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A Cost-Benefit Analysis of Public Bid Protests: A Representative Bidder Model

5 October 2018

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

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Abstract

The United States, the United Nations (UN), the Organization for Economic Cooperation & Development (OECD), and the World Trade Organization (WTO) all authorize losing bidders to protest public procurements. The dual goal is to reduce government fraud and errors and increase competition. The hypothesis is that bid protests serve as a decentralized mechanism to increase government accountability and encourage vendor participation. An extensive legal and regulatory literature has emerged that supports the benefits of protest systems, but it is surprisingly silent about the costs. The goal of this economic study is to examine costs as well as benefits of bid protests. The static, probabilistic, micro-economic, partial equilibrium, representative bidder model developed in this paper offers a cautionary tale for government agencies, countries, and international institutions that rely on bid protests to improve public procurement outcomes. Protest systems appear to be an example of a well-intentioned government policy that has significant unintended consequences. This study reveals multiple potential deficiencies of protest systems and suggests alternative approaches to improve public procurement outcomes.

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Table of Contents

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Introduction

The United States, the United Nations (UN), the Organization for Economic Cooperation and Development (OECD), and the World Trade Organization (WTO) all authorize losing bidders to protest public procurements.[1] (Government Accountability Office [GAO], 2008; UNCITRAL, 2014; OECD, 2016; WTO, 2012, etc.). Military acquisition offers an important illustration. (see Arena, et. al., 2018).

Two key claims appear in the legal literature in support of bid protests.[2] First, that protests play an important role as a decentralized oversight mechanism to ensure "fairness" of the public procurement process. The claim is that allowing vendors to protest procurements reduces the risk of "crony capitalism" and helps deter favoritism, fraud, and errors. The U.S. Congressional Research Service (CRS) explains:

> "Fundamentally, bid protest systems, like audit systems, serve a procurement oversight function. They provide a means of monitoring the activities of government procurement officials, enforcing compliance with procurement laws and regulations, and correcting incidents of improper government action" (Carpenter & Schwartz, 2018, p. 10).

The second claim is that allowing "disappointed bidders"[3] to protest makes vendors more willing to compete delivering benefits of competitive markets that improve performance, costs, and schedules (Arrowsmith, Linarelli, & Wallace, 2000). The CRS claims:

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[1] Whereas the most common term, and the term used in this study, is *bid protest*, the United Nations Commission on International Trade Law (UNCITRAL) refers to *reviews*, while the World Trade Organization's (WTO's) *Agreement on Government Procurement* uses the term *challenges* (see Gordon, 2006).

[2] According to the U.S. Federal Acquisition Regulation (FAR), a *protest* is defined as "a written objection by an interested party to any of the following: (1) A solicitation … by an agency … for a contract for the procurement of property or services, (2) The cancellation of the solicitation … (3) *An award … of the contract* [emphasis added], or (4) A termination or cancellation of an award of the contract" (FAR 33.101; see also U.S.C. 31 § 3551[1]). The majority of protests involve "an award … of the contract," and that is the focus of this paper.

[3] Terms besides *disappointed bidder* in the literature include *disappointed offeror*, *unsuccessful offeror*, *excluded offeror*, and *interested party.* For the purposes of this study, these terms are used interchangeably and refer to a company that has standing or is allowed to protest the solicitation or award of a contract. "Interested party…means an actual or prospective offeror whose direct economic interest would be affected by the award of a government contract" (FAR 33.101).

> "The bid protest system … can help promote fairness and transparency in the procurement process, which arguably encourages participation and increases competition for federal procurement awards. This, in turn, has the potential to improve the quality and reduce the costs of goods and services purchased by the government" (Carpenter & Schwartz 2018, p. 10).[4]

Experience from major defense acquisitions raises questions about both claims—that protests deter favoritism, and that they increase competition. In fact, a survey of the U.S. defense sector suggests that "increasingly, protests are being filed for business reasons rather than to correct mistakes or errors" (Hawkins, Yoder, & Gravier, 2016, p. 153).

According to the Congressional Research Service (CRS), since 2008, the annual rate of protests of government procurements has increased nearly 50% (Schwartz & Manuel, 2015). In 2014 alone, the Government Accountability Office (GAO) received over 2,500 protests.[5] Although bid protests are relatively rare in low-cost procurements, vendor selection decisions in major (high-dollar) defense purchases in the United States appear to be routinely and strategically protested. A recent study finds "the number of protesters and protest actions tends to grow with a contract's value" (Arena et al., 2018, p. xvi). As former head of the Office of Federal Procurement Policy, Dan Gordon, observed,

> It is … true that very high-dollar procurements are much more likely to be protested: the higher the dollar value, the greater the likelihood of a protest. …For a company that loses the competition … with all the bid and proposal costs ["bidding costs"], the additional cost of filing a protest ["filing costs"] may seem minimal, so that filing a protest can be very tempting. (quoted in Clark, 2013)

[4] "Enforcing compliance with procurement laws implicates not just high standards of integrity, but also…the maximization of competition" (Troff, 2005, pp. 118–120).

[5] A key pillar of the U.S. Federal Government's protest process, the Competition in Contracting Act (CICA; 1984) claims bid protests improve procurement outcomes by reducing risk of fraud and errors and increasing competition. The CICA gives the Government Accountability Office (GAO) authority over bid protests as a less expensive alternative to judicial proceedings. Congress directed "to the maximum extent practicable, the Comptroller General [at the GAO] shall provide for the inexpensive and expeditious resolution of protests" (31 U.S.C. § 3554(a)). Since the majority of protests are filed with the GAO, that is the primary focus of this study. (Note: From FY2003–2007, nearly 7,000 cases were filed with the GAO, and only 328 with the Court of Federal Claims; see Schaengold, Guiffré, & Gill, 2009, p. 255).

