International Public Management Journal, 2(2(A)): 273–298
ISSN: 1096-7494

Masako N. Darrough
Baruch College, CUNY

Privatization and Corruption: Patronage vs. Spoils

ABSTRACT: We examine the issue of privatization of those public goods that can be provided in-house or contracted out. Such privatization appears straightforward, yet history shows otherwise. For example, the private contracting system for street cleaning in 19th-century New York City was a failure, despite the safeguards instituted to ensure competition. The contract system was criticized for corruption, while in-house provision suffered from patronage abuses. We present two variations of the "rotten apple" theory to capture the salient features of the New York experience. The public officials and contractors were both operating under high-powered incentives, which invited opportunism. When players act strategically, the adverse effect of opportunism increases. Since the amounts of spoils can be larger than political contributions, contracting-out ends up being more costly, even though competition promotes productive efficiency. Another advantage of in-house provision is that incentives can be made low-powered by depoliticizing of the system.

INTRODUCTION

Privatization of services that were formerly provided by governmental agencies has been an important issue for both local and national governments. The rationale for privatization, however, is often based on ideology and blind faith rather than hard evidence or analysis.[1] The purpose of this paper is to examine the issue of privatization in a specific context. In particular, we focus on the provision of public goods such as street-cleaning and refuse collection in order to compare the

Direct all correspondence to: Masako Darrough, Baruch College Department of Accountancy, Baruch College, 17 Lexington Ave., E-0723, New York, NY 10010, USA; <Masako_Darrough@baruch.cuny.edu>

two methods of supplying these services: outsourcing to private contractors and in-house provision.[2] Since these services require relatively low technology, and both inputs and outputs are readily observable, one would think "privatization" through contracting-out would be a straightforward proposition.[3] History shows otherwise.

Our analysis is motivated by the experience New York City had in the nineteenth century.[4] During this century, the provision of street cleaning and refuse collection was assumed alternately by the municipal government and by private contractors.[5] When private contractors were brought in, it was in the hope of reducing costs. The results, however, were far from optimal. Streets were left in a scandalously filthy condition; private contractors were blamed; and the contract system was repeatedly pronounced a total failure.[6] Despite the various safeguards installed to ensure competition and performance, the private contract system was effectively undermined by corruption. In-house provision, however, was also fraught with problems, such as patronage and inefficiency. It was not until the end of the century that major reforms installed a satisfactory system.

We believe this history is surprisingly relevant to our current privatization debates. New York's experience serves to highlight the underlying forces at work and is applicable to any inadequately disciplined systems that offer opportunities for corruption.

To develop a framework for analysis, we focus on corruption in two stylized forms: patronage, under in-house production; kickbacks and bribery, under contracting-out. We refer to the former as the "patronage system" and the latter as the "spoils system." Although the issue of corruption has been analyzed in various contexts (see Becker, 1994, 1995; Becker and Stigler, 1974; Rose-Ackerman, 1978; Shleifer and Vishny, 1993; Bac, 1996; Bag, 1997 among others), our paper is closest in spirit to Hart, Shleifer, and Vishny (1997). In the context of prison privatization, they develop a theory of public contracting that focuses on the tradeoff between quality and cost. They argue that since it might be impossible to write complete contracts to specify the nature of required services, self-interested contractors will probably not deliver socially-optimal outputs. They conclude that privatization is likely to be more successful when

1. Non-contractible quality is not important;
2. A producer's incentive for cost reduction is important; and
3. Patronage is important to public officials.

These three conditions are exactly those New York City presented: the degree of street cleanliness was easily observable; a competitive bidding system was installed to select efficient contractors; and the affairs of the city were under the

control of elected officials who relied heavily on the patronage system. Yet the contract system proved a failure. An interesting argument in Hart, Shleifer, and Vishny is that when public officials are corrupt, an excessive amount of contracting-out tends to take place. This perhaps accounts for the longevity, but does not explain the poor performance, of the contract system in 19th-century NY.

