Air Force Institute of Technology

AFIT Scholar

3-10-2004

Measuring Small Business Participation in Air Force Contracting: the Impact of Acquisition Reform

William C. Pike

Follow this and additional works at: https://scholar.afit.edu/etd

Part of the Government Contracts Commons

MEASURING SMALL BUSINESS PARTICIPATION IN AIR FORCE

CONTRACTING: THE IMPACT OF ACQUISITION REFORM

THESIS

William C. Pike, Captain, USAF

AFIT/GAQ/ENV/04M-10

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

AFIT/GAQ/ENV/04M-10

MEASURING SMALL BUSINESS PARTICIPATION IN AIR FORCE

CONTRACTING: THE IMPACT OF ACQUISITION REFORM

THESIS

Presented to the Faculty

Department of Systems and Engineering Management

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Acquisition Management

William C. Pike, BS

Captain, USAF

March 2004

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

AFIT/GAQ/ENV/04M-10

MEASURING SMALL BUSINESS PARTICIPATION IN AIR FORCE
CONTRACTING: THE IMPACT OF ACQUISITION REFORM

William C. Pike, BS
Captain, USAF

Approved:

//signed//	10 Mar 2004
Patricia G. Luna (Chairwoman)	date
//signed//	10 Mar 2004
Michael A. Greiner (Member)	date
//signed//	10 Mar 2004
Timothy S. Reed (Member)	date
//signed//	10 Mar 2004
Teresa F. Rendon (Member) ASC/BC, Wright-Patterson AFB	date

AFIT/GAQ/ENV/04M-10

Abstract

Congress has mandated the Air Force to reform and streamline its acquisition procedures while promoting participation by small business contractors. Reports on the federal government as a whole suggest that the acquisition reforms have had a negative effect on small business participation, with a declining number of small businesses receiving contract awards.

Contracting with small business should be done for reasons beyond Congressional mandates. Small businesses' innovativeness and entrepreneurialism provide benefits that the Air Force should seek to maximize.

A causal regression model is used to determine that the Air Force has actually increased the number of small businesses receiving contract awards over the past thirteen years and has maintained a steady stream of new small businesses into that group. Variables are tested to determine their effect on small business participation. Those tests reveal that number of contract awards and number of government-wide agency contract orders placed are useful for predictive purposes.

The research also identifies two performance measurements for the Air Force small business office: total number of small business contractors and total number of new small business contractors. Goals for these metrics and strategies to reach those goals should be developed by the small business program.

To my family

Acknowledgements

I would like to thank Dr. Patricia Luna, my advisor, for her constant support and encouragement. I also would like to thank my committee members, Lieutenant Colonel Tim Reed, Major Mike Greiner, and Ms. Teresa Rendon, for their guidance and support.

Thanks to Mr. Dave Pfister at the Defense Information Systems Agency for his assistance in obtaining the data used in this research. I appreciate the support and guidance provided by Mr. Joseph Diamond and Mr. Matt Benavides of the Air Force Small Business office. Mr. Tony Lander's leadership of the Data IPT provided needed guidance and insight. I am also grateful to Mr. Dave Jackson and the Air Force Outreach Program Office for their support of my research.

I am particularly indebted to my wife for her unwavering and amazing support and love. To my children, goes immense appreciation and love because you have been an unbelievable source of inspiration. Ultimately all thankfulness goes to my Lord and Savior, Jesus Christ, through whom all things are possible.

Table of Contents

List of Figures

List of Tables

MEASURING SMALL BUSINESS PARTICIPATION IN AIR FORCE

CONTRACTING: THE IMPACT OF ACQUISITION REFORM

I. Introduction

Background

As President George W. Bush remarked in St. Louis, Missouri on January 22, 2003

"It's important for our fellow Americans to understand that the strength of our country,

the strength of our economy really depends upon the strength of the small business

community all across America" (Bush, 2003). Small businesses are an integral part of

the American economy. Reasons why small businesses are vital are reflected in President

Bush's Small Business Agenda. "Small businesses are the heart of the American

economy because they drive innovation . . . these dynamic companies also drive the job

creation process . . . entrepreneurship has become the path to prosperity" (The President's

Small Business Agenda, 2002:1).

Recognizing the innovativeness and entrepreneurial spirit that small businesses

contribute to the economy, Congress and the president have enacted legislation over the

past fifty years to help protect and develop small businesses. Much of this legislation

focuses on ensuring fair competition in federal government contracting for small

businesses. From the Small Business Act of 1953 to bills pending in the current

Congress, the leadership of the federal government has demonstrated a commitment to

small businesses. It is this commitment that led to the development of small business

programs in every federal agency and established specific goals of percentages of

contracts awarded to small businesses for those agencies.

But despite this commitment, problems exist in federal government contracting

efforts with small business. Congresswoman Nydia M. Velázquez serves as the ranking

Democratic member of the House Small Business Committee. Her office provides an

annual report card on the status of the federal government small business program. In the

2003 edition, twelve of the twenty-one federal agencies scored D or F, including the

Department of Defense, which improved from an F in 2002 to a D in 2003 (Velázquez,

2003: 12). Velázquez notes that "the trend is apparent—while the federal government's

buying power is at an all-time high, its small business goal achievement is at an all-time

low" (Velázquez, 2003: 15).

In a separate report, Congresswoman Velázquez enumerates a top ten list of contracts

that hurt small business. Two Air Force contracts made the list. In this report, Velázquez

concludes that the Air Force plays "a shell game of moving multimillion-dollar federal

contracts to locations where another federal agency may agree to their procurement

strategy of choice" and by doing so "the Air Force is excluding small businesses from the

federal contracting arena" (Velázquez, 2002: 5).

In addition, acquisition reform initiatives have impacted small businesses. A report

prepared by the Office of Management and Budget determined that since 1990, the

number of small businesses contracting with the federal government had been reduced by

nearly fifty percent, from over 25,000 to nearly 12,000 (Office of Management and

Budget, 2002: 5). The report suggests that contract bundling, multiple award contracts

(MACs), and government-wide acquisition contracts (GWACs), each a product of reform efforts, are the culprit behind the reduced small business base for the federal government as a whole (Office of Management and Budget, 2002: 5).

Efforts to reform the federal procurement process span over forty years but accelerated in the 1990s. Congress began a major effort to streamline the Department of Defense's acquisition process with the Defense Acquisition Workforce Improvement Act of 1990. As budgetary constraints forced the Department of Defense to rethink how it contracts for supplies and services, these legislative reforms had both intended and unintended effects on small businesses. In some cases, the impact of the reforms on small business participation is unknown and immeasurable due to the lack of data collected on those contracts. New reforms are continuously proposed, including those that are a product of the current effort to transform the military. Each of these reforms has the potential to either positively or negatively affect the success of the small business program.

One potential reason the impact of acquisition reform efforts on small business participation is unclear is that the success of the small business program is measured by a single metric mandated by Congress. This single metric is the percentage of total dollars awarded to small businesses. All small business program goals are based on this single metric.

Based on the percentage of total dollars awarded metric, the small business program of the Air Force has had declining success in recent years. But this metric is greatly influenced by factors such as the overall size of the Air Force budget and may not be the best measure of small business program success. Although this metric is mandated by

Congress, additional metrics may be able to be developed that could present a clearer picture of the state of small business programs.

Small businesses are a vital cog in the American economy. They are also an important contributor to the Air Force mission. This section has introduced the importance of small businesses, discussed the legislative background of the small business program, explored potential problem areas in current small business contracting, and examined the current small business program metric. These topics lay the groundwork of this thesis effort.

Problem

The Air Force Small Business office adopted the Air Force Small Business and HBCU/MI (Historically Black Colleges and Universities/Minority Institutions) Program Plan for Fiscal Years 2003-2007. The plan "outlines four goals that are designed to create a solid foundation to improve the efficiency and effectiveness of the Air Force SB (small business) and HBCU/MI Program" (Department of the Air Force, 2002). The fourth goal of the Program Plan is to "enhance the effectiveness of the SB and HBCU/MI Program through the use of data and analysis" (Department of the Air Force, 2002). An integrated product team consisting of both small business personnel and other military personnel was formed to determine how best to achieve this goal. This research is an outgrowth of that team's efforts.

The purpose of this research is to assist the Office of Small and Disadvantaged Business Utilization in determining the impact of acquisition reform on small business participation. In addition, potential metrics will be identified to assist that Office in

measuring the success of the small business program. Finally, the research will address the potential impact of pending transformation reform initiatives.

Scope

This research focuses specifically on the small business program of the United States Air Force. Only those acquisition reform initiatives that have impacted Air Force contracting procedures will be examined. Specifically, reforms that have produced measurable results will be the focus of the study. Contract data for the time period of 1990 to the present will be examined as this reflects the time frame of the acquisition reform efforts studied. Because of the limited contract data available, the study will only focus on contracts that exceed $25,000. Above this dollar amount, contracting officers must provide an Individual Contracting Action Report, or Department of Defense Form 350. The information from these forms for the Air Force are stored in the J001 database, which is a subset of the federal government-wide Federal Procurement Data System (FPDS). In addition, contracts awarded on the Federal Supply Schedule (FSS) or General Services Administration (GSA) schedules are not included because contractor size has only recently begun to be reported for these contracts.

Research Questions

1) Have acquisition reform initiatives negatively impacted small business participation in Air Force contracting?

2) Should the Air Force Small Business office incorporate the measures of total small business contractors and total new small business contractors into their metrics?

Investigative Questions

What benefits are derived from contracting with small businesses?

What is the history of the small business program in the federal government?

What metrics measure the success of the small business program?

Are those effective metrics or are there alternative metrics that could be used?

How many small businesses have contracted with the Air Force in each year since the Defense Acquisition Workforce Improvement Act of 1990?

How many new small businesses have contracted with the Air Force in each year since the Defense Acquisition Workforce Improvement Act of 1990?

What acquisition reform measures have been enacted and what are their perceived impact on small business contracting?

Have the acquisition reform measures impacted the number of small businesses and new small businesses contracting with the Air Force?

How might proposed transformation reforms affect future small business participation?

Overview

Chapter I provides subject matter background and an introduction to the research and investigative questions. Chapter II furnishes a literature review that summarizes the current status of small business programs. The literature review focuses on the importance of small business, the history of the small business program, acquisition reform efforts and their results, with a specific focus on contract bundling and performance-based service contracts, and an overview of the current metric and potential metrics to measure the success of the small business program. Chapter III presents the research methodology used in the study and identifies the benefits and limitations of the methods used. Chapter IV provides a detailed analysis of the collected data and the

resultant findings. Finally, Chapter V provides conclusions and recommendations for

future research.

II. Literature Review

The purpose of this chapter is to provide background information needed to answer the research questions and to gain an understanding of the research objectives. The first section provides information on the importance of small businesses to the national economy. The following section reviews the legislative history of the small business program. The next three sections examine acquisition reform initiatives affecting Air Force contracting and focus specifically on two products of that reform, contract bundling and performance-based service contracting. A look at current reform efforts, under the heading transformation, follows. The final sections provide information needed to determine if two metrics proposed by this research are appropriate for usage by the Air Force small business program.

Contributions of Small Business

Small businesses contribute to the national economy in several important ways. Acs and Audretsch (1998: 2) point out that small businesses and their owners contribute to the national economy as innovators, entrepreneurs, promoters of international competitiveness, and job generators. The roles of small businesses as innovators and entrepreneurs, in particular, led Denes (1997: 442) to declare, "The encouragement of small businesses is an important goal of many modern governments." This section will focus on small business as a source of innovation, entrepreneurship, and job creation. It will also address the ways that small businesses contribute to the economy and examine the role of the government in promoting small business development.

Innovation.

Small firms can be more innovative than large firms because "they are able to respond quickly to changing market demand, are organizationally flexible, and have efficient internal communications" (Mogee, 2003: 3). Small firms innovate when larger firms are more cautious because "pioneering new markets and providing information in small markets are often inherently risky activities and may yield economic returns that, for larger companies, are not commensurate with risk" (National Academy of Engineering, 1995: 37). Intriguingly, once creative small firms assume these risks, the larger firms are forced to be more inventive as well. One researcher concludes that in markets dominated by large firms, "the small firms must resort to a strategy of innovation in order to remain viable" (Acs and Audretsch, 1988: 687).

Small firms show an additional advantage over large firms: "small firm innovators are extremely effective at producing technically important innovations…small firm innovations are more than twice as likely as large firm innovations to be extremely high impact" (Chi Research, Inc., 2003: 12).

The innovativeness of small firms creates jobs in addition to technological advances. Entire industries may be created through the successful innovation of small firms. One researcher concludes that most growth comes from "comparatively younger firms in newer industries" and that most "economic growth comes from new small businesses which are successful and grow eventually to be large" (Terleckyj, 1999: 3).

Small business plays a vital role in the development of new technology. As the Air Force has become more technologically advanced and focused, the need to encourage small business development and the resultant innovativeness has increased as well.

9

Entrepreneurship.

Creating an economic climate that promotes entrepreneurship is a key element in promoting both innovation and small business. Creating such an environment is vital to the federal government's small business programs. "A cooperative project between an innovative small business and a bureaucratically attuned partner can lead to positive outcomes for the small business project team and many publics" (Brannen and Gard, 1985: 49).

The benefits of entrepreneurship are numerous. Entrepreneurship allocates resources to new competitive uses, it "introduces new knowledge or combines old knowledge in radically novel ways to improve economic performance," as well as creating human capital, "the basic source of innovative activity" (Karlsson and Karlsson, 2002: 179). Promoting entrepreneurship encourages innovative behavior and economic growth. "Entrepreneurship is the best instrument to secure that resources that have become idle are put into productive work as soon as possible" (Karlsson and Karlsson, 2002).

By facilitating an environment that promotes the entrepreneurial spirit, the Air Force serves as agent for achieving an economic equilibrium in addition to promoting innovation. Promoting small business facilitates such an environment.

Job Creation.

Small business plays an important function as a creator of jobs and also serves as an entrance to the workforce for many workers. Studies reveal, "Over a 4-5 year period, about three-fourths (75-80%) of new jobs have been shown to come from small firms. About 30-40% of these new jobs have come from the births of new firms and 60-70% from rapidly expanding 'gazelle' firms" (Office of Advocacy, 2000: 13). "Gazelles" is a

term coined by David Birch, which he defined as a firm that grows "at least 20% a year for four years from a base of at least \$100,000 in revenues" (" The Gazelle Theory", 2001: 29). An example of small business' impact on the labor market is that in 2000, small businesses added "a net total of 2,505,712 employees; they represented 75 percent of net non-farm employment change in the United States" (Office of Advocacy, 2003: 1). (The Department of Labor measures farm and non-farm employment separately. The non-farm labor totals are what are typically reported in the news media.) Clearly, small businesses are a major force in the labor market.

Small firms also fill a critical niche in the job market as "the essential mechanism by which millions enter the economic and social mainstream of American society" (Office of Advocacy, 1998: 4). Small business is "especially crucial in determining the job opportunities for low-skill workers" (Fitzgerald and Ribar, 2001: 1). What distinguishes small businesses in the labor market is their ability "to utilize secondary, or less attractive, resources in the marketplace" (Robbins and others, 2000: 295). These secondary resources are defined as "first time entrants into the job market, the long-term unemployed, individuals at low educational levels, part-time employees, women, certain minorities, immigrants, short-term workers, the previously self-employed and workers under the age of twenty" (Robbins and others, 2000: 295).

Contributions to the Economy.

Small business promotes innovation and entrepreneurship and creates jobs. Each of these functions is an important contribution to the economy. However, small business contributes to the economy in other ways as well. Small business contributions to the economy can be viewed in two ways: quantitatively and qualitatively. From a

11

quantitative perspective, statistical analysis can be used to demonstrate the contributions of small businesses. The qualitative view identifies attributes that enable small businesses to succeed.

The Small Business Administration defines small businesses as those that employ fewer than 500 people. Based on that definition, 99.9% of all firms in the United States are small businesses, and these businesses "accounted for 56.5% of the nation's private sector workforce" (Office of Advocacy, 2000: 7). In addition, 47% of all sales revenue comes from small firms and these firms contributed over 52% of non-farm Gross Domestic Product in 1992 (Office of Advocacy, 2000: 7).

Small firms are more flexible than large firms and thus can respond faster to changes in the environment. This flexibility ensures that "the arrival of any major new technology should favor young, small firms—firms that tend to have a nonhierarchical structure, fewer unionized workers, and fewer outdated management practices" (Jovanovic, 2001: 54).

Joel Popkin addresses two factors that affect small business contribution in the economy. According to Popkin, "the change within each industry sector of the importance of small business . . . and the shift in the economy toward the industries in which small businesses are providing the highest share of output" both help determine the long-term role of small business in the economy (Popkin, 2001: 2).

Government Role.

Small business contributes to innovation, entrepreneurship, job creation, and economic growth, but the involvement of the government in protecting and promoting small business is a topic of substantial debate. Some researchers have concluded that

government involvement is essential to the well being of small business. Lerner questions government promotion of small, high technology firms, but also acknowledges two rationales for government involvement. First, small firms lack the resources needed for research and development (R & D), and government investment can produce substantial returns. Second, the government can serve as a certifier of a small firm's potential success and increase the firm's ability to attract venture capital by demonstrating to other potential investors the legitimacy of the small business (Lerner, 1999: 286). An unintended benefit the government receives from this investment is R & D "spillover," in which the increased innovativeness of one firm in a market leads other firms (both large and small) to increase their investment in R & D (Lerner, 1999: 290).

A recurring concern over small business set-asides by the federal government is that they reduce competition and increase costs for the government. But Denes' (1997: 444) research demonstrates that the number of bidders is not reduced if the procurement is set-aside for small business and that "small business set-asides do not lead to higher cost of contracted services."

Summary of Small Business Contributions.

Small businesses fill an important role in the economy. They are a source of innovation and promote the entrepreneurial spirit. They provide over half of the jobs in the nation and serve an important function as an entry point into the labor market for many workers. Small businesses are flexible and provide an essential boost to economic growth. The federal government encourages and protects small businesses in order to receive these benefits, and does so at a limited cost. The evidence of government encouragement and protection is a long history of legislation and regulation.

Small Business Statutes and Regulations

The small business program has been developed and refined over the past fifty years by Congress and the President through legislation. The current status of the program can be captured in a review of the appropriate regulations that apply to the federal government in general and specifically to the Department of Defense (DoD) and the Air Force.

Statutes.

