NBER WORKING PAPER SERIES

THIRD-PARTY OPPORTUNISM AND THE NATURE OF PUBLIC CONTRACTS

Marian W. Moszoro
Pablo T. Spiller

Working Paper 18636
http://www.nber.org/papers/w18636

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
December 2012

This paper was developed during Moszoro's period as a Visiting Scholar at the Haas School of Business, University of California, Berkeley in 2009-2011. We thank the participants in the presentations made at Northwestern University, George Mason University, Yale University (Law & CBEY), University of Pennsylvania, Columbia University, University of Southern California (ISNIE 2012), Naval Postgraduate School, São Paulo School of Economics (FGV-EESP), Heriot-Watt University (Edinburgh), Université Paris-Sorbonne, Universite Paris-Dauphine, Technische Universität Berlin, IESE (Barcelona), the Economic Institute of the National Bank of Poland, and the joint Warsaw School of Economics–University of Warsaw Econ Seminar for their comments. We are also particularly indebted to Stéphane Saussier and Carine Staropoli for helpful modeling suggestions, and to Matthew Ellman and Pawel Gasiorowski for an extensive review of an early version of the paper. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2012 by Marian W. Moszoro and Pablo T. Spiller. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Third-Party Opportunism and the Nature of Public Contracts
Marian W. Moszoro and Pablo T. Spiller
NBER Working Paper No. 18636
December 2012
JEL No. D23,D72,D73,D78,H57

ABSTRACT

The lack of flexibility in public procurement design and implementation reflects public agents' political risk adaptation to limit hazards from opportunistic third parties – political opponents, competitors, interest groups – while externalizing the associated adaptation costs to the public at large. Reduced flexibility limits the likelihood of opportunistic challenge lowering third parties' expected gains and increasing litigation costs. We provide a comprehensible theoretical framework with empirically testable predictions.

Marian W. Moszoro
IESE Business School
Barcelona, Spain
mmoszoro@iese.edu

Pablo T. Spiller
University of California
Walter A. Haas School of Business
Faculty Bldg. 593
Berkeley, CA 94720
and NBER
spiller@haas.berkeley.edu

In contrast to private contracts, public contracts are open to challenge by third parties. The whiff of corruption and the concern for misuse of other people's monies make challenging public contracts feasible.[1] Even though the enactment and performance of a contract may be honest and legal, public agents may fear politically motivated challenges, and hence will *ex ante* adjust the nature of the contracts so as to limit those features whose probity may be questioned. These adjustments will imply more contract specificity in design and rigidity in implementation. Such contractual adaptation, however, is not costless. Contractors' perception of specificity and rigidity will translate into *ex ante* higher prices as well as the enactment of stronger compensating clauses. The contractual complexity and adaptation required to limit the potential for third-party challenges, whether opportunistic or not, make public contracting look "inefficient."

The higher level of contract specificity and rigidity in public contracting can be understood, then, as a political risk adaptation by public agents.[2] It is not that civic-oriented legislation limits public agents' discretionary actions with "red tape," but rather that public agents limit their exposure to the risk of third parties' challenges through contract formalities and rigidities, externalizing the associated costs to the public at large.

This paper provides an operationalization of Spiller's (2008) third-party opportunism (TPO), towards an understanding of the organizational foundations of pricing, specificity, and rigidity—the outer features (Spiller and Tommasi 2007)—of public contracts. Spiller's framework of public organization is rooted in a transaction cost-*cum*-positive political theory. It follows Williamson's four cornerstones of the economics of governance—namely, governance, transaction costs, adaptation, and interdisciplinary social science—,[3] and introduces third-party opportunism as the quintessential hazard of public transactions.

---

[1] A challenge to a public contract is the objection, either informal through media or formal at court, as to the probity posed by transactions organized in the public sector, with an implicit demand for proof (Williamson 1999).

[2] As Goldsmith and Eggers (2004, 122) underscore, "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."

[3] Williamson (2005, 3) defines governance as "the means by which to infuse order, thereby to mitigate conflict and realize mutual gains." Following Coase (1937), he acknowledges that hierarchies and procurement are alternative methods of coordinating production, that adapt not only through the price system, but also by managerial decisions (Williamson 2005).

1 Prior Literature

Third-party opportunism relates to a threefold literature on public contracting: industrial organization, public administration, and political economy.

In the industrial organization literature, public contract pricing is fundamentally determined by informational costs, arising from informational asymmetries, the extent of verifiability of information, and the presence of repeated interactions (Bajari and Tadelis 2001; Laffont and Tirole 1993; Loeb and Surysekar 1994; Macaulay 1963). According to Marshall, Meurer, and Richard (1994a), when terms can be contested by excluded sellers, agreements are carefully delimited and more formal features govern them.

According to the public administration view, contracting inefficiencies are associated with the large number of formal processes that appear to be essential to ensure the public sector's functions as well as with "red tape," i.e., costly and compulsory rules, regulations and procedures with no efficacy for their functional object (Bozeman 1993). Bureaucrats are used 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), designed to prevent abuses of power, protect people's rights (Baldwin 1990), and reflect equity values (Forrer, Kee, Newcomer, and Boyer 2010). Red tape regulations are intended to decrease public employees' 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).

Positive political scholars have also studied the use of interested parties (McCubbins and Schwartz 1984; de Figueiredo, Spiller, and Urbiztondo 1999) and consumers (Prendergast 2003) as instruments of oversight.

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: its fundamental hazards.

2 A Model of Third-Party Opportunism

2.1 Signaling Process: Hazards into Rigidity

We focus our analysis on the public agent's perspective. Furthermore, we ignore sunk costs to abstract from governmental opportunism[4] and to make the argument on TPO straightforward.

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

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

The signaling process starts before the contract is signed. The public agent receives project features and budget P^{bud} to contract for goods and services. The public agent perceives the threat of potential third-party challenges and tries to minimize political risks and maintain political support through the specificity and rigidity (i.e., the outer features) of the proposed procurement contract. Potential private contractors may not be directly aware of the hazards faced by the public agent, but observe contract specificity and rigidity. Specificity and rigidity equal less adaptability, higher contracting and implementation costs, and hence higher final prices charged to the public agent. Third parties privately perceive the benefits from challenge. Contract features affect third parties' strategies, thereby affecting whether a challenge takes place or not. We model the general public's reaction to a challenge in a stochastic fashion, so that the probability of a successful challenge depends, also, on the specificity and rigidity of the public contract. A successful challenge may imply weakened chances of re-election or re-appointment for incumbent public agents, judicial challenge, and 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.

