Political Contestability, Scrutiny, and Public Contracting

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September 24, 2017

Abstract

Do public agents undertake socially inefficient activities to protect themselves? In politically contestable markets, part of the lack of flexibility in the design and implementation of the public procurement process reflects public agents' risk adaptations to limit the political hazards from opportunistic third parties—political opponents, competitors, and interest groups. Reduced flexibility limits the likelihood of opportunistic challenges, while externalizing the associated adaptation costs to the public at large. We study this matter and provide a comprehensive theoretical framework with empirically testable predictions.

JEL Classification: D23, D73, D78, H57

Keywords: Transaction Costs, Bureaucracy, Positive Policy Analysis, Procurement

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1 Introduction

Do public agents undertake socially inefficient activities to protect themselves? Public agencies have developed procedural mechanisms—"fire alarms" (McCubbins, Noll, and Weingast 1989)—to hold politicians and public managers accountable. In contrast to private contracts, public contracts are open to challenge by third parties. A whiff of corruption and a concern for the misuse of other people's monies are all that is required to make a challenge to a public contract feasible.[1]

Third parties, nonetheless, may *opportunistically* take advantage of this procedure. Although the awarding and performance of a public contract may be honest and legal, public agents fear politically motivated challenges.[2] Since the public at large cannot distinguish ultimately whether a challenge is honest or opportunistic, this distinction is irrelevant from the public agent's standpoint, who treats every challenge as a political threat, and therefore will *ex ante* adjust the nature of contracts to limit those features whose probity may be questioned. These adjustments will imply more contract specificity in design and more rule-based and bureaucratic rigidity in implementation.[3] Such contractual adaptations, however, come at a cost. Contractors' perceptions of over-rigidity will translate into higher prices and stronger compensation clauses. The contractual adaptation required to limit the potential for third-party challenges, whether opportunistic or not, make public contracting look "inefficient." We show that public contracts cannot be evaluated vis-à-vis private contracts, but should be compared with analogous public contracts in similar political environments to

[1] A challenge to a public contract is an objection, either informally through the media or formally in a court, as to the probity posed by transactions conducted in the public sector and typically carries an an implicit demand for proof of the validity of the contracting process (Williamson 1999).

[2] Consider the Hetch Hetchy aqueduct, an extraordinary water and power system comprising 60 miles of tunnels through solid granite, 280 miles of pipelines, four major dams and powerhouses, two treatment plants, and 11 reservoirs. Michael O'Shaughnessy, tenured chief engineer of the City of San Francisco, opined in his account of the project: "I never handled any proposition where the engineering problems were so simple and *the political ones so complex*" (Hennessey 2012, 7, emphasis added).

[3] For example, a forestry company in Latin America contracted the construction and maintenance of a 60 kilometer (37 miles) network of six roads for heavy trucks within its forests. The life of the contract was for five years or until a predetermined volume of lumber was carried on the network, whichever occurred first. The payment schedule specified a unit price per kilometer and the timing (on completion of road foundation, on completion of the road, and in monthly installments). The contract specified building standards (such as width and thickness of asphalt), service standard requirements, and penalties for deviations from these requirements. This private road construction contract was ten pages long (Engel, Fischer, and Galetovic 2014, Box 3.1). Comparable public contracts usually are several hundred pages long because public administrators have to take into account, among others, all possible third-party claims.

assess their efficiency.

A higher level of contract rigidity in public contracts can therefore be understood as a signaling device and political risk adaptation by public agents. As Goldsmith and Eggers (2004, 122) indicate, "when something goes wrong in a public sector network, it tends to end up on the front page of the newspaper, instantly transforming a management issue into a political problem." In Capitol Hill jargon, political risk adaptation is typically referred to as the "Washington Post test," a commonly used phrase by politicians when working on a project—"How would it look on the front page on the Washington Post?" However, it is not only civic-oriented legislation that limits public agents' discretionary actions, but also that public agents hedge their exposure to the risk of third parties' challenges through contract formalities and rigidities: Although they could rightly impose flexible terms in their favor, they opt not to, and thus signal probity and avoid potentially steep litigation costs.

We provide a formalization of the interaction between political contestability and contracting to understand the organizational foundations of pricing, specificity, and rigidity—the outer features—of public contracts. Our framework is rooted in a transaction cost-*cum*-positive political theory and introduces third-party opportunism (Spiller 2008) as a key hazard of public transactions. According to the literature, public contract rigidities respond to a series of constraints, particularly the risks of corruption and renegotiation, the procurer/contractors' asymmetric information, and the presence of different (and possibly conflicting) government objectives. In these theories, political risks are (tacitly) assumed away or considered insignificant. We present a positive explanation—which complements extant normative theories—of greater rigidities in public contracts relative to private contracts in politically contestable markets.

According to the public administration literature, public contracting inefficiencies are associated with the large number of formal processes that appear to be essential to ensure the public sector's functions—in addition to "red tape," i.e., costly and compulsory rules, regulations, and procedures with no efficacy for their functional object (Bozeman 1993). Bureaucrats are employed only for "hard" agency problems where consumers cannot be trusted (Prendergast 2003). Extensive rules and regulations arise from dividing authority among the separate branches of government (executive, legislative, and judicial) to prevent abuses

of power, protect people's rights (Baldwin 1990), and reflect values rooted in equity (Forrer, Kee, Newcomer, and Boyer 2010). Red tape regulations are intended to decrease public agents' uncertainty about how they should behave (Kurland and Egan 1999). Both formalities and red tape are the instruments by which bureaucracies restrict public agents' discretion (Boyne 2002; Lan and Rainey 1992) and "overcome the temptation to capitulate to consumers simply to avoid complaints" (Prendergast 2003, 932).

Third-party opportunism (TPO) relates to two other strands of literature on public contracting: industrial organization and political economy. In the industrial organization literature, public contract pricing is fundamentally determined by informational costs that arise from informational asymmetries, the extent of the verifiability of information, and the presence of repeated interactions (Bajari and Tadelis 2001; Laffont and Tirole 1993; Loeb and Surysekar 1994; Macaulay 1963). When terms can be contested by excluded sellers, agreements are carefully delimited such that they are governed by more formal features (Marshall, Meurer, and Richard 1994a). Positive political scholars have also studied the engagement of interested parties (McCubbins and Schwartz 1984; de Figueiredo, Spiller, and Urbiztondo 1999) and consumers (Prendergast 2003) as instruments of oversight, where independent third-party scrutiny is always desirable. Both honest and opportunistic challenges may have positive welfare effects, e.g., lowering corruption (de Figueiredo, Spiller, and Urbiztondo 1999; Spiller 1990; Spiller and Urbiztondo 1994).

These prevailing theories of public contracting ignore, however, the costs of political contestability and fall short of incorporating the *opportunistic* motives of third parties and their anticipation by public administrators. In stressing government-specific characteristics by adding *ad hoc* assumptions, such as insufficient commitment that leads to renegotiation (Guasch, Laffont, and Straub 2008), these theories consider that the failures that arise in public contracting are not specific to these contracts. Thus, the theoretical frameworks applied to study public contracts equate them with restrained private contracts.

Laffont and Tirole (1993, 9) emphasize that the link "between procurement and regulation and the associated administrative and political constraints is still unknown to us or is still in a state of conjecture. [...] Institutions are endogenous and should as much as possible be explained by primitive considerations." This paper is an attempt to rationalize the basic

features of public contracting from its primitive considerations, i.e., from its political hazards. The remaining of the paper is organized as follows: In section 2, we introduce a reasoned theoretical model that captures the trade-off between the risks of challenges opportunistic third-party challenges and contractual costs. In section 3, we explain the implications of budget constraints for public contracts bid prices. In section 4, we provide various applications of our framework. Section 5 concludes and advances a novel set of empirically testable predictions relevant to public contracting and management.

2 A Model of Procurement under Political Contestability

2.1 Signaling Process: Hazards into Rigidity

We focus our analysis on the public agent's perspective. Furthermore, we ignore sunk costs to abstract them from governmental opportunism[4] and to make the argument regarding political contestability and third-party opportunism straightforward.

There are two agents explicitly involved and two agents implicitly involved in public contracting:

1. The incumbent public agent,
2. Private contractors,
3. Third-party challengers, i.e., political opponents to the incumbent administration, competitors of the contractor, and interest groups, and
4. The public at large, i.e., voters and courts.

Whereas third parties and the public at large may be concerned about purely private contracts in as much as these contracts educe externalities, they are certainly concerned about public contracts because of the social implications and public monies involved. I.e., third parties are *always* present in public procurement.

