts. We do not have data to address this issue directly; instead we compare industry sales by small firms with DoD awards to small firms in those industries. Finally, while the main thrust of our research is the industry-by-industry analysis, we also suggest several policy reforms that could make it easier for DoD to reach its small business goals.

What Data Did We Use?

- **The most recent Economic Census data (1997) to study sales by industry and firm size**
- **SBA small firm size guidelines for employment or sales to define small business**
 - **Employment, for most industries, but total sales for others**
 - **Industries with other guidelines (e.g., megawatt hours) were not included in the analysis**
- **DD350 Data (FY03) for DoD spending**
- **Federal Procurement Data System (FY03) for non-DoD spending**

Our study uses the most recently available Economic Census data (1997). The Census Bureau collects data on U.S. businesses every five years, obtaining information about establishments and firms, employment, labor costs, expenses, sales, assets, inventories, and capital expenditures. We intend to examine the 2002 Economic Census data when they become available, because they will provide a more recent industry snapshot. However, data are slow to be released (e.g., the 2002 data will not be available until late 2005).

The SBA has developed business size standards for use in government programs, including which firms qualify as “small.” These vary by industry. For most industries, the SBA has set an employment-based standard, usually 500, 750, or 1,500 employees per firm, depending on the industry. For other industries, such as construction and transportation, it is a sales-based measure. We applied these standards to the Census data to calculate how prevalent small firms are within industries. Two industries have neither an employment- nor sales-based standard. Utilities use a guideline based on megawatt hours, and financial institutions rely on an asset definition. We had no data on power generation or assets with which to gauge firm size in the Census data, and therefore these industries were excluded from the analysis.

We then compare these data on small business prevalence by industry in the economy with DoD procurement spending patterns as well as with non-DoD federal government spending. For DoD spending, we use FY03 DD350 data that record the size of procurement awards and whether the contract is with a small firm.³ It primarily applies to contracts greater than \$25,000. These data feed into the Federal Procurement Data System (FPDS), which contains contract transactions for almost all of the federal government. We did conduct some data cleaning. Small business contracts were validated against Dun & Bradstreet (D&B) data,⁴ which link parent companies and local establishments in determining size. Data coding errors remain in the DD350 and FPDS data that we are unable to correct, given the scope of our research, such as contract awards that contain purchases of both goods and services but must be characterized with a single Product Service Code.⁵ We do not believe, however, that the remaining data coding errors dramatically affect the general finding of the analyses.

³ DD350 refers to the form number used to collect procurement award data for contracts greater than \$25,000.

⁴ The authors obtained D&B local and parent companies data in flat files from DoD's Washington Headquarters Services, Directorate for Information Operations and Reports. DoD receives D&B data monthly. The data used in this report were current as of February 2005.

⁵ See, for example, Lloyd Dixon, Chad Shirley, Laura H. Baldwin, John A. Ausink, and Nancy F. Campbell, *An Assessment of Air Force Data on Contract Expenditures*, Santa Monica, Calif.: RAND Corporation, MG-274-AF, 2005.

Census Data Are Released in Aggregate Form

- **Aggregated by six-digit NAICS code and firm size**
 - Ten size categories per NAICS code
- **Suppressed data on sales and employment in some industry/firm size categories for confidentiality reasons**
 - Prevents identifying a firm if it is the only one in that industry in that size class

The publicly available Census data do not contain information about individual firms. Rather, data are aggregated into cells, defined by industry code and size. The industry code is the 1997 North American Industry Classification System (NAICS), an updated version of the older Standard Industry Code. Size is measured using employment or sales. The employment categories are:

- 1–4 employees
- 5–9 employees
- 10–19 employees
- 20–49 employees
- 50–99 employees
- 100–249 employees
- 250–499 employees
- 500–999 employees
- 1,000–2,499 employees
- 2,500 or more employees.

A given cell, then, would contain data on the number of firms and establishments within each employment category. (Firms may have one or more establishments, but are the controlling organizational entity. For example, someone owning a restaurant chain would own one firm and several establishments.)

Data for other industries are aggregated into sales categories that can vary by industry, but generally they are often as follows:

- less than \$100,000 in annual sales
- \$100,000–249,000
- \$250,000–499,000
- \$500,000–999,000
- \$1–2.49 million
- \$5–9.9 million
- \$10–24.9 million
- \$25–49.9 million
- \$50–99.9 million
- \$100 million or more.

Data are then presented for the number of firms and establishments in each sales category.