For over fifty years, laws passed by Congress have emphasized the importance of small businesses. The following section highlights laws relating to Federal procurement and small businesses, presented in chronological order:

* The Small Business Act of 1953 (Public Law 85-536)--Established the Small Business Administration (SBA) as an independent agency within the Federal government. In part the Act reads:

> It is the declared policy of the Congress that the Government should aid, counsel, assist, and protect, insofar as it is possible, the interests of small-business concerns in order to preserve free competitive enterprise, to ensure that a fair proportion of the total purchases and contracts . . . for the Government be placed with small business enterprises . . . and to maintain and strengthen the overall economy of the Nation. (United States Congress, 1953: Sec 2 (a))

* Amendment to the Small Business Act (Public Law 94-305)--Created an Office of Advocacy within the SBA. The law requires the Office of Advocacy to "evaluate Federal and business efforts to assist minority enterprises" and to "propose changes in practices of other agencies to assist small business" (United States Congress, 1976: Title II). The Office of Advocacy serves as "an independent voice for small business in the

formulation of public policy across the entire federal government" (Office of Advocacy, 2000: 4).

     * <u>Amendment to the Small Business Act (Public Law 95-507)</u>--Changed the Small Business Act to provide "maximum practicable opportunity" for "small business concerns owned and controlled by socially and economically disadvantaged individuals" (United States Congress, 1978: Title II). The law requires contractors who submit bids on contracts exceeding $10,000 to submit a subcontracting plan and requires federal agency heads "to establish goals for small business participation in specified federal procurement contracts" (United States Congress, 1978: Title II). A final provision of the law created in each federal agency an Office of Small and Disadvantaged Business Utilization.

     * <u>Small Business Innovation Development Act of 1982 (Public Law 97-219)</u>--Created the Small Business Innovative Research (SBIR) program requiring federal agencies to set goals for reaching research and development agreements with small businesses. By requiring set-asides, the law intended to "strengthen the role of the small, innovative firm in federally funded research and development" (United States Congress, 1982: Title I).

     * <u>National Defense Authorization Act for Fiscal Year 1987 (Public Law 99-661)</u>--Established specific goals for the DoD in three areas: (1) small business concerns; (2) Historically Black Colleges and Universities (HBCUs); and (3) minority institutions (United States Congress, 1986: Title IX, Part B).

     * <u>Small Business Competitiveness Demonstration Program Act of 1988 (Public Law 100-656)</u>--Required quarterly reporting of federal agency small business

participation goal achievement and directed federal agency heads to "implement a program to increase small business participation in agency acquisition of selected products and services in industry categories historically low in participation" (United States Congress, 1988: Title VII, Part B).

    * National Defense Authorization Act for Fiscal Year 1991 (Public Law 101-510)--Introduced two relevant topics. First, it required the Secretary of Defense to establish specific goals for contracting to HBCUs and minority institutions "in order to increase participation of such colleges and universities in defense research programs" (United States Congress, 1990: Title VIII, Part D). Second, the law created the Mentor-Protégé Program "to provide incentives to major DoD contractors (mentors) to help disadvantaged small businesses (protégés) perform as subcontractors and suppliers under DoD and other Government contracts" (United States Congress, 1990: Title VIII, Part D).

    * Small Business Technology Transfer Act of 1992 (Public Law 102-564)--Created the Small Business Technology Transfer (STTR) program that reserves a set percentage of each federal agency's research and development effort for small businesses in a format similar to the SBIR program (United States Congress, 1992: Title II).

    * Federal Acquisition Streamlining Act of 1994 (Public Law 103-355)--Reserved all federal procurements between $2,500 and $100,000 for small businesses. It established goals for awards to small businesses owned and controlled by women. It also authorized agency heads to restrict competition on some contracts to small businesses owned by socially and economically disadvantaged individuals (United States Congress, 1994: Title IV, Section 4004, Title VII, and Title VII, Section 7102).

    * <u>Small Business Reauthorization Act of 1997 (Public Law 105-135)</u>--Established

two new programs: the Historically Underutilized Business Zone (HUBZone) program

and the Service Disabled Veteran's program. The two programs shared the same goal: to

increase federal agency contracting with each set of small businesses. This act also

amended the Small Business Act by:

> Requiring each federal agency to (1) foster the participation of small
> businesses as prime contractors, subcontractors, and suppliers; (2)
> structure its contracting requirements to facilitate competition by and
> among small businesses; and (3) avoid the unnecessary and unjustified
> bundling of contracts that precludes small business participation as prime
> contractors. (United States Congress, 1997: Title IV, Subtitle B)

    The preceding legislation is only some of the legislation guiding federal agency

contracting in relation to small businesses. In the last fifty years, Congress has modified

almost annually the rules of the federal small business program. Specific Acts have

changed the focus of the socio-economic programs established by Congress, but the basic

intent of protecting small businesses and encouraging their growth has remained constant.

Congressional actions to protect and promote small business are the foundation of each

federal agency's small business program.

    Regulations.

    The Federal Acquisition Regulation (FAR) provides the guidelines for the

procurement of supplies and services for the federal government. Each agency within the

government provides a supplement, including the DoD Federal Acquisition Regulations

(DFARs). Within the DoD, each service maintains its own supplement, such as the Air

Force Federal Acquisition Regulations (AFFARs). Within the Air Force, separate

commands also provide their own supplements, such as the Pacific Air Forces Federal

Acquisition Regulations (PAFFARs). These supplements do not change or contradict the FAR laws but instead they provide further insight and explanation for circumstances particular to each organization. The supplements "shall not, except as required by law or as provided in Subpart 1.4 (Deviations from the FAR), conflict or be inconsistent with FAR content" (Federal Acquisition Regulation, 2003: FAR 1.304 (b)(2)).

In the FAR, Part 19 is titled Small Business Programs. Part 19 provides federal employees specific guidance for implementing the laws passed by Congress. The policy section, subpart 19.2, opens by declaring, "It is the policy of the government to provide *maximum practicable opportunities* (emphasis added) in its acquisitions to small business" (Federal Acquisition Regulation, 2003: FAR 19.201). Part 19 outlines the policies of the federal government in regards to small business. From specifying the requirement for each agency to have an Office of Small and Disadvantaged Business Utilization to providing direction on how to locate small business sources and determining fair market prices, FAR Part 19 spells out the requirements established in the Small Business Act and other small business legislation that impact government contracting personnel.

In the DFARs, the relevant section is Part 219. It provides further guidance on performing the specific actions associated with the FAR. It is within the DFARs, for example, that the specific responsibilities of the small business specialist are defined. One of these responsibilities is "reviewing and making recommendations for all acquisitions over $10,000" (Department of Defense Federal Acquisition Regulations, 2003: DFARS 219.201 (d)(10)(A)). The DFARs serves to define items that apply specifically to the military in regards to the small business program.

Summary of Small Business Statutes and Regulations.

Congress and the president determine what actions to take regarding small business legislation. Historically, many of these actions affect the way federal agencies perform their contracting function. When laws pass that change the regulations, then the responsible agencies (such as the Department of Defense, etc.) must review and amend their regulations to implement the required changes. As in other areas of acquisition, the FAR and its supplements serve as a living document to capture the most current status of small business legislation in their regulations.

Acquisition Reform

While the Congressional efforts to support small business have been numerous, the list of attempts to reform the DoD procurement system is just as lengthy. Such efforts can be traced back to the Armed Services Procurement Act of 1947, which was an attempt to standardize purchasing methods between the various military services (Battershell, 1999: 24). This section will focus on reforms made in the 1990s because "reforming government to reduce cost and improve operations has been a major theme throughout the 1990s" (Chinworth, 2000: 165). The purpose of this section is to briefly review three legislative actions and a Supreme Court ruling that directly affect small business participation in Air Force contracting, followed by a review of how these events are perceived to have impacted small business participation.

Defense Acquisition Workforce Improvement Act (DAWIA) of 1990.

 DAWIA is not an acquisition reform initiative per se, because it does not change any of the acquisition processes. DAWIA created an acquisition corps for each component of

DoD and established eligibility and selection criteria for membership in that corps. It also established a training program that emphasized the importance of an educated acquisition workforce (United States Congress, 1990: Title XII). DAWIA created "one of the most comprehensive career development programs in the federal government, designed to ensure that acquisition personnel have the knowledge and skills necessary to perform effectively" ("Under Secretary of Defense (Acquisition and Technology) Sets New Standards for the Defense Acquisition Workforce", 1999: 10).

Continual reform of the training and education requirements of personnel is necessary because the "acquisition workforce of the future must understand and interact effectively with the commercial sector, leverage best business practices and technological advances for continuing process improvement, and possess strong management and leadership competencies" (Cohen, 1998: 22). A more educated workforce is also "the key to successful acquisition reform implementation" (Cooper, 2002: 37).

Federal Acquisition Streamlining Act (FASA) of 1994.

FASA acted upon recommendations from the National Performance Review and the Advisory Panel on Streamlining and Codifying Acquisition Laws and "generated the broadest and most far-ranging changes to the government procurement system in almost a decade" (Tolan Jr., 1998, 89). Among its numerous initiatives, FASA contained four major provisions that directly impact small business.

First, FASA allowed for the creation of multiple-award contracts (MACs), which are used to allow for the acquisition of the same item from multiple firms (United States Congress, 1994: Title V, Subtitle D). MACs are "designed to provide agencies with a

great deal of flexibility in buying goods or services while minimizing the burden on government contracting personnel to administer contracts" (Hecker, 2001).

Second, FASA created the label of micropurchase for those acquisitions of $2,500 or less (United States Congress, 1994: Title IV, Subtitle D).   For these purchases, "government buyers do not have to obtain competition and are not required to purchase goods or services from small businesses" (Hecker, 2001). In addition, FASA raised the Simplified Acquisition Threshold, "the ceiling value at which individual procurement officers can make discretionary purchases without resorting to public procurement competitions" (Chinworth, 2000: 166) to $100,000, and reserved these contracts exclusively for small business.

FASA also signaled a major shift in federal procurement in moving from items purchased using military standards or specifications to commercial items. FASA created "a preference under current law for procurement of commercial items (or nondevelopmental items other than commercial items if commercial items suitable to meet the agency's needs are not available)" (United States Congress, 1994: Title VIII).

Finally, FASA introduced performance-based service contracting (PBSC) "as a method of reducing acquisition costs and improving contractor performance by encouraging innovative approaches to conducting the work within desired outcomes" (Cooper, 2002: 20). PBSC, like the move to commercial items, reflects the reformers efforts to be less prescriptive in the acquisition process. It provides both contracting personnel and prospective contractors greater flexibility in meeting agency needs. Performance-based service contracting will be discussed in greater detail later in this chapter.

Clinger-Cohen Act of 1996 (Clinger-Cohen).

The Clinger-Cohen Act refers to two acts passed under the DoD Authorization Act of 1996, the Federal Acquisition Reform Act (FARA) of 1996 and the Information Technology Management Reform Act (ITMRA) of 1996 (United States Congress, 1996: Division D).

FARA furthered the reforms made in FASA. It established commercial off-the-shelf (COTS) items as a subset of commercial items and "is even more generous in exempting COTS items from federal procurement laws than FASA was in exempting 'commercial' acquisitions from the ordinary bureaucracy of the government purchasing system" (Tolan Jr., 1998: 77). FARA also provided "greater flexibility to agencies in determining who may make purchases of $2,500 or less without competition" (Hecker, 2001).

ITMRA required "all federal agencies to link their technology plans and information technology use to the agency missions and goals" (Chinworth, 2000: 166). ITMRA removed the central authority of the General Services Administration (GSA) to make information technology purchases and "provided for the use of multiagency contracts and what have become known as government wide agency contracts (GWACs) for federal agencies to access each other's information technology contracts" (Hecker, 2001).

Adarand Constructors, Inc. v. Pena (Adarand).

The Adarand case is significant because of its impact on one part of the Air Force small business program, that part dealing with small, disadvantaged businesses (SDBs). Adarand is a small business that bid as a subcontractor to provide guardrails for the federal highway system in Colorado, but lost the contract because of additional compensation provided to the prime contractor to subcontract with SDBs (Wallace and

Schooner, 1997: 3). The Supreme Court concluded, "Government contracting initiatives to favor small and disadvantaged businesses would have to overcome strict scrutiny" (Tolan Jr., 1998: 75). The strict scrutiny test requires the government to determine "whether the interest cited by the government as its reason for injecting the consideration of race is sufficiently compelling to overcome the suspicion that racial characteristics ought to be irrelevant" (Wallace and Schooner, 1997: 6) .

In response to Adarand changes were made to the FAR. According to Welch, "the government's implementation of the Supreme Court's ruling took years and generated more than 150 pages of policy and regulation" (Welch, 2000: 107). The changes were made with the intent of "trying to tailor the remedies more narrowly so that the SDB program will survive strict scrutiny" (Tolan Jr., 1998: 97).

Perceived Effects on Small Business.

There are several reasons why acquisition reform took place. Chinworth outlines several of these:

> Acquisition reform is intended to reduce procurement costs and complexity through streamlined procurement processes, greater autonomy in decision-making at lower levels of government, reduced reliance on military standards and specifications and greater utilization of commercial standards and business practices. Another goal of acquisition reform has been to bring about more commonality in production programs by eliminating DoD-specific requirements in the management of those programs. (Chinworth, 2000: 167)

The reforms made have produced an acquisition culture that is "more team-based, value-based, results-driven, project-oriented, and relationship-focused" (Burman, 2000: 69).

But some question the impact of these reforms on small business. One declares the reforms a Trojan horse to small business and states that they work "against the

23

entrepreneurial instincts and innovative drives of many small- to medium-sized firms; a set of reforms that arbitrarily excludes many of these firms from the opportunity to compete for federal dollars" (Campbell, 1997: 40). Another feels that "regulations intended to streamline, simplify, and speed up government procurement are well and good, but small businesses worry that these reforms may be shutting them out of the federal marketplace" (Burman, 2001: 78). Senator John Kerry, D-Mass, declared in August of 2002 that, "Procurement reform of the early 1990s has not protected small business. We need a major change in how we are thinking about this" (Burman, 2002: 61). The bigger issue may be that "many of these wonderfully effective and efficient acquisition reforms are seldom applied with the intent of benefiting small businesses" (Welch, 2000: 107).

For example, since DAWIA, the DoD "has reduced the acquisition workforce by 42 percent" (Cohen, 1998: 21). Burman feels this exacerbates the negative impact of reforms on small business because "these officials are hard-pressed to keep up with the rules and various protocols associated with each legislative requirement and reporting tools that are frequently weak or nonexistent" (Burman, 2001: 78).

The increased use of MACs and GWACs has raised concerns that large contracts squeeze out small business. Some believe that "these types of contract vehicles can diminish the ability of small businesses to compete for federal contracts since they potentially can consolidate requirements, which small businesses may not have the capacity to meet" (Hecker, 2001).

The change to create a micropurchase level of $2,500 and not require those purchases to go to small business also may negatively affect small businesses. It is possible that

"buyers making micropurchases may be less likely to seek small businesses for these purchases" (Hecker, 2001). An opposing view is that because micropurchases are "typically easy to satisfy by award to local small or small disadvantaged businesses . . . there need be no adverse impact on small business due to this change" (Tolan Jr., 1998: 90). However determining which viewpoint is accurate is difficult because most of these purchases are made with the government purchase card, and "ultimately, there is no good way to determine how much of the credit card business is going to small companies" (Burman, 2001: 78) because part of the reason the government purchase card is used is to reduce paperwork. It is this very paperwork that has been eliminated which is needed to effectively track small business dollars in micropurchases.

Finally, the Adarand case created a great concern among SDBs that their work with the government would be reduced. The reforms made assuaged most of those fears, but "SDBs remain concerned that the affirmative action measures can be curtailed or eliminated based upon the success of SDBs in obtaining government work within certain industries" (Wallace and Schooner, 1997: 10).

Summary of Acquisition Reform.

Several major acquisition reforms in the 1990s completely reshaped the government acquisition process and attempted to streamline the acquisition process. Many of the reforms have created concern among small businesses that they could be negatively affected or even prevented from participating in the federal contracting process. The following sections will look more closely at two byproducts of the reforms that may have impacted small business participation: bundled contracts and performance-based service contracts.

Contract Bundling

Contract bundling is not specifically a product of the acquisition reform legislation of the 1990s, but it is "an acquisition practice that received a lot of attention in the 1990s and is often associated with" the reform legislation (Hecker, 2001). Contracts are bundled because it "makes contract oversight easier for agencies, but it frequently makes new awards so big that small businesses can't compete for the work" (Burman, 2002: 61). The purpose of this section is to review the history of contract bundling and recap what research has been done on its impact on small business.

Definition.

The Small Business Reauthorization Act of 1997 included a definition for a bundled contract. That definition is included in Chapter 2 of the FAR. It reads:

> Bundling means-
> (1) Consolidating two or more requirements for supplies or services, previously performed under separate smaller contracts, into a solicitation for a single contract that is likely to be unsuitable for award to a small business concern due to-
>   (i)   The diversity, size, or specialized nature of the elements of the performance specified;
>   (ii)   The aggregate dollar value of the anticipated award;
>   (iii)   The geographical dispersion of the contract performance sites; or
>   (iv)   Any combination of the factors described in paragraphs (1)(i), (ii), and (iii) of this definition. (Federal Acquisition Regulation, 2003: 2.101(b))

Past Research.

Eagle Eye Publishers produced the first major study to attempt to measure the impact of contract bundling on small business in June of 1997. This study examined federal contract data for the fiscal years 1991 to 1995. The report dealt with the lack of a definition of a bundled contract by identifying Candidate Bundled Contracts (CBCs),

which were defined as "any contract showing multiple SIC (Standard Industrial Classification) codes, multiple types of contract codes or multiple places of performance" (Eagle Eye Publishers, 1997: 9). Based on this definition, the study found that bundling was occurring at an increasing rate. In addition, the number of small businesses and new small businesses receiving contract awards declined as well. The study concludes, "The data show indisputably that fewer and larger contracts are being won by fewer and larger companies. Furthermore, it appears small businesses are being squeezed out of the federal marketplace as these trends occur" (Eagle Eye Publishers, 1997: 17).

The United States General Accounting Office (GAO) published a report in March 2000 on the extent and effect of contract bundling. Using the definition provided by the Small Business Reauthorization Act of 1997, the GAO concluded that many requirements had been consolidated but did not meet the legal definition of bundling. In fact, in reviewing three procurement centers, the report "identified one contract bundling case of all the contract consolidations we reviewed" (General Accounting Office, 2000: 15). The GAO study was limited as "there is very little data on the extent of contract bundling government wide and its effect on small business" (General Accounting Office, 2000: 3).

In September 2000, Eagle Eye published an updated report, this one spanning from Fiscal Year 1992 to Fiscal Year 1999. The updated study used the term explicitly bundled contract (EBC) in place of the CBC term in the first study, but EBCs still reflect a contract with dissimilar SICs, types of contracts, or places of performance (Eagle Eye Publishers, 2000: 5). This study concluded that small businesses were being negatively impacted by contract bundling, and calculated that "for every increase of 100 bundled contracts there was a decrease of 106 contracts to small business; and for every additional

27

$100 awarded on bundled contracts there was a decrease of $33 to small business" (Eagle Eye Publishers, 2000: v).