Modeling corruption in the context of public-good provision, we examine two models that have been inspired by the rotten apple theory. The Knapp Commission, which investigated corruption in the NY Police Department, identifies two alternative views of corruption as follows:

> The interaction of stubbornness, hostility and pride has given rise to the so-called "rotten apple" theory. According to this theory, which bordered on official Department doctrine, any policeman found to be corrupt must promptly be denounced as a rotten apple in an otherwise clean barrel. It must never be admitted that his individual corruption may be symptomatic of underlying disease.[7]

According to the "official" doctrine, corruption occurs because of "a rotten apple in an otherwise clean barrel." The way to eliminate corruption is simply to remove the rotten apple; the barrel is now completely clean. The doctrine however is silent as to how the rotten apple comes about. To capture the notion that a rotten apple is exogenously put in a barrel, we let player-type in Model I be determined exogenously; some players are born rotten. The Knapp Commission, on the other hand, suggests that corruption may be symptomatic of underlying "disease." If so, removing the rotten apple does not cure the disease; the disease is already embedded in the barrel. The barrel has to be cleaned or replaced. To model the latter notion, we let players in Model II behave strategically. They make choices by weighing the benefits against the cost of each strategy. Since all players behave strategically, each player's choice depends on that of the other player. Consequently, corrupt behavior of one player encourages others to behave in the same manner, spoiling perhaps the whole barrel. In our view, this version of the rotten apple theory is more applicable to the 19th-century NY experience. Both bribery and patronage were symptoms caused by the weakness in the underlying organizational structures adopted in public-good provision.

To set the stage for our story, we summarize briefly the findings of Adler and Darrough (1998), where we provide a detailed account of the failure of the contract system for street cleaning and garbage collection in New York City in the 19th century. Except for the two periods 1804–1806 and 1826–1842, when the city provided the service, private contractors played a dominant role in cleaning streets and collecting garbage. Adler and Darrough document that the contract system provided a set of well-specified procedures (safeguards); yet, many of the contractors were negligent; and the streets were almost always "filthy" under the contract system.[8] With a rapidly growing population and inadequate infrastructure in place, sanitation had become an important public-health concern. Street

cleanliness was considered important partly because many believed that the cause of contagious diseases was the vapor from filth (the "miasma" theory). Needless to say, many attempts were made to improve the contract system. For example, a series of laws was passed to require open and competitive bidding for contracts; performance-based rewards and penalties; bonds to be posted by contractors; limited contract periods; and a limit on the number of contracts awarded to each contractor.

Such safeguards were installed to promote competition among contractors and to ensure appropriate performance, but they were often ignored. Some contractors, for example, were chosen even though they were not the lowest bidders. Negligent contractors often went unpunished. Contracts were sometimes awarded to Street Commissioners. Numerous newspaper editorials denounced contractors and declared the contract system a failure.

Towards the end of the century, the contract system was gradually phased out. Various municipal departments started again to take more active roles in cleaning streets. During this period, complaints about lazy street cleaners and irresponsible contractors abounded. Workers were hired on the basis of political affiliation, since patronage had become a convenient form of assuring votes and political campaign funds for city officials. This situation continued until Colonel Waring, who became Street Commissioner in 1895, instituted major reforms in the Department of Street Cleaning.[9] Waring hired workers on the basis of job-qualifications; elevated their status to that of civil servants; and adopted scientific management techniques.[10] New York, which had been considered one of the dirtiest cities, became "the model city in the United States," "as clean as any city in Europe."[11] A satisfactory system had finally been established. Municipal provision of street cleaning and garbage collection became standard practice in most cities in the United States by the early 20th century.

The purpose of this paper is to analyze the benefit and cost of contracting out and in-house production with explicit consideration of corruption. Since we cannot compare the alternative arrangements *a priori*, we analyze models of corruption that are based on the most salient features from the NY experience. When the bounties from spoils and patronage were large, opportunism flourished. The immediate and high payoffs from these forms of corruption provided "high-powered incentives" to the players.[12] City officials used the power vested in them to gain votes and political campaign funds: the authority to award contracts and to hire workers was the source of power.[13] Contractors behaved in egregious manner, as safeguards were often not enforced. Since the amounts given in bribes (in the form of kickbacks) tended to be larger than political contributions from workers, the payoffs under contracting out were more powerful. Waring's reform in the Department Street Cleaning was successful because it replaced high-powered incentives with lower-powered incentives by "depoliticizing" and "demarketizing" its system.