The SBA uses data on firm size to certify an entity as a small business. The Census data contain firm-level data for most industries; a few (e.g., mining, construction, manufacturing) have only establishment-level data. We used firm data whenever possible to approximate SBA business size determinations.

Having only establishment-level data in manufacturing was a particular concern given the sector's size and the amount of money DoD spends in it. Later in this briefing, we show that manufacturing is dominated by large establishments and that industries manufacturing parts rather than larger goods (e.g., aircraft engines as opposed to aircraft) have a somewhat higher representation of small establishments, having applied the SBA guidelines to establishments rather than firms. To check whether our results would change if we had possessed data on firms instead of establishments in manufacturing, we compared firm and establishment totals by size according to published County Business Pattern (CBP) data for 1998. Ninety-eight percent of firms versus 89 percent of establishments

have fewer than 500 employees; this rises to 99 and 91 percent, respectively, if we use a 1,000 employee cutoff (CBP does not publish categories that would line up with the 1,500 employee cutoff sometimes used by the SBA). We conclude that our findings would not qualitatively change were we to have firm data in manufacturing rather than establishment data, except that small businesses would be even less prevalent than we report.

In construction, the number of firms and establishments is quite similar; therefore, having only establishment data does not pose a problem. According to the 1998 CBP, the numbers of firms and establishments in construction were similar, with 686,250 firms and 693,018 establishments, virtually all of which had fewer than 500 employees (less than 1 percent of either firms or establishments). The difference in mining is more apparent, with 19,831 firms (of which 2 percent had more than 500 employees) and 24,659 establishments (of which 14 percent had more than 500 employees). However, this industry is not a recipient of a great deal of DoD spending, and thus using establishments rather than firms does not materially change our overall conclusions.

Sample Data for the Construction Machinery Manufacturing Industry

Construction Machinery Manufacturing			
Size Category	Number of Estabs.	Employment	Sales (1,000s)
1-4 Employees	186	365	55,281
5-9 Employees	101	692	130,985
10-19 Employees	103	1,441	215,419
20-49 Employees	147	4,724	819,564
50-99 Employees	97	6,709	1,062,660
100-249 Employees	90	13,973	2,816,081
250-499 Employees	25	NA	NA
500-999 Employees	25	17,424	5,654,058
1,000-2499 Employees	6	9,262	3,221,504
2,500+ Employees	4	NA	NA
Industry Total	784	74,868	21,667,101

The table above shows Census data for construction. There are 186 establishments with one to four employees, for a total employment size of 365 individuals, with sales of \$55 million.⁶ Note that data in some cells are suppressed (indicated with NA for “not available”). For confidentiality reasons, Census data are not provided when only a few firms or establishments are in a category or when a particular firm could be identified, although we know industry totals. We attribute the difference between the industry total and the sum of the known categories in employment and sales to the suppressed categories.

⁶ Construction, manufacturing, and mining have data only on establishments; other industries have data on firms.

Experimented with Alternative Ways to Impute Suppressed Data

- **Used size category (employment and sales) to impute suppressed data**
 - in two-, four-, and six-digit industries
- **Varied results depending on how data are imputed**
- **Selected strategy used relationships between broad size categories and employment or sales across two-digit NAICS codes to impute suppressed data**

We experimented with a number of ways to impute the missing data. This entailed studying the information we did have on employment, sales, and number of firms. For example, we could use average employment per firm to fill in the missing data in that industry. The issue is how to calculate that average. We tried several strategies. One was to look within the six-digit industry at the average size in each size category and use the within-industry trend in this average to impute the suppressed data. Another strategy was to calculate the average size within a category across industries defined at the two- or four-digit level and use that average to impute missing data. We evaluated each strategy by comparing our estimated results with actual results in industries and size categories for which data were available. We came closest to replicating actual data when we imputed suppressed data by calculating averages within size categories across industries defined at the two-digit level.

