

Evaluation of Factors for Reaching the HUBZone Contracting Goal

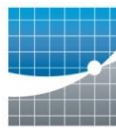
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REAL-TIME DATA-DRIVEN DECISION MAKING

Contract No. **73351018A0038** Order No. **0001 CLIN 2**

The statements, findings, and conclusions found in this study are those of the contractor and do not necessarily reflect the views of the Office of Program Performance, Analysis, and Evaluation, the United States Small Business Administration, or the United States Government.

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Glossary

Term	Definition
8(a)	The Minority Small Business and Capital Ownership Development Program provides participating small businesses with training, technical assistance, and contracting opportunities in the form of set-aside and sole-source awards.
BOA	Basic Ordering Agreement
BPA	Blanket Purchase Agreement
BRAC	Base Realignment and Closure Act
Commerce	U.S. Department of Commerce
CSA	Combined Statistical Alias
DDA	Difficult Development Areas
DHS	U.S. Department of Homeland Security
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOJ	U.S. Department of Justice
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
DUNS	Data Universal Numbering System
ED	U.S. Department of Education
EPA	U.S. Environmental Protection Agency
FPDS-NG	Federal Procurement Data System – Next Generation
FSS	Federal Supply Schedule
GSA	General Services Administration
GWAC	Government-Wide Acquisition Contract
HHS	U.S. Department of Health and Human Services
HUBZone	Historically Under-utilized Business Zone
HUD	U.S. Department of Housing and Urban Development
IDC	Indefinite Delivery Contract
IDV	Indefinite Delivery Vehicle
Interior	U.S. Department of the Interior
MAS	Multiple Award Schedules
MSA	Metropolitan Statistical Area
NAICS	North American Industry Classification System
NASA	National Aeronautics and Space Administration
NRC	U.S. Nuclear regulatory Commission
NSF	National Science Foundation
OPM	U.S. Office of Personnel Management
QCT	Qualified Census Tract
SAM	System for Award Management
SBA	U.S. Small Business Administration

Term	Definition
SBGR	Small Business Goaling Report
SSA	U.S. Social Security Administration
State	U.S. Department of State
Treasury	U.S. Department of Treasury
USAID	U.S. Agency for International development
USDA	U.S. Department of Agriculture
VA	U.S. Department of Veterans Affairs
VOSB	Veteran-Owned Small Business
WOSB	Women-Owned Small Business

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Executive Summary

Research Objective: Although federal agencies are collectively required to obligate 3 percent of their small business eligible dollars to Historically Under-utilized Business Zone (HUBZone)-certified small businesses, many have never met that goal. To better understand the factors that facilitate and hinder federal agencies from consistently meeting HUBZone contracting goals, the U.S. Small Business Administration has requested a quantitative study to answer the following questions:

1. What factors predict whether a federal agency obligates 3 percent of its contract dollars to HUBZone businesses?
2. What factors predict whether a HUBZone business procures a federal contract? Do these factors vary for rural-area and tribal-located¹ businesses, compared to businesses in metropolitan areas?

Key Findings: The study identified several factors that affect federal agencies' spending on HUBZone businesses. One hypothesis surmises a mismatch between the goods and services purchased by federal agencies and those provided by HUBZone businesses. To test this hypothesis, the study examined the relationship between HUBZone spending and the amount of small business eligible dollars each agency obligates to industries in which HUBZone businesses primarily operate. The study found that agencies purchasing goods and services from the Construction and Manufacturing industries tend to spend more with HUBZone businesses. This aligns with previous research that found Construction to be one of the industries in which federal agencies have a large number of awards to HUBZone businesses (Global Evaluation and Applied Research Solutions, 2018).

This study also tests several other hypotheses. Agencies that obligate proportionately more of their contract dollars through Basic Ordering Agreements (BOA) and the Federal Supply Schedule (FSS), also referred to as Multiple Award Schedules (MAS), have proportionately higher HUBZone spending. Similarly, agencies purchasing directly from HUBZone businesses through set-asides, sole-source, and price preference vehicles also have a positive relationship with HUBZone spending with larger contract awards associated with higher HUBZone spending. As HUBZone businesses often have other SBA certifications like 8(a) and other socioeconomic program designations such as Veteran-Owned Small Businesses (VOSBs) and Women-Owned Small Businesses (WOSBs), federal spending on 8(a) and VOSBs was found to increase spending on HUBZone businesses. Conversely, spending on WOSBs is shown to have a negative relationship with HUBZone spending.

¹ The study was not able to assess whether HUBZone businesses located in tribal areas have a differential likelihood of obtaining a federal contract as the data identifying the class of HUBZone areas where the businesses were located, specifically those in Indian reservations, were not available to this study

The second research question investigated the factors that predict whether a HUBZone business will obtain a federal contract and the size of the contracts it will receive. HUBZone businesses with multiple SBA and socioeconomic program designations have a higher likelihood of obtaining prime federal contracts. For instance, HUBZone businesses with 8(a) certification are 30 percentage points more likely to obtain a federal contract compared to non-8(a) HUBZone businesses. Therefore, the likelihood of a HUBZone business obtaining a federal contract increases from 28 percent to 58 percent if it is also 8(a) certified. Similarly, HUBZone businesses that are also VOSBs and WOSBs are 10 percentage points² and 3 percentage points³, respectively, more likely to obtain federal contracts than those that are not.

Business management practices also matter. For instance, HUBZone businesses that accept government credit cards are 9 percentage points more likely to win federal contracts than HUBZone businesses that do not accept government credit cards. HUBZone businesses located in urban areas were 3 percentage points less likely to obtain federal contracts compared to those located in rural areas. While HUBZone businesses in the Construction sector have a 4 percentage point higher likelihood of obtaining federal contracts compared to those in the Manufacturing sector; those that provide Professional, Technical, and Scientific Services are 6 percentage points less likely to win a prime federal contract, compared to HUBZone businesses in the Manufacturing sector.

The study found that the average size of the prime federal contracts received by HUBZone businesses is also associated with several factors. Holding all else constant, HUBZone businesses that are 8(a) certified and are VOSB have larger federal contracts (\$1.3 million and \$580,000 higher, respectively) than HUBZone businesses that are not. The average revenue, percent of revenue from federal contracts, and having previously obtained a federal contract, all positively affect the average dollar value of contracts won by HUBZone businesses. Finally, HUBZone businesses located in Metropolitan Statistical Areas (MSAs) are likely to have larger contracts (on average \$770,000 higher in value) than HUBZone businesses located in rural areas.

² The likelihood of obtaining a federal contract increase from 28 percent to 38 percent if the HUBZone business is also a VOSB.

³ The likelihood of obtaining a federal contract increase from 28 percent to 31 percent if the HUBZone business is also a WOSB.

Introduction

Research Objective: Federal agencies are required to award 3 percent of small business eligible dollars to Historically Under-utilized Business Zone (HUBZone)-certified small businesses.⁴ While several federal agencies have consistently met or exceeded the goal, between 2005 and 2017, almost one third of the agencies have never met the goal⁵ (U.S. Small Business Administration, Small Business Goaling Reports, 2018). Therefore, the Office of the HUBZone Program and the Office of Program Performance, Analysis, and Evaluation seek to understand the facilitators and barriers that federal agencies face in reaching the annual 3 percent HUBZone goal. Based on previous research evaluating the performance of the HUBZone program goal, the U.S. Small Business Administration (SBA) believes that agencies that meet the 3 percent contract⁶ award goal are most likely to contract with HUBZone businesses with unique characteristics that demonstrate specific types of contracting behaviors (Global Evaluation and Applied Research Solutions, 2018). To test these assumptions, the SBA has requested a quantitative study of these two different factors. The research design of the study is guided by the following research questions:

1. What factors predict whether a federal agency obligates 3 percent of its contract dollars to HUBZone businesses?
2. What factors predict whether a HUBZone business procures a federal contract? Do these factors vary for rural-area and tribal-located businesses compared to businesses in MSAs?

Intended Audience: The primary audience for this study is the SBA and HUBZone program office staffs, as well as contracting and program staffs across the Federal Government. The goal is to identify barriers that can be removed or levers that can be pushed that will lead to increased access to federal funding for HUBZone businesses. Placing more federal solicitations on HUBZone set-asides might greatly increase the amount of federal contract dollars⁷ going to HUBZone businesses. Improving outreach efforts and redesigning contracting vehicles to make them more friendly to HUBZone business access can also contribute to increasing access to federal contracts. Finally, from the viewpoint of certain federal agencies, there may be a

⁴ 15 U.S.C. § 644(g) (1)-(3) requires federal agencies and departments with procurement powers to collectively obligate 3 percent of prime and subcontract dollars to HUBZone businesses annually. However, SBA monitors the collective goal on a per agency basis.

⁵ The agencies that have not met the HUBZone contracting goal between fiscal years 2005 and 2017 are: the Department of Education, Department of Energy, National Aeronautics and Space Administration, United States Agency for International Development, Environmental Protection, National Science Foundation, and Department of Justice.

⁶ A unique contract award is defined in this study as a standalone contract award not associated with an Indefinite Delivery Vehicle (IDV). Individual task order awards under a single IDV or different IDVs are also counted as unique contract awards. Operationally, a unique contract award was identified by concatenating the variables *PIID*, *IDV_PIID*, and *IDV_REF_IDV_PIID* in the Small Business Goaling Report (SBGR) version of the Federal Procurement Data System – Next Generation (FPDS-NG) dataset.

⁷ The value of a unique contract award is the total small business eligible dollars obligated to it.

mismatch between the goods and services that HUBZone businesses can offer compared to the goods and services federal agencies require. This study should provide greater understanding of how to improve the match between the goods and services produced by HUBZone businesses and the needs and requirements of federal agencies.

Summary of Findings: After conducting a retrospective repeated measures analysis using federal contracts and business profile data from fiscal years 2013 to 2017, the study found that government expenditures in Construction and Manufacturing industries⁸ have a positive relationship with HUBZone spending. Agencies that demand goods and services in these industries may have a higher likelihood of meeting the 3 percent goal. This aligns with previous research that found Construction to be one of the industries in which federal agencies have a large number of awards to HUBZone businesses (Global Evaluation and Applied Research Solutions, 2018). Federal agencies are more likely to meet the goal in terms of procuring contracts directly from HUBZone businesses, if a larger percent of their contracts are through HUBZone set-asides, sole source, or price preference. At the same time, the average dollar value of contracts awarded to HUBZone businesses was also related to overall HUBZone spending. The study found that increasing the size of prime federal contracts awarded to HUBZone businesses may increase the likelihood of meeting the 3 percent contracting goal. Since roughly 10 percent of HUBZone businesses are also certified as 8(a) businesses and 12 percent are Veteran-Owned Small Businesses (VOSB), contracting with 8(a) and VOSBs⁹ may lead to increased HUBZone spending. On the other hand, the study found a negative relationship between federal spending on Women-Owned Small Businesses (WOSBs)¹⁰ and meeting the HUBZone contracting goal, implying a substitution effect. The results show that procurement through Blank Ordering Agreements (BOA) and the Federal Supply Schedule (FSS), also referred to as Multiple Award Schedule (MAS), had a positive relationship with HUBZone

⁸ Federal agency spending by industry is based on the primary North American Industry Classification System (NAICS) code of the contract award listed in the FPDS-NG.