The remainder of the paper is organized as follows: Section 2 provides an overview of the issues pertaining to the merits of in-house production versus contracting-out. We then turn to the two models of corruption: Model I in Section 3, and Model II in Section 4. Section 5 offers a brief discussion of how the 1895 reform changed the incentives from high to low-powered, and is followed by the last section with our concluding remarks.

AN OVERVIEW: IN-HOUSE VS. CONTRACTING-OUT

To develop a conceptual framework for analysis, we take the view that the overall structure constitutes a hierarchy with three-tiers: the general public as the principal; the public agent as the second-tier; and the contractor, or workers as the third-tier. The public good can be provided (1) in-house; or (2) by contracting-out. Since the service in question is a public good, we preclude the possibility of complete privatization, which might be applicable to private goods such as automobiles or steel. In case (1) the agent acquires equipment and hires his own workers, while in case (2) the agent delegates production to a private contractor, who in turn hires workers.[14]

First-Best

In the "first-best" world, where there is no moral hazard or information asymmetry, the public obtains all relevant information costlessly. Thus, the public appoints an agent, who in turn hires either the best workers or the best contractor. Every player expends a first-best level of effort for remuneration that just gives his reservation utility. No informational rent accrues to any of the players. In such an environment, the distinction between workers and contractors is immaterial. They are all agents of the public and are expected to perform the functions that have been assigned to them. The agency's problem is a standard two-tier hierarchy problem of "make or buy."

Clearly, the first best is not always possible. The public does not have the means or inclination to collect the necessary information to monitor and control the agency such that the first-best outcome is ensured.[15] Moreover, the reason for appointing an agent is precisely because the general public cannot involve itself with the production process. It would be realistic to assume that the most the public would do is to appoint an agent; it would not be able to oversee the actual production.

There are three ways in which in-house production may differ from external production. One possible difference is technological. For example, contractors might have access to better (proprietary) technology. They may be able to exploit economies of scale by combining work for several clients. A second possible difference is motivation: profit generation as opposed to public service. Efficient

production matters more to private contractors. Advocates of privatization focus on these two differences and argue that private contractors will outperform governmental work force. Our paper, on the other hand, focuses on a different aspect: the nature of the agency relationship and incentives. We argue that the very nature of the agency relationship gives rise to different forms of opportunism. In such a case, productive efficiency need not be passed on to the public.

Second-Best

In the second-best situation, the public agent is delegated authority to organize production in-house or by hiring a contractor. If the agent's incentives can be perfectly aligned with those of the public, the agent chooses the most efficient method for public-good provision. If they are not, then the very authority the agent is given can be used as a powerful means to pursue his own interest at the expense of the general public. Since the public's control over the agent is limited, perfect goal congruence between the first two tiers of the three-tier hierarchy is difficult to achieve. In fact, we argue that because we have a three-tier hierarchy in the context of public-good provision, the agency relationship in the first two tiers is even more tenuous than that under private provision of private goods.[16] The public's incentives as well as the means to monitor and control the hierarchy are more limited than those of shareholders of for-profit corporations. There are three reasons why control is more limited:

1. The free-rider problem on the part of the general public;
2. The availability of reward schemes or lack thereof; and
3. The need for votes and political campaign funds.

We discuss these reasons in more detail below.

First, other than in small communities where town-hall meetings are possible, the public interest is usually so diffused that the free-rider problem precludes the possibility of effective monitoring.[17] In addition, public control in general is less direct compared to that of shareholders.[18] Thus, direct monitoring by the public is both impractical and ineffective. Second, the incentives the public can offer to public agents are limited compared with those that shareholders of for-profit organizations can offer to their managers. Such performance measures as profits or stock prices do not exist for the public sector.[19] The problem of monitoring and control is exacerbated by the very nature of public goods.[20]

Third, in a public good context, whether a public agent is appointed as a civil servant (such as a city manager) or as an elected official (such as a mayor) determines the agent's incentives. Since it is difficult to remove civil servants for poor performance, a city manager faces a low-powered incentive.[21] An elected official, on the other hand, is concerned with politics, in particular, with

re-election; this in turn provides a high-powered incentive. In 19th-century NY, street cleaning was under the control of political office holders, such as the City Aldermen and the Mayor.[22] These officials had the authority and responsibility to select or fire contractors as well as to hire and fire workers. This very authority gave rise to the power and opportunity to pursue private gain. The pursuit of private gain, of course, was made inevitable by the official's need for votes and political campaign funds.[23] Temptation toward opportunistic behavior came from the very nature of the position they held. Since private contractors operated in a market economy, they also operated under a high-powered incentive. In 19th-century NY, both the public agent and the contractors were subject to high-powered incentives.

