

# Three Isn't Always a Charm: Third-Party Opportunism, Scrutiny, and the (In)Efficiency of Public Contracts

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## Abstract

Public contracts feature higher specificity and rigidity than analogous pure private contracts. The lack of flexibility in *ex ante* design and *ex post* implementation translates into contract inefficiencies and higher prices. However, specificity and rigidity are an efficient political risk adaptation by which public agents endogenize the likelihood of contract protest and limit political hazards from opportunistic third parties—political opponents, competitors, interest groups—externalizing the associated costs to the public at large. We present a comprehensible and testable theory of third-party opportunism and its effects on public contracts. We show that in the presence of opportunistic third parties there exists a Bayesian Nash equilibrium in which public contracts are more specific and rigid, and thus more expensive in their design, implementation, and control than the theoretical first-best in a non-opportunistic setup. Furthermore, we show conditions under which third-party scrutiny increases contracting efficiency. We use case examples to illustrate the theory in practical settings and derive empirical implications. Finally, we extend the model to embrace governmental opportunism and corporate governance with minority shareholders and external stakeholders.

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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<sup>1</sup> make challenging public contracts feasible. High *ex ante* payment volatility or *ex post* flexibility in implementation may trigger implementation challenges, leading to contract failure or to costly adaptation by the public official, whether in terms of time or political career. Thus, 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 on 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.<sup>2</sup> It is not that civic-oriented legislation limits public agents’ discretionary actions with “red tape,” but rather that public agents limit 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—of public contracts. Spiller’s theory of public organization is rooted in a transaction cost-cum-positive political theory, where the nature of organizational adaptation of public contracts results from their inherent hazards. Spiller’s framework follows Williamson’s four cornerstones of the economics of governance—namely, governance,<sup>3</sup> transaction costs,<sup>4</sup> adaptation,<sup>5</sup> and interdisciplinary social science<sup>6</sup>—and introduces third-party opportunism as the quintessential hazard of public transactions.

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<sup>1</sup> What Williamson (1999, 311) calls the hazard of probity posed by transactions organized in the public sector.

<sup>2</sup> As Goldsmith & 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.”

<sup>3</sup> Williamson (2005, 3) defines governance as “the means by which to infuse order, thereby to mitigate conflict and realize mutual gains.”

<sup>4</sup> Acknowledging that hierarchies and procurement are “alternative methods of coordinating production” (Coase 1937, 388).

<sup>5</sup> Not only through the price system, but also as a managerial decision.

<sup>6</sup> The need to incorporate insights from law, political science, and sociology to understand what the rough price theory cannot fully capture.

# 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 & Tadelis 2001, Laffont & Tirole 1993, Loeb & Surysekar 1994, Macaulay 1963, Marshall, Meurer & Richard 1994*a*). Hart & Moore (2008) present a model with a trade-off between flexibility and rigidity in relational contracts, where the combination of *ex ante* competition and *ex post* lock-in makes the initial contract a useful reference point. In a flexible contract, a party may feel entitled to different outcomes within the contract and thus “shades by providing perfunctory rather than consummate performance” if she does not get what she expected (Fehr, Hart & Zehnder 2011, 494). It is, however, the nature of the hazards involved in public-private relations that determines the fundamental features of public procurement and contracting. Not only is “the nature of the agreement [...] carefully delimited, and the more formal features govern when [...] terms are contested,” but the potential for a contest from an excluded seller what impacts the nature of the agreement (Marshall, Meurer & Richard 1994*a*). Whereas the parties in private-private relations adapt to new information as it becomes available in order to save litigation cost, and courts are rather used to terminate disputes, public contracts appear bureaucratic and over-monitoring in situations in which it is not needed (Prendergast 2003, 932–933).

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, 274).<sup>7</sup> Bureaucrats are used only for “hard” agency problems, where consumers cannot be trusted (Prendergast 2003, 933). 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

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<sup>7</sup> A report to Congressional Committees on a Congress-authorized test program to simplify the procedures for the acquisition of commercial supplies and services that allowed government buyers to eliminate certain procedural requirements when purchasing commercial items not exceeding \$5 million, i.e., allowing contract flexibility, indicated that although “data was not collected to provide a basis for measuring whether the test program produced the desired results of maximizing efficiency and economy and minimizing burden and administrative costs for both the government and industry, [...] the Office of Federal Procurement Policy survey of procurement executives in 1999 showed that these executives believed that the program has had a positive impact on the federal procurement process. [...] However, the survey did not collect empirical data that would have supported these views” (GAO 2001).

(Baldwin 1990, 10–11), and reflect equity values not necessarily present in private firms, including educational, health-related, legal, and environmental (Forrer et al. 2010, 480). Red tape regulations are intended to decrease public employees’ uncertainty about how they should behave (Kurland & Egan 1999, 440). Both formalities and red tape are the instruments by which bureaucracies restrict public agents’ discretion (Boyne 2002, Lan & Rainey 1992) and “overcome the temptation to capitulate to consumers simply to avoid complaints” (Prendergast 2003, 932).

The political economy profession has long been divided into advocates of public interest theory (in line with the public sector motivation literature), and “capture” or interest group theory of government intervention in industries, seeded by Buchanan (1965) and Olson (1965), and elaborated by Stigler (1971). This positive approach, both in its Chicago school (Becker 1983, Peltzman 1976, Stigler 1971) and Virginia school (Buchanan 1975, Buchanan, Tollison & Tullock 1980) modalities, concentrates on the demand-side, “black-boxing” the supply-side of political decision-making (Laffont & Tirole 1993, 475–476). On the other hand, positive political theory scholars, led by Riker (1963), focused on the supply-side of political decision-making, studying how politics—legislative procedures, administrative procedures, and bureaucratic oversight—affects legislative, judicial, and regulatory behavior.<sup>8</sup> Positive political scholars have also studied the use of interested parties (McCubbins & Schwartz 1984, de Figueiredo, Spiller & Urbiztondo 1999) and consumers (Prendergast 2003) as instruments of oversight.

In addition to the mainstream political economy view of public contracting, there is an increasing literature on the crucial role of political motives in shaping public-private long-term relations. According to Hammami, Ruhashyankiko & Yehoue (2006), private participation (from procurement to privatization) is positively correlated with less corruption and with an effective rule of law. Engel, Fischer & Galetovic (2006) suggest that public agents, to increase their chances for re-election, prefer direct spending instead of more complex contracts subject to scrutiny. In developing countries, new administrations tend to renegotiate or unilaterally change concession agreements (Brench et al. 2005, Guasch, Laffont & Straub 2007, Lobina & Hall 2003), i.e., reshape contract terms and appropriate rents. Iossa & Martimort (2008) conclude that long-term contracting can help to prevent cost overruns, but it requires institutions with strong commitment power and when the risk of regulatory opportunism increases, the case for long-term contracting is weaker.

Laffont & Tirole (1993) emphasize that the link “between procurement and regulation and

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<sup>8</sup> See, for example, Ferejohn (1990), Gely & Spiller (1990), McCubbins, Noll & Weingast (1987, 1989), Weingast & Moran (1983).

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 operationalize the basic features of public contracting from its primitive considerations: its fundamental hazards.

## 2 A Heuristic Model of Third-Party Opportunism

### 2.1 Signaling Process: Hazards into Rigidity

We focus our analysis on the public agent’s perspective. We ignore sunk costs to abstract from governmental opportunism,<sup>9</sup> 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 contractor
3. Third-party challengers, i.e., political opponents to the incumbent public agent, competitors to the contractor, and interest groups<sup>10</sup>
4. Public at large, i.e., voters and courts

The signaling process starts before the signing of a contract. The public agent is commissioned to use public monies and 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. Contract outcomes affect voters’ opinions, thereby affecting electoral outcomes. If a public contract does not meet the expectations of the public, political consequences may include weakened chances of re-election for incumbent public agents (Forrer et al. 2010, 480). The private contractor may not be directly aware of the hazards faced by the public agent, but observes 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.

### 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 & Tirole 1993, 307). Contract rigidity refers to *ex post*

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<sup>9</sup> See Spiller (2008) and references therein.

<sup>10</sup> In our understanding, the closest to a third-party challenger—reversing Buchanan’s (1975, 229) and Williamson’s (1985, 29) nomenclature—is an “anti-arbitrator,” i.e., an outsider who tries to create conflict between parties who have reached an agreement. As an arbitrator lessens frictions and transaction costs, so a challenger to a public contract increases political costs to the public agent.

enforcement, penalties, hardness, and intolerance to adaptation of contracts,<sup>11</sup> and normally correlates with contract specificity: the more specific the contract is, the more rigid its implementation and enforcement is expected to be. Otherwise, if the contract is specific and then the parties agree to deviate, third parties can accuse the contracting parties of collusion.

Complex public 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 & Rainey 1992), public high specificity and rigidity mitigate 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 contractors.<sup>12</sup> 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 & Tirole 1993, 5).