The model introduced in this paper focuses on a representative bidder competing for a government contract. The bidder is assumed to be a strategic, profit-maximizing firm responsible to shareholders. Under this assumption, it is demonstrated that well-intentioned protest systems can inadvertently motivate inefficient (and potentially fraudulent) behavior on the part of bidders and public procurement officials and may or may not increase competition. Some preliminary observations serve to motivate the model.

A. Do Protests Minimize Fraud and Errors?

The Congressional Research Service (CRS) reports, "Many … acquisition professionals are concerned that bid protests can delay contract awards…costing millions of dollars…preventing government from getting the goods and services it needs when it needs them" (Schwartz & Manuel, 2009, p. 8). The term "fedmail" is applied when strategic bidders use the threat of protests to extract concessions from well-intentioned procurement officials unwilling to risk shortages of critical equipment, services, or supplies. A survey by the American Bar Association found "half of all federal agencies had settled protests to simply move forward with the procurement. … POs [procurement officials] often settle by enhancing the terms of other contracts that the protester currently has with the procuring agency" (Marshall et al., 1991, p. 300).[6]

"Buyoff" settlements occur when risk-averse procurement officials preemptively offer concessions to bidders to ensure protest-proof procurements and avoid delays in acquiring critical equipment, services, and supplies.[7] Acting Under Secretary of Defense for Acquisition, Technology & Logistics John Young stated, "Protests are extremely detrimental to the warfighter and the taxpayer. These protest actions consume vast amounts of time of acquisition, legal, and requirements team members; [and] delay program initiation and the delivery of capability" (Schwartz & Manuel, 2009, p. 8).

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[6] For example, according to CNBC: "Lockheed Martin is getting offered a multiyear block buy for its F-35 aircraft in exchange for not objecting to its rival Boeing getting new orders from the Navy for the F/A-18 fighter..." (Daniels, 2017)

[7] Arguing that "the tail is wagging the dog," a survey by Hawkins et al. (2016) finds that "fear of protest increases compromised technical evaluations, added procurement lead time, and transaction costs, while it decreases contracting officer authority and is associated with source selection method inappropriateness" (p. 152).

Especially troublesome in the event of hidden fedmail and buyoff settlements by procurement agencies is a measure of successful protests routinely reported by the Government Accountability Office (GAO). The so-called "effectiveness rate" attempts to capture "the percentage of protesters obtaining relief—either through a protest being sustained, or through *voluntary action* [emphasis added] taken by the agency" (Kepplinger, 2008). The CRS is on record stating "the *effectiveness rate* may be a good way to measure the number of protests that have actual or potential merit" (Schwartz & Manuel, 2009, p. 5).

At first glance, a greater effectiveness rate might appear to reinforce the dual goals of a protest system. But this clearly is not the case if so-called "voluntary actions" involve inefficient and potentially fraudulent fedmail or buyoff settlements. In that case, an inflated "effectiveness rate" could inadvertently reflect government agencies over-generously engaged in fedmail or buyoff settlements with taxpayer dollars to keep procurements on schedule, minimize delays, or simply avoid negative publicity. This also contradicts a CRS claim that the "effectiveness rate" reflects protests that have merit.

The risk of fedmail and buyoff settlements warrants serious rethinking by the GAO, the CRS, and others tempted to use the "effectiveness rate" to guide policy decisions. Government departments, agencies, and Congress should be cautioned against any analysis or recommendations that utilize this measure.

If Fedmail and Buyoff settlements are a widespread problem, then allowing bid protests may inadvertently increase fraud and errors. Note that multiple less risky and potentially lower cost alternatives exist to ensure fairness in the public procurement process: inspector generals, random audits, alternative dispute resolution, integrity pacts, electronic auctions, etc.[8]

[8] According to Camm, et. al. (2012): "During 2000–2008, the Air Force experienced 836 protests—about 93 a year. It offered corrective action that offerors accepted in 273, or 33 percent, of these. It ultimately suffered sustained protests in only 29, or 3 percent, of these…[O]n average, we believe…costs to the Air Force of an observed sustained protest probably exceed those of an observed early corrective action. Nonetheless, because early corrective action is so much more common, both impose significant costs." (pp. ix-x)

B. Do Protests Increase Competition?

A guiding principle of the Competition in Contracting Act (CICA; 1984) and of the U.S. Federal Acquisition Regulation (FAR) is to promote competition for government contracts. The implicit assumption woven throughout these documents, and in the legal and regulatory literature, is that the "second chance" offered by bid protests to address possible fraud or errors in the procurement process makes prospective *losing* bidder types *more* inclined to participate (thereby increasing competition). Typical is the following: "The absence of a protest system might undermine public confidence that contract award decisions are based on merit and in compliance with the law, which could discourage participation by qualified and reputable parties ["losing bidder types"] and result in wasteful government spending" (Carpenter & Schwartz, 2018, p. 10).

But this ignores prospective *winning* bidder types. The risk they face is that a winning bid will be delayed and disputed. This increases transaction costs, which lowers the expected value of winning a government contract (see Hawkins et al., 2016). On the margin, this makes prospective winning bidder types *less* inclined to participate (thereby reducing competition).