In short, in the public good case, the principal is more likely to face a serious control problem. The cost of control loss, we argue below, is also determined by the choice of a third-tier player. Lack of control gives rise to opportunities for various players to engage in "opportunistic behavior" that might involve effort shirking, patronage, bribes, kickbacks, collusive bidding, etc.[24] Under high-powered incentives, players are more likely to resort to opportunism. The form of opportunism then determines the ultimate cost of control loss to the public.

MODEL I: EXOGENOUS TYPES

Consider the following highly-stylized one-period game between the agent and the third-tier player. To capture the notion of a rotten apple, we assume that:

[A1]: Players are of one of two types; honest (H) or opportunistic (O).

Although the distribution is common knowledge, each player's type is private information known only to the player. Note that type distribution is assumed to be exogenous. Thus, if there is any corruption, it is committed only by those who are of type O. The probability of being type O is denoted by ρ for public agents, ϕ for workers, and ψ for contractors.

Players of type H do not engage in behavior that is considered to be against the "rules of the game," while type-O players are willing to pursue all avenues for private gain. Both types are expected utility maximizers. The difference between the two lies in their opportunity sets in that opportunistic players have expanded sets, which include those that are "illegal" or against the (unenforceable) implicit contracts.[25] We assume that the public is interested in the consumption of a public good in a specific amount. Thus,

[A2]: The public agent is required to produce the public good in a prespecified amount, $\bar{y}$.

If the outputs are observable and measurable, this specification is reasonable. As examples, the level of cleanliness of streets, the frequency of street sweeping and garbage collection, the amount of garbage collected and disposed can be easily observed and measured. This assumption might appear at variance with the