### 2.3 Modeling Hazards, Rigidity, and Pricing

Third-party challenges may arise from honest attempts to control costs and from opportunistic attempts to replace the public agent. Third-party costs, then, have two components: expected third-party costs  $\mathbb{E}(T)$  related to political costs of loss of office, reputation, and support that surge from contract discretionary terms (flexible contracting), and third-party costs  $K$  that rise with expenses and penalties related to the contract. Penalties and part of these contracting costs is borne directly by the contractor ( $K_{pr}$ ) and reflected in the contract price, and part borne only by the public agent. 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,<sup>13</sup> or settlement awards made by the winning bidders to protesters in exchange for a promise to drop their protest (Marshall, Meurer & Richard 1994*b*). We underline political<sup>14</sup> costs as the main

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<sup>11</sup> In this regard, contract rigidity is the opposite of a “best efforts” clause.

<sup>12</sup> See the 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).

<sup>13</sup> Marshall, Meurer & Richard (1994*a*) sustain that allowing excluded bidders to challenge the outcome of a procurement process inefficiently reduces sole-sourcing.

<sup>14</sup> Maser, Subbotin & Thompson (2010) study the efficiency of the bid-protest mechanism in the US. In underlining “fairness” in contracting, i.e., that giving equal treatment to “*all* potential suppliers matters, not only to winners, but to losers as well” (Maser, Subbotin & Thompson 2010, 2; their emphasis), they characterize the challenger as a loser bidder and focus on the transaction-cost side of TPO, ignoring the political context of public agents. They make this point more explicitly next, recalling the rule-of-law doctrine: “official duties

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, expected third-party costs  $\mathbb{E}(T)$ —both honest and opportunistic—can be mitigated by contract specificity and rigidity  $R$ .

Contract design (*ex ante* specificity), and implementation and enforcement (*ex post* rigidity) costs are subject to time needed for contract preparation, lawyers, documentation, and control, and can be measured financially. Contracting and enforcement costs  $K$  rise with contract specificity and rigidity  $R$ . The public agent wants to keep  $K$  low, because the more expensive a contract is, the more subject the public agent is to third party challenges for misuse of funds.

In order to illustrate and operationalize the third-party opportunism theory of public contracts, we introduce some simple notation.<sup>15</sup> Hazards faced by the public agent are subject to the likelihood of TPO challenge  $\sigma$  and the likelihood of success of TPO challenge  $\tau$ ,<sup>16</sup> which are driven by contract complexity (sector-specific) and political contestability.

The price  $P$  bid by the contractor is the sum of operating costs (company-specific), contracting costs for the private contractor (contract-specific subject to rigidity  $R$ ) and a mark-up (economic profit). To simplify our argument, we assume a uniform technology across firms and a competitive bidding market, such that  $P$  is the lowest possible cost subject to zero economic profit and follows private contracting and enforcement costs  $K_{pr}$ . We also assume away governmental opportunism, i.e., direct or incremental expropriation by the public agent.

The likelihood of TPO challenge  $\sigma$  is assumed to increase in complexity of transactions, as inherent public-private information asymmetries increase with complexity; “open accessibility”, as in open democracies there is more public participation, scrutiny, and accountability; proximity to elections, since political challengers arise as potential political gains increase; and decrease in cost of challenge  $h$  (costs of court litigation, new elections campaign) relative to the gains and value of a contract, and rigidity  $R$ , as there is less room for challenge.

Given that it is harder to prove wrongdoing when there is less room for discretionary actions, the likelihood of success of TPO challenge  $\tau$  is also assumed to decrease in rigidity  $R$ , as the courts are more likely to dismiss and the public to ignore challenges to more specific and

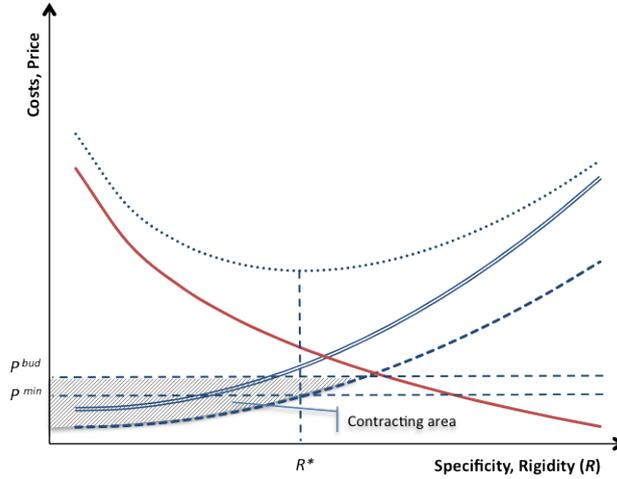
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are supposed to be defined primarily by neither instrumental aims nor political pressure, but by law” (Maser, Subbotin & Thompson 2010, 3).

<sup>15</sup> See Appendix A for a glossary of notation.

<sup>16</sup> We use the term “likelihood” instead of “probability” to underline that we refer here to singular public contacts. The likelihood of third-party challenge and the success of the challenge can be compounded, since what makes a challenge actual is its likelihood of success (likelihood of third-party challenge  $\sigma$  increases in the likelihood of success of the challenge  $\tau$ ). Every challenge has some probability of success; otherwise the challenger would lose resources and reputation.

rigid—“narrower”—contracts. As both  $\sigma$  and  $\tau$  decrease in  $R$ ,  $\mathbb{E}(T)$  costs fall as well in  $R$ .



**Figure 1:** 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 contracting and enforcement costs  $K$  (blue double-solid line) rising in  $R$ , and the U-shaped sum of  $\mathbb{E}(T) + K$  (blue 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.

The position of the  $\mathbb{E}(T)$  curve depends primarily on the political costs of a successful challenge to the incumbent public agent, and also on the costs of a new tender (documentation, new analyses), cost of externalities (including the value of lost time for users),<sup>17</sup> and the public agent’s reputation. The slope of  $\mathbb{E}(T)$  is a function of the likelihood of a successful TPO challenge, i.e., the product of the likelihood of a successful TPO challenge and political costs at fully discretionary contracting.

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

where  $T_0$  is the political third-party cost at lowest possible rigidity level.

**Proposition 1** *Expected political third-party opportunism costs  $\mathbb{E}(T)$  are decreasing and strictly convex in rigidity  $R$ .*

**Proof** See Appendix B.1. ■

<sup>17</sup> E.g., highway repair generates significant negative externalities for commuters through increased gridlock and commuting times. Bajari & Lewis (2010, 2) 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.

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—all deviations are observed and hence directly prosecuted.<sup>18</sup> Alternatively,  $\mathbb{E}(T)$  can be seen as the public agent’s disutility of lack of contract flexibility.

Contracting costs  $K$ —both public and private—are increasing in  $R$ .  $K$  is a function of materials and labor costs to be incurred, i.e., cost of time to close a contract, professionals (lawyers, engineers, consultants), documentation and control needed to meet rigidity  $R$ , and—principally—discounted penalties due to deviation from contract specifications at  $R$ . The slope of the  $K$  curve is a function of the marginal cost of contracting and enforcement at  $R$ —what Laffont & Tirole (1993, 307) call “processing costs”—and expected penalties.

**Proposition 2** *Contracting and enforcement costs  $K$  are rising and convex in rigidity  $R$ .*

**Proof** Rise and convexity of  $K$  in  $R$  follow from the assumption of marginal positive and non-decreasing effort needed for contract design and enforcement, cost of effort, and expected penalties for contract deviations in specificity and rigidity  $R$ . ■

**Remark** If applicable to multi-sectoral or multi-task contracts, specificity and rigidity multi-dimensionality (see Appendix D) reduces economies of scope, increasing the convexity of  $K$  in  $R$ .

We assume that the public agent internalizes expenses related to the contract, i.e., at the end, she is politically accountable, directly or indirectly, for all costs borne.<sup>19</sup> She has to pay contractors’ costs and her own costs, and she has also to minimize political costs. The optimal level of rigidity  $R^*$  is, therefore, driven by TPO costs, actual contracting and enforcement costs, and beliefs of the public agent about  $\sigma$  and  $\tau$ .

**Lemma 1** *If Propositions 1 and 2 hold, and expected political third-party opportunism costs fall faster in  $R$  than contracting costs rise in  $R$  for low  $R$  states, then the sum curve of expected political third-party opportunism costs  $\mathbb{E}(T)$  plus contracting and enforcement costs  $K$  is U-shaped and has a finite unique internal minimum.*

**Proof** See Appendix B.2. ■

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<sup>18</sup> The type of specifications we deal with is non-designative, i.e., such that 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 2.6.

<sup>19</sup> See Subsection 2.5 for a treatment of different levels of internalization of contracting costs.

**Remark** For multiple, but finite local minima see Appendix C and Appendix D.

Lemma 1 implies that the optimal contract is non-flexible and of finite rigidity. A too-flexible contract would be politically too risky while an over-rigid contract would be too expensive.