In 2001, RAND produced a report for the Air Force on how to increase the benefits and savings of contract bundling for service contracts while protecting small business. The RAND study concluded, "Bundled contracts can offer the possibility of significant performance and savings benefits to the Air Force" (Baldwin and others, 2002: 61). RAND recommended that to gain these benefits required improved Requests for Information (RFIs) by Air Force buyers. The study suggested that this could be accomplished by centralizing procurement activity, allowing personnel to become experts at developing quality RFIs. By increasing the continuity and experience levels of buyers, the Air Force would be more likely to bundle requirements in a way that could gain the benefits of bundling while still protecting small business interests. Ultimately, RAND suggested, "Market research for bundling decisions should be integrated within the Air Force's broader purchasing and supply management (PSM) and performance-based services acquisition (PBSA) activities" (Baldwin and others, 2002: 63).

Eagle Eye further updated their research in October of 2002, extending the report to cover through fiscal year 2001. This report argued, "the new, official federal bundled contract indicator . . . masks the harm to small business caused by contract bundling" (Eagle Eye Publishers, 2002: 5). According to the Eagle Eye study, the federal definition:

> . . . Fails to address the phenomenon of "accretive bundling." Accretive bundling occurs when contracting officers add new tasks to existing GSA Schedule, Indefinite Delivery/Indefinite Quantity (IDIQ), Government Wide Acquisition Contracts (GWACs), and other multiple award-type contracts. Accretive bundling has become the more widely practiced form

of bundling since the procurement reforms of the mid-1990s, and bundling has risen significantly since these reforms were implemented. (Eagle Eye Publishers, 2002: 6)

This report also changed its definition slightly, substituting Product Service Codes (PSCs) for SIC codes. This change was required because the government switched to using North American Industrial Codes (NAICS) and stopped tracking SICs in FY 2001 (Eagle Eye Publishers, 2002: 11). This Eagle Eye report reiterated that bundling was increasing in federal procurement and it was negatively impacting small business.

Finally, the Office of Management and Budget prepared a strategy for dealing with the effects of contract bundling on small business in October 2002. This report used three statistics to support its statement that "the effect of this increase in contract bundling over the past ten years cannot be underestimated" (Office of Management and Budget, 2002: ii). First, the study found that the number of new definitive contracts (over $25,000) had sharply declined, from over 60,000 in DoD in 1990 to under 20,000 by 2001 (Office of Management and Budget, 2002: 4). Second, the number of small business contractors receiving new contract award government wide had decreased from over 25,000 in 1990 to just over 10,000 in 2001 (Office of Management and Budget, 2002: 5). Finally, the number of dollars for orders under existing contracts increased from $21 billion in 1990 to over $72 billion in 2001 (Office of Management and Budget, 2002: 6). The OMB study agreed with the Eagle Eye report that the federal definition of bundled contract was very narrow and proposed changes to limit the impact of bundling on small business.

Summary of Contract Bundling.

Contract bundling has increased over the past decade, in part due to the acquisition reforms of the 1990s. The increased contract bundling has negatively impacted small

business. Unfortunately, varying definitions of a bundled contract and limited data

collection have hampered efforts to quantify that negative impact.

Performance-Based Services Acquisition (PBSA)

PBSA differs from contract bundling in that no studies have been conducted to assess

how the implementation of PBSA has affected small business, as this research will. The

purpose of this section of the literature review is to review the implementation of PBSA

in the Air Force and the reasons for its use.

Definition.

According to the FAR, there are four characteristics of performance-based contracts:

> Performance-based contracts—
> (a) Describe the requirements in terms or results required rather than the
>   methods of performance of the work;
> (b) Use measurable performance standards (i.e., terms of quality,
>   timeliness, quantity, etc.) and quality assurance surveillance plans;
> (c) Specify procedures for reductions of fee or for reductions to the price
>   of a fixed-price contract when services are not performed or do not
>   meet contract requirements; and
> (d) Include performance incentives where appropriate. (Federal
>   Acquisition Regulation, 2003: 37.601)

The idea behind PBSA is to switch from a prescriptive, detailed requirement to an open-

ended, results-based requirement that will allow a contractor to be innovative in how the

requirement is met. Although this research primarily uses the term PBSA, it may be used

interchangeably with the term performance-based service contracts (PBSC), which

appears in several quotations in the following section.

Implementation of PBSA.

PBSA became federal policy in April of 1991, when the Office of Federal

Procurement Policy (OFPP) required agencies to use PBSA "to the maximum extent

practicable when acquiring services" (Ausink and others, 2001: vii). As previously

mentioned, the FASA legislation of 1994 also stressed the use of PBSA for services

acquisition. The FAR was amended in 1997 to reflect the new policy and legislation.

The Air Force published Air Force Instruction (AFI) 63-124, *Performance-Based*

Service Contracts (PBSC) on April 1, 1999 to "prescribe how the Air Force will

implement PBSC and quality assurance in accordance with the FAR" (Ausink and others,

2001: vii). A year later, in April 2000, Jacques Gansler, the Under Secretary of Defense

for Acquisition and Technology, issued a memorandum declaring, "At a minimum, that

50 percent of service acquisitions, measured both in dollars and actions, are to be

performance-based by the year 2005" (Gansler, 2000).

Purpose of PBSA and the Results of Implementation.

The DoD Guidebook for PBSA details five objectives of using PBSA: maximize

performance, maximize competition and innovation, encourage and promote the use of

commercial services, shift in risk (from the government to the contractor), and achieve

savings (Office of the Under Secretary of Defense (Acquisition Reform), 2000: 5). In his

April 2000 memorandum, Gansler states, "In order to maximize performance, innovation,

and competition, often at lower cost, performance-based strategies for the acquisition of

services are to be used whenever possible" (Gansler, 2000).

However, a report of the Interagency Task Force on Performance-Based Service

Acquisition published in July 2003 questions the monetary savings of PBSA, stating that,

"There is little current data to support monetary savings, and if such data did exist, it

would be extremely difficult to isolate the exact reasons the savings occurred" (Office of

Management and Budget, 2003: 10). A RAND report isolated three reasons why

determining savings from PBSA was challenging: contracts change in scope, government cost estimates may be inaccurate, and most savings would be internal costs, and thus hard to measure (Ausink and others, 2001: 34). While the report found that government personnel's opinion of PBSA had improved and that those same personnel perceived improvement in contract performance, "surprisingly little credit was given to PBSA" for that improvement (Ausink and others, 2001: 33).

With only two years remaining before the requirement that 50 percent of service contracts be acquired using PBSA, measures of how widespread it is being used are not available. According to the OMB report, "Agencies have made moderate progress in implementing PBSA, but have experienced difficulties in applying PBSA effectively" (Office of Management and Budget, 2003: foreword).

Summary of Performance-Based Services Acquisition.

Legislation and regulation requires DoD and the Air Force to acquire services using PBSA. Although the use of PBSA is assumed to be increasing, an exact measure of its use is unavailable. In addition, its effects on small business have not been determined. This research will attempt to provide some insight into that question.

Transformation

The previous sections have reviewed prior acquisition reform efforts and initiatives. This section looks at current efforts to change the way the government procures materials and services. Current procurement reforms are classified under the broader term transformation, which applies to a comprehensive review of all aspects of the Department of Defense.

Defined.

As with many terms that become buzzwords, the exact meaning of transformation varies with each individual's perspective. It is not surprising, then, that "many in the acquisition community misunderstand the intended meaning of transformation" (Manchester, 2002: 73). Edward C. "Pete" Aldridge, Jr., the former Under Secretary of Defense (Acquisition, Technology, and Logistics), says transformation has two parts: "Using things we currently have in better, more innovative ways" and "the innovative use of new technology to achieve improvement in capability" (Gasiorek-Nelson, 2003: 22). The Chief of Staff of the Air Force, General John P. Jumper, stated, "There is a lot of talk about transformation today, and the power of transformation . . . is about relationships. It is about the commitment . . . to do things in new and different ways" (Bowman, 2003b: Slide 3). The Assistant Secretary of the Air Force, Marvin R. Sambur declares "We must change the way we do business to deliver capability to the warfighter in a timely, affordable manner" (Sambur, 2003: 1).

Procurement transformation is the "alignment of policies, processes, people and technologies in support of an overall procurement vision" (Bowman, 2003a: Slide 24). The motivation behind procurement transformation is "the Air Force must leverage its 'buying power' to meet the warfighters' needs" (Bowman, 2003a: Slide 5). The key to procurement transformation is that "transformation begins with changing behavior from transactional to strategic" (Bowman, 2003a: Slide 4).

Foundational Research.

Providing much of the basis of procurement transformation efforts is a RAND study commissioned by the Air Force. The study focused on how to implement purchasing and

supply chain management (PSCM) best practices from industry in the Air Force. Because new PSCM "practices in the commercial sector have been reported to substantially improve performance and reduce the costs of purchased goods and services" (Moore and others, 2002: 1), the Air Force could benefit from implementing these practices. In addition, "major changes in the FAR enable all DoD contracting organizations to take advantage of many of the best commercial PSCM practices" (Moore and others, 2002: 19). The study chronicled the most common commercial practices and made recommendations on how they could be implemented in the Air Force, concluding "Sourcing has strategic importance for the Air Force" (Moore and others, 2002: 98). PSCM practices can help the Air Force exploit sourcing's strategic value.

Implementation.

Building on the RAND findings, the Air Force has moved to implement some of these PSCM initiatives through procurement transformation. But transformation extends beyond the Air Force. The DoD has established Business Initiative Councils (BICs) to apply transformation to the acquisition community. The goal of the BICs is "to improve the efficiency of Department of Defense business operations by identifying and implementing business initiatives that create savings to be reallocated to higher priority efforts" (Manchester, 2002: 73).

Within the Air Force, Sambur declares there to be two goals of procurement transformation: a decrease in acquisition cycle time and increased credibility in acquisition execution. Sambur states, "All transformational initiatives must point back toward these two imperatives" (Sambur, 2003: 1). The implementation of procurement transformation is proceeding on several fronts.

One aspect of transformation is professional development and education. The goal here is "to develop mission-focused, multi-skilled business professionals leveraging world-class processes and technology" ("Procurement Transformation Status Update 20 March 2003," 2003: Slide 2). Current training and education requirements are being reviewed to see if they are consistent with new priorities. These new requirements demand that while focusing "on the future, we must transform our workforce to become commodity strategists, supplier relationship managers, and e-Business experts" ("Procurement Transformation Status Update 20 March 2003," 2003: Slide 2).

One direct result of the procurement transformation is the creation of commodity councils. Commodity councils are "cross-functional sourcing teams that use a centralized strategy with a decentralized execution" (Bowman, 2003a: Slide 9). There are four goals of the commodity council: eliminate duplication of effort, minimize supply chain costs through integration/collaboration, demonstrate the power of leveraged purchasing, and meet small business obligations and seize small business opportunities (Bowman, 2003b: Slide 14).

Impact on Small Businesses.

While still a recent initiative, procurement transformation will impact small business participation in Air Force contracting. The reforms made in the name of transformation, however, are reflective of changes occurring in the commercial marketplace. According to Lauren McGregor, manager of supplier diversity for United Technologies Corp., "Supply bases are consolidating, and smaller businesses are typically not necessarily in the position to handle a national or global size contract because of the size of their business" (Milligan, 1999: 61). Protecting small businesses and supplier diversity

requires "companies to seek out sustainable, long-term relationships" with suppliers (Milligan, 1999: 61).

The challenge in incorporating these new corporate techniques comes in protecting the small business interest. However, this challenge is not unique to government. In fact, "many firms that are successfully implementing PSCM practices have discovered ways to reduce the number of suppliers they purchase from while still providing opportunities for SDBs to benefit from these purchases" (Moore and others, 2002: 111). Furthermore, "there are sufficient instances of innovative commercial firms managing diversity in their supplier base to lead us to believe that the Air Force need not worry about PSCM practices eliminating SDBs from the competitions" (Moore and others, 2002: 113).

To ensure small businesses are protected will require effort and vigilance. It does appear to be a priority of procurement transformation, as "commodity councils must develop their procurement strategies with full consideration of small business obligations and opportunities" (Bowman, 2003b: Slide 18). It is even possible that some of the reforms, including more comprehensive data collection and "better spend analysis visibility can work to the advantage of small business" (Bowman, 2003b: Slide 18).

Summary of Transformation.

At this point in time, it is impossible to know how procurement transformation will be remembered and how it will impact small business participation. The only certainty is that protecting small businesses will require continued vigilance and effort. Although there may be no one agreed-upon definition of transformation, it indisputably provides a continuation of the acquisition reform efforts discussed previously.

Government Performance Results Act of 1993 (GPRA)

The previous sections of this chapter have provided a base of knowledge to address the first research question of this thesis: Have acquisition reform initiatives negatively impacted small business participation in Air Force contracting? The following sections provide information needed to answer the second research question: Are there alternative measures to the percentage of dollars metric that the Air Force Small Business office can use to evaluate the effectiveness of their program? Performance measures, or metrics, for the government must be judged based on the requirements of GPRA, a law designed to "improve the confidence of the American people in the capability of the Federal Government, by systematically holding Federal agencies accountable for achieving program results" (United States Congress, 1993: Sec. 2 (b)). This section will review the challenges and results of GPRA, while the following section will provide an outline of characteristics of successful business metrics.

History of GPRA.

GPRA passed Congress and was signed into law by President Clinton in 1993. It "intended to improve the efficiency and effectiveness of federal programs by establishing a system to set goals for program performance and to measure results" (General Accounting Office, 1997: 3). By requiring the creation of performance measurement systems for federal agencies, GPRA "intended to shift the focus of government decisionmaking, management, and accountability from activities and processes to the results and outcomes achieved" (General Accounting Office, 2001: 6). The focus in federal programs shifts to results under GPRA. But GPRA was intended as a starting point. John Mercer, who served as Counsel to the Senate Governmental Affairs

Committee during the passage of GPRA, stated "from the beginning, GPRA was intended to point the federal government in a particular direction toward a generally defined vision of improved government performance" (Mercer, 2001).

Improved government performance depended upon the two core values of GPRA: "Transparency and accountability in federal agencies is key to improving performance, particularly as measured by program efficiency and effectiveness" (Mercer, 2001). These two elements of transparency and accountability are the heart of GPRA. As one observer noted "Prior to GPRA, there was a tendency for government to 'manage activities and hope for results.' Post GPRA, with open disclosure and transparency, it is possible for Congress to 'choose to do only the programs that will produce results" (McTigue, 2001). Senator Fred Thompson chaired the Senate Government Affairs Committee and noted, "For the first time, Congress will see what results taxpayer-funded programs are achieving. For the Results Act to mean anything, it will be up to Congress to hold agencies accountable for those results" (Laurent, 2000: 78). GPRA did more than shift the focus on results; it tied budgets to results, which caused a shift in focus of the government as budget management became a planning and management function under GPRA (Melese, 1999: 19).

GPRA also required agencies to define strategic objectives. The Department of Defense identified four: integrate GPRA into the Performance-Planning-Budgeting System (PPBS); make GPRA a meaningful Secretary of Defense level report; develop corporate level goals and corporate level performance measures, and enable subordinate units to link to the corporate goals through the use of GPRA tools (Maroni, 1998: 12).

GPRA intended to change the focus of federal agencies and provide insights into how agencies should develop metrics. Implementing GPRA as Congress intended, however, faces several obstacles.

The Obstacles to Implementing GPRA.

Kautz and Netting believe, "At least three challenges to the GPRA's effectiveness seem likely: bureaucratic resistance to change, congressional and executive territorialism, and political currents" (Kautz and Netting, 1997: 367). GPRA requires a change in how agencies operate and plan for the future. The challenges involved extend beyond the cultural resistance to change. Setting strategic outcome goals are particularly challenging for government agencies because of their missions; in the commercial world, metrics can capture profit and loss measures, but in government, "since many of its agencies are mission oriented, organizational goals are not necessarily captured as cost savings or profits" (Chmielewski and Phillips, 2002: 226). Determining strategic outcomes can be more difficult when agencies "seldom measure their success, or their strategic objectives, in dollars" (Blackerby, 1994: 20). Before the bureaucracy can be convinced to change to a strategic outcome focus, agencies must determine those strategic outcomes.

The second challenge Kautz and Netting presents deals with the power struggle between the executive and legislative branches. First, both elements must agree on what agencies should be doing, because "until there is agreement on goals (results) and hard political decisions on overlapping programs, the GPRA is limited in what it can accomplish" (Aberbach, 2002b: 20). When this agreement is reached, agencies will be able to establish measures and collect data, but "data rarely are sufficient by themselves to drive policy" (White, 2001: 68). The President and Congress must agree upon policy

before effective data collection can begin. Finally, to be worthwhile, both the President

and Congress "must demonstrate that results information will be a major influence in

future decision-making" (McTigue, 2001). These two branches of government must

work together if the goals of GPRA are to be achieved.

The final challenge mentioned by Kautz and Netting is politics and political currents.

While politics is a major part of reaching agreement between Congress and the President,

it presents two additional challenges to GPRA. Implementing GPRA costs agencies time

and money, and "much remains to be done to ensure that performance measurement is

useful enough to justify the cost" (Wholey, 1997: 129). In addition to monetary

pressures, actions taken by one federal agency can have unintended effects on other

organizations. A challenge to GPRA is that "determining the links between what the

federal government does and outcomes turns out to be quite difficult because of the many

outside factors that influence whether or not goals are achieved" (Aberbach, 2002a: 63).

GPRA continues to faces obstacles to successful implementation ten years after

passage. External obstacles such as politics add to the internal challenge of the federal

government determining what its strategic outcomes should be. The next section will

look at the results of ten years of GPRA.

The Results of the Results Act.

After ten years, the federal government is still trying to implement GPRA. Testifying

before Congress, Christopher J. Mihm, the Director of Strategic Issues for the General

Accounting Office, believes "adopting a results-orientation requires transforming

organizational cultures to improve decisionmaking, maximize performance, and assure

accountability—it entails new ways of thinking and doing business" (Mihm, 2001).

Overcoming this challenge requires credible performance information, which, according to Mihm, "limited confidence in the credibility of performance information is one of the major continuing weaknesses with GPRA implementation" (Mihm, 2001). One of the potential challenges highlighted in the previous section still exists as "Congress continues to budget using its own system, thereby making it difficult to link performance data to congressional budget decisions" (Aberbach, 2002a: 62). A lack of knowledge plagues GPRA implementation, as "too many federal managers still believe that GPRA does not apply to them and their responsibilities" (Mercer, 2001).

Despite these difficulties, "the act has clearly succeeded in many ways" (Aberbach, 2002a: 62). Success often depends on the perception of the agency manager who can view GPRA as "a threat to programs and a burden for administrators or as an opportunity to demonstrate that programs improve clients' lives" (Kautz and Netting, 1997: 371). But Kautz and Netting (1997: 371) caution, "experience with other reforms indicates that the mere connection of evaluation within budgeting does not in itself reform government."