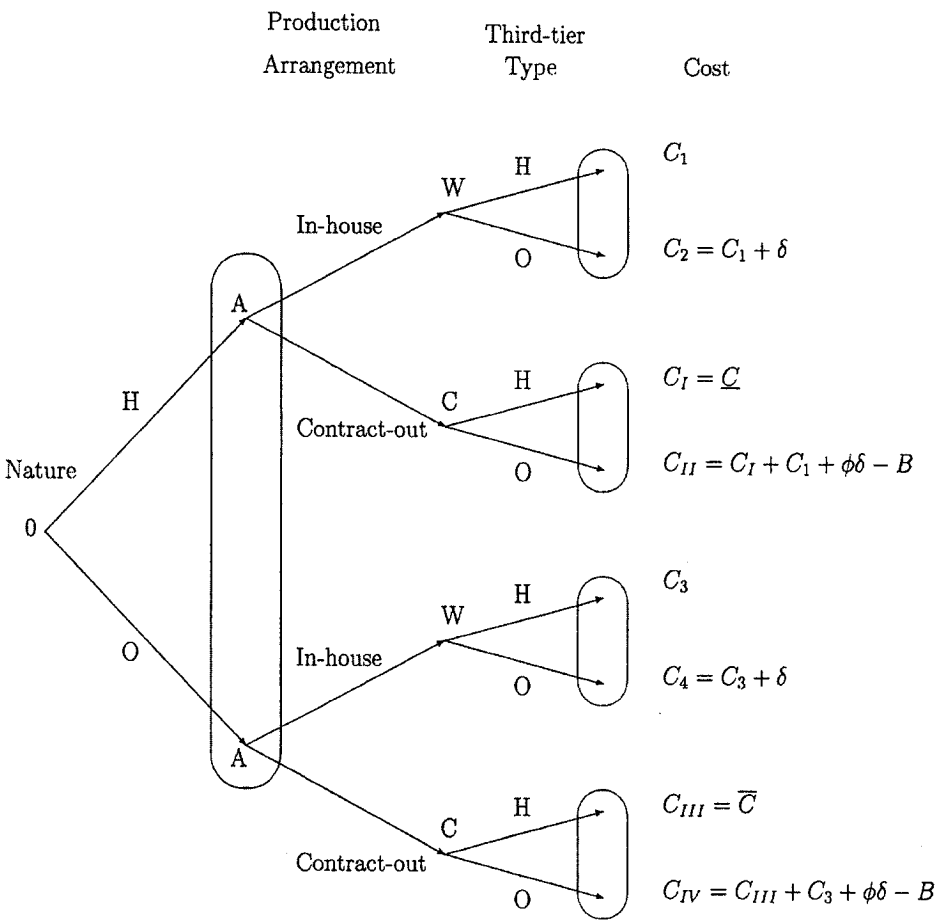

Figure 1. Extensive form. Model I: Exogenous Types.

"filthy" street condition of 19th century NY. However, even at that time, some minimal street cleaning and garbage collection had to be provided regularly; otherwise the entire city would have been literally buried in garbage in a short period of time. Most residents did not have practical means to dispose of their waste.

The extensive game form is depicted in Figure 1. First, Nature determines the type of players: the agent (A), Workers (W), and Contractors (C). Players are either type O (with probability ρ, ϕ, or ψ respectively) or type H. The agent or, alternatively, the general public then decides on the production method ("In-house" or "Contract-out"). Our interest is centered on the comparison of the production costs of alternative organizational arrangements. Denote the in-house production cost by C_1 when the agent and the workers are both honest; C_2 when

only the agent is honest; C_3 when only the workers are honest; and C_4 when both the agent and the workers are opportunistic. Similarly, denote the cost of contracts by C_I when both the agent and the contractor are honest; C_{II} when only the agent is honest; C_{III} when only the contractor is honest; and C_{IV} when both the agent and the contractor are opportunistic.

In order to compare the costs of the two production arrangements, we need to make reasonable assumptions about the payoffs and the behavior of players of different types. These assumptions are based on the stylized description of the NY experience.

In-house Production

If the agent is of type H, he hires workers based on job-related qualifications. If the workers are also of type H, they engage in cost-minimizing production by selecting the optimal amount of capital and labor to produce $\bar{y}$, given the market wages and the rental cost of capital. Then, $C_1 = min\ C(K, L: w, v, \bar{y})$, where $C(\cdot)$ is the cost function to produce $\bar{y}$; K and L are the quantity of capital and labor; v and w represent, respectively, the rental rate and wage rate of capital and labor. When workers are opportunistic, the honest agent has to supervise more closely to ensure workers' performance. Thus, the total cost is higher than that of the first-best case, i.e. $C_2 = C_1 + \delta > C_1$, where $\delta > 0$ is interpreted as the monitoring cost of workers. Since the extent of control and monitoring of the honest public agent over his workers is direct, the incremental cost is small.

If the agent is opportunistic, he hires workers based on political affiliations. Honest workers work, but do so inefficiently due to lack of proper qualifications and managerial input. Since workers are assessed an amount for political campaign, nominal wages must be increased, or work has to be reduced, to maintain the original real wage. Alternatively, if workers are under-qualified, the same nominal wage, w, minus the political contribution fund, τ, is sufficient to provide the appropriate efficiency wage. Then more workers are needed to produce $\bar{y}$. Either way, the total cost of production increases. Thus, $C_3 > C_1$, where $C_3 - C_1$ is interpreted as the cost under a corrupt management, or the cost of patronage. When neither the agent nor workers are honest, the cost will be highest. Thus, $C_4 = C_3 + \delta' > C_3$, where δ' is also interpreted as the cost of monitoring workers and $\delta' \geq \delta$. For simplicity, we let $\delta' = \delta$. Then, $C_4 - C_2 = C_3 - C_1$ is again the cost of patronage. In sum, we have $C_4 > C_2 > C_1$ and $C_4 > C_3 > C_1$.

Contracting-out

Independent of type, contractors' costs vary. Thus, we assume:

[A3]: Contractors' costs are distributed on an interval $[\underline{C}, \bar{C}]$.