We define the following objective functions for the agents:

$$\left\{ \begin{array}{ll} \text{Incumbent public agent:} & \underset{R}{\text{minimize}} \quad \mathbb{E}[T(R) | \sigma] + K(R) \\ & \text{subject to} \quad P^{bud} \geq K_{pr} \\ \text{Private contractor:} & \underset{P}{\text{maximize}} \quad (P - K_{pr}) | R \\ & \text{subject to} \quad P - K_{pr} \geq 0 \\ \text{Third-party challengers:} & \underset{q \in \{0,1\}}{\text{maximize}} \quad q(T_0\tau - c) | \tau(R) \\ & \text{subject to} \quad T_0\tau > c \\ \text{Public at large:} & \text{maximize} \quad v(P, w) \end{array} \right.$$

In equilibrium in a competitive bidding market for public contracts, the minimum price  $P^{min}$  equals  $K_{pr}$ , which also maximizes consumers/voters' indirect utility function  $v(P, w)$ , or  $v(t, w)$  if public services are paid indirectly through tax  $t$ , given endowment  $w$ . In the absence of opportunistic third parties, agents maximize payoffs at low rigidity. Opportunistic third parties maximize their payoff by challenging the incumbent public agent ( $q = 1$ ) with likelihood  $\sigma$  conditional on exogenous likelihood of success of a challenge  $\tau$  at specificity and rigidity  $R$ .  $\sigma$  is given by the probability of a positive expected value of a challenge  $T_0\tau - c$ , where the monetary, political, and reputational cost of challenge  $c$  rises in rigidity  $R$ . Thus the public agent adjusts  $R$  according to her beliefs on the likelihood of incidence  $\sigma$  and likelihood of success  $\tau$  of third-party challenges.

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

TPO does not lead to a “vicious cycle” as suggested by Maser, Subbotin & Thompson (2010, 4). A direct outcome from Corollary 1 is that the higher  $\mathbb{E}(T)$ , *ceteris paribus*,<sup>20</sup> the higher  $R^*$  and  $P$  will be.

## 2.4 Endogeneity of Opportunistic Challenge

The public agent endogenizes the likelihood of a challenge by adjusting specificity and rigidity  $R$ . On the one hand, the likelihood of success of an opportunistic challenge  $\tau$  decreases in  $R$  and,

<sup>20</sup> A minimal degree of specificity and rigidity is inherent to every contract, even in the absence of TPO, to avoid the standard contractual opportunism by the contractor (e.g., shading on quality) and the public agent (e.g., delay in payments, haggling). The degree of specificity and rigidity  $R$  presented in the figures and examples are beyond the levels of specificity and rigidity inherent to relational contracts.

on the other hand, the cost of challenge  $c$  rises in  $R$ . We assume that the public agent's beliefs on the expected political benefits from an opportunistic contract challenge by third parties equals her expected political costs from that challenge. The upper bound of the likelihood of a TPO challenge  $\sigma$  is given by the probability of a positive expected value of a challenge, i.e., it is the complementary to one of the cumulative probability of the third parties' expected benefits from an opportunistic challenge being equal or greater than the cost of challenge  $c$ :  $\sigma = \Pr(T_0\tau > c) = 1 - \Pr(T_0\tau - c \leq 0)$ .

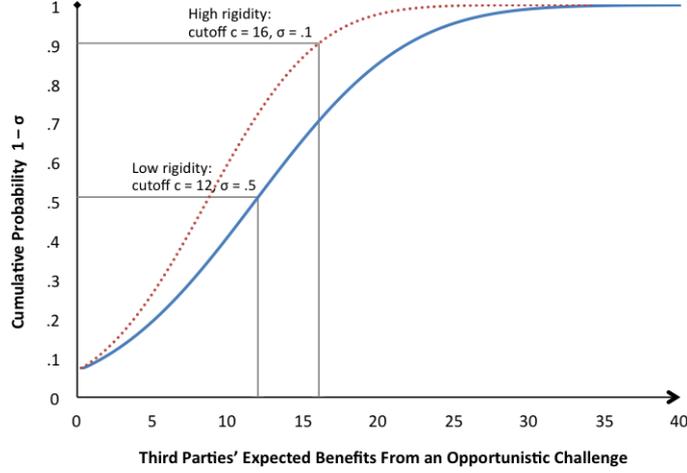
An increase in specificity and rigidity  $R$  carries two effects:

1. It lowers the likelihood of success of a TPO challenge  $\tau$ ; 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 specificity and rigidity  $R$  (downward probabilistic shift of the cumulative distribution curve of expected third-party opportunism benefits  $\mathbb{E}(T)$ )
2. It increases cost of challenge  $c$  and thus it decreases the probability at which an opportunistic challenge pays off (rightward move of cutoff level)

Figure 2 shows an example of the combination of these two effects resulting in a decrease in the likelihood of challenge  $\sigma$  due to an increase in contract specificity and rigidity  $R$ .

The endogeneity of opportunistic challenge satisfies and proves the assumption of convexity of  $\sigma$  in  $R$  made in the proof of Proposition 1 (see Figure 3). It also 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  $\mu$ ) and, therefore, are associated with higher likelihood of challenge  $\sigma$
- (b) In high informational asymmetry states between the public agent's actual political costs and third parties' expected political benefits from an opportunistic challenge, the volatility of beliefs is higher than in low informational asymmetry states; as informational asymmetry decreases, SD decreases and  $\sigma$  increases its convexity in  $R$  (higher  $-\frac{\partial^2\sigma(R)}{\partial\sigma(R)}$ )
- (c)  $\sigma$  is endogenous to the institutional framework given by  $\tau$ ; where the rule of law is enforced, an increase in  $R$  will induce a larger decrease in  $\sigma$

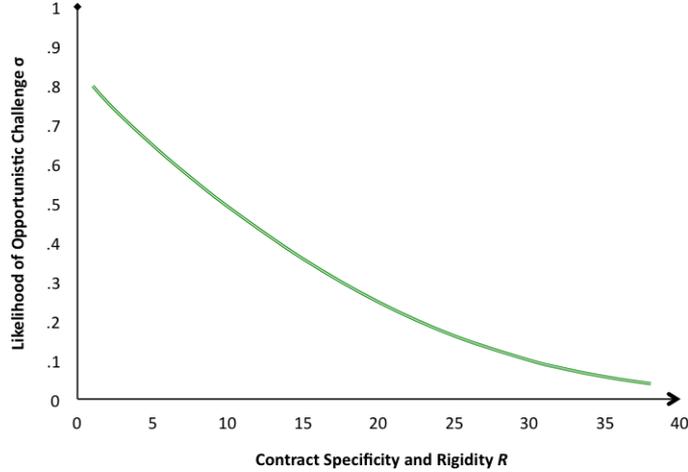


**Figure 2:** This graph plots the cumulative probability ( $y$  axis) of the public agent’s beliefs on third parties’ expected benefits from an opportunistic challenge ( $x$  axis): blue solid line for low rigidity and red dot line for high rigidity contracts. It assumes low rigidity  $R^L = 10$ , high rigidity  $R^H = 30$ , a normal distribution of benefits from an opportunistic challenge for third parties  $T_0$  ranging from 0 to 100 with  $\mu = 30$  and  $SD = 20$ ,  $\tau = \ln[\exp(1) + R]^{-1}$ , and cutoff  $c = \gamma R + 10$ , where  $\gamma = .2$  and 10 are calibration parameters for an increase of  $c$  in  $R$ . The likelihood of a TPO challenge  $\sigma$  is the complementary cumulative probability of the third parties’ expected benefits from an opportunistic challenge being lower than the cost of challenge, i.e.,  $\sigma = 1 - \Pr(T_0 \ln[\exp(1) + R]^{-1} < \gamma R + 10) = \Pr(T_0 \ln[\exp(1) + R]^{-1} - \gamma R + 10 \geq 0)$ . 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.

- (d)  $\sigma$  falls in litigation costs  $c$ ; likewise, the more litigation costs rise in  $R$  (higher  $\frac{\partial c(R)}{\partial R} = \gamma$ ), the more convex  $\sigma$  will be
- (e) The lower bound of  $\sigma$  depends on the third parties’ priors, i.e., the propensity to litigation adherent to the institutional framework
- (f) Exogenous institutional changes—e.g., new environmental norms, changes in the juridical system—alter  $\tau$  and produce a new cumulative probability of challenge distribution, which will be first-order stochastically dominated by the former one when the legal system becomes more restrictive (i.e., an increase in criteria subject to challenge) or first-order stochastically dominant when the legal system is deregulated

## 2.5 Scrutiny: A Two-Sided Sword

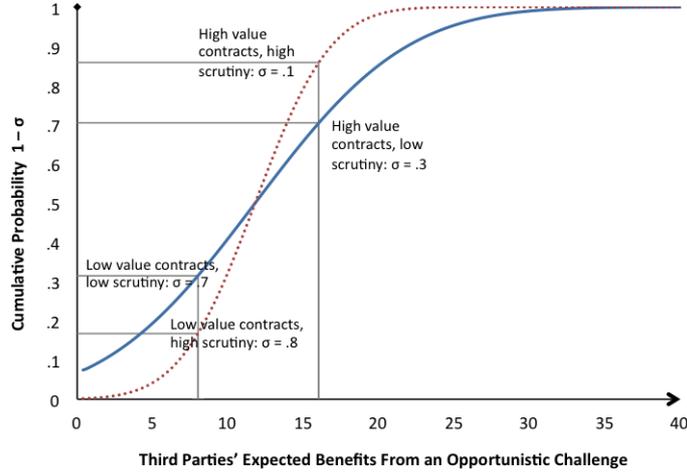
An increase in scrutiny—i.e., critical public observation and accountability through transparency and public participation—lowers the informational asymmetry between the actual political costs for the incumbent public agent and the third parties’ beliefs about the political benefits from an opportunistic challenge. Firstly, at higher level of scrutiny there is a calibration of beliefs



**Figure 3:** This graph plots the likelihood of opportunistic challenge  $\sigma$  for different levels of specificity and 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.

and the standard deviation of the distribution of expected political benefits decreases, yielding a second-order stochastically dominant distribution (see Figure 4), with the inflection point at the mean expected political benefits (Mas-Colell, Whinston & Green 1995, 197–199). Hence, all other things kept constant (particularly,  $\mu^L = \mu^H$ ), the likelihood of challenge  $\sigma$  of high value contracts—i.e., above expected mean  $\mu\tau$ —is comparatively higher under low scrutiny regimes, while the likelihood of challenge of low value contracts is comparatively higher under high scrutiny regimes.

