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Good Enough for Government Work? An Incomplete Contracts Approach to the Use of Nonprofits in U.S. Federal Procurement

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Abstract:
This paper examines the use of the nonprofit organizational form to mitigate the impact of incomplete contracts in the public sector Transaction costs economics (TCE) predicts that the expense of incomplete contracts will rise with contract complexity and asset specificity. Previous research shows that government agencies increase their use cost-plus style contracts to economize on these costs. However, cost-plus style contracts may also increase the propensity to inflate procurement costs, also known as gold-plating, when relationally specific investments are required. Consistent with this expectation, we find that federal agencies reduce their use of cost-plus style contracts as asset specificity rises. The paper then explores the use of nonprofit organizations as an alternative tool to reduce contracting costs. Using data from the Federal Procurement Data System, we examine the choice of organizational form by federal agencies, as contracts become more or less incomplete. Consistent with our hypotheses, we find that the use of nonprofit organizations increases with contract complexity. In contrast to cost-plus style contracts, we find that the use of nonprofits also increases with asset specificity. We apply this finding to support the conjecture that the nonprofit organization form is used by government agencies to mitigate contract incompleteness without the associated risk of cost inflation. We conclude by offering suggestions for why nonprofit contracts appear relatively infrequently in federal procurement data.

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1 Introduction

United States federal agencies are the largest purchasers of goods and services in the United States. In 2014, agencies issued over two million contracts with a total value of nearly four-hundred and fifty billion dollars. Federal agencies face a chain of complex decisions for each contract, which can be viewed broadly in three stages. First, the agency must determine whether it should make the product in-house, or contract with an external firm. Then, they decide what form or constrains to place into the contract. Finally, the agency chooses from whom to purchase those services.

Transaction Cost Economics (TCE) emerged in the late 1970s, primarily attributed to Oliver Williamson (1979, 1981), as a unifying theoretical framework for analyzing these decisions. Later, the theory was applied to help explain government procurement (Bajari, Houghton, and Tadelis 2014; Bajari and Tadelis 2001; Brown, Potoski, and Slyke 2016; Brown, Potoski, and Van Slyke 2010, 2015; Brown 2005). TCE predicts that the principle (in our case, government agencies) will economize on their transactions. This implies that agencies will make contracting decisions (i. e. make/buy, contract form, and the contracting firm) that minimize the overall cost of the transaction. TCE characterizes every transaction as governed by an implicit or explicit contract that attempts to describe the key elements of the transaction (e. g. price, timing, product characteristics). Contracts, however, are costly to construct. The TCE literature emphasizes two determinates of contracting cost, complexity, and asset specificity (Tadelis and Williamson 2012). Complexity refers to the effort and resources required to specify all the relevant contingencies in a contract. Predictably, these costs escalate as the task underlying the contract becomes more complicated. Asset specificity refers to relationally specific investments that are idiosyncratic to the contract. These may be physical assets, but can just as easily be human capital or information technology investments. The relevant trait is that those investments are valuable only within the context of a

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specific contract. To the extent that these investments are sunk, one party could demand ex-post adaptations to the contract (i. e. hold-up) that reduce the overall value of the transaction (Tadelis 2002).

This paper empirically examines the use of the nonprofit organizational form as a mechanism to reduce transaction costs. The idea that the nonprofit organizational form may reduce transaction costs was articulated as far back as Hansmann (1980), which identified the non-distribution constraint as a mechanism to reduce opportunistic behavior by the firm. Because nonprofit managers cannot consume the residual (revenues in excess of costs) as cash, the pecuniary incentive to shirk on non-contractible quality should be mitigated.[1] Hansmann's paper connects the nonprofit organizational form to the TCE literature by identifying the non-distribution constraint as a contractually relevant feature.

Subsequently, a small, but expanding, literature had developed which examines government choice to contract with nonprofit organizations (Bennett and Iossa 2007; Bennett, Iossa, and Legrenzi 2003; Feiock and Jang 2009; Lamothe and Lamothe 2006; Witesman and Fernandez 2012). This literature now bridges a connection between the TCE nonprofit theory and government procurement literatures. We briefly sketch out some of the theoretical predictions of this literature below. Empirical evidence, however, is still emerging and has faced significant data limitations. We believe that ours is the first paper to specifically analyze the choice of government agencies to contract with nonprofit within a TCE framework.

Our paper will examine whether the nonprofit organizational form serves as a useful tool to lower transaction costs when government procurement contracts are incomplete. We find that, consistent with theoretical predictions, federal agencies use nonprofits more frequently when contracts are more complex. Moreover, federal agencies continue to increase their use of nonprofits when asset investments are more relationally specific. This is in contrast to cost-plus contracts, which are reduced with high asset specificity. The evidence supports our conjecture that nonprofit organizations are a useful enhancement to traditional (and more studied) tools of cost reduction, because they mitigate the incentive to gold-plate procurement contracts.

The paper begins by surveying the policy instruments available to government agencies as they attempt to mitigate contracting costs. We then examine the use of nonprofit organizations in government contracts. We introduce a novel dataset and identification strategy to predict the use of nonprofits in government procurement. We offer some thoughts on why we observe relatively little use of the nonprofit form in the existing data.

2 Theory

Transaction costs typically emerge from three domains: the cost of obtaining the necessary information to construct a contract, the time and effort necessary to negotiate the contract, and the ongoing costs of monitoring and enforcing the contract. The degree of difficulty in designing a contract has been shown to be a significant influence of contract design for government agencies (Boerner and Macher 2008; Levin and Tadelis 2010).

Transaction Cost Economics emphasizes two particular characteristics of the contract: contract complexity and asset specificity (Tadelis and Williamson 2012; Williamson 1979, 1981). First, contract complexity describes the relative difficulty of stipulating the precise quality or quantity of a contract output. Often, complexity is derived from uncertainty about the production process (such as invention of new technologies, vendor aptitude to perform a novel service, or environmental conditions that can impact project cost).

Complexity can also be driven by opportunities for strategic defection by one of the contracting parties. For this circumstance Brown, Potoski, and Van Slyke (2010) adopt the terminology of Hart and Moore (2008), which describes perfunctory versus consummate actions. An agent may apply the minimal effort required by the contract (perfunctory) or additional effort to the benefit of the principal (consummate). Importantly, these actions are difficult to prove to some governing authority (i. e. they are non-verifiable). Strategic defection can take a wide variety of forms, including shirking, opportunism, or excessive risk taking.

Second, contracting costs may be exacerbated by high levels of asset specificity. This occurs when either contracting party must make costly investments in the production process that are irrecoverable in the secondary market (a sunk cost). When this occurs, the counterparty can make demands (also known as ex-post adaptations), that may substantively increase overall costs of the contract (Bajari and Tadelis 2001; Bajari, Houghton, and Tadelis 2014). As an example, contractors often invest in software, facilities, or production technologies that are idiosyncratic to the government contract. They may also shoulder implicit costs, such as re-tasking personnel or rearranging organizational structures. A key distinction of these investments is that they are only valuable within the context of the particular contract. Consequently, either party could attempt to gain advantage by making excessive demands after production has begun. These two dimensions of the contract influence a sequential set of the decisions by the principal. For our summary, we organize them as the: make/buy decision, contract form decision, and the contractor decision.

2.1 Make vs Buy Decision

TCE predicts that federal agencies will act to reduce contracting costs through a range of tools. Foremost, government agencies may choose whether to produce a good or service (the "make" decision), or to purchase the good or service from a third party (the "buy" decision) (Van Slyke 2007). Some contracts may draw on elements of both. In this decision, agencies face a tradeoff. The main advantage to an arm's-length transaction is that it engages high powered incentives for cost reduction. Vendors bear the full risk of cost overruns, as well as the potential gains from cost savings. In a competitive bidding environment, the government agency will extract the full benefit of low-cost production for itself.