Profit motives ensure that each cost is generated by cost-minimizing behavior as (omitting subscripts for contractors' identity):

$$C_I = min\ F(K, L: w, v, \bar{y}),$$

where C_I includes a normal profit (normalized at zero) and $F(\cdot)$ is the cost function available to various contractors. Each contractor knows his own cost and the interval, but the agent knows only the interval. This is an important assumption, since this information asymmetry allows opportunism. Of course, without this information asymmetry, we would not be concerned with the virtues of competitive bidding. The upperbound value of the cost function also dictates the upperbound of the kickbacks (and bribery). When both the agent and all contractors are honest, through a competitive bidding process, the lowest-cost contractor is awarded a contract for $C_I \geq \underline{C}$.[26] If there are sufficiently large number of contractors, $C_I = \underline{C}$. The benefit of production efficiency accrues to the public agent, and is passed on, in turn, to the principal. When both the public agent and contractors are opportunistic, or when either is, the competitive process would fail. Despite the competitive bidding system in place, collusive bidding, bribes, and kickbacks increase the winning bids.

When contractors are opportunistic, even though the agent is honest, some contractor will win a contract by bidding lowest at $\underline{C}$, without the intention of doing any (or much) work.[27] In the event of nonperformance, the city has to provide the service to the public at an expected cost of $(1 - \phi)\, C_1 + \phi C_2 = C_1 + \phi\delta$, assuming that there is zero correlation between the types of workers and contractors.[28] The cost of municipal provision on an emergency basis is no higher than the in-house production cost, since the technical requirement of either capital or labor for street cleaning is minimal. In order to discourage negligence, the contractor is asked to post a bond in the amount B, which would be forfeited for non-performance. Given that these contractors tend to be small enterprises, the wealth constraint restricts the bond to be $B < C_I$. Thus, $C_{II} = C_I + C1 + \phi\delta - B$.

When the agent is opportunistic, even though the contractors are honest, the agent demands a kickback. A clever agent will choose the lowest-cost contractor and demand a kickback in the amount of $\bar{C} - \underline{C}$. The contract cost is then $C_{III} = \bar{C}$.[29] Honest contractors will not offer bribes, but might go along with kickbacks. Whether they will do so depends on what form the kickbacks take, and on the cultural climate in government. Benson (1988) discusses unwillingness on the part of government officials to expose corruption. If officials are reluctant to expose corruption among their peers and colleagues, there is "little to fear from their peers." Similarly, it is quite possible that even honest contractors might be unwilling to blow the whistle for fear of putting the contract system in an unfavorable light. So we assume here that contractors will "go along."[30] Thus the

maximum kickback is $C_{III} - C_I$. Note that all the rent from production efficiency of the least-cost contractor is expropriated by the public agent, and does not at all accrue to the public.

Finally, when both the agent and the contractors are opportunistic, the contract cost will be at a maximum at $\bar{C}$, with the same amount of rent shared between the public agent and the contractor. This is the classic "spoils system." Exactly how the spoils are shared depends on the relative bargaining power of the two players. A Nash bargaining solution splits the spoils by half. The contractor in addition reneges on the contract and does not provide any work. The city eventually cleans the streets at an expected cost of $(1 - \phi)\, C_3 + \phi C_4 = C_3 + \phi\delta$. The bond posted by the contractor reduces the cleaning cost by B. Thus, $C_{IV} = C_{III} + C_3 + \phi\delta - B$.

Public Choice

Suppose the public decides whether to produce in-house or by contracting-out. If the public can screen players perfectly, it would choose the most efficient means of production with honest players. When the player types are not observable and screening is imperfect, however, the public compares the expected costs of the two possible arrangements. Subtracting the expected cost of in-house production from that of contracting-out, we have the cost differential of:

$$\Delta \equiv \Sigma\, p_i\, C_i - \Sigma\, p_j\, C_j \qquad (1)$$

where $i = I,\ldots,IV$, $j = 1,\ldots,4$, $p_I = (1 - \rho)(1 - \psi)$, $p_{II} = (1 - \rho)\psi$, $p_{III} = \rho(1 - \psi)$, $p_{IV} = \rho\psi$, $p_1 = (1 - \rho)(1 - \phi)$, $p_2 = (1 - \rho)\phi$, $p_3 = \rho(1 - \phi)$, and $p_4 = \rho\phi$. Substituting the relations above into Eqn. 1 and simplifying, we obtain:

$$\Delta = [C_I - C_1] + \rho[C_{III} - C_I] - \rho[C_3 - C_1] + \psi[(1 - \rho)C_1 + \rho C_3 + \phi\delta] - \phi\delta - \psi B.$$

If $\Delta > 0$, it implies that the expected cost of contracting-out is higher than that of in-house production.