Census Data Do Not Always Line Up with SBA Small Business Guidelines

- **Assumed firms were uniformly distributed within a category when an SBA size guideline fell within a Census size category to assign a percentage to small business**
 - **If the SBA cutoff was 750 employees, we assigned half of the industry sales in the 500–999 employees category to small business because 750 is halfway between 500 and 999**
- **Experimented with other assumptions**

Another adjustment we had to make for our analysis was to align the Census data to SBA small business size guidelines. Census data are aggregated into categories that do not always line up with the SBA guidelines. For example, in some industries the SBA-defined cutoff is 750 employees, but the Census data report the characteristics for firms with 500 to 999 employees. Thus we needed to make an assumption about how many firms in that category had 500 to 750 employees and could be counted as “small.” We adopted the strategy of assuming that firms were uniformly distributed within the category and that the percentage that could be considered “small” was the same percentage as the SBA cutoff relative to the endpoints. Thus a cutoff situated halfway between the endpoints meant that we attributed half of the category’s employment and sales to small firms. We experimented with assigning all or none of the sales in a category to small businesses to examine the impact on total percentage of sales within an industry attributed to small businesses. For industries with few small businesses, it did not matter much but could vary widely for industries in which small firms make up a sizable percentage of the total. Assuming a uniform distribution was the mid-range strategy (with none or all being the extremes). We also experimented with the assumption that the distribution is geometric; our results indicate that this does not substantively change the results.

Outline

- **Data Overview**
- ***Small Business Activity in the Economy***
- **DoD Spending**
- **Summary**

Once the necessary adjustments were made to the data, we could turn to analyzing small business patterns in the wider economy.

Small Business Sales Vary Widely by Industry

Six-Digit Industry	SBA Firm Size Guideline	Small Business Portion of Total Sales (%)
Nonscheduled Chartered Freight Air Transportation	1,500 Employees	100
Small Arms Ammunition Manufacturing	1,000 Employees	83
Communication Equipment Repair/Maintenance	\$6 Million	59
R&D in Physical/Engineering/Life Sciences	500 Employees	25
Food Service Contractors	\$17.5 Million	12

Our first step was to look at how much variation there is across industries in the extent to which small businesses account for total sales. This reflects their economic power in an industry better than a count of firms. There could be 10,000 small businesses in an industry with 10,001 firms, but if that one remaining firm accounts for 90 percent of the industry's total sales, the fact that there are many small businesses in that industry is of less economic significance.

We find that small business activity in the economy varies widely by industry, with some industries' sales dominated by small firms and others reporting almost no small business activity.

Even Within Manufacturing, Small Business Sales Vary Widely by Industry

Six-Digit Manufacturing Industry	SBA Firm Size (Empl.)	Small Business Portion of Total Sales (%)
Aircraft Manufacturing	1,500	6
Aircraft Engine and Engine Parts	1,000	36
Guided Missile and Space Vehicles	1,000	7
Guided Missile and Space Vehicle Propulsion Units and Unit Parts	1,000	35
Search, Navigation, Guidance Systems and Instruments Manuf.	750	22
Turbine and Turbine Generator Set Unit Manufacturing	1,000	28

In general, large firms dominate manufacturing. Nonetheless, small businesses are more common in industries that manufacture parts rather than whole items (e.g., aircraft engines and engine parts rather than aircraft). This suggests that if DoD could obtain small business purchasing credit for subcontracts, it would be more easily able to meet congressional goals. This is particularly relevant for industries in which DoD is often the final purchaser, such as in guided missiles and space vehicles, because it is DoD purchases of the final products that stimulate the demand for parts that can be met by small businesses.

Outline

- **Data Overview**
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- ***DoD Spending***
- **Summary**

We turn next to DoD spending patterns to examine which industries supply the goods and services the department contracts for, whether this spending goes to small businesses, and the extent to which the small business portion of that industry is dependent on DoD spending for its existence.

Half of DoD Spending Occurs in Just Ten Industries

Industry	% of DoD Spending	% of DoD Spending to Small Business	% of Industry Sales by Small Business
Aircraft Manufacturing	11	1	6
Engineering Services	9	17	28
R&D in the Physical, Engineering, and Life Sciences	9	15	25
Other Aircraft Parts and Auxiliary Equipment Manuf.	4	12	40
Ship Building and Repairing	4	11	37
Facilities Support Services	3	14	19
Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	3	5	22
Aircraft Engine and Engine Parts Manufacturing	3	4	36
Direct Health and Medical Insurance Carriers	3	0	0
Commercial and Institutional Building Construction	2	45	42
Total	51	11	

Fifty-one percent of DoD spending is concentrated in just ten industries, as listed in the left column. The next column shows the percentage of total DoD spending expended in that industry. Reading down the first column of numbers, aircraft manufacturing accounted for 11 percent of DoD spending in FY03, and engineering services accounted for 9 percent. The next column shows what percentage of DoD spending in that industry went to small businesses (where small is defined according to the SBA definition). For example, 17 percent of DoD spending on engineering services went to small businesses, while only 1 percent of DoD spending in aircraft manufacturing went to small businesses. The right column shows what percentage of all sales in that industry—economywide, not simply to DoD—was by small businesses (again, where small is defined by the SBA). For example, small businesses accounted for 6 percent of sales in aircraft manufacturing and 28 percent in engineering services.

