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## Exploring the Effect of Waivers to the Non-Manufacturer Rule on Contract Awards to Small Businesses

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2019-04-30

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Monterey, California. Naval Postgraduate School

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VOLUME I**

**Acquisition Research:  
Creating Synergy for Informed Change**

**May 8–9, 2019**

**Published: April 30, 2019**

Approved for public release; distribution is unlimited.

Prepared for the Naval Postgraduate School, Monterey, CA 93943.



ACQUISITION RESEARCH PROGRAM  
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY  
NAVAL POSTGRADUATE SCHOOL

# Exploring the Effect of Waivers to the Non-Manufacturing Rule on Contract Awards to Small Businesses

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## Abstract

The U.S. government regularly participates as a buyer in industrial markets where products are customarily sold through indirect marketing and distribution chains, separating buyers from manufacturers. In many cases, these marketing, distribution, and store-front activities add significant value for buyers, such as through pre- and post-sale service and support, improvements to product availability, and reductions in per-unit pricing (e.g., via economies due to warehousing, transportation, and ordering processes). Accordingly, the government (U.S. Small Business Administration) has, in some instances, issued class waivers to the requirements of the “non-manufacturer rule” (15 U.S.C. § 657s) when no small business manufacturers exist for a product, such that contracts can be set aside for competition among small business non-manufacturers. This study models the effectiveness of class non-manufacturer rule waivers on the utilization of small business concerns. The purpose of the research is to obtain a better understanding of market and industry conditions in which these waivers are successful at driving small business utilization, as well as conditions where class waivers, once issued, tend to be poorly utilized. A time series panel of data derived from several archival sources was used to estimate a fractional response model with a Bernoulli quasi-maximum likelihood estimation methodology. Findings indicate that NMR waivers work best to increase small business utilization in industries characterized by low concentration and low levels of price inflation. Understanding these factors will inform policy and regulation.



## Introduction

The Small Business Act of 1953 requires that a *fair proportion* of contract dollars be awarded, or set aside, to small businesses (Sakallaris, 2007). This is not a trivial directive as the public sector constitutes a huge market, approximately \$2.1 trillion annually in the United States alone. This means that a tremendous amount of those public funds—\$90.7 billion in fiscal year 2015 (Federal Procurement Data System, 2015)—is deliberately funneled to small businesses at all levels (municipal, county, state, and federal) as a matter of public policy aimed at achieving socio-economic benefits. The current, government-wide procurement goal stipulates that at least 23% of all federal government contracting dollars should be set aside for small businesses with targeted set-asides for Women Owned Small Business (5%), Small Disadvantaged Business (5%), Service Disabled Veteran Owned Small Business (3%), and Historically Underutilized Business Zones (3%).

Not only are socio-economic procurement programs important to the public sector (Denes, 1997), they are also critical to the private sector. Small businesses constitute approximately half of the private-sector economy and 99% of all businesses (U.S. Small Business Administration [SBA], 2012). They account for 90% of exports and innovations (Cullen, 2012). Small- and medium-sized enterprises (SMEs) are important to economic growth (Thurik & Wennekers, 2004; Wennekers & Thurik, 1999). SMEs differ from large businesses in job creation, strategic flexibility, and innovation (Audretsch, 2007). Consequently, economies with more SMEs are more competitive and have higher growth rates than those with fewer SMEs (Audretsch et al., 2006).

Small- and medium-sized businesses are a fundamental element of the health and economic viability of the United States (Sperling & Mills, 2012). According to the National Economic Council, over the past 20 years, small and new businesses in the United States have been responsible for creating two out of every three net new jobs and employ half of the private sector workforce (Sperling & Mills, 2012). More specifically, small businesses are a foundational element to communities (i.e., populations less than 10,000 people) and play a significant role in the economic health of those communities (Yoshida & Deyle, 2005). Small businesses also service as critical participants in the supply chain (Qi et al., 2014; Logozar, 2013).

Unfortunately, while the U.S. federal government annually seeks to award 23% of contract dollars to small businesses, it often fails to fully achieve its small business goals (FPDS, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015). Impediments to small business contracting include contract bundling, strategic sourcing resulting in supplier rationalization, a lack of accountability for achieving socio-economic goals, a lack of small businesses in some industries, and many small businesses' lack of interest in performing government work (Grammich et al., 2011).

Given the criticality of small businesses to long-term economic viability, several laws, regulations, and programs have been promulgated to advance their cause. One such rule is the non-manufacturer rule (NMR), enacted by Section 303(h) of Public Law



100-656 and Section 210 of Public Law 101-574. According to 13 C.F.R. § 121.406,<sup>1</sup> for a firm to qualify and represent itself as a small business concern on a federal procurement for an end item, it must either be the manufacturer (or producer) of that end item or meet additional criteria to qualify as a small non-manufacturer, including supplying the end item of a small business manufacturer, processor, or producer. As of 2016, this rule applies exclusively to acquisitions in excess of the simplified acquisition threshold, although smaller acquisitions were previously subject to the rule (81 FR 34243). Thus, the NMR allows a small business dealer who does not manufacture an end item (e.g., a wholesaler, a distributor) to compete as a small concern under set-aside federal contracts to supply that product, provided that the manufacturer is a small business located in the United States and that certain other requirements of the NMR are satisfied (FAR 19.001). However, in some industries, or for some end items or classes of end items, no small business manufacturers exist. In such cases, a waiver to the NMR could be requested—in the case of a class waiver, by the prospective small business supplier, by the contracting officer, by an industry group, or by some other entity—from the Small Business Administration (SBA) such that, for example, a small business distributor can supply a product manufactured by a large business and still qualify as a small business concern under a set-aside contract.