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

Public agent:

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

} t_0

Private contractors:

4. Observe contract specificity and rigidity
5. Less adaptability equals higher contracting and implementation costs, and hence higher final price

} t_1

Third parties:

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

} t_2

Figure 1: Signaling Process: Hazards into Rigidity—Timing

2.2 Conceptualizing Contract Specificity and Rigidity

Contract specificity refers to *ex ante* complexity of subject, completeness of clauses, technical provisions, and processing costs (Laffont and Tirole 1993). Contract rigidity refers to *ex post* enforcement, penalties, hardness, and intolerance to adaptation of contracts,[5] and normally correlates with contract specificity: the more specific the contract is, the more rigid its implementation and enforcement is expected to be. Rigidity implies that would the contract be specific, and the parties subsequently agree to a deviation, third parties can accuse the contracting parties of collusion. We treat specificity and rigidity hereinafter as interchangeable.

Complex contracts have more contractual rigidities than simpler contracts. The cost of *ex post* enforcement increases in complexity. Because the public sector has more ambiguous objectives than private organizations (Boyne 2002) and it is 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 directives specify in great detail source selection policies, including the development of objective technical, cost, schedule, manufacturing, performance, and risk criteria, the auction techniques, the organization of the selection committee, and the pertinence of contacts with contrac-

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

tors.[6] Public agents must also follow imposed standards of evidence, and may be constrained to formulate standards and follow their own rules to avoid discriminating between distinct situations on the basis of non-verifiable information (Laffont and Tirole 1993).

2.3 Modeling Hazards, Rigidity, and Pricing

To illustrate and operationalize third-party opportunism in public contracting, we introduce some simple notation.[7] The incumbent public agent faces third-party challenges of political cost T_0 with (endogeneous) likelihood ρ, which once placed are successful (at court and vis-à-vis the public at large) with likelihood τ.[8] Third-party challenges may arise from honest attempts to control costs and from opportunistic attempts to replace the public agent. Public agents' third-party related costs, then, have two components: expected third-party opportunism costs $\mathbb{E}(T)$ concomitant with political costs of loss of office, reputation, and support that arise from contract discretionary terms (flexible contracting), and third-party adaptation costs K that increase expenses associated with the contract. If a third-party challenge is successful, there are also costs associated with the financial and social costs of a new tender, i.e., time and documentation, or settlement payments (Marshall, Meurer, and Richard 1994b).[9] We underline political costs as the main burden for public agents concerning third-party challenges, which are difficult to appraise, let alone to measure financially. The more discretionary the contract terms are, the more room there is for third parties to challenge the contract. Therefore, we assume that expected third-party (both honest and) opportunism costs $\mathbb{E}(T)$ can be mitigated by contract rigidity $R \in (0, \infty)$.[10]

The likelihood of success of a challenge τ is common knowledge to all players. Given that it is harder to prove wrongdoing when there is less room for discretionary actions, the likelihood of success of a TPO challenge τ is assumed to decrease in rigidity R, as the courts are more likely to dismiss and the public to ignore challenges to more rigid—"narrower"—contracts. Likewise, in order to fit to more rigid contracts, an opportunistic challenger will

[6] See the U.S. Department of Defense's (2011) memorandum on "Source Selection Procedures," issued on March 4, 2011, and effective July 1, 2011. 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.

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

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

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

have to incur higher monetary, political, and reputational costs of challenge and litigation c. Therefore, the cost of challenge and litigation c is assumed to be increasing in rigidity R. τ and c capture the critical institutional features germane to TPO. We formalize these institutional features in Assumptions 1 and 2:

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

Assumption 2 *The cost of challenge and litigation c is concave and monotonically increasing in rigidity R, so that $\frac{\partial c}{\partial R} > 0$ and $\frac{\partial^2 c}{\partial R^2} \leq 0$.*

Expected third-party opportunism costs $\mathbb{E}(T)$ depend on the political costs of a successful challenge to the incumbent public agent—including the costs of a new tender (documentation, new analyses), cost of externalities, the value of lost time for users,[11] and the harm to the public agent's reputation—and on the likelihood of a successful challenge.

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

where T_0 is the public agent's cost if a TPO challenge is successful. Larger projects are associated with potentially larger TPO costs to the public agent, therefore are linked to higher T_0. Third parties observe benefits from opportunistic challenge, 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 $\widetilde{T_0}$, 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 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

[11] E.g., highway repair generates significant negative externalities for commuters through increased gridlock and commuting times. Lewis and Bajari (2011) take the example of Interstate 35W, a main commuting route in Minneapolis carrying 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 would be 175,000 hours. If we value time at $10 an hour, this is a social cost of $1.75 million per day. Most public contracts affecting the public at large, from sewage disposal to worse service because of a delay in buying IT equipment, carry externalities.

costs (e.g., a bipartisan political market); if $\zeta < 1$, the political market is fragmented and the challenger does not internalize all benefits from a successful contract protest.

From the public agent's perspective, then, the distribution of expected benefits for 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 endogenizes 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., it is the probability of third parties' expected benefits from an opportunistic challenge being higher than the cost of challenge c: $\rho = \Pr(\widetilde{T} > c)$.

An increase in rigidity R carries two effects:

1. It lowers the likelihood of success of a TPO challenge τ; hence, for any given continuous distribution function of third parties' expected political benefits from contract challenge, it yields a scalar transformation distribution function which is first-order stochastically dominated by the distribution function at lower rigidity R (downward probabilistic shift of the cumulative distribution curve of expected third-party opportunism benefits $\widetilde{T}$)

2. It increases 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 resulting in a decrease in the likelihood of challenge ρ due to an increase in contract rigidity R.

ρ is, therefore, 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 about the likelihood of incidence ρ and likelihood of success τ of third-party challenges. The public agent's rational expectation of ρ is consistent with third parties' costs and strategic decision, i.e., $\mathbb{E}(q \mid R) \equiv \Pr[\widetilde{T_0}\zeta\tau(R) > c(R)] \equiv \rho$.

Proposition 1 *The likelihood of challenge ρ is decreasing in rigidity R.*[12]

Proposition 2 *Expected political third-party opportunism costs $\mathbb{E}(T)$ are decreasing and globally convex in rigidity R.*

[12] Proofs are presented in Appendix B.