⁹ The VOSB dollars were calculated based on the definition used in the Small Business Goaling Report (SBGR): This column is an aggregation of Dollars Obligated when the 'Contracting Officer's Selection of Business Size' is equal to "Small Business" and the vendor's business type is Veteran-Owned. The percent of small business eligible dollars obligated to VOSB is also calculated using the SBGR definition: This column is computed as follows: Veteran-Owned Small Business Dollars/Total Small Business Eligible Dollars. The values for VOSB dollars and percent of small business eligible dollars per agency per year generated and used in this study from the FPDS-NG data match those listed in the SBGR. (U.S. Small Business Administration, Small Business Goaling Reports, 2018).

¹⁰ The WOSB dollars were calculated based on the definition used in the SBGR: This column is an aggregation of Dollars Obligated when the 'Contracting Officer's Selection of Business Size' is equal to "Small Business" and the vendor's business type is Women-Owned, Women-Owned Small Business, Joint Venture Women-Owned Small Business, Economically Disadvantaged Women-Owned Small Business or Economically Disadvantaged Joint Venture Women-Owned Small Business. The percent of small business eligible dollars obligated to WOSB is also calculated using the SBGR definition: This column is computed as follows: Women-Owned Small Business Dollars/Total Small Business Eligible Dollars. The values for WOSB dollars and percent of small business eligible dollars per agency per year generated and used in this study from the FPDS-NG data match those listed in the SBGR. (U.S. Small Business Administration, Small Business Goaling Reports, 2018).

spending. Increasing spending through these indefinite delivery vehicles (IDVs) may increase the likelihood of federal agencies meeting the HUBZone contracting goal.

On the supply side, the study results show that HUBZone businesses with other SBA certifications and socioeconomic program designations have a higher likelihood of obtaining prime federal contracts. For instance, HUBZone businesses that are 8(a) certified and are VOSBs are 30 percentage points and 10 percentage points, respectively, more likely to obtain a federal contract than those that are not. HUBZone businesses that accept government credit cards are 9 percentage points more likely to win federal contracts. HUBZone businesses located in urban areas were 3 percentage points less likely to obtain federal contracts compared to those located in rural areas. Lastly, while HUBZone businesses in the Construction industry¹¹ have a 4 percentage point higher likelihood of obtaining a federal contract compared to those in Manufacturing, those that provide Professional, Technical, and Scientific Services are 6 percentage points less likely to win a prime federal contract compared to HUBZone businesses in the Manufacturing industry.

The study found that the average size of the prime federal contracts received by HUBZone businesses is also influenced by a number of factors. HUBZone businesses with 8(a) certification and those that are also VOSB are likely to have contracts valued around \$1.3 million and \$580,000, respectively, higher than those that are not. The average revenue, percent of revenue from federal contracts, and history of working with the Federal Government all positively affect the average dollar value of contracts won by HUBZone businesses. Finally, HUBZone businesses located in Metropolitan Statistical Areas are likely to have contracts valued on average \$770,000 higher than those in rural areas.

Outline of the Report: This final evaluation report begins by providing a brief description of the HUBZone program and outlining the hypotheses identified through the literature review to answer the research questions. The report then describes the research design of the study, presents a detailed discussion of its results, and outlines its limitations. The report concludes by summarizing the key findings and presenting the study's recommendation to improve the performance of the HUBZone program.

Overview of the HUBZone Program

Background of the Program: The HUBZone program is an SBA program that assists small businesses located in under-utilized communities.

¹¹ The industry of the HUBZone business is defined by the primary North American Industry Classification System (NAICS) code of the business listed in the System for Award Management (SAM).

In 1997, Congress enacted the Small Business Administration Reauthorization Act (Public Law 105-135), designed to promote economic development and employment opportunities in low income metropolitan or rural areas with high poverty and unemployment rates. Title VI of the Act established the HUBZone program with a goal to award federal contracts to small businesses located in these areas. In 2004 and 2005, Congress designated two additional classes of HUBZones: Indian lands and military bases closed under the Base Realignment and Closure (BRAC) Act. As a result of these changes there are now five classes of HUBZone areas:

1. Qualified census tracts (QCTs),
2. Qualified counties,
3. Indian reservations,
4. Difficult development areas (DDAs), and
5. Military bases closed under BRAC.

The HUBZone program has three mechanisms for specifically procuring goods and services from HUBZone businesses:

1. Set asides for competition restricted to a HUBZone business if there is a reasonable expectation of two qualified HUBZone bidders and a fair market price.
2. Sole source contracts to qualified HUBZone businesses.
3. Price preferences can be offered to a qualified HUBZone business in any full and open competition. The price offered by a qualified HUBZone business shall be deemed as being lower than the price of another offeror if the HUBZone business price offer is not more than 10 percent higher than the other price offer.

Government Spending on HUBZone Businesses: Federal government procurement by HUBZone businesses has steadily grown since the inception of the program. During the period of this analysis, HUBZone spending increased from \$6.2 billion in 2013 to \$7.2 billion in 2017. The average spending on HUBZone businesses per agency¹² per fiscal year was about \$277 million and the percent of small business eligible dollars spent on HUBZone businesses per agency was about 2.6 percent per fiscal year. However, HUBZone spending varied by agency with half of the agencies not meeting the goal for a single fiscal year during the period of analysis of this study as shown in Figure 1. On average, 24 percent of all HUBZone procurement were through HUBZone set-aside, HUBZone sole-source, and price preference contracts, and around 45 percent of all contract obligations to HUBZone businesses were in the Construction and Manufacturing industries. Figures 2 and 3 illustrate these findings.

¹² The federal agencies included in this study are the 24 agencies that comprise the Chief Financial Officers (CFO) Council established pursuant of the CFO ACT of 1990 (Public Law 101-576).

Figure 1: Percent of small business eligible dollars spent on HUBZone businesses by agency over time



Figure 2: Spending percentages through HUBZone specific vehicles

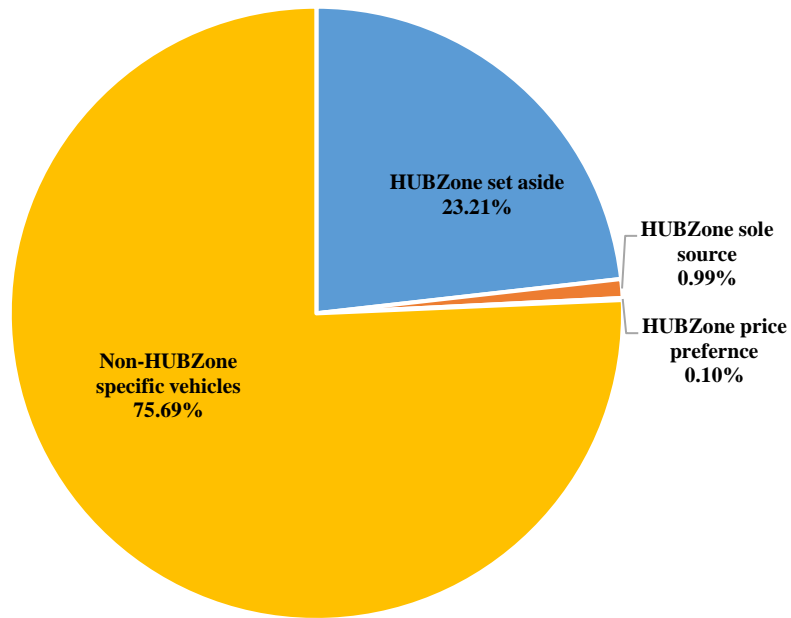
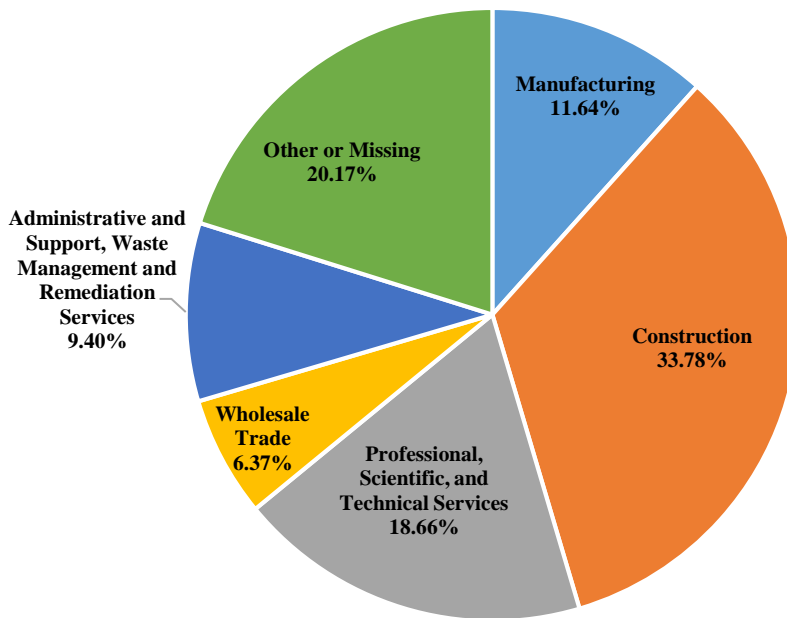


Figure 3: Federal government HUBZone spending percentages by industry



Characteristics of HUBZone Businesses: Based on HUBZone portfolio data covering fiscal years 2014 to 2017, the small businesses that make up the HUBZone program have been operating on average for a little over 18 years, with a range of a few months to 157 years. The revenue of HUBZone businesses are highly skewed with an annual average value of \$4.3 million, median value of \$1.2 million, and a range of up to \$100 million. Figure 4 below illustrates the range of the average annual revenue of HUBZone businesses by industry. Most HUBZone businesses are located in either urban or metropolitan areas, 33 percent and 62 percent, respectively, with 6 percent located in rural areas as shown in Figure 5. Approximately 15 percent of HUBZone businesses are concentrated in the Washington, D.C. metropolitan area as shown in Figure 6. HUBZone businesses are heavily concentrated in a few industry sectors; Construction (28 percent), Manufacturing (12 percent), Professional, Scientific, and Technical Services (21 percent), Administrative and Support, Waste Management and Remediation Services (9 percent), and Wholesale Trade (6 percent) as shown in Figure 7. Only 28 percent of all HUBZone businesses have been awarded at least one prime federal contract. The average value of the contracts received was around \$250,000.