Secondly, an increase in scrutiny updates third parties' distribution of beliefs about the political benefits from an opportunistic challenge. If expected political costs for the incumbent public agent were downwardly biased (underestimated) by third parties ( $\mu^L < \mu^H$ ), expected political benefits from an opportunistic challenge would be upwardly adjusted (first-order stochastic dominance given the same standard deviation); correspondingly, if expected political costs for the incumbent public agent were upwardly biased (overestimated) by third parties ( $\mu^L > \mu^H$ ), expected political benefits from an opportunistic challenge would be downwardly adjusted (see Figure 5). High scrutiny regimes are efficient (lower  $\sigma$ , thus lower  $R^*$  and  $P$ ) for high value contracts, i.e., when the distribution of third-party beliefs about political benefits from an opportunistic challenge at low rigidity first-order stochastically dominates all other possible distributions at high scrutiny. Likewise, high scrutiny regimes are inefficient for low value contracts. For medium value contracts, high scrutiny regimes are efficient conditional on beliefs updates: they are efficient for downward and small upward beliefs updates and inefficient for



**Figure 4:** This graph plots the cumulative probability ( $y$  axis) of the public agent’s beliefs on 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  $T_0$  with  $\mu = 30$ ,  $SD = 20$  for low scrutiny states and  $SD = 10$  for high scrutiny states,  $\tau = \ln[\exp(1) + R]^{-1}$ , 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  $\sigma$  is the complementary cumulative probability of the third parties’ expected benefits from an opportunistic challenge being lower than the cost of challenge, i.e.,  $\sigma = 1 - \Pr(T_0 \ln[\exp(1) + R]^{-1} < \gamma R + 10) = \Pr(T_0 \ln[\exp(1) + R]^{-1} - \gamma R + 10 \geq 0)$ . 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 kept constant, the likelihood of challenge  $\sigma$  of high value contracts, i.e., above expected mean  $\mu\tau$ , is comparatively higher under low scrutiny regimes, while the likelihood of challenge of low value contract is comparatively higher under high scrutiny regimes.

upward and small downward beliefs updates.

Furthermore, scrutiny increases the level of internalization of contracting costs by the public agent and leads, *ceteris paribus*, to a gain in efficiency due to lower optimal contract rigidity and contracting price. On the other hand, better informed third parties due to scrutiny may increase or decrease the likelihood of TPO. Hence, it is equivocal whether open information policies (as the case of the State of California<sup>21</sup> or the State of Berlin<sup>22</sup>) lead to more efficient

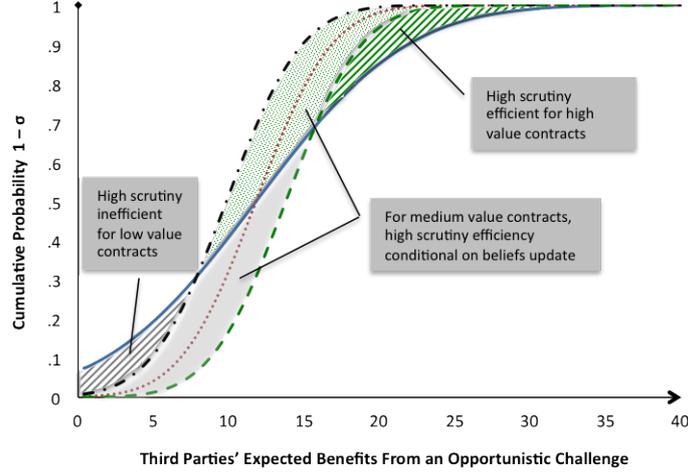
<sup>21</sup> The California State Legislatures Brown Act of 1953 guarantees the public’s right to attend and participate in meetings of local legislative bodies. The Brown Act solely applies to California city and county government agencies, boards, and councils.

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 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 people’s business.”

For all California State Legislature acts see <http://www.legislature.ca.gov/>.

<sup>22</sup> 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



**Figure 5:** This graph plots the cumulative probability ( $y$  axis) of the public agent’s beliefs on third parties’ expected benefits from an opportunistic challenge ( $x$  axis): blue solid line for low scrutiny states ( $\mu^L = 30, SD^L = 20$ ), red dot line for high scrutiny states and unchanged contract value beliefs ( $\mu^H = 30, SD^H = 10$ ), green dash line for high scrutiny states and upwardly adjusted contract value beliefs ( $\mu^H = 35, SD^H = 10$ ), and black dash-dot line for high scrutiny states and downwardly adjusted contract value beliefs ( $\mu^H = 25, SD^H = 10$ ). Upwardly adjusted beliefs (green dash line) first-order stochastically dominate unchanged contract value beliefs (red dot line).

public contracts.

**Proposition 3** *Assuming away administrative scrutiny costs, an increase in scrutiny increases public contracting efficiency only if the internalization of contracting costs effect is larger than the increase of political costs effect due to access to information by opportunistic third parties.*

**Proof** See Appendix B.3. ■

**Example** Let contracting costs be given by  $K(R) = \alpha^{L,H} R^{1.02}$ . Let the political costs at no rigidity  $T_0$  correspond to a normal distribution with mean  $\mu = 30$  and standard deviation  $SD = 20$  for low scrutiny states and  $SD = 10$  for high scrutiny states, the likelihood of a successful third-party opportunistic challenge be given by  $\tau(R) = \ln[\exp(1) + R]^{-1}$ , the likelihood of a third-party opportunistic challenge by  $\sigma(R) = \Pr(T_0\tau > c)$  and the cost of challenge by  $c = .2R + 10$ , so that the expected political third-party opportunistic costs be  $\mathbb{E}(T) = T_0[\sigma(R)\beta^{L,H}]\tau(R) = T_0[\Pr(T_0 \ln[\exp(1) + R]^{-1} > .2R + 10)\beta^{L,H}] \ln[\exp(1) + R]^{-1}$  and the optimal rigidity at low and high scrutiny be  $R^{*L,H} = \arg \min_R [T_0[\Pr(T_0 \ln[\exp(1) + R]^{-1} > .2R + 10)\beta^{L,H}] \ln[\exp(1) + R]^{-1} + \alpha^{L,H} R^{1.02}]$ .

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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).

Assuming  $T_0 = 30$ , for low level of internalization of contracting costs by the public agent  $\alpha^L = .3$  and low information types of informed third parties for low scrutiny states  $\beta^L = .5$ , the optimal level of rigidity would be  $R^{*L} = \arg \min_R [30[\Pr(30 \ln[\exp(1) + R]^{-1} > .2R + 10)].5 \ln[\exp(1) + R]^{-1} + .3R^{1.02}] = 8.3$ . An increase in scrutiny leads to an increase in the internalization of contracting costs, i.e., for any  $\alpha^L < \alpha^H$ , the optimal level of rigidity will be lower (i.e.,  $R^{*L} > R^{*H}$ ) and there will be a gain in efficiency ( $P^{min}$  will be lower). E.g., for  $\alpha^H = .7$  and remaining the same ( $\beta^H = \beta^L = .5$ ),  $R^{*H} = 5.2$ . If an increase in the internalization of contracting costs ( $\alpha = .7$ ) is accompanied by a decrease in the likelihood of challenge ( $\beta = .4$ ), there will always be a gain in efficiency ( $R^{*H} = 4.0$ ). If, on the contrary, an increase in scrutiny increases, but minimally, the likelihood of challenge ( $\beta^H = .7$ ), there will still be an increase in efficiency ( $R^{*H} = 8.0$ ). However, if  $\beta^H$  increases to .9, there will be a loss in efficiency ( $R^{*H} = 10.3$ ).

Table 1 summarizes the numerical example.