Granting class waivers in such markets dominated by large businesses should, in theory, open opportunity for small businesses distributors to secure federal contracts. From the buyer's perspective, opening up markets to small business distributors should expand the available supply base under a small business set-aside, further enhancing competition and, in turn, reducing purchase prices (Chiang, Chhaged, & Hess, 2003). Furthermore, making more small businesses eligible to provide certain products means that more requirements can be set aside for small businesses, thereby increasing the amount of dollars awarded to small businesses and helping buying agencies meet their socio-economic goals.

To date, however, the contribution of class waivers to the NMR to small businesses' success in winning contracts is unknown. The purpose of this research, therefore, is to explore whether industry characteristics influence the effectiveness of class NMR waivers with regard to achieving their intended goal of improving small business utilization on federal purchases, and if so, to what degree. This research is important due to its implications not only for socio-economic program design but also for effective and efficient channel design. Allowing small businesses to compete as intermediaries broadens the competitive base of federal buying agencies; thus, economic efficiencies are also at stake.

Generally, research has ignored key micro-level factors, especially in the context of small businesses. There are roughly 28 million small businesses in the United States, yet they are often ignored, despite the fact that ignoring SMEs in research is "in fact totally inappropriate" (Spence & Lozano, 2000, p. 43). Our scan of the last 10 years of the *Journal of Small Business Management*, *Journal of Small Business Strategy*, and *Journal of Small Business and Entrepreneurship* revealed only 48 B2B articles

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<sup>1</sup> See, for instance, the requirements contained within Federal Acquisition Regulation (FAR) 52.219-1, *Small Business Program Representations*, which state that a firm representing itself as a small business concern must satisfy the criteria in 13 C.F.R. § 121.406.



representing 8% of all contributions. Most of these articles address various aspects of franchising. Furthermore, research in a business-to-government context is almost non-existent. Only one article (Albano et al., 2015) addressed any aspect of small businesses in the public sector.

The remainder of this work is organized as follows. Underlying theory relevant to waivers to the NMR is synopsisized. Next, the study presents the research design and methodology, and then the study provides an analysis of the proposed model and reports the findings. Lastly, the study offers a summary discussion, including conclusions and implications.

## Literature Review

Of all of the elements of a value chain, the marketing channel ranks highly in importance (Krafft, Goetz, Mantrala, Sotgiu, & Tillmanns, 2015), with wholesale distribution comprising revenues of \$5.2 trillion in 2017. Nevertheless, they are not fully understood. Scholars have called for a more unifying theory of distribution channels (Ingene & Parry, 1995). Similarly, omni-channel research is largely void of theoretical grounding (Erdem, Kotzab, Teller, Yumurtaci Hüseyinoglu Isik, & Pöppelbuß, 2018). The interface between industry and government has also been identified as a promising research avenue (Krafft et al., 2015).

Socio-economic programs have been used by both government and private sectors to develop local economies, develop labor capabilities, and expand their customer base. This macro strategy is well founded as “states with higher proportions of very small business employment do indeed experience higher levels of productivity growth, and Gross State Product growth, while having less wage inflation and lower unemployment rates” (Robbins et al., 2000, p. 293). Sourcing from small, minority-owned enterprises can increase job creation and economic development in distressed regions (Carter et al., 1999; Walker & Preuss, 2008). In turn, the income from these businesses and employees thereof expand the firm’s customer base (Ram & Smallbone, 2003).

NMR waivers are one tool that allows government to fence off large business manufacturers and distributors from competing against small business distributors for contracts from the federal government segment. The lack of research into the contribution of class NMR waivers or the circumstances conducive to their effectiveness creates a sub-optimal situation where NMR waiver success—and the factors influencing or impeding success—are not well understood. Evidence suggests that industry characteristics significantly determine the success or failure of selected channels. NMR waivers provide remedy for small businesses who must deal with power and conflict against large businesses.

Research on channel power and conflict emerged as a distinct research group in the 1990s by a study of the intellectual structure of retailing research (Chabowski, Hult, & Mena, 2011). At this time, channel competition was also identified as a distinct group of research. Matters of channel design continue to intrigue marketing scholars. Relevant to NMR waivers, a content analysis of recent channels research (2010–2012) identified *vertical competition* among seven key categories (Young & Merritt, 2013). Improving channel performance and coordination as well as lessening channel conflict and power were found to be prominent research themes, although with regard to small businesses, research has a strong franchise focus. The focus on the tension between small franchisees and large franchisors suggests that opportunistic use of power by larger channel members can have long-lasting effects on trust and performance (Winsor et al.,



2012). This calls into question the efficacy of NMR waivers to reassure or encourage small businesses to engage in industries characterized by many large companies.