The comparison of the middle and right columns suggests areas where DoD might find opportunities to expand its small business spending, with an important caveat. We do not have any additional detail on these industries. We do not know, for example, whether DoD is in the market for the kinds of airplanes that small businesses manufacture. It may be the case that small businesses in that industry produce lightweight planes for hobbyists. Thus we suggest targeting these industries for further exploration, but we fully expect that at least a few of these industries will

prove to be dead ends because the product sold by small firms is not suited for DoD needs.

Nonetheless, if the DoD procurement from small firms in these industries were to equal the industry average in these ten industries, small business spending would double, from 11 percent to 23 percent.⁷ This would be more easily achievable in some industries than others. DoD already spends at parity in the commercial and institutional building construction industry. Aircraft manufacturing is not a particularly conducive industry for small businesses, at only 6 percent penetration, but more than a quarter of sales in engineering services are by small businesses. Aircraft parts manufacturing, both auxiliary equipment and engines, could be another promising avenue. These industries also, however, point to another data limitation in addition to the one noted above, in that we do not know how much of the final demand for those products is already driven by DoD demand. Small businesses may operate as subcontractors on DoD projects in these industries that manufacture parts. In other words, DoD may already contribute more to small business sales in those industries than the data indicate and therefore will have less room to expand its purchases than it at first appears. The next slide suggests, however, that this is not a binding constraint.

⁷ We estimate this by holding total industry spending constant and reallocating within-industry spending to small firms such that the percentage of spending going to small firms equals the industry average.

There May Be Room to Expand Small Business Sales in Some of These Industries

Industry	% of Industry Sales by Small Business	% of Industry Small Business Sales to DoD	DoD Spending on Small Firms (millions)
Aircraft Manufacturing	6	<1	\$119
Engineering Services	28	3	\$3,030
R&D in the Physical, Engineering, and Life Sciences	25	25	\$2,747
Other Aircraft Part and Auxiliary Equipment Manufacturing	40	5	\$1,006
Ship Building and Repairing	37	8	\$843
Facilities Support Services	19	15	\$877
System and Instrument Manufacturing	22	1	\$267
Aircraft Engine and Parts Manuf.	36	1	\$213
Direct Health and Medical Insurance Carriers	0	0	\$0
Comm. and Inst. Building Construction	42	1	\$2,256

If DoD already accounts for the majority of sales by small businesses in an industry, that may not leave much room for increasing small business purchasing. Conversely, industries with significant small business activity that do not appear to rely on DoD for sales may represent areas where DoD small business utilization could increase.

We compared the dollar amount of small business sales in an industry with the amount DoD purchased in prime contracts from small businesses in that industry. A percentage close to zero suggests that DoD is not a major customer of small businesses in that industry (again, in terms of prime contracts). It may be the case that DoD is a major customer for certain small firms in that industry, but this is not an industrywide effect. A percentage close to 100 suggests that DoD is virtually the only customer for small businesses in that industry.

The left column of numbers is reproduced from the previous slide, comprising the percentage of industry sales accounted for by small businesses. The point to keep in mind is that while none of these industries is dominated by small business, most have at least 20 percent of sales made by small businesses.

The middle column estimates what percentage of small business sales in each industry was made to DoD. We calculated this by dividing 2003 DoD sales to small businesses in each industry by economywide small business

sales in each industry in 1997 inflated to 2003 dollars using the Consumer Price Index. As long as industries remained fairly similar in their mix of large and small firms between 1997 and 2003,⁸ this should be a reasonable proxy for the extent to which DoD is a large customer for small businesses in that industry.

The results demonstrate the variation in the extent to which DoD is a major customer in these industries. Six percent of aircraft manufacturing sales are made by small businesses, and less than 1 percent of those sales are to DoD. In fact, apart from research and development (R&D) and facilities support services, most small businesses in these industries rely on customers other than DoD for their revenue. This may suggest that there is room for DoD to expand its efforts to target small firms in these industries. However, as we noted previously, we do not have more detailed information within these industries that would illuminate whether small businesses supply products that meet DoD requirements. For example, some small firms might specialize in an aspect of ship repair that has no relevance for the DoD. We provide this list of DoD's top industries as a good place to start exploring potential opportunities to expand small business utilization; however, we do not guarantee that those opportunities definitely exist.