Variable		$R$	$T_0$	SD	$c$	$\alpha$	$\beta$	$\tau$	$\sigma$	$\mathbb{E}(T)$	$K(R)$	Objective function:
Formula					$= .2R + 10$			$= \ln[\exp(1) + R]^{-1}$	$= \Pr(T_0\tau > c)$	$= T_0\tau\sigma\beta$	$= \alpha R^{1.02}$	$\min_R \mathbb{E}(T) + K(T)$
Scrutiny	low	8.3	30	20	11.7	.3	.5	.4	.5	3.4	2.6	6.0
	high	5.2	30	10	11.0	.7	.5	.5	.8	5.5	3.8	9.3
		4.0	30	10	10.8	.7	.4	.5	.8	5.2	2.8	8.1
		8.0	30	10	11.6	.7	.7	.4	.6	5.3	5.8	11.1
		10.3	30	10	12.1	.7	.9	.4	.5	4.9	7.5	12.4

**Table 1:** This table presents a numerical example of possible contract outcomes of an increase in scrutiny, where specificity and rigidity  $R$  is the argument that solves the minimization of political and contracting costs. On the one hand, an increase in scrutiny increases the internalization of contracting costs (shown in the  $\alpha$  parameter) and, on the other hand, it changes—increases or decreases, depending on the types of third parties—the expected political costs due to access to information by opportunistic third parties (captured in the  $\beta$  parameter).

## 2.6 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  $\lim_{R \rightarrow 0^+} \frac{\partial[\mathbb{E}(T)+K]}{\partial R} < 0$  holds (see Appendix B.2), then designative specificity is a sufficient condition for finite optimal equilibrium rigidity as shown in Lemma 1.

### 3 Contract Price Under TPO

In every tender under budgetary constraints, the public agent sets—explicitly in tender information, announcements or the budget, or implicitly in internal regulations—a maximum contract price  $P^{bud}$  that she can pay the contractor. To lessen TPO, she also adjusts contract specificity and rigidity at  $R^*$ . The acceptable contracting price-rigidity sets for the public agent are below  $P^{bud}$ , i.e., contracts “in the budget,” subject to low TPO costs. The contractor sees specificity and rigidity  $R^*$  in the tender documentation and bids accordingly. On the contractor’s side, the acceptable price-rigidity sets are those above her private contracting 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 1 plots  $\mathbb{E}(T)$  and  $K$  curves, bid and budgeted and minimum prices, optimal rigidity, and the price-rigidity contracting area.

Before the tender, especially in complex contracts and given the contracting rigidities, the public agent only has an estimation of the contractor’s 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 at that level of  $R$ , 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. Therefore, “no contract” is a possible outcome if political risks are significant and budgeted expenses are too low at a given rigidity.<sup>23</sup> 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 Empirical Implications

The base case that our model tackles is a simple public procurement contract. However, there are other situations where TPO can explain the mechanisms related to public procurement and efficiency. We now apply and extend the framework to practical settings to derive empirical implications.

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<sup>23</sup> Scarce budgeted expenses for transport infrastructure along with excessive contract specificity and rigidity due to continuous TPO can explain the paralysis in highway development in Poland during the last decade. See “Poles repositioned,” *Project Finance Magazine*, October 23, 2010.

## 4.1 Bureaucracies

Civil servants are subject to more specific and rigid contracts (e.g., regulated hiring, list of duties and responsibilities) than their peers in the private sector.<sup>24</sup> A private company can hire whoever it wants and a typical employment contract may simply say “follow the instructions of your principal,” while in a public institution the process of employment of civil servants 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, 20, 88, 112), and subject to independent ordinary and extraordinary controls (Horn 1995, 98).<sup>25</sup> 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<sup>26</sup> (analogical to higher price in public tenders). TPO thus provides a consistent explanation of civil service inefficiencies broader than the public administration view on red tape.<sup>27</sup>

Bambaci, Spiller & Tommasi (2007) describe the Argentine bureaucracy as a combination of constitutional protections of civil servants, relative low wages,<sup>28</sup> and low accountability to “short lived” political public agents,<sup>29</sup> 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 emerged is the large use of a “parallel bureaucracy,”<sup>30</sup> 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 & Tommasi 2002, Bambaci, Spiller & Tommasi 2007). Thereby, political public agents in Argentina blend permanent bureaucracy with temporary bureaucrats who respond more flexibly

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<sup>24</sup> In this instance, bureaucrats as individuals are the private party contracting with the public agency.

<sup>25</sup> 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.

<sup>26</sup> 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).

<sup>27</sup> See Bozeman (1993). See also Laffont & Tirole (1991), Pfiffner (1987), and Spiller & Urbiztondo (1994).

<sup>28</sup> 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 & Payne (2003).

<sup>29</sup> The low accountability of the Argentinian administration is in 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 & Tommasi 2007, 165).

<sup>30</sup> 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 & Tommasi 2007, 172).

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 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).<sup>31</sup>

In practice, cost-plus contracts have been criticized by the administration, lawmakers, and taxpayers 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 flexible to adaptation, but also subject to potential abuse<sup>32</sup> and shading (Fehr, Hart & 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.”<sup>33</sup> In the presence of closer third-party oversight and fear of TPO,<sup>34</sup> public agents will prefer fixed-price contracts in settings where cost-plus contracts could prove to be more efficient.<sup>35</sup>

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<sup>31</sup> See Loeb & Surysekar (1994).

<sup>32</sup> 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)).

<sup>33</sup> 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/](http://www.whitehouse.gov/the_press_office/Memorandum-for-the-Heads-of-Executive-Departments-and-Agencies-Subject-Government/) (accessed July 11, 2011).

<sup>34</sup> 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 noncompetitive 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).

<sup>35</sup> Analyzing major defense acquisition programs, Wang & San Miguel (2011) argued that fixed-price contracts do not provide adaptable risk-sharing mechanisms and may lead to an unintended increase in government payments. 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).

### 4.3 Public-Private Partnerships and Key Performance Indicators

A public-private partnership (PPP) is a public service business operated under a long-term contract or license associated with a degree of exclusivity within a certain geographical area. It may involve the transfer to the private contractor of the right to use some existing infrastructure required to carry out a business (such as a water supply system in a city) and commonly the private contractor assumes substantial financial, technical, and operational risk in the project.

PPPs allow for *ex ante* flexibility in contracting to gain efficiency. To control quality *ex post*, Key Performance Indicators (KPIs) are used, i.e., measures specifically tailored for each sector, under which the private partner is evaluated. At the same time, KPIs constitute a signal for the public at large (consumers and voters) that the service, although privately provided, remains publicly accountable. KPIs are thus crucial to third-parties' perception of PPPs.

*Ex ante* flexibility, however, makes PPPs vulnerable to third-party challenges (higher  $\sigma$ ), a hazard that private investors translate into higher prices. 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.<sup>36</sup>

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.”<sup>37</sup>

In the presence of TPO, public agents would pursue private provision of public goods mostly in projects where—assuming internalization of contract expenses by the public agent—expected gains from lower contract specification and better private management offset increased *ex ante* contracting costs related to compliancy with cost-benefit assessment and higher *ex post* rigidity related to KPIs.

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<sup>36</sup> See, for example, Department of Treasury and Finance of Victoria's (2001) technical note on PSC.

<sup>37</sup> Brian Rudman, “Promised electric trains derailed by misguided enthusiasm.” *The New Zealand Herald*. June 1, 2009. Emphasis added.

#### 4.4 Public-to-Public Contracts

When a public agent engages in a contract with another public agent (e.g., a state contracting a service from a government-owned enterprise) or a quasi-public agent (e.g., a state negotiating salaries with a public-employee union)<sup>38</sup>, both sides have to respond to their constituencies (i.e., the public agent to voters; the union leader to union members). TPO costs rise because of double scrutiny and higher likelihood of political challenge on both sides. Higher expected TPO costs result in higher contract rigidity. If the public agent subsidizes the government-owned company, higher contract rigidity might not be directly reflected in higher prices, but indirectly, e.g., through taxes or lower delivered quality of services. Public agents and government-owned companies or public-employee unions can agree to low contract specificity and rigidity only if there is strong political leadership and low political contestability (low TPO costs), as in authoritarian regimes.<sup>39</sup>

#### 4.5 External Consultants and Certification of Contractors

The engagement of independent consultants (e.g., multilateral agencies, international advisers, especially in countries with weak law 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.

Moszoro & 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

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<sup>38</sup> See *The Becker-Posner Blog* entry for March 27, 2011: “Public-Employee Unions” by Richard Posner and “Government Sector Unions” by Gary Becker (<http://www.becker-posner-blog.com/>, accessed March 28, 2011). As Becker notes, “even without the strike threat—indeed, possibly even without unions—public employees can often extract considerable benefits from local, state, and the federal government in the form of higher earnings and generous pensions and health benefits. Public employees form a sizable voting bloc with formidable resources of money and the time of members to spend on supporting political candidates who they expect will be generous when it comes time to bargain over compensation.”

<sup>39</sup> See discussion in Section 4.6.

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.<sup>40</sup> 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.<sup>41</sup> 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 ( $\sigma$ ). 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  $R^*$ .