Another stream of research surrounding omni-channel retailing identified three areas: channel demand side, channel supply side, and channel management and strategy (Erdem et al., 2018). The channel supply side area focuses on supply chain processes, with one group of papers addressing multi-channel fulfillment strategies. This particular stream of research is underserved while considered a promising frontier of inquiry (Erdem et al., 2018). In general, it appears that direct channels can be profitable when channel members (manufacturers and retailers) share profits. This suggests that in an environment with high price pressures (highly inflationary), small businesses will be at a disadvantage with regard to negotiating profit sharing with large manufacturers.

From a supply management perspective (i.e., a buyer's), channel design presents a special case of strategy. With increased outsourcing, supply managers often play the role of integrator, stitching together capabilities of suppliers into seamless processes ranging from product development to delivery (Parker & Anderson, 2002). Research suggests that the integration of product development, manufacturing process design, and supply chain design can contribute to a competitive advantage (Ellram, Tate, & Carter, 2007). The competitive advantage results from parallel cross-functional coordination and strong supplier involvement, which suggests that industries characterized by many small businesses may achieve more success and benefit more from NMR waivers.

Firms concerned about corporate social responsibility often look to promote socio-economic goals. In this case, channels can be customized to the value offering as buyers seek qualified small business suppliers. Notwithstanding, best practices in supply management suggest that, in some circumstances, buyers should develop capabilities in strategic suppliers—termed *supplier development* in the literature (Krause, 1997). This, of course, alters the supply chain for certain material and component inputs.

A key question in marketing channels is, *Under what circumstances is a certain channel structure appropriate?* Class waivers to the non-manufacturer rule provide an interesting test-bed to examine not only the effectiveness of a federal policy, but also the conditions under which a direct channel will prevail over an indirect channel.

H1: There will be a negative, two-way interaction between industry-level price inflation and issuance of class waivers to the non-manufacturer rule, such that a waiver's positive effect on small business utilization is attenuated when industry-level prices are highly inflationary.

H2: There will be a negative, two-way interaction between industry concentration and issuance of class waivers to the non-manufacturer rule, such that a waiver's positive effect on small business utilization is attenuated when industries are highly concentrated.

H3: There will be a positive, two-way interaction between the proportion of small firms in an industry and issuance of class waivers to the non-manufacturer rule, such that a waiver's positive effect on small business utilization is amplified when there is a high proportion of small firms in an industry.





## Data and Measures

The SBA's class waiver list as of January 1, 2015, includes 139 waivers covering 72 NAICS categories (SBA, 2018), a majority of which cover chemicals, adhesives, metals, carpet, storage tanks, construction equipment, turbines, ammunition, office copiers, automobiles, computer equipment, televisions, medical equipment, aircraft, and furniture.

To test the research hypotheses, a time-series panel was constructed using multiple sources of archival data. Data on the issuance of class waivers to the non-manufacturing rule by the SBA were collected from the administration's current class waiver list (SBA, 2018). This list contains information for each class waiver, including the applicable industry as identified by the North American Industry Classification System (NAICS) code, the type of product and an effective date for the waiver (the date the class waiver was posted in the Federal Register). A total of 148 class waivers are on the list, with waivers issued for products manufactured across 77 industries. Example class waivers include ice-making machinery, turbines, hospital furniture, ammunition, and turboprop aircraft.

Data on the government's utilization of small suppliers were collected from the Federal Procurement Data System-Next Generation (FPDS-NG), which catalogs unclassified transactions between federal agencies and firms for the purchase of goods and services (Eckerd & Girth, 2017). In the context of government purchasing, a "small" firm is formally defined for each industry by the SBA. Criteria for determining firm size include the number of employees and/or average annual revenues. In FPDS-NG, government buyers report for each purchase whether the purchase was made to a small firm, based on representations made by the firm at the time of the purchase. We collect FPDS data on contracts across the U.S. government. Our period of analysis begins with Fiscal Year 2007, as significant improvements to FPDS data quality followed the passage of the Federal Funding Accountability and Transparency Act of 2006 (Lewis, 2017). We do not collect FPDS data for transactions after 2015, as certain industry establishment data (described below) are not available beyond 2015.

Lastly, to obtain information on industry characteristics, we obtain time-series observations on industries from the U.S. Bureau of Labor Statistics and the U.S. Census Bureau. These data are detailed in the following sections. All economic data were collected in their unseasonal form.

### **Dependent Variable**

We measure federal performance on the utilization of small businesses concerns as the proportion of awards to small businesses within a given NAICS code, on a given annual measurement occasion, as reported in FPDS-NG. We refer to this variable as *UTILIZATION*. The federal government similarly uses proportions to measure small business utilization, as has prior research into the determinants of performance of small business contracting programs (Smith & Fernandez, 2010).

### **Treatments**

Our primary explanatory variable, *TREATMENT*, reflects waiver issuance and is identified by an occurrence of one or more non-manufacturer waivers issued to an industry in succession (i.e., within a six-month period), between the years 2007 and 2015. For instance, three class waivers were issued in August 2010 to the computer storage device manufacturing industry (NAICS 334112) for automated data processing input/output and storage devices, support equipment and supplies, reflecting a



treatment. A total of 20 treatments occurred during the period of analysis, to a total of 20 industries.