Figure 4: Average annual revenue of HUBZone business by industry

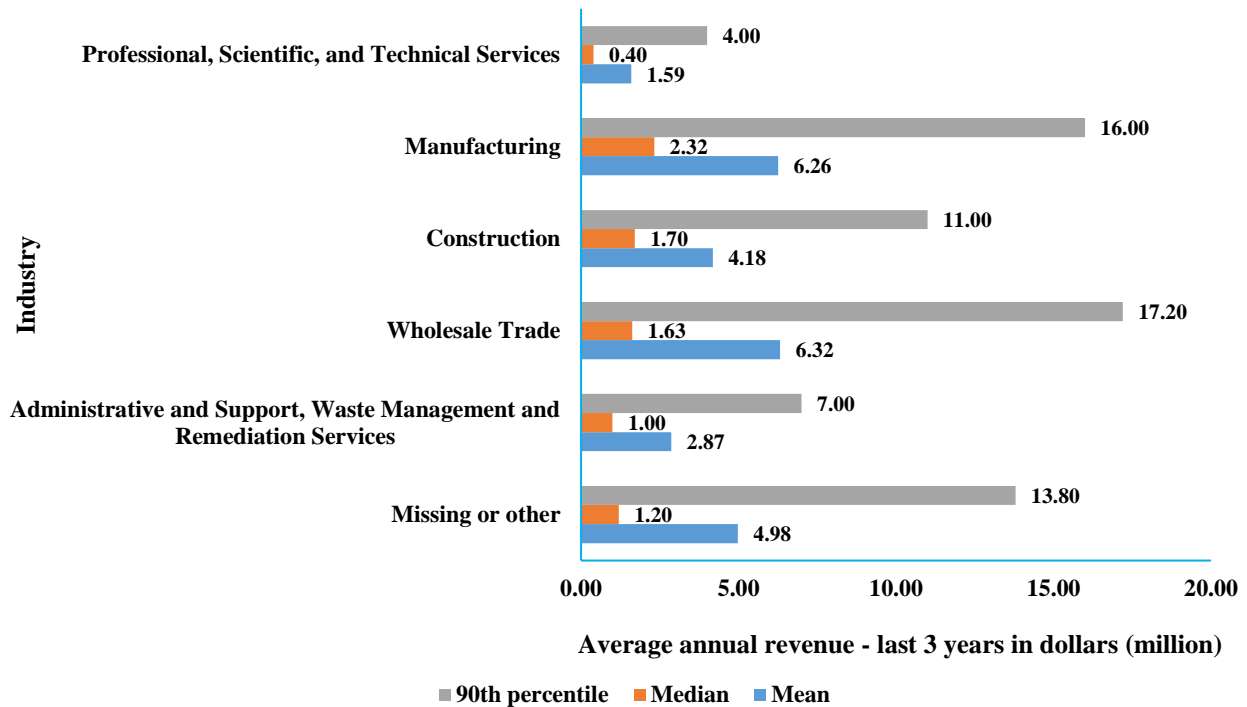


Figure 5: Percent of HUBZone businesses by location

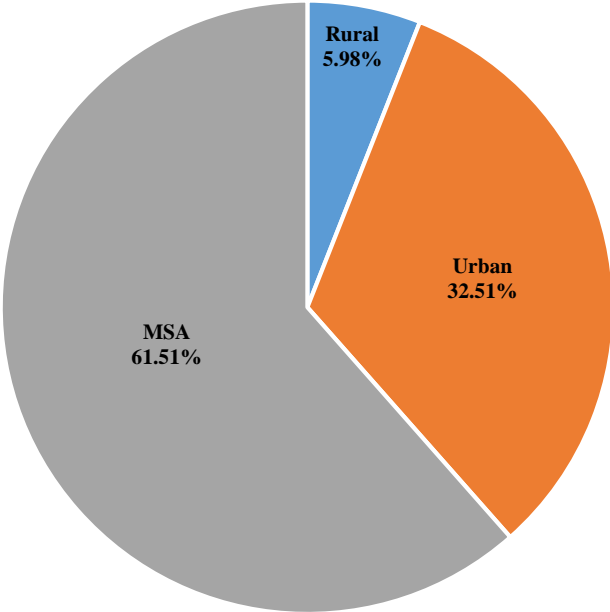


Figure 6: Percent of HUBZone businesses located in the Washington, D.C. area

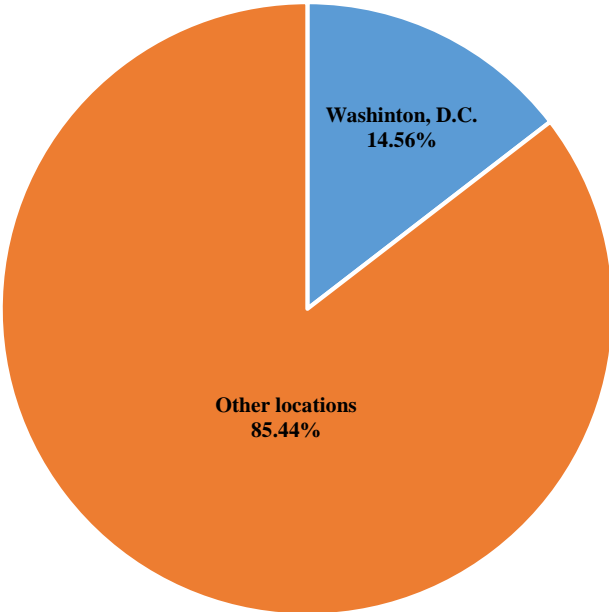
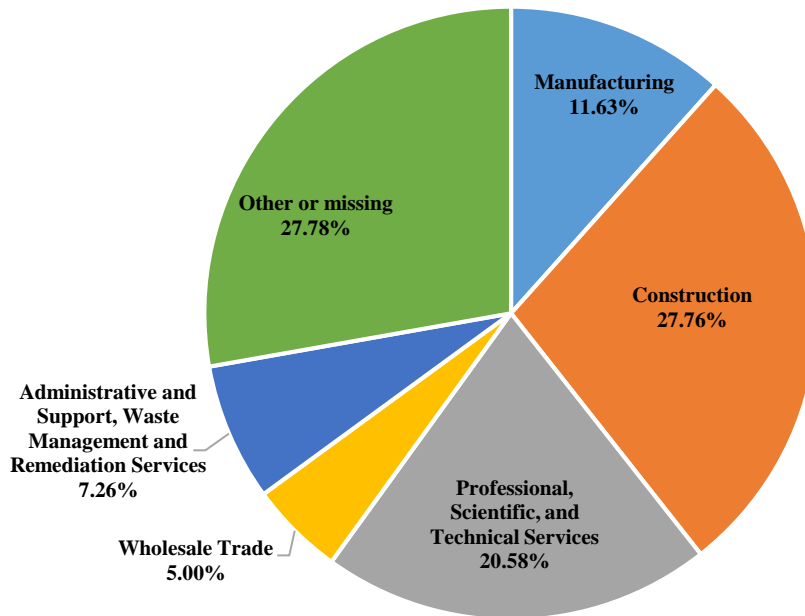


Figure 7: Percent of HUBZone businesses by industry



Literature Review

The study reviewed existing literature on the demand and supply of goods and services produced by HUBZone businesses to understand what is known about the HUBZone program as well as to identify the gaps in knowledge to inform the research design.

Research question 1: What factors predict whether a federal agency obligates 3 percent of its contract dollars to HUBZone businesses?

The literature review suggested seven testable hypotheses for the first research question.

1. Federal agencies with a mismatch in the goods and services they buy and those sold by HUBZone businesses are less likely to meet the 3 percent HUBZone procurement goal. The previous evaluation of the HUBZone program suggests that a barrier to federal agencies meeting HUBZone funding goals is a lack of small businesses that can meet agency needs. Specifically, an insufficient overall number of HUBZone businesses, a lack of HUBZone small businesses with the capacity to work on large projects, and not enough HUBZone small businesses with highly technical skills prevent an agency from meeting the HUBZone goal (Brome, 2018).

2. Federal agencies that bundle contracts are less likely to meet the goal. Contract bundling appears to be a deterrent to small business access to federal contract opportunities. The term “bundling” refers to the consolidation of two or more procurement requirements for goods or services previously provided or performed under separate smaller contracts into a solicitation of offers for a single contract that is likely to be unsuitable for a single prime contract to a small business. Other types of “bundling” would include multiple award contracts through IDVs. The study hypothesizes that when agencies bundle contracts, fewer contracts are awarded, but the ones awarded are larger, as compared to unbundled contracts. In a 2017 report, the SBA Office of Government Contracting and Business Development states that unbundling agency contracts may allow small and HUBZone businesses to successfully bid on more federal opportunities as it would likely increase the supplier base of small businesses (U.S. Small Business Administration, 2017).
3. Federal agencies are more likely to meet the goal if a larger percentage of their contracts are HUBZone set asides, price preference or sole source. The majority of HUBZone contracts are through HUBZone set-asides (Beale & Deas, 2008).
4. Federal agencies are more likely to meet the goal if a larger percentage of their contracts are awarded to businesses with multiple SBA certifications and socioeconomic program designations. HUBZone goals are more often met by agencies pursuing multiple small business goals, such as 8(a), VOSB, and WOSB (Global Evaluation and Applied Research Solutions, 2018).
5. Federal agencies are more likely to meet the goal if they have a HUBZone set aside contracting vehicle and multiyear HUBZone contracts (Beale & Deas, 2008).
6. Federal agencies are more likely to make the goal if the agency has engaged in active outreach to HUBZone businesses prior to the solicitation. The lack of quality small business outreach programs, such as those that provide business development strategies, have created significant barriers to federal agencies’ efforts to increase contracting with small business funding, including meeting HUBZone funding goals (U.S. Small Business Administration, 2017). In general, there has been no systematic outreach and marketing of the HUBZone program (Beale & Deas, 2008).
7. Federal agencies are more likely to meet the goal if they concentrate on fewer HUBZone businesses by making larger awards to those businesses. Federal agencies seem to be most successful at meeting HUBZone contracting goals when they focus on developing procurement relationships with a limited number of HUBZone businesses. In HUBZones receiving a large share of federal contracts, one vendor often accounted for over 90 percent of HUBZone contract revenue (Beale & Deas, 2008).

Research question 2: What factors predict whether a HUBZone business procures a federal contract? Do these factors vary for rural-area and tribal-located businesses compared to businesses in metropolitan areas?

The literature review identified eight possible factors that can predict whether a HUBZone business procures a federal contract for the second research question.

1. HUBZone businesses that win federal contracts are likely to be more knowledgeable about government contracting processes and practices. One indication is that the most successful HUBZone businesses have multiple SBA certifications and socioeconomic program designations, such as 8(a), VOSB, and WOSB (Beale & Deas, 2008).
2. HUBZone businesses that win federal contracts are more likely to have a positive past performance record than those that do not (Beale & Deas, 2008).
3. HUBZone businesses that win federal contracts are more likely to be located in the Washington, D.C. metropolitan area. From 2000 through 2007, Washington, D.C. metropolitan area received the largest revenues from federal HUBZone contracts (Beale & Deas, 2008).
4. HUBZone businesses that win federal contracts are more likely to have management capacity (Beale & Deas, 2008).
5. HUBZone businesses that win federal contracts are more likely to have operated longer than those that do not (Beale & Deas, 2008).
6. HUBZone businesses that win federal contracts are more likely to have larger revenues (Beale & Deas, 2008).
7. HUBZone businesses that win federal contracts are more likely to have less than 51 percent of their revenues coming from federal sources (Beale & Deas, 2008).
8. HUBZone businesses that win federal contracts are more likely to be actively responding to federal solicitations. One indication is the number of successful HUBZone businesses that appear to be repeat business from contract offices (Beale & Deas, 2008).

Research Design

To answer the research questions, this study explored the market for goods and services demanded by federal agencies and those supplied by HUBZone businesses by conducting a retrospective repeated measures analysis.

Research question 1: What factors predict whether a federal agency obligates 3 percent of its contract dollars to HUBZone businesses?

Methodological Approach: The study answered the first research question by modeling the contracting experience of federal agencies with HUBZone businesses to understand the demand side of the market. The unit of analysis are federal agencies in a fiscal year, the independent variables are predictors designed to evaluate each research hypothesis, and the dependent variable is the percent of small business eligible contract dollars obligated to HUBZone businesses.