Addressing the issue of small business, Welch believes that GPRA must succeed. Welch argues, "Establishing a sensible strategic plan for small business, linking that plan to agency performance goals, and unleashing the flexibility of acquisition reform, will benefit not only small business but also the country" (Welch, 2000: 108).

Summary of Government Performance Results Act of 1993.

GPRA became law with the intent of changing the focus of government from processes to results. In the past decade it has overcome some of the challenges and met with some success, but still faces many challenges to successful implementation. GPRA

41

and its requirements must be considered before developing metrics for any government organization.

Metrics

GPRA provides direction on how federal agencies should determine what performance measures to use. Determining how well proposed metrics meet the standards of GPRA is one way to evaluate the usefulness of a measurement. An additional element to consider in evaluating proposed metrics is what the commercial standard is for developing performance measures.

Definitions and Terms.

Metrics can be divided into two groups: primary and secondary. Primary metrics focus on overall organization performance, while the focus of secondary metrics is more internal and are used to evaluate different units within the organization. The focus of this research is primary metrics, which "address the results you intend to produce and the value you export to others" (Frost, 2000: 24). Primary metrics can help the organization "align efforts, manage who's accountable for what, track progress, and report results" (Frost, 2000: 24). Two key elements of metrics are their reliability and validity; a reliable metric "produces the same result every time, given the same circumstances" (Frost, 2000: 66), while a valid metric "tracks what it's supposed to" (Frost, 2000: 64). An effective primary metric is both valid and reliable.

Why Metrics?

Metrics are "widely recognized as a powerful tool for strengthening organizations and communities, empowering people, facilitating organizational development and capacity

building, and managing change" (Love, 2001: 442). Metrics provide a focus for

organizations and their members; clearly stating goals through metrics allows individuals

to focus their drive on achieving those goals. In summation, "the bottom line for

organizations in all sectors is the clear demand to measure outcomes and use both

quantitative and qualitative data to tell compelling 'performance stories' about how well

their strategies have worked" (Love, 2001: 438). Metrics form the foundation of these

"performance stories".

Characteristics of Effective Metrics and How They Relate to Strategy.

Mark Graham Brown provides eight characteristics of what he terms "world-class

performance measurements":

- Fewer are better: Concentrate on measuring the vital few key variables rather than the trivial many.
- Measures should be linked to the factors needed for success: key business drivers.
- Measures should be a mix of past, present, and future to ensure that the organization is concerned with all three perspectives.
- Measures should be based around the needs of customers, shareholders, and other key stakeholders.
- Measures should start at the top and flow down to all levels of employees in the organization.
- Multiple indices can be combined into a single index to give a better overall assessment of performance.
- Measures should be changed or at least adjusted as the environment and your strategy changes.
- Measures need to have targets or goals established that are based on research rather than arbitrary numbers. (Brown, 1996: 3)

Each of these elements is important to an effective metric. The key element to a good

metric is that it must be linked to the organization's strategy, which is one of the

requirements of GPRA. Meeting the requirements of GPRA meets the framework of the

commercial metric model.

Brown provides a model for how metrics link to strategy. He argues that an organization must first establish what its mission, vision, and values are. From there, the organization can identify what factors will most influence the ability to successfully accomplish that mission. These factors should be measured as metrics. The metrics then can be used to set goals and objectives. These goals and objectives require a strategy to achieve them. Hence, identifying relevant metrics is essential in the strategy development process (Brown, 1996: 11).

Challenges to Metric Usage.

Developing effective metrics is not without its challenges. Difficulties include "clarifying the logic that links program outputs with desired long term outcomes, and devising processes for verifying and validating performance data" (Newcomer, 2001: 337). Additionally, "performance indicators, especially in the absence of extensive and costly validation efforts, tend to oversimplify and obscure, and are inappropriate for high stakes decisions" (Mark, 2001: 475).

Identifying the links between metrics and strategy is a challenge. Incorporating the complex factors that can affect performance can be costly and time consuming. In the end, "the problem of utilization of performance measures emerges as a multifaceted one, where measures are often not developed, developed only selectively, or, most notably, developed but not used or selectively used" (Julnes and Holzer, 2001: 694). Metrics must possess all of the characteristics identified previously to be effective, but they also must be seen as useful by the members of the organization in order to truly help drive organizational strategy. Without the support of organizational leaders and members, metrics cannot achieve their potential benefit.

Summary of Metrics.

GPRA provides guidelines and directions for government agencies in developing

metrics. Commercial firms' experiences also provide assistance in developing effective

metrics. In many cases, GPRA incorporates the lessons learned from industry. The key

test to determining the effectiveness of a metric is whether or not it is linked to an

organization's mission and whether or not it is being implemented in the organization's

strategy.

Conclusion

This chapter has provided the background information needed to answer the

research questions. It has looked at the basics of the small business program, acquisition

reform, and developing metrics. This chapter provides a foundation for answering the

research questions, and the following chapter provides the method to answer those

questions.

III. Methodology

The purpose of this chapter is to examine the methodology used to answer the research questions. It begins with a discussion of the data used in the research and the advantages and disadvantages of using secondary data, followed by a detailed description of modifications made to the original data set. Next, the chapter will compare two methodological approaches to answering the research questions, address methods used in previous research, and consider potential stumbling blocks of the chosen method. Then the chapter will outline the selection of dependent and independent variables, construct the model used to answer the research questions, list the hypotheses to be tested by the model, followed by a step-by-step list of the procedures to be used to implement the chosen methodology. Finally, a construct will be developed to determine whether or not a given metric is effective.

The Data

The data used for this study are from the J001 database, which is the Air Force component of the Federal Procurement Data System (FPDS). The data set used is the complete J001 database from Fiscal Year (FY) 1990 to FY 2003.

The data consists of all Form DD-350s (Department of Defense Individual Contract Action Reports) completed during that time period. DD-350s are completed any time an obligation is made on a contract of at least $25,000 and "describe the financial, competitive, statutory, and other characteristics of the obligation" (Eagle Eye Publishers, 2002). A separate DD-350 is completed for initial contract award as well as any modification of the contract. Modifications can be made for a wide variety of reasons,

from adding money to the contract to exercising an option to terminating the contract. The DD-350 is only completed for prime contracts, those directly between the government and the contractor. Additional related work performed by subcontractors for the prime contractor is not captured in the DD-350, or any other tracking database for Air Force contracting activities (Eagle Eye Publishers, 2002).

Using Secondary Data.

Data can be either primary, meaning that it comes from original sources and is collected by the researcher to answer a specific question, or it can be secondary, meaning that it has already been collected for another purpose (Emory and Cooper, 1991: 286). Secondary data "may be used as the sole basis for research" (Emory and Cooper, 1991: 287), as is the case with this research. The most obvious advantage of using secondary data is that it can be retrieved more quickly and inexpensively than primary data. Two major drawbacks of secondary data are that because the researcher does not collect the data by design, the data may not meet the researcher's needs and may not be timely (Emory and Cooper, 1991: 287). These issues both affect this research in that the available data restricts the selection of independent variables to those that data is available for and also restricts the timeframe of the research to the last fourteen years. Additional difficulties with the data used will be addressed in the limitations section of the final chapter of this thesis.

Modifying the data.

The data set includes all Air Force DD350s. DD350s are generated by both new contract awards and by contract modifications. Because this research is focused directly on how different factors have affected small business participation, the research is only

concerned with new contract awards. Including modifications to existing contracts in the research may skew the results by counting a firm that received just one contract award with subsequent modifications as having received awards in multiple years. Therefore, the researcher removed all DD350's that are for modifications from the studied data set.

Research Methodology

In dealing with purely quantitative research, several possible methods of manipulating the data are available to the researcher. A causal regression model method and a time series model method were both considered for this research. This section will examine the advantages and disadvantages of each method, defend the chosen method, review methods used in similar research, and address potential pitfalls in the chosen method.

Time Series Models.

A time series is "a set of observations x_t, each one being recorded for a specific time t" (Brockwell and Davis, 1996: 1). The time series model is "constructed without drawing on any theories concerning possible behavioural relationships between variables" (Harvey, 1981: viii). These models are "based on the analysis of a chronological sequence of observations on a particular variable" (Gaynor and Kirkpatrick, 1994: 5). Time series are useful for predicting the performance of one variable of interest based on its past performance.

Brockwell and Davis provide three uses for time series models: they can provide a compact description of the data; they can help separate (or filter) the noise from the signals; and they are useful for simulation studies (Brockwell and Davis, 1996: 6). Harvey contends that the "main reason for modeling a time series is to enable forecasts of

future values to be made . . . no attempt is made to relate y_t to other variables. The movements in y_t are 'explained' solely in terms of its own past, or by its position in relation to time" (Harvey, 1981: 1).

Time series models are based on "the assumption that one may forecast the value of an item by studying past movements of that item over time" (Gaynor and Kirkpatrick, 1994: 5). They are "generated under the assumption of no pattern change" (Gaynor and Kirkpatrick, 1994: 7). In addition to these assumptions, a major limitation of time series models is that they "require a lot of data for fitting the points" (Gottman, 1981: 57). If limited data is available, then the model provides "limited power to detect differences between means. Of course, there are those rare cases when, in fact, this is a necessary course of action. However, in general, it is not a wise course" (Gottman, 1981: 57).

Causal Regression Models.

A causal regression model is useful to "discover the form (mathematical curve) of the relationship between all the variables and to use it to forecast future values of the variable of interest (dependent variable)" (Gaynor and Kirkpatrick, 1994: 5). Causal regression models "assume that the variable to be forecasted can be explained by the behavior of another variable or set of variables (independent variables)" (Gaynor and Kirkpatrick, 1994: 5).

There are two major shortcomings to using a causal regression model. First, it can only be used for a limited timeframe and is not appropriate for long-term forecasts. Second, it provides "no method to account for outside influences or changes that would affect the results" (Gaynor and Kirkpatrick, 1994: 6). It can be used to examine the

relationships between various factors, but it is unlikely that all factors that affect the relationship can be identified.

The causal regression model does have some advantages:

- Once the choice of independent variable(s) is made, the forecasts are based only on their predetermined values and thus are completely objective.
- There are ways to measure the accuracy of the forecast.
- Once the models are constructed, it is less time-consuming to generate forecasts from them.
- They have a means of forecasting point estimates (one specific value) or interval estimates (a range of values based upon a confidence interval). (Gaynor and Fitzpatrick, 1994: 5)

Finally, the causal regression model is "generated based upon a set of underlying assumptions concerning both structural and behavioral relationships that are assumed to be the same over the time period" (Gaynor and Kirkpatrick, 1994: 7). Because of these assumptions, "the model must be generated with great care, constantly mindful of the changes that have occurred" (Gaynor and Kirkpatrick, 1994: 7).

The Chosen Methodology.

Understanding the relationship between acquisition reform initiatives and small business participation in the Air Force is the focus of this research. Because the goal is to understand the relationship between variables (in this case, small business contractors and variables related to reform initiatives), a causal regression model approach is used. Additionally, only fourteen data points are available (one for each year 1990-2003). Having such a limited number of data points in a time series models could result in the limited usefulness that Gottman cautions against. Finally, although a causal regression model can be used in a predictive way, this research is not focused on predicting future events; rather it is interested in attempting to understand past relationships.

Past Causal Regression Models in Research.

Mayer (1992) demonstrated through use of a causal regression model that there are economic and electoral cycles in defense contract awards. Mayer's variable of interest was contract awards. His research concluded "defense contracting activity increased immediately before elections, both to stimulate the economy and to advance the interests of incumbent legislators" (Mayer, 1992: 28). In addition, his research found that "before major social programs were enacted, defense contracts were also used to combat unemployment" (Mayer, 1992: 28). While the results of Mayer's research may or may not be perceived as surprising, his research did demonstrate the effectiveness of a causal regression model that incorporates both quantitative and binary factors. For Mayer, a few of his quantitative factors were non-contract award dollars, total contract award dollars, and the unemployment rate. His binary factors included whether or not the United States was at war, whether it was the last month of the fiscal year, and whether or not it was an election year.

Barben (1998) constructed a similar model to measure the effects of acquisition reform initiatives as well as political-fiscal variables on the number of protests of Air Force contract awards made to the General Accounting Office (GAO). Barben's variable of interest was the number of Air Force GAO protests processed during each year. His sole binary factor considered acquisition reform initiatives, while his quantitative factors included number of Air Force contract actions, total Air Force contract dollars, GAO protest sustainment rate, as well as the unemployment rate (Barben, 1999: 37).

While these two models do not specifically address the issues that are the focus of this research, they do establish that a causal regression model can be used to answer

51

questions similar to the questions examined in this research. Furthermore, they both demonstrate the effectiveness of causal regression when confronted with both quantitative and binary factors.

Pitfalls of the Causal Regression Model.

There are four major threats to the validity of a causal regression model. The first pitfall is parameter estimability. A model requires sufficient data points to allow an estimate of the parameters of the model to be made. This problem is resolved by the rule "in general, the number of levels of observed x values must be one more than the order of the polynomial in x that you want to fit" (McClave and others, 1998: 551). For example, a second order polynomial requires three observed data points in order to avoid the pitfall of parameter estimability.

The second pitfall is multicollinearity. This occurs when two of the independent variables in the research are correlated. Failure to identify this correlation can skew the results for the dependent variable. In dealing with multicollinearity, it is useful to use a stepwise regression, where each variable is introduced independently into the model. It is important to note, however, that even if two independent variables are correlated, each may still independently contribute information for understanding the dependent variable (McClave and others, 1998: 552).

The third pitfall occurs when a causal regression model is used to predict outside the experimental region. The causal regression model reflects relationships that occur in a certain timeframe and "use of the model outside that range is a dangerous practice" (McClave and others, 1998: 552).

Finally, a pitfall occurs with correlated errors. Because "the values of both the independent and dependent variables are observed sequentially over a period of time, the observations tend to be correlated over time, which in turn often causes the prediction errors of the regression model to be correlated" (McClave and others, 1998: 551). McClave suggests that to combat this issue, a time series model should be considered.

This research will attempt to avoid each of these pitfalls. First, all of the variables tested have at least three data points, with most having fourteen. This meets the requirement to avoid parameter inestimability. Second, stepwise regression will be performed for the model to identify multicollinearity issues. Third, the model is not being used to predict future events, but instead focuses solely on the time frame studied. Finally, past research demonstrates that the causal regression model can avoid the pitfall of correlated errors even when the data is of time series form. Despite the potential for problems, the causal regression model is the best available to answer the research questions of this thesis.

Building the Model

Model building provides "a model that will provide a good fit to a set of data and that will give good estimates of the mean value of *y* and good predictions of future values of *y* for given values of the independent variable" (Mendenhall and Sincich, 1996: 274). The first step in model building is to identify the dependent variables and independent variables that will be used to answer the research question. The model is then constructed using those variables.

Dependent Variables.

The dependent variable, y, is the response variable or the variable to be modeled (McClave and others, 1998: 432). It is the variable of interest in the research. In this research, there are two separate dependent variables. The first one is the total number of small businesses receiving Air Force contract awards each year. The second dependent variable is the total number of new small businesses receiving Air Force contract awards each year. With two dependent variables, a model will be constructed for each one.

Independent Variables.

The independent variable(s), x, are also called the predictor variables as they are used to predict y (McClave and others, 1998: 432). The independent variables can be either quantitative or binary (Mendenhall and Sincich, 1996: 275). A quantitative independent variable "is one that assumes numerical values corresponding to the points on a line" (Mendenhall and Sincich, 1996: 275). The model will incorporate six quantitative independent variables: number of Air Force contract actions, amount of Air Force contract dollars, number of performance-based service contracts, number of bundled contracts, number of government wide agency contracts, and the number of multiple award contracts. A binary independent variable is not associated with a numerical scale, so it requires the use of dummy (indicator) variables to make the model work (Mendenhall and Sincich, 1996: 303). In addition to the six quantitative variables above, the model includes two binary independent variables: the first variable is whether or not the Federal Acquisition Streamlining Act was in effect, and the second variable is whether or not the Clinger-Cohen Act was in effect. These eight variables were chosen carefully based on the results of the literature review as well as the focus of the study.

The Model.

Because there are two dependent variables of interest, there are two models used in the research. The two models, however, share the same independent variables and are thus, identical in equation form. The model is:

$$y = \beta_0 + \beta_1 (x_1) + \beta_2 (x_2) + \beta_3 (x_3) + \beta_4 (x_4) + \beta_5 (x_5) + \beta_6 (x_6) + \beta_7 (x_7) + \beta_8 (x_8) + \epsilon$$

where

y = Number of Air Force small business contractors in model 1 and Number of new Air Force small business contractors in model 2

x_1 = Air Force contract actions

x_2 = Air Force contract dollars

x_3 = Number of performance based service contracts

x_4 = Number of bundled contracts

x_5 = Number of government wide agency contracts

x_6 = Number of multiple award contracts

x_7 = Federal Acquisition Streamlining Act: 0 if prior to FASA, 1 if after FASA

x_8 = Clinger-Cohen Act: 0 if prior to Clinger-Cohen, 1 if after Clinger-Cohen

ϵ = Random error component

Hypotheses to be Tested

The causal regression model provides an indication of the relationship between the dependent and independent variables. It cannot, however, prove cause and effect in those relationships because the independent variables are observational in nature as opposed to experimental (Mendenhall and Sincich, 1996: 349). The research uses observational data

so a statistically significant relationship between *y* and *x*, "simply means that *x* contributes information for the prediction of *y*" (Mendenhall and Sincich, 1996: 348).

Despite this restriction, the model will allow various hypotheses to be tested that can provide insight into the answers to the research questions. Following are the sixteen hypotheses to be tested in the research.

Barben's research linked an increased number of contract actions to an increased number of contractor protests. The first two hypotheses suggest that a similar relationship holds between an increased number of contract actions and the number of small business contractors. One assumption made in these hypotheses is that additional awards are going to additional contractors, not just the same contractors getting multiple awards.

> $\underline{H_1}$: An increase in Air Force contract actions will increase the number of Air Force small business contractors.

> $\underline{H_2}$: An increase in Air Force contract actions will increase the number of new Air Force small business contractors.

Barben also linked an increase in Air Force dollars spent to an increase in number of contractor protests. Hypotheses 3 and 4 suggest a similar relationship between increased Air Force dollars and number of small business contractors. One assumption made here is that the additional money is associated with additional awards and additional contractors.

> $\underline{H_3}$: An increase in Air Force dollars spent will increase the number of Air Force small business contractors.

> $\underline{H_4}$: An increase in Air Force dollars spent will increase the number of new Air Force small business contractors.

Hypotheses 5 and 6 are the first to test the effects of the acquisition reforms considered in this research. No previous research has documented any relationship between performance-based service contracts and small business participation. Therefore, the hypotheses test a negative relationship in order to identify any negative impacts of these reforms.

