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# Political Corruption in the Execution of Public Contracts\*

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## Abstract

This paper presents a novel theoretical framework to explain the occurrence of corruption in public procurement. It extends the agency cost-padding model by Laffont and Tirole (1992) to allow for the principal to be a partially selfish politician who can design the contract auditing policy. It is found that a benevolent politician, by choosing a sufficiently strict auditing, deters the contracting firm from padding costs; conversely, a selfish politician chooses a relatively lax auditing in order to create an incentive for cost-padding, and engages in corruption with the firm in case of detection. If the cost of auditing is high enough, even a benevolent politician might prefer to allow cost-padding.

**Keywords:** Corruption in procurement; Cost-padding; Selfish politician; Endogenous auditing; Procurement contracts; Principal-agent model.

**JEL Classification:** D73; D82; L51.

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# 1 Introduction

In June 2014 a huge corruption scandal broke in Italy concerning the MOSE, an ambitious public project of underwater barriers designed to protect Venice from flooding. The investigations led to the arrest of 35 people including entrepreneurs, bureaucrats and politicians with the charges of fiscal fraud, corruption, extortion and money laundering. The inquiry unveiled a well-established system where contracting and sub-contracting firms in the consortium in charge of the MOSE works systematically embezzled project funds, mainly via inflated and false billing. The embezzled money was then allocated to managers' private use and to buy the favoritism of local and national-level leading politicians (e.g., to unblock extra funding to the project - a decision taken at the governmental level) and the connivance of the public officials in charge of the monitoring of the works.<sup>1</sup> Authorities reported that the money embezzled since the beginning of the works in 2003 to the time of the inquiry, amounted to €1 billion, i.e. 20 percent of the cost of the MOSE project. In addition, the corruption episode and the following investigations delayed the works beyond the 2018 planned project deadline, such that the MOSE was not yet completed in November 2019, when Venice was hit by severe flooding events which caused huge damages and two casualties.

This paper extends the agency regulatory model of cost-padding by Laffont and Tirole (1992) to explain the occurrence of huge embezzlement and corruption episodes in the execution of public projects like the MOSE.<sup>2</sup>

Laffont and Tirole's paper assumes that the principal is a benevolent politician or regulator who delegates to a bureaucrat the monitoring of potential cost-padding by the agent, the contracting firm. The supervisor relies on an exogenous auditing technology and can be corrupted by the agent. Corruption however does never occur in equilibrium as the principal only offers "corruption-proof" contracts i.e., always makes a take-it-or-leave-it offer to the bureaucrat that matches his expected gain from colluding with the firm.

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<sup>1</sup>Authorities reported that the consortium paid real "annual wages"- ranging from €100.000 to €1 million per person per year - to politicians (both right- and left-wing and also as electoral funding) public officials, judges, and intelligence officers. In addition to monetary "wages", substantial favors were paid in in-kind utilities (e.g., holidays, private flights). The president of the consortium, which was also nicknamed by people in the corrupt system as the "Doge" (the name formerly used for the chief magistrate and leader of the Republic of Venice), used diverted money to increase his own salary by €1 million per year, to benefit relatives and even to enhance his reputation as a philanthropist of Venice - creating job positions, funding the university, sponsoring public events and even funding for €5 million the America's Cup World Series Venice 2012 (source: *Il Venerdì di Repubblica*, 20 June 2014).

<sup>2</sup>Corruption is a major issue in public procurement. Episodes of corruption of various entity in big public works projects and more generally in public procurement are ubiquitous in both developing and developed countries (see e.g., Rose-Ackerman (1999), Auriol (2006), OECD (2007)). It is estimated that at least €400 billion a year are lost to bribery and corruption in public procurement globally. In more relative terms, this implies an increase in government purchasing costs of about 20-25% (Transparency International (2006)). Such huge cost overruns not only severely distort public finances, but may also impair the delivery of essential public services (both in terms of delay and of suboptimal quality) and, in the context of internationally funded development projects, eventually retard efforts to reduce poverty (see e.g., Rose-Ackerman (1975), Rose-Ackerman (1999), Golden and Picci (2005), Ware et al. (2007)).

However, the example of the MOSE shows not only that severe episodes of corruption can occur, but also that when potential gains from corrupt deals are high, corruption may involve not only bureaucrats but also higher levels of the government hierarchy, up to top-level politicians. Politicians at the top of the procurement administration might be interested in participating in corrupt deals, and even promoting them.<sup>3</sup>

Based on these observations, this paper extends the model of Laffont and Tirole (1992) in two directions to allow for the principal to have both the *motives* and the *instrument* for manipulating procurement contracts to create stakes for corrupt deals he can privately gain from. First, the principal is no longer necessarily benevolent i.e., a pure social-welfare maximizer, but he can also care to some extent about his private utility. Second, the auditing policy, which determines the probability of detection of cost-padding, is endogenous in the model and strategically chosen by the politician as part of the procurement contracts he offers. Furthermore, the auditing policy is costly. Upon detection, the politician can then decide whether to punish the firm by confiscating and returning embezzled funds to consumers, or rather enter a corrupt transaction with the firm, that is to suppress evidence of cost-padding in exchange of a share of the embezzled money. Since the incentives for the firm to pad costs in the first place are influenced by the contracted auditing level, the politician has an instrument to induce or prevent embezzlement according to his own motives.<sup>4</sup>

The main result of the paper reflects this intuition and is that a benevolent politician - provided the cost of auditing is sufficiently low - chooses contracts with relatively strict auditing, thereby preventing the firm from engaging in cost-padding; conversely, a sufficiently selfish politician, by choosing contracts with relatively lax auditing, creates an incentive for embezzlement in optimal contracts and, in case of detection, enters in a corrupt transaction with the firm. If the cost of auditing is too high, even a benevolent politician might prefer to allow for cost-padding and save on the cost of auditing in order to minimize the welfare loss. This result is consistent with the “mixed” nature of the politician, who cares both about social welfare and his private utility. Since cost-padding implies a higher cost for consumers in terms of distortionary taxation, only a politician who is selfish enough,

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<sup>3</sup>Other examples of severe episodes of corruption where, like in the MOSE, corruption was found to involve top politicians, are the “Tangentopoli”, World’s Fair EXPO 2015, and “Mafia Capitale” cases in Italy, and the many cases concerning international development projects in developing countries (see e.g., Rose-Ackerman (1999) and Ware et al. (2007)).

<sup>4</sup>While in practice the contracting and auditing activities are implemented by bureaucrats employed by the contracting authority, the politician can have a direct control on them by taking or influencing employment decisions. This was for example reported to occur in the MOSE and in the other important cases of corruption in Italy and in developing countries. There are also other channels through which politicians can interfere with the procurement process and guarantee their own participation in corrupt deals. In Korea the president can appoint members of his networks as CEOs of state-owned firms, who serve as intermediaries in allocating government contracts (Schoenherr (2019)). Political connections of the board of directors of publicly traded companies in the USA have been found to affect the allocation of government procurement contracts (Goldman et al. (2013)). Also, they can exploit their discretionary power to decide on the allocation of funds to big projects, including to cover cost-overruns due to renegotiations. The government of Chile used renegotiations of big concession contracts to increase expenditure on infrastructure projects in view of an upcoming election (Engel et al. (2006)).

that is who gives sufficiently larger weight to his private utility than to social welfare, is willing to allow for cost-padding to occur and engage in corruption.

While these results seem intuitive, it is interesting to note that the trade offs underlying the choices of the two types of politicians are less straightforward. On one hand a benevolent politician would like to choose high enough levels of auditing so to always deter the firm to engage in cost padding. However, strict auditing comes with a high welfare cost due to distortionary taxation, so he might be willing to allow cost-padding to limit the welfare consequences of expensive auditing. On the other hand, also a selfish politicians would prefer high auditing, that allows him to detect cost-padding more often, hence increasing his expected share of embezzled money. However, stricter auditing deters the firm from engaging in cost-padding in the first place, decreasing the politician's expected share, so that he needs to restrict auditing. Furthermore, an interesting comparative statics result which emerges is that an improvement in the efficiency of the fiscal system makes cost-padding easier to occur. This happens since a decrease in the social cost of cost-padding (in terms of less distortionary taxation) also induces less selfish politicians to engage in corruption.

In addition, it is interesting to note that while these results cannot be generated by the benchmark model by Laffont and Tirole (1992), two rather simple extensions can produce them. In Laffont and Tirole (1992) - where the politician is benevolent and the auditing technology is exogenous - (bureaucratic) corruption can never occur in equilibrium, since the principal always makes a take-it-or-leave-it offer to the corruptible bureaucrat. In addition, cost-padding can emerge in optimal contracts only due to incomplete information i.e., when preventing cost-padding is too costly in terms of the extra information rents the politician needs to pay. On the other hand, in this model, due to the possibility of selfishness on the side of the politician and the endogeneization of the auditing policy, cost-padding and corruption are ultimately choices of the politician, induced through contract manipulation.

Notice that both extensions are needed to fully explain the occurrence of big episodes of embezzlement and corruption like the MOSE. On one hand, if the politician had endogenous auditing but not the selfishness, there would be no corruption. In fact, as long as the cost of auditing is not excessive, there would be no cost-padding either, as the politician would always be able and willing to deter it. On the other hand, while under a selfish politician corruption could emerge also if the auditing technology were exogenous like in LT (as long as the detection probability is low enough to leave the firm an incentive to pad costs), episodes of grand corruption show that politicians may have channels to induce malfeasance in a more systematic manner. In this setting endogenous auditing provides politicians with an instrument to systematically manipulate contracts to create stakes for his own corrupt deals.

The paper is related to a number of strands in the literature. First, it contributes to the research on corruption in the execution of public contracts.<sup>5</sup> This literature, to which

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<sup>5</sup>Corruption in the execution stage can occur in the form of fraudulent renegotiations, manipulation of delivered quality, and cost-padding, i.e., accounting manipulations that allow the firm to inflate reimbursable costs and divert public funds to private uses (see e.g. Boehm and Olaya (2006), Ware et al. (2007), Piga (2011)). Examples of cost-padding activities include increasing expense claims for materials, supplies

Laffont and Tirole (1992) belongs, generally looks at a three-tier hierarchical relationship where a firm (agent) executes a contract for an imperfectly informed public purchaser (principal) who can employ a bureaucrat (supervisor) for monitoring contract execution. The supervisor can abuse his or her discretion and engage in corruption with the agent.<sup>6</sup> Seminal papers in this literature (Tirole (1986) and Laffont and Tirole (1993)) have shown that the stake of corruption is given by the informative rent of the agent, which creates a trade-off for the principal between collusion prevention and power of incentives.<sup>7</sup> Laffont and Tirole (1992) analyzed cost-padding as an extension of the standard regulatory agency problem in Laffont and Tirole (1986) where cost-padding is a second choice variable for the firm on top of effort.<sup>8</sup> In a more recent paper, Iossa and Martimort (2016) studied the optimal degree of contractual completeness needed to minimize the scope for post-tender corruption in the procurement hierarchy, finding that the solution depends on a country's quality of auditing institutions and levels of corruption.

Closely related to the literature above but in a broader regulation context not specific to procurement, Laffont (2000) considers the case that the benevolent principal is the Constitution while politicians act as selfish informed supervisors that can use their power to pursue their private agenda e.g. by colluding with the regulated firm.

Differently from the mentioned works, this paper allows for the possibility that the principal is not benevolent. To this extent, the setting is similar to Dhimi and Al-Nowaihi (2007), who study a two-tier auditing structure in the context of the provision of a public output and allow the principal (a politician) to be partially self-interested and audit himself the agent (a corruptible bureaucrat). They find that an enough selfish politician designs contracts with quantity shortage in order to create bribes to be shared ex-post in corrupt bargaining with the agent. The current paper adopts a similar modelization of politician's selfishness, auditing and ex-post corrupt bargaining but here the principal chooses the auditing level as part of the contract, while Dhimi and Al-Nowaihi (2007) treat it as exogenous.

The paper also contributes to the literature that looks at the role of politics and politicians on public procurement performance. Coviello and Gagliarducci (2017) finds that

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and services (e.g., by inflating invoices or having ghost employees and consulting studies on the project payroll), charging advertising and other unallowable expenses to project costs, and increasing managerial compensation (see e.g., Søreide (2005), Ware et al. (2007)).

<sup>6</sup>A number of papers look at corruption occurring at the awarding stage of procurement, that is the case when the auctioneer, as an agent of the public purchaser, can manipulate the tender in favor of a specific participant in exchange for a bribe (see e.g. theoretical contributions by Laffont and Tirole (1991), Celentani and Ganuza (2002), Burguet and Che (2004) Compte et al. (2005), Lengwiler and Wolfstetter (2006), Burguet and Perry (2007) and empirical investigations by Di Tella and Schargrodsky (2003), Bandiera et al. (2009), and Guasch and Straub (2009)).

<sup>7</sup>Later papers have studied the optimal degree of collusion to allow in equilibrium and optimal punishments under different assumptions on delegation and auditing schemes (see e.g., Mookherjee and Png (1995), Khalil and Lawarrée (1995), Kofman and Lawarrée (1996), Strausz (1997), Baliga (1999), Kessler (2000)).

<sup>8</sup>Other cost-padding models that build on Laffont and Tirole (1986) include Chu and Sappington (2007) and Bougheas and Worrall (2012). These papers model cost-padding as *negative effort* and do not include auditing or corruption

more time in office for politicians is associated with a worsening of procurement performance. Goldman et al. (2013) finds that firms that are connected to winning parties are significantly more likely to experience an increase in procurement contracts. Schoenherr (2019) finds that public firms (whose CEOs are appointed politically) allocate significantly more contracts to private firms with a CEO from the same network, and that contracts allocated to connected private firms are executed systematically worse and experience more frequently cost overruns. Ferraz and Finan (2011) look at the role of politics on corruption in municipal procurement in Brazil, finding that mayors that can be re-elected are significantly less corrupt than mayors that do not face re-election incentives. While all the mentioned papers provide an empirical assessment of the involvement of politicians in procurement corruption, we provide a theoretical framework. A related theoretical paper, that however does not focus on corruption, is Engel et al. (2006), which shows that politicians can exploit renegotiations of public procurement contracts as an alternative to issuing public debt (subject to scrutiny by the opposition) to boost investment spending for re-election.