The signaling process begins in the preparatory stage before the contract is signed. The public agent receives the project features and budget to contract for goods and services. The public agent also perceives the threat of potential third-party challenges and tries to minimize the political risks and maintain political support through the rigidity of the proposed procurement process and contract.

[4] See Spiller (2008) and the references therein.

Potential private contractors may not be directly aware of the hazards faced by the public agent, but they observe the contract's rigidity. Rigidity represents less adaptability, higher contracting and implementation costs, and thus higher bid prices.

Third parties privately perceive the benefits of a challenge. The features of the contract affect third parties' strategies, thereby affecting whether they place a challenge.

Finally, we model the reaction of voters and courts to a challenge in a stochastic fashion, such that the probability of a successful challenge also depends on the rigidity of the public contract. A successful challenge may imply weakened chances of re-election or re-appointment for incumbent public agents, a judicial challenge, or loss of reputation and current position.

Figure 1 presents the timing of the signaling process (and the associated information set) from third-party hazards into contract rigidity.

Public manager: — t_0

1. Receives project features and budget
2. Perceives threat of potential TPO challenges
3. Minimizes political risks through contract specificity and rigidity

Private contractors: — t_1

4. Observe contract rigidity
5. Less adaptability indicates higher contracting and implementation costs and therefore a higher final price

Third parties: — t_2

6. Privately perceive the benefits from a potential challenge
7. Contract features affect third parties' strategies, thereby affecting political outcomes

Figure 1: Signaling Process: Hazards into Rigidity—Timing

2.2 Conceptualizing Contract Specificity and Rigidity

Contract specificity refers to the *ex ante* complexity of the subject and the completeness of the clauses, technical provisions, and processing costs (Laffont and Tirole 1993). Contract rigidity refers to rule-based and bureaucratic implementation, i.e., *ex post* enforcement, penalties, hardness, and intolerance to adaptation in a contract[5] and normally correlates with contract

[5] In this regard, contract rigidity is the opposite of a "best efforts" clause.

specificity: the more specific a contract is, the more rigid its implementation and enforcement are expected to be.

Complex contracts have more contractual rigidities than simpler contracts, and the cost of enforcing contracts *ex post* increases with complexity. Because the public sector has more ambiguous objectives than private organizations (Boyne 2002)—and it is sometimes difficult to assess to what extent these objectives are achieved (Lan and Rainey 1992)—public contracts' high rigidity mitigates ambiguity and problematic evaluation. For example, U.S. Department of Defense's directives specify source selection policies in great detail, including the development of objective technical, cost, schedule, manufacturing, performance, and risk criteria; the auction techniques; the organization of a selection committee; and the degree of subcontracting.[6] public agents must also follow imposed standards of evidence, or they may be constrained to formulate their own standards and follow their own rules to avoid discriminating among distinct situations on the basis of non-verifiable information (Laffont and Tirole 1993).

2.3 Modeling Hazards, Rigidity, and Pricing

To operationalize political contestability and third-party scrutiny in public contracting, we introduce a simple model and notations.[7] The incumbent public agent faces political challenges of cost T_0 with (endogeneous) likelihood ρ, and the likelihood that these political challenges will be successful (in court and/or vis-à-vis the public at large) is represented by likelihood τ.[8] Third-party challenges arise from honest efforts to control costs and from opportunistic attempts to replace the public agent; however, the types of challenges are not distinguishable *ex ante*, thus public agents treat all challenges as political threats.

Public agents' contracting costs have two components: expected political costs $\mathbb{E}(T)$—concomitant with loss of office, reputation, and support—that arise from discretionary contract terms (flexible contracting); and the costs of adaptation to contract specifications K.

[6] See the U.S. Department of Defense's memorandum on "Source Selection Procedures," issued on March 4, 2011 and available at: http://www.acq.osd.mil/dpap/policy/policyvault/USA007183-10-DPAP.pdf (accessed May 19, 2011).

[7] See Appendix A for a glossary of notations and abbreviations.

[8] We model the likelihood of success of a TPO challenge τ as purely stochastic, although decreasing in the extent of rigidity, without modeling the decision process of the court and the public at large.

If a challenge is successful, there are also costs associated with the financial and social costs of a new bid, i.e., time and documentation and settlement payments (Marshall, Meurer, and Richard 1994b).[9] We highlight political costs as a crucial burden for public agents with respect to third-party challenges. The more discretionary the contract terms are, the more room there is for third parties to challenge the contract. Therefore, expected political costs due to third-party (both honest and opportunistic) challenges $\mathbb{E}(T)$ can be mitigated by contract rigidity R.[10]

The likelihood of success of a challenge τ is common knowledge to all of the players. Rigidity turns into a *signaling device* of the public agent's probity: It is more difficult to prove wrongdoing when there is less room for discretionary actions and, therefore, the likelihood of success of a TPO challenge τ decreases with rigidity R. In other words, courts are more likely to dismiss and the public is more likely to ignore challenges to contracts with strictly followed rigid specifications. τ captures a critical institutional feature to the TPO game, which we formalize in Proposition 1:

Proposition 1 *The likelihood of success of an opportunistic challenge τ is convex and monotonically decreasing in R, such that $\frac{\partial \tau}{\partial R} < 0$ and $\frac{\partial^2 \tau}{\partial R^2} \geq 0$.*[11]

Likewise, lengthy and numerous clauses signal costly litigation. An opportunistic challenger will be forced to incur higher monetary, political, and reputational costs of challenge and litigation c to screen for eventual contractual weaknesses that fit to more rigid clauses. Therefore, the cost of challenge and litigation c for the challenger increases with rigidity R. This observation is sufficient, but not necessary for our results.

Expected political costs $\mathbb{E}(T)$ depend on the actual costs of a successful challenge to the incumbent public agent—including the costs of a new bid (documentation and analyses), externalities,[12] and the harm to the public agent's reputation—and on the likelihood of a

[9] Marshall, Meurer, and Richard (1994a) argue that allowing excluded bidders to challenge the outcome of a procurement process inefficiently reduces sole-sourcing.

[10] $R = 0$ denotes the minimum rigidity inherent to relational contracts.

[11] Proofs are presented in Appendix B.

[12] The value of lost time for users would be such an externality. For example, highway repairs generate significant negative externalities for commuters through increased gridlock and commuting times. Lewis and Bajari (2011) use the example of Interstate 35W, a main commuting route in Minneapolis that carries over 175,000 commuters per day. If a highway construction project results in a 30-minute delay each way for commuters on this route, the daily social cost imposed by the construction is 175,000 hours. If one values

challenge being successful, i.e.:

Definition 1 $\mathbb{E}(T) = T_0 \rho \tau$

where T_0 is the public agent's actual cost if a TPO challenge is successful. Larger projects are associated with potentially larger TPO costs to the public agent and are therefore linked to a higher T_0. Third parties calculate the benefits from opportunistic challenges, but the public agent does not know *ex ante* the particular value of these benefits for third parties. Third parties' overall benefits from an opportunistic challenge correspond to a random variable $\widetilde{T_0}$, which is distributed normally with mean μ and variance σ^2.

From the third parties' perspective, the realization of TPO benefits is subject to winning the challenge with likelihood τ and also subject to the competitive environment. TPO benefits may not be internalized entirely by the challenger, but are distributed to all third parties involved. We model third parties' competitive environment with concentration parameter $\zeta \in (0, 1]$. If $\zeta = 1$, the TPO challenger's benefits are symmetrical to the incumbent public agent's TPO costs (e.g., a two-party political market); if $\zeta < 1$, the political market is fragmented, and the challenger does not internalize all the benefits from a successfully protested contract.

Thus, from the public agent's perspective, the expectation of benefits to an opportunistic challenger, $\widetilde{T}$, is given by the random benefits of an opportunistic challenge, the likelihood of the challenge being successful, and the internalization of benefits by the challenger, i.e., $\widetilde{T} = \widetilde{T_0} \tau \zeta$.

The public agent affects the likelihood of challenge ρ by adjusting rigidity R. The likelihood of a TPO challenge ρ is given by the probability of a positive expected benefit for third parties. I.e., ρ is the probability that third parties' expected benefits from an opportunistic challenge will be higher than the cost of challenge c: $\rho = \Pr(\widetilde{T} > c)$.

An increase in rigidity R thus has two effects:

1. It lowers the likelihood of success of a TPO challenge τ; thus, for any given continuous distribution function of third parties' expected political benefits from a challenge, it yields a scalar transformation distribution function that is first-order stochastically

time at $10 an hour, the social cost is $1.75 million per day. Most public contracts carry externalities for the public at large.

dominated by the distribution function at lower rigidity (downward probabilistic shift of the cumulative distribution curve of expected third-party opportunism benefits $\widetilde{T}$)

2. It increases the cost of challenge c and thus it decreases the probability at which an opportunistic challenge pays off (rightward move of the cost of litigation)

Figure 2 shows a graphical representation of the combination of these two effects that result in a decrease in the likelihood of challenge ρ due to an increase in contract rigidity R.