However, purchasing the good or service via a market transaction requires writing a contract that fully specifies the relevant quality and quantity parameters. This may be trivial for services that are simple and observable, such as janitorial or landscaping services. However, constructing complete contracts can become prohibitively difficult as the complexity of the good or services rise, as may be the case with law enforcement, environmental clean-up, or cyber-security services. Just as important, there may be no easy mechanism to handle ex-post adaptations to the contract, where one party or the other wishes to materially change the terms of the contract. This can lead to costly renegotiations that may overwhelm the value of the original contract (Bajari, Houghton, and Tadelis 2014). A contract requiring significant investments in relationship specific assets exacerbates the problem. Because of large specific investments, it becomes prohibitively costly to switch vendors, increasing the possibility of hold-up.

In light of these problems, government agencies may prefer to keep production in-house (the "make" decision). Under this regime, transactions occur through a hierarchy, which deliberately mute high-powered incentives (Alchian and Demsetz 1972). Compared to market transactions, incentives toward productive efficiency will be reduced. However, administrative (versus market) control may be preferable, if ex-post contract adaptation becomes more likely or frequent (Tadelis and Williamson 2012).

A series of empirical papers have generated support for the hypothesis that local government agencies economize on transaction costs by "buying" services that are relatively simple to define and monitor, while "making" services that are relatively complex or require specific relational assets (Brown and Potoski 2005; Brown, Potoski, and Van Slyke 2006, 2010; Levin and Tadelis 2010). Federal contracts have also been studied and found to respond in similar ways to minimize contracting costs (Crocker and Reynolds 1993).

2.2 Cost-Plus vs. Fixed Price Contracts

Conditional on the government agencies deciding to contract out (or buy) a good or service, the agency may also vary the form of the procurement contract offered to the vendor. While there are numerous varieties of contract forms, most federal contracts may be categorized along a spectrum of fixed price vs. cost-plus (Kim and Brown 2012; Kim, Roberts, and Brown 2016; Tadelis and Bajari 2006). As the name implies, fixed price contracts prescribe a defined bundle of outputs at a predetermined price. In contrast, a cost-plus contract typically remunerates the vendor for the cost of production, plus some fee or percentage of the total cost as profit.

Fixed price contracts are typically preferred by the principal because the agent bears the risk for cost or scheduling overruns.[2] The fixed price contract incents low cost production, because vendors can directly profit from lower cost technologies, dollar for dollar. In a competitive bidding environment, those lower costs should be passed along to the federal agency. However, fixed cost contracts may become prohibitively costly to negotiate as contract complexity increases. Perhaps even more important, production contracts relying on significant relationship specific investments may induce costly ex-post renegotiation, which can easily overwhelm the financial benefits of the initial contract (Bajari and Tadelis 2001).

In contrast, cost-plus contracts allow any unforeseen increases in cost to be passed along to the purchaser. Thus, they are flexible to deviation in contract requirements, and reduce the potential for renegotiations. Furthermore, they are relatively simple to construct, since price flexibility is built into the contract. By design, the risk of cost overruns is borne by the government agency. Previous empirical research has demonstrated that low-complexity contracts will more often be structured as fixed-price, while higher complexity contracts are more likely to be structured as cost-plus (Kim and Brown 2012; Kim, Roberts, and Brown 2016; Tadelis and Bajari 2006).

Perversely, to the extent that profits for the vendors are a function of costs, there exists an embedded incentive to escalate those costs once the contract is executed (Iossa and Martimort 2016). This incentive is exacerbated when asset specificity is high, because it is – by definition – costly for the government agency to renegotiate the contract or change vendors. The inflation of costs when relationship assets are high has been described, in practice, as "gold-plating" (Brown, Potoski, and Slyke 2016; Kim and Brown 2012; Kim, Roberts, and Brown 2016). The propensity for gold-plating a contract will rise with asset specificity, within the context of a cost-

plus contract (Brown, Potoski, and Slyke 2016). Consequently, we predict that the use of cost-plus contracts will decline as asset specificity rises in order to reduce the potential for ex-post cost inflation.

2.3 Organizational Form: Nonprofit and For-profit Contractors

Finally, and novel to this paper, a government agency may choose to contract with either a for-profit or a nonprofit firm. The non-distribution constraint (where the nonprofit has no residual claimant) softens the incentive for opportunistic behavior (e. g. non-contractible quality or ex-post renegotiation) simply because there is less to be gained by doing so (Young et al. 2010; Young and Casey 2006). In this way, diluted incentives for self-dealing may improve cooperation and result in more stable systems of mutually beneficial relationships (Valentinov 2014; Valentinov and Chatalova 2016).

Interestingly, Hansmann (1980, 888) specifically notes that the nonprofit organizational form should have the same impact as a cost-plus contract, because it places as similar (if more extreme) limitation on the firm. While not offering a formal model, Hansmann outlines his basic intuition. Where a cost-plus contract requires a dedicated fraction of the contract revenue to be allocated to production, the non-distribution constraint implicitly forced the firm to allocate all of the contract revenue to production. More formally, the nonprofit organizational form can be viewed as the extreme (i. e. complete) case of the separation of ownership from control, as modeled in Jensen and Meckling (1976). The nonprofit literature has tended to focus on the positive aspects of this ownership structure, where the manager incentives to lower non-contractible quality or engage in gold-plating are muted. The finance literature has tended to focus on the negative aspects of this ownership structure. When managers are separated from ownership, they bear a lower cost for any perquisite consumption and bear less risk for uncertain ventures (Fama and Jensen 1983; Jensen 2016).

We make the conjecture that principals will choose to contract with for-profit firms for relatively simple contracts in competitive markets. Because of the built-in profit maximization incentive, the owner of a for-profit firm has a high-powered incentive to provide the good or service at the lowest possible cost. In the case of a competitive bidding market, these cost savings will be passed along to the government agency (Carril and Duggan 2018).

We also make the conjecture that the nonprofit organizational form will be useful as contracts become more complex. In this way we expect (as did Hansmann) that the use of the nonprofit organizational form will behave similarly to cost-plus contract. Both the use of the cost-plus contract and the nonprofit organizational form should rise with contract complexity.

Our predictions become more interesting when investments are relationship specific (or idiosyncratic) to the procurement contract. As discussed previously, this is a weakness for the cost-plus contract, because it generates lock-in to a particular firm. This gives that firm the opportunity to "gold-plate" a contract by padding its costs. We expect that the nonprofit organizational form will mitigate against this effect for two reasons. First, the nonprofit organizational form offers a credible signal of goal alignment between the principal and the agent (Bennett and Iossa 2009; Besley and Ghatak 2001; Brown and Troutt 2004; Valentinov 2007; Van Slyke 2007). Relative to for-profit firms, it is more likely that nonprofit firms will have objectives in line to the contracting agency and be considered more trustworthy, thereby reducing monitoring and enforcement costs associated with opportunism (Bryce 2012; Fernandez 2009; Prüfer 2011; Witesman and Fernandez 2012).

Second, the nonprofit organizational form maintains a public and legal prohibition against private inurement (i. e. the non-distribution constraint) where there is no legal residual claimant (Hopkins 2011). Because managers cannot directly consume marginal profits as cash, the incentive to undertake such reductions in quality will be reduced, relative to for-profit firms (Ferris and Graddy 1991; Glaeser and Shleifer 2001).

For these reasons, we expect that the use of the nonprofit organizational form will be preferred to the cost-plus contract under conditions where both complexity and asset specificity exist. To the extent that nonprofit firms are less likely to engage in opportunistic behaviors, or demonstrate better goal alignment, contracting costs should be lower for nonprofit relative to their for-profit counterparts. This paper examines this question empirically by looking to see if government agencies attempt to lower transaction costs by using nonprofits more as contracts become both more complex and asset specific.