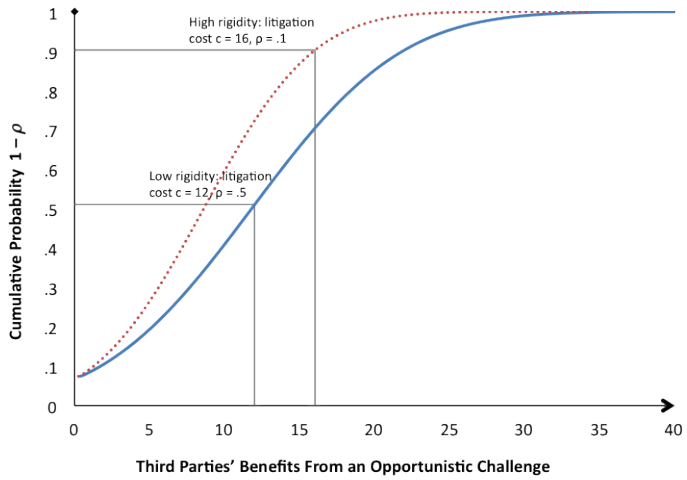

Figure 2: This graph plots the cumulative probability (y axis) of the public agent's beliefs about third parties' expected benefits from an opportunistic challenge (x axis): blue solid line for low rigidity and red dot line for high rigidity contracts. It assumes low rigidity $R^L = 10$, high rigidity $R^H = 30$, a normal distribution of benefits from an opportunistic challenge for third parties $\widetilde{T_0}$ ranging 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 $\gamma = .2$ 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 from R from 10 to 30 induces a decrease in the likelihood of TPO challenge from .5 to .1.

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]

Contract design (*ex ante*), and implementation and enforcement (*ex post*) costs are subject to contract preparation time, professionals (lawyers, engineers, consultants), documentation, and control needed, as well as discounted penalties due to deviations from contract at rigidity R. Penalties, and part of these adaptation costs, are borne directly by the contractor (K_{pr}) and reflected in the contract price, and part is borne only by the public agent (K_{pu}). We assume adaptation costs K—both public and private, and so contract price P—to be increasing in R. The slope of the K curve is a function of the marginal positive and increasing cost (effort) of adaptation—what Laffont and Tirole (1993) call "processing costs"—and penalties at R.

[13] The type of specifications we deal with is non-designative, i.e., they do not point to any particular bidder and do not preclude a competitive bidding market. The particular case of designative specifications is developed in Subsection 2.8.

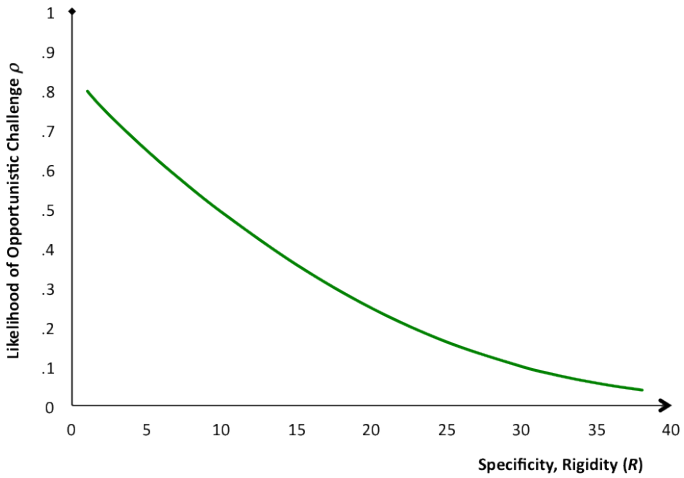

Figure 3: This graph plots the equilibrium likelihood of opportunistic challenge ρ for different levels of rigidity R, assuming the same distribution functions of third parties' expected benefits from an opportunistic challenge and the same cost of challenge as in Figure 2.

Assumption 3 *Adaptation costs K are strictly convex and monotonically rising in rigidity R, so that $\frac{\partial K}{\partial R} > 0$ and $\frac{\partial^2 K}{\partial R^2} > 0$.*

The price P bid by the contractor reflects the sum of operating and adaptation costs (contract-specific subject to rigidity R). The contractor's maximum bid price is 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 subject to zero economic profit 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:

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

Bid price P equals $K_{pr} \mid R$, which also minimizes $K_{pu} \mid R$. Expected third parties' benefits from an opportunistic challenge are given by $\overline{T_0}$, ζ, and c and conditional on τ at R. $\overline{T_0}$ is the particular realization of $\widetilde{T_0}$, known to third parties but unobserved by the public

agent. If the challenge is realized ($q = 1$), 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 costs borne. She has to pay contractors' costs and her own costs, while aiming at minimizing political costs. The optimal level of rigidity R^* is, therefore, driven by expected TPO costs, 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) $P^* \in [P^{min}, P^{bud}] = K_{pr} \mid R^*$

This solution can be achieved intuitively backwards. Starting from R^*, any deviation from equilibrium makes the public agent worse off:

(a) If $R < R^*$, then $\tau(R) > \tau(R^*), c(R) < c(R^*)$, therefore $\rho > \rho^*$ and $\mathbb{E}[T(R)] - \mathbb{E}[T(R^*)] > K(P, R^*) - K(P, R)$ ($\mathbb{E}(T)$ increase offsets gains in K decrease)

(b) If $R > R^*$, then $\mathbb{E}[T(R^*)] - \mathbb{E}[T(R)] < K(P, R) - K(P, R^*)$ (K increase outmatches gains in $\mathbb{E}(T)$ decrease)

Lemma 1 *If Assumption 3 and Proposition 2 hold and if expected third-party opportunism costs $\mathbb{E}(T)$ fall faster in R than adaptation costs K increase in rigidity R for low R states, the sum of expected third-party opportunism costs $\mathbb{E}(T)$ plus 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, TPO is irrelevant for the outcome of the contract (i.e., relational contracts). If TPO is a relevant hazard for the public agent, Lemma 1 implies that the optimal contract is partly flexible and of finite rigidity. A too-flexible contract would be politically too risky while an over-rigid contract would be too expensive. Figure 4 plots an example of expected third-party opportunism costs $\mathbb{E}(T)$ falling in rigidity and specificity R, costs borne by the contractor K_{pr} and adaptation

[14] From the perspective of the TPO, the uncertainty is not on the benefits but on the likelihood of success of the challenge τ.

costs K rising in R, and the U-shaped sum of $\mathbb{E}(T) + K$ as the objective function of the public agent minimizes.