Finally, focusing on cost-padding in contract execution, the paper also relates to the literature on cost-overruns and renegotiations in public procurement. This literature considers the role of contractual incompleteness on incentives of bidders and contractors (the better informed party) and derives implications for both optimal contract design (see e.g., Bajari and Tadelis (2001)) and award procedure design (see e.g., Bajari et al. (2008), Bajari et al. (2014) and Herweg and Schmidt (2017)). On the other hand this paper abstracts from contractual incompleteness issues and focuses instead on the incentives generated by the monitoring of the execution stage.

The rest of the paper is structured as follows: Section 2 presents the model; Section 3 analyzes the corrupt bargaining between the politician and the firm; Section 4 characterizes the politician’s optimal choice of procurement contracts; Section 5 provides a discussion on political accountability; Section 6 concludes. All proofs are gathered in the Appendix.

## 2 The model

### 2.1 Setting

A politician (principal) wants to contract the realization of a single and indivisible project of public utility from a firm (agent).<sup>9</sup> The basic agency setting is the same as in the cost-padding model of Laffont and Tirole (1992) (LT in the following).

The firm’s technology is represented by a linear cost function

$$C(\beta, e, a) = \beta - e + a \tag{1}$$

where  $\beta$  is a parameter that measures the technological efficiency (or “intrinsic productivity”) of the firm, with  $\beta \in \{\beta_L, \beta_H\}$ ,  $\beta_L < \beta_H$  ( $\beta_H$  corresponds to a less efficient

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<sup>9</sup>The firm might be the winner of a procurement tender or a concessionaire for that project (like in the MOSE case).

technology),  $e$  is the level of cost-reducing effort exerted by the firm and  $a$  is its level of the cost-padding activity (i.e., embezzlement of public funds), with  $a \in \{0, \alpha\}$ ,  $\alpha > 0$ .<sup>10</sup> The firm bears an increasing and convex disutility of effort (expressed in monetary terms)  $\psi(e)$ ,  $\psi_e > 0$ ,  $\psi_{ee} > 0$ .<sup>11</sup>

The efficiency parameter  $\beta$  is private information to the firm. The politician only has a prior distribution over the two types i.e.,  $\nu = P(\beta = \beta_L) \in (0, 1)$ . Moreover, cost-reducing effort  $e$  and cost-padding activity  $a$  are both unobservable by the politician. He is only able to observe (and verify) realized cost  $C$ , without disentangling its determinants. Therefore, this setting is an extension of the standard regulatory agency problem (Laffont and Tirole (1986)) where moral hazard becomes two-dimensional: the firm can try to inflate observed costs not only by shirking on effort, which yields a benefit in terms of saving on disutility, but also by embezzling public money through accounting transfers, which directly increases profits. While the two activities - reducing effort and increasing cost-padding - are observationally equivalent for the principal (i.e. they both linearly increase observed costs  $C$ ) they have different consequences, as the former determines the actual project cost ( $\beta - e$ ) while the latter impacts only accounted costs.

The politician reimburses the realized cost  $C$  and pays to the firm a net monetary transfer as a function of the cost  $t(C) \geq 0$  (the firm has limited-liability).

Differently from LT, where the auditing level is exogenous, here the politician chooses an auditing policy as part of the contract. The auditing policy simply amounts to a level of detection probability  $\rho \in (0, 1)$ , a low probability being interpreted as a lax policy (or weak auditing technology) and a high probability as a strict policy (or strong auditing technology). The auditing produces hard-information, namely for a given level of cost-padding  $a \in \{0, \alpha\}$ , the auditing detects the true (and verifiable) level of cost-padding with probability  $\rho$  and nothing with probability  $1 - \rho$ .<sup>12</sup> Moreover, differently from LT, the auditing technology is assumed to have a (linear) cost,  $\mathcal{C}(\rho) = c\rho$  ( $c > 0$ ).<sup>13</sup>

Therefore, a contract between the politician and the firm specifies a triple  $(C, t, \rho)$ . If the firm does not accept the contract, it gets its reservation utility, which is normalized to zero. Contracts are assumed to be enforceable and non-renegotiable. Both the firm and the politician are assumed to be risk neutral.

The project has constant value  $S > 0$  for consumers. To finance the project costs (including auditing), the politician levies distortionary taxation, namely, for each monetary unit of taxes consumers bear disutility  $(1 + \lambda)$ , where  $\lambda > 0$  denotes the shadow cost of public funds. Notice that since both the extra project cost due to cost-padding and the

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<sup>10</sup>As in LT, the choice of limiting the cost-padding decision to a binary variable is driven by technical reasons. Allowing for a continuum of values would make the derivation of optimal contracts problematic. This is so because given that the politician also takes into account the firm's incentive to pad costs for a given contract choice, it is not known which level of cost-padding will a given type choose *when mimicking the other type*, so that the rents from mimicking would be undetermined.

<sup>11</sup>The following regularity conditions also hold:  $\psi(0) = 0$  and  $\lim_{e \rightarrow \beta} \psi(e) = +\infty$ .

<sup>12</sup>We rule out the possibility of mistakes in auditing, i.e. it is never possible that the auditing technology detects cost-padding when cost-padding did not occur.

<sup>13</sup>Costs of auditing reflect the fact that it can be time-consuming and technically demanding to check accounting manipulations, especially for big projects that involve many sub-transactions.



cost of auditing will be covered out of taxation, the tax burden for consumers increases not only in the level of embezzlement but also in the level of auditing.

## 2.2 Auditing and corruption

After implementation of the contract (i.e., after the firm has chosen the level of cost-padding and effort) the politician audits the firm about cost-padding. Similarly to Dhami and Al-Nowaihi (2007), if no hard evidence of cost-padding is found, the firm keeps the entire amount of diverted money; if instead hard evidence is found, the politician has two possible choices: either he confiscates the money and returns it to consumers as a lump-sum transfer, or he enters a corrupt transaction with the firm where he suppresses evidence if the firm agrees to share the embezzled money.<sup>14</sup> If the firm agrees with the sharing, the politician and the firm divide the money and nothing is returned to consumers. If instead the firm does not agree with the sharing, the amount of embezzled money is confiscated and returned back to consumers. The firm is only punished with the confiscation of the diverted money.<sup>15</sup> The corrupt sharing is determined by the Nash-bargaining solution. The shares of embezzled money accruing to the firm, the politician and consumers are random variables, that are denoted respectively as follows:

$$a^F = \begin{cases} k^F a, & \text{w.p. } \rho \\ a, & \text{w.p. } 1 - \rho \end{cases} \quad a^P = \begin{cases} k^P a, & \text{w.p. } \rho \\ 0, & \text{w.p. } 1 - \rho \end{cases} \quad a^C = \begin{cases} (1 - k^F - k^P)a, & \text{w.p. } \rho \\ 0, & \text{w.p. } 1 - \rho \end{cases} \quad (2)$$

with  $k^F, k^P, k^C \in [0, 1]$  being determined endogenously depending on whether Nash-bargaining between firm and politician will occur, and on the bargaining outcome. Importantly, the stakes of corruption, which amount to the level of money embezzled by the firm, are endogenous in this model and depend on the politician's behavior.

## 2.3 Timing of the game

The timing of the game is summarized as follows:

- 1) Nature chooses the state of technological efficiency  $\beta$ ;
- 2) The politician offers a contract to the firm specifying a transfer-cost pair and an auditing policy level,  $(C, t, \rho)$ ;
- 3) The politician and the firm sign the contract. The firm chooses cost-padding level  $a \in \{0, \alpha\}$  and effort level  $e$ ;
- 4) The firm undergoes auditing and the politician discovers evidence of cost-padding with

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<sup>14</sup>Different from LT, it is assumed that the money diverted by cost-padding can be fully recouped by the politician in case of detection, whereas LT assume that cost-padding is fully consumed by the firm before the audit, so that the stakes of corruption are instead generated by the transfer differential between the two auditing outcomes.

<sup>15</sup>As in Dhami and Al-Nowaihi (2007), the inclusion of penalties above the confiscation of diverted money would not change qualitatively the results as long as they do not completely eliminate the incentive for cost-padding.

probability  $\rho$ ;

5) Upon detection, the politician decides whether to enter corrupt Nash bargaining with the firm to share embezzled money, or to return money to consumers. Shares of embezzled money  $a^F$ ,  $a^P$  and  $a^C$  are determined;

6) Transfers are realized.

## 2.4 Payoffs

On the basis of the setting described above, the payoff functions of the firm and the politician are defined.

### 2.4.1 Firm

The expected profit of a firm of type  $\beta$  who accepts contract  $(C, t, \rho)$  and engages in a level of cost-padding  $a \in \{0, \alpha\}$  is therefore:

$$\mathbb{E}[\Pi] = t + \mathbb{E}[a^F] - \psi(\beta - C + a) \quad (3)$$

Notice that for given  $C$  and  $\beta$ , engaging in cost padding  $a = \alpha$  needs to be counterbalanced by an equivalent increase in  $e$ . Therefore, the firm incurs a cost from cost-padding in terms of extra disutility of effort.

### 2.4.2 Politician

Differently from LT and from standard contract theoretical analysis of regulation and procurement, the principal is not a purely benevolent social welfare maximizer, but is partially selfish, that is he maximizes a weighted average between social welfare and private utility, which in this model merely amounts to the share of embezzled funds accruing to the politician,  $a^P$ .

Social welfare is composed by both consumers welfare and firm's profits. However, it is assumed that upon detection the politician does not include in social welfare the firm's gain from cost-padding (which after detection is observable and measurable).<sup>16</sup>

Therefore, the expected social welfare when the contracting firm is of type  $\beta$ , accepts contract  $(C, t, \rho)$  and engages in cost-padding level  $a \in \{0, \alpha\}$  is:

$$\mathbb{E}[SW] = S + \mathbb{E}[a^C] - (1 + \lambda)(C + t + c\rho) + t + (1 - \rho)a - \psi(\beta - C + a) \quad (4)$$

and the objective function of the politician is:

$$\mathbb{E}[U] = \mathbb{E}[SW] + \mu\mathbb{E}[a^P] \quad (5)$$

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<sup>16</sup>This is in line with the thinking of some authors in the literature (see e.g., Dhimi and Al-Nowaihi (2007), Garoupa and Klerman (2002)), who adopt consumer surplus as the measure of social welfare, arguing that including profits in social welfare is questionable because of the inclusion of the proceeds of illegal activities like corruption.

where  $\mu \geq 0$  is a *selfishness parameter* measuring the weight placed on private utility relative to social welfare (see e.g., Dhimi and Al-Nowaihi (2007)).<sup>17</sup>

According to the value of  $\mu$ , politicians can be categorized as follows:

**Definition 1.** *If  $\mu > 1$  the politician is “relatively selfish”, i.e., he cares more about his private utility; if  $\mu \leq 1$  the politician is “relatively benevolent”, i.e., he cares more about social welfare.*

The “Contract Theory” purely benevolent politician and the “Public Choice” purely selfish politician are limit cases of this modelization, where, respectively,  $\mu = 0$  and  $\mu \rightarrow \infty$ . The type of the politician is common knowledge.

## 2.5 Strategies and equilibrium concept

A strategy for the politician specifies a procurement contract  $(C, t, \rho)$  and a decision about whether entering or not into corrupt bargaining with the firm upon detection of cost-padding. A strategy for (each type of) the firm specifies a contract decision about whether accepting or rejecting the contract offer, a choice of cost-padding, and a decision about whether entering or not into corrupt bargaining with the politician upon detection.

The relevant equilibrium concept is Perfect Bayesian Equilibrium (PBE). Notice that while the politician might update his beliefs about the firm’s type after contract execution, however he will not strategically use this information in the auditing subgame, since, as part of the contract, the auditing policy is not renegotiable.<sup>18</sup> Also, notice that a successful audit does not add any new information about the firm’s type that has not already been revealed by the firm’s contract choice.

The game is solved by backward induction. Therefore first the equilibrium of the corrupt bargaining between the firm and politician is characterized, and the equilibrium expected shares of embezzled funds  $\mathbb{E}[a^{F*}]$ ,  $\mathbb{E}[a^{P*}]$  and  $\mathbb{E}[a^{C*}]$  derived. Then, on the basis of continuation payoffs, the optimal procurement contracts for the politician  $(C^*, t^*, \rho^*)$  (which, since the politician as usual acts as a Stackelberg leader, takes into account the firm’s optimal choice of cost-padding), are derived.

## 3 Corrupt bargaining solution

If evidence of cost-padding is found, the politician chooses the most profitable between the two options of entering Nash-bargaining with the firm or returning money to con-

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<sup>17</sup>The objective function in (5) identifies the politician as a top politician rather than a bureaucrat. A bureaucrat would have different motives, mostly driven by private career concerns (see e.g., Alesina and Tabellini (2007) and Alesina and Tabellini (2008)).

<sup>18</sup>While such modelling choice was driven by the intention to follow LT and remain in the realm of non-renegotiable contracts, it is worth discussing its possible consequences in this context. As will be argued in Section 4, relaxing the assumption would not substantially change results, provided the firm is assumed to be a rational agent.

sumers. This decision depends on the Nash-bargaining solution, which is now derived. If the politician and the firm manage to reach an agreement on the sharing of the “cake”, their respective payoffs are:

$$U_A = S - (1 + \lambda)(C + t + c\rho) + t - \psi(\beta - C + a) + \mu k^P a \quad (6)$$

$$\Pi_A = t + (1 - k^P)a - \psi(\beta - C + a) \quad (7)$$

If instead they do not manage to reach an agreement, the politician returns money to consumers as a lump-sum transfer. Therefore, the disagreement payoffs are:

$$U_D = S + a - (1 + \lambda)(C + t + c\rho) + t - \psi(\beta - C + a) \quad (8)$$

$$\Pi_D = t - \psi(\beta - C + a) \quad (9)$$

The equilibrium shares are given by the solution to the following problem:

$$\max_{k^P: (U_A, \Pi_A) \geq (U_D, \Pi_D)} (U_A - U_D)(\Pi_A - \Pi_D) \quad (10)$$

which is

$$k^{P*} = \frac{\mu + 1}{2\mu}, \quad k^{F*} = \frac{\mu - 1}{2\mu} \quad (11)$$

It is immediate to check that  $U_A \geq U_D$  holds *only if* the politician is relatively selfish ( $\mu > 1$ ), while the firm always finds it profitable to enter bargaining. As expected, only a selfish enough politician enters corrupt Nash Bargaining. Otherwise ( $\mu \leq 1$ ), he returns money to consumers. Notice that the politician does not need to be fully benevolent ( $\mu = 0$ ) to decide not to enter the corrupt deal: politicians can well be selfish, but only particularly selfish ones - the ones who let private cause substantially exceed public interest - will damage the public by engaging in corruption.