This yields a counterintuitive result. Copying the private sector which has no formal protest system, and ensuring fairness of the process in lower cost ways could actually increase competition (if reducing the risk of disputes motivates more winning bidder types to participate, than losing bidder types drop out). In sharp contrast to the standard assumption in the existing literature, it is an empirical question whether or not protest systems increase competition.

Unfortunately, even if (on net) a bid protest system succeeds in attracting more vendors, insights from "transaction cost economics" remind us ex-ante competition often leads to ex-post monopoly (Williamson, 1971, 1979, 1999). The risk is that a winning "foot-in-the-door" bidding strategy results in a "hold-up," where a winning bidder more than covers its losses from high prices later charged for change orders (see Melese, et. al., 2007). So even if bid protest systems succeed in attracting more vendors ex-ante this does not guarantee better ex-post procurement outcomes.

Similarly, regardless of how slight the probability a protest will be sustained, a losing incumbent on a re-competed contract may have strong strategic incentives to protest to artificially extend their contract. There is concern "[automatic] stays triggered by GAO protests [can] encourage contractors to 'game the system' … [where] contractors knowingly file … protests with GAO in order to harass their competitors and delay awards…or in the hopes of obtaining short-term contracts … during the pendency of the GAO protest" (Manuel & Schwartz, 2016).[9] Hawkins, et. al. find "[s]ometimes protests are filed by incumbents to delay a switch in contractors, thereby gaining a few more months of revenue" (2016, p. 155).

To achieve desirable competitive market outcomes, instead of bid protests, the "contestable markets" literature urges lowering entry barriers as a more cost-effective strategy (see Baumol, Panzar, & Willig, 1982). For example, by reducing military specifications; complexity (e.g., optimal "bundling"); excessive rules and regulations; unique government accounting/reporting and other regulatory requirements; the degree of asset specificity; or the ability of incumbents to raise entry barriers through strategic bid protests.

C. What Interventions and Alternatives Exist to Achieve the Goals of a Protest System?

If profit-maximizing strategic bidders can undermine government's goals for a bid protest system, then it pays to investigate ways to modify bidder behavior, and to explore alternatives (i.e., more cost-effective governance mechanisms).[10] The risks posed by significant transaction costs and unintended consequences from bid protests should encourage public officials to review costs and benefits of protest systems and evaluate alternatives. The model developed in this paper offers a starting point.

The comparative statics results of the model reveal how several key government decision variables could impact a profit-maximizing representative bidder. Recognizing

[9] "Federal statutes and regulations…[require] GAO to…[resolve] protests within 65 to 100 days after they are filed." (Manuel & Schwartz, 2016)

[10] "Congress has passed several provisions intended to address concerns with the bid protest process, which largely have been focused on increasing Congress's understanding of how legislative amendments to bid protest procedures could enhance the efficiency of the procurement process, discourage unwarranted protests, and generally improve procurement outcomes for the federal government" (Carpenter & Schwartz, 2018, p. 11).

costs as well as benefits of a protest system, this study invites a review of alternative portfolios of governance mechanisms to improve procurement outcomes that could substitute for bid protests (e.g., internal audits, external audits, independent investigations, alternative dispute resolution, integrity pacts, and other incentive mechanisms). Results of the model also suggest there may be significant returns from reducing regulatory (and product) complexity, and making critical investments in the education, training, motivation (incentive alignment), and retention of experienced public procurement officials. The model suggests this could have the added bonus of lowering bid prices, thereby reducing government procurement costs.

If it is established that the burden of protests outweighs the benefits, and it is politically infeasible to abandon protest systems, then reducing the rate of protests is appropriate, and can be accomplished in two ways: by *reducing expected benefits* of a protest to a "disappointed bidder" (including enabling a protester to achieve desired outcomes through other means), or by *increasing expected costs*. Options include narrowing standing (eligibility), setting stricter time limits for filing and deciding protests, encouraging alternative dispute resolution (ADR), raising filing fees, setting fines for frivolous protests, instituting new rules or reputation assessments to restrict frequent or repeated protestors, or having losers pay, as is done in the UK (see Appendix 1).[11]

A major concern expressed in the legal and regulatory literature is that limiting protests will inhibit competition and result in higher costs.[12] However, the literature is mostly silent regarding the *strategic* behavior of bidders and procurement officials. It also ignores the potential benefits of more timely delivery of projects, products and services, and lower transaction costs, and potentially lower prices, from fewer protests. Finally, the legal and regulatory literature mostly neglects how the growing burden and complexity of regulations to address past procurement problems complicates the task of procurement

[11] "The FY2018 U.S. National Defense Authorization Act (NDAA) established a three-year pilot program, to begin in December 2019, to assess and issue a report on 'the effectiveness of requiring [certain] contractors to reimburse the Department of Defense for costs incurred in processing covered protests' that are denied by GAO" (Carpenter & Schwartz, 2018, p. 11).

[12] "Attempts to disincentivize protests … may have, on balance, the unintended consequence of harming the federal procurement system by discouraging participation in federal contracting and, in turn, limiting competition" (Kepplinger, 2009b, p. 12).

officials. The more complex the regulatory environment, the more likely errors are made in the procurement process, raising the probability of bid protests, and the probability those protests are sustained, which in turn increases risks of fedmail and buyoff settlements.[13]

The next section leverages these observations to develop a probabilistic, micro-economic, partial equilibrium, representative bidder model. The following section summarizes and interprets results of the model. The concluding section offers policy recommendations and some avenues for future research.