The analytical approach involves first exploring the bi-variate relationship of each predictor with the dependent variable and the multivariate analysis then estimates the coefficients of the predictors on the dependent variable controlling for changes over time.

Data Source and Preparation: The data source used for this analysis is the *Federal Procurement Data System-Next Generation (FPDS-NG)*, 2013-2017 that covers 13 modules, such as Contract Dollar Values, Product or Service Information, Purchaser Information, Contractor Data, and Competition Information, which provide the percent of prime contract dollars to HUBZone small businesses and relevant agency indicators of efforts toward HUBZone contracting. SBA maintains a static version of the FPDS-NG as of March each year called the Small Business Goaling Report (SBGR) which excludes contracts that are not small business eligible. The study uses the SBGR version of the FPDS-NG. The analytical dataset is prepared by collapsing the contract action level SBGR version of the FPDS-NG data to the funding agency level for each fiscal year¹³.

Research question 2: What factors predict whether a HUBZone business procures a federal contract? Do these factors vary for rural-area and tribal-located businesses compared to businesses in metropolitan areas?

Methodological Approach: The study answers the second research question by modeling the experiences of HUBZone businesses in competing for and acquiring contracts with federal agencies to understand the supply side of the market. The unit of analysis is certified HUBZone small businesses in a fiscal year, the independent variables are predictors designed to evaluate each research hypothesis, and the dependent variables are whether or not the HUBZone businesses receive any federal prime contracting dollars, and if so, the total value of the prime contracting dollars.

The analytical approach involves exploring the bi-variate relationship of each predictor with the dependent variables. The multivariate analysis is a two-part model: the first part estimates the coefficients for each predictor on whether the HUBZone businesses receive any prime contracting dollars and the second part estimates coefficients for the predictors on the total amount of dollars received for only those HUBZone businesses that received a prime contract.

Data Source and Preparation: The data sources used for the analysis are the SBGR version of the FPDS-NG, SBA's annual HUBZone portfolio, and business profile data from the System for Award Management (SAM) for fiscal years 2014 to 2017. The HUBZone portfolio data contains information of all HUBZone businesses with their respective status in the program as of October of the reference year and the SAM data provide information on additional SBA certifications as well as other business characteristics. The analytical dataset is prepared by linking the attributes of federal prime contract recipients from SAM to the FPDS-NG data, collapsing the contract action level merged FPDS-NG and SAM data to the Data Universal Numbering System (DUNS)

¹³ Data pertaining to HUBZone businesses recorded in FPDS-NG and SAM are not verified by SBA. Only the dates of certification and decertification are verified by SBA.

of the HUBZone business for each year, and then linking the collapsed FPDS-NG and SAM data to the SBA Annual HUBZone Portfolio data for each fiscal year¹³.

Findings

The study answered the research questions by empirically testing the hypotheses identified through the literature review. The findings are discussed in detail below.

Research question 1: What factors predict whether a federal agency obligates 3 percent of its contract dollars to HUBZone businesses?

Mismatch of Goods and Services: The study found that agencies that buy goods and services in certain industries with strong HUBZone presence may have a higher likelihood of meeting the 3 percent goal. Government expenditure in the Construction and Manufacturing industries have positive relationships with HUBZone spending. Figure 8 illustrates the overlap of industries from which federal agencies buy goods and services and those in which HUBZone businesses operate. Figure 9 further breaks down Federal Government spending by industry at the agency level.

Figure 8: Federal agency spending by industry and HUBZone businesses by industry (%)

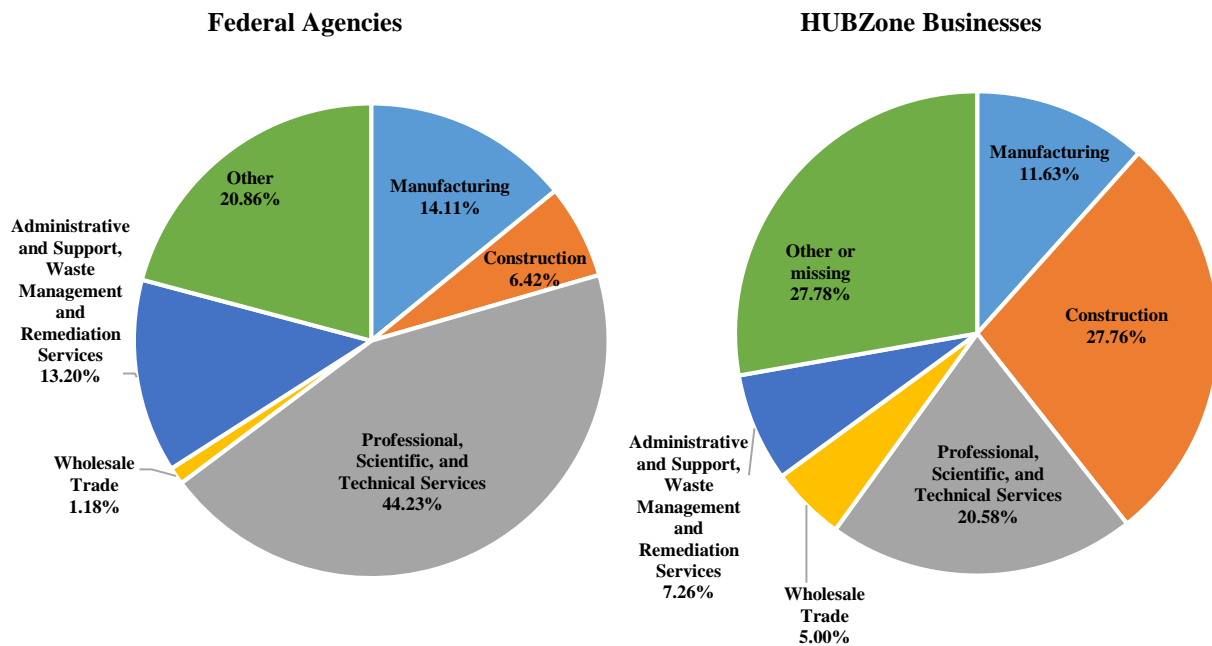
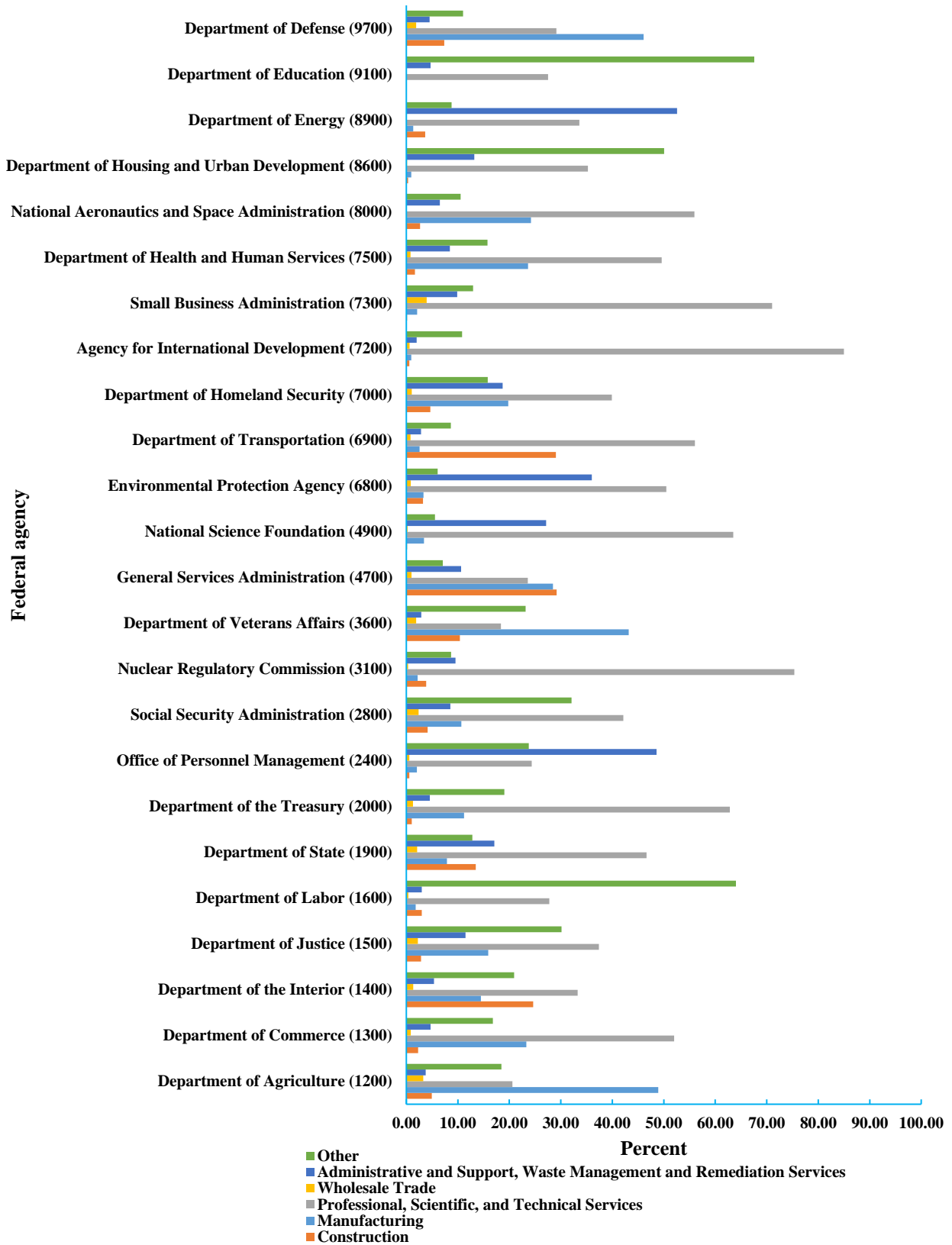


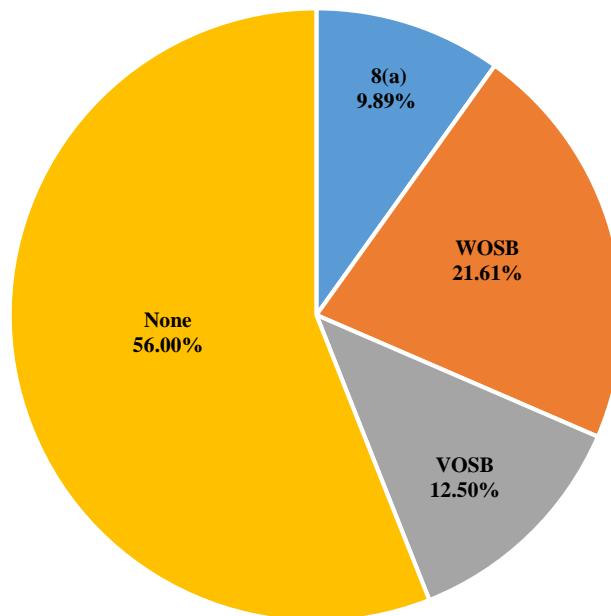
Figure 9: Federal government spending by industry and agency



Contracting Vehicles and Bundling Contracts: The study found no relationship between procurement through most IDVs and HUBZone spending. The only exceptions were contracting through the Federal Supply Schedule and Basic Ordering Agreement which had a positive relationship with HUBZone spending. For instance, between fiscal years 2013 and 2017, federal agencies spent between 0.5 percent and 47 percent of small business eligible dollars per year, with an average spending of 14 percent, buying goods and services from all types of businesses through FSS. Increasing expenditure through FSS by 5 percentage points or approximately \$19 billion per year across the Federal Government could increase the percent of small business eligible dollars spent on HUBZone businesses by 0.4 percentage points and take it from 2.6 percent to the target of 3 percent. Similarly, increasing expenditure through BOA by 5 percentage points or around \$19 billion government wide could increase the HUBZone spending by 1.4 percentage points. While procurement through BOA has a much stronger relationship with HUBZone spending, federal agencies spent, on average, only 0.5 percent, with a range of up to 4 percent, of small business eligible dollars per year between fiscal year 2013 and 2017 through BOA. Therefore, increasing expenditure through FSS may be a more viable approach to increasing HUBZone spending.