$\underline{H_5}$: An increase in performance-based service contracts will decrease the number of Air Force small business contractors.

$\underline{H_6}$: An increase in performance-based service contracts will decrease the number of new Air Force small business contractors.

Several studies, including those by the Eagle Eye publishers and the General Accounting Office, concluded that bundled contracts have greatly reduced the number of small businesses receiving federal contracts. Hypotheses 7 and 8 will see if those findings hold when looking only at Air Force contracts. It is important to note that the definition of bundling used in this research reflects the FAR definition, as that is the one used on the DD350 form that serves as the basis of the data used in the research.

$\underline{H_7}$: An increase in bundled contracts will decrease the number of Air Force small business contractors.

$\underline{H_8}$: An increase in bundled contracts will decrease the number of new Air Force small business contractors.

The literature review raised the idea that small businesses are less likely to receive awards if the contracts are very large in dollars or complex in scope. GWACs tend to meet both of these criteria. Hypotheses 9 and 10 test whether an increase in the number of actions issued against GWACs leads to a decrease in the number of Air Force small business contractors.

$\underline{H_9}$: An increase in the number of government wide agency contract actions will decrease the number of Air Force small business contractors.

$\underline{H_{10}}$: An increase in the number of government wide agency contract actions will decrease the number of new Air Force small business contractors.

Similarly to the GWACs, MACs will negatively affect small businesses for the same two reasons. First, they tend to be larger, more complex contracts. Second, the use of MACs would tend to decrease the number of new contract awards. Hypotheses 11 and 12 test whether an increased use of MACs hurts Air Force small business participation.

$\underline{H_{11}}$: An increase in the number of multiple award contract actions will decrease the number of Air Force small business contractors.

$\underline{H_{12}}$: An increase in the number of multiple award contract actions will decrease the number of new Air Force small business contractors.

Hypotheses 13, 14, 15, and 16 speak directly to the heart of the research question. Senator Kerry and Congresswoman Velázquez have each suggested that the acquisition reforms of the 1990s have negatively impacted small business participation. The reports of the Eagle Eye publishers and the General Accounting Office provide data to support those suggestions. Hypotheses 13 and 14 test whether FASA hurt Air Force small business participation. Hypotheses 15 and 16 test whether Clinger-Cohen hurt Air Force small business participation.

$\underline{H_{13}}$: FASA led to a decrease in the number of Air Force small business contractors.

$\underline{H_{14}}$: FASA led to a decrease in the number of new Air Force small business contractors.

$\underline{H_{15}}$: Clinger-Cohen led to a decrease in the number of Air Force small business contractors.

<u>H</u>₁₆: Clinger-Cohen led to a decrease in the number of new Air Force
    small business contractors.

These sixteen hypotheses suggest factors that have influenced small business

participation. Figure 1 pictorially demonstrates the relationship between the eight

independent variables, the two dependent variables, and the sixteen hypotheses.

Independent Variables   **Dependent Variables**

Air Force Contract Actions → **H1 (+)**

H2 (+)

Air Force Contract Dollars → **H3 (+)**

H4 (+)

Number of PBSCs → **H5 (-)**   **# of AF SB contractors**

H6 (-)

Number of bundled contracts → **H7 (-)**

H8 (-)

Number of GWACs → **H9 (-)**

H10 (-)

Number of MACs → **H11 (-)**   **# of new AF SB contractors**

H12 (-)

FASA → **H13 (-)**

H14 (-)
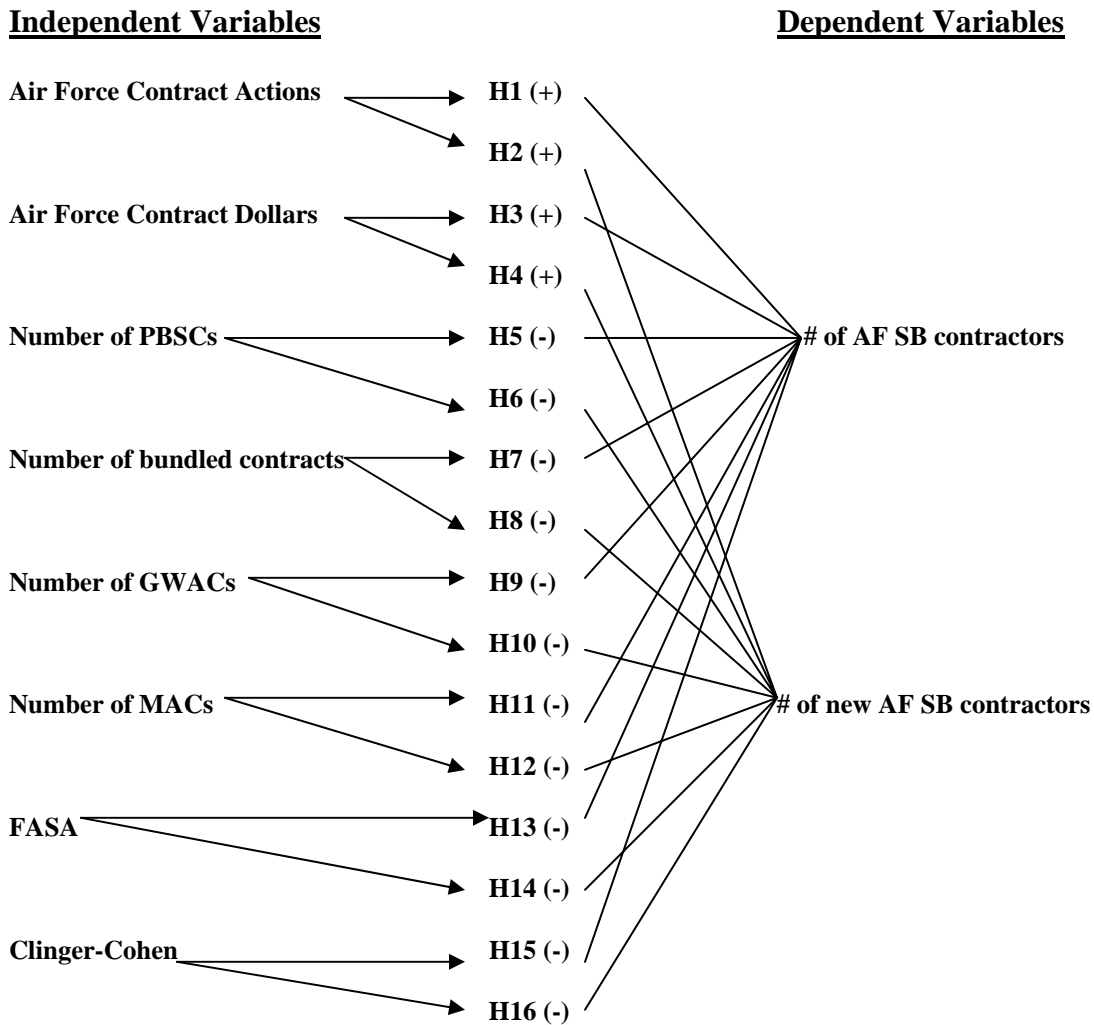
Clinger-Cohen → **H15 (-)**

H16 (-)

Figure 1. Relationship of Independent and Dependent Variables to Hypotheses

Step-by-Step Procedures

The following steps will be used to implement this methodology:

1) Data on Air Force contracting actions from 1990-2003 will be obtained from the J001 database. Actions that are modifications will be removed from the data as previously discussed. Totals for each of the dependent and independent variables will then be calculated and listed in tabular form.
2) The dependent variables will be graphed to visually distinguish any long-term trends. Descriptive statistics will be used to analyze the normality of the dependent variables.
3) Each of the dependent variable to independent variable relationships will be plotted in a scattergram format to analyze the possible relationship. The scattergram may reveal whether the relationship is positive, negative, non-existent, linear, or quadratic.
4) The complete multiple regression model developed in this chapter will then be tested using the JMP statistical software program. This test will estimate the model coefficients, allowing a least squares model to be built. The complete model will be examined for usefulness by evaluating the R-squared score. Each variable will then be tested using the t-statistic test. These tests will identify if the model as a whole is useful and identify which independent variables should be included in the final analysis.
5) The new model incorporating only the relevant independent variables will be tested using the multiple regression features of the JMP statistical software. This test will determine the usefulness of the new model.
6) The usefulness of the new model will be compared to the original model to ensure the proper independent variables remain in the model.
7) Based on the results of the previous six steps, the hypotheses will be tested.

Determining the Effectiveness of a Metric

This section consists of the methodology used to answer the second research question:

Should the Air Force Small Business office incorporate the measures of total small

business contractors and total new small business contractors into their metrics? The

literature sets standards for determining the effectiveness of metrics. Love (2000) points

out that a metric must be measurable and quantifiable to be of value. Brown (1996), in

his model, defines effective metrics as those that are consistent with organizational goals,

allow for the creation of research-based goals, and promote the development of strategy

to achieve those goals. Julnes and Holzer (2001) emphasize the importance of support

from organizational leaders to promote organizational acceptance. Based on these

concepts, the following questions will be used to test the effectiveness of the proposed

metrics:

1) Is the measurement quantifiable?
2) Is the metric consistent with the goals of the organization?
3) Can the metric establish specific, research-based targets for the organization?
4) Can a strategy be developed to meet the targets of the metric?
5) Does the metric have the support of organizational leadership?

By testing the proposed metrics with these five questions, this research will determine

the appropriateness of the Air Force Small Business office using these two measures. In

determining the appropriateness of the metrics, the second research question will be

answered.

Conclusion

This chapter has provided a review of the methodology used in the research. It has

covered the data set used, the type of model chosen, the development of the model, and

identified the hypotheses to be tested by the model. It has provided a step-by-step listing

of how the hypotheses will be tested. It has also created a construct of five questions that

can determine the appropriateness of proposed metrics. Chapter IV follows both the step-

by-step procedures and metrics construct. Chapter V then applies the results to the

research questions forwarded from Chapter I.

Chapter IV: Data Analysis and Results

The purpose of this chapter is to implement the methodology presented in Chapter III. This chapter presents the results of the step-by-step procedures and tests the hypotheses developed in Chapter III. This chapter also provides analysis of the metrics construct developed in Chapter III.

Step 1: Collection and Compilation of the Data

The researcher obtained data for all contracting actions recorded in the J001 database for the period covering Fiscal Year 1990 to Fiscal Year 2003. The data was then reduced, in accordance with the discussion in Chapter III, to remove all modifications from the data. This was done by removing all actions that contained a value in Block B13D, the Modification block, of the DD Form 350. The remaining data set will be referred to as the primary data set in this research.

Each fiscal year's data was then measured for the variables involved in the research. First, the total number of contract actions and total dollars awarded were calculated based on the total set of primary data. Next, the complete primary data set was used to determine the number of government-wide agency contracts (GWACs) and multiple-award contracts (MACs) for each fiscal year. The number of GWACs was determined using the B13A block of the DD Form 350. Any action coded as an order under a federal schedule or as a BPA (Blanket Purchase Agreement) order under a federal schedule was counted as a GWAC. In addition, if block B13F of the DD Form 350 was coded as being Government-wide, then that action was also counted as a GWAC. Actions were counted as MACs if block B13C of the DD Form 350 was coded "M" for multiple award. It is

significant to note that the first year that MACs were recorded in the DD350 was FY 1996. This limitation required adjustments within the model testing process.

Of greater concern, however, was the measurement of bundled contracts and PBSCs. Block B1C of the DD Form 350 records whether or not a contract is bundled. Block B1E records whether the contract is PBSC or not. Unfortunately, each of these statistics has only been reported in the DD350 since FY 2001. Although the totals are included in Table 1, they cannot be used in the regression model because of the limited (three) number of data points for each measure.

After all of the independent variables were recorded, the primary data set was reduced again in order to measure the dependent variables. All actions not coded as being a "Small Disadvantaged Business (SDB) Performing in the U.S." or as an "Other Small Business (SB) Performing in the U.S." in block D1A of the DD Form 350 were removed from the primary data set. The remaining actions, reflecting all awards to small business, were sorted by Block B5A of the DD Form 350, the contractor identification number (DUNS, or Dun & Bradstreet) block. All non-unique DUNS numbers were removed, providing a set that included only each small business awarded a contract. This count provided the number for the total number of small businesses dependent variable.

The next step required compiling all the unique small businesses for all fiscal years into a data set and sorting by fiscal year of award. Then, all non-unique DUNS were once again removed from the data set, providing a list of all small businesses awarded contracts sorted by when each business first received a contract. FY 1990 was used as the base year, and a count was done for each following year of the number of new small businesses. An example provides insight into the usefulness of this approach. Assume

that Small Business X has won four Air Force contract awards, one in FY 1992, two in

FY 1997, and one in FY 2002. Small Business X will count as one small business for

each of these three years, but will only count as a new small business in FY 1992.

The remaining two independent variables, FASA and Clinger-Cohen, are binary, and

coded according to the procedures outlined in Chapter III. The results of this data

analysis are compiled in Table 1.

Table 1. Summary of Dependent and Independent Variables

Fiscal Year	# Of Small Businesses	# Of new Small Businesses	Total Contract Awards	Total Dollars Awarded (000's)	GWACS	MACS	# Of Bundled Contracts	# Of PBSCs	FASA	Clinger-Cohen
1990	3908	X	30,800	$12,018,113	4493	X	X	X	0	0
1991	3804	2206	32,156	$16,099,119	4525	X	X	X	0	0
1992	3733	1959	28,511	$9,748,949	4554	X	X	X	0	0
1993	4770	4142	33,870	$14,421,807	5231	X	X	X	0	0
1994	4391	2558	35,142	$14,280,275	5310	X	X	X	0	0
1995	4651	2253	37,807	$13,303,025	7139	X	X	X	1	0
1996	5484	2712	37,443	$16,586,586	5845	9434	X	X	1	0
1997	5249	3772	35,352	$15,082,151	5024	4855	X	X	1	1
1998	4829	2390	34,751	$14,002,955	5848	3339	X	X	1	1
1999	4655	1989	35,559	$13,018,073	7092	2956	X	X	1	1
2000	4633	1854	36,573	$19,897,905	6841	2862	X	X	1	1
2001	4276	1654	33,930	$19,813,732	6938	2690	55	2555	1	1
2002	4745	1885	39,887	$17,823,747	9089	3553	41	4112	1	1
2003	5979	2631	49,172	$23,551,210	11470	4727	20	6227	1	1

Step 2: Analysis of the Dependent Variables

Figure 2 provides a graph of the dependent variables. The number of small business

contractors appears to be in a general upward trend, with a particularly sharp spike in FY

2003. By consulting the information in Table 1, it is noted that FY 2003 is also the peak

year for total contracts awarded and total dollars awarded. In contrast, the number of

new small businesses is relatively stable throughout the process except for two spikes in FY 1993 and FY 1997. None of the information in Table 1 relates a clear reason for these spikes.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Small businesses	3804	3733	4770	4391	4651	5484	5249	4829	4655	4633	4276	4745	5979
New small businesses	2206	1959	4142	2558	2253	2712	3772	2390	1989	1854	1654	1885	2631
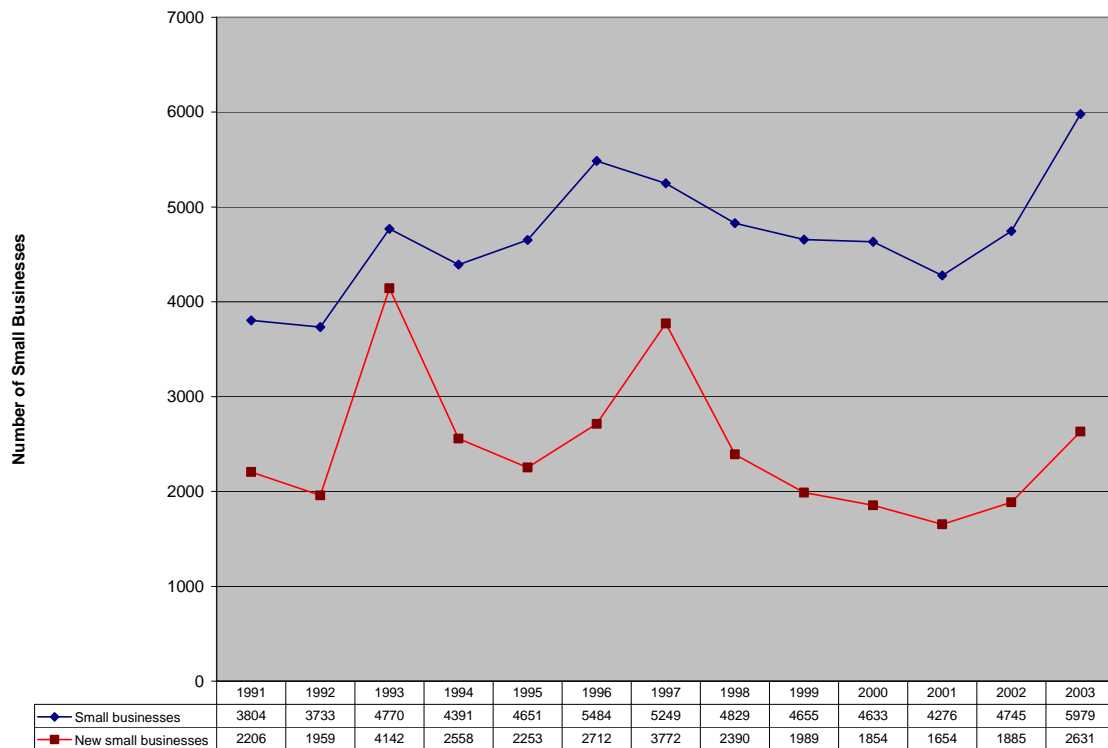
Figure 2. Graph of Dependent Variables

Table 2 contains various descriptive statistics regarding the two dependent variables. These statistics are useful for further analysis of the variables. The mean number of small businesses contracting with the Air Force from FY 1990 to FY 2003 is 4650.5, with a standard deviation of 631.9. The mean number of new small businesses contracting with the Air Force from FY 1991 to FY 2003 is 2461.9, with a standard deviation of 740.8. Only the sharp increase in FY 2003 of small business contractors falls more than

65

two standard deviations from the mean. Similarly, only the spike of FY 1993 falls more than two standard deviations from the mean of new small business contractors.

Table 2. Descriptive Statistics for the Dependent Variables

	Number of Small Businesses	Number of New Small Businesses
Mean	4650.5	2461.9
Standard Error	168.9	205.5
Standard Deviation	631.9	740.8
Maximum	5979	4142
Minimum	3733	1654
Range	2246	2488
Count	14	13
Wilk-Shapiro W Test for Normality	0.950799	0.843688

The Wilk-Shapiro W Test for Normality feature of the JMP statistical software package reveals that the number of small businesses follows an approximately normal distribution, as the .95 score indicates a failure to reject the null hypothesis of normality at the .05 significance level. The number of new small businesses score of 0.84, however, results in a rejection of the null hypothesis of normality at the .05 significance level. The number of new small businesses does not follow an approximately normal distribution. This is further supported by the high standard deviation and that the range of the numbers is greater than the mean. However, "it is not necessary that data follow a normal distribution for multiple linear regression to be valid" (Dallal, 2002).