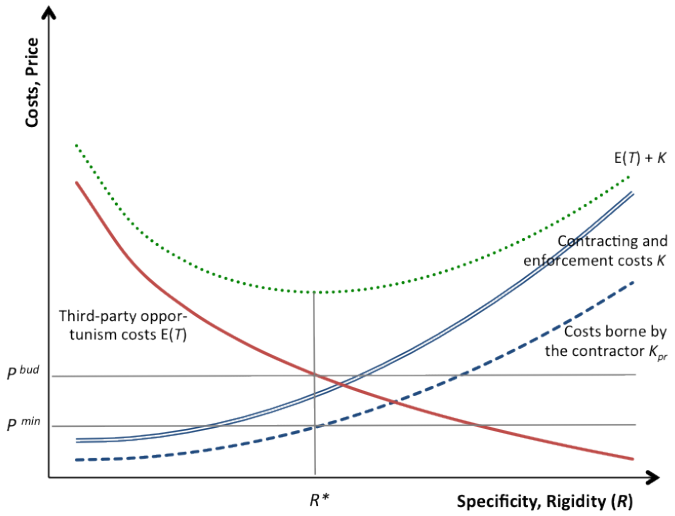

Figure 4: This graph plots expected third-party opportunism costs $\mathbb{E}(T)$ (red solid line) falling in rigidity and specificity R, costs borne by the contractor K_{pr} (blue dash line) and adaptation costs K (blue double-solid line) rising in R, and the U-shaped sum of $\mathbb{E}(T) + K$ (green dot line) as the objective function of the public agent minimizes. The contracting sets of price and rigidity are given by the area above costs borne by the contractor K_{pr} and below the price budgeted by the public agent P^{bud}. P^{min} is the equilibrium price in a competitive market for public contracts.

Corollary 1 *In the presence of TPO, the sequential equilibrium public contract that minimizes political and contracting costs is rigid, ergo more expensive in its design, implementation, and control than the theoretical first-best in the absence of TPO.*

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

2.5 Endogeneity of Opportunistic Challenge

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

(a) Larger contracts are associated with higher expected political benefits for opportunistic third parties (higher mean μ) and, therefore, are associated with higher likelihood of challenge ρ. Similarly, ρ increases in the proximity to elections, since potential political gains are discounted at a higher discount factor

(b) Inherent public-private information asymmetries increase with complexity of transactions. The dispersion of third parties' beliefs about expected political benefits from an opportunistic challenge σ is higher in high informational asymmetry (low scrutiny) states and than in low informational asymmetry ("open accessibility") states

(c) The more dispersed third parties' beliefs about expected political benefits from an opportunistic challenge is, lower cost of litigation c leads to lower ρ and higher c leads to higher ρ

(d) ρ is sensitive to the institutional environment determining τ and c: the higher τ, the higher ρ; the higher c, the lower ρ; the more τ decreases in R, the more ρ will fall in R

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

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

(g) Exogenous institutional changes—e.g., new environmental norms, amendments to the legal system—alter τ and c, and produce a new cumulative probability of challenge distribution, which 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 when the legal system is deregulated

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 informational asymmetry between the actual political costs for the incumbent public agent and the third parties' beliefs about the political benefits from an opportunistic challenge. It induces a calibration of beliefs about expected benefits from an opportunistic challenge (lower standard deviation), yielding a second-order stochastically dominant distribution (see Figure 5), with the inflection point at the mean expected benefits (Mas-Colell, Whinston, and Green 1995). Hence, all other things being kept constant (particularly, mean expected benefits at low scrutiny equal to 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.

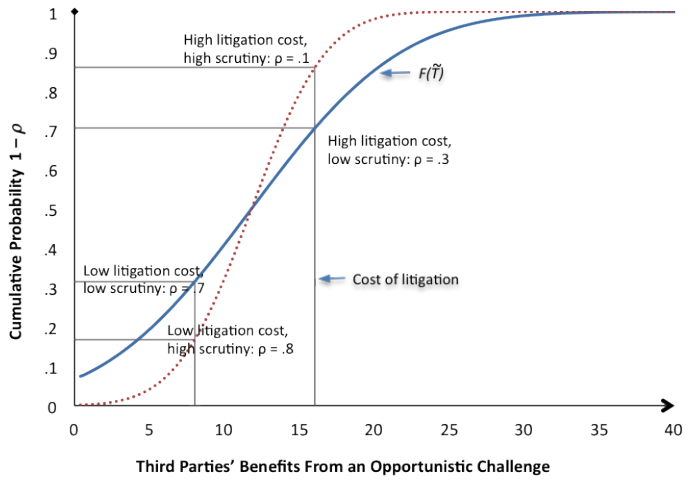

Figure 5: This graph plots the cumulative probability (y axis) of the public agent's beliefs about third parties' expected benefits from an opportunistic challenge (x axis): blue solid line for low scrutiny states and red dot line for high scrutiny states. It assumes rigidity $R = 10$, a normal distribution 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 $\gamma = .2$ 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, $\rho = 1 - \Pr(\widetilde{T_0} \ln[\exp(1) + R]^{-1} < \gamma R + 10) = \Pr(\widetilde{T_0} \ln[\exp(1) + R]^{-1} - \gamma R + 10 \geq 0)$. The distribution function at high scrutiny (red dot line) second-order stochastically dominates the distribution function at low scrutiny (blue solid line). All other things being 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 symmetrizes the information of the public agent and third parties. Consequently, the public agent can better forecast third parties' reaction to her project and choice of R. This prompts a counter-intuitive implication: increased scrutiny increases third parties' knowledge about the public agent and, thus, the public agent knows better what third parties know. This, in turn, leads to a reassessment of the distribution of the public agent's beliefs about benefits of opportunism for third parties $\widetilde{T}$: depending on litigation costs, better informed third parties may increase or decrease the likelihood of TPO. As a result, it is equivocal whether open information policies (as the case of the State of California[15] or the

[15] The California State Legislatures 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.

The Bagley-Keene Open Meeting Act of 1967 implements a provision of the California Constitution which declares that the meetings of public bodies and the writings of public officials and agencies shall be open to public scrutiny, and 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.

The California Public Records Act of 1968 mandates disclosure of governmental records to the public upon

State of Berlin[16]) lead to more efficient public contracts.