Multiple Certifications & Socioeconomic Program Designations: HUBZone businesses often hold other SBA certifications and socioeconomic program designations. About 10 percent of HUBZone businesses are 8(a) certified, 22 percent are WOSB, and 13 percent are VOSB as illustrated in Figure 10. The study found that Federal Government procurement from 8(a) businesses has a strong positive relationship with increasing HUBZone spending. Increasing 8(a) spending by 5 percentage points or about \$19 billion per year across all agencies would increase the percent of small business eligible dollars spent on HUBZone businesses by 0.6 percentage point. Spending on VOSBs also has a positive, albeit less strong, relationship with HUBZone spending. Increasing VOSB spending by 5 percentage points or around \$19 billion across the Federal Government per year would increase HUBZone spending by 0.4 percentage point. Conversely, the study found a negative relationship between federal spending on WOSBs with HUBZone dollars, where a 5 percentage point increase in WOSB spending was associated with a 0.6 percentage point decrease in HUBZone spending.

Figure 10: Other SBA certifications and socioeconomic program designations of HUBZone businesses by percent



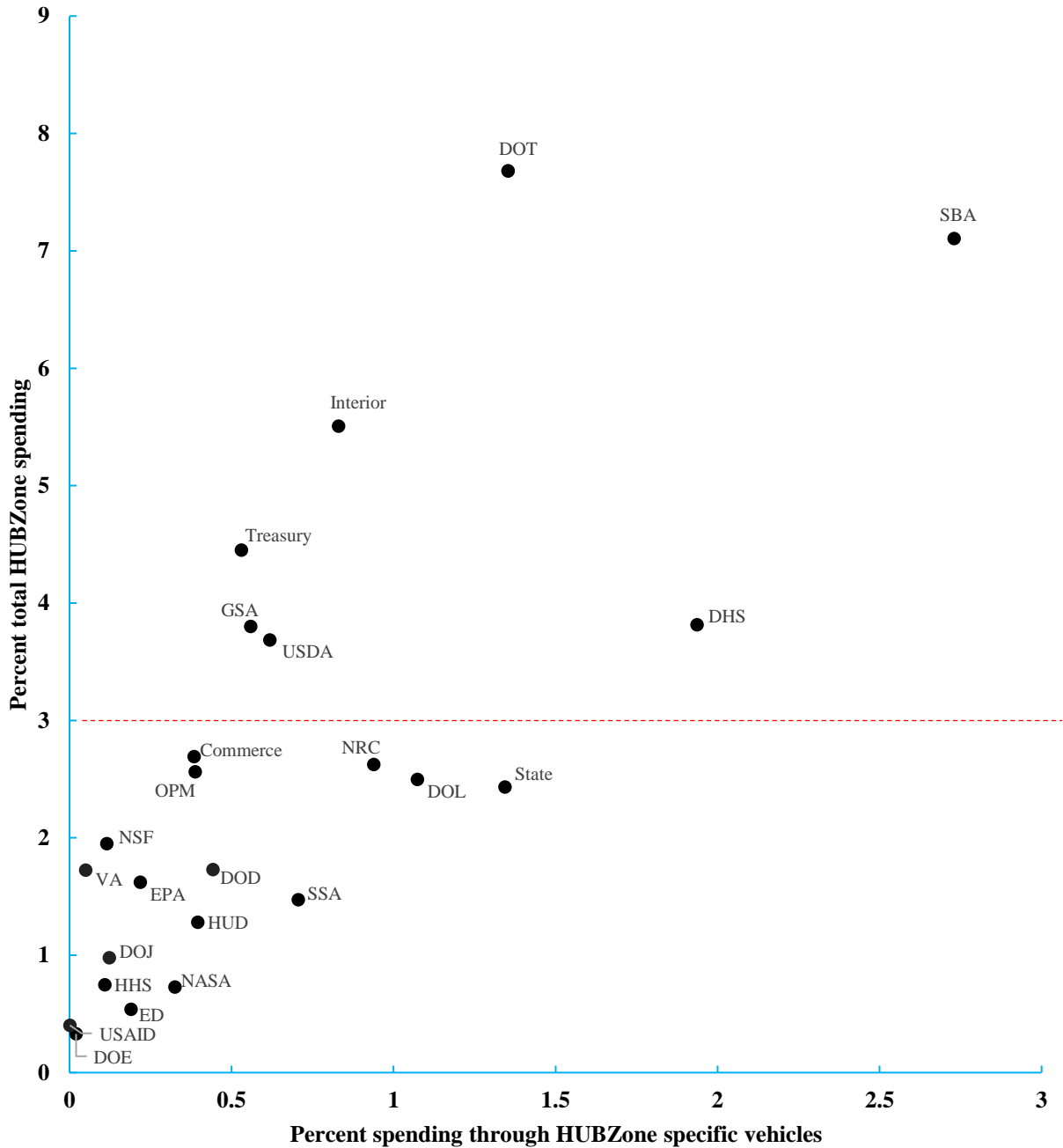
HUBZone Specific Contracting Vehicles: Federal agencies spent, on average, 0.64 percent, with a range of up to 4.2 percent, of small business eligible dollars buying goods and services through HUBZone set-aside, HUBZone sole-source, and price preference contracts between fiscal year 2013 and 2017. The study found that contracting through such vehicles had the largest effect on HUBZone spending. Increasing expenditure through such vehicles by 0.5 percentage point or about \$2 billion per year across the Federal Government is associated with a 0.8 percentage point increase in small business eligible dollars spent on HUBZone businesses. The strong positive relationship between buying directly from HUBZone businesses and total HUBZone spending is illustrated in Figure 11.

Outreach Efforts: The study attempted to measure outreach of the contracting offices of federal agencies to procure goods and services from HUBZone businesses by counting the number of first time contracts with HUBZone businesses by agency. The study found no relationship in the number of new HUBZone contracts and the percent of small business eligible dollars spent on HUBZone businesses.

Value of HUBZone Contracts: The study found that the average dollar value of prime federal contracts awarded by federal agencies has a positive relationship with HUBZone spending. Between fiscal years 2013 and 2017, the average dollar value of federal contracts obtained by

HUBZone businesses was approximately \$250,000. Increasing the size of the average contract award to HUBZone businesses by 20 percentage points or \$50,000 will increase the percent of small business eligible dollars spent on HUBZone businesses by 1 percentage point.

Figure 11: Percent of total HUBZone spending by procuring via HUBZones specific contract vehicles



Research question 2: What factors predict whether a HUBZone business procures a federal contract? Do these factors vary for rural-area and tribal-located businesses compared to businesses in metropolitan areas?

Multiple Certifications & Socioeconomic Program Designations: HUBZone businesses with multiple SBA certifications and socioeconomic program designations have a higher likelihood of obtaining prime federal contracts. HUBZone businesses with 8(a) certification are 30 percentage points more likely to obtain a federal contract than those without such certification. Therefore, the likelihood of a HUBZone business obtaining a federal contract increases from 28 percent to 58 percent if it is also 8(a) certified. Similarly, HUBZone businesses that are also WOSB and VOSB are 3 percentage points and 10 percentage points more likely to obtain a federal contract respectively. Figure 12 illustrates these findings. Of the HUBZone businesses that obtained prime federal contracts, the average size of federal contracts for HUBZone businesses with 8(a) certification and those that are also VOSB are likely to be around \$1.3 million and \$580,000 higher than HUBZone businesses without such certifications respectively. Figure 13 illustrates these findings.

Figure 12: Factors associated with a HUBZone certified firm obtaining federal contracts (%)

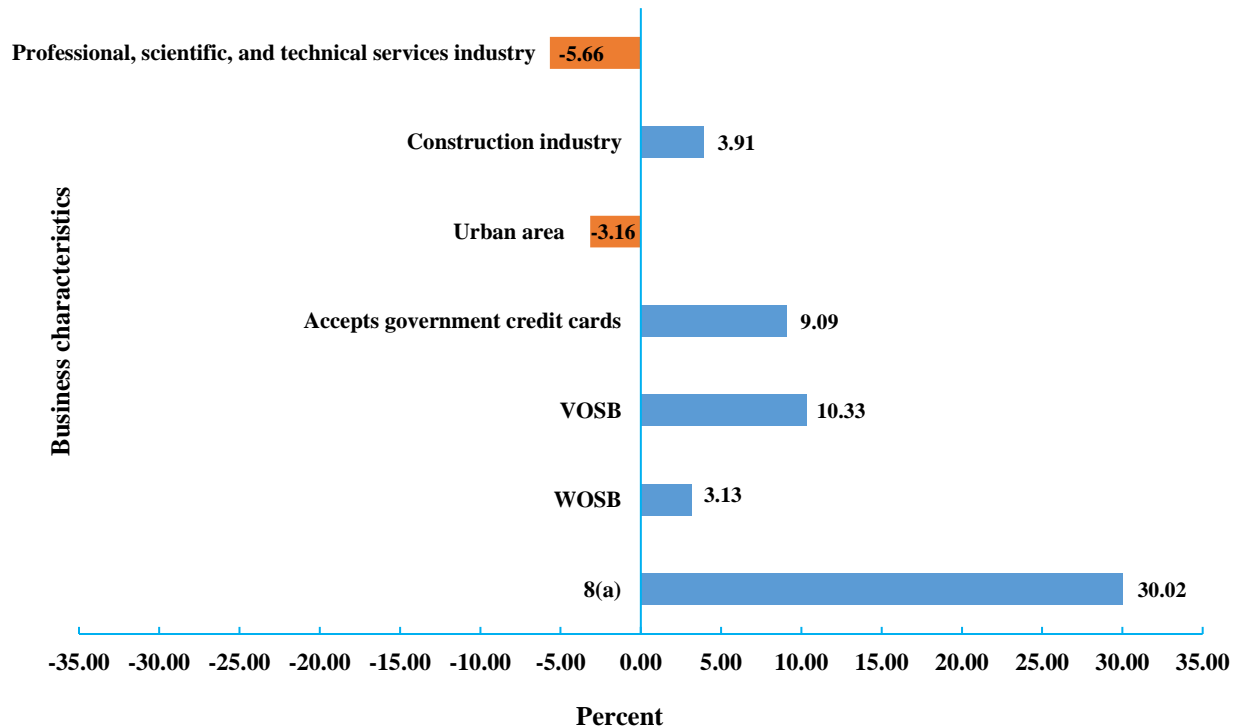
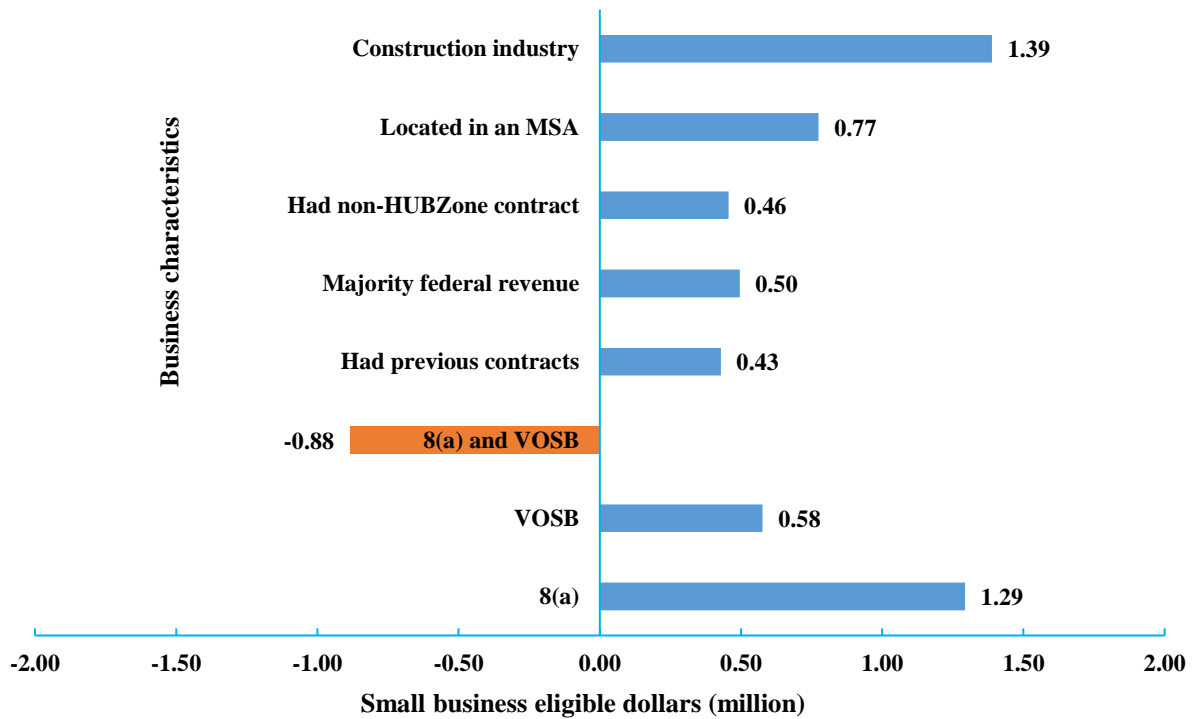