### **Moderators**

Within H1, H2, and H3, we hypothesized that three industry-level moderators would moderate (amplify or attenuate) the effects of non-manufacturer rule waivers on small business utilization. The first moderator, *CONCENTRATION*, reflects the degree to which market share is concentrated within firms in an industry. Industry concentration data was obtained from the U.S. Census Bureau,<sup>2</sup> of which the most recent data available is from the 2012 economic census. *CONCENTRATION* is measured using the 50-firm Herfindahl-Hirschman Index (HHI), a summation of squared market shares. Higher HHI values reflect greater concentration and may range to a maximum value of 10,000. We utilize 2012 HHI observations as our *CONCENTRATION* measure, and log-transformed the values to account for skew. As the economic census is performed every five years, the only other possible index is from 2007, at the start of our analysis.<sup>3</sup> As we later explain, we reserve the 2007 index instead for propensity score matching of treated industries (those receiving waivers) with untreated industries. Thus, our measure of *CONCENTRATION* remains time-invariant over the period of analysis.

The second moderator, *SMALLPROP*, reflects the proportion of small firms in each industry, at each annual measurement occasion, operationalized as the proportion of firms in an industry having less than 500 employees.<sup>4</sup> Data on the distribution of firms within industries by firm size were obtained from the U.S. Census Bureau's Statistics of U.S. Businesses (SUSB),<sup>5</sup> which provides distributional data on enterprises in the U.S. economy by size and industry. SUSB provides data on both firms and establishments, where establishments are locations where work is performed (e.g., business locations) and where one or more establishment may be nested within a firm (Headd & Kirchoff, 2009). We exclusively utilize firm data when calculating *SMALLPROP*.

The third moderator, *PRICEINDEX*, is an annual, aggregate measure of the prices received by domestic producers within an industry for their output. We obtain industry-level price information from the U.S. Bureau of Labor Statistics (BLS), using the producer price indices (PPIs) that they develop on each industry through a process of systematic sampling within industries (BLS, 2016). We obtain PPIs in their nominal form and apply a natural log transformation, following Pelztman (2000).

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<sup>2</sup> <https://www.census.gov/econ/concentration.html>

<sup>3</sup> An alternative source, Compustat data is a common alternative to U.S. Census Bureau's concentration measure. However, it only accounts for public firms and correlates at a mere 13% with the Census Bureau's data, which is considered highly reliable (Ali et al., 2009).

<sup>4</sup> This follows how industry-level data on firm size is reported by the U.S. Census Bureau. The U.S. Small Business Administration (SBA) assigns various size standards to industries to classify businesses as "small" under its programs, and SBA standards may be based on revenues or number of employees, the latter of which may differ from 500 (although a threshold of 500 employees is common).

<sup>5</sup> <https://www.census.gov/programs-surveys/susb.html>



## **Controls**

We include three controls to account for potentially confounding effects from other variables. First, we control for market competitiveness, as the average number of offers received by federal purchasers in response to solicitations within an industry, and at a given measurement occasion. Data on the number of offers received was collected from FPDS-NG. Specifically, the COMPETITIVENESS measure reflects the average number of offers received on RFPs that resulted in purchases. If no offers were received and thus no purchase was made, then the data would not be included within the dataset. However, if an RFP was later re-issued (which would typically be the case, possibly in some modified form) and resulted in a purchase, then the data would be included within the dataset. We control for competitiveness because it may be related to contract price and several of our explanatory variables, including industry concentration, thus posing a potential confound. Second, we account for growth in federal participation in markets for goods manufactured by an industry by including a control for the number of new contract awards within an industry, and at a given measurement occasion. Data on PARTICIPATION was also collected from FPDS-NG and is measured as the count of new contracts awarded by the federal government for goods manufactured by an industry. However, as this count of awards alone may not fully account for the nature of federal participation in markets, we include an additional control variable, OBLIGATIONS, which measures the total contractual obligations by the federal government on new contracts awarded by the federal government for goods manufactured by an industry. All three variables were log-transformed to reduce the effects of extreme values (positive skew) and to improve interpretability of regression coefficients.

## **Matching by Propensity Score**

*To further guard against potential confounds, we use propensity score matching to pair the 20 industries receiving a non-manufacturer rule waiver (“treatment”) during the nine-year period with a similar set of industries who did not, thus creating an artificial control group. Propensity score matching is a technique commonly used to reduce exposure to potential confounds in settings characterized by non-randomized assignment or self-selection on one or more treatment conditions (Rosenbaum & Rubin, 1983). Wangenheim and Bayón (2007) provide a detailed description of the propensity score matching process. A logistic regression of TREATMENT on a series of covariates including a count of pre-existing non-manufacturer rule waivers, small business obligations, and initial level of industry concentration was estimated using data from the year 2007. As 2007 is the first year in our sample, it reflects the initial conditions for the industries at the start of our analysis. The logit model fit significantly better to the data than did its null alternative ( $\chi^2_A(4) = 20.11, p < .01$ ). To identify matches, we utilize caliper matching (Althausser & Rubin, 1970) with a tolerance of .20 of the standard deviation of the propensity score, following the recommendations of Austin (2011). We match industries without replacement with the objective of improving the precision of modeling results (Dehejia & Wahba, 2002). Each of the 20 industries receiving treatment in our dataset successfully matched to a similar, non-treated industry, thus resulting in a balanced sample of 40 industries. As we have nine annual observations on each industry, our total sample size is 360. Descriptive statistics and correlations for the resulting dataset are listed within Table 1.*