Proposition 3 *An increase in scrutiny leads to an increase in the likelihood of challenge at low litigation costs and to a reduction in the likelihood of challenge at high litigation costs.*

2.7 Political and Market Structure

The model accounts for political and market structure. If the political opposition is fragmented, benefits from a challenge can go to any of the political competitors, not necessarily to the challenger who bears costs c; as $\zeta \approx 0$ (atomized political opposition), there will be no TPO challenges, which resembles a single party or autocratic system.[17]

Analogously, a loser bidder will challenge a contract output only if the expected benefits $\widetilde{T}$ are higher than litigation costs c. In this case, ζ describes the challenger's market structure: $\zeta = 1$ for symmetrical Bertrand duopolies (one's contractor losses are the gains for the other), $\zeta < 1$ for oligopolies, and $\zeta \approx 0$ for perfect competition, where an individual competitor has no incentives to challenge a public tender outcome.

2.8 Designative Specifications

In the event that over-detailed specifications were designative, i.e., pointed to one or more particular bidders and precluded a competitive bidding market, they would be a source of TPO challenge of potential collusion or favoritism.

In this case, $\mathbb{E}(T)$ is convex but not strictly decreasing in R, i.e., expected political TPO costs $\mathbb{E}(R)$ first fall in R and then rise in over-specificity R. If $\lim_{R\to 0^+} \frac{\partial[\mathbb{E}(T)+K]}{\partial R} < 0$ holds (see Appendix B.3), then designative specificity is a sufficient condition for finite optimal

request, unless there is a specific reason not to do so. According to Article 1 of the California Constitution due to California Proposition 59 (the Sunshine Amendment) "the people have the right of access to information concerning the conduct of the peoples business."

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

[16] According to the amendment of the Freedom of Information Act of the State of Berlin of July 2010, all contracts have to 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 is the access to contracts on 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 and 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).

[17] Argentina's President Cristina Kirchner does not hold councils with the Board of Ministers nor organize press meetings, and closes the doors to dialogue with the politically fragmented opposition. See: Carmen de Carlos, "El caudillaje de Cristina Kirchner (I)," *ABC*, Barcelona, February 19, 2012, pp. 36–37.

equilibrium rigidity as shown in Lemma 1.

3 Contract Price Under TPO

The public agent budgets—explicitly in tender information, announcements, or budget notes; or implicitly in internal regulations—a maximum price P^{bud} that she can pay the contractor. The acceptable contracting price-rigidity sets for the public agent are below P^{bud}, i.e., contracts "in the budget," and subject to low TPO costs adjusted by R. The 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 sets 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 the contractor is P^{min}. Figure 4 plots $\mathbb{E}(T)$ and K curves, optimal rigidity, and budgeted and minimum prices.

Before the tender, especially in complex contracts, the public agent only has an estimation of the contractor's adaptation costs K_{pr}, but does not know them with certainty. 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—in the case that P^{bud} is not known by bidders prior to the tender—bidders will bid $P > P^{bud}$ and the tender will be annulled.[18] Therefore, "no contract" is a possible outcome if political risks are significant and budgeted expenses are too low at a given rigidity. In this case, the tender will have to be redesigned at a lower rigidity level at the risk of higher TPO for the public agent; the budget reconsidered, creating room for third-party challenges attempting to control budget expenses; or terms negotiated after bidding, increasing TPO on suspicion of collusion.

4 Applications and Supportive Evidence

The TPO model attends to standard public procurement. Nonetheless, it encompasses a wider range of public contracting praxes and can be conductive to the understanding of

[18] In October 2011, the regional government of Lower Silesia, Poland, assigned PLN 12 million for road renovation and maintenance. Meanwhile, it received bids ranged from PLN 46 million to PLN 115 million. Similarly, the city of Łódź, Poland, which planned to spend PLN 201 million for a stadium, received bids ranged from PLN 218 million to PLN 322 million (see: http://www.umwd.dolnyslask.pl/transport/aktualnosci/artykul/o-planach-zwiazanych-z-partnerstwem-publiczno-prywatnym-1/; accessed January 26, 2011). Both tenders were annulled.

mechanisms in public management and efficiency. We now apply the TPO framework to specific settings to derive empirical implications.

4.1 Bureaucracies

Civil servants are subject to more rigid contracts (e.g., regulated hiring, list of duties and responsibilities) than their peers in the private sector.[19] A private company can hire whoever it wants and a typical employment contract may simply say "follow the instructions of your principal," while in most jurisdictions the process of employment of civil servants in public institutions is highly formalized and procedural, and responsibilities are detailed in civil service laws and internal regulations of the agency, department, office, and section in question (Horn 1995), and subject to independent ordinary and extraordinary controls (Horn 1995).[20] Both specific employment procedures and rigid contracts in the civil service are aimed at avoiding challenges of favoritism (Horn 1995; GAO 2003), but nonetheless result in civil servants being allowed less discretion, less initiative in bringing solutions, and lower productivity[21] (analogous to higher price in public tenders). TPO thus provides a consistent explanation of civil service inefficiencies that is broader than the public administration view on red tape.[22]

Bambaci, Spiller, and Tommasi (2007) describe the Argentine bureaucracy as a combination of constitutional protections of civil servants, relatively low wages,[23] and low accountability to "short-lived" political public agents,[24] which produces unresponsive bureaucrats with few incentives to invest in their own capabilities. Precisely because political public agents do not last long, TPO is not a prevalent hazard for them. The institutional adaptation that

[19] In this instance, bureaucrats as individuals are the private party contracting with the public agent.

[20] 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 Brasil or the Bundesrechnungshof in Germany, to name a few.

[21] According to the British Office for National Statistics (ONS), public sector productivity fell by 3.4 percent in 1997-2006, compared with a rise of 28 percent in the private sector over the same 10-year period (see Robert Watts, "Public sector pay races ahead in recession," *The Sunday Times*, January 3, 2010).

[22] See Bozeman (1993). See also Laffont and Tirole (1991), Pfiffner (1987), and Spiller and Urbiztondo (1994).

[23] In 1999, Federal Government wages divided by GDP per capita equaled 1.65 in Argentina, compared with 3.70 in Brazil, 3.25 in Colombia, 3.05 in Chile, and 1.99 in Mexico. See Carlson and Payne (2003).

[24] The low accountability of the Argentinian administration is to a large extent due to the high turnover of political public principals: ministers, secretaries, and undersecretaries of state. For instance, the average tenure of Ministers of Finance in 1950-1989 was 1 year, compared with 2.4 years in developed countries and 2.0 in developing countries (Bambaci, Spiller, and Tommasi 2007).

emerged is the large use of a "parallel bureaucracy,"[25] i.e., temporary contracted professionals, better paid, more responsive to their principals, under a more flexible regime than permanent bureaucrats, and whose appointments are left to the discretion of the principal public agent in office (Iacoviello and Tommasi 2002; Bambaci, Spiller, and Tommasi 2007). Thereby, political public agents in Argentina blend permanent bureaucracy with temporary bureaucrats who respond more flexibly and efficiently.