Figure 13: Factors associated with the size of federal contracts obtained by HUBZone certified firms



Organizational and Management Capacity: The study found that HUBZone businesses with more established organizational and management capacity are more likely to obtain federal contracts. HUBZone businesses that accept government credit cards are 9 percentage points more likely to obtain contracts and those that are active in SAM¹⁴ are 19 percentage points more likely to obtain contracts. Figure 12 illustrates these findings. Of the HUBZone businesses that have obtained prime federal contracts, the average revenue, percentage of revenue from federal contracts, and history of working with the Federal Government, all affect the size of the contracts they are awarded. The average annual revenue of HUBZone businesses with federal contracts was around \$5.6 million, between 2014 and 2017; HUBZone businesses with annual revenues 5 percentage points higher than this average, had contracts valued \$1.3 million higher on average as well. Fourteen percent of HUBZone businesses with federal contracts earned more than half of their annual revenue from federal sources. The average value of a federal contract for such HUBZone businesses is on average \$500,000 higher than HUBZone businesses with less than 51 percent of revenue from federal sources. Sixteen percent of HUBZone businesses with federal contracts had previously won prime contracts. The average value of a federal contract won by

¹⁴ The System for Award Management (SAM) collects and maintains organizational characteristics and other business profile information of entities interested in or currently doing business with the Federal Government. Organizations have to annually update their accounts to maintain them in the system. HUBZone businesses that have registered in SAM and maintained their account status for the period of analysis of this study are defined as active in SAM. An active SAM account is an indirect measure of HUBZone businesses willingness to do business with federal agencies, as an active SAM account is a necessary condition of doing business with the U.S. government.

these HUBZone businesses was \$430,000 higher than those winning their first federal contract. Fifty-two percent of HUBZone businesses with federal contracts have won a non-HUBZone contract. The average value of a federal contract won by these HUBZone businesses was \$460,000 higher than HUBZone businesses that have only won HUBZone set aside or sole source contracts. Figure 13 presents these findings.

Location: HUBZone businesses located¹⁵ in urban areas were 3 percentage points less likely to obtain federal contracts compared to those located in rural areas. However, HUBZone businesses that have won federal contracts located in Metropolitan Statistical Areas are likely to have contracts valued \$770,000 on average higher than those in rural areas. Figures 12 and 13 illustrate these findings.

Primary Industry: The study found that the primary industry in which the HUBZone businesses operated affects their ability to obtain federal contracts, as well as the size of the contracts they win. HUBZone businesses in the Construction sector have a 4 percentage point higher likelihood of obtaining a federal contract and are likely to win contracts valued \$1.4 million higher than those that operate in the Manufacturing sector. Conversely, HUBZone businesses that provide professional, technical, and scientific services have a 6 percentage point lower likelihood of obtaining federal contracts. This is shown in figures 10 and 11.

Limitations

The findings of this study are limited by the quality and completeness of the data used and the methodological challenges faced in modeling factors that could not be directly measured.

In the first research question, the study could not perfectly replicate the estimates for the percent of small business eligible dollars contracted by federal agencies each fiscal year through IDVs using the SBGR version of the FPDS-NG data. The estimates are accurate up to one decimal point for data validation purposes. The dollar amounts included in the findings are estimates used to provide context to results calculated in percentage points on how different factors affect federal agencies' ability to meet the 3 percent HUBZone goal. The dollar amounts are generated by estimating the change in the predictors as a percent of the average of the total small business eligible dollars for fiscal years 2013 to 2017 obligated across the Federal Government. As such, the dollar amounts should only be used as points of reference in understanding the findings in percentage points.

¹⁵ Only 6 percent of HUBZone businesses are located in rural areas compared to 33 percent in urban areas and 62 percent in MSAs. Around 29 percent of the small number of HUBZone businesses located in rural areas have federal contracts (490 out of 1,688 rural HUBZone businesses), which is slightly higher than the 26 percent of HUBZone businesses with contracts in urban areas. Therefore, while statistically significant difference, the likelihood of HUBZone businesses in urban areas obtaining a federal contract is only slightly lower than those in rural areas.

The study also could not directly measure the effect of active outreach of the contracting offices of federal agencies in meeting the 3 percent HUBZone goal. The study used the number of contracts awarded to HUBZone businesses with which the agency had not previously contracted as a proxy for outreach. The use of such a proxy may not fully capture the phenomenon and accurately test the hypothesis.

For the second research question that identified factors that predict whether a HUBZone business procures a federal contract, the HUBZone portfolio data contained missing or incomplete information on pertinent business characteristics relevant to the analysis. To resolve this issue, the study linked business characteristics data of HUBZone businesses from historical archives of the For Official Use Only (FOUO) level SAM data. However, as FOUO level historical SAM data was only available from January 2014, the analysis for the second research question was completed only for fiscal years 2014 to 2017.

While SAM data could be linked to the HUBZone portfolio, not all HUBZone businesses listed as active participants of the HUBZone program were present in SAM for a given fiscal year. Based on feedback from the SBA, the study listed those HUBZone businesses not recorded in SAM as inactive, listed all other certifications for those businesses as not available, and used the inactive status as a proxy for how actively they responded to federal solicitations.

The study found businesses inconsistently listed as certified in the HUBZone program. For instance, the study found some businesses listed with a given certification date in the HUBZone program for a certain year not listed at all in the next year, but then listed again with the original certification date from two years previous. The study systematically identified businesses inconsistently listed in the HUBZone program based on guidance from the SBA and removed all observations of these businesses from each year they appeared in the portfolio to remedy this issue.

Finally, while the study was able to answer the question of whether HUBZone businesses located in rural areas had a differential likelihood of obtaining federal contracts, it was not able to empirically explore such a relationship for tribal-located businesses. The data identifying the class of HUBZone areas where the businesses were located, specifically those on Indian reservations, were not available to this study.

Conclusions and Recommendations

This study conducted an empirical analysis using federal contracts and business profile data to evaluate the performance of the HUBZone program. Specifically, the study explored the market for goods and services demanded by federal agencies and those supplied by HUBZone certified businesses, to identify factors that predict federal agencies' ability to meet the 3 percent

HUBZone contracting goal and factors that predict HUBZone businesses' ability to obtain prime federal contracts.

Major Findings: The study identified several factors that affect federal agency spending on HUBZone businesses. One hypothesis is that there is a mismatch between the goods and services purchased by federal agencies and those provided by HUBZone businesses. The study found that agencies purchasing goods and services from the Construction and Manufacturing industries tend to spend more with HUBZone businesses.

This study also tested several other hypotheses. Agencies that obligate more of their contract dollars through Blank Ordering Agreements BOA and the Federal Supply Schedule, also referred to as Multiple Award Schedules, have higher HUBZone spending. Similarly, purchasing directly from HUBZone businesses through set-asides, sole-source, and price preference vehicles also have a positive relationship with HUBZone spending with larger contract awards associated with higher HUBZone spending. Lastly, as HUBZone businesses often have other SBA certifications like 8(a) and socioeconomic program designations such as VOSB and WOSB, federal spending on 8(a) and VOSBs was found to increase spending on HUBZone businesses. Conversely, spending on WOSBs is shown to have a negative relationship with HUBZone spending.

The second research question investigated the factors that predict whether a HUBZone business will obtain a federal contract and the size of contracts it will receive. HUBZone businesses with multiple SBA and socioeconomic program designations have a higher likelihood of obtaining prime federal contracts. For instance, HUBZone businesses with 8(a) certification are 30 percentage points more likely to obtain a federal contract compared to non-8(a) HUBZone businesses. Similarly, HUBZone businesses that are VOSB and WOSB are 10 percentage points and 3 percentage points, respectively, more likely to obtain federal contracts than those that are not.

Business management practices also matter. For instance, HUBZone businesses that accept government credit cards are 9 percentage points more likely to win federal contracts than HUBZone businesses that do not accept government credit cards. HUBZone businesses located in urban areas were 3 percentage points less likely to obtain federal contracts compared to those located in rural areas. While HUBZone businesses in the Construction sector have a 4 percentage point higher likelihood of obtaining federal contracts compared to those in the Manufacturing sector; those that provide Professional, Technical, and Scientific services are 6 percentage points less likely to win a prime federal contract compared to HUBZone businesses in the Manufacturing sector.

The study found that the average size of the prime federal contracts obtained by HUBZone businesses also is associated with several factors. Holding all else constant, HUBZone businesses

that are 8(a) and VOSB certified have larger federal contracts (\$1.3 million and \$580,000 higher, respectively) than HUBZone businesses that are not. The average revenue, percentage of revenue from federal contracts, and history of working with the Federal Government all positively affect the average dollar value of contracts won by HUBZone businesses. Finally, HUBZone businesses located in Metropolitan Statistical Areas are likely to have larger contracts (on average \$770,000 higher in value) than HUBZone businesses located in rural areas.