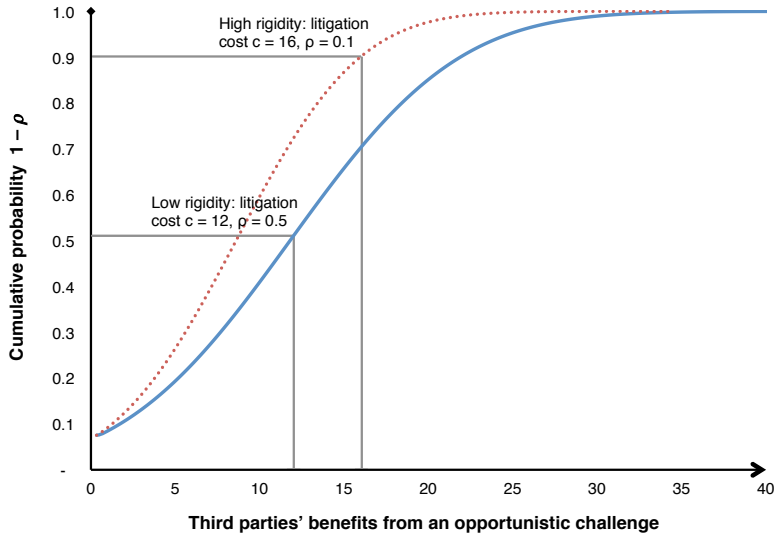

Figure 2: This graph plots the cumulative probability (y axis) that a challenge will *not* be filed because the expected benefits (x axis) are below the cost of litigation (c): the blue solid line shows the results for low rigidity contracts, and the red dotted line shows the results for high rigidity contracts. In the numerical simulation, we show low rigidity $R^L = 10$, high rigidity $R^H = 30$, a normal distribution of benefits from an opportunistic challenge for third parties $\widetilde{T_0}$ that ranges from 0 to 100 with $\mu = 30$ and $\sigma = 20$, $\tau = \ln[\exp(1) + R]^{-1}$, $\zeta = 1$, and cost of litigation $c = \gamma R + 10$, where $\gamma = 0.2$ and 10 are calibration parameters for an increase of c in R. The likelihood of a TPO challenge ρ is the complementary cumulative probability of the third parties' expected benefits from an opportunistic challenge being lower than the cost of challenge, i.e., $\rho = \Pr(\widetilde{T} - c > 0)$. The cumulative distribution function at high rigidity is first-order stochastically dominated by the cumulative distribution function at low rigidity. An increase in rigidity R from 10 to 30 induces a decrease in the likelihood of a TPO challenge from 0.5 to 0.1.

Therefore, the likelihood of opportunistic challenge ρ is given by the probability of a positive expected value of a challenge $\Pr(\widetilde{T} - c > 0)$. The public agent adjusts R *ex ante* according to her beliefs regarding the likelihood of incidence ρ and the likelihood of success τ of third-party challenges. The public agent's rational expectation of ρ is consistent with third parties' costs and their strategic decisions, i.e., $\mathbb{E}(q \mid R) \equiv \Pr[\widetilde{T_0}\zeta\tau(R) > c(R)] \equiv \rho$.

Proposition 2 *For any $\widetilde{T_0}$, the likelihood of challenge ρ is decreasing in rigidity R.*

Proposition 3 *Expected political costs $\mathbb{E}(T)$ are decreasing and convex in rigidity R.*

Figure 3 plots the equilibrium likelihood of opportunistic challenge ρ for different levels of rigidity R. The intuition that $\mathbb{E}(T)$ falls in R is that the likelihood of a successful TPO challenge can be reduced to negligible by extreme contract rigidity.[13]

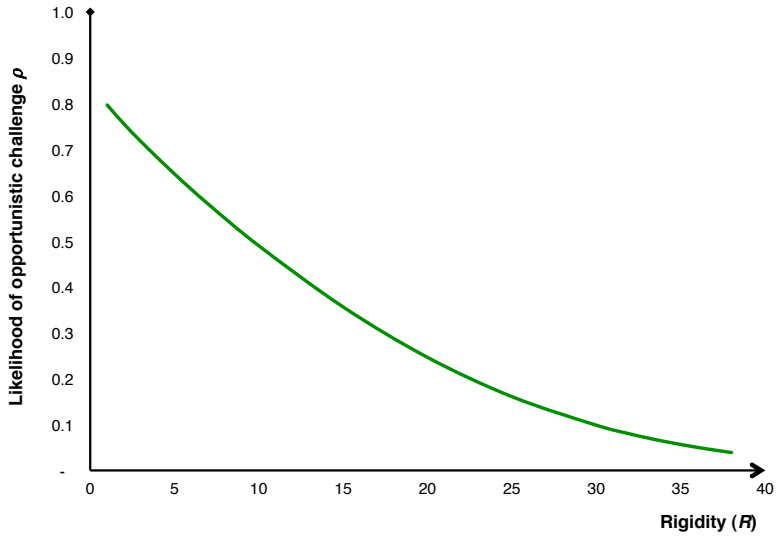

Figure 3: This graph plots the equilibrium likelihood of an opportunistic challenge ρ for different levels of rigidity R for identical distribution functions of third parties' expected benefits from an opportunistic challenge and identical costs of challenge following the numerical simulation presented in Figure 2.

Contract design (*ex ante*), and implementation and enforcement (*ex post*) costs are a function of time, skills (i.e., lawyers, engineers, and consultants), effort (e.g., documentation

[13] The presence of asymmetric information between the public agent and the third parties implies that the public agent has some discretion in defining the specifications. Most public procurements are bid by several bidders, thus generally specifications do not preclude a competitive bidding market. In the event that over-detailed specifications are designative (i.e., they indicate a particular bidder), such specifications can be a source of favoritism, i.e., biasing the specifications (or scoring rule) in favor of one bidder (Lambert-Mogiliansky and Kosenok 2009). Except for times of emergency (e.g., there may be need to expedite the procurement in case of natural disasters or national security), these are signal of corruption. First, most public contracts' specifications are non-designative, i.e., they do not point to any particular bidder and do not preclude a competitive bidding market, which is the case for most public bids. Second, we focus on the contractual stage, at which there is no profit for the corrupted public agent to reduce the discretion of the favored bidder. Third, if present, corruption may be a confounding factor in cross-section analysis, but would not explain longitudinal variations of contractual features.

and control), and expected penalties due to contractual deviations. Most of these costs—i.e., expected penalties and adaptation costs—are borne directly by the contractor (K_{pr}) and incorporated into the contract price; the remainder (e.g., excess administrative costs) is borne by the public administration (K_{pu}) and externalized to the public at large through taxation. It is a standard result in public finance that the efficiency cost of a tax (i.e., the *excess burden* of taxation) increases with the square of the tax rate (Harberger 1971; Judd 1987). Since contractual rigidity is a *tax on adaptation*—what Laffont and Tirole (1993) call "processing costs"—the same convexity applies to rigidity R as well. Small rigidity have very small distorting effects; large rigidity have very large negative effects. Thus, adaptation costs K—both public and private—increase convexly in R.

Proposition 4 *Adaptation costs K are strictly and monotonically rising in rigidity R, such that $\frac{\partial K}{\partial R} > 0$ and $\frac{\partial^2 K}{\partial R^2} > 0$.*

The price bid by a contractor is the sum of operating (technology-specific) and adaptation costs (contract-specific and subject to rigidity R). A contractor's maximum bid price is the reservation price P^{bud}. To simplify our argument, we assume a uniform technology across firms and a competitive (or Bertrand competition) bidding market, such that the resulting price P is the lowest possible cost and follows private adaptation costs K_{pr}. We also assume away governmental opportunism, i.e., direct or incremental expropriation by the public agent.