4.2 Fixed-Price vs. Cost-Plus Contracts

In theory, 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), while cost-plus procurement is 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).[26]

In practice, cost-plus contracts have been criticized by the Obama administration for frequent and substantial cost overruns in government contracting. A GAO (2008) study of 95 major defense acquisition projects found cost overruns of 26 percent, totaling $295 billion over the life of the projects. Cost-plus contracts are more adaptable, but also abusable[27] and shading (Fehr, Hart, and Zehnder 2011). The Presidential Memorandum of March 4, 2009, 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."[28]

Procurement laws normally allow public agents the design of public procurements based

[25] In 1998-1999, parallel bureaucrats accounted for 17 percent in the Presidency office, but 63–88 percent in ministries (see "Estudio exploratorio sobre la transparencia en la Administración Pública Argentina: 1998-1999," Oficina Anticorrupción, Ministerio de Justicia, 2000, cited in Bambaci, Spiller, and Tommasi 2007, 172).

[26] See Loeb and Surysekar (1994).

[27] Cost-plus contracts are seen 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).

[28] 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).

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. There is, however, a strong affinity for the price criterion when accountability and scrutiny, and attached to them political hazards are high. In France, only 2 percent of all public tenders include soft clauses.[29] In pre-EU Poland, most of public contracts where tendered based on a menu of objective and discretionary criteria: 39 percent of public tenders where based on the lowest price bidder single criterion in 2001 and 2002, 51 percent in 2003, and only 29 percent in 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). According to analysts, this preference for fixed-price bidding was the result of increased frequency, complexity, and profundity of controls after Poland's joining the European Union.[30] 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 political risks.

Fixed-price contracts do not provide adaptable risk-sharing mechanisms and may lead to an unintended increase in government payments.[31] In the presence of closer third-party oversight and fear of TPO,[32] public agents will prefer fixed-price contracts in settings where cost-plus contracts could prove to be more efficient. Our result that larger (and thus more complex) projects lead to more restrictive terms of contracting seem counter to the extant literature that cost-plus is preferable for complex projects.

4.3 Public-Private Partnerships

Public-Private Partnerships (PPPs) are public service businesses operated under long-term agreements with private providers. Beside fiscal motives, they are aimed at gaining efficiency from the private sector's technical and managerial advantage through innovation and flexi-

[29] See: http://www.ngo.pl/x/686690.

[30] Poland entered the European Union on May 1, 2004, which can be considered a transition year.

[31] 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). Flyvbjerd, Holm, and Buhl (2002) report costs underestimation in 9 out of 10 transport infrastructure projects: actual costs were 45 percent higher than planned in rail projects, 34 percent in tunnels and bridges projects, and 20 percent in road projects.

[32] As stated in the Presidential Memorandum (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).

bility. Flexibility, however, makes PPPs vulnerable to third-party challenges (higher ρ). To limit the scope of *ex post* challenges from third parties, public agents control outputs through Key Performance Indicators (KPIs), i.e., measures under which the contractors are evaluated. At the same time, KPIs constitute a signal for the public at large that the service, although privately provided, remains publicly accountable. KPIs are thus crucial to curb third parties' ability to challenge PPPs. Nevertheless, the failure of many (potential) PPPs can be rooted in high adaptation costs K imposed on private contractors.

A number of Australian studies of private investment in infrastructure reached the conclusion that, in most cases, the PPPs were inferior—overall more expensive for the public or delivered lower quality of services—than the standard model of public procurement based on competitively tendered construction of publicly-owned assets. One response by public agents to these negative findings was the development of formal procedures for *ex ante* assessment of PPPs using the Public Sector Comparator (PSC) and Value-for-Money (VfM) methodologies, i.e., introducing more contractual *ex ante* specificity and contractual costs.[33]

In 2009, the Treasury of New Zealand, in response to inquiries by the new National Party government, released a report on PPPs that came to the conclusion that "there is little reliable empirical evidence about the costs and benefits of PPPs" and that "the advantages of PPPs must be weighed against the *contractual complexities and rigidities* they entail."[34]

PPPs were introduced to bring private management practices to the public sphere and over time became closer to regulation. In the presence of TPO, public agents will pursue private provision of public goods only in projects where expected gains from contract flexibility and better private management offset the increase of costs of compliancy with *ex ante* cost-benefit assessment and *ex post* KPIs.

4.4 External Consultants and Certification of Contractors

The engagement of independent consultants (e.g., multilateral agencies, international advisers, especially 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 crossed the line and become collusion.

[33] See, for example, the Department of Treasury and Finance of Victoria's (2001) technical note on PSC.

[34] Brian Rudman, "Promised electric trains derailed by misguided enthusiasm." *The New Zealand Herald*. June 1, 2009. Emphasis added.

Moszoro and Krzyzanowska (2008) report the employment of external consultants in the city of Warsaw in the pre-procurement planning phase when it wanted to introduce novel PPP contracts: firstly, to overcome the lack of expertise in complex contracting (to reduce K) and, secondly and most importantly, to "safeguard the city authorities against complaints and criticism by subsequent administrations." While the city authorities could have designed the tender process in-house, they seem to have outsourced it to reduce TPO. The use of external consultants, however, came at a cost: PLN 10 million ($3.2 million), i.e., 1.2 percent of the estimated budget for those projects.

Similarly, certain public tenders require certification of contractors and sub-contractors, increasing contract specificity and the price of the tender. In May 2010, a public procurement for the "Canal Safety and Drainage Improvements Project" in Antioch, Pittsburg, Bay Point, Clyde, and Walnut Creek (California), tendered by the Contra Costa Water District Construction Department, was objected to by JMB Construction.[35] JMB Construction argued that the apparent low bidder Con-Quest Contractors included a non-certified subcontractor. According to Contra Costa Water District Construction Department, the relevance of the works the alleged sub-contract would provide was minimal for the project overall; 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. [36] Furthermore, if required "red-tape" certificates exclude qualified bidders and prevent competitive bidding, the market structure will become more oligopolistic and additional dead-weight inefficiencies will add to the final equilibrium price.