We conduct our analysis in two stages. First, we validate our data and identification strategy by first replicating the findings of Brown and Potoski (2005) and Levin and Tadelis (2010) with our own sample data. These papers demonstrate that private sector contractors increase their usage of cost-plus contracts when complexity increases, as TCE predicts. We confirm this finding with federal agencies, indicating that our treatment variables and empirical strategy are consistent with the previous TCE papers.

Second, we test for the impact of contract complexity on the use of nonprofit organizational form in federal contracts. For the reasons described above, we expect that the use of nonprofits by federal agencies will increase with contracts that are more complex. Furthermore, unlike CP contracts, nonprofit organizations do not suffer the same incentive for gold-plating. Thus, their use should also increase with asset specificity.

3 Data

Our study uses the Federal Procurement Data System – Next Generation (FPDS-NG), which catalogs all federal agency contracts greater than three thousand dollars, as well as all modifications to those contracts. The FPDS-NG reports contract data via a web portal, www.usaspending.gov, which is updated nightly. The dataset is large, containing over 1.5 million contracts in 2014.

For tractability, we have constrained our sample in several ways. First, we examine only contracts – as opposed to grant awards – which are analyzed in a separate paper. Second, we isolate contracts that are newly issued in 2014, excluding contract renewals and adjustments. Third, we isolate our analysis to five agencies: The Departments of: Agriculture, Justice, Homeland Security, Health & Human Services, and the General Services Administration. These five agencies represent the largest non-defense related agencies, by number of contracts in 2014. These adjustments reduce the total number of contract observations to 390,521. Finally, our sample is reduced to those federal contracts which are described in Levin and Tadelis (2010) and Brown and Potoski (2005). These two papers are used to generate our treatment variable, described in the next section. Our final sample is 38,855 federal contracts in 2014. This selection process is discussed in detail in Section 4.2.

3.1 Dependent Variables

The paper uses two dependent variables. The first dependent variable characterizes whether federal contracts are formed as a cost-plus (CP = 1) or fixed price (CP = 0).[3] Table 1 summarizes the distribution of contract form by U.S. federal agency. Consistent with federal policy, relatively few (15.3 %) of contracts in the FPDS-NG database are formed as cost-plus. Health and Human Services is a disproportionate user of cost-plus contracts in the sample, using both the highest number (3,454) and the greatest percentage (59 %) of its contracts as cost–plus in the sample.

Table 1: Full sample tablulation by contract type.

	Cost-Plus		**Fixed Price**	
Department of Agriculture	265	2.6 %	9,951	97.4 %
Department of Justice	2,156	15.8 %	11,495	84.2 %
Department of Veterans Affairs	4	0.1 %	6,989	99.9 %
General Services Administration	33	1.8 %	1,839	98.2 %
Health & Human Services	3,454	59.0 %	2,402	41.0 %
	5,912	*15.3 %*	*32,676*	*84.7 %*
	Nonprofit		**For Profit**	
Department of Agriculture	90	*0.9 %*	10,126	*99.1 %*
Department of Justice	2,627	*19.2 %*	11,024	*80.8 %*
Department of Veterans Affairs	917	*13.1 %*	6,076	*86.9 %*
General Services Administration	77	*4.1 %*	1,795	*95.9 %*
Health & Human Services	109	*1.9 %*	5,747	*98.1 %*
	3,820	*9.9 %*	*34,768*	*90.1 %*

Our primary interest in this paper is to predict the use of nonprofit organizations by federal agencies (NONPROFIT = 1). Table 1 also partitions the sample by agency and organizational form. Again, the unit of observation is the contract. For example, the Department of Agriculture issued 10,216 contracts in the sample. Of these, 10,126 (99.1 %) were issued to for-profit organizations. Of the five agencies analyzed, the Department of Justice is the most prolific user of nonprofits (19.2 %), the Department of Agriculture is the least frequent user (0.9 %).

Table 2 presents a simple cross-tabulation of cost-plus and nonprofit contracts in the sample. Seventy five percent of the sample contracts (28,870) are awarded to for-profit firms as fixed-price contracts. Fifteen percent of sample contracts are awarded to for-profits as cost-plus contracts. Ten percent of the sample is awarded to nonprofits as fixed-price contracts. Only a trivial number (n = 14) of the contracts in the sample are both cost-plus and awarded to nonprofits. That federal agencies use either cost-plus style contract or nonprofit organizations – but almost never both – is useful for our analysis. In our next section we explore the conditions under which federal agencies may choose nonprofit organizations as a substitute for cost-plus style contracts.

Table 2: Full sample tablulation by contract type.

		Nonprofit		
		No	**Yes**	**Total**
Cost Plus	No	28,870	3,806	*32,676*
Contract	Yes	5,898	14	*5,912*
	Total	*34,768*	*3,820*	*38,588*

3.2 Explanatory Variables Measuring Contractibility and Asset Specificity

Our treatment variables are measures of *complexity* and *asset specificity* for the procurement contract. We apply two schemes, developed independently, in Brown and Potoski (2005) and Levin and Tadelis (2010) to generate our treatment. Both papers survey local purchasing managers regarding the relative complexity of contracting and asset specificity for various services.[4]

Brown and Potoski (2005) survey 75 purchasing managers over 64 common contracts regarding their relative complexity.[5] The purchasing managers scored each contract over a range of measurement and asset specificity. We extract this information for non-contractibility and asset specificity from their study using the NAICS codes, and then match those codes directly to federal contracts. The sub-sample generated using the Brown and Potoski (2005) method yields 23,122 observed contracts from the FPDS-NG.[6]

A similar approach was used for Levin and Tadelis (2010). They surveyed 23 city managers over 29 distinct services. Two of their survey items are comparable to the BP survey, these items ask for information about the ease of measurement (complexity), and the potential for holdup (asset specificity). Again, we extract the relevant NAICS codes from the study and code the respective contracts from the FPDS-NG. The sub-sample generated using the LT scheme includes twenty-four NAICS codes and yields 15,476 unique contracts.[7]

The survey instruments from each paper use distinct ordinal scales. To accommodate this measurement issue, we convert both of their ordinal scales into binomials using the authors' own criteria to categorize responses as either Complex/Not Complex and Asset Specific/Not Asset Specific.[8] Our Table 3 offers a visual summary of the two survey schemes by depicting each NAICS code in the sample, organized by whether it was classified as complex or asset specific. There are sixty-three unique NAICS contract codes represented in both samples. The non-italicized code numbers represent the BP categorization, while the italicized codes represent LT surveys.

Table 3: Tablulation of NAICS codes.

		Complex					
		No			**Yes**		
Asset Specific	No	237,310	237,310	238,210	561,710	541,350	
		561,440	561,440	485,113	812,910	812,910	
		561,612	561,612	488,410		541,820	
		561,730	561,730	488,490		561,410	
		561,790	561,790	522,320		541,612	
		561,990	561,990	532,112		921,130	
		562,111	562,111	541,214		926,110	
		562,212	562,212	541,620		926,140	
		812,930	812,930	812,220			
		115,112	924,120	561,710			
	Yes	221,310	221,310		221,320	221,210	221,210
		562,213	221,320		519,120	713,940	488,119
			237,110		712,110	712,110	621,910
			485,111		541,110	541,110	622,110
			518,210		541,350	622,210	561,591
			519,120		562,998	623,110	922,140
			541,370		621,420	623,220	922,160
			562,211		621,493	624,110	923,120
			926,130		624,120	624,221	237,130
					624,410	624,410	

Notes: NAICS numbers in black are from Brown and Potoski (2005)
NAICS numbers in italics are from Levin and Tadelis (2010)
Grey shaded cells indicate an overlap BP and LT for Complexity and Asset Specificity
Cross Hatched cells indicate a discrepency between BP and LT for either Complexity or Asset Specificity
Non-shaded cells indicate the NAICS codes do not overlap Between Studies

There is some overlap in the contracted services across the two sub-samples. The greyed cells represent where BP and LT both include a particular NAICS contract, and classify that contract the same way (complex or asset specific). For example, in the top left corner, both BP and LT include NAICS code 237310 (Electricity Utility operation and management), and classify that contract as complex and asset specific. Twelve of the NAICS codes are categorized consistently in both LT and BP samples. However, four of the NAICS codes are categorized inconsistently. For example, NAICS code 56710 (Insect/rodent control) is classified by BP as Not Asset Specific and Complex, but is categorized by LT as Not Asset Specific and Not Complex. These are noted by the crossed-hatched cells.[9] Thirty-eight of the NAICS codes do not overlap between BP and LT surveys. Table 4 reports correlation coefficients between indicators for specific and complex for both sample sets. The two sub-samples (BP & LT) have a correlation of roughly 0.6.