2.4 Existence of an Internal Equilibrium

We define the following objective functions for the agents:

$$\begin{cases} \text{Incumbent public agent:} & \underset{R}{\text{minimize}} & \mathbb{E}[T(R) \mid \tau] + K(P,R) \\ & \text{subject to} & K = K_{pr}(R) + K_{pu}(P,R), P^{bud} \geq K_{pr} \\ \text{Private contractor:} & \underset{P}{\text{maximize}} & (P - K_{pr}) \mid R \\ & \text{subject to} & P^{bud} \geq P \geq K_{pr} \\ \text{Third-party challengers:} & \underset{q \in \{0,1\}}{\text{maximize}} & q(\overline{T_0}\zeta\tau - c) \mid R \end{cases} \tag{1}$$

The bid price P equals $K_{pr} \mid R$, which also minimizes $K_{pu} \mid R$. The expected third party benefits from an opportunistic challenge are given by $\overline{T_0}$, ζ, τ, and c. $\overline{T_0}$ is the particular realization of $\widetilde{T_0}$, which is known to third parties but is unobserved by the public agent. If the

challenge is realized ($q = 1$), the expected third parties' benefits equal $\overline{T_0}\zeta\tau - c$.[14]

The public agent internalizes expenses related to the contract; i.e., at the end, she is accountable—directly or indirectly—for all the costs that are borne. She must pay the contractors' costs and her own costs, while aiming at minimizing the political costs. Therefore, the optimal level of rigidity R^* is driven by the expected political costs, the actual adaptation costs, knowledge about τ, and the public agent's beliefs about ρ.

Given T_0, $\widetilde{T_0}$, τ, c, ζ, and K, the equilibrium $\{q^*, \rho^*, R^*, P^*\}$ is such that:

(a) $R^* = \arg\min_R[T_0\rho(R)\tau(R) + K(P, R)]$

(b) $\rho^* \equiv \mathbb{E}(q^* \mid R^*) \equiv \Pr[\widetilde{T_0}\zeta\tau(R^*) > c(R^*)]$

(c) $P^* \in [P^{min}, P^{bud}] = K_{pr} \mid R^*$

Intuitively, this solution can be derived backwards. Starting from R^*, any deviation from equilibrium makes the public agent worse off:

(a) If $R < R^*$, then $\tau(R) > \tau(R^*)$ and $c(R) < c(R^*)$; therefore $\rho > \rho^*$ and $\mathbb{E}[T(R)] - \mathbb{E}[T(R^*)] > K(P, R^*) - K(P, R)$, i.e., the increase in political costs $\mathbb{E}(T)$ offsets the gains from the decrease in contracting costs K.

(b) If $R > R^*$, then $\mathbb{E}[T(R^*)] - \mathbb{E}[T(R)] < K(P, R) - K(P, R^*)$, i.e., the increase in contracting costs K outmatches the gains from the decrease in political costs $\mathbb{E}(T)$.

Lemma 1 *The sum of the expected political costs $\mathbb{E}(T)$ plus the adaptation costs K is U-shaped and has an interior global minimum at R^*.*

If $\mathbb{E}(T)$ does not fall faster in R than K increases in R for low R states, political contestability is irrelevant for the outcome of the contract (i.e., it is a relational contract). If political contestability is a relevant hazard for the public agent, Lemma 1 implies that the optimal contract is partly flexible and of finite rigidity. A contract that is too flexible would be too risky politically, whereas a contract that is too rigid would be too expensive. Figure 4 plots an example of expected third-party opportunism costs $\mathbb{E}(T)$ falling in rigidity and

[14] From the perspective of opportunistic third parties, the uncertainty is not in the benefits but in the likelihood of success of the challenge.

specificity R, costs borne by the contractor K_{pr} and adaptation costs K rising in R, and the U-shaped sum of $\mathbb{E}(T) + K$ as the objective function that the public agent minimizes.

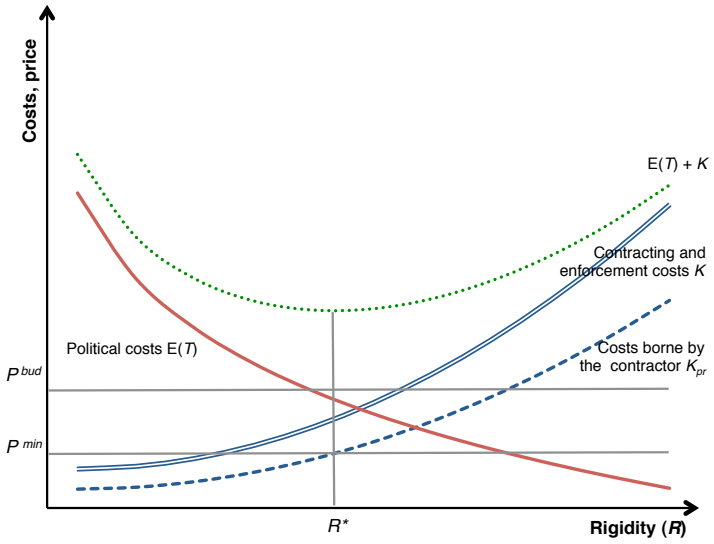

Figure 4: This graph plots expected political costs $\mathbb{E}(T)$ (red solid line) that are falling in rigidity and specificity R, costs borne by the contractor K_{pr} (blue dashed line) and adaptation costs K (blue double-solid line) rising in R, and the U-shaped sum of $\mathbb{E}(T) + K$ (green dotted line) as the objective function that the public agent minimizes. The contracting sets of price and rigidity are given by the area above the costs borne by the contractor K_{pr} and below the public agent's reservation price P^{bud}. P^{min} is the equilibrium price for public contracts in a competitive bidding market.

Corollary 1 *With political contestability and third-party scrutiny, the sequential equilibrium public contract that minimizes political and contracting costs is rigid and thus more expensive in its design, implementation, and control than the theoretical first-best public contract in the absence of TPO.*

A direct outcome of Corollary 1 is that the higher $\mathbb{E}(T)$ is, *ceteris paribus*, the higher R^* and P will be.

2.5 Endogeneity of Opportunistic Challenge

The endogeneity of an opportunistic challenge provides contractual properties that are consistent with observations in public contracting practice:

(a) Larger contracts are associated with higher expected political benefits for opportunistic third parties (higher mean μ) and, therefore, are associated with a higher likelihood of

challenge ρ. Similarly, ρ increases in the proximity to elections, because potential political gains are discounted at a higher factor.

(b) Inherent public-private information asymmetries increase with transactional complexity. The dispersion of third parties' beliefs about the expected political benefits from an opportunistic challenge σ is higher with high informational asymmetry (low scrutiny) states than in low informational asymmetry states, i.e., in North, Wallis, and Weingast's (2009) "open-access" orders.

(c) When third parties' beliefs about the expected political benefits from an opportunistic challenge are more dispersed, a low cost of litigation c leads to a lower ρ and a high c leads to a higher ρ.

(d) ρ is sensitive to the institutional environment that determines τ and c: the higher τ is, the higher ρ is; the higher c is, the lower ρ is; and the more τ decreases in R, the more ρ falls in R.

(e) The rule of law implies, *ceteris paribus*, a higher ρ.

(f) The lower bound of ρ depends on the third parties' priors, i.e., the propensity to litigation that is proper for the institutional framework.

(g) Exogenous institutional changes (e.g., new environmental norms or amendments to the legal system) alter τ and c and produce a new cumulative probability of challenge distribution that will first-order stochastically dominate the former distribution when the legal system becomes more restrictive (i.e., an increase in clauses subject to challenge) or will be first-order stochastically dominated by the former distribution following deregulation.

2.6 Scrutiny: A Two-Sided Sword

An increase in scrutiny (i.e., critical public observation and accountability through transparency and public participation) lowers the information asymmetry between the actual political costs for an incumbent public agent and third parties' beliefs about the political benefits of an opportunistic challenge. Increased scrutiny induces a calibration of beliefs about the expected benefits from an opportunistic challenge (lower standard deviation), which yields

a second-order stochastically dominant distribution (see Figure 5) with the inflection point at the mean expected benefits (Mas-Colell, Whinston, and Green 1995). Thus, with all else kept constant (particularly with the mean expected benefits at low scrutiny kept equal to the mean expected benefits at high scrutiny), an increase in scrutiny leads to an increase in the likelihood of challenge ρ at low litigation costs c and to a reduction in ρ at high c.