Step 3: Plotting the Relationships Between the Dependent and Independent Variables

A scattergram can be used to determine a possible relationship between two variables. If the plotted points follow a generally upward-pointing line, then the two variables may share a positive relationship. If the plotted points follow a generally downward-pointing line, then the two variables may share a negative relationship. If the plotted points appear to be randomly distributed, then no relationship is suggested. A positive relationship implies that as one variable increases or decreases, the other variable moves in the same direction. A negative relationship implies that as one variable increases or decreases, the other variable moves in the opposite direction. It is useful to know the relationship in this research to apply the results of the multiple regression model. If the model determines that there is a relationship between two variables, the scattergram will suggest the nature of that relationship.

Because of the limited data available, the independent variables of "Bundled Contracts" and "PBSCs" will not be plotted. Three data points are not enough to suggest a trend or relationship. Similarly, because the variables related to acquisition reform are binary, they cannot be plotted in the scattergram format. Therefore, the independent variables plotted are: Total Contract Awards, Total Dollars Awarded, GWACs, and MACs.

Figures 3 through 10 on the following pages represent each of the independent variables relationship with the two dependent variables of Total Small Businesses and Total New Small Businesses. The line on each table represents a trend in the relationship and is added for clarity. Table 3 summarizes each of the possible relationships identified in Figures 3 through 10.
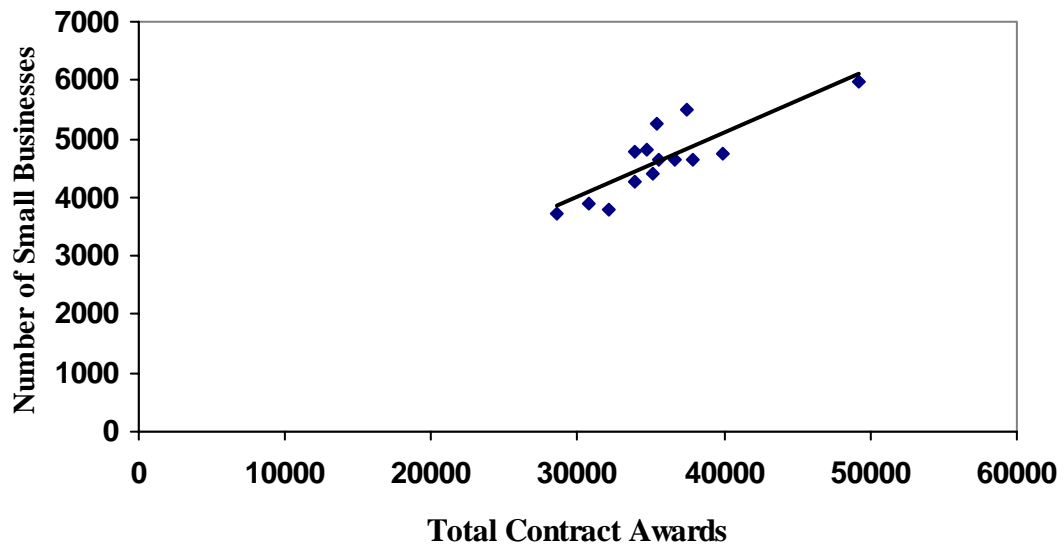
Figure 3. Number of Small Businesses vs. Total Contract Awards

Figure 4. Number of New Small Businesses vs. Total Contract Awards

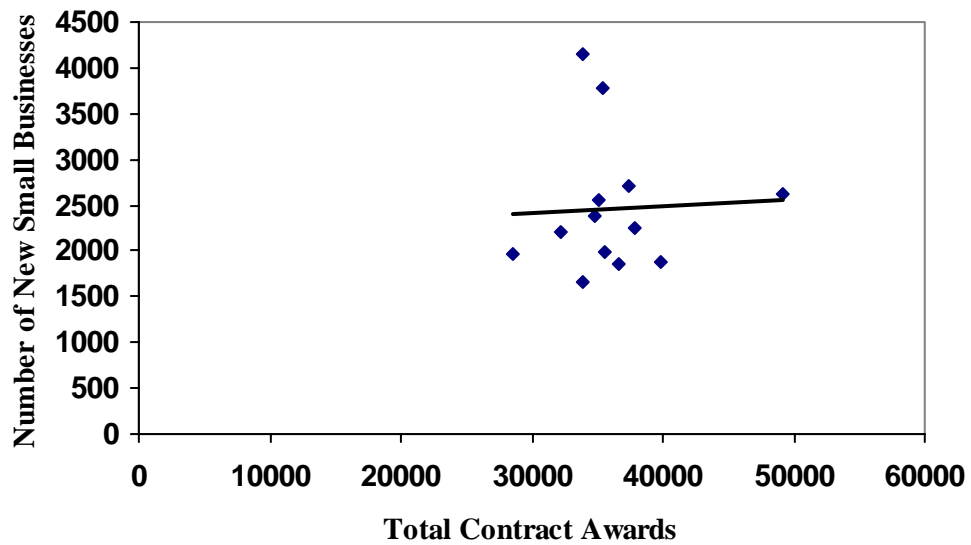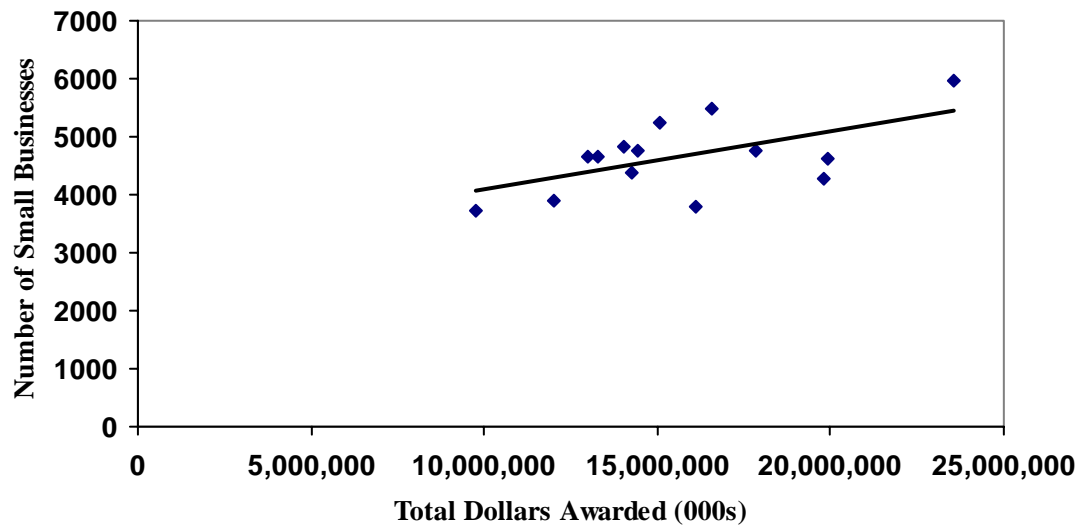**Figure 5. Number of Small Businesses vs. Total Dollars Awarded**
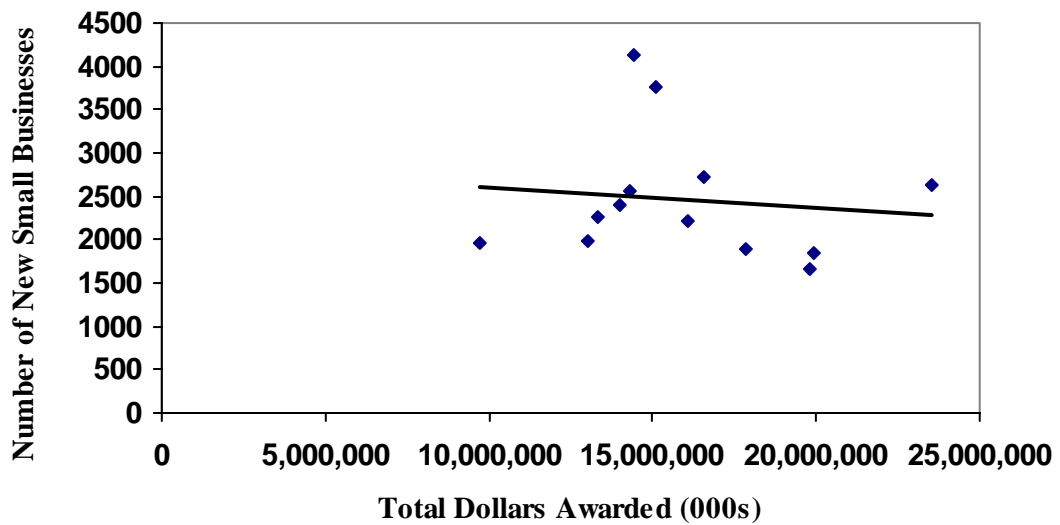
Figure 6. Number of New Small Businesses vs. Total Dollars Awarded
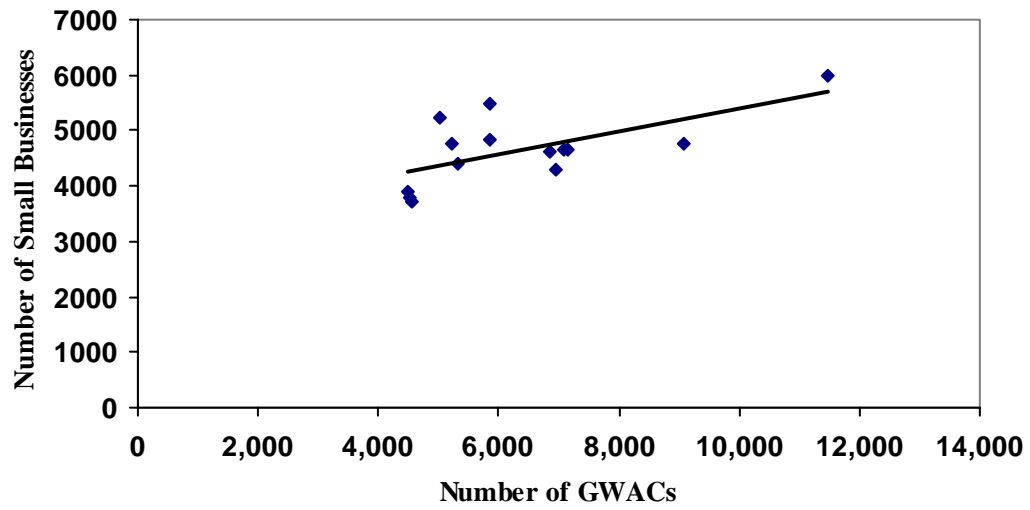
Figure 7. Number of Small Businesses vs. Number of GWACs
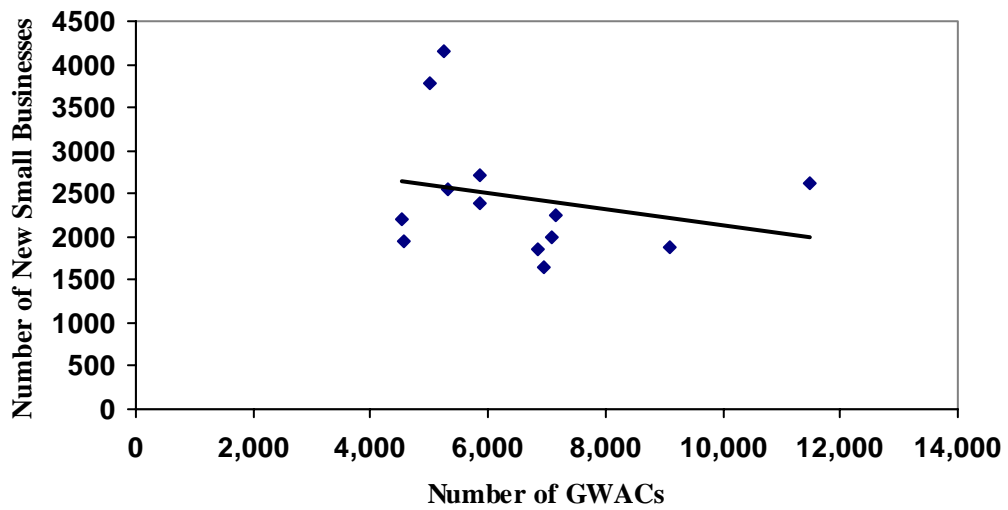
Figure 8. Number of New Small Businesses vs. Number of GWACs
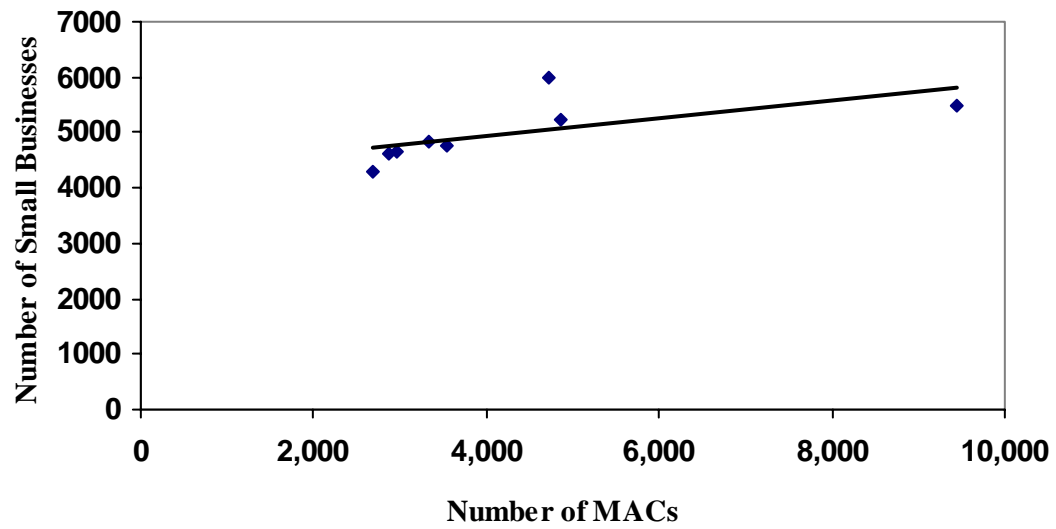
Figure 9. Number of Small Businesses vs. Number of MACs
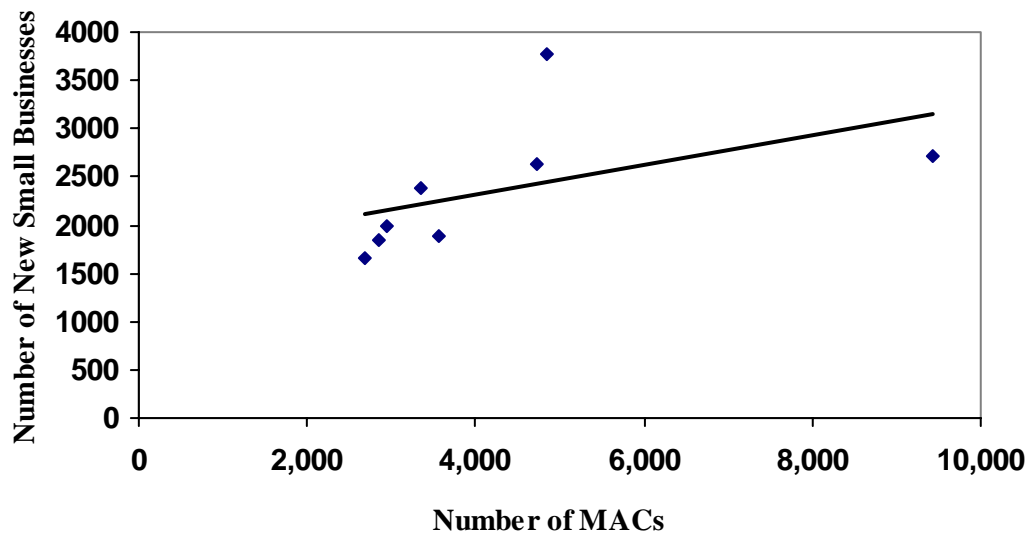
Figure 10. Number of New Small Businesses vs. Number of MACs

The results of several of the scattergrams are more clearly evident than others, but each trend line reveals a possible relationship. Table 3 summarizes those relationships.

Table 3. Relationships Between Dependent and Independent Variables

	Number of Small Businesses	Number of New Small Businesses
Total Contract Awards	**Positive**	**Slightly Positive**
Total Dollars Awarded	**Positive**	**Negative**
Number of GWACs	**Positive**	**Negative**
Number of MACs	**Positive**	**Positive**

Based on these results, one could assume, for example, that increasing the number of MACs awarded will increase the number of small businesses and the number of new small businesses. Such an assumption at this point would be flawed. The following steps test the multiple regression model to see whether the independent variables affect the dependent variables or not. Without the knowledge gained through the multiple regression model, the scattergram results have limited meaning.

Step 4: Testing the Complete Multiple Regression Model

As mentioned in Step 1, the number of MACs awarded has only been tracked by the Air Force since FY 1996. This requires an adjustment to the complete model. For each dependent variable, the model will be tested twice: the first test will cover the entire time period but not include the MACs independent variable; the second test will cover the time period since FY 1996 and not include the variables related to acquisition reform, as they

are constant through the covered period. This section provides an overview of the results of those tests.

Figure 11 provides the JMP results for the total small businesses dependent variable for the period from FY 1990 to FY 2003. The independent variables included are: Total Contract Awards, Total Dollars Awarded, GWACs, FASA, and Clinger-Cohen.

Summary of Fit

RSquare	0.883052
RSquare Adj	0.80996
Root Mean Square Error	275.4582
Mean of Response	4650.5
Observations (or Sum Wgts)	14

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	5	4583483.7	916697	12.0813
Error	8	607017.8	75877	Prob > F
C. Total	13	5190501.5		0.0015

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-609.8748	933.9573	-0.65	0.5321
Total Contract Awards	0.2140573	0.045641	4.69	0.0016
Total Dollars Awarded	-2.561e-8	3.506e-8	-0.73	0.4859
GWACs	-0.320371	0.106998	-2.99	0.0172
FASA[0]	-169.6682	129.7906	-1.31	0.2274
Clinger-Cohen[0]	-83.61065	128.5215	-0.65	0.5336

Figure 11. JMP Results for Total Small Businesses FY 1990 to FY 2003

The least squares model is:

$$\text{y-hat} = -609.87 + .21x_1 - 0.00000003x_2 - 0.32x_3 - 169.67x_4 - 83.61x_5 + \in$$

The R-squared score reflects that 88% of the variation is accounted for within the model. To be useful, the F-Ratio must be greater than the F-Ratio of the chosen significance level. Using the standard $F_{.05}$, the model is useful if the F-Ratio > 4.26. For this model, the F-Ratio of 12.08 exceeds the $F_{.05}$. Individual elements are subjected to the t-test. There are two components to the t-test. First, the individual t-score will be compared to the $t_{.05}$ score and if it is larger than the $t_{.05}$ score, it is an indication that the variable is useful. Second, if the observed significance level is less than the alpha of .05, then that also is an indication that the variable is useful. The $t_{.05}$ score for this portion of the model with thirteen degrees of freedom is 1.771. Based on these factors, the useful variables of this model are Total Contract Awards and GWACs.