The terms in the above equation have natural interpretations. The first term is the cost difference between contracting-out and in-house production. The second term is the expected cost of kickbacks (spoils), while the third is the expected cost of patronage. The fourth term represents the cost of cleanup when contractors are negligent, while the fifth term represents the cost of moral hazard on the part of workers. The last term stands for the benefit of the forfeited bond when contractors are found to be negligent.

Whether or not Δ is positive clearly depends on the strength of the six terms. Although productive efficiency favors contracting-out, opportunism raises the

cost of contracting-out as well as in-house production. The following proposition summarizes the comparative statics of the cost comparison:

Proposition 1: Opportunism on the part of workers raises the cost of in-house production, whereas opportunism on the part of contractors raises the cost of contracting-out. Opportunism on the part of the public agent increases (1) the cost of contracting-out as the size of kickbacks (spoils) increases and (2) the cost of in-house production as the size of patronage benefit increases.

Proof: See Appendix 1.

The Agent

Alternatively, suppose the agent is delegated the authority to choose between the two arrangements. If the agent is honest, the cost differential to focus on is $C_I - \psi(C_1 + \phi\delta) - \phi B$. Again, even though the best contractor can be quite efficient ($C_I \leq C_1$), the existence of "fly-by-night" contractors reduces the advantage of contracting. If the agent himself is opportunistic, he focuses on his private gain. His choice will then be diametrically opposed to the interest of public.

Proposition 2: The public preference for in-house production increases with the size of spoils and decreases with the size of patronage cost, whereas an opportunistic agent's preference for in-house production decreases with the size of spoils and increases with the size of patronage benefit.

Proof: See Appendix 1.

In fact, it is more likely that the opportunistic agent prefers contracting-out to in-house production, since the political contributions the workers can make are bounded above by their wages, whereas the contractor's kickbacks are bounded only by the maximum contract fee (which includes wages, cost of capital equipment, and normal profit for the least efficient contractor).

In our discussion so far, we have ignored the possibility that players face punishment for being opportunistic. However, unless the expected disutility from penalties are larger than the cost saving from not doing any work, opportunistic contractors still will not work. Thus, the basic nature of the game remains the same, although the cost to the public might be less due to revenues derived from the penalties.

MODEL II: ENDOGENOUS TYPES

An alternative approach to Model I is to assume that players behave strategically, deciding whether to act "honestly" or "opportunistically" depending on the payoffs. The payoffs in turn depend on the opponent's strategy choice. For example, contractors' behavior might depend on the agent's behavior, since it is