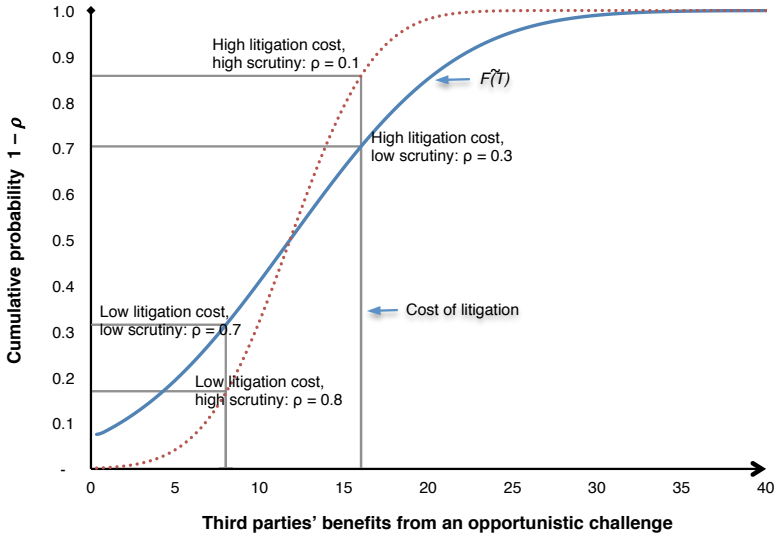

Figure 5: This graph plots the cumulative probability (y axis) of a public agent's beliefs about third parties' expected benefits from an opportunistic challenge (x axis): the blue solid line represents low-scrutiny states, and red dotted line represents high-scrutiny states. The numerical simulation presents rigidity $R = 10$, a normal distribution of benefits from an opportunistic challenge for third parties $\widetilde{T_0}$ with $\mu = 30$, $\sigma = 20$ for low-scrutiny states and $\sigma = 10$ for high-scrutiny states, $\tau = \ln[\exp(1) + R]^{-1}$, $\zeta = 1$, and $c = \gamma R + 10$, where $\gamma = 0.2$ and 10 are calibration parameters for an increase of c in R. The likelihood of an opportunistic challenge ρ is the complementary cumulative probability of the third parties' expected benefits from the challenge being lower than the cost of the challenge, i.e, $\rho = 1 - \Pr(\widetilde{T_0} \ln[\exp(1) + R]^{-1} < \gamma R + 10) = \Pr(\widetilde{T_0} \ln[\exp(1) + R]^{-1} - \gamma R + 10 \geq 0)$. The distribution function at high scrutiny (red dotted line) second-order stochastically dominates the distribution function at low scrutiny (blue solid line). With all else kept constant, an increase in scrutiny leads to an increase in the likelihood of challenge ρ at low litigation costs c and to a reduction in ρ at high c.

Increased transparency brings the information of a public agent and third parties into symmetry. Consequently, a public agent can better forecast third parties' reaction to her project and choice of R. This knowledge prompts a counter-intuitive implication: increased scrutiny increases third parties' knowledge about the public agent; therefore, the public agent knows better what third parties know. This more precise forecast, in turn, leads to a reassessment of the distribution of the public agent's beliefs about the benefits of an

opportunistic challenge for the third parties $\widetilde{T}$: depending on litigation costs, better informed third parties may increase or decrease the likelihood of opportunistic challenges. As a result, it is equivocal whether open information policies (such as those in the State of California[15] or the State of Berlin[16]) lead to more efficient public contracts.

Proposition 5 *An increase in scrutiny leads to an increase in the likelihood of challenge when litigation costs are low and to a reduction in the likelihood of challenge when litigation costs are high.*

On the one hand, the literature has considered transparency as a means through which the risk of corruption can be kept at bay by outsourcing the costly monitoring of the procurement process (audit) to third parties (McCubbins and Schwartz 1984; de Figueiredo, Spiller, and Urbiztondo 1999; Prendergast 2003). On the other hand, facing greater transparency and low litigation costs a public agent will *ex ante* readjust rigidity to a higher level to lower the likelihood of a challenge. In this case, more transparency will lead to higher contracting costs and lower government efficiency.

[15] California's open information policy is rooted in the following legal acts:

(a) The California State Legislature's Brown Act of 1953 guarantees the public's right to attend and participate in meetings of local legislative bodies. The Brown Act solely applies to California city and county government agencies, boards, and councils.

(b) The Bagley-Keene Open Meeting Act of 1967 implements a provision of the California Constitution that declares that "the meetings of public bodies and the writings of public officials and agencies shall be open to public scrutiny," and the Act explicitly mandates open meetings for California state agencies, boards, and commissions. The Act facilitates accountability and transparency of government activities and protects the rights of citizens to participate in state government deliberations.

(c) The California Public Records Act of 1968 mandates the disclosure of governmental records to the public upon request, unless there is a specific reason not to do so. According to Article 1 of the California Constitution and due to California Proposition 59 (the Sunshine Amendment), "the people have the right of access to information concerning the conduct of the people's business."

For California State Legislature Acts, see http://www.legislature.ca.gov/.

[16] According to the amendment to the Freedom of Information Act of the State of Berlin of July 2010, all contracts must be made available to the public (see http://www.berlin.de/sen/finanzen/ and Alexander Dix, 2011, "Proactive Transparency for Public Services: the Berlin Model," http://www.freedominfo.org/2011/10/proactive-transparency-for-public-services-the-berlin-model/; accessed December 5, 2011). The primary subject of this Act concerns access to contracts regarding the delivery of basic public services to which the State of Berlin and private investors are parties. Additionally, in February 2011, the State of Berlin was forced by referendum to unconditionally disclose all contracts, decisions, and side agreements associated with the partial privatization of the Berlin Water Utilities that were closed between the State of Berlin and the private shareholders: see "Act for the full disclosure of secret contracts for the partial privatization of the Berlin Water Utilities," as of March 4, 2011, (GVBl. p. 82).

2.7 Political and Market Structure

Our framework accounts for political and market structure. If the political opposition is fragmented, the challenger bears the litigation costs c, but any political competitor can get the benefits of a challenge; as $\zeta \approx 0$ (atomized political opposition), there will be no political challenges because the litigation costs surpasses the expected benefits of a challenge, which resembles a single party or autocratic system.

Challenges to an awarding procedure frequently arrive from a firm that is classified as the second-best bidder and that would become the winner if it succeeded in disqualifying the winning contractor. Analogously to a political opponent, a losing bidder will challenge a contract output only if the expected benefits $\widetilde{T}$ are higher than the litigation costs c. In this case, ζ describes the challenger's market structure: $\zeta = 1$ for symmetrical Bertrand duopolies (one's contractor losses are another contractor's gains), $\zeta < 1$ for oligopolies, and $\zeta \approx 0$ for perfect competition, where an individual competitor has no incentives to challenge a public procurement outcome.

3 Contract Price Under Budget Constraints

A public agent budgets—explicitly through bidding information, announcements, and budget notes, or implicitly through internal regulations—a maximum price P^{bud} that she can pay a contractor. The acceptable price-rigidity sets for a public agent are below P^{bud} (i.e., upper bound to keep contracts "in the budget") and above rigidity R that makes political costs *bearable*.

A contractor sees rigidity R and bids accordingly. On the contractor's side, the acceptable price-rigidity sets are those above her private adaptation costs K_{pr}. Therefore, the contracting area (i.e., the set of prices acceptable to both the public agent and the contractor) is given by price-rigidity combinations above K_{pr} and below P^{bud}. At a given R^*, the minimum price required by a contractor is P^{min}. Figure 4 plots the $\mathbb{E}(T)$ and K curves, optimal rigidity, and budgeted and minimum prices.

Before a bid, particularly in complex contracts, a public agent only has an estimation of a contractor's adaptation costs K_{pr}. If P^{bud} budgeted by the public agent is below the minimum acceptable price $P^{min} = K_{pr}$ for the contractor at a given R^*, then there will be

no bidders, or—if P^{bud} is not known by the bidders—the bidders will bid $P > P^{bud}$ and the bid will be annulled.

Therefore, "no contract" is a possible outcome if the political risks are significant and the budgeted expenses are too low at a given rigidity. In such a case, the bid will have to be redesigned at a lower rigidity level at the risk of higher political costs for the public agent; the budget will have to be reconsidered, which will create room for third-party challenges that attempt to control budget expenses; or the terms must be negotiated after bidding, which increases the political hazards for suspicion of collusion.

4 Applications and Supportive Evidence

Prevailing contract theories explain contractual rigidity as an optimal choice to: (a) foster price competition among firms for simple contracts; (b) account for higher investments at the project design stage for complex contracts (Bajari and Tadelis 2001);[17] and/or (c) lower the risk of *ex post* renegotiation and alleviate a double-sided hold-up problem by imposing *ex ante* rigid limits on the parties' ability to renegotiate contract terms (Boyne 2002; Prendergast 2003).

Our focus is on public procurement in politically contestable markets. We now apply the TPO framework to settings in which a public agent faces a trade-off between contract efficiency and political hazards. We analyze various comparative statics to derive the empirical implications.

4.1 Bureaucracies

Rainey and Bozeman (2000) identified personnel as one of the areas where public agents show sharp differences from business managers on perceptions about organizational formalization. Civil servants are subject to more rigid contracts (e.g., regulated hiring and lists of duties and responsibilities) than their peers in the private sector.[18]

[17] The use of more rigid awarding procedures in continental Europe compared with the UK is often associated with differences in their investments at the project design stage. See, e.g., Hermes and Michel (2006), Sforzi and Michel (2005), and Winch and Campagnac (1995). See also comparative reports of Bianchi and Guidi (2010), Rangone (2008), and the OECD (2007): "Public procurement review and remedies systems in the European Union," Sigma Papers 41.