Summary of Fit

RSquare	0.983161
RSquare Adj	0.960709
Root Mean Square Error	109.189
Mean of Response	4981.25
Observations (or Sum Wgts)	8

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	2088274.8	522069	43.7895
Error	3	35766.7	11922	Prob > F
C. Total	7	2124041.5		0.0054

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-338.6023	533.1637	-0.64	0.5705
Total Contract Awards	0.2048412	0.027327	7.50	0.0049
Total Dollars Awarded	-2.269e-8	1.705e-8	-1.33	0.2752
GWACs	-0.29755	0.065402	-4.55	0.0199
MACs	0.0300412	0.027665	1.09	0.3570

Figure 12. JMP Results for Total Small Businesses FY 1996 FY 2003

74

Figure 12 provides the JMP results for the total small businesses dependent variable

for the period from FY 1996 to FY 2003. The independent variables included are: Total

Contract Awards, Total Dollars Awarded, GWACs, and MACs.

The least squares model is:

$$\text{y-hat} = -338.6 + .20x_1 - 0.00000002x_2 - 0.30x_3 + 0.03x_4 + \in$$

For this model, the R-squared score jumps to 98.3% of the variation explained. The F-

Ratio again exceeds the standard $F_{.05}$, so the model is useful for prediction. The $t_{.05}$ score

with seven degrees of freedom is 1.895. Based on this, the useful variables from this

model are Total Contracts Awarded and GWACs.

Summary of Fit

RSquare	0.571106	
RSquare Adj	0.264754	
Root Mean Square Error	635.208	
Mean of Response	2461.923	
Observations (or Sum Wgts)	13	

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	5	3760948.2	752190	1.8642
Error	7	2824424.7	403489	Prob > F
C. Total	12	6585372.9		0.2192

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-2806.797	2172.286	-1.29	0.2373
Total Contract Awards	0.2947753	0.105365	2.80	0.0266
Total Dollars Awarded	-6.253e-8	8.115e-8	-0.77	0.4662
GWACs	-0.65701	0.247008	-2.66	0.0325
FASA[0]	321.85641	305.6415	1.05	0.3273
Clinger-Cohen[0]	-279.9835	296.4038	-0.94	0.3763

Figure 13. JMP Results for Total New Small Businesses FY 1991 to FY 2003

Figure 13 provides the JMP results for the total new small businesses dependent variable for the period from FY 1991 to FY 2003. The independent variables included are: Total Contract Awards, Total Dollars Awarded, GWACs, FASA, and Clinger-Cohen. The least squares model is:

$$y\text{-hat} = -2806.8 + .29x_1 - 0.00000006x_2 - 0.66x_3 - 321.86x_4 - 279.98x_5 + \in$$

The R-squared score reflects that 57% of the variation is accounted for within the model. The F-Ratio does not exceed the standard $F_{.05}$, so the model is not useful for prediction. The $t_{.05}$ score with twelve degrees of freedom is 1.782. Based on this, the useful variables from this model are Total Contract Awards and GWACs.

Summary of Fit

RSquare	0.807689
RSquare Adj	0.551274
Root Mean Square Error	460.6142
Mean of Response	2360.875
Observations (or Sum Wgts)	8

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	2673224.7	668306	3.1499
Error	3	636496.2	212165	Prob > F
C. Total	7	3309720.9		0.1865

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-3335.463	2249.152	-1.48	0.2347
Total Contract Awards	0.3239923	0.115277	2.81	0.0673
Total Dollars Awarded	-4.309e-8	7.191e-8	-0.60	0.5912
GWACs	-0.744442	0.275897	-2.70	0.0739
MACs	-0.09242	0.116703	-0.79	0.4862

Figure 14. JMP Results for Total New Small Businesses FY 1996 to FY 2003

Figure 14 provides the JMP results for the total new small businesses dependent variable for the period from FY 1996 to FY 2003. The independent variables included are: Total Contract Awards, Total Dollars Awarded, GWACs, and MACs. The least squares model is:

$$\text{y-hat} = -3335.46 + .32x_1 - 0.00000004x_2 - 0.74x_3 - 0.09x_4 + \in$$

For this model, the R-squared score jumps to 80.7% of the variation explained. The F-Ratio again fails to exceed the standard $F_{.05}$, so the model as a whole is not useful for prediction. The $t_{.05}$ score with seven degrees of freedom is 1.895. Based on this, the useful variables from this model are Total Contract Awards and GWACs. However, none of the variables pass the observed significance level alpha test. This suggests that none of the independent variables are useful in the prediction model.

Table 4 summarizes the results of the preliminary whole model tests.

Table 4. Usefulness of Whole Models and Independent Variables

Model	Useful as a Model?	Useful Independent Variables
Total Small Businesses FY 1990 to FY 2003	Yes	Total Contract Awards GWACs
Total Small Businesses FY 1996 to FY 2003	Yes	Total Contract Awards GWACs
Total New Small Businesses FY 1991 to FY 2003	No	Total Contract Awards GWACs
Total New Small Businesses FY 1996 to FY 2003	No	None

Step 5: Testing the Reduced Model

The new model will be run using only the independent variables deemed useful from the complete model. The only independent variables used in each model will be Total

Contract Awards and GWACs. Figure 15 presents the results from the reduced total

small businesses model. Figure 16 presents the results from the reduced total new small

businesses model. Each will be analyzed using the same tools to analyze the complete

model.

Summary of Fit

RSquare	0.798506
RSquare Adj	0.761871
Root Mean Square Error	308.3467
Mean of Response	4650.5
Observations (or Sum Wgts)	14

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	4144646.8	2072323	21.7961
Error	11	1045854.7	95078	Prob > F
C. Total	13	5190501.5		0.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-978.763	975.1368	-1.00	0.3371
Total Contract Awards	0.2017287	0.04344	4.64	0.0007
GWACs	-0.24885	0.106914	-2.33	0.0400

Figure 15. JMP Results for Total Small Businesses Reduced Model

The least squares model is:

$$\text{y-hat} = -978.76 + .20x_1 - 0.25x_2 + \in$$

The R-squared score is 79.9%. The F-Ratio of 21.7961 does exceed the standard $F_{.05}$,

providing evidence that the model is useful. In addition, each independent variable

passes the t-test of usefulness.

Summary of Fit				
RSquare		0.480248		
RSquare Adj		0.376298		
Root Mean Square Error		585.0437		
Mean of Response		2461.923		
Observations (or Sum Wgts)		13		

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	3162612.1	1581306	4.6200
Error	10	3422760.8	342276	Prob > F
C. Total	12	6585372.9		0.0379

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-1997.468	1892.09	-1.06	0.3159
Total Contract Awards	0.2344635	0.082932	2.83	0.0179
GWACs	-0.615523	0.202882	-3.03	0.0126

Figure 16. JMP Results for Total New Small Businesses Reduced Model

The least squares model is:

$$\text{y-hat} = -1997.47 + .23x_1 - 0.62x_2 + \epsilon$$

The R-squared score is 48.0%. The F-Ratio of 4.62 barely exceeds the standard $F_{.05}$,

providing evidence that the model is useful. In addition, each independent variable

passes the t-test of usefulness.

Step 6: Comparing the Reduced Models to the Complete Models

There are two steps to comparing the usefulness of the reduced models to the

complete models. First, the F-Ratios will be compared. A higher F-Ratio reflects a more

useful model. Second, the R-squared scores will be compared. The higher the R-squared

score, the more the variance that is accounted for within the model. Table 5 compares the

F-Ratios and R-squared scores of the six models tested.

Table 5. Comparison of Reduced Models to Complete Models

Model	F-Ratio	R-squared scores
Complete model—Total Small Businesses—FY 1990 to FY 2003	**12.08**	**0.88**
Complete model—Total Small Businesses—FY 1996 to FY 2003	**43.79**	**0.98**
Complete model—Total New Small Businesses— FY 1991 to FY 2003	**1.86**	**0.57**
Complete model—Total New Small Businesses— FY 1996 to FY 2003	**3.15**	**0.808**
Reduced model—Total Small Businesses— FY 1990 to FY 2003	**21.8**	**0.799**
Reduced model—Total New Small Businesses— FY 1991 to FY 2003	**4.62**	**0.48**

Based on the idea that higher F-Ratios and R-squared scores represent more effective models, then the best model used is the Complete Model—Total Small Businesses—FY 1996 to FY 2003. However, it is important to note that the Reduced Model covers a longer time period. Additionally, although the Reduced Model may appear less useful based on these two measures, it reflects only the independent variables that have been determined to be useful. This helps isolate the importance of those two variables—the R-squared scores of the Reduced Models represent a large percentage of the Complete Model, with a reduced number of variables to track.

Step 7: Testing the Hypotheses

This section will involve testing each of the hypotheses presented in Chapter III using the results of both the Complete Models and the Reduced Models.

> H_1: An increase in Air Force contract actions will increase the number of Air Force small business contractors.

The data supports H1. Number of contract actions is a useful independent variable in the model. In addition, the scattergrams confirm the positive relationship between Air Force contract actions and the number of Air Force small business contractors.

H_2: An increase in Air Force contract actions will increase the number of new Air Force small business contractors.

The data supports H2. Number of contract actions is a useful independent variable in the model. In addition, the scattergrams confirm the slightly positive relationship between Air Force contract actions and the number of new Air Force small business contractors.

H_3: An increase in Air Force dollars spent will increase the number of Air Force small business contractors.

H_4: An increase in Air Force dollars spent will increase the number of new Air Force small business contractors.

The data do not support H3 and H4. Air Force dollars spent is not a useful independent variable in either model.

H_5: An increase in performance-based service contracts will decrease the number of Air Force small business contractors.

H_6: An increase in performance-based service contracts will decrease the number of new Air Force small business contractors.

H_7: An increase in bundled contracts will decrease the number of Air Force small business contractors.

H_8: An increase in bundled contracts will decrease the number of new Air Force small business contractors.

Unfortunately, the lack of data means that these four hypotheses cannot be tested using the models developed. Although the variables could not be tested in the model, some

81

initial findings can be made in reference to these two variables. As Table 1 shows, the

number of bundled contracts has decreased each of the three years it has been recorded,

from 55 in FY 2001 to 20 in FY 2003. This trend is not surprising, due to the mandate to

eliminated bundled contracts and the special procedures required to use the bundling

technique. PBSCs have increased in each of the three years, from 2555 in FY 2001 to

6227 in FY 2003. Again, with the mandates requiring that 50 percent of all service

contracts be performance-based, the rising number should be expected.

> $\underline{H_9}$: An increase in the number of government wide agency contract
> actions will decrease the number of Air Force small business
> contractors.

> $\underline{H_{10}}$: An increase in the number of government wide agency contract
> actions will decrease the number of new Air Force small business
> contractors.

The number of government wide agency contracts does appear to be a useful independent

variable in each model. The scattergrams suggest that there is a positive relationship

between the number of GWACs and the total number of small businesses. However, the

model confirms that there is a negative relationship between these two variables (negative

estimate value). Based on this, H9 and H10 are not rejected.

> $\underline{H_{11}}$: An increase in the number of multiple award contract actions will
> decrease the number of Air Force small business contractors.

> $\underline{H_{12}}$: An increase in the number of multiple award contract actions will
> decrease the number of new Air Force small business contractors.

> $\underline{H_{13}}$: FASA led to a decrease in the number of Air Force small business
> contractors.

$\underline{H}_{14}$: FASA led to a decrease in the number of new Air Force small business contractors.

$\underline{H}_{15}$: Clinger-Cohen led to a decrease in the number of Air Force small business contractors.

$\underline{H}_{16}$: Clinger-Cohen led to a decrease in the number of new Air Force small business contractors.

The data do not support Hypotheses 11 through 16. The number of MACs, FASA, and Clinger-Cohen are not useful independent variables in either model.

Testing the Proposed Metrics Using the Metrics Construct

Chapter III identified five questions that can be used to determine whether metrics are effective. Answering the five questions for the proposed metrics of total number of Air Force small business contractors and total number of new Air Force small business contractors will provide the analysis needed to answer the second research question in Chapter V.

The first requirement is that the measurement be quantifiable. Both proposed metrics pass this test. Not only can they be quantified, but the method of doing so is clear. The actual count can be obtained through an analysis of the J001 database, as performed in this research.

The second question requires the metrics to be consistent with the goals of the organization, which is the Air Force Small Business office in this case. Again, both metrics meet this requirement. Both measures fit well with the outlined strategies and

goals included in the *Air Force Small Business and HBCU/MI Program Plan for Fiscal Years 2003-2007*.

The third question requires that the organization be able to establish specific, research-based targets based on the metrics. The real issue here is whether the targets are based on research or merely arbitrary numbers. This research provides historical figures for each of the metrics for over a decade. Based on these numbers, specific targets can be set for each metric. Each metric meets the requirements of the third question.

The fourth question requires that a strategy to reach the targets of the metric must be able to be developed. This research has identified several factors that affect the numbers for each metric. Other factors exist that still need to be determined. By understanding how these factors relate to the metrics, the Air Force Small Business office will be able to develop strategies to reach the targets set for each metric. Again, each metric passes this test.

The final question requires the metric to have the support of organizational leadership. This research cannot determine the answer to this question. The leadership of the Air Force Small Business office must determine that these metrics are useful and important and provide their full support of them in order for either metric to meet this requirement and to be effectively used by the organization.

Conclusion

In a perfect world, the chosen independent variables would fully explain the variance in the dependent variables. Additionally, one or two variables would be identified that would, by themselves, allow predictions to be made regarding the dependent variable.

Such has not been the case with these models and variables. Nonetheless, the models are statistically useful for predicting the dependent variables. Two independent variables have been identified as being important contributors to the variation in the dependent variables. By following the steps outlined in the methodology of Chapter III, the models have allowed the hypotheses to be tested despite limited data. These hypotheses tests provide information to help answer the main questions of this research. Those questions will be addressed in Chapter V.

Chapter V: Conclusions and Recommendations

Chapter V uses the information obtained through the literature review of Chapter II combined with the data analysis of Chapter IV to answer the research questions of Chapter I. It then looks at the contributions of the research, the limitations of the research, and the recommendations of the researcher for future actions and research.

The Research Questions

This research began by presenting two main research questions in the opening chapter. They are:

      1) Have acquisition reform initiatives negatively impacted small business participation in Air Force contracting?

      2) Should the Air Force Small Business office incorporate the measures of total small business contractors and total new small business contractors into their metrics?

The literature review of Chapter II, the methodology of Chapter III, and the analysis of Chapter IV provide answers to these questions.

The acquisition reforms of the 1990s appear to have had little, if any, impact on small business participation. The number of small businesses and number of new small businesses participating in Air Force contracting has been relatively stable or even increasing over the past thirteen years (see Figure 1). Of the independent variables tested in the model related to acquisition reforms, only the number of government wide agency contracts has been determined to affect the participation of small businesses. The answer

to the question of whether acquisition reform has negatively impacted small business participation must be answered negatively based on the factors considered within this research.

The second question can be answered based on the construct developed in Chapter III and tested in Chapter IV. Both metrics are viable candidates for use by the Air Force Small Business office. Leadership of that office must provide full support for the metric, however, including developing a strategy to achieve increased small business participation and linking it to the overall Small Business office strategy will ensure that these additional metrics are effective. This research concludes that the Air Force Small Business office should use both metrics as performance measurements.

Contributions of the Research

This effort makes two related contributions to small business research. Significantly, the research has found that the Air Force has been able to maintain and even increase the number of small businesses with contracts. This goes directly against findings for the federal government as a whole and therefore what may have been anticipated for the Air Force. The reasons for this difference may not ultimately be clear, but the data demonstrates that the Air Force has not experienced the same reductions in small business contractors that the federal government as a whole has experienced according to research performed by the Office of Management and Budget.

The second contribution of the research is that acquisition reform has had limited impact on small business participation. Despite expectations or fears that some actions have negatively impacted small businesses, this research concludes that they have not.

The important point is that with the iterative nature of acquisition reform, the expected impact of individual reforms may not be what is anticipated. Unfortunately, this research is unable to determine why reforms that on the surface appear to be harmful to small business participation have not had a negative effect.

Limitations to the Research

The primary limitation to this research is the data. Not only does the availability of data constrain the independent variables that could be included in the model, but two variables in the original model could not be tested due to limited data points. In addition to the limited nature of the data, the accuracy of the data must also be questioned. David E. Cooper, Director of Contracting Issues for the General Accounting Office, testified before Congress in 2003 on flaws in the Federal Procurement Data System (FPDS). According to Cooper, of the 49,366 companies who were coded as small businesses in FPDS and received contract awards in fiscal year 2001, 5,341 of those companies also received awards coded as large businesses. This suggests that many of the companies in the database are potentially miscoded in regards to business size (Cooper, 2003). Congresswoman Velázquez believes that this miscalculated data means that "the state of contracting opportunities for small businesses is much worse than was previously believed" (Velázquez, 2003:3). It is important to note, however, that miscoded data is not always going to have a negative impact on the final results. It is just as possible that a business coded as a large business, and therefore not counted towards small business goals, could be a small business. The important point is that inaccurate and incomplete data can greatly affect the results of this research.

A second limitation of the research is the regression model used. Because the results can only be applied to the data used in the model, it lacks predictive power to suggest how small business participation might be affected in the future. The model is able to meet the needs of the research design in identifying relationships, but a predictive ability could enhance the research.

Recommendations

The following recommendations can be sorted into two groups: recommendations for policymakers in the small business office and recommendations for future research. Each recommendation is based on results of the research and observations of the researcher.

Measuring the number of small businesses contracting with the Air Force and the number of new small businesses that enter that group should be metrics used by the Air Force Small Business Office. The metrics must be linked to strategic goals that will lead to the development of strategic actions and plans. The Air Force Small Business Office needs to develop strategies that support and encourage current and potential small businesses to compete for Air Force contracts.

Although acquisition reforms covered in this research have not negatively impacted small business participation, there is no guarantee that current and future reforms will not. Currently, the Air Force Small Business Office is closely involved in the protection of small business participation as reforms are implemented. These actions need to be maintained. Research such as this should be an iterative process to see how any reforms are impacting small business participation.