It is tempting to compare across the columns, but this type of comparison should be resisted. For example, in R&D, both columns show 25 percent, but this does not mean that there is "parity" in some sense. It simply means that a quarter of industry sales are made by small businesses, and of that quarter, 25 percent are to DoD. In other words, the fact that there is a gap between the columns may not be a concern, nor necessarily is the fact that the numbers in the middle column are low.

In fact, what may be a relatively small part of DoD overall spending is still a great deal of money. For example, in FY03, DoD spent \$21.3 billion on aircraft, less than 1 percent of which went to small businesses in that industry. That can be a substantial amount of money—in this case, almost \$119 million.

⁸ Later in this briefing, we examine CBP data that suggest that industries have remained relatively stable in terms of the percentage of firms in the industry that qualify as "small."

Other Possible Industries for Small Business Outreach

Industry	% of DoD Spending	% of DoD Spending to Small Business	% of Industry Sales by Small Business
Petroleum Refineries	2.3	8	77
All Other Professional, Scientific, and Technical Services	1.5	15	59
Nonscheduled Chartered Freight Air Transportation	0.6	4	100
Ammunition (except Small Arms) Manufacturing	0.8	6	84
Other Communications Equipment Manufacturing	1.1	17	67
Other Computer-Related Services	1.4	28	61
Military Armored Vehicle, Tank, and Tank Component Manufacturing	1.0	3	53
Small Arms Ammunition Manufacturing	0.6	5	54
Scheduled Passenger Air Transportation	0.4	0	69
Custom Computer Programming Services	1.1	27	47

Other Possible Industries for Small Business Outreach—continued

Industry	% of DoD Spending	% of DoD Spending to Small Business	% of Industry Sales by Small Business
Motor Vehicle Body Manufacturing	0.3	12	88
Scheduled Freight Air Transportation	0.3	6	78
Power Boiler and Heat Exchanger Manufacturing	0.3	1	87
Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	1.1	17	35
Blankbook, Looseleaf Binders, and Devices Manuf.	0.3	0	68
All Other Misc. Electrical Equip. and Component Manuf.	0.3	16	89
Other Electronic Component Manufacturing	0.4	24	81
Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing	0.4	2	53
Bare Printed Circuit Board Manufacturing	0.3	4	67
Fabric Coating Mills	0.2	28	100

We also examined which industries, in addition to the ones already discussed, showed the greatest gap between DoD reliance on small firms

and the prevalence of the small business in the broader economy. We calculated the gap by comparing current DoD spending with what spending would be if the percentage of DoD spending in that industry equaled the small business percentage of total industry sales. As the chart shows, these industries are dominated by small businesses.

We are not advocating that DoD try to equate the percentage of its spending on small businesses in an industry with the percentage of industry sales made by small businesses. Rather, our calculations simply served as a way to sift through the data for industries in which DoD spends a lot of money or in which the gap between the DoD reliance on small business and the industry prevalence of small businesses was particularly large. Again, 84 percent of ammunition manufacturing sales may be made by small businesses, but this does not mean that these small businesses necessarily produce the product DoD requires. However, it is an industry in which it may prove fruitful to explore further opportunities for small business utilization, including, perhaps, programs designed to help small firms make the products DoD requires.

Other Government Spending Is Higher in Industries with More Small Businesses

Top Ten Industries as a Percentage of Non-DoD Government Spending	% of non-DoD Federal Government Spending	% of non-DoD Spending to Small Business	% of Industry Sales by Small Business
R&D in the Physical, Engineering, and Life Sciences	13	7	25
Facilities Support Services	11	11	19
Other Computer Related Services	5	37	61
Admin. and General Management Consulting Services	4	32	33
Engineering Services	3	20	28
Computer Systems Design Services	3	19	37
Pharmaceutical Preparation Manufacturing	3	0.1	51
Lessors of Nonresidential Buildings	2	42	42
Custom Computer Programming Service	2	40	47
Ammunition (except Small Arms) Manufacturing	2	0	84
Total	48	36	48

It is possible that reaching Congress’s small business spending goal is more difficult for DoD than for the rest of the federal government because of the industries it buys in and the unique nature of some of its needs. To examine this, we compared FPDS data on non-DoD spending in the federal government with DoD spending. The chart above shows the top ten spending categories for the non-DoD federal government. The first column indicates the percentage of non-DoD government spending concentrated in each industry; the middle column shows what percentage of those dollars go to small businesses; and the right-hand column shows our estimates from the Economic Census of the extent of total industry sales accounted for by small businesses.