[18] In this instance, civil servants as individuals are the private party contracting with the public agent.

A private company can hire whoever it wants and a typical employment contract may simply say "follow the instructions of your principal," whereas in most jurisdictions, the process of employment of civil servants in government agencies is highly formalized and procedural, and job responsibilities are detailed in bylaws and the internal regulations of the agency involved and subject to independent audits (Horn 1995).[19] Both specific employment procedures and rigid contracts in the civil service are aimed at avoiding challenges related to favoritism (Horn 1995), but nonetheless result in bureaucracies with less discretion and creative solutions, and lower productivity compared to the private sector (which is analogous to higher prices in public procurement).

The adaptation of personnel procedures to potential third-party challenges provides a consistent explanation of civil service "inefficiencies" in politically contestable markets that is complementary to the public administration perspective on red tape (Bozeman 1993).[20]

4.2 External Consultants and Certification of Contractors

The engagement of independent consultants (including multilateral agencies and international advisers, particularly in countries with weak legal systems) strengthens the objectivity of procurement processes and prevents third-party challenges that cooperation between public agents and private contractors has become collusive. The use of external consultants, however, comes at a cost.

Similarly, many public bids require the certification of contractors and sub-contractors, which increases contract rigidity and the price of the bid.[21]

With external consultants and the certification of contractors, the implicit aim is to decrease the likelihood of opportunistic challenges ρ by lowering their likelihood of success τ

[19] For example, controls may be overseen by the Government Accountability Office in the USA, the Australian National Audit Office in Australia, the Tribunal de Contas da União in Brazil, or the Bundesrechnungshof in Germany, to name a few.

[20] See also Laffont and Tirole (1991), Pfiffner (1987), and Spiller and Urbiztondo (1994).

[21] For example, in May 2010 a public procurement for the "Canal Safety and Drainage Improvements Project" in Antioch, Pittsburg, Bay Point, Clyde, and Walnut Creek (California), procured by the Contra Costa Water District Construction Department, was objected to by JMB Construction (see http://www.ccwater.com/buscenter/109067_results.pdf; accessed May 28, 2010). JMB Construction argued that the apparent low bidder Con-Quest Contractors included a non-certified subcontractor. According to the Contra Costa Water District Construction Department, the relevance of the works that the alleged subcontractor would provide was minimal for the overall project; however, the challenger argued that the inclusion of a non-certified subcontractor allowed Con-Quest Contractors to bid a lower price ($756,000 compared with JMB Construction's $852,000, i.e., 11 percent cheaper) than if it had included only certified subcontractors.

and increasing the cost c of protesting. In other words, there is a trade-off for the public agent between lower political hazards (downward shift of $\mathbb{E}(T)$) and the additional contracting costs of external consultants and certification (upward shift of K). Therefore, the public agent will employ external consultants and require certification when they sufficiently lower the political costs $\mathbb{E}(T)$ in comparison to the additional contracting costs K.

4.3 Fixed-Price versus Cost-Plus Contracts

Crocker and Reynolds (1993) examined the incentives for contractual parties to design agreements that are left intentionally incomplete with regard to future duties or contingencies. On the one hand, rigid contracts (e.g., fixed-price contracts) mitigate *ex post* opportunism and the associated distortions in unobservable investment, but at the cost of additional resources expended in *ex post* design. On the other hand, flexible contracts (e.g., cost-plus contracts) allow for opportunistic behavior, but are less costly in their design.

In like manner, Bajari, McMillan, and Tadelis (2009) considered the determinants of the choice between auctions (i.e., a rigid procedure) and negotiations (i.e., a discretionary procedure). Auctions perform poorly when projects are complex, contractual design is incomplete, and there are few available bidders. Furthermore, auctions may stifle communication between buyers and sellers, preventing the buyer from utilizing the contractor's expertise when designing the project.

In theory, then, fixed-price contracts are preferable when the adverse selection problem decreases relative to the moral hazard problem (e.g., in the procurement of standardized goods and services or in projects involving a low level of informational asymmetry between the contracting parties), whereas cost-plus contracts are preferable in complex projects when the adverse selection problem increases relative to the moral hazard problem—i.e., when uncertainties related to technological requirements are unknown and bigger than the inefficiencies arising from incomplete monitoring and insulation of the contractor from cost overruns (Loeb and Surysekar 1994).

In practice, cost-plus contracts in the public sphere have been criticized for frequent and substantial cost overruns in government spending.[22] Cost-plus contracts are more adaptable

[22] A U.S. Government Accountability Office's study of 95 major defense acquisition projects found cost overruns of 26 percent, which totaled $295 billion over the life of the projects. Cf. U.S. Government Account-

but also more abusable[23] and subject to shading (Fehr, Hart, and Zehnder 2011). Moreover, the Presidential Memorandum for the Heads of Executive Departments and Agencies on Government Contracting explicitly stated that "there shall be a preference for fixed-price type contracts. Cost-reimbursement contracts shall be used only when circumstances do not allow the agency to define its requirements sufficiently to allow for a fixed-price type contract."[24]

Procurement laws normally allow public agents to design of public procurement projects based on a menu of price, technical, and quality criteria. Public agents are given discretion regarding the choice of criteria and the weights of those criteria in the final decision scoring. However, there is a strong affinity for the price criterion when accountability, scrutiny, and their attached political hazards are high. In France, only 1.9 percent of all public bids include soft clauses.[25] In pre-EU Poland, most public contracts were procured based on a menu of objective and discretionary criteria: 39 percent of public bids were based on the lowest price bidder single criterion in 2002 and 51 percent in 2003. After Poland enter the EU in mid 2004, the lowest price bidder as the single criterion increased to 53 percent in 2005, 64 percent in 2006, 87 percent in 2007, 84 percent in 2008, 90 percent in 2009, and 91 percent in 2010 (Jarzyński 2011). This shift in preference for fixed-price bidding seems to be the result of the increased frequency and complexity of audits after Poland joined the European Union. I.e., public agents preferred to include technical and quality parameters in specifications and rely on the more "objective, clear, and accountable"—less contestable—price criterion for bid selection to avoid TPO.[26]

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ability Office (2008, March): "Defense acquisitions. assessments of selected weapon programs." Report to Congressional Committees, Washington, D.C.

[23] Cost-plus contracts are understood as a "blank check" for contractors and the root cause of procurement inefficiencies. A notable exception is the case of London's Heathrow Airport Terminal 5, which was delivered on schedule and under budget under a cost-plus regime (see http://www.airport-technology.com/projects/heathrow5/ (accessed July 10, 2011).

[24] See Presidential Memorandum of March 4, 2009, for the Heads of Executive Departments and Agencies on Government Contracting, retrieved from http://www.whitehouse.gov/the_press_office/Memorandum-for-the-Heads-of-Executive-Departments-and-Agencies-Subject-Government/ (accessed July 11, 2011).

[25] See Ministère de l'Économie des Finances et de l'Industrie (2010).

[26] Similarly, Cai, Henderson, and Zhang (2013) discuss how Chinese local officials respond to a new party secretary appointment and inquiries into local corruption on land transactions conducted by the city government, the Party, or the National Audit Office. Investigations can lead to removal, indictment, and/or criminal charges against local officials. When faced with increased political risks, local officials responded by temporarily increasing the use of English auctions, the most rigid mechanism they can apply.

Fixed-price contracts do not provide adaptable risk-sharing mechanisms and may lead to an unintended increase in government payments.[27] With closer third-party oversight and a fear of political challenges,[28] public agents will prefer fixed-price contracts in settings in which cost-plus contracts could prove to be more efficient.

4.4 Privatizations of Government-Owned Enterprises

Privatizations of government-owned companiesare typically subject to clauses of commitment by the private acquirer concerning labor retention, modernization processes, future investments, and other politically sensitive issues that impose higher contracting and adaptation costs. On the one hand, rigid privatization contracts (high R) are used because of the fear of challenges to the incumbent public agent by labor unions, the local community, and the political opposition. To minimize opportunistic challenges to privatizations, public agents embed clauses and golden shares in privatization contracts to limit the discretion and "cream skimming" (Kolderie 1986) of the private investor.

On the other hand, such privatization clauses curb the company's governance and consequently lower its selling price (i.e., analogously to a high price for a public procurement). If the privatization proceeds are low, the public agent will be accused of incompetence and of "selling off the family silver" (Kolderie 1986), which implies a high expected political cost for the public agent.