Table 4: Correltation coefficients of contractibility over sample set.

	specific_BP	**complex_BP**	**complex_LT**	**specific_LT**
specific_BP	1.00			
complex_BP	0.76	1.00		
complex_LT	0.36	0.60	1.00	
specific_LT	0.61	0.53	0.81	1.00

Notes:
_BP indicates those observations drawn from Brown and Potoski (2005)
_LT indicates those observations drawn from Levin and Tadelis (2010)

For our empirical tests, we stack these two sub-samples to create a variable indicating the contract is complex (COMPLEX = 1) or asset-specific (ASSET_SPECIFIC = 1). Table 5 reports basic summary statistics for the dependent variables. The sample is roughly symmetric in the treatments, with 57 % of the sample as COMPLEX = 1 and 65 % of the sample as SPECIFIC = 1.

Table 5: Summary of variables.

Dependent Variables	**Abbreviation**	**n**	**mean**	**s.d.**	**min**	**max**
Nonprofit	NP	38,588	0.10	0.30	0.00	1.00
Cost Plus Contract	CP	38,588	0.15	0.36	0.00	1.00
Treatment						
Complex	COMPLEX	38,588	0.57	0.49	0.00	1.00
Specific	SPECIFIC	38,588	0.65	0.48	0.00	1.00
Covariates						
Contract Value (000's)	CONTRACT VALUE	38,588	$271	$5,259	$0	$560,014
Contractor Revenue (000's)	CONTRACTOR REVENUE	38,588	$1,789,848	$131,000,000	$0	$25,600,000,000
# of Bids	BIDS	38,457	2.00	2.19	0.00	10.00
Duration in Years	DURATION	35,325	1.07	1.76	0.00	91.06
Brown & Potoski Treatment	BP	38,588	0.60	0.49	0.00	1.00

3.3 Covariates

Table 5 offers summary statistics for each of the remaining covariates. We include a vector of contract characteristics to control for heterogeneity in the contracting environment. CONTRACT VALUE is the dollar value of

the contract, in thousands. CONTRACTOR REVENUE is the total revenues of the contract recipient, in thousands of dollars. Number of BIDS proxies for the competitiveness of the bidding process by offering the total number of bids for that particular contract. DURATION is the total duration of the contract, measured in years. Each of these previous variables are distributed non-normally, thus we take their natural logarithms before the regression analysis.

Finally, we include an indicator, BP which equals unity if is drawn from Brown and Potoski (2005), otherwise the treatment is drawn from Levin and Tadelis (2010). This will allow us to segment the regression by treatment to test the model robustness.

Model (1) is as follows:

CP equals unity if the contract *i* issued by agency *j* in states is awarded as a cost-plus style contract; zero indicates the contract was fixed price.

$$\begin{aligned}\left\{CP_{ijs}\right\} = \alpha + \beta COMPLEX_i + \gamma ASSET\_SPECIFIC_i + \sum_j \delta AGENCY_j \\ + \sum_s \theta STATE_s + \sum_s \varphi CONTRACTCOVARIATES_i + \mu BP_i + \varepsilon_{ijs}\end{aligned} \tag{1}$$

Model (2) is as follows:

NONPROFIT equals unity if the contract *i* issued by agency *j* in state *s* is awarded to a nonprofit organization; zero indicates the contract was awarded to a for-profit.

$$\begin{aligned}\left\{NONPROFIT_{ijs}\right\} = \alpha + \beta COMPLEX_i + \gamma ASSET\_SPECIFIC_i + \sum_j \delta AGENCY_j \\ + \sum_s \theta STATE_s + \sum_s \varphi CONTRACTCOVARIATES_i + \mu BP_i + \varepsilon_{ijs}\end{aligned} \tag{2}$$

Our treatment variables are *COMPLEX* and *SPECIFIC*. *COMPLEX* is a binomial equal to unity if the NAICS contract code associated with the contract was identified as complex. *SPECIFIC* is a binomial equal to unity if the NAICS code was identified as requiring specific investments. We also include a vector of indicator variables for the federal *AGENCY* issuing the contact, and the *STATE* where the contract is executed. We include a vector of contract specific covariates described in Table 5. Finally, *BP* equals unity if contract I was drawn from the Brown and Potoski (2005) sample, zero if it was drawn from Levin and Tadelis (2010). This binomial will allow us to test if there are differences in the sub-samples.

Contract complexity data gathered from both Brown and Potoski (2005) and Levin and Tadelis (2010) provide distinct, independent, and validated data sources for contract complexity and asset specificity. Combining these two separate surveys increases the reliability of our study. Finally, we believe that we are the first study to apply this style of research design to federal contract data.

4 Results

The models are estimated using Logit. The results are summarized in Table 6, columns 1 and 2. In each case, the STATE control variables as well as CONTRACT covariates are suppressed for presentation purposes. Full regression results are reported in the Appendices C & D.

Table 6: Logit regression results.

Dependent Var	**1** **CP**		**2** **NP**	
COMPLEX	1.834	**	2.112	**
s.e.	*0.109*		*0.094*	
SPECIFIC	–1.529	**	0.962	**
s.e.	*0.111*		*0.105*	
BP	–0.187	**	0.778	**
s.e.	*0.061*		*0.071*	
Department of Justice	4.913	**	2.089	**
s.e.	*0.142*		*0.132*	
Veterans Affairs	–2.729	**	1.923	**
s.e.	*0.573*		*0.139*	
General Service Adminstration	–0.048		2.375	**

s.e.	*0.139*		*0.188*	
Health and Human Services	4.593	**	0.946	**
s.e.	*0.106*		*0.183*	
_cons	–10.384	**	–7.469	**
s.e.	*0.501*		*0.375*	
n	35,243		35,184	
Psuedo R2	0.5162		0.3982	

Notes:
BP = 1 indicates that the sample overvation came from Brown and Potoski (2005)
BP = 0 indicates the sample observation came from Levin and Tadelis (2010)
Department of Agriculture is the base case for agency indicators
** indicates statistical significance at 0.01

4.1 Cost-Plus Dependent Variable

We first estimate the model using the cost-plus (CP) dependent variable. We run this initial regression to validate our data against the previous literature. Initial results are listed in column 1 of Table 6. The probability of observing a cost-plus contract increases with contract complexity (COMPLEX = 1). This finding is consistent with the literature described in Section 2.1. Thus, we are more confident that both our measures of complexity are valid and consistent with the previous empirical literature.

We also find that the use of cost-plus contracts is lower when assets are specific (SPECIFIC = 1). Federal agencies appear to reduce their reliance on cost-plus style contract as those contracts require increasingly relationship specific investments. This finding is consistent with our conjecture that asset specific may induce gold-plating (described in Section 2.2). Thus, government agencies appear to respond to this incentive by reducing the use of CP contracts when assets are relationally specific.