Therefore, if the politician is relatively selfish (indicated with subscript  $S$ ) the equilibrium shares of embezzled money are:  $a_S^{P*} = \frac{\mu+1}{2\mu}a$ ,  $a_S^{F*} = \frac{\mu-1}{2\mu}a$ ,  $a_S^{C*} = 0$ . Notice that  $\frac{\partial a_S^{P*}}{\partial \mu} < 0$  (with  $\lim_{\mu \rightarrow \infty} \frac{\mu+1}{2\mu}a = \frac{a}{2}$ ,  $\lim_{\mu \rightarrow 1+} \frac{\mu+1}{2\mu}a = a$ ). Interpretation is that the more selfish the politician is, the easier it is to bribe him: the higher the selfishness, the lower needs to be the actual share, as he values it more. Instead, if the politician is relatively benevolent (indicated with subscript  $B$ ) the equilibrium shares are:  $a_B^{P*} = 0$ ,  $a_B^{F*} = 0$ ,  $a_B^{C*} = a$ .<sup>19</sup>

From the results above it is possible to derive the expected equilibrium shares of embezzled money and state the following result:

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<sup>19</sup>Notice that there is a discontinuity at  $\mu = 1$ :  $\lim_{\mu \rightarrow 1+} a^{P*} = a$  but for  $\mu \leq 1$   $a^{P*} = 0$ .

**Proposition 1.** (Expected equilibrium shares of embezzled money) *The expected equilibrium shares of embezzled money depend on the selfishness of the politician and are as follows:*

$$\mathbb{E}[a_j^{P*}] = \begin{cases} 0, & \text{if } j = B \\ \rho \frac{\mu+1}{2\mu} a, & \text{if } j = S \end{cases}, \quad \mathbb{E}[a_j^{F*}] = \begin{cases} (1-\rho)a, & \text{if } j = B \\ (1-\rho \frac{\mu+1}{2\mu})a, & \text{if } j = S \end{cases}, \quad \mathbb{E}[a_j^{C*}] = \begin{cases} \rho a, & \text{if } j = B \\ 0, & \text{if } j = S \end{cases}$$

As intuitive,  $\frac{\partial \mathbb{E}[a_j^{F*}]}{\partial \rho} < 0$ ,  $\frac{\partial \mathbb{E}[a_j^{P*}]}{\partial \rho} > 0$ . The expected continuation payoffs for the politician and the firm from the auditing subgame are the expressions in (3) and (5) where the expected shares are at their equilibrium levels.

Notice that so far only the optimal *shares* of embezzled funds have been determined. The equilibrium *level* of cost-padding is a decision of the firm given its choice of contract, as addressed next.

## 4 Equilibrium procurement contracts

The principal optimally offers the menu of type-contingent contracts that maximize his objective function. Therefore, politician of type  $j$  will choose contracts  $(C_{ij}, t_{ij}, \rho_{ij})$ ,  $i \in \{L, H\}$ ,  $j \in \{B, S\}$ , that maximize

$$\mathbb{E}[U_j] = \nu[\mathbb{E}[SW_{Lj}^*] + \mu\mathbb{E}[a_{Lj}^{P*}]] + (1-\nu)[\mathbb{E}[SW_{Hj}^*] + \mu\mathbb{E}[a_{Hj}^{P*}]] \quad (12)$$

under constraints of Individual Rationality (*IR*) and Incentive Compatibility (*IC*).

However, differently from the benchmark procurement problem with no cost-padding, here the principal needs to take into account the incentives for the firm to pad costs conditional on the contract choice. After accepting contract  $(C_{kj}, t_{kj}, \rho_{kj})$ , with  $k = i$  or  $k \neq i$ , the firm engages in cost padding (i.e.,  $a = \alpha$ ) if and only if

$$t_{kj} + \mathbb{E}[\alpha_{kj}^{F*}] - \psi(\beta_i - C_{kj} + \alpha) \geq t_{kj} - \psi(\beta_i - C_{kj}) \quad (13)$$

or

$$\mathbb{E}[\alpha_{kj}^{F*}] \geq \psi(\beta_i - C_{kj} + \alpha) - \psi(\beta_i - C_{kj}) \quad (14)$$

that is, if and only if the gain from engaging in cost-padding (i.e., the firm's expected share of embezzled funds) outweighs its cost (i.e., the extra disutility of effort due to cost-padding). This reduces to a condition on the level of the auditing: the firm will engage in cost-padding if and only if the auditing is low enough:

$$\rho_{kj} \leq \frac{\alpha - [\psi(\beta_i - C_{kj} + \alpha) - \psi(\beta_i - C_{kj})]}{\alpha} K_j \quad (15)$$

$$\text{with } K_j = \begin{cases} 1, & \text{if } j = B \\ \frac{2\mu}{\mu+1}, & \text{if } j = S \end{cases} \quad (16)$$

Also, the fact that for a given  $C$  more cost-padding needs to be financed out of more effort, combined with the fact that the marginal disutility of effort is lower for the efficient

type ( $\psi_{e\beta} > 0$ ), suggests that for a given cost level a more efficient type will engage in more cost-padding than a less efficient type.<sup>20</sup> This result is proved to be true in LT and is stated here for the binary case:

**Lemma 1.** (Proposition 1 LT) *If for a given cost level  $C$   $a_L^*$  and  $a_H^*$  are the optimal levels of cost-padding for, respectively,  $\beta_L$  and  $\beta_H$ , then it must be the case that if  $a_H^* = \alpha$ , then  $a_L^* = \alpha$ .*

It is important to remark that Lemma 1 asserts that the more efficient type engages in cost-padding when the less efficient type does *for a given cost level*, not that the more efficient type will engage in cost padding *in equilibrium*, since in general different types will produce at different costs.

Also the benchmark result from LT on equilibrium contracts in absence of cost-padding will be useful in the following:

**Lemma 2.** (Equilibrium procurement contracts in the benchmark with no cost-padding LT)

*When cost-padding is not possible, the politician offers a menu of contracts where he requires the first-best effort from the efficient type and distorts downward the effort from the inefficient type:*

$$\begin{cases} C_H = \beta_H - e^{SB} \\ t_H = \psi(e^{SB}) \end{cases} \quad \begin{cases} C_L = \beta_L - e^{FB} \\ t_L = \psi(e^{FB}) + \Phi(e^{SB}) \end{cases}$$

where

$$e^{FB} : \psi'(e^{FB}) = 1, \quad e^{SB} : \psi'(e^{SB}) = 1 - \frac{\lambda}{1+\lambda} \frac{\nu}{1-\nu} \Phi'(e^{SB}), \quad e^{SB} < e^{FB}$$

$$\Phi(e^{SB}) = \psi(e^{SB}) - \psi(e^{SB} - \Delta\beta)$$

Lemma 2 summarizes the standard result that the optimal contract optimizes on the trade-off between incentives for cost-efficiency and rent extraction: distorting the effort of the inefficient type downward relative to the first-best level allows to reduce the information rent of the efficient type.

Propositions 2 and 3, and Tables 1, 2 and 3 below characterize equilibrium contracts under the two different types of politician when cost-padding is possible.

**Proposition 2.** (Equilibrium procurement contracts for a benevolent politician)

*For low levels of the cost of auditing ( $c \leq \underline{c}$ ) a benevolent politician chooses a menu of cost-padding free contracts ( $(C_{iB}^{NC}, t_{iB}^{NC}, \rho_{iB}^{NC})$  in Table 1). For intermediate cost of auditing ( $\underline{c} < c \leq \bar{c}$ ) he induces cost padding only from the type which is frequent enough to be too costly to deter ( $(C_{iB}^{CPH}, t_{iB}^{CPH}, \rho_{iB}^{CPH})$  or  $(C_{iB}^{CPL}, t_{iB}^{CPL}, \rho_{iB}^{CPL})$  in Table 1). If the cost of auditing is high enough ( $c > \bar{c}$ ) he chooses contracts where he forgoes auditing and induces cost-padding from both types ( $(C_{iB}^{CP}, t_{iB}^{CP}, \rho_{iB}^{CP})$  in Table 1). The politician always requires*

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<sup>20</sup>Condition  $\psi_{e\beta} > 0$  amounts to the Spence-Mirrlees Single-crossing condition, which will ensure the sustainability of a separating equilibrium in optimal contracts (see e.g., Bolton and Dewatripont (2005)). Notice that  $\psi_\beta > 0$  also holds, namely the efficient type has a lower disutility from effort.

the first-best effort from the efficient type while the downward distortion of the inefficient type's effort is lower or equal than in the benchmark with no cost-padding ( $e_{HB}^{NC} = e_{HB}^{CPL} = \bar{e} > e^{SB} = e_{HB}^{CPH} = e_{HB}^{CP}$ ).

*Proof.* In the Appendix 7.2.

**Proposition 3.** (Equilibrium procurement contracts for a selfish politician)

If the cost of auditing is low enough ( $c \leq \tilde{c} < \underline{c}$ ) a moderately selfish politician ( $1 < \mu \leq \underline{\mu}$ ) chooses cost-padding free contracts ( $(C_{iS}^{NC}, t_{iS}^{NC}, \rho_{iS}^{NC})$  in Table 2). For intermediate values of selfishness ( $\underline{\mu} < \mu \leq \bar{\mu}$ ) the politician induces cost-padding only from the type which is frequent enough to be too costly to deter ( $(C_{iS}^{CPH}, t_{iS}^{CPH}, \rho_{iS}^{CPH})$  or  $(C_{iS}^{CPL}, t_{iS}^{CPL}, \rho_{iS}^{CPL})$  in Table 2). A selfish enough politician ( $\mu > \bar{\mu}$ ) chooses contracts with cost padding by both types ( $(C_{iS}^{CP}, t_{iS}^{CP}, \rho_{iS}^{CP})$  in Table 2). When the cost of auditing is higher ( $c > \tilde{c}$ ) the politician needs to be more selfish than before ( $\mu > \tilde{\mu} > \underline{\mu}$ ) to choose contracts with cost-padding. Politicians that are not so selfish choose the cost-padding free contracts (see Table 3). The politician always requires the first-best effort from the efficient type while the downward distortion of the inefficient type's effort is lower or equal than in the benchmark with no cost-padding ( $e_{HS}^{NC} = e_{HS}^{CPL} = \bar{e} > e^{SB} = e_{HS}^{CPS} = e_{HS}^{CP}$ ).

*Proof.* In the Appendix 7.3.

Table 1: Equilibrium contracts for a benevolent politician

	$\nu \leq \frac{2}{3}$	$\nu > \frac{2}{3}$
$c \leq \underline{c}$	$\begin{cases} C_{HB}^{NC} = \beta_H - \bar{e} \\ t_{HB}^{NC} = \psi(\bar{e}) \\ \rho_{HB}^{NC} = \rho_H^2 \end{cases}$	$\begin{cases} C_{HB}^{NC} = \beta_H - \bar{e} \\ t_{HB}^{NC} = \psi(\bar{e}) \\ \rho_{HB}^{NC} = \rho_H^2 \end{cases}$
$\underline{c} < c \leq \bar{c}$	$\begin{cases} C_{HB}^{CPH} = \beta_H - e^{SB} + \alpha \\ t_{HB}^{CPH} = \psi(e^{SB}) - (1 - \rho_{HB}^{CPH})\alpha \\ \rho_{HB}^{CPH} = \rho_H^4 \end{cases}$	$\begin{cases} C_{HB}^{CPL} = \beta_H - \bar{e} \\ t_{HB}^{CPL} = \psi(\bar{e}) \\ \rho_{HB}^{CPL} = \rho_H^2 \end{cases}$
$c > \bar{c}$	$\begin{cases} C_{HB}^{CCP} = \beta_H - e^{SB} + \alpha \\ t_{HB}^{CCP} = \psi(e^{SB}) - (1 - \rho_{HB}^{CPH})\alpha \\ \rho_{HB}^{CCP} = 0 \end{cases}$	$\begin{cases} C_{HB}^{CCP} = \beta_H - e^{SB} + \alpha \\ t_{HB}^{CCP} = \psi(e^{SB}) - (1 - \rho_{HB}^{CPH})\alpha \\ \rho_{HB}^{CCP} = 0 \end{cases}$

where  $\bar{e}$ :  $\psi'(\bar{e}) = 1 - \frac{\lambda}{1+\lambda} \frac{\nu}{1-\nu} \Gamma'_B(\bar{e})$ ,  $e^{SB} < \bar{e} < e^{FB}$  and  $\Gamma_B(\bar{e}) \equiv \psi(\bar{e}) - \psi(\bar{e} - \Delta\beta + \alpha) + (1 - \rho_H^2)\alpha$   
(See subsection 7.1 in Appendix for full notation description).