Forty-eight percent of non-DoD federal government spending is concentrated in these ten industries; about 36 percent of those dollars flow, in turn, to small businesses. There is some overlap between DoD and non-DoD purchasing: R&D, facilities support, and engineering services appear on both top ten lists. The DoD list contains more industries related to aircraft and ships, whereas the non-DoD list has more computer-related industries.

We simulated what DoD spending on small businesses would be if it had the same industry mix in its purchases as the rest of the federal government. We did this by recalculating the total dollars spent in each

industry so that, as a percentage of total spending, they would match the non-DoD distribution. For example, we recalculated DoD spending such that it spent 13 percent of its funds on R&D, as the rest of the government does, rather than the 9 percent it spends now.

We then multiplied this dollar amount by the percentage of DoD spending on small businesses in each industry. (In other words, we assumed that DoD reliance on small firms in each industry would remain as it is currently.) We found that the dollar amount DoD spends on small businesses would rise by 31 percent if DoD had the same industry mix as the rest of the federal government. This suggests that, indeed, the particular product DoD requires does make achieving the congressionally mandated goal of 23 percent substantially more difficult for the department than for the rest of the federal government.

***DoD Relies More on Small Businesses in Some Industries,
Less in Others Relative to the Rest of the Federal Government***

Industry	% DoD Spending to Small Business	% non-DoD Spending to Small Business	% of Industry Sales by Small Business
Aircraft Manufacturing	1	20	6
Engineering Services	16	19	28
R&D in the Physical, Engineering, and Life Sciences	20	8	25
Other Aircraft Parts and Auxiliary Equipment Manuf.	14	21	40
Ship Building and Repairing	13	91	37
Facilities Support Services	21	6	19
Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	5	8	22
Aircraft Engine and Engine Parts Manufacturing	4	2	36
Direct Health and Medical Insurance Carriers	0	5	0
Commercial and Institutional Building Construction	41	54	42

Even if DoD and the rest of the government differ in the industries they rely on for their procurement needs, there might still be mutually beneficial discussions between DoD and other departments and agencies about how to reach out to small businesses in industries in which the products they buy are apt to be similar. For example, DoD relies more on small businesses for R&D and facilities support; the rest of the government relies more on small businesses in engineering services and in commercial and institutional building construction.

***DoD Small Business Utilization
Is Relatively High in Some Industries***

Industry	% of DoD Spending	% of DoD Spending to Small Business	% of Industry Sales by Small Business
Commercial Lithographic Printing	0.1	100	86
Food Service Contractors	0.3	24	12
Computer Facilities Management Services	0.2	43	6
Industrial Non-Building Structure Construction	0.7	47	28
Drugs and Druggists' Sundries Wholesalers	0.6	48	25
Bridge and Tunnel Construction	0.5	54	39
Electronic Computer Manufacturing	0.7	28	24
Other Telecommunications	0.2	35	30
Men's Footwear (except Athletic) Manufacturing	0.1	70	62
Security Guards and Patrol Services	0.2	41	37

***DoD Small Business Utilization
Is Relatively High in Some
Industries—continued***

Industry	% of DoD Spending	% of DoD Spending to Small Business	% of Industry Sales by Small Business
Satellite Telecommunications	0.2	43	12
Truck, Utility Trailer, and RV Rental and Leasing	0.1	71	21
Data Processing Services	0.1	41	14
Navigational Services to Shipping	0.1	88	30
Wired Telecommunications Carriers	0.9	31	30
Other Computer Peripheral Equipment Manufacturing	0.2	42	39
Remediation Services	0.7	41	38
Manufacturing and Industrial Building Construction	2.5	45	42

An earlier slide noted that 51 percent of DoD spending occurs in just ten industries and that, on average, about 11 percent of those dollars flow to small businesses. This implies that, to reach the congressional goal of 23 percent small business utilization, DoD must rely heavily on small businesses in the many industries that comprise the remaining 49 percent of DoD spending. We list some of these industries, screening out those in which spending is relatively miniscule, to note that they would probably not be logical first targets for increased small business utilization. However, DoD could also try to build on its successes in these industries to further rely on small firms.