[13] In fact, Wong & Gerras (2015) conclude U.S. Army officers became comfortable lying about complying with regulations, partly as a result of the challenge of compliance with conflicting regulations.

The Model

The literature generally focuses on two players: a disappointed bidder and the government. In the United States, the "government" consists of several distinct players. Disappointed bidders have the option to challenge any of three key players: government procurement officials (POs) and their agency (department or activity); the quasi-judicial Government Accountability Office (GAO); and/or the Court of Federal Claims (COFC). For simplicity, we restrict our representative bidder to a single protest (e.g., either with the agency, the GAO, or the COFC).[14]

Other key stakeholders are often overlooked in the protest literature. Besides a "disappointed bidder," it is critical to consider other bidders (especially the "winning bidder," eager to defend the award), those that ultimately depend on procurement outcomes (e.g., our troops and/or citizens), and taxpayers who foot the bill.[15] The goal of this paper is to represent the best interests of the last two players, in the case of military contracts, troops, and taxpayers. This section develops a probabilistic, micro-economic, partial equilibrium representative bidder model to help identify opportunities to enhance the efficiency and effectiveness of government procurements, in order to obtain the greatest (troop) value for (taxpayer) money.

Assuming a representative bidder's goal is to maximize expected profits, the objective function for any bidder/offeror entering a competition for a government contract consists of three scenarios (or "states of nature"): (1) the expected returns from winning the competition, E(W); (2) the expected returns from winning a protest given they lose the

[14] Note GAO issues preliminary and final decisions on protests. Again, for simplicity, the model assumes a single decision is taken by the Agency, GAO, or COFC.

[15] Gordon (2006) focuses on four principal parties: the disappointed offeror who is denied a contract award or the potential offeror who is excluded from competition, the acquiring agency, the public at large and their elected representatives, and an intervening offeror or successful awardee. Each has a different objective in resolving the protest. The unsuccessful offeror seeks a forum to air complaints, to learn as much information as possible about the denial or exclusion of their offer, and, ultimately, to obtain some type of meaningful relief. The acquiring agency seeks to resolve the protest in a way that minimizes the impact on the efficiency and effectiveness of the acquisition process. The public seeks a resolution that promotes the integrity, transparency, and accountability of the acquisition system. The successful awardee (or intervening offeror) seeks a resolution that supports the original award (Gordon, 2006, p. 4).

competition (i.e., the protest is "sustained") is given by E(W/L); and (3) the expected returns from losing the competition and losing the protest (i.e., the protest is not sustained) is given by E(L/L).

Our representative bidder's problem is illustrated in Figure 1. The probability the bidder wins the competition is *Pw* and the probability a protest is sustained is *Ps*.[16] Expected payoffs at the end of each branch [E(W); E(W/L); E(L/L)] are explained in detail below.