Table 2: Equilibrium contracts for a selfish politician,  $c \leq \tilde{c}$ 

	$\nu \leq \frac{2}{3}$	$\nu > \frac{2}{3}$
$1 < \mu \leq \underline{\mu}$	$\begin{cases} C_{HS}^{NC} = \beta_H - \bar{e} \\ t_{HS}^{NC} = \psi(\bar{e}) \\ \rho_{HS}^{NC} = \rho_{H, \mu+1}^2 \end{cases}$	$\begin{cases} C_{HS}^{NC} = \beta_H - \bar{e} \\ t_{HS}^{NC} = \psi(\bar{e}) \\ \rho_{HS}^{NC} = \rho_{H, \mu+1}^2 \end{cases}$
$\underline{\mu} < \mu \leq \bar{\mu}$	$\begin{cases} C_{HS}^{CPH} = \beta_H - e^{SB} + \alpha \\ t_{HS}^{CPH} = \psi(e^{SB}) - (1 - \rho_{HS}^{CPH, \frac{\mu+1}{2\mu}})\alpha \\ \rho_{HS}^{CPH} = \rho_{H, \mu+1}^4 \end{cases}$	$\begin{cases} C_{LS}^{CPH} = \beta_L - e^{FB} \\ t_{LS}^{CPH} = \psi(e^{FB}) + \Phi(e_H^{SB}) \\ \rho_{LS}^{CPH} = \rho_{L, \mu+1}^1 \end{cases}$
$\mu > \bar{\mu}$	$\begin{cases} C_{HS}^{CP} = \beta_H - e^{SB} + \alpha \\ t_{HS}^{CP} = \psi(e^{SB}) - (1 - \rho_{HS}^{CP, \frac{\mu+1}{2\mu}})\alpha \\ \rho_{HS}^{CP} = \rho_{H, \mu+1}^4 \end{cases}$	$\begin{cases} C_{LS}^{CP} = \beta_L - e^{FB} + \alpha \\ t_{LS}^{CP} = \psi(e^{FB}) - (1 - \rho_{HS}^{CP, \frac{\mu+1}{2\mu}})\alpha + \Phi(e^{SB}) \\ \rho_{LS}^{CP} = \rho_{L, \mu+1}^2 \end{cases}$

where  $\bar{e}$ :  $\psi'(\bar{e}) = 1 - \frac{\lambda}{1+\lambda} \frac{\nu}{1-\nu} \Gamma'_S(\bar{e})$ ,  $e^{SB} < \bar{e} < e^{FB}$  and  $\Gamma_S(\bar{e}) \equiv \psi(\bar{e}) - \psi(\bar{e} - \Delta\beta + \alpha) + (1 - \rho_H^2 \frac{\mu+1}{2\mu})\alpha$   
 (See subsection 7.1 in Appendix for full notation description).

Table 3: Equilibrium contracts for a selfish politician,  $c > \tilde{c}$ 

	$\nu \leq \frac{2}{3}$	$\nu > \frac{2}{3}$
$1 < \mu \leq \tilde{\mu}$	$\begin{cases} C_{HS}^{NC} = \beta_H - \bar{e} \\ t_{HS}^{NC} = \psi(\bar{e}) \\ \rho_{HS}^{NC} = \rho_{H, \mu+1}^2 \end{cases}$	$\begin{cases} C_{HS}^{NC} = \beta_H - \bar{e} \\ t_{HS}^{NC} = \psi(\bar{e}) \\ \rho_{HS}^{NC} = \rho_{H, \mu+1}^2 \end{cases}$
$\tilde{\mu} < \mu \leq \bar{\mu}$	$\begin{cases} C_{HS}^{CPH} = \beta_H - e^{SB} + \alpha \\ t_{HS}^{CPH} = \psi(e^{SB}) - (1 - \rho_{HS}^{CPH, \frac{\mu+1}{2\mu}})\alpha \\ \rho_{HS}^{CPH} = 0 \end{cases}$	$\begin{cases} C_{LS}^{CPL} = \beta_L - e^{FB} \\ t_{LS}^{CPL} = \psi(e^{FB}) - (1 - \rho_{HS}^{CPL, \frac{\mu+1}{2\mu}})\alpha + \Gamma_S(\bar{e}) \\ \rho_{LS}^{CPL} = 0 \end{cases}$
$\mu > \bar{\mu}$	$\begin{cases} C_{HS}^{CP} = \beta_H - e^{SB} + \alpha \\ t_{HS}^{CP} = \psi(e^{SB}) - (1 - \rho_{HS}^{CP, \frac{\mu+1}{2\mu}})\alpha \\ \rho_{HS}^{CP} = \rho_{H, \mu+1}^4 \end{cases}$	$\begin{cases} C_{LS}^{CP} = \beta_L - e^{FB} + \alpha \\ t_{LS}^{CP} = \psi(e^{FB}) - (1 - \rho_{HS}^{CP, \frac{\mu+1}{2\mu}})\alpha + \Phi(e^{SB}) \\ \rho_{LS}^{CP} = \rho_{L, \mu+1}^2 \end{cases}$

where  $\bar{e}$ :  $\psi'(\bar{e}) = 1 - \frac{\lambda}{1+\lambda} \frac{\nu}{1-\nu} \Gamma_S'(\bar{e})$ ,  $e^{SB} < \bar{e} < e^{FB}$  and  $\Gamma_S(\bar{e}) \equiv \psi(\bar{e}) - \psi(\bar{e} - \Delta\beta + \alpha) + (1 - \rho_H^2 \frac{\mu+1}{2\mu})\alpha$   
 (See subsection 7.1 in Appendix for full notation description).

The interpretation of Propositions 2 and 3 is as follows. A benevolent politician, who cares more about the extra burden for consumers due to cost-padding than about the bribe, would in principle always prefer to choose cost-padding free contracts, where the optimal auditing levels are high enough to deter both types of firm from padding costs. However, since auditing is costly, he might still prefer to induce cost-padding from one or both types since the loss in social welfare for deterring cost padding at a higher (and hence more costly) auditing level can be higher than the loss due to inducing cost-padding at a lower auditing cost. When the cost gets prohibitively high he prefers to forgo auditing and allow cost-padding from both types. This would never happen in case of costless auditing, since the politician would be always able to deter cost-padding at no welfare cost.

On the other hand, not all selfish politicians allow for cost-padding in equilibrium.<sup>21</sup> The politician needs to be selfish enough to prefer cost-padding, and the more so the higher is the auditing cost and the more so to induce cost-padding from both types rather than one type only. Notice that such an extremely selfish politician faces a trade-off when choosing the auditing level: on one hand, like a benevolent politician, he would also prefer high auditing, that allows him to detect cost-padding more often, hence increasing his expected share of embezzled funds; on the other hand, stricter auditing deters the firm from engaging in cost-padding in the first place, decreasing the politician's expected share, so that he needs to restrict auditing.<sup>22</sup> Therefore, the optimal auditing levels for such a selfish politician ( $\rho_{HS}^{CP}, \rho_{LS}^{CP}$ ) are the highest ones that are still consistent with both types of firm having an incentive to engage in cost-padding.

The intuition why the downward distortion of the efficient type's optimal effort level can be lower than in the benchmark with no cost-padding ( $e_{Hi}^{NC} = e_{Hi}^{CPL} = \bar{e} > e^{SB} = e_{Hi}^{CPH} = e_{Hi}^{CP}$ ) is that due to the fact that cost-padding increases the marginal disutility of the efficient type of mimicking the inefficient type, a marginal increase in the effort of the inefficient type increases the rent of the efficient type by less than when the efficient type does not want to pad costs. Related to that, the reason why the optimal level of auditing in the cost-padding free optimum is lower for the efficient type than for the inefficient type ( $\rho_{Li}^{NC} < \rho_{Hi}^{NC}$ , see Lemma 4 in the Appendix), is that the efficient type has a lower incentive to pad costs since it is required to exert a higher equilibrium effort which makes cost-padding more costly in terms of extra disutility of effort.

On the other hand, the reason why for the same type of contract the auditing levels are higher under a selfish politician than under a benevolent one (e.g.  $\rho_{iS}^{NC} = \rho_{iB}^{NC} \frac{2\mu}{\mu+1} > \rho_{iB}^{NC}$ ) is that the firm has a higher expected share of embezzled funds under a selfish politician, and therefore a higher incentive to pad costs.

It is interesting to note that, provided the firm is not naive, these results would hold also in the case where the politician can strategically deviate from the contracted auditing policy after the contract is executed. In fact, a rational firm would disregard the contracted policy and would take the cost-padding decision under rational expectations of the behavior of the politician (whose type is common knowledge). The firm would for example anticipate

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<sup>21</sup>However the cost threshold for preferring cost-padding free contracts, as intuitive, is lower than under a benevolent politician.

<sup>22</sup>A similar trade-off occurs in Dittmann (2006).

that a benevolent politician has an incentive to ex-post reduce auditing (to save on welfare costs) and as a response would pad costs which is an inferior outcome for a benevolent politician (at least in the low-cost scenario). Similarly, increasing ex-post auditing for a selfish politician (to increase his expected share) would result in the firm not padding costs - an inferior option for a selfish politician. Therefore, there seem to be no room for time-inconsistency issues in this context.

Some further interesting insights come from comparative statics on the thresholds  $\underline{\mu}$  and  $\tilde{\mu}$  that determine equilibrium cost-padding under different cost configurations, as stated in the next proposition.

**Proposition 4.** (Comparative statics) *A selfish politician is more likely to choose contracts with cost-padding the less distortionary is taxation ( $\frac{\partial \underline{\mu}}{\partial \lambda} > 0$ ,  $\frac{\partial \tilde{\mu}}{\partial \lambda} > 0$ ) and the lower is the auditing cost ( $\frac{\partial \underline{\mu}}{\partial c} > 0$ ,  $\frac{\partial \tilde{\mu}}{\partial c} > 0$ ).*

A decrease in the distortions of taxation reduces the social cost of cost-padding, which implies that also moderately opportunist politicians will have an incentive to let cost-padding occur. In the limit case of a perfectly efficient fiscal system (i.e.,  $\lambda = 0$ ) all relatively selfish politicians (i.e.,  $\forall \mu > 1$ ) will allow cost-padding to occur. Similarly, the less costly the auditing, the lower the social cost of cost-padding, and therefore the less selfish need to be the politician to allow for cost-padding to occur in equilibrium. Since politicians need to weaken the auditing technology in order to induce cost-padding, the model predicts an *endogenous substitutability* between auditing and State capacity (in terms of the efficiency of the fiscal system): if the State works well the politician chooses poor auditing, while if the State works poorly he prefers strong auditing.

Propositions 2, 3 and 4 confirm that differently from the benchmark in LT, the occurrence of cost-padding in the execution of public projects can be explained as a problem of *political corruption*. In LT - where the politician is benevolent (dislikes cost padding) and the auditing technology is exogenous - cost-padding can emerge in optimal contracts only due to incomplete information and imperfect auditing, and due to the desire of the principal to extract rents. If auditing were perfect, he would require zero cost-padding (as auditing is also free) and the regulatory solution would be the same as in the benchmark with no cost-padding. Imperfect auditing implies that cost-padding prevention and rent extraction get in conflict. While preventing cost-padding calls for high-powered incentives and fixed price contracts, rent extraction calls for weaker incentives and cost-sharing contracts. Therefore, when auditing is weak, so it is too costly for the principal to prevent cost-padding in terms of extra information rents, the principal allows cost-padding by the inefficient type (while he always offers a fixed price contract to the efficient type). Therefore, in LT the occurrence of cost-padding is a response of the principal to imperfect auditing. Furthermore in LT (bureaucratic) corruption can never occur in equilibrium, since the principal always makes a take-it-or-leave-it offer to the corruptible bureaucrat, no matter how costly it is (i.e., all contracts are by construction corruption-free).

On the other hand, in this model, due to the possibility of selfishness on the side of the politician and the endogeneization of the auditing policy, the occurrence of cost-padding is a choice of the politician induced through the contractual auditing policy and

depending on his motives. A selfish enough politician offers loose contracts with low levels of auditing to induce cost padding as stakes for corrupt deals he can gain from for. A benevolent politician let cost padding happen only if it is too expensive to prevent it in terms in cost of auditing. This explains why, although with different reasons, both types of politicians might want to induce cost padding also from the efficient type. In addition notice that while under a selfish politician corruption could emerge also if the auditing technology were exogenous like in LT (provided the detection probability is low enough for the firm to have an incentive to pad costs), endogenous auditing gives the principal a more powerful instrument to create stakes for corrupt deals e.g., enabling him to take into account the different incentives of the different firm types to pad costs. This reflects the observation from the MOSE and other episodes of grand corruption that politicians may have channels and instruments to systematically induce malfeasance for their own interest. Endogenous auditing is good as well for a benevolent politician, that can exploit auditing choices to improve the outcomes for the taxpayers. The two extensions of LT model, which allow politicians to have not only the motives but also the instruments to misbehave, can explain large episodes of embezzlement and corruption in the execution of public contracts.

## 5 A discussion on political preferences and accountability

Although in the model there is no explicit modelization of accountability or control of the politician, the parameter  $\mu$  captures these elements in a reduced form.  $\mu$  can be interpreted as a measure of (exogenous) effectiveness of the political and legal system, thereby defining the extent to which the politician is able to pursue his private agenda rather than social welfare (see e.g., Shapiro and Willig (1990)).<sup>23</sup> The more efficient are the political and legal systems, i.e., the more accountable are politicians, the lower is  $\mu$ . This can justify why in the model the politician still needs the agreement of the firm to embezzle money.

Notice that this interpretation of  $\mu$  allows for an interesting reading of one of the main results of the paper, namely that a decrease in  $\lambda$  (or  $c$ ) must be more than counterbalanced by a decrease in  $\mu$  in order to make cost-padding less easy to occur. This result can be explained in the light of Acemoglu (2010)'s discussion about State capacity.<sup>24</sup> A reduction in the distortion of taxation has ambiguous effects on welfare: on one hand it has a direct positive effect insofar it improves redistribution and allocation of resources. On the other hand however, it has an indirect negative effect to the extent that it increases the potential benefits of ruling the State, so that pursuing personal interest becomes more attractive for the politician: the higher the improvement in efficiency, the lower degree of selfishness is needed for the politician to prefer the cost-padding regime.<sup>25</sup> Therefore the result in

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<sup>23</sup>In other words  $\mu$  can be interpreted as a “net benefit” measure derived from the anticipation of punishment coming from the electorate or from the legal authorities.

<sup>24</sup>Also see Acemoglu et al. (2011).