**Table 1. Correlation Matrix and Descriptive Statistics**

	1	2	3	4	5	6	7	8
1. UTILIZATION	1.000							
2. TREATMENT	-0.191	1.000						
3. CONCENTRATION	0.145	0.034	1.000					
4. SMALLPROP	-0.112	0.147	0.235	1.000				
5. PRICEINDEX	0.146	-0.050	0.094	-0.167	1.000			
6. COMPETITIVENESS	0.030	0.011	0.100	0.161	0.112	1.000		
7. PARTICIPATION	-0.433	0.165	0.102	0.169	0.012	-0.024	1.000	
8. OBLIGATIONS	-0.740	0.204	-0.001	0.300	-0.105	-0.074	0.641	1.000
Mean	0.446	0.317	5.149	0.776	5.014	1.668	7.635	18.840
Standard Deviation	0.242	0.466	1.176	0.166	0.413	1.216	1.448	1.861
Minimum	0.022	0.000	0.693	0.163	3.619	-1.611	3.497	13.314
Maximum	0.998	1.000	6.172	0.991	5.779	6.458	11.265	23.021

## Model and Methodology

A model of federal utilization of small businesses concerns as a function of class non-manufacturer rule waiver treatments is given in Equation 1.

$$\begin{aligned}
 UTILIZATION_{it} = & \beta_0 + \beta_1 \times TREATMENT_{it} \\
 & + \beta_2 \times CONCENTRATION_i + \beta_3 \times CONCENTRATION_i \times TREATMENT_{it} \\
 & + \beta_4 \times SMALLPROP_{it} + \beta_5 \times SMALLPROP_{it} \times TREATMENT_{it} \\
 & + \beta_6 \times PRICEINDEX_{it} + \beta_7 \times PRICEINDEX_{it} \times TREATMENT_{it} \\
 & + \beta_8 \times COMPETITIVENESS_{it} + \beta_9 \times PARTICIPATION_{it} \\
 & + \beta_{10} \times OBLIGATIONS_{it} + e
 \end{aligned}
 \tag{1}$$

Given that the dependent variable is a proportion (a fraction) and is bounded between values of zero and one, estimation of the model using ordinary least squares can result in the prediction of values outside of the (0,1) interval (Papke & Wooldridge, 1996). Further, residuals produced from an ordinary least squares regression are unlikely to meet the assumptions of homogeneity and, thus, bias is likely in standard errors under the ordinary least squares estimator (Cohen et al., 2003, p. 240). Smith and Fernandez (2010) provide a discussion of this issue in the context of modeling small business utilization proportions, and identify several potential solutions, including the use of a quasi-maximum likelihood estimation technique developed by Papke and Wooldridge (1996). We also adopt this approach, but utilize the extension of the technique proposed by Papke and Wooldridge (2008) for estimating fractional response models with panel data, a Bernoulli quasi-MLE (QMLE) estimator (Papke & Wooldridge, 2008). Explanatory variables in QLME are specified as  $(1, \mathbf{X}_{it}, \bar{\mathbf{X}}_i)$  (Papke & Wooldridge, 2008, p. 124). As our interest is in change over time in the fractional response (i.e., the within-variance component), we limit our presentation of QLME results to those given by  $\mathbf{X}_{it}$ .



## Results

Model estimation was performed in R (R Core Team, 2018). Estimates are presented in Table 2 and have been rescaled following the procedure given by Papke and Wooldridge (2008, Equation 3.11). As previously discussed, all three moderator variables (CONCENTRATION, SMALLPROP, PRICEINDEX) were centered about their grand means prior to entry into the regression equation. Thus, the coefficient for the non-manufacturer rule waiver treatment, TREATMENT, reflects the model-estimated effect of a waiver issuance at average levels of industry concentration, when the proportion of small firms in this industry is average, and at average prices. At this point, the simple effect (simple slope) of the waiver treatment is not decidedly non-zero ( $\beta^* = .036$ ,  $t = 1.704$ ,  $p = .088$ ).