Logit coefficients are cumbersome to interpret directly. Thus, it is helpful to look at marginal effects $\left(\frac{\delta y}{\delta x}\right)$ and for the main explanatory variables. These are summarized in Table 7. For the full sample, the probability of observing a cost-plus (CP) contract increases by eight percentage points when the contract is identified as complex. To check the robustness of our treatment, we split our results by the unbundled treatment sub-samples. Recall that BP = 1 indicates our results for only the Brown and Potoski (2005) treatment. When only this piece of the treatment is activated, the probability of observing a CP contract increases by eight percentage points when the contract is complex. BP = 0 indicates the treatment only for the Levin and Tadelis (2010) sub-sample. The effect is nearly identical for both sub-samples, and all results are statistically significant at normal confidence intervals.

Table 7: Predictive margins for CP.

Cost Plus		dy/dx	Std.	z	P > z	[95 % Conf.	Interval]
COMPLEX							
Full Sample		0.08	0.01	14.92	0.00	0.070	0.091
	BP = 1	0.08	0.01	14.90	0.00	0.069	0.090
	BP = 2	0.08	0.01	15.07	0.00	0.070	0.091
SPECIFIC							
Full Sample		–0.06	0.00	–13.38	0.00	–0.068	–0.051
	BP = 1	–0.06	0.00	–13.43	0.00	–0.068	–0.050
	BP = 2	–0.06	0.00	–13.02	0.00	–0.071	–0.052

BP = 1 indicates that only the Brown and Potoski (2005) treatment is applied.
BP = 2 indicates that only the Levin and Tadelis (2010) treatment is applied.

The impact of SPECIFIC (asset specificity) is also consistent with our expectations. Table 7 reports that, for the entire sample, we observe that asset specificity (SPECIFIC = 1) results in a six percentage point *reduction* in cost-plus contracts for the entire sample. The results are nearly identical when we split the treatment into BP and LT subsamples. All results are statistically significant. From these results, we can be relatively confident that our treatment is consistent across both BP and LT sub-samples and that their application is suitable for federal contracts.

4.2 Nonprofit Dependent Variable

Our primary interest for this paper lies in the impact of contract complexity and asset specificity on the use of nonprofits in federal procurement. These results are presented in Table 6, column 2.

Confirming our overall hypotheses from Section 2.3, the nonprofit organizational form serves a similar function as the cost-plus contract. We observe that, as contract complexity increases, the utilization of nonprofits organizational form rises. Unlike our results for CP contract, we also find that the use of nonprofit increases with asset-specificity (SPECIFIC). These results are statistically significant at normal confidence intervals. Consistent with our conjectures outlined in Section 2.3, we hypothesized that – because of goal alignment and the non-redistribution constraint – the nonprofit organizational form may serve as a useful contracting tool, particularly when assets are specific. Stated plainly, the nonprofit organizational form may, simultaneously, reduce the risk of gold-plating via moral hazard.

For clarity, we again present the marginal effects of the main treatment variables in Table 8. For the full sample, the probability of observing a contract with a nonprofit organization increases by eleven percentage points when that contract is considered complex. The results are consistent when separating the two treatment subsamples. The change in a contract to COMLEX = 1 results in an increase in the probability of using a nonprofit by 7 % for BP and 12 % for LT sub-samples. All results are statistically significant. These findings confirm our hypotheses that federal agencies use nonprofit organizations more as contracts become increasingly complex. In this way, federal agencies are using nonprofits similarly to cost-plus contracts.

Table 8: Predictive margins for Nonprofit.

NONPROFIT		dy/dx	Std.	z	P > z	[95 % Conf. Interval]	
COMPLEX							
Full Sample		0.11	0.0039	26.67	0.00	0.097	0.113
	BP = 1	0.07	0.0039	18.88	0.00	0.066	0.081
	BP = 2	0.12	0.0046	25.72	0.00	0.108	0.126
	SPECIFIC						
Full Sample		0.05	0.0048	10.28	0.00	0.040	0.059
	BP = 1	0.05	0.0054	10.24	0.00	0.044	0.065
	BP = 2	0.04	0.0035	10.6	0.00	0.030	0.044

CP = 1 indicates that only contracts that are catagorized as Cost Plus are analyzed.
CP = 2 indicates that only contracts that are catagorized as Fixed Price are analyzed.

However, we observe a divergence from CP behavior when looking at asset specificity (SPECIFIC). For the case of nonprofits (Table 6 column 2), federal agencies increase their usage of nonprofit when those contracts have a high degree of asset specificity. The marginal effects in Table 8 indicate that when a contract becomes relationally asset specific (SPECIFIC = 1) the probability of observing a contract with a nonprofit increases by 5 % for the entire sample, 5 % for the BP sub-sample, and 4 % for the LT sub-sample. All results are statistically significant at normal confidence intervals.

To restate our full results, we observe that contract complexity (COMPLEX) is associated with an increase in the probability of observing a cost-plus contract by federal agencies. Because this result is consistent with other research. Thus, we are more confident in our application of the treatment. The use of nonprofits also increases with contract complexity. This is consistent with our hypothesis that the nonprofit organizational form lowers contracting costs.

We also observe that asset specificity (SPECIFIC) is associated with a decrease in the use of cost-plus contracts. This is consistent with the literature on the potential for gold-plating contracts when assets are specific, though other stories could apply. In contrast, we observe that the use of nonprofits increases with asset specificity. This behavior diverges from the cost-plus contract. We discuss possible explanations for this in the next section.

The regressions were tested over a variety of specifications for robustness. Most importantly, our primary results are not sensitive to either the size of the contract, or to the sample of federal agencies used.[10] We acknowledge and suspect that there exists important differences in how various federal agencies treat the nonprofit organizational form in their procurement process, however a clear pattern does not emerge in our data. A more fine-grain qualitative analysis of these practices would be a fruitful avenue of future research.

5 Discussion and Conclusions

The aim of this paper has been to examine whether federal agencies adjust their use of nonprofit organizational form in response to changes in contracting costs. We start with the stylized fact that nonprofits represent only a small fraction of government contracts. We directly test the long-standing hypothesis that nonprofits may be used as a tool to mitigate agency problems in government contracts, via theories of goal alignment and the non-distribution constraint.

Using two independent schema for contract characteristics, we test the use of nonprofit organizations by federal agencies under differing levels of contract complexity. Our findings were consistent across the two treatment schema. First, our results support the hypothesis that nonprofit are used more frequently with more complex contracts. It is likely that the institutional constraints (such as the non-distribution constraint) embedded in the nonprofit organizational form mitigate some of the monitoring costs of contracting as they become more complex. As discussed previously, the nonprofit organization form is also a credible signal of goal alignment, mitigating some adverse selection problems. A potential manager or entrepreneur could have entered the market as a for-profit firm. Because nonprofits are constrained to a particular objective (and submit to higher levels of public scrutiny), they may offer a credible signal to the contracting agency as to their common objectives.

Second, we observe an increase in the use of nonprofits when relational asset specificity is higher. This is particularly interesting because it diverges from the use of cost-plus contracts. It is plausible that the non-distribution constraint (i. e. no residual claimant) may mitigate moral hazard. This is a particular concern for contracts that are both complex *and* relationally specific. Our results demonstrate that nonprofits are used more often in this circumstance. This finding suggests that the nonprofit organizational form may accrue some additional benefits beyond those of the cost-plus contract. It is possible that the non-distribution constraint mitigates the incentive to gold-plate contracts with additional expenditures (or lower non-contractible quality) because those marginal revenues cannot be consumed as cash. Thus the nonprofit organizational form offers potentially valuable protections when contracts are particularly non-contractible.