<sup>25</sup>In Acemoglu (2010) an increase in the potential benefits of controlling the state intensifies the political conflict aimed at capturing this control.

the paper appears to confirm Acemoglu (2010)’s insight that an improvement in State capacity (like a more efficient fiscal system) is not good *per se* (as instead argued by e.g., Besley and Persson (2010) - who neglected the impact that an increase in State capacity has on the political equilibrium) but it is beneficial only if it comes from or is coincident to an increase in the political accountability of politicians. An interesting extension in this direction would be to endogenize the politician’s selfishness  $\mu$  with respect to  $\lambda$  and in general the institutions that constrain the politician’s behavior.<sup>26</sup>

There are as well a number of possibilities to model the control and accountability of the politician more explicitly. One option, following Laffont (2000), is the separation of auditing powers among multiple supervisors. For example, the main auditing activity run by the politician in power could be complemented by an external monitoring activity on which the politician in power has no influence (e.g. random police or judiciary checks, possibly requested or triggered by a politician from the opposition). If side contracting is not allowed between supervisors and equilibrium behavior is such that each supervisor only asks for prudent bribes (i.e., only in the case that the other supervisor did not detect the illegal activity), the presence of the second supervisor reduces the leverage of the information at disposal of the politician, therefore reducing his discretion to and stakes from manipulating auditing, which ultimately reduces corruption. The same outcome would result from allowing an external monitoring services (e.g., an anti-corruption authority) to investigate on the occurrence of corruption between the politician and the firm. If such external auditing entails a positive probability of detection and a punishment upon detection, the expected stakes from corruption are reduced.

A second possibility would be to allow for the Constituency to act as a super-principal and use elections as a discipline device to enhance the accountability of the politician. The idea, following first generation electoral accountability models a la Barro (1973) and Ferejohn (1986) is that citizens can exploit voting and political alternation to achieve that politicians deliver outcomes closer to their preferences, in this case lower cost-padding. This could apply to our model by assuming that voters are able to announce - and commit to - an incentive-based re-election rule before the politician raises taxes and contracts with the firm for the project realization. Then, after the incumbent politician has contracted with the firm and the project has been realized, elections are held in which the voters choose between the incumbent and an opponent. If voters are satisfied with the incumbent’s job, they re-elect him. If they are not, they punish him by electing the opponent.<sup>27</sup> It is possible to show that incentives for the politician to induce cost-padding are lower in presence of elections, as when choosing the contracts the politicians takes into account the rents from being elected.

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<sup>26</sup>A second possible way to endogenize the politician’s self-interest would be “motivational” and would consider the role of psychological and social factors on the intrinsic motivation and self-regulation of the politician (see e.g., Bénabou and Tirole (2002), Bénabou and Tirole (2003) and Bénabou and Tirole (2006)).

<sup>27</sup>This type of behavior was for example observed in the elections after the big political corruption scandal of “Tangentopoli”, where citizens switched their vote from historical parties (which were all found to be involved in the scandal) to new parties. This led to a radical change of the Italian party system.

An interesting twist for both extensions would be to allow for the politician’s type to be private information (rather than common knowledge as in the current model). In this case the third “benevolent” player (i.e. the monitoring authorities or the Constituency could use the information that is revealed by the contract and the auditing choices of the politician to make inference about the politician’s type. Also, the politician himself might want to bias the procurement policy as a way to signal his type (see e.g., Acemoglu et al. (2013)). Another possibility, suggested by the result that a more selfish politician has a lower bargaining power in the sharing of the embezzled money, would be to investigate whether the politician has any incentive to pretend to have a smaller selfishness (but still compatible with corruption,  $\mu > 1$ ) in order to get a larger bribe in Nash bargaining.

## 6 Conclusion

This paper provided a novel economic explanation for the occurrence of embezzlement in the execution of public contracts. It was argued that at the core of the phenomenon is a problem of *political* corruption: selfish politicians at the top of the procurement hierarchy may be interested in obtaining a share of the money embezzled by the contracting firm and, hence, may create incentives for the firm to pad costs.

To investigate this conjecture, the paper extended the agency regulatory model of cost-padding in Laffont and Tirole (1992), to allow for the principal to be partially selfish and to design procurement contracts where he also chooses the intensity of auditing over the execution of the contract. Depending on his degree of selfishness, the politician decides both how strict the auditing of contract execution should be and, in case evidence of cost-padding is found, whether to enter a corrupt transaction with the firm i.e., hide evidence in exchange of a share of the embezzled money.

The main finding of the paper is that a relatively benevolent politician - provided the cost of auditing is sufficiently low - chooses cost-padding free contracts, where the auditing policy is strict enough to prevent the firm from engaging in cost-padding; conversely, a sufficiently selfish politician, chooses contracts where the auditing is lax enough to create an incentive for embezzlement and, conditional upon detection, enters in a corrupt transaction with the firm. If the cost of auditing is very high, even a relatively benevolent politician might prefer to allow for cost-padding, thus saving on the cost of auditing in order to minimize the welfare loss. This result is consistent with the “mixed” nature of the politician, who cares both about social welfare and his private utility. Since cost-padding implies a higher cost for consumers in terms of distortionary taxation, only a politician who is eager enough is willing to allow for cost-padding to occur.

In addition, an interesting comparative statics result that emerged is that an improvement in the efficiency of the fiscal system makes cost-padding easier to occur, since when the social cost of cost-padding (in terms of distortionary taxation) is lower, less selfish politicians are also tempted to engage in corruption.

These theoretical results suggest a number of empirically testable predictions that can be useful to inform the design of policies directed to curb cost-padding and corruption in

the execution of public contracts. First, countries or jurisdictions where the monitoring of the execution of public contracts is responsibility of an external independent authority, or where an independent authority supervises overall procurement implementation, should display lower levels of cost-padding relative to countries where the function is integrated in the contracting authority (if instead cost-padding where mostly a problem of asymmetric information rather than corruption, similar levels of cost-padding should be observed across the two systems).<sup>28</sup> Similarly, countries and jurisdictions that rely to a larger extent on standardized contracts, which might reduce the discretion of the politicians in procurement activities (see e.g., Iossa and Martimort (2016)), should be less affected by cost-padding.<sup>29</sup> Second, countries or jurisdictions with higher level of political accountability or closer to election rounds should be associated with lower levels of cost-padding. Third, under the same administration (and for the same size of contract) complex contracts which are more costly to audit (e.g. because of many sub-transactions) should be more prone to cost-padding than contracts that are easier to audit. Last, countries or jurisdictions with a less efficient fiscal system (i.e., more distortionary taxation) should also display lower levels of cost-padding.

## 7 Appendix

### 7.1 Definitions

The following definitions are adopted in the paper

$$e^{FB} : \psi'(e^{FB}) = 1 \quad (18)$$

$$e^{SB} : \psi'(e^{SB}) = 1 - \frac{\lambda}{1+\lambda} \frac{\nu}{1-\nu} \Phi'(e^{SB}), e^{SB} < e^{FB} \quad (19)$$

$$\Phi(e^{SB}) \equiv \psi(e^{SB}) - \psi(e^{SB} - \Delta\beta) \quad (20)$$

$$\bar{e} : \psi'(\bar{e}) = 1 - \frac{\lambda}{1+\lambda} \frac{\nu}{1-\nu} \Gamma'_B(\bar{e}), e^{SB} < \bar{e} < e^{FB} \quad (21)$$

$$\Gamma_B(\bar{e}) \equiv \psi(\bar{e}) - \psi(\bar{e} - \Delta\beta + \alpha) + (1 - \rho_H^2)\alpha \quad (22)$$

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<sup>28</sup>Under the current European legislation (e.g., Directives 2014/24/EU, 2014/25/EU), the bureaucrat that in practice is responsible for contract monitoring is an employee of the purchasing authority. The same is true for the bureaucrats in charge of contract design and contract award. However many countries have established independent authorities monitoring public procurement.

<sup>29</sup>Also, a higher degree of centralization and aggregation of procurement (e.g., through an increased use of regional or national procurement agencies) may help reducing the interference of politicians in contract design and award activities (see e.g., Dimitri et al. (2006)), as it would be more difficult to influence larger authorities.



$$\Gamma_S(\bar{e}) \equiv \psi(\bar{e}) - \psi(\bar{e} - \Delta\beta + \alpha) + (1 - \rho_H^2 \frac{\mu + 1}{2\mu})\alpha \quad (23)$$

$$\underline{c} \equiv \frac{2\lambda\alpha}{(1 + \lambda)\rho_H^1} \quad (24)$$

$$\bar{c} \equiv \frac{2\lambda\alpha}{(1 + \lambda)\rho_L^1} \quad (25)$$

$$\tilde{c} \equiv \frac{\lambda\alpha}{(1 + \lambda)} < \underline{c} \quad (26)$$

$$\rho_L^1 \equiv \frac{\alpha - [\psi(e^{FB} + \alpha) - \psi(e^{FB})]}{\alpha} \quad (27)$$

$$\rho_L^2 \equiv \frac{\alpha - [\psi(e^{FB}) - \psi(e^{FB} - \alpha)]}{\alpha} \quad (28)$$

$$\rho_H^1 \equiv \frac{\alpha - [\psi(\bar{e} + \alpha) - \psi(\bar{e})]}{\alpha} \quad (29)$$

$$\rho_H^2 \equiv \frac{\alpha - [\psi(\bar{e} - \Delta\beta + \alpha) - \psi(\bar{e} - \Delta\beta)]}{\alpha} \quad (30)$$

$$\rho_H^3 \equiv \frac{\alpha - [\psi(e^{SB} - \Delta\beta + \alpha) - \psi(e^{SB} - \Delta\beta)]}{\alpha} \quad (31)$$

$$\rho_H^4 \equiv \frac{\alpha - [\psi(e^{SB}) - \psi(e^{SB} - \alpha)]}{\alpha} \quad (32)$$

$$\underline{\mu} \equiv \frac{\lambda\alpha(4 - \rho_H^4) + \alpha\rho_H^4 + 2c(1 + \lambda)(\rho_H^4 - \rho_H^2) + \sqrt{[\lambda\alpha(4 - \rho_H^4) + \alpha\rho_H^4 + 2c(1 + \lambda)(\rho_H^4 - \rho_H^2)]^2 - 4\alpha^2\lambda(\rho_H^4)^2}}{2\rho_H^4\alpha} \quad (33)$$

$$\bar{\mu} \equiv \frac{\lambda\alpha(4 - \rho_L^2) + \alpha\rho_L^2 + 2c(1 + \lambda)(\rho_L^2 - \rho_L^1) + \sqrt{[\lambda\alpha(4 - \rho_L^2) + \alpha\rho_L^2 + 2c(1 + \lambda)(\rho_L^2 - \rho_L^1)]^2 - 4\alpha^2\lambda(\rho_L^2)^2}}{2\rho_L^2\alpha} \quad (34)$$

$$\tilde{\mu} \equiv \frac{\lambda\alpha(4 - \rho_H^4) + \alpha\rho_H^4 + 2c(1 + \lambda)(\rho_H^4 - \rho_H^1) + \sqrt{[\lambda\alpha(4 - \rho_H^4) + \alpha\rho_H^4 + 2c(1 + \lambda)(\rho_H^4 - \rho_H^1)]^2 - 4\alpha^2\lambda(\rho_H^4)^2}}{2\rho_H^4\alpha} \quad (35)$$

## 7.2 Proof of Proposition 2

This section first characterizes possible contractual optima under a benevolent politician and then the optimal choice by comparison of the values of his objective function at the different optima.

### 7.2.1 Possible contractual optima under a benevolent politician

Let  $(C_{iB}, t_{iB}, \rho_{iB})$  with  $i \in \{L, H\}$  be a menu of contracts under a benevolent politician.

Depending on which are the optimal levels of cost-padding for each type of firm, in principle four types of optima are possible:

**Type 1** Cost-padding by the inefficient type only:  $a_H^* = \alpha, a_L^* = 0$ ;

**Type 2** Cost-padding by the efficient type only:  $a_H^* = 0, a_L^* = \alpha$ ;

**Type 3** Cost-padding by both types:  $a_H^* = \alpha, a_L^* = \alpha$ ;

**Type 4** No cost-padding:  $a_H^* = 0, a_L^* = 0$ .

**Lemma 3.** (Type 1 optima: cost-padding by type H only) *There is a unique Type 1 optimum (indicated with superscript CPH) which is as follows:*

$$\left\{ \begin{array}{l} C_{HB}^{CPH} = \beta_H - e^{SB} + \alpha \\ t_{HB}^{CPH} = \psi(e^{SB}) - (1 - \rho_{HB}^{CPH})\alpha \\ \rho_{HB}^{CPH} = \begin{cases} \rho_H^A, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ 0, & \text{otherwise} \end{cases} \end{array} \right. \quad (36) \quad \left\{ \begin{array}{l} C_{LB}^{CPH} = \beta_L - e^{FB} \\ t_{LB}^{CPH} = \psi(e^{FB}) + \Phi(e_H^{SB}) \\ \rho_{LB}^{CPH} = \rho_L^1 \end{array} \right. \quad (37)$$

where the optimal levels of effort were used in the expressions for  $\rho_{iB}^{CPH}$ . The threshold on cost (which determines the optimal level of auditing for the type that pads cost in equilibrium,  $H$ ) is determined by the sign of the difference  $[\lambda\alpha - (1 + \lambda)c\rho_{HB}]$ . If the sign is positive (negative), the politician's payoff increases (decreases) the higher is the auditing level for the "padding" type.