Opportunities for future research exist. The model developed here could be used to incorporate other independent variables, such as those used by Mayer (1992), to identify the effects of the budget, economic, and political cycles on small business participation. Research that attempts to understand why individual small businesses choose or choose not to contract with the Air Force can provide an alternative perspective that can guide policy formation. Research that addresses the quality of the relationships between small businesses and the Air Force is also lacking. Qualifying relationships as successful or unsuccessful and determining what factors influence each outcome can help focus Air Force outreach efforts. Finally, research that addresses Air Force small business outreach is also needed. What is the success of current efforts and how can this tool be used to increase the number of new small businesses doing business with the Air Force? Any of these topics are appropriate for further exploration and research in attempting to understand the participation of small businesses in Air Force contracting.

Bibliography

Aberbach, Joel D. "Improving Oversight: The Endless Task of Congress," *Society*, 40:60-63, Nov/Dec 2002a.

-----. "What's Happened to the Watchful Eye?," *Congress & the Presidency*, 29: 3-23 (Spring 2002b).

Acs, Zoltan J. and David B. Audretsch. "Innovation in Large and Small Firms: An Empirical Analysis," *The American Economic Review*, 78: 678-690 (September 1988).

-----. "Introduction," in *Small Firms and Entrepreneurship: An East-West Perspective*. Eds. Zoltan J. Acs and David B. Audretsch. New York: Cambridge University Press, 1993.

Ausink, John and others. *Performance-Based Contracting in the Air Force: A Report on Experiences in the Field*. Washington: RAND Corporation, 2001.

Baldwin, Laura H. and others. *Bundled Services: A Framework for Cutting Costs, Improving Performance, and Supporting Small Businesses*. Washington: RAND Corporation Report No. RB-89-AF, 2002.

Barben, Raymond M. *The Impact of Acquisition Reform and Political-Fiscal Variables on Air Force GAO-Protests Processed*. MS Thesis, AFIT/GCM/LAS/99S-1. School of Logistics and Acquisition Management, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1999 (ADA369533).

Battershell, A. Lee. *The DoD C-17 versus the Boeing 777: A Comparison of Acquisition and Development*. Washington: National Defense University, 1999.

Blackerby, Phillip. "Strategic Planning: An Overview for Complying with GPRA (P. L. 103-62)," *Armed Forces Comptroller*, 39:17-22, Winter 1994.

Bowman, Dan. "Procurement Transformation: Leveraging Air Force Buying Power." Briefing by the Chief of the Procurement Transformation Team, Deputy Assistant Secretary (Contracting), Assistant Secretary (Acquisition), 2003a.

-----. "Procurement Transformation: The Road Ahead." Briefing by the Chief of the Procurement Transformation Team, Deputy Assistant Secretary (Contracting), Assistant Secretary (Acquisition), 25 June 2003b.

Brannen, Kathleen C. and Joel C. Gard. "Grantsmanship and Entrepreneurship: A Partnership Opportunity Under the Small Business Innovation Development Act," *Journal of Small Business Management*, 23: 44-49 (July 1985).

Brown, Mark Graham. *Keeping Score: Using the Right Metrics to Drive World-Class Performance*. New York: Productivity, Inc., 1996.

Burman, Allan V. "Big Plans for Small Business," *Government Executive*, 34: 61 (August 2002).

-----. "For Small Business, It's A Jungle Out There," *Government Executive*, 33: 78 (August 2001).

-----. "The Winding Paths of Reform," *Government Executive*, 32: 69 (February 2000).

Bush, George W. President of the United States. "Taking Action to Strengthen Small Businesses [Remarks by the President on the Economy]." Address to J. S. Logistics, St. Louis, MO. 22 January 2003.

Campbell, Donald L. "Acquisition Reform—A Good Omen or the Trojan Horse in Our Midst?," *Program Manager*, 26: 38-40 (November/December 1997).

Chinworth, Michael W. "Acquisition Reform in the United States: Assessing Change," *Defense Analysis*, 16: 165-183 (August 2000).

CHI Research, Inc. *Small Serial Innovators: The Small Firm Contribution to Technical Change*. Prepared for the Small Business Administration Office of Advocacy under contract number SBAHQ-01-C-0149. Washington: GAO, February 27, 2003.

Chmielewski, Todd L. and Jack J. Phillips. "Measuring Return-on-Investment in Government: Issues and Procedures," *Public Personnel Management*, 31:225-237, Summer 2002.

Cohen, William S. "Actions to Accelerate the Movement to the New Workforce Vision," *Program Manager*, 27: 20-23 (May/June 1998).

Cooper, Michael Andrew. *Department of Defense Implementation of Acquisition Reform Initiatives*. MS Thesis. Naval Postgraduate School, Monterey, CA, June 2002 (ADA405801).

Cooper, David E. "Diversion of Small Business Contracts to Larger Firms," testimony before the Committee on House Small Business, United States House of Representatives, May 7, 2003.

Dallal, Gerard E. Ph.D. *The Little Handbook of Statistical Practice,* accessed on 19 February 2004 at http://www.tufts.edu/~gdallal/LHST.htm

Denes, Thomas A. "Do Small-Business Set-Asides Increase the Cost of Government Contracting?," *Public Administration Review*, 57: 441-444 (September/October 1997).

Department of the Air Force, Office of Small and Disadvantaged Business Utilization. *Air Force Small Business and HBCU/MI Program Plan for Fiscal Years 2003-2007*, accessed on 26 November 2003 at http://selltoairforce.org/faq/plan2003.htm.

Department of Defense. *Department of Defense Federal Acquisition Regulations*, accessed on 29 May 2003 at http://farsite.hill.af.mil.

Eagle Eye Publishers. *Bundled Contract Study FY91-FY95*. Prepared for the Small Business Administration Office of Advocacy under contract number SBAHQ-95-C-0020. Washington: GAO, June 20, 1997.

-----. *The Impact of Contract Bundling on Small Business FY 1992- FY 1999*. Prepared for the Small Business Administration Office of Advocacy under contract number SBAHQ-97-M-0861. Washington: GAO, September 12, 2000.

-----. *The Impact of Contract Bundling on Small Business FY 1992- FY 2001*. Prepared for the Small Business Administration Office of Advocacy under contract number SBAHQ-01-M-0352. Washington: GAO, October 2002.

Emory, C. William and Donald R. Cooper. *Business Research Methods* (4th Edition). Homewood, IL: Richard D. Irwin, Inc., 1991.

Federal Acquisition Regulation, accessed on 29 May 2003 at http://farsite.hill.af.mil.

Fitzgerald, John M. and David C. Ribar. *Does a Rising Tide of Small Business Jobs Lift All Boats?* Prepared for the Small Business Administration Office of Advocacy under contract number SBAHQ-00-M-0574. Washington: GAO, July 2001.

Frost, Bob. *Measuring Performance*. Dallas, TX: Measurement International, 2000.

Gasiorek-Nelson, Sylvia. "Acquisition and Logistics Excellence," *Program Manager*, 32: 18-23 (May/June 2003).

"Gazelle Theory, The," *Inc.*, 23: 28-29 (May 29, 2001).

Gansler, Jaccques S. Memorandum on Performance-Based Services Acquisition (PBSA). Pentagon, Washington D.C., April 5, 2000.

General Accounting Office. *Department of Defense: Status of Achieving Outcomes and Addressing Major Management Challenges*. Report Number GAO- 01-783. Washington: GPO, June 2001.

-----. *The Government Performance and Results Act: 1997 Governmentwide Implementation Will Be Uneven*. Report Number GAO/GGD-97-109. Washington: GPO, June 1997.

-----. *Small Businesses: Limited Information Available on Contract Bundling's Extent and Effects*. Report prepared for the Chairman, Committee on Small Business, U.S. Senate. Washington: GAO, March 2000.

Hecker, Jayetta Z. "Small Business Trends in Federal Procurement in the 1990s," report to Congressional requesters, January 18, 2001.

Jovanovic, Boyan. "New Technology and the Small Firm," *Small Business Economics*, 16: 53-55 (2001).

Julnes, Patricia de Lancer and Marc Holzer. "Promoting the Utilization of Performance Measures in Public Organizations: An Empirical Study of Factors Affecting Adoption and Implementation," *Public Administration Review*, 61:693-708 (Nov 2001).

Karlsson, Charlie and Martin Karlsson. "Economic Policy, Institutions and Entrepreneurship," *Small Business Economics*, 19: 163-182 (2002).

Kautz III, James R. and F. Ellen Netting. "The Government Performance and Results Act of 1993: Implications for Social Work Practice," *Social Work*, 42:364-373, July 1997.

Laurent, Anne. "The Results Act is Dead," *Government Executive*, 32:78, May 2000.

Lerner, Josh. "The Government as Venture Capitalist: The Long-Run Impact of the SBIR Program," *Journal of Business*, 72: 285-318 (1999).

Love, Arnold J. "The Future of Evaluation: Catching Rocks With Cauldrons," *American Journal of Evaluation*, 22:437-444, Fall 2001.

Manchester, Steven J. "Promoting Transformation With Ideas From the Acquisition Workforce," *Program Manager*, 31: 73-75 (September/October 2002).

Mark, Melvin M. "Evaluation's Future: Furor, Futile, or Fertile?," *American Journal of Evaluation*, 22:457-479, Fall 2001.

Maroni, Alice C. "Department of Defense Implementation of the Government Performance and Results Act," *Armed Forces Comptroller*, 43:12-14, Winter 1998.

Mayer, Kenneth R. "Elections, Business Cycles, and the Timing of Defense Contract Awards in the United States," in *The Political Economy of Military Spending in the United States*. Ed. Alex Mintz. London: Routledge, 1992.

McClave, James T. and others. *Statistics for Business and Economics* (7th Edition). Upper Saddle River, NJ: Prentice Hall, 1998.

McTigue, Maurice P. "The Results Act: Has It Met Congressional Expectations?," testimony before the Subcommittee on Government Efficiency, Financial Management and Intergovernmental Relations, Committee on Government Reform, United States House of Representatives, June 19, 2001.

Melese, Francois. "The Latest in Performance Budgeting: The Government Performance and Results Act (GPRA)," *Armed Forces Comptroller*, 44:19-22 (Spring 99).

Mercer, John. "The Results Act: Has It Met Congressional Expectations?," testimony before the Subcommittee on Government Efficiency, Financial Management and Intergovernmental Relations U.S. House of Representatives, June 19, 2001.

Mihm, J. Christopher. "GAO Managing for Results," testimony before the Subcommittee on Government Efficiency, Financial Management and Intergovernmental Relations, Committee on Government Reform, United States House of Representatives, June 19, 2001.

Milligan, Brian. "Supplier Consolidation Brings New Challenges," *Purchasing*, 127: 60-61 (August 12, 1999).

Mogee, Mary Ellen. *Foreign Patenting Behavior of Small and Large Firms: An Update*. Prepared for the Small Business Administration Office of Advocacy under contract number SBAHQ-01-M-0357. Washington: GAO, April 2003.

Moore, Nancy Y. and others. *Implementing Best Purchasing and Supply Management Practices*. Washington: RAND Corporation, 2002.

National Academy of Engineering. *Risk & Innovation: The Role and Importance of Small High-Tech Companies in the US Economy*. Prepared by the Committee on Technology, Management, and Capital in Small, High-Tech Companies. Washington: National Academy Press, 1995.

Newcomer, Kathryn E. "Tracking and Probing Program Performance: Fruitful Path or Blind Alley for Evaluation Professionals?," *American Journal of Evaluation*, 22:337-341, Fall 2001.

Office of Advocacy, U.S. Small Business Administration. *2003 State Small Business Profile: United States*. Washington: GAO, 2003.

-----. *Background Paper on the Office of Advocacy, 1994-2000*. Washington: GAO, 2000.

-----. *The New American Evolution: The Role and Impact of Small Firms*. Washington: GAO, June 1998.

Office of the Under Secretary of Defense (Acquisition Reform). *Guidebook for Performance-Based Services Acquisition (PBSA) in the Department of Defense*. Washington: GAO, December 2000.

Office of Management and Budget, Office of Federal Procurement Policy. *Contract Bundling: A Strategy for Increasing Federal Contracting Opportunities for Small Business*. Washington: GAO, October 29, 2002.

-----. *Performance-Based Service Acquisition: Contracting for the Future*. Prepared by the Interagency Task Force on Performance-Based Service Acquisition. Washington: GAO: July 2003.

Popkin, Joel and Company. *Small Business Share of Economic Growth*. Prepared for the U.S. Small Business Administration under contract number SBA-HQ-00-C-0001. Washington: GAO, December 14, 2001.

"The President's Small Business Agenda." Released by the White House Office of the Press Secretary, 2002.

"Procurement Transformation Status Update 20 March 2003," Briefing slides accessed on 25 September 2003 at http://www.safaq.hq.af.mil/.

Robbins, D. Keith and others. "An Empirical Assessment of the Contribution of Small Business Employment to U.S. State Economic Performance," *Small Business Economics*, 15: 293-302 (2000).

Sambur, Marvin R. "Agile Acquisition Implementation," Policy Memo 03A-002 from the Assistant Secretary of the Air Force (Acquisition). Pentagon, Washington D.C., 4 February 2003.

Terleckyj, Nestor E. *Measuring Contribution of Small Business to Industry Job Growth By Data in Business Association Directories*. Prepared for the Small Business Administration Office of Advocacy for Project SBAHQ-97-M-0753. Washington: GAO, April 30, 1999.

Tolan Jr., Patrick E. "Government Contracting with Small Businesses in the Wake of the Federal Acquisition Streamlining Act, the Federal Acquisition Reform Act, and Adarand: Small Business As Usual?," *Air Force Law Review*, 44: 75-118.

"Under Secretary of Defense (Acquisition and Technology) Sets New Standards for the Defense Acquisition Workforce," *Program Manager*, 28: 10-11 (January/February 1999).

United States Congress. *The Small Business Act of 1953*. Public Law 85-536, 85th Congress, 1st Session. Washington: GPO, 1953.

-----. *Amendment to the Small Business Act*. Public Law 94-305, 94th Congress, 2nd Session. Washington: GPO, 1976.

-----. *Amendment to the Small Business Act*. Public Law 95-507, 95th Congress, 2nd Session. Washington: GPO, 1978.

-----. *Small Business Innovation Development Act of 1982*. Public Law 97-219, 97th Congress, 2nd Session. Washington: GPO, 1982.

-----. *National Defense Authorization Act for Fiscal Year 1987*. Public Law 99-661, 99th Congress, 2nd Session. Washington: GPO, 1986.

-----. *Small Business Competitive Demonstration Program Act of 1988*. Public Law 100-656, 100th Congress, 2nd Session. Washington: GPO, 1988.

-----. *National Defense Authorization Act for Fiscal Year 1991*. Public Law 101-510, 101st Congress, 2nd Session. Washington: GPO, 1990.

-----. *Small Business Technology Transfer Act of 1992*. Public Law 102-564, 102nd Congress, 2nd Session. Washington: GPO, 1992.

-----. *Government Performance and Results Act of 1993*. Public Law No. 62, 103rd Congress, 1st Session. Washington: GPO, 1993.

-----. *Federal Acquisition Streamlining Act of 1994*. Public Law 103-355, 103rd Congress, 2nd Session. Washington: GPO, 1994.

-----. *National Defense Authorization Act for Fiscal Year 1996*. Public Law 104-106, 104th Congress, 2nd Session. Washington: GPO, 1996.

-----. *Small Business Reauthorization Act of 1997*. Public Law 105-135, 105th Congress, 1st Session. Washington: GPO, 1997.

Velázquez, Nydia M. "Federal Contract Watch List: How Big Contracts Hurt Small Businesses: 10 to Watch," Report prepared by the House Small Business Democrats, 25 April 2002.

-----. "Scorecard IV: Federal Agencies—Closed to Small Business," Report prepared by the House Small Business Democrats, 25 June 2003.

Wallace, David A. and Steven L. Schooner. "Affirmative Action in Procurement: A Preview of the Post-Adarand Regulations in the Context of an Uncertain Judicial Landscape," *Army Lawyer*, 298: 3-17 (September 1997).

Welch, Bob. "Small Business Gets Lost in Big Picture," *Government Executive*, 32: 106-108 (June 2000).

White, Barry. "Seizing the Moment on GPRA," *Government Executive*, 33:68, Jan 2001.

Wholey, Joseph S. "Trends in Performance Measurement: Challenges for Evaluators," in *Evaluation for the 21st Century: A Handbook*. Eds. Eleanor Chelimsky and William R. Shadish. Thousand Oaks, CA: Sage Publications, 1997.

Vita

Captain William C. Pike graduated from Booker T. Washington High School in Pensacola, Florida in June 1988. He received his Bachelor of Science in Economics and Political Science from Florida State University in 1992. He was commissioned a second lieutenant in the United States Air Force in August 1998.

His first assignment was to the 354th Contracting Squadron at Eielson Air Force Base, Alaska. In August 2002, he entered the Graduate School of Engineering and Management at the Air Force Institute of Technology. Upon graduation, he will be assigned to the Air Force Logistics Management Agency in Montgomery, Alabama.

REPORT DOCUMENTATION PAGE

*Form Approved
OMB No. 074-0188*

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to an penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.
PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE *(DD-MM-YYYY)* 23-03-2004	2. REPORT TYPE **Master'sThesis**	3. DATES COVERED *(From – To)* August 2002-March 2004

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
MEASURING SMALL BUSINESS PARTICIPATION IN AIR FORCE CONTRACTING: THE IMPACT OF ACQUISITION REFORM	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)	5d. PROJECT NUMBER
Pike, William C., Captain, USAF	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S) Air Force Institute of Technology Graduate School of Engineering and Management (AFIT/EN) 2950 HobsonStreet, Building 640 WPAFB OH 45433-7765	8. PERFORMING ORGANIZATION REPORT NUMBER AFIT/GAQ/ENV/04M-10

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Air Force Small Business Mr. Joseph Diamond, Director 901 North Stuart Street, Suite 802 Arlington, VA 22203	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
   APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Congress has mandated the Air Force to reform and streamline its acquisition procedures while promoting participation by small business contractors. Reports on the federal government as a whole suggest that the acquisition reforms have had a negative effect on small business participation, with a declining number of small businesses receiving contract awards.
A causal regression model is used to determine that the Air Force has actually increased the number of small businesses receiving contract awards over the past thirteen years and has maintained a steady stream of new small businesses into that group. Variables are tested to determine their effect on small business participation. Those tests reveal that number of contract awards and number of government-wide agency contract orders placed are useful for predictive purposes. The research also identifies two performance measurements for the Air Force small business office: total number of small business contractors and total number of new small business contractors.

15. SUBJECT TERMS
 Air Force contracting, small business participation, acquisition reform, GPRA

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Patricia G. Luna
REPORT **U**	ABSTRACT **U**	c. THIS PAGE **U**	**UU**	112	19b. TELEPHONE NUMBER *(Include area code)* (937) 255-2998

Standard Form 298 (Rev: 8-98)
Prescribed by ANSI Std. Z39-18