In both cases—the use of external consultants and certification of contractors—the implicit aim is to lessen the likelihood of TPO challenge ρ. There is a trade-off for the public agent between lower TPO hazards and additional contracting costs K of external consultants and certification. The public agent will employ external consultants and certification when additional contracting costs K incurred are lower than price gains in contract flexibility due to lower $\mathbb{E}(T)$ and R^*.

[35] See http://www.ccwater.com/buscenter/109067_results.pdf (accessed May 28, 2010).
[36] Based on an interview held in May 2010 with a Contra Costa Water District engineer.

4.5 Efficient Small Communities and Authoritarian Regimes

Small local governments (towns, counties) can be more efficient in public contracting than larger governments (metropolises, states). In local communities, projects are relatively small, but challenge costs may not be lower than in larger communities. Under these conditions, smaller governments may face less challenges than central governments and subsequently lower potential TPO costs. The public agent in local communities can therefore engage in more discretionary contracts and incur lower transaction costs.

Autocratic regimes, where the likelihood of challenging the incumbent public agent is low, can contract public works more discretionarily and, thus, quicker and even cheaper when omitting inefficiencies arising from favoritism and corruption. The lack of chances for TPO can help to explain the rapid development of infrastructure in Paraguay during the Stroessner regime. Molinas, Pérez-Liñán, Saiegh, and Montero (2006, 12–13) report the significant ability of the regime "to reap the benefits offered by long-term economic opportunities. (...) [Development programs were] possible because of the intertemporal 'cooperation' of the key actors (the government, the Party, and the Armed Forces). The adaptation of the development model to allow for increasing integration with Brazil would have been unlikely under short-lived governments like the ones characterizing the post-Chaco war period (1936-1954). During that 18-year period, there were 12 different presidents, and political volatility prevented an adaptation to changing economic environments. (...) During the 1960s and the 1970s, Paraguay built roads, silos and, most importantly, the biggest dam in the world, the Itaipú Hydro-electric Dam, built jointly with Brazil. The long-term growth strategy turned out to be effective. During the 1960s, real GDP growth was 4.2 percent. During the 1970s, Paraguay had one of the highest growth rates in the region, with real GDP increasing at 8 percent over the decade." That ability to move policy decisively and effectively by an authoritarian regime, however, also funneled most of the benefits from this fast development period to a few contractors and subcontractors—companies owned by the dictator's followers (Fogel 1993).

4.6 Privatizations of Government-Owned Companies

Privatizations of government-owned companies[37] are usually subject to clauses of commitment by the private acquirer concerning labor retention, modernization processes, future investments and other social sensitive issues. On the one hand, rigid privatization contracts (high R^*) take place in the fear of TPO challenges to the incumbent public agent by labor unions, the local community, and the political opposition. In order to minimize TPO challenges to privatizations, public agents embed clauses and golden shares in privatization contracts that allow them to limit "cream skimming" (Kolderie 1986) and the discretion of the private investor. On the other hand, such privatization clauses limit the company's governance and, consequently, lower its value (analogous to a high price in a public procurement). If the revenue to the public budget from privatization is low, the public agent can be accused of collusion with the private agent or of "selling off the family silver" (Kolderie 1986). The corollary is that privatizations' aftermath regarding price and efficiency appears to be a sell-off from a government's valuation standpoint and rigid from a private managerial perspective.

5 Concluding Remarks

Our approach combines political hazards and transaction costs to explain apparent inefficiencies in public contracts. High *ex ante* payment volatility or *ex post* flexibility in implementation may trigger drawbacks, leading to contract failure or costly adaptation by the public official, whether in terms of time or political career. A paramount conclusion of our analysis is that public contracts cannot be directly compared to private contracts. Instead, they can only be compared to analogous public contracts, and should 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 original), to attest to their efficiency.

The fact that public contracting is more expensive and rigid than private contracting, however, does not mean that transferring those activities to the public sector would reduce political risks and hence make them more efficient. Public procurement is used for "hard"

[37] PPP and privatization differ in that the former is a transfer to the private sector of a right (which may or may not come with a physical asset) to perform the public function, while the latter usually refers to the sale of an asset which is not necessarily idiosyncratic to the public sector (e.g., liquor stores in Pennsylvania).

agency problems where consumers cannot be trusted and "when bureaucracies work poorly, [but] consumer choice works worse" (Prendergast 2003, 930–933). Not only, as Williamson (1999) discusses, do certain transactions have special needs for probity and require the security of the State, but the privatization of public functions itself involves TPO hazards, making them doubtably preferable for public agents than public contracting itself.

In this paper, we have analyzed public procurement in a variety of environments to show that much of its outer features can be understood as political adaptations to the fundamental hazard of third-party opportunism prevalent in public contracting.

Appendix A Notation

Variable	Formula	Meaning
c		Cost of challenge and litigation for third parties
$\mathbb{E}(T)$	$T_0\rho\tau$	Expected third-party opportunism costs
$F(\cdot), f(\cdot)$		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
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 of third-party opportunism for the public agent
$\widetilde{T_0}$	$\widetilde{T_0} \sim \mathcal{N}(\mu, \sigma^2)$	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
DoD	U.S. Department of Defense
GAO	U.S. General Accounting Office
KPI	Key Performance Indicator
PPP	Public-Private Partnership
PSC	Public Sector Comparator
TPO	Third-Party Opportunism

Appendix B Proofs

Appendix B.1 Proof of Proposition 1

Third parties' choice of opportunistic challenge q is such that $q = 1$ iff expected returns to 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 $\frac{\partial c}{\partial R} > 0$,

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

Appendix B.2 Proof of Proposition 2

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 1:

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

$\mathbb{E}(T)$ 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 Assumption 1 and Proposition 1:

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

Appendix B.3 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, since $|\lim_{R\to 0} \frac{\partial \mathbb{E}(T)}{\partial R}| > \lim_{R\to 0} \frac{\partial K}{\partial R}$ 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.4 Proof of Corollary 1

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

Appendix B.5 Proof of Proposition 3

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

Recalling equation 2,

$$\rho^{L,H} = \Pr\left[\widetilde{T_0}\zeta\tau(R) - c(R) > 0\right] \tag{9}$$

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 $\rho^L > \rho^H$ ∎

References

Bajari, P. and S. Tadelis (2001). Incentives versus transaction costs: A theory of procurement contracts. *RAND Journal of Economics 32*(3), 387–407.

Baldwin, J. N. (1990). Perceptions of public versus private sector personnel and informal red tape: Their impact on motivation. *American Review of Public Administration 20*(1), 7–28.