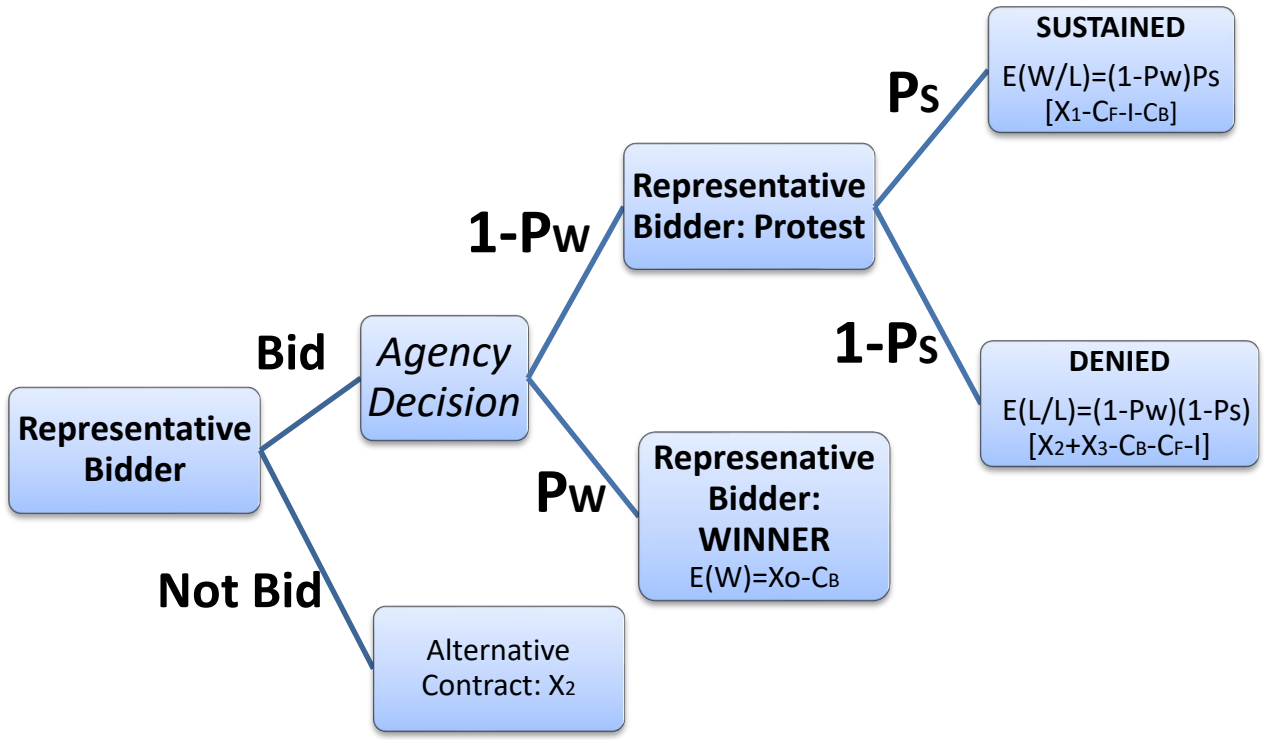

Figure 1. Representative Bidder Decision Problem

The two key decision variables controlled by our representative bidder are the bid price, P≥0, for the contracted quantity, Q≥0; and the investment, I≥0, to sustain a protest in the event the bidder loses the competition. The bidder's problem is to select an optimal

[16] Note the sum of the probabilities of the three possible states of nature (winning the competition E(W); losing but winning the protest E(W/L); losing and losing the protest E(L/L)) are mutually exclusive and collectively exhaustive, and therefore must sum to one (i.e., Pw+(1-Pw)[Ps+(1-Ps)]=1).

combination of bid price and protest investment (P*, I*) to maximize overall expected profits:

$$\textbf{Max } V(P,I) = E(W) + E(W/L) + E(L/L). \quad (1)$$

The first term, the expected return from winning the competition, is given by

$$E(W) = P_W(X_0 - C_B). \quad (2)$$

Profits from a winning bid are $X_0 = PQ - C(Q,R)$, where $C(Q,R)$ is the winning bidder's cost function, and R represents regulatory complexity, such that $\delta C/\delta Q>0$, and $\delta C/\delta R>0$ (i.e., a more complex and burdensome regulatory environment raises production costs).

To allow the possibility other bidders might protest a winning bid, we introduce the possibility of "split buys" (see Coughlan & Gates, 2012). The contracted quantity is therefore given by $Q=Q(I_0)$, where $I_0 \geq 0$ represents cumulative protest investments of other losing bidders, such that $\delta Q/\delta I_0<0$ (i.e., the greater cumulative protest investment, the smaller the quantity allocated to a winning bidder).

To simplify the model, bid and proposal costs, C_B, act as a proxy for quality of the project, product, or service, and capture any other non-price variables of interest to the government. We assume these costs are directly related to the measure of effectiveness (MOE) of the bidder's proposal (i.e., not including price).

Therefore, higher bid and proposal costs, C_B, incurred by our bidder (ceteris paribus), increase the probability they win the competition, given by $P_W=P_W(P,N,C_B)$, such that $\delta P_W/\delta C_B>0$, and $\delta^2 P_W/(\delta C_B)^2<0$. Conversely, the higher the price bid, P, and the more bidders, $N \geq 2$, the lower the probability of winning, such that $\delta P_W/\delta N<0$ and $\delta P_W/\delta P<0$,[17] where $\delta^2 P_W/(\delta P)^2<0$, $\delta^2 P_W/\delta P \delta N \leq 0$, and $\delta^2 P_W/\delta P \delta C_B \geq 0$.[18]

[17] We further assume the absolute value of the elasticity of the probability of winning the competition with respect to the bid price is less than one (i.e., the elasticity is the %reduction in P_W for a given %increase in P, or $|(\delta P_W/\delta P)(P/P_W)|<1$).

[18] The greater the number of bidders, N, then for any given bid price, P, the lower the probability of winning, P_W. Conversely, the greater a representative bidder's investment in the quality of their proposal reflected in bid and proposal costs, C_B, then for any given bid, P, the greater the probability of winning, P_W.

The second term in Equation 1 represents expected returns from losing the competition, but winning the protest (i.e., the protest is "sustained"):

$$\mathbf{E(W/L)= (1-P_W)P_S[X_1-C_F-I-C_B],} \quad (3)$$

where $(1-P_W)$ is the probability of losing the competition; C_F are exogenous government-set filing fees, and for simplicity, $X_1 \leq X_0$ is the award or "prize" in the event the protest is sustained.

The probability a protest is sustained is given by, $Ps=Ps(P,I,N,T,I_0,R,C_B)$. The higher the bid price, $P>0$, the lower the probability a protest is sustained, such that $\delta Ps/\delta P<0$; where $\delta^2 Ps/(\delta P)^2<0$.[19] However, the greater the representative bidder's investment in the protest process, $I>0$, the greater likelihood a protest is sustained, such that $\delta Ps/\delta I>0$, where $\delta^2 Ps/(\delta I)^2<0$, such that bidder protest investments increase the probability a protest will be sustained, but at a decreasing rate, and $\delta^2 Ps/\delta P\delta I \leq 0$ (i.e., the larger the protest investment, the smaller the impact of a high bid price on the probability the protest is sustained). Also, for any given protest investment, the greater the quality of the proposal (reflected in higher bid and proposal costs, C_B), the greater the probability the protest is sustained, or $\delta^2 P_S/\delta I\delta C_B>0$.

The proxy variable, T, represents training/education/experience of government procurement officials. The greater T, the lower the risk of errors in the acquisition process, and the better communication, documentation, contract specifications, quality of debriefings, etc. Thus the greater T, the less likely a protest will be sustained, or $\delta Ps/\delta T<0$, where $\delta^2 Ps/\delta I\delta T<0$, and $\delta^2 Ps/\delta P\delta T \leq 0$.