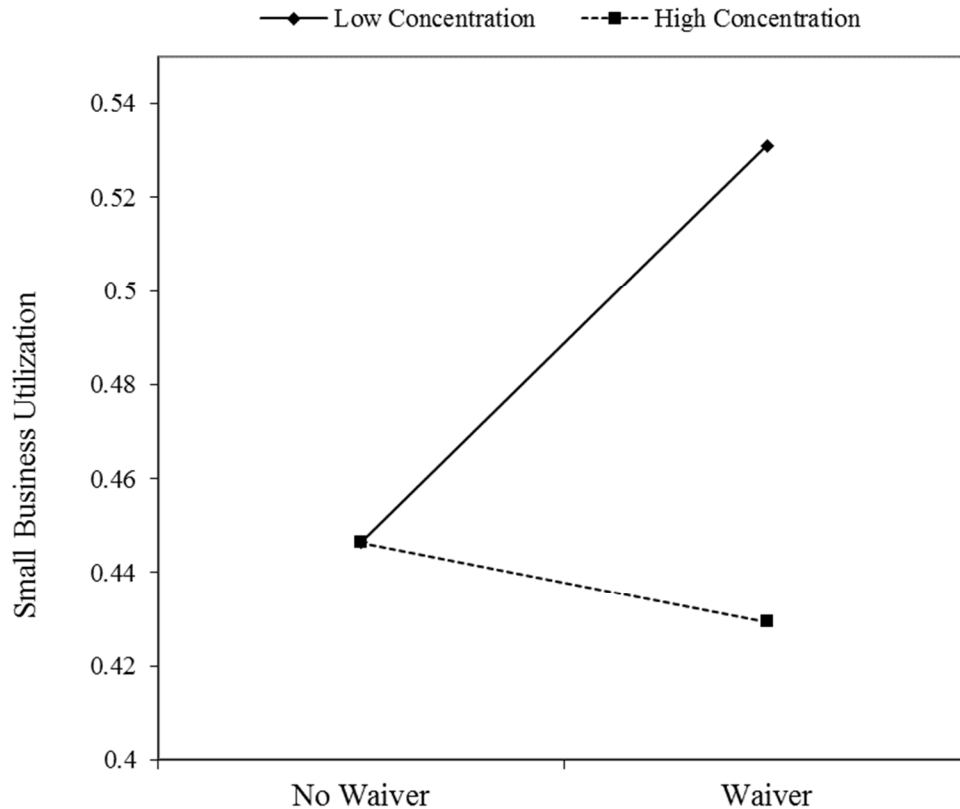
**Table 2. Regression Results**

Explanatory Variable	Estimate	Unscaled	Std. Error	<i>t</i> -value	Pr(>  <i>t</i>  )
TREATMENT	0.036	0.098	0.058	1.704	0.088 *
CONCENTRATION × TREATMENT	-0.040	-0.123	0.047	-2.684	0.007 **
SMALLPROP	0.305	0.875	1.458	0.600	0.549
SMALLPROP × TREATMENT	0.046	0.231	0.268	0.860	0.390
PRICEINDEX	0.050	0.130	0.289	0.449	0.653
PRICEINDEX × TREATMENT	-0.106	-0.320	0.153	-2.095	0.036 **
COMPETITIVENESS ( <i>control</i> )	-0.023	-0.066	0.033	-2.017	0.044 **
PARTICIPATION ( <i>control</i> )	0.036	0.092	0.045	2.057	0.040 **
OBLIGATIONS ( <i>control</i> )	-0.056	-0.153	0.083	-1.844	0.065 *

Notes. \* $p < .10$ , \*\* $p < .05$ . CONCENTRATION, SMALLPROP, AND PRICEINDEX are grand-mean centered.

Consistent with the expectations of Hypothesis 1, industry concentration (CONCENTRATION) has a statistically significant and negative moderating effect on the waiver treatment ( $t = -2.684$ ,  $p < .01$ ). Figure 1 depicts this interaction, providing simple slopes for the effect of the waiver treatment on small business utilization at high and low values of industry concentrations ( $\pm$  one standard deviation from the mean). Estimates and standard errors for the simple slopes were calculated using the mean vector and variance-covariance matrix for the model-implied coefficients (Spiller et al., 2013). When industry concentration is low, the waiver treatment has a positive and statistically significant effect on small business utilization ( $\beta^* = .085$ ,  $t = 2.876$ ,  $p = .004$ ). However, when industry concentration is high, the waiver has no discernable impact on small business utilization ( $\beta^* = -.017$ ,  $t = -.675$ ,  $p = .500$ ).