The corollary is that in politically contestable markets, privatizations appear as too costly politically from the public agent's standpoint and as too expensive and over-rigid from a private manager's perspective. Thus, privatizations are less likely to ocurr in politically contested markets in which the expected political costs $\mathbb{E}(T)$ are prohibitive for the public agent.

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[27] See also Tony Purton, "The case for a return to 'cost plus'," *Defense Viewpoints*, March 24, 2007, http://www.defenceviewpoints.co.uk/articles-and-analysis/the-case-for-a-return-to cost-plus (accessed July 10, 2011).

[28] As stated in the Presidential Memorandum of March 4, 2009 (op. cit.), "reports by agency Inspectors General, the Government Accountability Office (GAO), and other independent reviewing bodies have shown that non-competitive and cost-reimbursement contracts have been *misused*, resulting in wasted taxpayer resources, poor contractor performance, and inadequate accountability for results," and "improved *contract oversight* could reduce such sums significantly" (emphasis added).

4.5 Federal Bid Protest Mechanisms and Strategic Sourcing

Political contestability and TPO have relevance with respect to the U.S. Office of Federal Procurement Policy's acquisition regulations and continued oversight demands from the Congress. U.S. executive departments and agencies spend over $500 billion annually to purchase goods and services.[29] The source selection process gives rise to governmental opportunism.

To mitigate governmental opportunism, Congress introduced bid protest mechanisms[30] and entrusted the Government Accountability Office (GAO) as the primary venue for adjudicating federal procurement bid protests. In anticipation of potential third-party challenges, federal agency managers increase the rigidity of the procurement process, which leads to higher prices.[31]

An attempt to remedy higher prices due to TPO was to discourage bid protests by "downgrading" contractors' past performance evaluations for availing themselves of their rights by filing protests or for deciding not to use Alternative Dispute Resolution (ADR) or giving more "positive" past performance evaluations to contractors who refrain from filing protests or agree to use ADR. This practice was disallowed by the Office of Management and Budget in 2002.[32]

More recently, there has been a range of efforts to move federal agencies out of the political arena, toward strategic sourcing,[33] to cut unnecessary contractual rigidity and save

[29] See U.S. Office of Management and Budget memorandum on "Improving Acquisition through Strategic Sourcing," issued on December 5, 2012 and available at: https://www.whitehouse.gov/sites/default/files/omb/memoranda/2013/m-13-02_0.pdf (accessed July 20, 2016).

[30] Bid protests belong to the general class of "fire alarm" mechanisms described by McCubbins, Noll, and Weingast (1989). A "bid protest" is the exercise of the right to contest the outcome of a source selection decision—before or after the award—by third parties, generally by rejected bidders.

[31] Moreover, according to Maser, Subbotin, and Thompson (2012), the outcomes of GAO bid protests appear to be biased in favor of the constituents of congressional leaders. Contested congressional leaders may favor constituency interests (e.g., domestic producers), which exacerbates bid protests from excluded bidders.

[32] See U.S. Office of Management and Budget memorandum on "Protests, Claims, and Alternative Dispute Resolution (ADR) as Factors in Past Performance and Source Selection Decisions," issued on April 1, 2002 and available at: https://www.whitehouse.gov/sites/default/files/omb/assets/omb/procurement/publications/past-perfmemo.pdf (accessed July 20, 2016).

[33] Strategic sourcing is an institutional procurement process that continuously improves and re-evaluates the purchasing activities of an organization. It refers to customized solutions to meet the client's individual needs and/or optimize the supply chain management. The term was popularized by several consulting firms in the late 1980s and early 1990s.

taxpayer dollars by pooling agencies' spending—either centralizing contracting decisions or using government-wide strategic sourcing vehicles—in order to lower prices and reduce duplication and administrative costs.[34]

5 Concluding Remarks

We combine political hazards and transaction costs to explain the apparent inefficiencies in public contracts. High *ex ante* payment volatility or *ex post* flexibility in implementation can trigger opportunistic challenges from third parties that lead to contract failures or costly adaptations by public officials in terms of time or political career. A paramount conclusion of our analysis is that public contracts cannot be directly compared with private contracts to assess their efficiency. Instead, public contracts should be compared with analogous public contracts in similar political environments and should be able to pass Williamson's "remediableness criterion," which holds that "an extant mode of organization for which no superior *feasible* alternative can be described and *implemented* with expected net gains is *presumed* to be efficient" (Williamson 1999, 316; the emphasis is in the original).

The fact that third-party oversight makes public contracting more expensive and rigid than private contracting, however, does not indicate that transferring those activities to the private sector would reduce the political risks and therefore make the activities more efficient. Public procurement is used for "hard" agency problems where consumers cannot be trusted and "when bureaucracies work poorly, [but] consumer choice works worse" (Prendergast 2003, 930–933). As Williamson (1999) indicates, certain transactions have special needs for probity and require the security of the state, and transferring public functions to the private sector (i.e., minimizing the scope of the state) itself involves political hazards, making such transfers hardly preferable for public agents over public contracting itself.

In this paper, we have analyzed public procurement in a variety of environments to show that many of its outer features can be understood as adaptations to the hazards of political

[34] For example, since being put into place in 2010, government-wide contracts for office supplies have saved over $140 million by offering lower prices than any single agency could negotiate on its own. Similar vehicles for domestic delivery services saved over $31 million in 2011 over what agencies were paying under previous agreements (cf. U.S. Office of Management and Budget memorandum on "Improving Acquisition through Strategic Sourcing," issued on December 5, 2012 and available at: https://www.whitehouse.gov/sites/default/files/omb/memoranda/2013/m-13-02_0.pdf (accessed July 20, 2016).

contestability and third-party scrutiny that are prevalent in public contracting. Empirical predictions of the TPO hypothesis include: (a) contracts subject to public scrutiny are more rigid than purely private-to-private (i.e., relational) contracts[35] and (b) in the sub-sample of public contracts, rigidity increases with political contestability.

[35] See, e.g., Moszoro, Spiller, and Stolorz (2016) for a comparison of rigidity terms in contracts in regulated versus non-regulated industries.

Appendix A Notation

Variable	Formula	Meaning
c		Cost of challenge and litigation for third parties
$\mathbb{E}(T)$	$T_0\rho\tau$	Expected political costs from third-party challenges
$F(\cdot), f(\cdot)$		Cumulative distribution function (CDF) and probability density function (PDF)
K	$K_{pr} + K_{pu}$	Adaptation costs, compound of costs borne by the contractor K_{pr} and costs borne by the public agent K_{pu}
P		Price bid by the contractor
P^{bud}		Price budgeted by the public agent (reservation price)
P^{min}	$\geq K_{pr}$	Minimum acceptable price by the contractor
q		Third parties binary decision variable: $q = 1$ when a contract protest is placed; $q = 0$ otherwise
R^*		Optimal contract rigidity
T_0		Political costs for the public agent if the challenge succeeds
$\widetilde{T_0}$	$\widetilde{T_0} \sim \mathcal{N}(\mu, \sigma^2)$	Random variable of third parties' benefits from an opportunistic challenge, distributed normally with mean μ and variance σ^2
$\widetilde{T}$	$\widetilde{T_0}\zeta\tau$	Distribution of expected benefits for an opportunistic challenger
$\overline{T_0}$		Particular value of $\widetilde{T_0}$, known to third parties but unobserved by the public agent
ρ	$\Pr(\widetilde{T} > c)$	Likelihood of third-party opportunistic challenges
τ		Likelihood of success of third-party opportunistic challenges
ζ		Political (market) concentration

Abbreviation	Meaning
ADR	Alternative Dispute Resolution
DoD	U.S. Department of Defense
GAO	U.S. Government Accountability Office
KPI	Key Performance Indicator
OMB	U.S. Office of Management and Budget
PPP	Public–Private Partnership
PSC	Public Sector Comparator
TPO	Third-Party Opportunism

Appendix B Proofs

Appendix B.1 Proof of Proposition 1

Method 1 (Blackwell's theorem):
Consider an experiment D characterized by $k > 0$ irreproachable clauses and $l > 0$ dubious clauses at court such that $D = \{1, 2, \ldots, k, \ldots, k + l\}$, and an experiment D' characterized by k and l, as previously, and $R > 0$ clauses with uninformative clauses or clauses that redundantly specify previous clauses such that $D' = \{1, 2, \ldots, k, \ldots, k + l, \ldots, k + l + R\}$. Further, consider $D'' = \{1, 2, \ldots, k, \ldots, k + l, \ldots, k + l + R'\}$, where $R' > R > 0$.