These findings, however, beg the question. If nonprofits are effective in mitigating transaction cost, why do we observe so few of them in the data? We suggest three possible explanations for the low prevalence of nonprofits. First, nonprofit firms may be more prevalent in secondary sub-awards. Recall that our data only included prime awards. Many of these are block grants to states. Nonprofits are often sub-contracted by state institutions for service provision, rather than through federal agencies directly.[11]

Alternatively, it is also possible that there exists idiosyncratic process in the federal contracting process that makes it particularly difficult to contract with nonprofits. This contingency is difficult to detect in the federal contracting dataset. However, we do note that there is wide variation across agencies in their propensity to contract with nonprofits, even after controlling for the complexity of the contract. One fruitful avenue of future research would be a deeper qualitative analysis of the various contracting idiosyncrasies of the various agencies that may prohibit working with the nonprofit sector.

A final, and interesting possibility, is that altruistic entrepreneurs are scarce and the capital constraints embedded in the nonprofit organizational form limit the scale of nonprofit enterprises (Glaeser and Shleifer 2001). It is possible that there are simply not enough nonprofits to meet the demand of federal agencies. The observation that nonprofit contracts were only subject to half as many competing bids – relative to for-profits – supports this conjecture. As they say, further investigation on each of these points is warranted. We believe that all are plausible, but we leave their exploration to future research.

Appendix

A NAICS Catagoriation based on Brown & Potoski (2005)

NAICS	Description	Frequency	Ease of measurement	Complex	Asset Specific
221210	Gas Utility Operation and Management	556	No	Yes	Yes
221310	Water treatment and distribution	494	Yes	No	Yes
221320	Sewage Treatment Facilities	166	Yes	No	Yes
237110	Water and Sewer Line and Related Structures Construction	683	Yes	No	Yes

237130	Electricity utility operation and management	127	No	Yes	Yes
237310	Street repair	825	Yes	No	No
238210	Traffic signal installation and maintenance	1446	Yes	No	No
485111	Operation/Maintenance of Bus Systems	18	Yes	No	Yes
485113	Bus transit systems (except mixed mode)	45	Yes	No	No
488119	Airports, civil, operation and maintenance	20	No	Yes	Yes
488410	Motor Vehicle Towing & Storage	27	Yes	No	No
488490	Street/Parking Lot cleaning & snow removal	65	Yes	No	No
518210	Data processing services	734	Yes	No	Yes
519120	Operation of Libraries	61	Yes	No	Yes
522320	Financial Transactions Processing	36	No	No	No
532112	Fleet Management and Maintenance	11	Yes	No	No
541110	Legal services	2,275	No	Yes	Yes
541214	Payroll Services	6	Yes	No	No
541350	Inspection/code Enforcement	185	No	Yes	No
541370	Title records/plat map maintenance	409	Yes	No	Yes
541612	Personnel management consulting services	141	No	Yes	No
541620	Environmental inspection services	969	No	No	No
541820	Public Relations Agencies	244	No	Yes	No
561410	Secretarial services	155	No	Yes	No
561440	Collection and Delinquent Processing	2	Yes	No	No
561591	Convention and visitors bureaus	4	No	Yes	Yes
561612	Building Secturity	1,801	No	No	No
561710	Insect/rodent control	164	Yes	No	No
561730	Parks and Landscaping Maintenance	847	Yes	No	No
561790	Building and Grounds Maintenance	237	Yes	No	No
561990	Parking Meter maintenance and collection	439	Yes	No	No
562111	Commercial Solid Waste Collection	547	Yes	No	No
562211	Solid Waste Treatment and Disposal	485	Yes	No	Yes
562212	Residential nonhazardous solid waste (e. g. trash)	75	Yes	No	No
621910	Ambulance and Emergency Vehicle Maintenance	696	Yes	Yes	Yes
622110	Operation/management of Hospitals	4,988	No	Yes	Yes
622210	Drug and Alcholol Treatment	6	No	Yes	Yes
623110	Programs for Elderly	2,033	No	Yes	Yes
623220	Mental Health Programs and Facilities	169	No	Yes	Yes
624110	Child welfare services	8	No	Yes	Yes
624221	Homeless shelters	125	No	Yes	Yes
624410	Day Care Services	7	No	Yes	Yes
712110	Museums	4	No	Yes	Yes
812220	Cemeteries and Crematories	77	No	No	No
812910	Animal Control (except Veterinary) Services	29	No	Yes	No
812930	Operation of parking garages or lots	209	Yes	No	No
921130	Tax Assessing	10	No	Yes	No
922140	Prisons/jails	5	No	Yes	Yes
922160	Fire Provention/Suppression	109	No	Yes	Yes
923120	Public health program administration	144	No	Yes	Yes
924120	Operation and maintenance of recreation facilities	6	Yes	No	No
926110	Arts and cultural program administration, government	2	No	Yes	No
926130	Police/fire communications	161	Yes	No	Yes
926140	Animal Control	25	No	Yes	No
	Total	23,112			

Notes: Catagorizations based on Brown & Potoski (2005) Table 5, pp. 340–341.
The original paper uses the term "Easy Measurement" to imply contractibility . We replace this term with Complex, whereby "Complex" implies low levels of measurability, or "Easy Measure" = 0. We retain the word Asset Speficic, with it's original meaning.

B NAICS Categorization based on Levin & Tadelis (2010)

NAICS	Description	Frequency	Complex	Asset Specific
115310	Fire Prevention	4,720	Yes	Yes
221310	Water treatment and distribution	494	No	Yes
221320	Sewage collection and water treatment	166	Yes	Yes
237310	Street repair	825	No	No
488410	Vehicle Towing & Storage	27	No	No
519120	Operation of Libraries	61	Yes	Yes
541110	Legal Services	2,275	Yes	Yes
541350	Commerical Solid Waste Collection	185	Yes	Yes
561440	Delinquint tax collection services	2	No	No
561612	Crime Prevention/Patro	1,801	Yes	Yes
561621	Building Security	1,398	No	No
561710	Insect/Rodent Control	164	Yes	No
561730	Tree Trimming/planting	79	No	No
561730	Building landscape care and maintenance services	847	No	No
561790	Street/Parking Lot Cleaning	237	No	No
561990	Utility Meter Reading	439	No	No
562111	Commerical Solid Waste Collection	547	No	No
562212	Residential Solid Waste Collection	75	No	No
562213	Solid Waste Disposal	59	No	Yes
562998	Sanitary Inspection	97	Yes	Yes
621420	Drug and Alcholol Treatment	392	Yes	Yes
621493	Emergency Medical Service	31	Yes	Yes
624120	Programs for the elderly	280	Yes	Yes
624410	Operation of Daycare Facilities	7	Yes	Yes
712110	Operation of Museums	4	Yes	Yes
713940	Operaton/Maintenance of Recreational Facilities	26	Yes	Yes
812910	Animal Control	29	Yes	Yes
A	Operation of Parking Lots and Garages	209	No	No
	Total	15,476		

Notes: Catagorizations based on Levin and Tadelis (2010) Table 2, pp. 522.
The original paper uses the term "Measure" to imply difficulty in measurement. We replace this term with "Complex", whereby Complex = 1 if Measure ≥ 0, zero otherwise. Further, the original paper uses the term "Holdup", we replace this term with "Asset Specific", where Asset Specific = 1 if Holdup ≥ 1, zero otherwise.
The original paper uses continuous variables for "Measure" and "Holdup". For comparability, we transform these variables into binomials using a criteria defined in the original Levin & Tadelis (2010) paper. The criteria are detailed in the notes for Table IV on p. 525. Please see the original paper for more detail.