#### Proof of Lemma 3

Suppose the case  $a_H^* = \alpha, a_L^* = 0$  is an optimum. The cost level of the inefficient type is then  $C_{HB} = \beta_H - e_H + \alpha$ . Let  $a_L^m$  be the optimal level of cost-padding for the efficient type when it mimics the inefficient type (i.e., chooses contract  $(C_{HB}, t_{HB}, \rho_{HB})$ ). It is known from Lemma 1 that  $a_L^m = \alpha$ . Therefore, relevant constraints  $IC_L$  and  $IR_H$  are respectively:

$$\Pi_{LB} = t_{LB} - \psi(\beta_L - C_{LB}) \geq t_{HB} + (1 - \rho_{HB})\alpha - \psi(\beta_L - C_{HB} + \alpha) \quad (38)$$

$$\Pi_{HB} = t_{HB} + (1 - \rho_{HB})\alpha - \psi(\beta_H - C_{HB} + \alpha) \geq 0 \quad (39)$$

Furthermore, the two following conditions need to be satisfied at the optimum namely that 1) the inefficient type does find it profitable to engage in cost-padding when accepting his contract  $(C_{HB}, t_{HB}, \rho_{HB})$ , and 2) the efficient type does not want to deviate to cost-padding when accepting his contract  $(C_{LB}, t_{LB}, \rho_{LB})$ . Namely, using condition (15):

$$\rho_{HB} \leq \frac{\alpha - [\psi(\beta_H - C_{HB} + \alpha) - \psi(\beta_H - C_{HB})]}{\alpha} \quad (40)$$

$$\rho_{LB} > \frac{\alpha - [\psi(\beta_L - C_{LB} + \alpha) - \psi(\beta_L - C_{LB})]}{\alpha} \quad (41)$$

Using the fact that  $IC_L$  and  $IR_H$  constraints will be binding at the optimum, which implies that  $\Pi_H = 0$  and  $\Pi_L = \Phi(e_H)$ , where  $\Phi(e) = \psi(e) - \psi(e - \Delta\beta)$  ( $\Phi' > 0$ ,  $\Delta\beta = \beta_H - \beta_L$ ), the maximization problem of politician  $j$  is reduced to the following problem:

$$\begin{aligned} \max_{e_H, e_L, \rho_H, \rho_L} \quad & \{\nu[S - (1 + \lambda)[\beta_L - e_L + \psi(e_L)] - \lambda\Phi(e_H)] + (1 - \nu)[S - (1 + \lambda)[\beta_H - e_H + \psi(e_H)] + \\ & (1 - \nu)[-2\lambda\alpha + \lambda\alpha\rho_{HB} - (1 + \lambda)c\rho_{HB}] - \nu(1 + \lambda)c\rho_{LB}\} \end{aligned} \quad (42)$$

s.t. (40), (41)

Notice that the problem is linear in  $\rho_i$  so their optimal values can be determined using condition (15) after the optimal value of  $e_H$  is determined. Furthermore, if  $\psi''' \geq 0$ ,  $\Phi$  is convex, which ensures the regulator objective function is concave in  $e_H$ .  $\square$

Solutions for the other cases can be obtained analogously, as proved in the rest of this section. Before proceeding, we state an useful result on the ranking of the auditing thresholds, as follows:

**Lemma 4.** *The ranking of the optimal auditing levels is as follows:*

$$0 < \rho_L^1 < \rho_L^2 < \rho_H^1 < \rho_H^2 < \rho_H^3 < \rho_H^4 < 1 \quad (43)$$

*Proof:* Since  $e^{SB} < \bar{e} < e^{FB}$  and function  $\Phi$  is increasing and convex, the following will be true:

$$\begin{aligned} \psi(e^{FB} + \alpha) - \psi(e^{FB}) &> \psi(e^{FB}) - \psi(e^{FB} - \alpha) > \psi(\bar{e} + \alpha) - \psi(\bar{e}) > \psi(\bar{e} - \Delta\beta + \alpha) - \psi(\bar{e} - \Delta\beta) > \\ &\psi(e^{SB} - \Delta\beta + \alpha) - \psi(e^{SB} - \Delta\beta) > \psi(e^{SB}) - \psi(e^{SB} - \alpha) \end{aligned} \quad (44)$$

from which the ranking follows straightforwardly.  $\square$

Also, the following result will be useful for the rest of the proof:

**Lemma 5.** *In each type of optimum, the efficient type is always required to exert the first-best level of effort,  $e_L^* = e^{FB}$ .*

*Proof.* In all of the cases,  $e_L$  enters in the problem of the politician only through the term  $(1 + \lambda)[\beta_L - e_L + \psi(e_L)]$ . In all solutions therefore the optimal level of  $e_L$  satisfies  $\psi'(e_L) = 1$ .  $\square$

**Lemma 6.** (Type 2 optima: cost-padding by type L only) *Two mutually exclusive Type 2 optima are possible.*

*When type L does not want to pad cost while mimicking H, the CPL1 solution emerges:*

$$(45) \quad \begin{cases} C_{HB}^{CPL1} = \beta_H - e^{SB} \\ t_{HB}^{CPL1} = \psi(e^{SB}) \\ \rho_{HB}^{CPL1} = \rho_H^3 \end{cases} \quad \begin{cases} C_{LB}^{CPL1} = \beta_L - e^{FB} + \alpha \\ t_{LB}^{CPL1} = \psi(e^{FB}) - (1 - \rho_{HB}^{CPL1})\alpha + \Phi(e^{SB}) \\ \rho_{LB}^{CPL1} = \begin{cases} \rho_L^2, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ 0, & \text{otherwise} \end{cases} \end{cases} \quad (46)$$

*When type L wants to pad costs while mimicking H, the CPL2 solution emerges:*

$$(47) \quad \begin{cases} C_{HB}^{CPL2} = \beta_H - \bar{e} \\ t_{HB}^{CPL2} = \psi(\bar{e}) \\ \begin{cases} \rho_H^2, & \text{if } c \leq \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)} \\ \rho_H^1, & \text{otherwise} \end{cases} \end{cases} \quad \begin{cases} C_{LB}^{CPL2} = \beta_L - e^{FB} + \alpha \\ t_{LB}^{CPL2} = \psi(e^{FB}) - (1 - \rho_{HB}^{CPL2})\alpha + \Gamma_B(\bar{e}) \\ \rho_{LB}^{CPL2} = \begin{cases} \rho_L^2, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ 0, & \text{otherwise} \end{cases} \end{cases} \quad (48)$$

### Proof of Lemma 6

In this case, the cost level of the inefficient type is  $C_H = \beta_H - e_H$ . If type  $L$  mimics type  $H$ , both  $a_L^m = 0$  and  $a_L^m = \alpha$  are admissible by Lemma 1. Therefore, the  $IC_L$  is less trivial to define than before, insofar it is needed that the rent of the efficient type is such that he does not want to mimic the inefficient type neither without engaging in cost-padding:

$$IC_L(a_L^m = 0) : \Pi_{LB} = t_{LB} + (1 - \rho_{LB})\alpha - \psi(\beta_L - C_{LB} + \alpha) \geq t_{HB} - \psi(\beta_L - C_{HB}) \quad (49)$$

nor with engaging in cost-padding

$$IC_L(a_L^m = \alpha) : \Pi_{LB} \geq t_H + (1 - \rho_{HB})\alpha - \psi(\beta_L - C_{HB} + \alpha) \quad (50)$$

By using the fact that constraint  $IR_H$  will bind at the optimum as usual i.e.,  $\Pi_{HB} = t_{HB} - \psi(e_H) = 0$ , constraints (49) and (50) can be rewritten respectively as

$$\Pi_{LB} \geq \Phi(e_H) \quad (51)$$

and

$$\Pi_{LB} \geq \Gamma(e_H) \quad (52)$$

where  $\Phi(e_H) \equiv \psi(e_H) - \psi(e_H - \Delta\beta)$  and  $\Gamma(e_H) \equiv \psi(e_H) - \psi(e_H - \Delta\beta + \alpha) + (1 - \rho_{HB})\alpha$ .

Depending on which of the constraints (51) and (52) binds at the optimum, different solutions can emerge. To consider all possibilities the following maximization problem is set (since the problem is linear in the auditing levels  $\rho_H$  and  $\rho_L$ , their optimal values can

be determined ex post using condition (15)).

$$\begin{aligned} \max_{e_H, \Pi_{LB}} \quad & \mathbb{E}[U(e_H, \Pi_L)] = \nu[S - (1 + \lambda)[\beta_L - e^{FB} + \psi(e^{FB})] - \lambda\Pi_{LB}] \\ & + (1 - \nu)[S - (1 + \lambda)[\beta_H - e_H + \psi(e_H)]] + \nu[-2\lambda\alpha + \rho_{LB}\lambda\alpha - (1 + \lambda)c\rho_{LB}] - (1 + \lambda)c\rho_{HB} \\ \text{s.t.} \quad & (51), (52) \end{aligned} \tag{53}$$

Writing constraints (51) and (52) in the form

$$\Phi(e_H) - \Pi_{LB} \leq 0 \tag{54}$$

$$\Gamma(e_H) - \Pi_{LB} \leq 0 \tag{55}$$

the Lagrangian for problem (53) is:

$$\begin{aligned} \mathcal{L} = & \nu[S - (1 + \lambda)[\beta_L - e^{FB} + \psi(e^{FB})] - \lambda\Pi_{LB}] + \\ & (1 - \nu)[S - (1 + \lambda)[\beta_H - e_H + \psi(e_H)]] + \xi\Pi_{LB} - \Phi(e_H) + \zeta\Pi_{LB} - \Gamma(e_H) \end{aligned} \tag{56}$$

where the constant  $\nu[-2\lambda\alpha + \rho_{LB}\lambda\alpha - (1 + \lambda)c\rho_{LB}] - (1 + \lambda)c\rho_{HB}$  is omitted and  $\xi$  and  $\zeta$  are the Lagrange multipliers of constraints (54) and (55) respectively.

Applying the Khun-Tucker necessary conditions (which in this case are also sufficient), four possible cases need to be considered, according to which of the constraints is binding:

**Case 1** no constraint is binding:  $\xi = 0, \zeta = 0$

**Case 2** (54) binding, (55) not binding:  $\xi > 0, \zeta = 0$

**Case 3** (55) binding, (54) not binding:  $\xi = 0, \zeta > 0$

**Case 4** both constraints are binding:  $\xi > 0, \zeta > 0$

**Sublemma 1.** *Only Case 2 and Case 3 yield a solution.*

*Proof.*

Case 1  $\xi = 0, \zeta = 0$

The FOC relative to the variable  $\Pi_{LB}$  gives  $-\nu\lambda = 0$ , which is clearly impossible (as expected, since the incentive compatibility constraint for the efficient type should be binding in equilibrium).

Case 2  $\xi > 0, \zeta = 0$  (CPL1)

Provided that the following condition

$$\Phi(e^{SB}) \geq \Gamma(e^{SB}) \quad (57)$$

holds, the unique solution for this case is:  $\{e^{CPL1} = e^{SB}; \Pi_{LB}^{CPL1} = \Phi(e^{SB}); \zeta^{CPL1} = \nu\lambda\}$ , where

$$e^{SB} : \psi(e^{SB}) = 1 - \frac{\lambda}{1 + \lambda} \frac{\nu}{1 - \nu} \Phi'(e^{SB}) \quad (58)$$

Case 3  $\xi = 0, \zeta > 0$  (CPL2)

Provided that the following condition

$$\Gamma(\bar{e}) \geq \Phi(\bar{e}) \quad (59)$$

holds, the unique solution for this case is  $\{e^{CPL2} = \bar{e}; \Pi_{LB}^{CPL2} = \Gamma(\bar{e}); \zeta^{CPL2} = \nu\lambda\}$ , where

$$\bar{e} : \psi(\bar{e}) = 1 - \frac{\lambda}{1 + \lambda} \frac{\nu}{1 - \nu} \Gamma'(\bar{e}) \quad (60)$$

Case 4  $\xi > 0, \zeta > 0$

The FOCs imply  $\zeta^{4*} < 0$ , impossible.

Therefore only Case 2 and Case 3 give solutions Q.E.D.

**Sublemma 2.**  $\bar{e} > e^{SB}$ .

*Proof.* Since  $\Phi'(e) > \Gamma'(e) \quad \forall e \geq 0$ , the result follows by inspection of the FOCs in (58) and (60).

**Sublemma 3.** *The solutions found in Case 2 and Case 3 are mutually exclusive. Therefore for each regime there is a unique solution, which by virtue of the concavity of the problem is global.*

*Proof.* Given Sublemma 2, it must be the case that if (57) holds for  $e^{SB}$ , it must hold also for  $\bar{e} > e^{SB}$ . Therefore, when (57) holds, (59) cannot hold. With a similar reasoning one can conclude that when (59) holds, (57) cannot hold. When (57) holds,  $(e^{SB}, \Phi(e^{SB}))$  is the only maximizer, while when (59) holds,  $(\bar{e}, \Gamma(\bar{e}))$  is the only maximizer Q.E.D.

The solution CPL1 can occur if and only if the the efficient type wants to engage in cost-padding when accepting his contract and does not want to engage in cost-padding when mimicking, i.e., if and only if the two following conditions holds (where use of condition (15) and of optimal values of effort was made):

$$\rho_{LB} \leq \rho_L^2 \quad (61)$$

$$\rho_{HB} > \rho_H^3 \quad (62)$$

Notice the the latter also implies that the inefficient type will not deviate to cost-padding when accepting his contract. Using the conditions on the sign of the constant that multiplies  $\rho_{LB}$  (which is the same than the one used in Lemma 3 for  $\rho_{HB}$ ), it is possible to conclude on the optimal values of the auditing levels as the ones stated in the Lemma.

On the other hand, the solution *CPL2* can occur if and only if 1) the efficient type does finds it profitable to do cost-padding both when choosing her contract and when mimicking the inefficient type; and 2) the inefficient type does not want to deviate to cost-padding (in this case Lemma 1 does not help). That is, the three following conditions need to hold (using  $\beta_L - C_{LB}^{CPL2} + \alpha = e^{FB}$  and  $\beta_H - C_{HB}^{CPL2} = \bar{e}$ )

$$\rho_{LB} \leq \rho_L^2 \quad (63)$$

(i.e.,  $L$  wants to engage in cost-padding when not mimicking)

$$\rho_{HB} \leq \rho_H^2 \quad (64)$$

(i.e.,  $L$  wants to engage in cost-padding when mimicking<sup>30</sup>)

$$\rho_{HB} > \rho_H^1 \quad (65)$$

(i.e.,  $H$  does not want to engage in cost-padding)

The threshold on cost, which in this case determines the optimal level of auditing for the type that does not pad costs in equilibrium,  $H$  is determined by the sign of the difference  $[\lambda\alpha\nu\rho_{HB} - (1-\nu)(1+\lambda)c\rho_{HB}]$  where the first term is the part of the information rent of the efficient type,  $\Gamma_B(\bar{e})$ , that depends on  $\rho$ .  $\square$

**Lemma 7.** (Type 3 optima: cost-padding by both types) *There is a unique Type 3 optimum (indicated with superscript CP) which is as follows:*

$$(66) \quad \begin{cases} C_{HB}^{CP} = \beta_H - e^{SB} + \alpha \\ t_{HB}^{CP} = \psi(e^{SB}) - (1 - \rho_{HB}^{CP})\alpha \\ \rho_{HB}^{CP} = \begin{cases} \rho_H^4, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ 0, & \text{otherwise} \end{cases} \end{cases} \quad \begin{cases} C_{LB}^{CP} = \beta_L - e^{FB} + \alpha \\ t_{LB}^{CP} = \psi(e^{FB}) - (1 - \rho_{HB}^{CP})\alpha + \Phi(e^{SB}) \\ \rho_{LB}^{CP} = \begin{cases} \rho_L^2, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ 0, & \text{otherwise} \end{cases} \end{cases} \quad (67)$$

### Proof of Lemma 7

In this case the cost level of the inefficient type is  $C_H = \beta_H - e_H + \alpha$ . Again, it is known from Lemma 1 that  $a_L^m = \alpha$ . Therefore, the relevant  $IC_L$  and  $IR_H$  constraints are respectively:

$$\underline{\Pi_{LB}} = t_{LB} + (1 - \rho_{LB})\alpha - \psi(\beta_L - C_{LB} + \alpha) \geq t_{HB} + (1 - \rho_{HB})\alpha - \psi(\beta_L - C_{HB} + \alpha) \quad (68)$$

<sup>30</sup>Notice that condition (64) corresponds to (59).

$$\Pi_{HB} = t_{HB} + (1 - \rho_{HB})\alpha - \psi(\beta_H - C_{HB} + \alpha) \geq 0 \quad (69)$$

It is immediate to check that the maximization problem for the politician is the same as the one in Type 1 case (equation (42)), with the only difference that the objective function is augmented of the constant  $\nu(-2\lambda\alpha + \rho_{LB}\lambda\alpha)$  since also the efficient type engages in cost-padding. Therefore the optimal effort for the inefficient type will be the same. As in the other cases, we use condition (15) to determine the optimal values of the auditing levels.