Recommendations: Based on the findings, the following recommendations are intended to improve federal agencies ability to meet their HUBZone procurement goal:

1. Increasing procurement directly from HUBZone businesses through HUBZone set-aside, sole source, and price preference vehicles and increasing the size of those awards may improve agencies' ability to meet their HUBZone procurement goal;
2. Awarding contracts through BOA and FSS vehicles may also improve HUBZone spending;
3. As HUBZone businesses are often also VOSB and 8(a) certified, spending on VOSB and 8(a) businesses may increase HUBZone spending;
4. Encouraging HUBZone businesses to apply for certification in other SBA programs may increase their chances of obtaining contracts and thereby increase the supply of small businesses federal agencies can buy from; and
5. Encouraging HUBZone businesses to accept government credit cards may improve their likelihood of winning contracts.

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Appendix A: Research Question 1 Summary Statistics

The table below presents the summary statistics of the analytical dataset developed to answer the first research question. The unit of observation of the dataset is *federal agency - fiscal year*.

Variable	Mean ¹⁶	Std. Dev.	Min.	Max.
<i>Small business eligible dollars obligated to certified HUBZone businesses</i>	0.026	0.022	0.001	0.109
<i>Small business eligible dollars obligated to NAICS code 23 - Construction</i>	0.064	0.091	-0.001	0.362
<i>Small business eligible dollars obligated to NAICS code 31 - Manufacturing</i>	0.022	0.086	0.000	0.452
<i>Small business eligible dollars obligated to NAICS code 32 – Manufacturing</i>	0.026	0.064	0.000	0.311
<i>Small business eligible dollars obligated to NAICS code 33 – Manufacturing</i>	0.093	0.107	0.001	0.437
<i>Small business eligible dollars obligated to NAICS code 42 - Wholesale Trade</i>	0.012	0.017	0.000	0.102
<i>Small business eligible dollars obligated to NAICS code 54 - Professional, Scientific, and Technical Services</i>	0.442	0.188	0.175	0.892
<i>Small business eligible dollars obligated to NAICS code 56 - Administrative and Support, Waste Management and Remediation Services</i>	0.132	0.147	0.009	0.611
<i>Small business eligible dollars obligated to IDV type - Basic Ordering Agreement</i>	0.004	0.009	0.000	0.042
<i>Small business eligible dollars obligated to IDV type - Blank Purchasing Agreement</i>	0.053	0.044	0.002	0.245
<i>Small business eligible dollars obligated to IDV type - Federal Supply Schedule</i>	0.137	0.092	0.005	0.465
<i>Small business eligible dollars obligated to IDV type - Government-Wide Acquisition Contract</i>	0.059	0.060	0.001	0.301
<i>Small business eligible dollars obligated to IDV type – Other Indefinite Delivery Contract¹⁷</i>	0.384	0.171	0.017	0.721
<i>Small business eligible dollars obligated to 8(a) businesses</i>	0.075	0.058	0.001	0.342
<i>Small business eligible dollars obligated to Veteran-Owned Small Businesses</i>	0.057	0.042	-0.004	0.216

¹⁶ The mean value listed is the proportion of small business eligible dollars that met the criteria captured by the variable unless otherwise specified.

¹⁷ Other Indefinite Delivery Contract is an IDV awarded to one or more businesses for services and supply orders. There are three types of Other IDCs: Indefinite Delivery/Requirements, Indefinite Delivery/Indefinite Quantity, and Indefinite Delivery/Definite Quantity (International Business Machines Corporation, 2018).

Variable	Mean¹⁶	Std. Dev.	Min.	Max.
<i>Small business eligible dollars obligated to Women-Owned Small Businesses</i>	0.086	0.045	0.011	0.237
<i>Small business eligible dollars obligated to HUBZone set-aside, HUBZone sole source, or price preference awards</i>	0.006	0.007	-0.003	0.042
<i>Count of contracts awarded to HUBZone businesses new to the agency</i>	100.07	182.72	2.00	1478.00
<i>Average dollar value of contracts awarded to a certified HUBZone business</i>	247009.40	235192.20	51982.52	1436199.00
No. of observations	120			

Appendix B: Research Question 1 Model Specification

The equation below presents the detailed specification of the multiple linear regression model developed to answer the first research question. The unit of observation of the model is *federal agency - fiscal year*.

$$Y_{it} = \alpha + \Gamma N_{it} + \delta B_{it} + \beta E_{it} + \rho V_{it} + \sigma W_{it} + \tau S_{it} + \sigma O_{it} + \theta D_{it} + \Pi_t + \varepsilon_{it}$$

Where,

i = is the federal agency;

t = is the fiscal year;

Y_{it} = percent of small business eligible dollars obligated to certified HUBZone businesses;

N_{it} = vector of variables that capture percent of small business eligible dollars obligated to most prevalent NAICS codes of certified HUBZone businesses: NAICS code 23 – Construction, NAICS code 31-33 – Manufacturing, NAICS code 42 - Wholesale Trade, NAICS code 54 - Professional, Scientific, and Technical Services, and NAICS code 56 - Administrative and Support, Waste Management and Remediation Services;

B_{it} = vector of variables that capture percent small business eligible dollars obligated to Indefinite Delivery Vehicles: Basic Order Agreement, Blank Purchasing Agreement, Federal Supply Schedule, Government-Wide Acquisition Contract, and Indefinite Delivery Contract;

E_{it} = percent of small business eligible dollars obligated to 8(a) businesses;

V_{it} = percent of small business eligible dollars obligated to Veteran-Owned Small Businesses;

W_{it} = percent of small business eligible dollars obligated to Women-Owned Small Businesses;

S_{it} = percent of small business eligible dollars obligated to HUBZone set-aside, HUBZone sole source, or price preference awards;

O_{it} = count of contracts awarded to HUBZone businesses new to the agency;

D_{it} = average dollar value of contracts awarded to a certified HUBZone business; and

Π_t = fixed effects that align with the fiscal year to control for changes across time.

Appendix C: Research Question 1 Results

The table below presents the results of the multiple linear regression model developed to answer the first research question. The dependent variable is the percent of small business eligible dollars obligated to certified HUBZone businesses. The unit of observation is *federal agency - fiscal year*.

Independent Variables¹⁸	Coefficient	Robust Std. Error
<i>Small business eligible dollars obligated to NAICS code 23 - Construction***</i>	0.000700	0.000181
<i>Small business eligible dollars obligated to NAICS code 31 - Manufacturing***</i>	0.000519	0.000181
<i>Small business eligible dollars obligated to NAICS code 32 – Manufacturing</i>	-0.000144	0.000274
<i>Small business eligible dollars obligated to NAICS code 33 – Manufacturing</i>	0.000195	0.000218
<i>Small business eligible dollars obligated to NAICS code 42 - Wholesale Trade</i>	-0.000184	0.000420
<i>Small business eligible dollars obligated to NAICS code 54 - Professional, Scientific, and Technical Services</i>	0.000092	0.000138
<i>Small business eligible dollars obligated to NAICS code 56 - Administrative and Support, Waste Management and Remediation Service</i>	0.000113	0.000131
<i>Small business eligible dollars obligated to IDV type - Basic Ordering Agreement**</i>	0.002732	0.001318
<i>Small business eligible dollars obligated to IDV type - Blank Purchasing Agreement</i>	0.000364	0.000269
<i>Small business eligible dollars obligated to IDV type - Federal Supply Schedule**</i>	0.000874	0.000355
<i>Small business eligible dollars obligated to IDV type - Government-Wide Acquisition Contract</i>	-0.000226	0.000236
<i>Small business eligible dollars obligated to IDV type – Other Indefinite Delivery Contract</i>	-0.000142	0.000127
<i>Small business eligible dollars obligated to 8(a) businesses***</i>	0.001226	0.000289
<i>Small business eligible dollars obligated to Veteran-Owned Small Businesses**</i>	0.000875	0.000443
<i>Small business eligible dollars obligated to Women-Owned Small Businesses*</i>	-0.001211	0.000630
<i>Small business eligible dollars obligated to HUBZone set-aside, HUBZone sole source, or price preference awards***</i>	0.008338	0.002429

¹⁸ * Denotes statistical significance at the 10 percent level.

** Denotes statistical significance at the 5 percent level.

*** Denotes statistical significance at the 1 percent level.

Independent Variables¹⁸	Coefficient	Robust Std. Error
<i>Count of contracts awarded to HUBZone businesses new to the agency</i>	0.000655	0.000483
<i>Average dollar value of contracts awarded to a certified HUBZone business***</i>	0.000003	0.000001
No. of observations		120

Appendix D: Research Question 2 Summary Statistics - I

The table below presents the summary statistics of the analytical dataset developed for part one of the two part model to answer the second research question. Part one evaluates factors associated with HUBZone businesses obtaining a federal contract. The unit of observation of the dataset is *DUNS number of the HUBZone business – fiscal year*.

Variable	Mean¹⁹	Std. Dev.	Min.	Max.
<i>Has a federal contract</i>	0.28	0.45	0.00	1.00
<i>Certified as an 8(a) business</i>	0.10	0.30	0.00	1.00
<i>Women-Owned Small Business</i>	0.22	0.41	0.00	1.00
<i>8(a) business and a Women-Owned Small Business</i>	0.03	0.17	0.00	1.00
<i>Veteran-Owned Small Business</i>	0.12	0.33	0.00	1.00
<i>8(a) business and a Veteran-Owned Small Business</i>	0.02	0.13	0.00	1.00
<i>Women-Owned Small Business and a Veteran-Owned Small Business</i>	0.01	0.11	0.00	1.00
<i>8(a) business, Women-Owned Small Business, and a Veteran-Owned Small Business</i>	0.00	0.04	0.00	1.00
<i>Located in the Washington, D.C. MSA</i>	0.15	0.35	0.00	1.00
<i>Accepts government credit cards</i>	0.56	0.50	0.00	1.00
<i>Age of the business in years²⁰</i>	18.23	15.52	0.00	163.00
<i>Average annual revenue for the past three years in dollars²¹</i>	4277001.00	8665166.00	0.00	100000000.00
<i>Active in SAM</i>	0.77	0.42	0.00	1.00
<i>Located in a rural area</i>	0.06	0.24	0.00	1.00
<i>Located in an urban area</i>	0.33	0.47	0.00	1.00
<i>Located in an MSA</i>	0.62	0.49	0.00	1.00
<i>Primary industry is Manufacturing</i>	0.12	0.32	0.00	1.00

¹⁹ The mean value listed is the proportion of HUBZone businesses that met the criteria captured by the variable unless otherwise specified.

²⁰ As a quality control measure, the study randomly checked to verify the age of several businesses in operation over 70 years by visiting their website listed on SAM or by identifying their website through Google web search.

²¹ As a quality control measure, the study randomly checked to verify the revenue of several business with revenue in excess of \$10 million by reviewing their federal revenue listed on their profile at USAspending.gov.