The reverse is true for regulatory complexity, R. The more complex and burdensome the regulatory environment, not only does this increase production costs, but it leads to a greater risk of missteps and errors by procurement officials, which

[19] Note that it is likely the percentage difference in price relative to the low price bid, $(P-P_L)/P_L$, is more likely to influence the probability a bid is sustained, than the absolute price bid, P. This can be accommodated by constraining the functional form of the relationship given by $\delta Ps/\delta P<0$, and $\delta^2 Ps/(\delta P)^2<0$, so that the Price is bounded between the low price bid, P_L (where $Ps=1$), and $P_{Max}=(1+X\%)P_L$ (where $Ps=0$) (i.e., where X reflects how far the price in percentage terms can reasonably be above the low bid before there is no chance a protest will be sustained). In this case, the comparative static results will be the same if we use either the bid price or the percentage difference between the bid price and the low bid.

increases the probability a protest is sustained, or δPs/δR>0, where δ^2Ps/δIδR>0 and δ^2Ps/δPδR≥0.

Since bid and proposal costs are a proxy for quality, the greater CB, the greater the probability a protest is sustained, δPs/δC$_B$>0, where δ^2Ps/$(\delta C_B)^2$<0, δ^2Ps/δPδC$_B$≥0, and δ^2Ps/δIδC$_B$≥0 such that the greater a representative bidder's investment in their proposal, C$_B$, then for any given bid, P, or protest investment, I, the greater the probability a protest is sustained, Ps.

Data reported in Maser & Thompson (2010) suggests increasing the number of bidders (ceteris paribus) increases the probability a protest is sustained, δPs/δN>0. However, the sign on δ^2Ps/δIδN is an empirical question: positive (negative) depending if more bidders increases (decreases) the likelihood a representative bidder's protest is sustained, for any given protest investment.

Finally, it is also an empirical question whether greater cumulative protest investments by other bidders, Io, raise or lower the probability a given bidder's protest is sustained (i.e., δPs/δIo=?). It is also unclear if greater cumulative protest investment makes it more or less likely an individual bidder's protest will be sustained for any given bid price (i.e., δ^2Ps/δPδIo=?), and more or less likely any individual bidder's protest is sustained for a given protest investment (i.e., δ^2Ps/δIδIo=?).

The final term in our representative bidder's profit Equation 1, is the expected return from losing the competition, and losing the protest:

$$\mathbf{E(L/L)= (1-P_W)(1-P_S)[X_2+X_3-C_F-I-C_B]} \quad (4)$$

where the variable, X$_2$<Xo represents the bidder's "opportunity cost," or value of the next best alternative project available if they lose the competition, or decide not to participate (see Figure 1). If a representative bidder's protest is denied, then the variable, X$_3$, can represent two possibilities: X$_3$>0 represents compensation that might be offered a losing bidder (i.e., possibly reflecting "fedmail" or "buyoffs," or perhaps valuable information obtained from a more extensive government debrief about competitors winning strategy), while X$_3$<0 represents a penalty for losing the protest (e.g., "loser pays").

Maximizing the representative bidder's expected profits (given by (1), (2), (3), and (4)) to solve the optimal bid price and protest investment (P*,I*), yields the following First Order Necessary Conditions for an Optimum:

$$\mathbf{V_1=\delta V/\delta P}= PwQ + (\delta Pw/\delta P)[Xo-(X_2+X_3)-C_F-I] + (X_1-X_2-X_3)[(1-Pw)(\delta Ps/\delta P)-Ps(\delta P_W/\delta P)] = 0 \quad (5)$$

and

$$\mathbf{V_2=\delta V/\delta I} = (1-Pw)[(\delta Ps/\delta I)(X_1-X_2-X_3)-1] = 0. \quad (6)$$

Conditions required to ensure the Second Order Sufficient Conditions are satisfied at the optimum (or that, $V_{11}V_{22}-V_{12}^2>0$), include: $\delta^2 Ps/(\delta I)^2<0$; $\delta^2 Ps/(\delta P)^2\leq 0$; $X_1>(X_2+X_3)$; and $Xo>[(PsX_1+(1-Ps)(X_2+X_3))-C_F-I]$.

From the Implicit Function Theorem, the first order necessary, and second order sufficient, conditions for a maximum yield a set of comparative statics results for the two decision variables: the optimal bid price, P*, and protest investment, I*. Applying the Envelope Theorem[20] further reveals the impact of changes in the exogenous variables on a representative bidder's expected profits, V*. A summary of the results appears in Table 1.

TABLE I: Comparative Statics Results

	X_1	X_2	$X_3>0$ ($X_3<0$)	N	I_o	C_B	C_F	T (R)
P*	+?	+	+ (-)	-?	-?	+	-	- (+)
I*	+	-	- (+)	-?	-	+	0	- (+)
V*	+	+	+ (-)	?	-	?	-	- (?)

Note: "?" indicates: given certain conditions.

[20] From the Envelope Theorem (Silberberg, 1978, pp. 168–171), taking partial derivatives of the objective function with respect to any parameter, k, yields the change in the overall value function at the optimum, **V***, with respect to a change in k. Detailed calculations are available upon request.