The *CP* solution can occur if and only if both types find it profitable to do cost-padding when accepting their own contracts. Therefore, the following two conditions need to hold (using  $\beta_L - C_{LB} + \alpha = e^{FB}$  and  $\beta_H - C_{HB} + \alpha = e^{SB}$ ):

$$\rho_{LB} \leq \rho_L^2 \quad (70)$$

$$\rho_{HB} \leq \rho_H^4 \quad (71)$$

Similarly as for Type 1, it can be concluded that the optimal auditing levels are the ones stated in the Lemma.  $\square$

**Lemma 8.** (Type 4 optima: no cost-padding)

*Similarly to Type 2 case, two mutually exclusive Type 4 optima are possible.*

*When type L does not want to pad cost while mimicking type H, the NC1 solution emerges:*

$$\begin{cases} C_{HB}^{NC1} = \beta_H - e^{SB} \\ t_{HB}^{NC1} = \psi(e^{SB}) \\ \rho_{HB}^{NC1} = \rho_H^3 \end{cases} \quad (72) \quad \begin{cases} C_{LB}^{NC1} = \beta_L - e^{FB} \\ t_{LB}^{NC1} = \psi(e^{FB}) + \Phi(e^{SB}) \\ \rho_{LB}^{NC1} = \rho_L^1 \end{cases} \quad (73)$$

*When type L wants to pad cost while mimicking type H, the NC2 solution emerges:*

$$\begin{cases} C_{HB}^{NC2} = \beta_H - \bar{e} \\ t_{HB}^{NC2} = \psi(\bar{e}) \\ \rho_{HB}^{NC2} = \begin{cases} \rho_H^2, & \text{if } c \leq \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)} \\ \rho_H^1, & \text{otherwise} \end{cases} \end{cases} \quad (74) \quad \begin{cases} C_{LB}^{NC2} = \beta_L - e^{FB} \\ t_{LB}^{NC2} = \psi(e^{FB}) + \Gamma_B(\bar{e})_B \\ \rho_{LB}^{NC2} = \rho_L^1 \end{cases} \quad (75)$$

### Proof of Lemma 8

Also in this case, as for Type 2 optima, both  $a_L^m = 0$  and  $a_L^m = \alpha$  are admissible by Lemma 1 when the efficient type mimics the inefficient type. Therefore, again a double  $IC_L$  is needed:

$$IC_L(a_L^m = 0) : \Pi_{LB} = t_{LB} - \psi(\beta_L - C_{LB}) \geq t_{HB} - \psi(\beta_L - C_{HB}) \quad (76)$$

$$IC_L(a_L^m = \alpha) : \Pi_{LB} \geq t_{HB} + (1 - \rho_{HB})\alpha - \psi(\beta_L - C_{HB} + \alpha) \quad (77)$$



and the maximization problem is the same as in (53), apart from constant  $\nu(-2\lambda\alpha + \rho_{LB}\lambda\alpha)$  which here is missing since type  $L$  is not padding costs at the optimum. Consequently, also the optimal level of effort of the inefficient type will be the same.

As for the optimal values of the auditing levels, the solution  $NC1$  can occur only if the efficient type does not find it profitable to engage in cost-padding neither when mimicking the inefficient type nor when not mimicking. Therefore only if conditions (62) and (41) hold. Notice that by virtue of Lemma 1, condition (62) guarantees that the inefficient type neither will deviate to cost-padding when accepting his contract, which implies the optimal values stated in the Lemma.

The  $NC2$  solution can occur only if the efficient type does want to engage in cost-padding when mimicking the inefficient type but not when not mimicking *and* the inefficient type does not want to engage in cost-padding (Lemma 1 does not help in this case), i.e., if and only if conditions (41), (64) and (65) hold, which leads to the optimal auditing values stated in the Lemma.  $\square$

### 7.2.2 Ranking of optima for a benevolent politician

In order to know which of the contractual optima characterized above will be chosen by the politician, the value functions from each of the possible optima need to be compared and ranked, as the politician will choose the contract that gives him the highest value function.

The value functions of the benevolent politician differ depending on parameter configurations and are as follows:

$$U_B^{CPH} = \begin{cases} U^{SB} - (1-\nu)2\lambda\alpha + (1-\nu)[\lambda\alpha - (1+\lambda)c]\rho_H^4 - \nu(1+\lambda)c\rho_L^1, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ U^{SB} - (1-\nu)2\lambda\alpha - \nu(1+\lambda)c\rho_L^1, & \text{otherwise} \end{cases} \quad (78)$$

with

$$U^{SB} = \nu[S - (1+\lambda)(\beta_L - e^{FB} + \psi(e^{FB})) - \lambda\Phi(e^{SB})] + (1-\nu)[S - (1+\lambda)(\beta_H - e^{SB} + \psi(e^{SB}))] \quad (79)$$

$$U_B^{CPL1} = \begin{cases} U^{SB} - \nu 2\lambda\alpha + \nu[\lambda\alpha - (1+\lambda)c]\rho_L^2 - (1-\nu)(1+\lambda)c\rho_H^3, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ U^{SB} - \nu 2\lambda\alpha - (1-\nu)(1+\lambda)c\rho_H^3, & \text{otherwise} \end{cases} \quad (80)$$

$$U_B^{CP} = \begin{cases} U^{SB} - 2\lambda\alpha + \nu[\lambda\alpha - (1+\lambda)c]\rho_L^2 + (1-\nu)[\lambda\alpha - (1+\lambda)c]\rho_H^4, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ U^{SB} - 2\lambda\alpha, & \text{otherwise} \end{cases} \quad (81)$$

$$U_B^{NC1} = U^{SB} - \nu(1+\lambda)c\rho_L^1 - (1-\nu)(1+\lambda)c\rho_H^3 \quad (82)$$

$$U_B^{NC2} = \begin{cases} U^{SB} - \nu(1+\lambda)c\rho_L^1 - (1-\nu)(1+\lambda)c\rho_H^2, & \text{if } c \leq \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)} \\ U^{SB} - \nu(1+\lambda)c\rho_L^1 - (1-\nu)(1+\lambda)c\rho_H^1, & \text{otherwise} \end{cases} \quad (83)$$

- $v > 1/2$

$$U_B^{CPL2} = \begin{cases} U^{SB} - \nu 2\lambda\alpha + \nu[\lambda\alpha - (1 + \lambda)c]\rho_L^2 - (1 - \nu)(1 + \lambda)c\rho_H^2, & \text{if } c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ U^{SB} - \nu 2\lambda\alpha - (1 - \nu)(1 + \lambda)c\rho_H^2, & \text{if } \frac{\lambda\alpha}{(1+\lambda)} < c \leq \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)} \\ U^{SB} - \nu 2\lambda\alpha - (1 - \nu)(1 + \lambda)c\rho_H^1, & \text{otherwise} \end{cases} \quad (84)$$

- $v < 1/2$

$$U_B^{CPL2} = \begin{cases} U^{SB} - \nu 2\lambda\alpha + \nu[\lambda\alpha - (1 + \lambda)c]\rho_L^2 - (1 - \nu)(1 + \lambda)c\rho_H^2, & \text{if } c \leq \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)} \\ U^{SB} - \nu 2\lambda\alpha + \nu[\lambda\alpha - (1 + \lambda)c]\rho_L^2 - (1 - \nu)(1 + \lambda)c\rho_H^1, & \text{if } \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)} < c \leq \frac{\lambda\alpha}{(1+\lambda)} \\ U^{SB} - \nu 2\lambda\alpha - (1 - \nu)(1 + \lambda)c\rho_H^1, & \text{otherwise} \end{cases} \quad (85)$$

**Lemma 9.** (Ranking of contractual optima for a benevolent politician)

The ranking depends on parameters configurations as summarized in the following table.

Table 4: Ranking of contractual optima for a benevolent politician

	$c \leq \underline{c}$	$\underline{c} < c \leq \bar{c}$	$c > \bar{c}$
$\nu \leq \frac{2}{3}$	$NC \succ CPL \succ CPH \succ CP$	$CPH \succ CP \succ NC \succ CPL$	$CP \succ CPL \succ CPH \succ NC$
$\nu > \frac{2}{3}$	$NC \succ CPH \succ CPL \succ CP$	$CPL \succ CP \succ NC \succ CPH$	$CP \succ CPH \succ CPL \succ NC$

where  $\underline{c} = \frac{2\lambda\alpha}{(1+\lambda)\rho_H^1}$ ,  $\bar{c} = \frac{2\lambda\alpha}{(1+\lambda)\rho_L^1}$

*Proof.* Given the ranking in Sublemma 4, it is straightforward that optima  $CPL2$  and  $NC2$  are always preferred to optima  $CPL1$  and  $NC1$ , respectively. As for the remaining optima (where for easiness of notation  $CPL2$  and  $NC2$  are referred to as  $CPL$  and  $NC$ , respectively) it is possible to check by long but straightforward comparisons of value functions, that the ranking is the one stated in the table.<sup>31</sup>□

The equilibrium contracts under a benevolent politician are summarized in Table 1 in the main text.

### 7.3 Proof of Proposition 3

Before proceeding, we state the following result on the ranking of the thresholds on  $\mu$ :

**Lemma 10.** The ranking of the thresholds on  $\mu$  is such that  $\bar{\mu} > \tilde{\mu} > \underline{\mu}$ .

*Proof.* First of all notice that  $\tilde{\mu}$  and  $\underline{\mu}$  are identical other than the terms  $\rho_H^2$  and  $\rho_H^1$ . Since we know from Sublemma 4 that  $\rho_H^2 > \rho_H^1$  it is straightforward to conclude that  $\tilde{\mu} > \underline{\mu}$ . To prove the second side of the inequality  $\bar{\mu} > \tilde{\mu}$  notice that since  $\rho_H^1 > \rho_L^1$ ,  $\bar{\mu} > \bar{\mu}(\rho_H^1)$ ,

<sup>31</sup>Full calculations are available upon request.

where with  $\bar{\mu}(\rho_H^1)$  we denote the expression for  $\bar{\mu}$  where we have substituted  $\rho_L^1$  with  $\rho_H^1$ . Therefore we only need to prove  $\bar{\mu}(\rho_H^1) > \tilde{\mu}$ . Notice that the expressions for  $\bar{\mu}(\rho_H^1)$  and  $\tilde{\mu}$  are identical functions of  $\rho$  as follows

$$\mu(\rho) = \frac{\lambda\alpha(4 - \rho) + \alpha\rho + 2c(1 + \lambda)(\rho - \rho_H^1) + \sqrt{[\lambda\alpha(4 - \rho) + \alpha\rho + 2c(1 + \lambda)(\rho - \rho_H^1)]^2 - 4\alpha^2\lambda(\rho)^2}}{2\rho\alpha} \quad (86)$$

Since  $\rho_H^4 > \rho_L^2$  it is enough to show that  $\mu(\rho)$  is decreasing in  $\rho$  to conclude that  $\bar{\mu}(\rho_H^1) > \tilde{\mu}$ . By denoting

$$A(\rho) = \lambda\alpha(4 - \rho) + \alpha\rho + 2c(1 + \lambda)(\rho - \rho_H^1) \quad (87)$$

It is possible to show that  $\mu(\rho) < 0$  iff  $A(\rho) > \rho A'(\rho)$ , which after simplifications reduces to  $2\alpha\lambda - c\rho_H^1(1 + \lambda) > 0$ . Therefore for  $c < \underline{c}$   $\bar{\mu} > \tilde{\mu}$ . For  $c > \underline{c}$   $\mu(\rho) > 0$ , so that the larger  $c$  the closer  $\tilde{\mu}$  gets to  $\bar{\mu}$ .  $\square$

### 7.3.1 Possible contractual optima under a selfish politician

The possible optima under a selfish politician ( $C_{iS}, t_{iS}, \rho_{iS}$ )  $i \in \{L, H\}$  are derived analogously as above and are summarized in the following tables<sup>32</sup>.