Bambaci, J., P. T. Spiller, and M. Tommasi (2007). The bureaucracy. In P. T. Spiller and M. Tommasi (Eds.), *The Institutional Foundations of Public Policy in Argentina*. New York: Cambridge University Press.

Boyne, G. A. (2002). Public and private management: What's the difference? *Journal of Management Studies 39*(1), 97–122.

Bozeman, B. (1993). A theory of government 'red tape'. *Journal of Public Administration Research and Theory 3*(3), 273–303.

Carlson, I. and J. M. Payne (2003). Estudio comparativo de estadísticas de empleo público en 26 países de América Latina y el Caribe. In K. Echebarria (Ed.), *Red de gestión y transparencia de la política pública. Servicio civil: temas para el diálogo*. Washington, DC: Inter-American Development Bank.

Coase, R. H. (1937). The nature of the firm. *Economica 4*(16), 386–405.

de Figueiredo, R. J. P., P. T. Spiller, and S. Urbiztondo (1999). An informational perspective on administrative procedures. *Journal of Law, Economics, and Organization 15*(1), 283–305.

Department of Defense (2011). Source selection procedures. Memorandum.

Department of Treasury and Finance of Victoria (2001). Partnerships Victoria guidance material: Public sector comparator—technical note.

Fehr, E., O. Hart, and C. Zehnder (2011). Contracts as reference points—experimental evidence. *American Economic Review 101*(2), 493–525.

Flyvbjerd, B., M. S. Holm, and S. Buhl (2002, Summer). Underestimating costs in public works projects: Error or lie? *Journal of the American Planning Association 68*(3), 279–295.

Fogel, R. (1993). La estructura social paraguaya y su incidencia en la transición a la democracia. In D. A. Brun (Ed.), *Paraguay en Transición*, pp. 13–30. Caracas: Editorial Nueva Sociedad.

Forrer, J., J. E. Kee, K. E. Newcomer, and E. Boyer (2010). Public–private partnerships and the public accountability question. *Public Administration Review 70*(3), 475–484.

GAO (2003). Equal employment opportunity. SSA Region X's changes to its EEO process illustrate need for agencywide procedures. Report to Congressional Requesters.

GAO (2008). Defense acquisitions. assessments of selected weapon programs. Report to Congressional Committees.

Goldsmith, S. and W. D. Eggers (2004). *Governing by Network: The New Shape of the Public Sector*. Washington, DC: Brookings Institution Press.

Horn, M. (1995). *The Political Economy of Public Administration: Institutional Choice in the Public Sector*. Political Economy of Institutions and Decisions. Cambridge, UK: Cambridge University Press.

Iacoviello, M. and M. Tommasi (2002). Diagnóstico institucional de sistemas de servicio civil: caso Argentina. In *Diálogo Regional de Políticas*. Buenos Aires: [n.a.].

Jarzyński, W. (2011). Najniższa cena w przetargach publicznych. Analiza FOR 12/2011.

Kolderie, T. (1986). The two different concepts of privatization. *Public Administration Review 46*(4), 285–291.

Kurland, N. B. and T. D. Egan (1999). Public v. private perceptions of formalization, outcomes, and justice. *Journal of Public Administration Research and Theory 9*(3), 437–458.

Laffont, J.-J. and J. Tirole (1991). The politics of government decision-making: A theory of regulatory capture. *Quarterly Journal of Economics 106*(4), 1089–1127.

Laffont, J.-J. and J. Tirole (1993). *A Theory of Incentives in Procurement and Regulation*. Cambridge, Mass.: MIT Press.

Lan, Z. and H. G. Rainey (1992). Goals, rules, and effectiveness in public, private, and hybrid organizations: More evidence on frequent assertions about differences. *Journal of Public Administration Research and Theory 2*(1), 5–28.

Lewis, G. and P. Bajari (2011). Procurement contracting with time incentives: Theory and evidence. *Quarterly Journal of Economics 126*(3), 1173–1211.

Loeb, M. P. and K. Surysekar (1994). On the optimality of cost-based contracts in sole source procurement. *Management Accounting Research 5*(1), 31–44.

Macaulay, S. (1963). Non-contractual relations in business: A preliminary study. *American Sociological Review 28*(1), 55–67.

Marshall, R. C., M. J. Meurer, and J.-F. Richard (1994a). Curbing agency problems in the procurement process by protest oversight. *RAND Journal of Economics 25*, 297–318.

Marshall, R. C., M. J. Meurer, and J.-F. Richard (1994b). Litigation settlement and collusion. *Quarterly Journal of Economics 109*(1), 211–239.

Mas-Colell, A., M. D. Whinston, and J. R. Green (1995). *Microeconomic Theory*. Oxford University Press.

McCubbins, M. D. and T. Schwartz (1984). Congressional oversight overlooked: Police patrols versus fire alarms. *American Journal of Political Science 28*(1), 165–179.

Molinas, J., A. Pérez-Liñán, S. M. Saiegh, and M. Montero (2006). Political institutions, policymaking processes and policy outcomes in Paraguay, 1954-2003. *IDB Working Paper No. 201*.

Moszoro, M. and M. Krzyzanowska (2008). Striving for the quality of public services through public-private partnerships. the case of 7 projects in the city of Warsaw. In L. Galetic and N. Cavlek (Eds.), *An Entterprise Odyssey: Tourism—Governance and Enterpreneurship*, pp. 29–30. University of Zagreb.

Pfiffner, J. P. (1987). Political appointees and career executives: The democracy-bureaucracy nexus in the third century. *Public Administration Review 47*(1), 57–65.

Prendergast, C. (2003). The limits of bureaucratic efficiency. *Journal of Political Economy 111*(5), 929–958.

Spiller, P. T. (2008). An institutional theory of public contracts: Regulatory implications. *NBER Working Paper No. 14152*.

Spiller, P. T. and M. Tommasi (2007). *The Institutional Foundations of Public Policy in Argentina*. Cambridge University Press.

Spiller, P. T. and S. Urbiztondo (1994). Political appointees vs. career civil servants: A multiple principals theory of political bureaucracies. *European Journal of Political Economy 10*(3), 465–497.

Williamson, O. E. (1999). Public and private bureaucracies: A transaction cost economics perspectives. *Journal of Law, Economics, and Organization 15*(1), 306–342.

Williamson, O. E. (2005). The economics of governance. *American Economic Review 95*(2), 1–18.