Results

To interpret the results in Table 1, we work our way from left to right across the top row and discuss each model parameter in turn. The bigger the expected "prize" from a protest, **X1**, the greater the optimal bid price, P*. When a protest offers a bigger prize/award, it is optimal to increase the bid price, taking a greater risk of losing the competition, because of the greater expected value from the "second chance" provided by a bid protest. Not surprisingly, a bigger protest prize also justifies a bigger investment, I*, to increase chances of winning the protest. Naturally, a bigger protest prize also boosts overall expected profits at the optimum, V*.

While a greater value of a representative bidder's next best alternative project, $\mathbf{X_2}$, justifies a higher bid price for the government contract, P*, (i.e., there is a lower opportunity cost to losing the competition), it also reduces the incentive to invest in a protest, I*. Of course, an increase in the value of any alternative to the government contract, increases overall expected profits, V*.

Now consider the possibility of "Fed Mail" or "Buy Offs" so that losing a protest still offers a consolation prize, $\mathbf{X_3>0}$. Then any increase in such benefits (presumably made by a government agency to reduce future disruptions from unhappy bidders), *besides directly raising agency costs and indirectly other costs, involves a serious negative externality—an unintended consequence is higher optimal bid prices, P*, which increases overall government procurement costs*. However, since a bigger consolation prize means the same expected value of a protest can now be achieved with a lower probability of winning the protest, this has the effect of lowering incentives to invest in bid protests, I*. Of course, a higher consolation prize increases overall expected profits, V*.

Instead of receiving a consolation prize for losing a protest, now suppose penalties apply, or that $\mathbf{X_3<0}$. In this case, increasing penalties yields the opposite results: the optimal bid price, P*, will be lower to try to win the competition, since there is now greater risk in protesting. The greater risk of punishment from *losing* a protest also means it pays to invest *more in winning the protest*, I*. Finally, the added risk (expected cost) of a possible penalty reduces overall expected profits, V*.

The greater the number of bidders, N, the lower any individual competitor's optimal bid price, P* (a public benefit of increased competition), and protest investment, I* (if $\delta^2 Ps/\delta I \delta N<0$). It also lowers the expected overall profits of any individual bidder, V*.[21]

Knowing there is an increase in protest expenditures by other bidders, I_0, will reduce the optimal bid price of a representative bidder, P* (if the absolute value of elasticity of Pw with respect to P is less than one), and the representative bidder's own protest investment, I*. It also reduces the bidder's expected profits, V*.[22]

An increase in filing fees for a protest, C_F, lowers the optimal bid price, P*, but has no impact on protest investment, I*, since the fees are essentially "sunk costs." Of course, higher filing fees will lower overall expected profits, V*.

Conversely, since an increase in bid and proposal costs, C_B, reflects an increase in the quality (MOE) of the proposal, this increases the optimal bid price, P*, and the optimal protest investment, I*.[23] The impact on overall expected profits, V*, is indeterminate, that is, positive (negative) if benefits from increasing the probability of winning and sustaining a protest are bigger (smaller) than the higher investment costs of preparing the bid.

Paradoxically, adding well-intentioned rules and regulations that inadvertently increase regulatory complexity, R, can have perverse effects. It raises optimal bid prices, P*, increasing the costs of public projects, products, and services. Increased regulatory complexity also contributes to higher bid protest investments, I*, increasing transaction costs and possibly triggering other unintended consequences. The impact on overall expected profits, V*, is negative (positive) if added expected production costs from regulation, $Pw(\delta C/\delta R)$, are bigger (smaller) than the expected increase in profits from a

[21] Condition for P* is satisfied if $\delta^2 Pw/\delta P \delta N=0$ (or small enough). Condition for I* is satisfied if $\delta^2 Ps/\delta I \delta N<0$. Condition for V* is satisfied if positive impact of N on Ps ($\delta Ps/\delta N>0$) is small enough, and/or if the absolute value of the impact of N on Pw ($\delta Pw/\delta N<0$) is big enough. Higher bid costs increase the probability of winning the competition, but the extra costs lower profits from winning, requiring a higher price to "break even."

[22] Condition for P* holds if absolute value of impact of cumulative protest expenditures by other bidders, Io, on a representative bidder's contract quantity ($\delta Q/\delta Io<0$) is small enough, or the probability the representative bidder's protest is sustained ($\delta Ps/\delta Io<0$) is big enough, and/or that (X_1-X_2-X_3) is big enough. Condition for I* holds since $\delta^2 P_S/\delta I \delta I_O<0$.

[23] Condition on P* is satisfied if $\delta^2 Pw/\delta P \delta C_B \geq 0$, and $\delta^2 Ps/\delta P \delta C_B \geq 0$. Condition on I* is satisfied if $\delta^2 Pw/\delta I \delta C_B>0$.

protest, given the marginal increase in probability of winning a protest from greater errors, etc. resulting from increased regulatory complexity, $(1-Pw)(\delta Ps/\delta R)[X1-(X_2+X_3)]$.

Finally, boosting government investments in education/training/experience of public procurement officials, T, has multiple payoffs. It lowers optimal bid prices, P, cutting the costs of public projects, products, and services. It also reduces the optimal amount invested in bid protests, I*, lowering transaction costs and possibly limiting other unintended consequences.* The impact of increasing the competency of procurement officials in reducing optimal bid prices, P*, and protest investments, I*, is reflected in lower overall expected profits for bidders, V*.[24]

[24] Condition on P* is satisfied since $\delta^2 Ps/\delta P\delta T \leq 0$. Condition on I* is satisfied since $\delta^2 Ps/\delta I\delta T < 0$.