C Full Regression Results for Cost Plus Dependent Variable

Logistic regression	Number of obs	= 35,243				
	LR chi2(62)	22,492.45				
	Prob > chi2	0				
Log	Pseudo R2	0.7074				
likelihood = –4652.4689						
CP	**Coef.**	**Std. Err.**	**z**	**P > z**	**[95 % Conf. Interval]**	
1.complex	1.833587	0.1086002	16.88	0	1.620735	2.046439
1.specific	–1.529261	0.1105898	–13.83	0	–1.746013	–1.312509
1.BP	–0.1870564	0.0608054	–3.08	0.002	–0.3062328	–0.06788
state						
AS: AMERICAN SAMOA	0	(empty)				
AZ: ARIZONA	0.0562482	0.6618364	0.08	0.932	–1.240927	1.353424
CA: CALIFORNIA	2.782663	0.4763761	5.84	0	1.848983	3.716344
CO: COLORADO	3.840714	0.5152999	7.45	0	2.830745	4.850683
CT: CONNECTICUT	3.418973	0.5444957	6.28	0	2.351781	4.486165
DC: DISTRICT OF COLUMBIA	1.701006	0.4892527	3.48	0.001	0.742088	2.659923

DE: DELAWARE	3.114425	0.9049821	3.44	0.001	1.340693	4.888157
FL: FLORIDA	2.956481	0.4896998	6.04	0	1.996687	3.916275
GA: GEORGIA	2.628643	0.4917577	5.35	0	1.664816	3.592471
GU: GUAM	5.265265	1.042918	5.05	0	3.221183	7.309346
HI: HAWAII	4.163333	0.7731449	5.38	0	2.647997	5.678669
IA: IOWA	2.710617	0.7338734	3.69	0	1.272251	4.148982
ID: IDAHO	1.3788	0.543412	2.54	0.011	0.313732	2.443868
IL: ILLINOIS	4.446254	0.4759548	9.34	0	3.5134	5.379108
IN: INDIANA	2.991486	0.5047879	5.93	0	2.00212	3.980852
KS: KANSAS	2.104535	0.6962033	3.02	0.003	0.7400014	3.469068
KY: KENTUCKY	3.027073	0.5079721	5.96	0	2.031465	4.02268
LA: LOUISIANA	2.646888	0.6179491	4.28	0	1.43573	3.858046
MA: MASSACHUSETTS	3.97564	0.4970878	8.00	0	3.001366	4.949914
MD: MARYLAND	2.379983	0.4946249	4.81	0	1.410536	3.349429
ME: MAINE	4.708887	0.6430212	7.32	0	3.448589	5.969186
MI: MICHIGAN	5.440404	0.4952007	10.99	0	4.469828	6.41098
MN: MINNESOTA	2.425598	0.5156523	4.70	0	1.414938	3.436258
MO: MISSOURI	1.661399	0.5713432	2.91	0.004	0.5415872	2.781211
MP: NORTHERN MARIANA ISLANDS	0	(empty)				
MS: MISSISSIPPI	4.207447	0.5514955	7.63	0	3.126536	5.288359
MT: MONTANA	3.420495	0.5107249	6.70	0	2.419493	4.421498
NC: NORTH CAROLINA	3.553362	0.5236185	6.79	0	2.527089	4.579635
ND: NORTH DAKOTA	0.1331825	0.6976875	0.19	0.849	–1.23426	1.500625
NE: NEBRASKA	4.654871	0.5578041	8.34	0	3.561595	5.748147
NH: NEW HAMPSHIRE	4.824934	0.5843025	8.26	0	3.679722	5.970146
NJ: NEW JERSEY	–0.5385385	0.9127414	–0.59	0.555	–2.327479	1.250402
NM: NEW MEXICO	1.46463	0.5174967	2.83	0.005	0.4503551	2.478905
NV: NEVADA	3.61693	0.5230647	6.91	0	2.591742	4.642118
NY: NEW YORK	4.289626	0.4787745	8.96	0	3.351245	5.228007
OH: OHIO	4.8086	0.5046555	9.53	0	3.819493	5.797706
OK: OKLAHOMA	1.527265	0.4948662	3.09	0.002	0.5573447	2.497185
OR: OREGON	3.237706	0.4777378	6.78	0	2.301357	4.174055
PA: PENNSYLVANIA	3.397217	0.4798619	7.08	0	2.456705	4.337729
PR: PUERTO RICO	3.211731	0.6843805	4.69	0	1.87037	4.553092
RI: RHODE ISLAND	3.065145	0.9286885	3.30	0.001	1.244949	4.885341
SC: SOUTH CAROLINA	–0.7779598	0.7762109	–1.00	0.316	–2.299305	0.7433855
SD: SOUTH DAKOTA	4.060294	0.4914795	8.26	0	3.097012	5.023576
TN: TENNESSEE	3.712655	0.5091525	7.29	0	2.714735	4.710576
TX: TEXAS	4.013843	0.4709576	8.52	0	3.090784	4.936903
UT: UTAH	2.161051	0.8055375	2.68	0.007	0.5822263	3.739875
VA: VIRGINIA	3.448576	0.4808361	7.17	0	2.506154	4.390997
VI: VIRGIN ISLANDS OF THE U.S.	3.882387	1.145659	3.39	0.001	1.636938	6.127837
VT: VERMONT	4.536123	0.8192073	5.54	0	2.930506	6.14174
WA: WASHINGTON	1.0342	0.5650424	1.83	0.067	–0.0732629	2.141663
WI: WISCONSIN	6.986821	0.5066395	13.79	0	5.993826	7.979816
WV: WEST VIRGINIA	0.3898719	0.6914875	0.56	0.573	–0.9654187	1.745163
WY: WYOMING	–0.5237732	0.8581224	–0.61	0.542	–2.205662	1.158116
agency						
1500: JUSTICE, DEPARTMENT OF	4.913362	0.1417203	34.67	0	4.635595	5.191128
3600: VETERANS AFFAIRS, DEPARTMENT OF	–2.728936	0.5729936	–4.76	0	–3.851983	–1.605889
4700: GENERAL SERVICES ADMINISTRATION	–0.0479361	0.2895837	–0.17	0.869	–0.6155096	0.5196375
7500: HEALTH AND HUMAN SERVICES, DEPARTMENT OF	4.593395	0.1391418	33.01	0	4.320682	4.866108
log_bids	0.8533655	0.0617883	13.81	0	0.7322627	0.9744684
log_duration_years	3.89159	0.0786222	49.50	0	3.737493	4.045686

log_contractvalue	–0.2187655	0.0200203	–10.93	0	–0.2580047	–0.1795264
log_contractorrevenue	–0.1368296	0.0043368	–31.55	0	–0.1453296	–0.1283296
_cons	–10.38444	0.5013778	–20.71	0	–11.36712	–9.401759