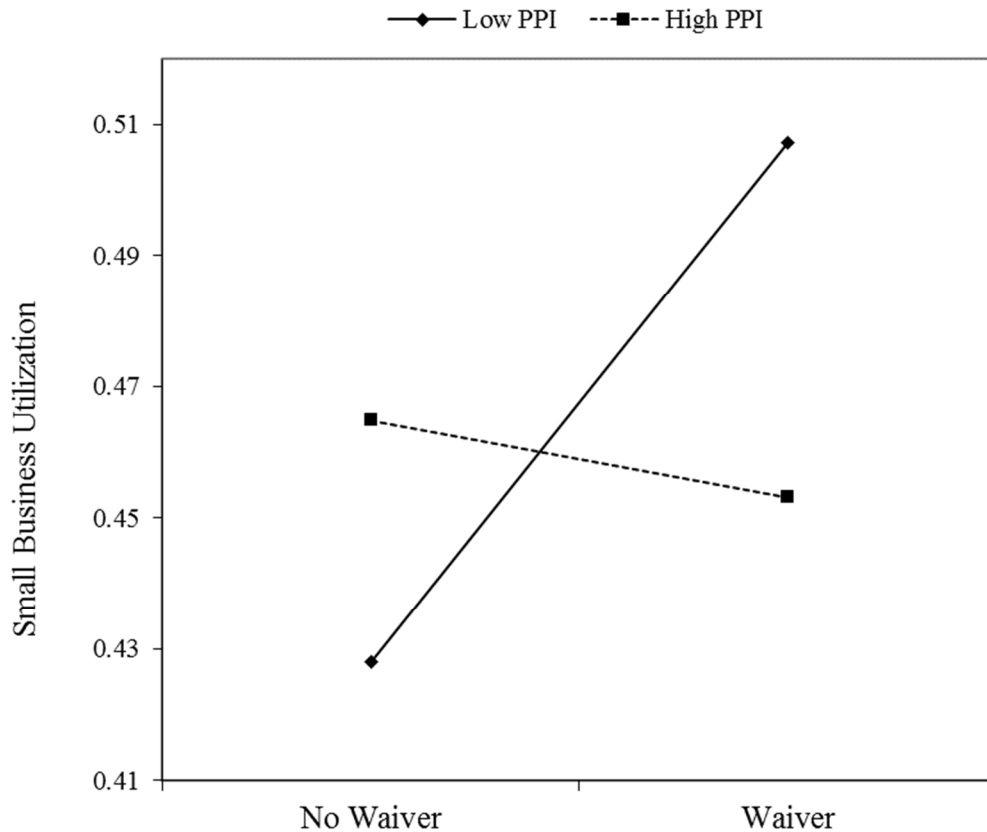


**Figure 1. . Interaction Plot of CONCENTRATION and Non-Manufacturer Rule Waiver Treatment**

The statistical model offered no support for Hypotheses 2, which suggested that the proportion of small firms in the industry (SMALLPROP) would amplify the effect of the waiver treatment. While the coefficient estimate for the interaction term was indeed positive, there was insufficient evidence to conclude that the effect exists (i.e., differs from a value of zero) in the population ( $\beta^* = .046$ ,  $t = .860$ ,  $p = .390$ ).

Hypothesis 3 was supported by the model. This hypothesis suggested that a waiver treatment would be less effective for industries experiencing high levels of price growth (PRICEINDEX). This implies a negative coefficient for the interaction term, as was estimated by the model ( $\beta^* = -.106$ ,  $t = -2.095$ ,  $p = .036$ ). The resulting interaction is depicted within Figure 2. When the industry price index (PPI) is low, the waiver treatment has a significant and positive effect on small business utilization ( $\beta^* = .079$ ,  $t = 2.657$ ,  $p = .008$ ). However, when the industry price index (PPI) is high, the effectiveness of the waiver treatment is attenuated, and does not appear to differ from a value of zero in the population ( $\beta^* = -.012$ ,  $t = -.406$ ,  $p = .685$ ).





**Figure 2. Interaction Plot of PRICEINDEX (PPI) and Non-Manufacturer Rule Waiver Treatment**

## Discussion

This is the first study that we are aware of to examine, using empirical data, industry-level conditions that amplify or attenuate the effectiveness of non-mandatory small business programs, such as class waiver program for the non-manufacturer rule. The study also provides a unique context to study the efficacy of marketing channel designs under differing industry conditions.

Our analysis demonstrates that industry-level factors strongly condition the effectiveness of class waivers to the non-manufacturing rule. For the “average” industry (e.g., as a measured by concentration, price levels, and the proportion of small firms in the industry), a class waiver may have little influence alone on small business utilization. This finding is not entirely surprising, given that the waivers are meant to be exceptions, and thus should not be expected to perform well in a general case (i.e., under general industry conditions). Yet, under the correct industry conditions, the waivers appear to have a robust, positive impact on small business outcomes. These conditions are discussed next.

The statistical results for our first hypothesis point to the criticality of industry composition to the efficacy of class waivers and, more broadly, to the success of targeted small business policies and programs. We found that, when industry



concentration was high, issuance of a class waiver had no impact on the utilization of small businesses. Yet, when industry concentration is low, a waiver can produce a marked increase in small business utilization. Clearly, this result does not imply that the U.S. Small Business Administration should adopt a practice of broadly issuing class waivers within low-concentration industries. It does imply, however, that regulators and policy makers should consider the conditions present in the industry within the review and decision-making process for waiver issue: Low concentration can catalyze the waivers' effects. If concentration in an industry is high, then regulators might instead seek alternative mechanisms to spur small business growth and development, such as through bonding and funding programs.

Similarly, our results suggest that price stability—and the avoidance of high levels of industry price inflation—is critical to the success of the class waiver program. High industry-level prices nullified the positive effect that a class waiver to the non-manufacturer rule might otherwise have on small business utilization. There are two potential explanations for this. First, transaction costs between channel partners tend to rise as instability and uncertainty increases. Not only might quantities of final demand be more uncertain, but channel members may be incentivized to alter ordering and inventory behavior, reducing the potential for up-stream channel members to capitalize on potential economies in production and logistics. If additional transaction costs accrue between manufacturers and resellers (e.g., wholesalers, retailers), then pricing through indirect channels may become less competitive. Further, when prices are on the rise, buyers looking to enter into medium or long-term relationships for a class of products may be less willing to pay for value-added services provided by channel partners (e.g., local post-sales support), given the risk of future price increases.