#### 4.6 Efficient Small Communities and Authoritarian Regimes

Small local governments (towns, counties) can be more efficient in public contracting than larger governments (metropolises, states). Due to lower value of contracts in comparison to larger governments, the benefits from political challenge are relatively low. Thus the likelihood of challenge is lower and subsequently potential TPO costs are lower. The public agent can therefore engage in more discretionary contracts and incur lower transaction costs.

Coviello & Gagliarducci (2010) present a study covering 3,825 Italian municipalities and 27,537 auctions, where an increase in the mayor’s tenure of one term is associated with fewer bidders per auction (−23.28 percent), higher probability that the winner is local (+3.20 percent) and that the same firm is awarded repeated auctions (+25.52 percent), i.e., more discretionary contracting (lower  $R^*$ ) correlated with longer tenure. They also find evidence that a high level of heterogeneity within the government coalition reduces the possibility of favoritism in shaping

<sup>40</sup> See [http://www.ccwater.com/buscenter/109067\\\_results.pdf](http://www.ccwater.com/buscenter/109067\_results.pdf) (accessed May 28, 2010).

<sup>41</sup> Based on an interview held in May 2010 with a Contra Costa Water District engineer.

the procurement process, that less “colluded”<sup>42</sup> mayors are more likely to gain reelection and survive longer, and that citizens and competitors are more likely to closely monitor large public projects.

Two reasons can be given why mayors with longer tenure show low concern about TPO and contract discretionarily. First, the Italian electoral system in municipalities is a simple majority regime. Consequently, in very small municipalities, more political contestability results in more dispersed voting and relative advantage of incumbent mayors.<sup>43</sup> Second, procurement protests in Italy go through courts, where penalties for breaking procurement laws are hardly enforced.<sup>44</sup> When  $K$  increases more rapidly than  $\mathbb{E}(T)$  decreases in  $R$  or  $\mathbb{E}(T)$  are insignificant due to lack of political contestability (as seems to be the case in Italian municipalities), the outcome is discretionary procurement.<sup>45</sup>

Authoritarian regimes, where the likelihood of challenging the incumbent public agent is low, can contract public works more discretionarily and, thus, cheaper and quicker. The lack of opportunities for TPO can help to explain the rapid contracting and development of infrastructure in Paraguay during the Stroessner regime. Molinas et al. (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,

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<sup>42</sup> Coviello & Gagliarducci (2010, 26–27) argue that mayors’ time in office progressively lead to a long-term relation (“collusion”) with a few favored bidders, and propose two interpretations: one based on favoritism and bribes in procurement, and another based on a learning process of mayors about the quality of contractors and a preference for highest-quality contractors with work.

<sup>43</sup> If  $m$  is the population and  $n$  the number of candidates, a candidate needs  $m/n + 1$  votes to win the election.

<sup>44</sup> During the period 2005-2008, the Italian central purchasing authority CONSIP made 4,095 random inspections on the *ex post* renegotiations of procurement contracts for goods and services, and found a total of 1,455 contractual infringements. Only 4 percent of the associated penalties were paid (Coviello & Gagliarducci 2010, 27). Anecdotally, it takes on average more than 10 years for juries to come to a verdict on contract protests. How public contracting can actually take place in an environment in which penalties are seldom paid remains a subject of future research.

<sup>45</sup> Coviello & Gagliarducci (2010) also report—contrary to our predictions—an increase in contract prices (reduction of winning rebate by –12.68 percent) along with an increase in contract discretion. According to those authors, higher prices are not due to higher cost of procurement and contract terms (the study analyzed the procurement of standardized items), but are driven by mayors’ favoritism and colluded renegotiations (corruption) or preference for higher-quality contractors.

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, 16).

#### 4.7 Privatizations of Government-Owned Companies

Privatizations of government-owned companies<sup>46</sup> are usually subject to clauses of commitment of the private acquirer over 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 in privatization contracts clauses and golden shares 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 governance of the company and, consequently, lower its value (analogical 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.

#### 4.8 Immunity for Public Agents

Many countries guarantee public agents a degree of immunity from legal prosecution as a way to insulate them from threats of media smear campaigns, courts, and legal harassment. Dal Bó, Dal Bó & Di Tella (2006) develop a model in which the public agent cares about money, punishment, and the political cost of getting involved in a corrupt deal, e.g., the result of a detection probability (2006, 45). They show (2006, 49) that, by limiting the potential for pressure from interested groups, immunity may indirectly lead to an increase in the quality of public officials, and hence better public policies. Congruently, from a TPO theory perspective, immunity lowers the likelihood of successful TPO challenges  $\sigma\tau$  because the public agent will not have to prove probity and, consequently, provides flexibility that leads to an increase in efficiency of public

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<sup>46</sup> 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).

agents.

## 5 Interrelation Between Third-Party and Governmental Opportunism

In this paper, our goal was to highlight third-party opportunism implications for public contracting. However, the model can also serve to analyze the impact of governmental opportunism ( $G$ ) as a hazard to public contracts (Moszoro 2011).

**Proposition 4** *In the presence of governmental opportunism, the private contractor will respond by seeking further specificity and rigidity  $R$  and charging an additional premium  $\psi(R)A$  to her private contracting costs  $K_{pr}$ .*

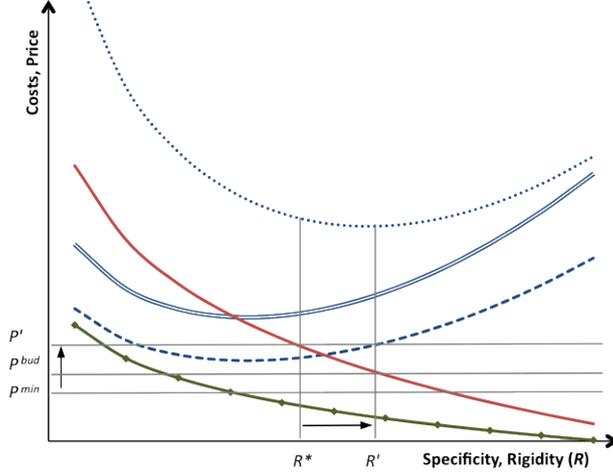
**Proof** Let  $I$  be sunk investments and  $A$  be the rents of the public agent from expropriation (whereas  $A = I$  represents total expropriation and  $A < I$  represents partial expropriation) and  $\psi$  the likelihood of governmental opportunism of appropriating  $A$ . Expected costs of governmental opportunism equals  $\mathbb{E}(G) = \psi(R)A$ , where  $\psi$  is assumed to decrease in contract specificity and rigidity ( $\frac{\partial\psi}{\partial R} < 0$ ).

For any  $\psi > 0$ , the higher sunk investments  $I$ , the higher possible expropriation rents  $A$  and expected costs of governmental opportunism  $\mathbb{E}(G)$  (Troesken 1996), specificity and rigidity of the contract  $R' > R^*$ , and final price  $P' > P^{min}$  charged to the public sector (see Figure 6).

■

**Corollary 2** *A corollary of the interrelation of third-party and governmental opportunism is that higher price  $P'$  due to governmental opportunism makes the contract more vulnerable to third-party challenges, or not feasible, if the  $P'$  is above the maximum price  $P^{bud}$  that the public agent is willing or is able to pay.*

The contractor's taking out insurance against adverse political events (e.g., governmental expropriation, confiscation of assets, or repudiation of contracts) mitigates the expected costs of governmental opportunism, but shifts up the cost of contracting  $K$  by the insurance premium. In a competitive insurance market, the political risk insurance premium equals the public agent's expropriation rents expected by the insurer  $\mathbb{E}_S(G)$ , while the contractor's willingness to pay for political risk insurance equals her expected expropriation loss  $\mathbb{E}(G)$ . Political risk insurance will be beneficial for the public at large only if the political risk insurance premium, compounded now in the contract price, amounts to no more than the differential between contract prices



**Figure 6:** This graph plots expected third-party opportunism costs  $\mathbb{E}(T)$  (red solid line) and expected costs of governmental opportunism  $\mathbb{E}(G)$  (green solid-dot line) falling in rigidity and specificity  $R$ , and costs borne by the contractor  $K_{pr}$  (blue dash line) and contracting and enforcement costs  $K$  (blue double-solid line) rising in  $R$ , and the U-shaped sum of  $\mathbb{E}(T) + K + \mathbb{E}(G)$  (blue 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  $P^{bud}$ . The equilibrium specificity and rigidity in a competitive market for public contracts with governmental opportunism rises from  $R^*$  to  $R'$  and the equilibrium price rises from  $P^{min}$  to  $P'$ .

with and without political risk insurance, i.e.,  $\mathbb{E}_S(G) \leq P' - P^{min}$ , this differential being due to further rigidity and the contractor's expected cost of governmental opportunism at  $R'$ . Political risk insurance will be cost-efficient for the contractor if the political risk insurance premium is lower or equal to her expected cost due to governmental opportunism, i.e.,  $\mathbb{E}_S(G) \leq \mathbb{E}(G)$ .