Variable	Mean¹⁹	Std. Dev.	Min.	Max.
<i>Primary industry is Construction</i>	0.28	0.45	0.00	1.00
<i>Primary industry is Professional, Scientific, and Technical Services</i>	0.21	0.40	0.00	1.00
<i>Primary industry is other</i>	0.24	0.42	0.00	1.00
<i>Primary industry is missing</i>	0.16	0.37	0.00	1.00
No. of observations	28180			

Appendix E: Research Question 2 Model Specification - I

The equation below presents the detailed specification of part one of the two part multiple linear regression model developed to answer the second research question. Part one evaluates factors associated with HUBZone businesses obtaining a federal contract. The unit of observation of the model is *DUNS number of the HUBZone business – fiscal year*.

$$Y_{it} = \alpha + \Gamma S_{it} + \beta D_{it} + \delta C_{it} + \rho A_{it} + \sigma R_{it} + \tau M_{it} + \sigma L_{it} + \theta I_{it} + \delta J_{it} + \Pi_t + \varepsilon_{it}$$

Where,

i = is the DUNS number of the HUBZone business;

t = is the fiscal year;

Y_{it} = whether the HUBZone business has obtained a federal contract;

S_{it} = vector of variables that capture additional SBA certifications and socio-economic program designations held by the HUBZone business: 8(a) business, Women-Owned Small Business, 8(a) business and a Women-Owned Small Business, Veteran-Owned Small Business, 8(a) business and a Veteran-Owned Small Business, Women-Owned Small Business and a Veteran-Owned Small Business, and 8(a) business, Women-Owned Small Business, and a Veteran-Owned Small Business;

D_{it} = whether the HUBZone business was located in the Washington, D.C. metropolitan statistical area;

C_{it} = whether the HUBZone business accepts government credit cards;

A_{it} = age of the HUBZone business in years;

R_{it} = average annual revenue of the HUBZone business for the past three years;

M_{it} = whether the HUBZone business has an active account in SAM

L_{it} = vector of variables that capture the location of the HUBZone business: rural area, urban area, and metropolitan statistical area;

I_{it} = vector of variables that capture the primary industry of the HUBZone business: Manufacturing, Construction, Professional, Scientific, and Technical Services, other industries, and if the primary industry information is missing;

J_{it} = vector of variables to control for underlying characteristics of the state or territory in which the HUBZone business is located; and

Π_t = fixed effects that align with the fiscal year to control for changes across time.

Appendix F: Research Question 2 Results – I

The table below presents the results of part one of the two part multiple linear regression model developed to answer the second research question. Part one evaluates factors associated with HUBZone businesses obtaining a federal contract. The dependent variable is whether the HUBZone business has obtained a federal contract. The unit of observation is *DUNS number of the HUBZone business – fiscal year*.

Independent Variables²²	Coefficient	Robust Std. Error
<i>Certified as an 8(a) business***</i>	0.300	0.016
<i>Women-Owned Small Business***</i>	0.031	0.010
<i>8(a) business and a Women-Owned Small Business</i>	0.004	0.028
<i>Veteran-Owned Small Business***</i>	0.103	0.013
<i>8(a) business and a Veteran-Owned Small Business</i>	0.021	0.034
<i>Women-Owned Certified Business and a Veteran-Owned Certified Business</i>	-0.039	0.037
<i>8(a) business, Women-Owned Certified Business, and a Veteran-Owned Certified Business</i>	0.103	0.089
<i>Located in the Washington, D.C. MSA</i>	0.000	0.023
<i>Accepts government credit cards***</i>	0.091	0.007
<i>Age of the business in years**</i>	0.001	0.000
<i>Average annual revenue for the past three years in dollars***</i>	0.000	0.000
<i>Active in SAM***</i>	0.185	0.005
<i>Located in an urban area**</i>	-0.032	0.015
<i>Located in an MSA</i>	-0.015	0.015
<i>Primary industry is Construction***</i>	0.039	0.012
<i>Primary industry is Professional, Scientific, and Technical Services***</i>	-0.057	0.013

²² ** Denotes statistical significance at the 5 percent level.

*** Denotes statistical significance at the 1 percent level.

Independent Variables²²	Coefficient	Robust Std. Error
<i>Primary industry is other</i>	0.012	0.013
<i>Primary industry is missing***</i>	-0.128	0.013
No. of observations		28180

Appendix G: Research Question 2 Summary Statistics - II

The table below presents the summary statistics of the analytical dataset developed for part two of the two part model to answer the second research question. Part two evaluates factors associated with the size of the federal contract awards in terms of dollars obligated to those HUBZone businesses that have obtained a federal contract. The unit of observation of the dataset is *DUNS number of the HUBZone business – fiscal year*.

Variable	Mean²³	Std. Dev.	Min.	Max.
<i>Total small business eligible dollars received</i>	2511154.00	6491398.00	0.01	177000000.00
<i>Certified as an 8(a) business</i>	0.23	0.42	0.00	1.00
<i>Women-Owned Small Business</i>	0.27	0.45	0.00	1.00
<i>8(a) business and a Women-Owned Small Business</i>	0.07	0.26	0.00	1.00
<i>Veteran-Owned Small Business</i>	0.20	0.40	0.00	1.00
<i>8(a) business and a Veteran-Owned Small Business</i>	0.04	0.21	0.00	1.00
<i>Women-Owned Small Business and a Veteran-Owned Small Business</i>	0.02	0.14	0.00	1.00
<i>8(a) business, Women-Owned Small Business, and a Veteran-Owned Small Business</i>	0.01	0.07	0.00	1.00
<i>Received a federal contract in the past</i>	0.16	0.37	0.00	1.00
<i>Located in the Washington, D.C. MSA</i>	0.15	0.36	0.00	1.00
<i>Accepts government credit cards</i>	0.68	0.47	0.00	1.00
<i>Age of the business in years²⁴</i>	18.52	15.00	0.00	157.00
<i>Average annual revenue for the past three years²⁵</i>	5605358.00	9284643.00	1.00	100000000.00
<i>Federal revenue consists of more than 50 percent of the overall revenue</i>	0.14	0.34	0.00	1.00
<i>Has received a non-HUBZone federal contract award in the past</i>	0.52	0.50	0.00	1.00
<i>Located in a rural area</i>	0.06	0.24	0.00	1.00

²³ The mean value listed is the proportion of HUBZone businesses that meet the criteria captured by the variable unless otherwise specified.

²⁴ As a quality control measure, the study randomly checked to verify the age of several businesses in operation over 70 years by visiting their website listed on SAM or by identifying their website through Google web search.

²⁵ As a quality control measure, the study randomly checked to verify the revenue of several business with revenue in excess of \$10 million by reviewing their federal revenue listed on their profile at USAspending.gov.

Variable	Mean²³	Std. Dev.	Min.	Max.
<i>Located in an urban area</i>	0.30	0.46	0.00	1.00
<i>Located in an MSA</i>	0.64	0.48	0.00	1.00
<i>Primary industry is Manufacturing</i>	0.12	0.32	0.00	1.00
<i>Primary industry is Construction</i>	0.34	0.47	0.00	1.00
<i>Primary industry is Professional, Scientific, and Technical Services</i>	0.19	0.39	0.00	1.00
<i>Primary industry is other</i>	0.28	0.45	0.00	1.00
<i>Primary industry is missing</i>	0.08	0.27	0.00	1.00
No. of observations	7949			

Appendix H: Research Question 2 Model Specification - II

The equation below presents the detailed specification of part two of the two part multiple linear regression model developed to answer the second research question. Part two evaluates factors associated with the size of the federal contract awards in terms of dollars obligated to those HUBZone businesses that have obtained a federal contract. The unit of observation of the model is *DUNS number of the HUBZone business – fiscal year*.

$$Y_{it} = \alpha + \Gamma S_{it} + \vartheta P_{it} + \beta D_{it} + \delta C_{it} + \rho A_{it} + \sigma R_{it} + \tau F_{it} + \mu N_{it} + \sigma L_{it} + \theta I_{it} + \delta J_{it} + \Pi_t + \varepsilon_{it}$$

Where,

i = is the DUNS number of the HUBZone business;

t = is the fiscal year;

Y_{it} = total small business eligible dollars received by the HUBZone business;

S_{it} = vector of variables that capture additional SBA certifications and socio-economic program designations held by the HUBZone business: 8(a) business, Women-Owned Small Business, 8(a) business and a Women-Owned Small Business, Veteran-Owned Small Business, 8(a) business and a Veteran-Owned Small Business, Women-Owned Small Business and a Veteran-Owned Small Business, and 8(a) business, Women-Owned Small Business, and a Veteran-Owned Small Business;

P_{it} = whether the HUBZone business was awarded a federal contract in the past;

D_{it} = whether the HUBZone business was located in the Washington, D.C. metropolitan statistical area;

C_{it} = whether the HUBZone business accepts government credit cards;

A_{it} = age of the HUBZone business in years;

R_{it} = average annual revenue of the HUBZone business for the past three years;

F_{it} = whether the federal revenue consists of more than 50 percent of the overall revenue of the HUBZone business;

N_{it} = whether the HUBZone business has received non-HUBZone federal contract award;

L_{it} = vector of variables that capture the location of the HUBZone business: rural area, urban area, and metropolitan statistical area;

I_{it} = vector of variables that capture the primary industry of the HUBZone business: Manufacturing, Construction, Professional, Scientific, and Technical Services, other industries, and if the primary industry information is missing;

J_{it} = vector of variables to control for underlying characteristics of the state or territory in which the HUBZone business is located; and

Π_t = fixed effects that align with the fiscal year to control for changes across time.

Appendix I: Research Question 2 Results – II

The table below presents the results of part two of the two part multiple linear regression model developed to answer the second research question. Part two evaluates factors associated with the size of the federal contract awards in terms of dollars obligated to those HUBZone businesses that have obtained a federal contract. The dependent variable is the total small business eligible dollars received by the HUBZone business. The unit of observation is *DUNS number of the HUBZone business – fiscal year*.

Independent Variables²⁶	Coefficient	Robust Std. Error
<i>Certified as an 8(a) business***</i>	1293624.00	370762.70
<i>Women-Owned Small Business</i>	66515.81	256133.90
<i>8(a) business and a Women-Owned Small Business</i>	-462378.20	429230.70
<i>Veteran-Owned Small Business***</i>	576327.80	217720.10
<i>8(a) business and a Veteran-Owned Small Business*</i>	-884021.90	499988.20
<i>Women-Owned Small Business and a Veteran-Owned Small Business</i>	-303248.10	643543.60
<i>8(a) business, Women-Owned Small Business, and a Veteran-Owned Small Business</i>	391386.20	891104.00
<i>Received a federal contract in the past*</i>	428246.00	237994.10
<i>Located in the Washington, D.C. MSA</i>	883801.30	593088.00
<i>Accepts government credit cards</i>	-195236.60	171634.30
<i>Age of the business in years</i>	-3026.98	5933.63
<i>Average annual revenue for the past three years***</i>	0.24	0.04
<i>Federal revenue consists of more than 50 percent of the overall revenue***</i>	495089.10	166657.90
<i>Has received a non-HUBZone federal contract award in the past***</i>	455467.90	148089.50
<i>Located in an urban area</i>	79757.67	214529.20
<i>Located in an MSA***</i>	774467.90	237223.70
<i>Primary industry is Construction***</i>	1388454.00	278655.40

²⁶ * Denotes statistical significance at the 10 percent level

*** Denotes statistical significance at the 1 percent level.

Independent Variables²⁶	Coefficient	Robust Std. Error
<i>Primary industry is Professional, Scientific, and Technical Services</i>	562306.00	424733.70
<i>Primary industry is other</i>	250937.20	256693.00
<i>Primary industry is missing</i>	-46026.66	436798.60
No. of observations		7949