By the Blackwell's theorem (Blackwell 1953; Crémer 1982), since D' is a garble of D and D'' is a garble of D', then $D \succ D' \succ D''$ to the decision-making court. ∎

Method 2 (random court):
Without loss of generality, Consider a project D characterized by $k > 0$ irreproachable clauses and $l > 0$ dubious clauses at court such that $D = \{1, 2, \ldots, k, \ldots, k+l\}$, and a simple court technology, where a challenge is successful ($\tau = 1$) if the court randomly checks and finds a dubious clause. Thus, the *a priori* probability of a successful challenge at court is $\tau = (l)/(k + l)$.

In a second stage, the politician can add $R > 0$ clauses with uninformative clauses or clauses that redundantly specify previous clauses, but are indifferent at court, such that $D' = \{1, 2, \ldots, k, \ldots, k + l, \ldots, k + l + R\}$. Thence, if a challenge is submitted to court, the *a posteriori* probability of losing office is $\tau = (l)/(k + l + R)$. Differentiating τ regarding R yields $\frac{\partial \tau}{\partial R} < 0$ and $\frac{\partial^2 \tau}{\partial R^2} > 0$. ∎

Appendix B.2 Proof of Proposition 2

Third parties' choice of opportunistic challenge q is such that $q = 1$ if the expected returns of TPO are positive, i.e., $\widetilde{T_0}\zeta\tau(R) > c(R)$. From the public agent's perspective, ρ is the expected value of the random realization of q:

$$\mathbb{E}(q \mid R) \equiv \Pr\left[\widetilde{T_0}\zeta\tau(R) - c(R) > 0\right] \equiv \rho \tag{2}$$

Given that $\frac{\partial \tau}{\partial R} < 0$ and $\frac{\partial c}{\partial R} > 0$,

$$\frac{\partial \rho}{\partial R} = \underbrace{f\left[\widetilde{T_0}\zeta\tau(R) - c(R)\right]}_{\geq 0} \underbrace{\left(\underbrace{\widetilde{T_0}\zeta\frac{\partial \tau}{\partial R}}_{<0} - \underbrace{\frac{\partial c}{\partial R}}_{>0}\right)}_{<0} \leq 0 \quad ∎ \tag{3}$$

Appendix B.3 Proof of Proposition 3

Let $F(\widetilde{T_0}) \sim \mathcal{N}(\mu, \sigma^2)$ be the twice-differentiable normal distribution of $\widetilde{T_0}$ with mean μ and standard deviation σ. From the linear transformation property of normal distributions, let $f\left[\widetilde{T_0}\zeta\tau - c; \zeta\tau\mu - c, (\zeta\tau)^2\sigma^2\right]$.

$\mathbb{E}(T)$ decreases in R—from Proposition 2:

$$\frac{\partial \mathbb{E}(T)}{\partial R} = T_0\left(\tau\frac{\partial \rho}{\partial R} + \rho\frac{\partial \tau}{\partial R}\right) < 0 \tag{4}$$

$\mathbb{E}(T)$ is locally convex in R:

$$\frac{\partial^2 \mathbb{E}(T)}{\partial R^2} = T_0 \Bigg(\underbrace{\tau \frac{\partial^2 \rho}{\partial R^2}}_{\text{See Eq 6}} + \underbrace{2 \frac{\partial \rho}{\partial R} \frac{\partial \tau}{\partial R} + \rho \frac{\partial^2 \tau}{\partial R^2}}_{>0} \Bigg) \tag{5}$$

Differentiating Equation 3 with respect to R:

$$\frac{\partial^2 \rho}{\partial R^2} = \frac{\partial f(\cdot)}{\partial R} \underbrace{\left(\widetilde{T_0} \zeta \frac{\partial \tau}{\partial R} - \frac{\partial c}{\partial R} \right)^2}_{>0} + \underbrace{f(\cdot) \left(\widetilde{T_0} \zeta \frac{\partial^2 \tau}{\partial R^2} - \frac{\partial^2 c}{\partial R^2} \right)}_{>0} \tag{6}$$

Replacing Equation 6 in Equation 5:

$$\frac{\partial^2 \mathbb{E}(T)}{\partial R^2} \begin{cases} \geq 0 & \text{for} \quad \frac{-\partial f(\cdot)}{\partial R} \leq \frac{\tau f(\cdot) \left(\widetilde{T_0} \zeta \frac{\partial^2 \tau}{\partial R^2} - \frac{\partial^2 c}{\partial R^2} \right) + 2 \frac{\partial \rho}{\partial R} \frac{\partial \tau}{\partial R} + \rho \frac{\partial^2 \tau}{\partial R^2}}{\tau \left(\widetilde{T_0} \zeta \frac{\partial \tau}{\partial R} - \frac{\partial c}{\partial R} \right)^2} \\ < 0 & \text{otherwise (locally concave)} \end{cases} \tag{7}$$

$\mathbb{E}(T)$ is globally convex in R—from Propositions 1 and 2:

$$\lim_{R \to 0^+} \frac{\partial \mathbb{E}(T)}{\partial R} < \lim_{R \to \infty} \frac{\partial \mathbb{E}(T)}{\partial R} = 0 \text{ and } \lim_{R \to 0^+} \frac{\partial^2 \mathbb{E}(T)}{\partial R^2} > \lim_{R \to \infty} \frac{\partial^2 \mathbb{E}(T)}{\partial R^2} = 0 \quad \blacksquare \tag{8}$$

Appendix B.4 Proof of Proposition 4

The proof is analogous to the proof of Harberger's triangle (Harberger 1971; Judd 1987).

Let $\eta_Q = -\frac{dQ}{dR} \frac{P}{Q}$ be the effect of a 1% increase in the baseline price due to a change in contractual rigidity dR on equilibrium quantity (i.e., the elasticity version of incidence formula).

Let us define adaptation cost K using change in quantity and change in price:

$$K = -\left(\frac{1}{2} \right) dQ dR \tag{9}$$

i.e., the marginal adaptation cost K is equal to the *wedge* generated by the marginal quantity demand loss dQ times the marginal increase in rigidity dR.

Multiplying both sides of equation (9) by equality $1 = dR/dR \cdot P/Q \cdot Q/P$:

$$K = -\left(\frac{1}{2} \right) \frac{dQ}{dR} \left(\frac{P}{Q} \right) \left(\frac{Q}{P} \right) dR \cdot dR \tag{10}$$

and plugging η_Q into equation (10), we obtain:

$$K = \frac{1}{2} \eta_Q \left(\frac{Q}{P} \right) dR^2 \tag{11}$$

Therefore, K is increasing and strictly convex in R. $\blacksquare$

Appendix B.5 Proof of Lemma 1

For $\lim_{R\to 0^+} \frac{\partial[\mathbb{E}(T)+K]}{\partial R} \geq 0$, $R^* = 0$ (e.g., relational contracting). Otherwise, because $|\lim_{R\to 0} \frac{\partial \mathbb{E}(T)}{\partial R}| > \lim_{R\to 0} \frac{\partial K}{\partial R}$ and $|\lim_{R\to\infty} \frac{\partial \mathbb{E}(T)}{\partial R}| < \lim_{R\to\infty} \frac{\partial K}{\partial R} \exists R^* \in (0,\infty) : R^* = \arg\min_R[\mathbb{E}(T(R)) + K(P,R)]$ and $\frac{\partial[\mathbb{E}(T(R^*))+K(R^*)]}{\partial R} = 0$. ∎

Appendix B.6 Proof of Corollary 1

This proof follows from Lemma 1 and the discussion provided in the text. ∎

Appendix B.7 Proof of Proposition 5

Let $\sigma^L > \sigma^H$ be the standard deviation and let ρ^L, ρ^H be the likelihood of a challenge at low and high scrutiny respectively.

Recalling Equation 2,

$$\rho^{L,H} = \Pr\left[\widetilde{T_0}\zeta\tau(R) - c(R) > 0\right] \tag{12}$$

for $F(\widetilde{T_0}) \sim \mathcal{N}(\mu, (\sigma^{L,H})^2)$. Thus $F(\widetilde{T})^{L,H} \sim \mathcal{N}(\zeta\tau\mu, (\zeta\tau\sigma^{L,H})^2)$ are the CDF of third parties' expected benefits from an opportunistic challenge at low and high scrutiny respectively.

From the mean-preserving spread property $F(\widetilde{T})^{L,H}$ at low and high scrutiny:

(a) If $c = \zeta\tau\mu$, then $\rho^L = \rho^H$

(b) If $c < \zeta\tau\mu$, then $\rho^L < \rho^H$

(c) If $c > \zeta\tau\mu$, then $\rho^L > \rho^H$ ∎

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