Industry Size Distribution Has Been Stable Since 1997

- **County Business Pattern Data** are available for the years between Censuses
 - We studied trends in the percentage of firms in an industry with fewer than 500 employees from 1998 to 2002
- **Most industries are stable:** Over time, the same percentage of firms in the industry have fewer than 500 employees
- The percentage of small firms declined in **Military Armored Vehicle, Tank, and Tank Component Manufacturing**
- There is some evidence of more small firms in **Petroleum Refineries, Aircraft Manufacturing, and Ammunition (except Small Arms) Manufacturing**

We were concerned about using Economic Census data from 1997 and, therefore, sought more up-to-date information on the percentage of firms in an industry that qualify as small (according to the SBA definition). There are limited data with which to examine this. CBP data are available every year, including those between Censuses. Data through 2002 have been released and are published on the Census Bureau Web site (www.census.gov/epcd/cbp/view/cbpview.html). The data have the advantage of being comparable over time, and they contain some data on firm size (by six-digit NAICS). The disadvantage is that the data are not available in a form that makes it straightforward to apply SBA definitions about sales or employees to define a small business.

More specifically, CBP data publish the number of firms in each of ten specified employment size categories, such as “0 employees,” “1–4 employees,” and so on. This means that, because revenue data are not available, we cannot apply SBA small business size guidelines that operate according to revenue rather than employment. We also cannot apply the SBA employment size guidelines that are larger than 500 because the largest size category in the data series that presents the results by six-digit NAICS is “500 or more” employees. (The SBA Office of Advocacy uses a 500 employee cutoff to define small firms; the size categories that vary by industry are for government use only.) Thus what we can do is study trends in the number of firms that fall below the 500 employee mark. If

consolidation is evident in the industry, it should be apparent from these data.

We found overall evidence of stability, shown in Table 1 below, in industries in which DoD makes major purchases, such as in aircraft parts manufacturing, engineering services, and aircraft engine manufacturing. The table fixes the percentage of firms with fewer than 500 employees at its 1998 level (indexed to 1) and then measures change relative to that year. For example, the table shows that between 1998 and 1999, the percentage of firms with fewer than 500 employees in the petroleum refinery industry grew by 3 percent. The percentage of the industry consisting of firms with fewer than 500 employees declined in military armored vehicle, tank, and tank component manufacturing, and there was some evidence of small firm growth in petroleum refineries, aircraft manufacturing, and ammunition (except small arms) manufacturing.

Our limited evidence does not suggest significant industry consolidation to the point at which firms would be too large to compete for small business contracts.

**Table 1: Percentage of Firms in Industry with Fewer Than 500 Employees,
Indexed to 1998**

Industry	1998	1999	2000	2001	2002
Petroleum refineries	1	1.03	1.04	1.09	1.17
Other aircraft parts and auxiliary equipment manufacturing	1	1.00	1.01	1.00	0.99
Engineering services	1	1.00	1.00	1.00	1.00
Ship building and repairing	1	1.00	1.00	1.01	1.01
Aircraft engine and engine parts manufacturing	1	0.98	0.98	0.97	0.98
All other professional, scientific, and technical services	1	1.00	1.00	1.00	1.00
Aircraft manufacturing	1	1.02	1.03	1.04	1.05
Nonscheduled chartered freight air transportation	1	0.99	0.99	1.01	1.01
Ammunition (except small arms) manufacturing	1	1.02	1.06	1.14	1.11
Other communications equipment manufacturing	1	0.99	1.00	0.99	1.00
Other computer-Related services	1	1.00	1.00	1.00	1.00
Military armored vehicle, tank, tank component manufacturing	1	0.99	0.95	0.89	0.84
Search, detection, system, and instrument manufacturing	1	0.99	1.00	1.00	1.00
R&D in the physical, engineering, and life sciences	1	1.00	1.00	1.00	0.99
Small arms ammunition manufacturing	1	1.01	1.01	1.00	1.00
Scheduled passenger air transportation	1	0.99	0.99	0.99	0.98
Custom computer programming services	1	1.00	1.00	1.00	1.00
Scheduled freight air transportation	1	0.99	0.99	1.00	1.01

SOURCE: County Business Patterns (1998–2002).

Outline

- **Data Overview**
- **Small Business Activity in the Economy**
- **DoD Spending**
- ***Summary***

Summary

- **Analysis suggests industries that DoD should consider in its efforts to raise small business purchasing**
- **Focus on the industries in which DoD spends more than half its funds because they are large enough that additional outreach efforts could affect DoD's "bottom line," its ability to meet its small business spending goal**
 - **These include: Engineering Services, Aircraft Engine and Parts Manufacturing, Ship Building and Repair, and Search and Navigation Equipment Manufacturing**
- **Other possible industries include: Petroleum Refineries, Professional Services, Ammunition Manufacturing, and Other Communications Equipment Manufacturing**