Lastly, counter to our expectations, the data did not offer support for an amplification of the class waiver's effect when industries were comprised of a high proportion of small firms. However, this absence of an effect may not be entirely surprising. On one extreme, a waiver could not be expected to fare well at increasing small business utilization in an industry devoid of small businesses. On the other extreme, an industry that is already highly saturated with small business may already experience high levels of utilization, and thus the marginal benefit of a waiver may be minimal. For this reason, the relationship may truly be a polynomial (e.g., a quadratic and inverted-U), such that the waivers effects are greatest when there is only a moderate proportion of small businesses operating within the industry. While we were unable to test this proposition with our data, we discuss it as an area for future research.

### ***Implications for Practice***

Government procurement leaders who seek to maximize all tools at their disposal in order to comply by laws that facilitate small business participation may be disappointed to discover that factors beyond their control may render waivers an impotent tool. This suggests that procurement leaders should first conduct market analysis of industry factors; a basic understanding of the economic and environmental conditions can augment the effectiveness of waivers, where they are effective.

Waivers are least effective in industries characterized by high concentration and high price inflation, conditions that pose other procurement challenges. Knowing this, procurement managers who are forewarned of industry conditions can develop strategies appropriate to the industry and purchase circumstances. One could cite the success of specific examples of federal procurement initiatives that exhibit this approach, such as DIUx. DIUx caters to specific product-market-industry





characteristics—perhaps offices specialized by purchasing circumstances would be appropriate for certain other industries.

Procurement managers might also consider the broader competitive and innovative benefits of providing certain resources to small businesses. Small businesses may suffer due to higher transaction costs relative to large businesses. At the individual business level, transaction costs for small businesses are usually lower (c.f., Paparoidamis et al., forthcoming), although purchase volume often would drive the use of many small businesses, for a greater sum of transaction costs than results from open market purchases from another large business. Facilitating inter-company information flows may be a strategy that re-empowers the NMR waiver so that it improves small business engagement.

### ***Implications for Theory***

Transaction costs enjoy an ample and well-established body of research with regard to government policies, yet relatively few studies connect transaction costs with channel design considerations in the context of government procurement. Environmental factors such as industry concentration and inflationary conditions may comprise the single most important consideration for the success of government initiatives to support small businesses, and these findings suggest that research should consider further moderator effects of environmental factors on government procurement policies. High industry concentration seemed to diminish the positive effects of waivers on small business, which may result from the relatively low transaction costs for large transactions among few large enterprises in highly concentrated industries, suggesting a primary role for transaction costs as an explanatory theory, at least for endogenous variables.

On the other hand, Coase (1937) originally proposed that the limit of the firm will occur where marginal transaction (“buy”) costs will just balance marginal production (“make”) costs, so it may be that exogenous variables related to industry structural factors ultimately determine production and transaction costs. For example, technological and product life-cycle maturity may determine the degree of industry concentration and its subsequent effects on small business participation. Our results provide evidence for the importance of structural factors. To address this structural difference between industries with regard to the effectiveness of waivers, transaction cost theory suggests that publicly funded information exchange networks may reduce transaction costs for small businesses in order generate the same waiver benefits for high concentration industries as for low. Institutional theory may offer an alternative both as an explanation and a remedy, suggesting that the social and regulatory environment surrounding highly concentrated industries may explain the difference in waiver outcomes, while simultaneously providing an example to emulate. Specifically, one-size-fits-all approaches to encourage small business participation may be infeasible, and tailoring of institutions may yield greater returns (Rodríguez-Pose, 2013).

Considering that traditional approaches have failed to resolve entirely the issue of sufficient federal procurement engagement with small business, new theory should be considered. Since small business policy is based in part upon creating healthier, more resilient, and more innovative economies, endogenous growth theory and the knowledge spillover theory of entrepreneurship may offer perspectives to study small business waivers that could explain our findings while providing guidance to public policy (c.f., Huggins & Thompson, 2015).



### **Study Limitations**

This study has several limitations that should be kept in mind. A primary limitation, and one that we share with other research utilizing archival data, is that we are unable to directly observe or measure mechanisms that we theorize to underlie effects. Indeed, while we believe the theory and mechanisms that we rely on to be plausible, we are unable to conclude through our data or statistical analysis that these are truly the mechanisms that are at work and that our specification is indeed “correct” (Cudeck & Henly, 1991). Second, as data is not available on the issuance of individual (vs. class) waivers to the non-manufacturing rule, we are unable to control for the role that these waivers might have on promoting small business utilization. It seems likely, for instance, that industries most conducive to requests and approvals of individual waivers would also be most conducive to requests for class waivers.

### **Future Research Directions**

Class NMR waivers usually originate from small business intermediaries who want to be eligible for somewhat restricted markets (small businesses only via set-asides). Future research could explore instances in which the buying agency originates the NMR waiver (i.e., an “individual” waiver) with the goals to understand (1) the circumstances in which this occurs, and (2) why it does not occur more often. Government buyers often do not conduct effective market research (Pang, 2018) and demonstrate a lack of commitment to small business goals (Hawkins, Gravier, & Randall, 2018).

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