If political risk insurance premiums are too low, contractors that face opportunistic-type governments will take out insurance, increasing the average claims. Contractors may also lower rigidity below the optimal level without political risk insurance due to moral hazard, sparking more governmental opportunism and further increasing the average claims. Advancing this result, the insurer will increase political risk premiums. If political risk insurance premiums are too high, it will not be cost-efficient for contractors of non-opportunistic-type governments to take out political risk insurance. In equilibrium without informational asymmetry on the government type, contractors will be indifferent about taking out political risk insurance. In the presence of informational asymmetry about the likelihood of governmental opportunism  $\psi$ , an adverse selection screening game—largely described in the literature on insurance markets—will take place, which explains high political risk insurance premiums, the existence of tiny private markets for political risk insurance, and the indispensable involvement of multilateral agencies

(MLAs).<sup>47</sup>

## 6 An Extension: Corporate Governance Under Stakeholders' Scrutiny

Adaptations of TPO are interpretative of phenomena in quasi-political corporate governance settings. Whereas managers' discretion is subject to minority shareholders' or external stakeholders' scrutiny, they may take *ex ante* otherwise dispensable legal precautions to avoid *ex post* penalties and costs of litigation. Recent court sentences regarding fraudulent conveyance and minority buyout transactions are illustrative.

### 6.1 Fraudulent Conveyance

The doctrine of fraudulent conveyance (or “fraudulent transfer”) arises in Anglo-American bankruptcy law basing on legal precedents that date back to a 16th century English statute (Fraudulent Conveyances Act 1571, 13 Eliz 1, c 5) which made it illegal for a debtor to transfer assets with the intent to hinder, delay, or defraud his creditors. For example, under the law an insolvent farmer may not simply give his livestock to his brother to prevent lenders from seizing it to satisfy their claims. Modern extensions of the law make similar transfers illegal if they have the effect of defrauding creditors, even if there is no fraudulent intent on the part of the debtor.

This latter version of the law that has been applied to LBOs, MBOs, levered recapitalizations, and spinoffs in the U.S. and U.K. (Simkovic & Kaminetzky 2011). The litigation arises when a highly levered transaction is followed by a bankruptcy filing. Impaired (usually unsecured) creditors may allege that the original deal constituted a fraud because it left the firm insolvent at closing or led inevitably to subsequent insolvency. Consequently, they may ask the court to go back and “undo” the deal—i.e., to reclaim for the benefit of creditors all funds (or other assets) distributed in connection with the original deal.

The simplest example is an LBO in which the firm borrows to repurchase all equity from public shareholders. If the debt load is such that the surviving firm is rendered insolvent, then equity holders have succeeded in stripping value from an insolvent firm, to the disadvantage of creditors. In the eyes of the law, this is no different from having an insolvent firm pay a huge dividend to shareholders when it should instead have repaid its creditors first. To win their claim, creditors have to show that the firm was insolvent at the deal date, or that it was left

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<sup>47</sup> See, for example, the Multilateral Investment Guarantee Agency (MIGA), a member of the World Bank Group (<http://www.miga.org/>; accessed July 15, 2011), or the Overseas Private Investment Corporation (OPIC), a U.S. Government's development finance institution (<http://www.opic.gov/insurance>; accessed July 15, 2011).

with unreasonably small capital, or that it could not pay its debts as they came due.

Since fraudulent conveyance complaints arise in bankruptcy court, if there is no bankruptcy filing, i.e., there is no complaint even though the deal itself might have rendered the subject from insolvent. Although courts have so far been reluctant to allow creditors to stop a deal from closing merely by alleging that it will lead to a future bankruptcy, in current turmoil times with higher likelihood of bankruptcy, parties to levered transactions take (costly) steps *ex ante* to lower the likelihood of a successful lawsuit *ex post* (Simkovic & Kaminetzky 2011). Such measures include:

1. Refinancing the entire capital structure in the course of the deal, even though some pre-existing debt could have been left outstanding, to ensure that there are no pre-existing or “involuntary” creditors at closing, i.e, to ensure that all creditors’ participation in the deal is voluntary; it makes it harder for creditors to object *ex post* that they didn’t approve the deal *ex ante*
2. Obtaining a solvency opinion (not just a fairness opinion) at closing—to let an independent third party assess and attest to solvency at the time of the deal, which makes it harder for an interested party to claim insolvency *ex post*
3. Special provisions that trigger asset sales or partial restructuring steps when pre-specified liquidity or capital levels are crossed—to proactively prevent a bankruptcy filing that might lead to fraudulent conveyance complaints

## 6.2 Minority Buyout Transactions

In evaluating a reverse stock split, the Court of Chancery of the State of Delaware in *Ginette Reis v. Hazelett Strip-Casting Corp.*,<sup>48</sup> applied an entire fairness analysis and held that a board’s attempt to cash out minority (“third-party”) shareholders via a reverse split was neither the subject of a fair process nor resulted in a fair price.

The Court denied a summary judgment motion where the defendants (majority shareholders) argued that their actions were protected by the business judgment rule and that the plaintiff (minority shareholders) was only entitled to a statutory claim for fair value under 8 Del. C. §155(2). The Court denied the motion and held that the controller and conflicted directors had the burden to prove that the reverse split was entirely fair.

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<sup>48</sup> See C.A. No. 3552-VCL, 2011 WL 303207 (Del. Ch. 1 Jan. 21, 2011), [http://www.delawarelitigation.com/uploads/file/int4C\(2\).pdf](http://www.delawarelitigation.com/uploads/file/int4C(2).pdf).

Where a controlling stockholder employs “a reverse split to freeze out minority stockholders without any procedural protections, the transaction will be reviewed for entire fairness with the burden of proof on the defendant fiduciaries” (C.A. No. 3552-VCL, 2011 WL 303207, 21). The burden will be shifted to the plaintiff to prove unfairness where the board appoints a special committee or if the split was contingent upon a majority-of-the-minority vote. If both mechanisms are used, the action can avoid an entire fairness review.

Where entire fairness applies, “the defendants must establish to the courts satisfaction that the transaction was the product of both fair dealing and fair price [...] A reverse split in which stockholders receive cash in lieu of fractional interests is an end stage transaction for those stockholders being cashed out of the enterprise. A disinterested and independent boards decision to pay cash in lieu of fractional shares therefore should be subject to enhanced scrutiny” (C.A. No. 3552-VCL, 2011 WL 303207, 20). The Court found that because the board did not employ any procedural protections and because the minority had no one to bargain on its behalf, there was no fair dealing.

The *Ginette Reis v. Hazelett Strip-Casting Corp.* decision is noteworthy for its application to a reverse stock split of principles generally used in assigning the burden of proof in minority buyout transactions (Reder, Schwartz & Siddiqui 2011, 4). As in *In re CNX Gas Corp. Shareholders Litigation*,<sup>49</sup> it was restated that a minority buyout may be entitled to the benefits of a more deferential business judgment analysis if both of the recognized procedural protections—formation of a special board committee and a majority-of-the-minority vote stockholder vote—are utilized. If this approach is affirmed, dealmakers will have to consider more sophisticated alternatives in structuring minority buyouts, whether effected via a merger or a reverse stock split.

## 7 Concluding Remarks

TPO theory combines political hazards and transaction costs to explain apparent inefficiencies in public contracts. 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 (1999) “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;

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<sup>49</sup> See *CNX Gas*, 4 A.3d 397 (Del. Ch. 2010).

emphasis is original), to attest to their efficiency.

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” agency problems where consumers cannot be trusted and “when bureaucracies work poorly, consumer choice works worse” (Prendergast 2003, 930–933). Not only, as Williamson (1999, 320) 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 less 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
$A$	$\leq I$	Public agent's rents from penalties or expropriation
$c$		Monetary, political, and reputational cost of challenge for third parties (cutoff)
$\mathbb{E}(G)$	$\psi(R)A$	Expected costs of governmental opportunism
$\mathbb{E}_S(G)$		Expropriation rents expected by the insurer
$\mathbb{E}(T)$	$\sigma(R)\tau(R)T_0$	Expected political third-party opportunism costs
$I$		Sunk investments
$K$		Contracting and enforcement costs
$K_{pr}$		Costs borne by the contractor
$P$		Price bid by the contractor
$P'$		Price bid by the contractor in the presence of governmental opportunism
$P^{bud}$		Price budgeted by the public agent
$P^{min}$	$\geq K_{pr}$	Minimum acceptable price by the contractor
$R$		Contract specificity and rigidity
$R^*$		Optimal contract specificity and rigidity
$R'$		Optimal contract specificity and rigidity in the presence of governmental opportunism
$T_0$		Political costs of third-party opportunism at discretionary contracting
$\alpha^L, \alpha^H$		Level of internalization of contracting costs by the public agent under low and high scrutiny regimes
$\beta^L, \beta^H$		Types of informed third parties under low and high scrutiny regimes
$\mu^L, \mu^H$		Mean of third parties' beliefs of political benefits from opportunistic challenges under low and high scrutiny regimes
$\psi$		Likelihood of governmental opportunism
$\sigma$	$\Pr(T_0\tau > c)$	Likelihood of third-party opportunistic challenges
$\tau$		Likelihood of success of third-party opportunistic challenges
Abbreviation		Meaning