Table 5: CPH solution

	$c \leq \frac{\lambda\alpha}{(1+\lambda)}$	$c > \frac{\lambda\alpha}{(1+\lambda)}$
L	$\begin{cases} C_{LS}^{CPH} = \beta_L - e^{FB} \\ t_{LS}^{CPH} = \psi(e^{FB}) + \Phi(e_H^{SB}) \\ \rho_{LS}^{CPH} = \rho_L^1 \frac{2\mu}{\mu+1} \forall \mu > 1 \end{cases}$	$\begin{cases} C_{LS}^{CPH} = \beta_L - e^{FB} \\ t_{LS}^{CPH} = \psi(e^{FB}) + \Phi(e_H^{SB}) \\ \rho_{LS}^{CPH} = \rho_L^1 \frac{2\mu}{\mu+1} \forall \mu > 1 \end{cases}$
H	$\begin{cases} C_{HS}^{CPH} = \beta_H - e^{SB} + \alpha \\ t_{HS}^{CPH} = \psi(e^{SB}) - (1 - \rho_{HS}^{CPH} \frac{\mu+1}{2\mu})\alpha \\ \rho_{HS}^{CPH} = \rho_H^4 \frac{2\mu}{\mu+1} \forall \mu > 1 \end{cases}$	$\begin{cases} C_{HS}^{CPH} = \beta_H - e^{SB} + \alpha \\ t_{HS}^{CPH} = \psi(e^{SB}) - (1 - \rho_{HS}^{CPH} \frac{\mu+1}{2\mu})\alpha \\ \rho_{HS}^{CPH} = \begin{cases} \rho_H^4 \frac{2\mu}{\mu+1}, & \text{if } \mu > \bar{\mu} \\ 0, & \text{otherwise} \end{cases} \end{cases}$

<sup>32</sup>Full calculations are available upon request.

Table 6: CPL1 solution

	$c \leq \frac{\lambda\alpha}{(1+\lambda)}$	$c > \frac{\lambda\alpha}{(1+\lambda)}$
L	$\begin{cases} C_{LS}^{CPL1} = \beta_L - e^{FB} + \alpha \\ t_{LS}^{CPL1} = \psi(e^{FB}) - (1 - \rho_{HS}^{CPL1} \frac{\mu+1}{2\mu})\alpha + \Phi(e^{SB}) \\ \rho_{LS}^{CPL1} = \rho_L^2 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$	$\begin{cases} C_{LS}^{CPL1} = \beta_L - e^{FB} + \alpha \\ t_{LS}^{CPL1} = \psi(e^{FB}) - (1 - \rho_{HS}^{CPL1})\alpha + \Phi(e^{SB}) \\ \rho_{LS}^{CPL1} = \begin{cases} \rho_L^2 \frac{2\mu}{\mu+1}, & \text{if } \mu > \underline{\mu} \\ 0, & \text{otherwise} \end{cases} \end{cases}$
H	$\begin{cases} C_{HS}^{CPL1} = \beta_H - e^{SB} \\ t_{HS}^{CPL1} = \psi(e^{SB}) \\ \rho_{HS}^{CPL1} = \rho_H^3 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$	$\begin{cases} C_{HS}^{CPL1} = \beta_H - e^{SB} \\ t_{HS}^{CPL1} = \psi(e^{SB}) \\ \rho_{HS}^{CPL1} = \rho_H^3 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$

Table 7: CPL2 solution

	$c \leq \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)2}$	$c > \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)2}$
H	$\begin{cases} C_{HS}^{CPL2} = \beta_H - \bar{e} \\ t_{HS}^{CPL2} = \psi(\bar{e}) \\ \rho_{HS}^{CPL2} = \rho_H^2 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$	$\begin{cases} C_{HS}^{CPL2} = \beta_H - \bar{e} \\ t_{HS}^{CPL2} = \psi(\bar{e}) \\ \rho_{HS}^{CPL2} = \begin{cases} \rho_H^2 \frac{2\mu}{\mu+1}, & \text{if } \mu < \tilde{\mu} \\ \rho_H^1, & \text{otherwise} \end{cases} \end{cases}$
L	$\begin{cases} C_{LS}^{CPL2} = \beta_L - e^{FB} + \alpha \\ t_{LS}^{CPL2} = \psi(e^{FB}) - (1 - \rho_{HS}^{CPL2} \frac{\mu+1}{2\mu})\alpha + \Gamma_S(\bar{e}) \\ \rho_{LS}^{CPL2} = \rho_L^2 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$	$\begin{cases} C_{LS}^{CPL2} = \beta_L - e^{FB} + \alpha \\ t_{LS}^{CPL2} = \psi(e^{FB}) - (1 - \rho_{HS}^{CPL2} \frac{\mu+1}{2\mu})\alpha + \Gamma_S(\bar{e}) \\ \rho_{LS}^{CPL2} = \begin{cases} \rho_L^2 \frac{2\mu}{\mu+1}, & \text{if } \mu > \underline{\mu} \\ 0, & \text{otherwise} \end{cases} \end{cases}$

Table 8: CP solution

	$c \leq \frac{\lambda\alpha}{(1+\lambda)}$	$c > \frac{\lambda\alpha}{(1+\lambda)}$
L	$\begin{cases} C_{LS}^{CP} = \beta_L - e^{FB} + \alpha \\ t_{LS}^{CP} = \psi(e^{FB}) - (1 - \rho_{HS}^{CP} \frac{\mu+1}{2\mu})\alpha + \Phi(e^{SB}) \\ \rho_{LS}^{CP} = \rho_L^2 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$	$\begin{cases} C_{LS}^{CP} = \beta_L - e^{FB} + \alpha \\ t_{LS}^{CP} = \psi(e^{FB}) - (1 - \rho_{HS}^{CP} \frac{\mu+1}{2\mu})\alpha + \Phi(e^{SB}) \\ \rho_{LS}^{CP} = \begin{cases} \rho_L^2 \frac{2\mu}{\mu+1}, & \text{if } \mu > \underline{\mu} \\ 0, & \text{otherwise} \end{cases} \end{cases}$
H	$\begin{cases} C_{HS}^{CP} = \beta_H - e^{SB} + \alpha \\ t_{HS}^{CP} = \psi(e^{SB}) - (1 - \rho_{HS}^{CP} \frac{\mu+1}{2\mu})\alpha \\ \rho_{HS}^{CP} = \rho_H^4 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$	$\begin{cases} C_{HS}^{CP} = \beta_H - e^{SB} + \alpha \\ t_{HS}^{CP} = \psi(e^{SB}) - (1 - \rho_{HS}^{CP} \frac{\mu+1}{2\mu})\alpha \\ \rho_{HS}^{CP} = \begin{cases} \rho_H^4 \frac{2\mu}{\mu+1}, & \text{if } \mu > \underline{\mu} \\ 0, & \text{otherwise} \end{cases} \end{cases}$

Table 9: NC1 solution

	$\forall c$
L	$\begin{cases} C_{LS}^{NC1} = \beta_L - e^{FB} \\ t_{LS}^{NC1} = \psi(e^{FB}) + \Phi(e^{SB}) \\ \rho_{LS}^{NC1} = \rho_L^1 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$
H	$\begin{cases} C_{HS}^{NC1} = \beta_H - e^{SB} \\ t_{HS}^{NC1} = \psi(e^{SB}) \\ \rho_{HS}^{NC1} = \rho_H^3 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$

Table 10: NC2 solution

	$c \leq \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)2}$	$c > \frac{\lambda\alpha\nu}{(1+\lambda)(1-\nu)2}$
L	$\begin{cases} C_{LS}^{NC2} = \beta_L - e^{FB} \\ t_{LS}^{NC2} = \psi(e^{FB}) + \Gamma_S(\bar{e}) \\ \rho_{LS}^{NC2} = \rho_L^1 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$	$\begin{cases} C_{LS}^{NC2} = \beta_L - e^{FB} \\ t_{LS}^{NC2} = \psi(e^{FB}) + \Gamma_S(\bar{e}) \\ \rho_{LS}^{NC2} = \rho_L^1 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$
H	$\begin{cases} C_{HS}^{NC2} = \beta_H - \bar{e} \\ t_{HS}^{NC2} = \psi(\bar{e}) \\ \rho_{HS}^{NC2} = \rho_H^2 \frac{2\mu}{\mu+1} \quad \forall \mu > 1 \end{cases}$	$\begin{cases} C_{HS}^{NC2} = \beta_H - \bar{e} \\ t_{HS}^{NC2} = \psi(\bar{e}) \\ \rho_{HS}^{NC2} = \begin{cases} \rho_H^2 \frac{2\mu}{\mu+1}, & \text{if } \mu < \tilde{\mu} \\ \rho_H^1 \frac{2\mu}{\mu+1}, & \text{otherwise} \end{cases} \end{cases}$

### 7.3.2 Ranking of optima for a selfish politician

The value functions of the selfish politician differ depending on cost configuration and the degree of selfishness and are as follows:

- If  $c \leq \frac{\lambda\alpha}{(1+\lambda)}$

$$U_S^{CPH} = U^{SB} - (1-\nu)2\lambda\alpha + (1-\nu)\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_H^4 - \nu(1+\lambda)c\rho_L^1 \quad \forall \mu > 1 \quad (88)$$

$$U_S^{CPL1} = U^{SB} - \nu 2\lambda\alpha + \nu\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_L^2 - (1-\nu)(1+\lambda)c\rho_H^3 \quad \forall \mu > 1 \quad (89)$$

$$U_S^{CPL2} = U^{SB} - \nu 2\lambda\alpha + \nu\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_L^2 - (1-\nu)(1+\lambda)c\rho_H^2 \quad \forall \mu > 1 \quad (90)$$

$$U_S^{CP} = U^{SB} - 2\lambda\alpha + \nu\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_L^2 + (1-\nu)[\lambda\alpha - (1+\lambda)c]\rho_H^4 \quad \forall \mu > 1 \quad (91)$$

$$U_S^{NC1} = U^{SB} - \nu(1+\lambda)c\rho_L^1 - (1-\nu)(1+\lambda)c\rho_H^3 \forall \mu > 1 \quad (92)$$

$$U_S^{NC2} = U^{SB} - \nu(1+\lambda)c\rho_L^1 - (1-\nu)(1+\lambda)c\rho_H^2 \forall \mu > 1 \quad (93)$$

- If  $c > \frac{\lambda\alpha}{(1+\lambda)}$

$$U_S^{CPH} = \begin{cases} U^{SB} - (1-\nu)2\lambda\alpha + (1-\nu)\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_H^4 - \nu(1+\lambda)c\rho_L^1, & \text{if } \mu > \underline{\mu} \\ U^{SB} - (1-\nu)2\lambda\alpha - \nu(1+\lambda)c\rho_L^1, & \text{otherwise} \end{cases} \quad (94)$$

$$U_S^{CPL1} = \begin{cases} U^{SB} - \nu 2\lambda\alpha + \nu\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_L^2 - (1-\nu)(1+\lambda)c\rho_H^3, & \text{if } \mu > \underline{\mu} \\ U^{SB} - \nu 2\lambda\alpha - (1-\nu)(1+\lambda)c\rho_H^3, & \text{otherwise} \end{cases} \quad (95)$$

$$U_S^{CPL2} = \begin{cases} U^{SB} - \nu 2\lambda\alpha + \nu\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_L^2 - (1-\nu)(1+\lambda)c\rho_H^2, & \text{if } \underline{\mu} < \mu \leq \tilde{\mu} \\ U^{SB} - \nu 2\lambda\alpha - (1-\nu)(1+\lambda)c\rho_{2H}, & \text{if } \mu \leq \underline{\mu} \\ U^{SB} - \nu 2\lambda\alpha + \nu\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_L^2 - (1-\nu)(1+\lambda)c\rho_H^1, & \text{otherwise} \end{cases} \quad (96)$$

$$U_S^{CP} = \begin{cases} U^{SB} - 2\lambda\alpha + \nu\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_L^2 + \\ (1-\nu)\{\alpha[(\lambda+\mu)(\frac{\mu+1}{2\mu}) - 1] - (1+\lambda)c\}\rho_H^4, & \text{if } \mu > \underline{\mu} \\ U^{SB} - 2\lambda\alpha, & \text{otherwise} \end{cases} \quad (97)$$

$$U_S^{NC1} = U^{SB} - \nu(1+\lambda)c\rho_L^1 - (1-\nu)(1+\lambda)c\rho_H^3 \forall \mu > 1 \quad (98)$$

$$U_S^{NC2} = \begin{cases} U^{SB} - \nu(1+\lambda)c\rho_L^1 - (1-\nu)(1+\lambda)c\rho_H^2, & \text{if } \mu < \tilde{\mu} \\ U^{SB} - \nu(1+\lambda)c\rho_L^1 - (1-\nu)(1+\lambda)c\rho_H^1, & \text{otherwise} \end{cases} \quad (99)$$

**Lemma 11.** (Ranking of contractual optima for a selfish politician) *The ranking depend on parameters configurations, as summarized in the following tables:*

- $c \leq \frac{\lambda\alpha}{(1+\lambda)} = \tilde{c} < \underline{c}$

Table 11: Ranking of contractual optima for a selfish politician  $c \leq \tilde{c}$

	$1 < \mu \leq \underline{\mu}$	$\underline{\mu} < \mu \leq \tilde{\mu}$	$\mu > \tilde{\mu}$
$\nu \leq \frac{2}{3}$	$NC \succ CPL \succ CPH \succ CP$	$CPH \succ CP \succ NC \succ CPL$	$CP \succ CPL \succ CPH \succ NC$
$\nu > \frac{2}{3}$	$NC \succ CPH \succ CPL \succ CP$	$CPL \succ CP \succ NC \succ CPH$	$CP \succ CPH \succ CPL \succ NC$

- $c > \tilde{c}$

Table 12: Ranking of contractual optima for a selfish politician  $c > \tilde{c}$

	$1 < \mu \leq \tilde{\mu}$	$\tilde{\mu} < \mu \leq \bar{\mu}$	$\mu > \bar{\mu}$
$\nu \leq \frac{2}{3}$	$NC \succ CPL \succ CPH \succ CP$	$CPH \succ CP \succ NC \succ CPL$	$CP \succ CPL \succ CPH \succ NC$
$\nu > \frac{2}{3}$	$NC \succ CPH \succ CPL \succ CP$	$CPL \succ CP \succ NC \succ CPH$	$CP \succ CPH \succ CPL \succ NC$

*Proof.* Given the ranking in Sublemma 4, it is like before straightforward to conclude that optima  $CPL2$  and  $NC2$  are always preferred to optima  $CPL1$  and  $NC1$ , respectively. As for the remaining optima (for easiness of notation  $CPL2$  and  $NC2$  are referred to as  $CPL$  and  $NC$ , respectively) it is possible to check by long but straightforward comparisons of value functions, that the ranking is the one stated in the tables <sup>33</sup>  $\square$

The equilibrium contracts under a selfish politician are summarized in Tables 2 and 3 in main text.

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<sup>33</sup>Full calculations are available upon request.

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