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Conclusion

The goal of any public procurement system is to obtain “value for money.” To help achieve this goal, countries around the world have adopted bid protest systems. The legal and regulatory literature that underpins protest systems in the United States and other countries claims allowing disappointed bidders to protest public procurements reduces favoritism, fraud, and errors, and encourages competition. This study offers a cautionary tale for any government agency, country, or international organization that relies on, and/or promotes, bid protests to improve public procurement outcomes.

As a first step to explore the costs and benefits of a protest system, a static, probabilistic, micro-economic, partial equilibrium, representative bidder model is developed. Bidders are assumed to be strategic, profit-maximizing firms responsible to shareholders. Under this assumption, it is demonstrated that well-intentioned protest systems can inadvertently motivate inefficient (and potentially fraudulent) behavior on the part of bidders and public procurement officials and may or may not increase competition.

Risks from high transaction costs and other unintended consequences of bid protests should encourage public officials to critically review their systems and consider alternatives. If the burden of protests outweighs the benefits, then reducing protests is appropriate and can be accomplished in two ways: by reducing expected benefits of a protest (including enabling protesters to achieve desired outcomes through other means) or by increasing expected costs.

The comparative statics results of the model reveal how several key government decision variables impact profit-maximizing bidders. The representative bidder controls their bid price, P*, and any investment to sustain a protest, I*. The government controls the variables: X1, X3, CF, T and R. Reducing the protest prize (X1) and unnecessary regulatory burdens (R), and increasing investments in human capital (T), all reduce expected benefits of a protest. Alternatively, governments can raise expected costs by increasing filing fees (CF) and/or introducing penalties for losing a protest (X3<0).

Reducing the protest award (X1), can be accomplished by (i) unbundling the contract vertically, in terms of different stages of production, or horizontally, in terms of

quantities; (ii) sharing awards (split buys); or (iii) recording protests by firms, using this information in future competitions (i.e., using reputation to establish contract quantities).

Constructive ways of reducing the probability of a successful protest include (i) investing in training and experience, (ii) initiatives to build integrity (e.g., codes of conduct, ethics training, etc.); (iii) aligning incentives for procurement officials to improve procurement outcomes, such as linking pay and promotions to successful procurement outcomes; (iv) ensuring transparency of assessment criteria; (v) ensuring transparency and accountability of the evaluation and selection process; (vi) making companies aware of the low probability of awards being overturned; and (vii) employing alternative strategies such as random (internal and external) audits and investigations, and encouraging alternative dispute resolution (ADR). An important avenue for future research is to investigate costs and benefits of alternative portfolios of governance mechanisms to improve procurement outcomes. This study offers a starting point.

Appendix

Note that in the United States, restricting the number of protests may be unconstitutional on First and Fifth Amendment grounds. To limit the number of non-frivolous protests would violate the First Amendment right to petition the government for the redress of grievances, and the Fifth Amendment right to due process. Federal courts tend not to favor broad limitations on access to the legal process. For example, the Supreme Court held in *Bill Johnson's Restaurants, Inc. v. National Labor Relations Board* (461 U.S. 731 (1983)), that a Federal agency cannot halt lawsuits brought even for improper motives unless those lawsuits are based on "intentional falsehoods or on knowingly frivolous claims," or otherwise lack a reasonable basis. In another case, *California Motor Transport Co. v. Trucking Unlimited* (404 U.S. 508 (1972)), the Supreme Court held that Federal antitrust laws may penalize businesses bringing lawsuits and petitions to Federal agencies only if such petitions and lawsuits are "a mere sham to cover what is actually nothing more than an attempt to interfere directly with a business relationship of a competitor." Federal appellate courts also identified two limited ways which can render a legal action frivolous:

> First, a legal action is considered "frivolous as filed" when a plaintiff or appellant grounds its case on arguments or issues "that are beyond the reasonable contemplation of fair-minded people, and no basis for [the party's position] in law or fact can be or is even arguably shown." … Second, a legal action is considered "frivolous as argued" when a plaintiff or appellant has not dealt fairly with the court, has significantly misrepresented the law or facts, or has abused the judicial process by repeatedly litigating the same issue in the same court. (GAO, 2009, p. 11)

However, options include agency policies requiring mandatory consideration of stay overrides, requiring vigorous objections, setting stricter time limits for deciding or resolving protests, mandating alternative dispute resolution (ADR) as the default resolution mechanism, or other approaches such as replicating sanctions for frivolous protests available at the Court of Federal Claims in GAO protests, or instituting rules such as the posting of bonds for the expenses of delays resulting from stays of protests that are ultimately not sustained. In addition, the standard of review at the GAO may be adjusted from the more relaxed and subjective "reasonableness" standard to the

"arbitrary, capricious, abuse of discretion, or otherwise not in accordance with law" standard used by the COFC under the Administrative Procedures Act (*Choice of Forum for Federal Government Contracts Bid Protests,* at 298 (2009). Further, agencies can be encouraged not to allow post-award bid protests challenging the evaluation and the conduct of source selection to result as a matter of course in pre-award corrective actions, such as total cancellation of solicitation and full re-competition. The Competition in Contracting Act (1984), Title 31 of the U.S. Code, Sections 3551–3556, is a key pillar of the U.S. protest process, together with the Federal Acquisition Regulation (FAR Parts 5, 10, 12–15, and 33), the Tucker Act (2010), Executive Order No. 12979 (1995), and various case law precedents. Note: These legal insights were edited by former NPS colleague, Max Kidalov, in Melese et al. (2010).

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