DoD	U.S. Department of Defense
GAO	U.S. General Accounting Office
KPI	Key Performance Indicator
MLA	Multi-Lateral Agency
PPP	Public-Private Partnership
PSC	Public Sector Comparator
TPO	Third-Party Opportunism
VfM	Value-for-Money

## Appendix B Proofs

### Appendix B.1 Proof of Proposition 1

- (a) Let  $T_0, R \in \mathfrak{R}^+$  and  $\sigma, \tau \in (0, 1)$  be non-concave and monotonically decreasing in  $R$ , so that  $\frac{\partial \sigma}{\partial R} < 0$ ,  $\frac{\partial \tau}{\partial R} < 0$ ,  $\frac{\partial \sigma}{\partial^2 R} \geq 0 \wedge \frac{\partial \tau}{\partial^2 R} \geq 0$ . Recalling Definition 1, let  $\mathbb{E}(T) = \mathbb{E}[T(R)] = \sigma(R)\tau(R)T_0$
- (b)  $\frac{\partial \mathbb{E}(T)}{\partial R} = T_0(\tau \frac{\partial \sigma}{\partial R} + \sigma \frac{\partial \tau}{\partial R})$
- (c) From assumptions in (a),  $\tau \frac{\partial \sigma}{\partial R} + \sigma \frac{\partial \tau}{\partial R} < 0$
- (d)  $\frac{\partial \mathbb{E}(T)}{\partial^2 R} = T_0(\tau \frac{\partial^2 \sigma}{\partial^2 R} + 2 \frac{\partial \sigma}{\partial R} \frac{\partial \tau}{\partial R} + \sigma \frac{\partial^2 \tau}{\partial^2 R})$
- (e) Since  $2 \frac{\partial \sigma}{\partial R} \frac{\partial \tau}{\partial R} > 0 \wedge \tau \frac{\partial^2 \sigma}{\partial^2 R} + \sigma \frac{\partial^2 \tau}{\partial^2 R} \geq 0$ , thus  $\frac{\partial \mathbb{E}(T)}{\partial^2 R} > 0$

The concurrence of (c) and (e) closes the proof.

### Appendix B.2 Proof of Lemma 1

- (a) Let  $T_0, R \in \mathfrak{R}^+$  and  $\mathbb{E}(T)$  be decreasing in  $R$ , differentiable, and strictly convex, so that  $\frac{\partial \mathbb{E}(T)}{\partial R} < 0 \wedge \frac{\partial^2 \mathbb{E}(T)}{\partial^2 R} > 0$  (as proved in Proposition 1) and let  $K$  be increasing in  $R$ , differentiable, and convex, so that  $\frac{\partial K}{\partial R} > 0 \wedge \frac{\partial^2 K}{\partial^2 R} \geq 0$  (as proved in Proposition 2)
- (b)  $\frac{\partial \mathbb{E}(T)}{\partial R} < \frac{\partial K}{\partial R} \wedge \frac{\partial [\mathbb{E}(T)+K]}{\partial^2 R} > 0 \forall R$
- (c) If  $\lim_{R \rightarrow 0^+} \frac{\partial [\mathbb{E}(T)+K]}{\partial R} \geq 0$ , then  $R^* = 0$ , but this contradicts (a) in  $R \notin \mathfrak{R}^+$  (there are no contracts of no rigidity)
- (d) If  $\lim_{R \rightarrow 0^+} \frac{\partial [\mathbb{E}(T)+K]}{\partial R} < 0$ , then from (a) and (b), it follows that there exists  $R^* \in (0, \infty)$  such that  $\frac{\partial [\mathbb{E}(T(R^*))+K(R^*)]}{\partial R} = 0$ , which closes the proof

### Appendix B.3 Proof of Proposition 3

- (a) Let  $\alpha^L, \alpha^H \in (0, 1)$  be the level of internalization of contracting costs by the public agent, where  $\alpha^L < \alpha^H$ ,  $\alpha^L$  represents low internalization for low scrutiny states of the world and  $\alpha^H$  represents high internalization for high scrutiny states of the world, and  $\alpha^{L,H}K$  are third-party contracting and enforcement costs accounting for scrutiny
- (b) An increase in scrutiny from  $\alpha^L$  to  $\alpha^H$  leads to an increase in the internalization of direct and indirect expenses by the public agent, i.e.,  $\frac{\partial \alpha^H K}{\partial R} - \frac{\partial \alpha^L K}{\partial R} = (\alpha^H - \alpha^L) \frac{\partial K}{\partial R} > 0$

- (c) In comparative statics, if Propositions 1 and 2 hold, and for any given  $K_{pr}$ , an increase in the level of internalization of contracting costs by the public agent ( $\alpha^L \rightarrow \alpha^H$ ) leads to a decrease in the optimal rigidity ( $R^{*L} > R^{*H}$ ), thus—*ceteris paribus*—lower  $R^*$  leads to lower  $K_{pr}$  and lower  $P^{min}$  due to monotonicity and strict convexity of  $\mathbb{E}(T)$  in  $R$
- (d) Let  $\beta^L, \beta^H \in (0, 1)$  be the types of informed third parties from scrutiny, where  $\beta^L$  represents low informed types for low scrutiny states of the world and  $\beta^H$  represents high informed types for high scrutiny states of the world, and  $\sigma\beta$  is the likelihood of third party challenges accounting for scrutiny
- (e) 
$$\frac{\partial \mathbb{E}(T)|\beta^H}{\partial R} - \frac{\partial \mathbb{E}(T)|\beta^L}{\partial R} = T_0[\tau \frac{\partial \sigma}{\partial R} + \sigma \beta^H \frac{\partial \tau}{\partial R}] - T_0[\tau \frac{\partial \sigma}{\partial R} + \sigma \beta^L \frac{\partial \tau}{\partial R}] = (\beta^H - \beta^L) \sigma T_0 \frac{\partial \tau}{\partial R}$$
- (f) Depending on the type of informed third parties,  $\sigma\beta$  may increase in scrutiny ( $\beta^L < \beta^H$ , i.e., opportunistic third parties are better informed to make a challenge) or decrease in scrutiny ( $\beta^L > \beta^H$ , i.e., better informed third parties make less challenges because they know more about the contracts)
- (g) If  $\beta^L > \beta^H$ , every increase in scrutiny leads to an increase in efficiency, i.e., to a decrease in  $R$  and  $P^{min}$
- (h) If  $\beta^L < \beta^H$ , an increase in scrutiny leads to an increase in efficiency only if  $(\alpha^H - \alpha^L) \frac{\partial K}{\partial R} > (\beta^H - \beta^L) \sigma T_0 \frac{\partial \tau}{\partial R}$

## Appendix C Concavities in Political and Contracting Costs

Concavities in  $\mathbb{E}(T)$  or  $K$  are a necessary, but not sufficient condition for concavities in  $\mathbb{E}(T) + K$ , and concavities in  $\mathbb{E}(T)$  or  $K$  are a necessary, but not sufficient condition for multiple local minima in  $\mathbb{E}(T) + K$  and multiple contract rigidity  $R$  equilibria. The maximum number of local minima in  $\mathbb{E}(T) + K$  equals the sum of concavities in  $\mathbb{E}(T)$  and  $K$ .

If there exist concavities in  $\mathbb{E}(T) + K$ , the condition for at least one internal minimum is  $\lim_{R \rightarrow 0^+} \frac{\partial(\mathbb{E}(T)+K)}{\partial R} < 0$ . In such case, the only difference from Lemma 1 is the presence of multiple local minima, which post welfare issues and technical dynamic problems for the public agent to optimize globally its TPO and contracting costs, however the argument for more rigid and more expensive public contracts than private relational contracts remains valid.

## Appendix D Multidimensionality of Rigidity

If a contract is considered as  $n$ -dimensional in its specifications and rigidities (conf. “multidimensional types” and “multidimensional bidding” in Laffont & Tirole 1993, 184–186, 308), let  $\mathbf{R}_j$  be the vector of different contract specifications and rigidities where  $j = 1, 2, \dots, n$  (e.g., delivery schedule, materials, output quality, environmental requirements, etc.).  $\mathbb{E}(T) + K$  has an internal unique minimum if Propositions 1 and 2 hold for every  $\mathbf{R}_j$ .

Multidimensional rigidities ease the existence of concavities ( $\mathbb{E}(T)$  and  $K$  may not be respectively strictly decreasing and increasing in every rigidity dimension), however since  $\mathbb{E}(T)$  and  $K$  are respectively non-increasing and non-decreasing in any rigidity dimension ( $\frac{\partial \mathbb{E}(T)}{\partial \mathbf{R}_j} \leq 0 \wedge \frac{\partial K}{\partial \mathbf{R}_j} \geq 0 \forall j = 1, 2, \dots, n$ ), Corollary 1 of TPO theory of public contracts holds for multidimensional rigidities: public contracts will be more rigid in at least one dimension and therefore more expensive than private relational contracts.

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