D Full Regression Results for Nonprofit Dependent Variable

Logistic regression	Number of obs	= 35,184				
	LR chi2(59)	9893.38				
	Prob > chi2	0				
Log likelihood = –6560.3032	Pseudo R2	0.4299				
nonprofit	**Coef.**	**Std. Err. z**	**z**	**P > z**	**[95 % Conf. Interval]**	
1.complex	2.11236	0.094072	22.45	0	1.927982	2.296738
1.specific	0.9619969	0.1048007	9.18	0	0.7565913	1.167402
1.BP	0.7776455	0.0712893	10.91	0	0.6379212	0.9173699
state						
AS: AMERICAN SAMOA	0	(empty)				
AZ: ARIZONA	1.036381	0.3889036	2.66	0.008	0.2741438	1.798618
CA: CALIFORNIA	1.035441	0.3571377	2.90	0.004	0.3354636	1.735418
CO: COLORADO	1.076877	0.4040504	2.67	0.008	0.2849529	1.868801
CT: CONNECTICUT	0.0947018	0.4972425	0.19	0.849	–0.8798755	1.069279
DC: DISTRICT OF COLUMBIA	1.214917	0.3806904	3.19	0.001	0.4687775	1.961056
DE: DELAWARE	0	(empty)				
FL: FLORIDA	0.4028498	0.3664478	1.10	0.272	–0.3153748	1.121074
GA: GEORGIA	0.8999806	0.4209622	2.14	0.033	0.0749098	1.725051
GU: GUAM	0	(empty)				
HI: HAWAII	1.639421	0.5476714	2.99	0.003	0.5660042	2.712837
IA: IOWA	2.608792	0.4316448	6.04	0	1.762784	3.454801
ID: IDAHO	–0.2036415	0.415993	–0.49	0.624	–1.018973	0.6116898
IL: ILLINOIS	1.729999	0.3576265	4.84	0	1.029064	2.430934
IN: INDIANA	–0.7168797	0.4120502	–1.74	0.082	–1.524483	0.0907239
KS: KANSAS	0.2124366	0.5304412	0.40	0.689	–0.8272091	1.252082
KY: KENTUCKY	1.048517	0.3835558	2.73	0.006	0.2967609	1.800272
LA: LOUISIANA	0.9869307	0.4464305	2.21	0.027	0.111943	1.861918
MA: MASSACHUSETTS	0.2941122	0.4105695	0.72	0.474	–0.5105893	1.098814
MD: MARYLAND	1.302451	0.3887846	3.35	0.001	0.5404469	2.064454
ME: MAINE	1.95879	0.5567817	3.52	0	0.8675181	3.050062
MI: MICHIGAN	1.297068	0.3893939	3.33	0.001	0.5338703	2.060266
MN: MINNESOTA	2.231415	0.3626266	6.15	0	1.52068	2.94215
MO: MISSOURI	2.602906	0.3688589	7.06	0	1.879956	3.325856
MP: NORTHERN MARIANA ISLANDS	0	(empty)				
MS: MISSISSIPPI	–0.8511624	0.799746	–1.06	0.287	–2.418636	0.716311
MT: MONTANA	1.38501	0.4272019	3.24	0.001	0.5477096	2.22231
NC: NORTH CAROLINA	0.6707337	0.443587	1.51	0.131	–0.1986808	1.540148
ND: NORTH DAKOTA	2.776283	0.4266712	6.51	0	1.940023	3.612543
NE: NEBRASKA	1.336363	0.4658002	2.87	0.004	0.4234112	2.249314
NH: NEW HAMPSHIRE	–0.7372171	0.8134346	–0.91	0.365	–2.33152	0.8570855
NJ: NEW JERSEY	2.065029	0.3550049	5.82	0	1.369232	2.760826
NM: NEW MEXICO	1.405203	0.438406	3.21	0.001	0.545943	2.264463
NV: NEVADA	0.897032	0.5117248	1.75	0.08	–0.1059302	1.899994
NY: NEW YORK	1.060008	0.370957	2.86	0.004	0.3329454	1.78707
OH: OHIO	1.639098	0.3680579	4.45	0	0.9177177	2.360478
OK: OKLAHOMA	–0.5509361	0.5732574	–0.96	0.337	–1.6745	0.5726278
OR: OREGON	–1.174985	0.417095	–2.82	0.005	–1.992476	–0.3574936
PA: PENNSYLVANIA	1.921221	0.3604629	5.33	0	1.214727	2.627716
PR: PUERTO RICO	0.8288848	0.5151726	1.61	0.108	–0.180835	1.838605
RI: RHODE ISLAND	1.647223	0.7184524	2.29	0.022	0.239082	3.055364

SC: SOUTH CAROLINA	–0.7980878	0.5479269	–1.46	0.145	–1.872005	0.2758291
SD: SOUTH DAKOTA	1.846042	0.3847244	4.80	0	1.091996	2.600088
TN: TENNESSEE	0.2989907	0.4812112	0.62	0.534	–0.644166	1.242147
TX: TEXAS	–0.3950686	0.3705422	–1.07	0.286	–1.121318	0.3311808
UT: UTAH	1.599635	0.4673269	3.42	0.001	0.6836916	2.515579
VA: VIRGINIA	0.5945241	0.4018357	1.48	0.139	–0.1930595	1.382108
VI: VIRGIN ISLANDS OF THE U.S.	0	(empty)				
VT: VERMONT	2.978125	0.4926585	6.05	0	2.012532	3.943718
WA: WASHINGTON	0.0897415	0.4559965	0.20	0.844	–0.8039952	0.9834781
WI: WISCONSIN	0.9168262	0.3986777	2.30	0.021	0.1354322	1.69822
WV: WEST VIRGINIA	1.068811	0.3623922	2.95	0.003	0.3585358	1.779087
WY: WYOMING	1.433031	0.5590565	2.56	0.01	0.3373	2.528761
agency						
1500: JUSTICE, DEPARTMENT OF	2.088716	0.1323388	15.78	0	1.829337	2.348095
3600: VETERANS AFFAIRS, DEPARTMENT OF	1.922656	0.1387958	13.85	0	1.650621	2.19469
4700: GENERAL SERVICES ADMINISTRATION	2.37473	0.1879444	12.64	0	2.006365	2.743094
7500: HEALTH AND HUMAN SERVICES, DEPARTMENT OF	0.9455045	0.182747	5.17	0	0.587327	1.303682
log_bids	–1.128033	0.0774573	–14.56	0	–1.279846	–0.9762194
log_duration_years	–1.430087	0.0835829	–17.11	0	–1.593906	–1.266267
log_contractvalue	0.1023375	0.0172709	5.93	0	0.0684872	0.1361877
log_contractorrevenue	0.0425792	0.0042024	10.13	0	0.0343426	0.0508159
_cons	–7.468762	0.3753355	–19.90	0	–8.204406	–6.733118

Notes

1 Nonprofit firms may consume residual profits as non-cash perquisites (i. e. plush offices, short work weeks, etc.), which would reduce the effectiveness of the nondistribution constraint along this margin. See Castaneda, Garen, and Thornton (2008) for a review of this literature.
2 Except under special circumstances, Federal Acquisition Regulations (FAR) typically mandate that government agencies use fixed (relative to cost-plus) price contracts (Carril and Duggan 2018).
3 The cost-plus contract, as identified in this paper, includes all of the following cost-plus style pricing schemes: cost-plus award fee, cost no fee; cost sharing; cost-plus fixed fee; cost-plus incentive; time and materials, labor hours. The fixed price contracts, as identified in this paper includes all of the following fixed price style pricing schemes: fixed price redetermination, fixe price level effort, firm fixed price, fixed price with economic price adjustment, fixed price inventive, fixed price award fee.
4 Recall that our analysis is restricted to the NAICS contract codes included in those two papers, reducing the sample to 35,588 unique contracts. The NAICS stands for the North American Industry Classification System (NAICS), which was developed by the Office and Management and Budget as a method for classifying business establishments. Further information is available at http://www.census.gov/eos/www/naics/.
5 The services in the survey were derived from those listed in the International City/ County Managers Association (ICMA) survey. See page 335 of the original article for a complete description of the scale and the survey instrument.
6 A complete list of contracts extracted from Brown and Potoski (2005) available in Appendix A.
7 A complete list of contracts extracted in Levin and Tadelis (2010) available in Appendix B.
8 For Brown and Potoski (2005), we use Table 4, pp. 336–337, which organizes survey responses into binomial form. For Levin and Tadelis (2010), we apply the notes from Table 4 on p. 525 to transform the survey responses.
9 The number of observations within the conflicting NAICS codes is small, just 142. We experiment with a variety of different strategies for handing the conflicting data. Because each treatment BP and LT are estimated separately, we decide to leave in the conflicting observations. However, our results were not materially influenced if those observations are removed.
10 These additional results are available from the authors, upon request.
11 For more detail on how nonprofit award data is structured, see (Lecy and Thornton 2016).

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