RAND analyzed data internal and external to DoD to study how small and disadvantaged businesses participate in DoD contracts, to establish empirical patterns in the DoD's reliance on small businesses, and to place them in their larger economic context. We used DD350 data on DoD contracts worth \$25,000 or more, national Economic Census data, and FPDS data on contracts awarded by federal agencies. We compared the extent to which DoD small business purchasing differs from the rest of the federal government simply due to the different industries they purchase from as opposed to differing ability to reach small businesses in an industry. We also compared DoD and other federal purchasing patterns with economywide data from the Economic Census to study how small business patterns differ between the industries DoD purchases from and those of the rest of the federal government. These analyses rely on Economic Census data from 1997. When the 2002 Census becomes available sometime in 2005, we will augment our analysis with more up-to-date data. Our analysis of CBP data from 1998 to 2002 suggests that our findings will not change dramatically.

We focused our analysis first on DoD's largest supplier industries, because those are the ones for which spending is high enough that additional small business targeting could have an impact on the overall percentage of DoD spending flowing to small businesses. That is, an enormous small business outreach effort in an industry in which DoD

does not spend a lot of money will not have a large impact on DoD's ability to meet its small business spending goals. Our analysis suggested industries DoD should consider in its efforts to raise small business purchasing, including engineering services, aircraft engine and parts manufacturing, and search and navigation equipment manufacturing.

We then studied industries with the largest gap between the percentage of DoD spending on small firms and the size of the small business sector in that industry, ignoring industries in which DoD spends relatively little money. This suggested another set of industries to target for additional small business outreach: petroleum refineries, professional services, ammunition manufacturing, and other communications equipment manufacturing.

Our analysis used NAICS definitions, which code industries at the six-digit level. We do not have more detailed information within these industries that would illuminate whether small businesses supply products that meet DoD requirements. This means that, while we suggest industries for further study, there is no guarantee that there are plentiful opportunities to expand small business purchasing in those industries, given the kinds of products the DoD requires. For example, some small firms might specialize in an aspect of ship repair that has no relevance for DoD. Nonetheless, our analysis suggests that these industries are a good place to start exploring potential opportunities to expand small business utilization.

Finally, we compared DoD spending to the rest of the government. We found that DoD small business spending would rise by 35 percent if the distribution of its spending across industries looked like that of the rest of the government. The nature of much of DoD spending makes it more difficult for DoD to reach congressionally mandated goals regarding small business utilization than is true of the rest of the government.

Some industries that supply DoD are dominated by small businesses, such as construction. Others, such as manufacturing, do not support many small businesses. It should not be surprising that procurement of fighter jets, aircraft carriers, and missile systems does not have many small business prime contractors. Yet, small and disadvantaged businesses can contribute in important ways to even the largest projects as subcontractors to large firms (e.g., creating new technologies or subsystems for weapon systems). Indeed, given the challenges associated with being a prime government contractor and the potential benefits of mentor-protégé relationships with large, well-respected firms, some small and disadvantaged businesses may best be served by acting as subcontractors on large government contracts.

The main impetus for this research was to suggest industries that DoD could target for outreach and to note industries in which the department already performs relatively well and perhaps does not need to target, at least in its initial efforts. Another option would be for DoD to increase the amount of outsourcing it does in industries in which small businesses are prominent. However, one might also reconsider whether the 23 percent goal is the right numerical target. We have been unable to document how and why that particular number was chosen as the target, which suggests a certain degree of arbitrariness. Now that the government has had experience with this policy, the time may have come to reassess whether the policy is having the intended effect and whether an across-the-board 23 percent is the right target. Considering the vast sums DoD is required to spend on goods that do not lend themselves to small business participation as prime contractors, perhaps it should be held to a lower percentage goal than are other government entities. Another way to take into account the different spending requirements of DoD would be to credit the department with subcontracts to small businesses in large weapon systems manufacturing, an industry in which demand for the final product is largely determined by DoD needs. One could also imagine simply taking weapon systems spending out of the calculation of small business percentages, much as foreign arms sales are removed from calculations currently. Similarly, DoD expenditures on health insurance are included in its procurement spending, even though it is a military employee benefit. Moreover, by design, insurance schemes are large so that risk can be spread across many individuals; this is not a field conducive to small business development. This spending would be a logical candidate for exclusion from procurement calculations. Finally, rather than varying the 23 percent target by department or agency, one could also imagine a policy in which small business spending targets are set by industry or broad industry classes, just as the SBA size guidelines that apply to government procurement vary by industry.

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