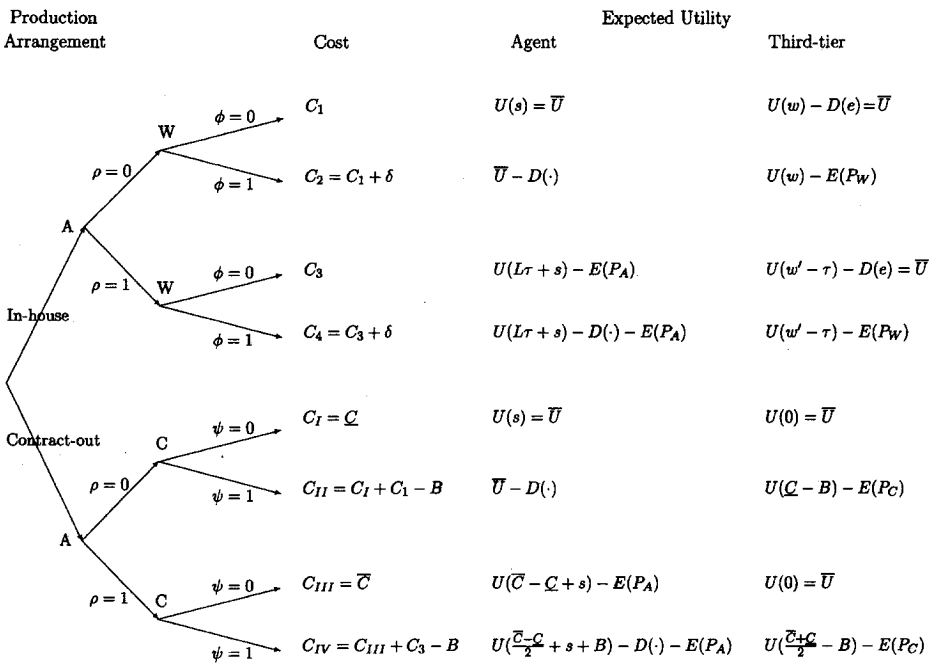

Figure 2. Extensive Form. Model II: Endogenous Types.

easy to bribe an opportunistic agent, but difficult with an honest agent. Similarly, facing an opportunistically-acting contractor, the agent might choose to behave in the same manner. In this case, the probability of simultaneously having a corrupt agent and a corrupt contractor increases. Contractors help elect corrupt agents, who in turn award contracts to corrupt contractors. Corruption breeds more corruption, so to speak. Although the same temptation exists with in-house production, to the extent that the spoils are larger in contracting than political contributions, the spoils system is more attractive to the agent (and clearly to the contractors). Such calculation perpetuates this kind of a system, even though it does not serve the public. The cost to the public would be higher under the spoils system than under the patronage system. In Model II, we formalize the idea outlined above.

The Model

We start with a basic structure that is virtually identical to that of Model I and make additional modifications to incorporate specific features. The extensive game in Figure 2 specifies the strategies and payoffs in expected utilities of players.[31] In the interest of notational simplicity, we omit subscripts for various

functions to identify the player. First, we focus on the interaction between the agent and the third-tier player, under "In-house" or "Contract-out" arrangement. For the moment, we sidestep the issue of the choice between In-house and Contract-out. Since player-type is endogenous, we now interpret ρ, ϕ, and ψ as the probability of players choosing to act opportunistically. Thus, $\rho = \phi = \psi \in [0, 1]$. We consider only pure strategies, however, so $\rho = \phi = \psi \in \{0, 1\}$. If $\rho = \phi = \psi = 1$, all players act opportunistically, whereas if $\rho = \phi = \psi = 0$, they all act honestly. Of course, any combination of $\{0, 1\}$ for three players is feasible. Since players select strategies to maximize expected utility, we need to specify the expected utility each player receives at each end node.

[A4]: When players act honestly, they each receive utility that is equal to the reservation utility $\bar{U}$.

If players are to participate in the game, they would have to be guaranteed their reservation utilities. Thus, if workers act honestly, they receive $U(w) - D(e) = \bar{U}$, where U(w) is the utility each worker receives from his wage and D(e) is the disutility of his effort, e. The honest contractor who wins his bid with the lowest cost receives a normal profit, $\pi = \underline{C} - wL - vK$ (normalized at zero), which gives him $U(0) = \bar{U}$. With the salary of s and honest work, the agent receives $U(s) = \bar{U}$. When players act opportunistically, they are subject to possible censure.

[A5]: When players act opportunistically, there is a positive probability that they are punished.

The expected disutility from punishment depends on both the size of the penalty and the probability of being punished. The latter depends on the monitoring mechanism and the judicial system in place. The internal control system of the agency plays an important role, but what is more important is whether players themselves bring corruption into public light. It is not so much a matter of awareness, but rather of whether the issue becomes public and the accused is properly penalized according to the law. When all players act opportunistically, however, the penalty is rarely enforced. Thus, we assume:

[A6]: When all players act opportunistically, the probability of penalty actually imposed is negligible.

That is, the probability is sufficiently small that each player's strategy choice is not affected by the existence of penalty.

To analyze the game, we first consider the subgame between the public agent and contractors and then the subgame between the public agent and workers. The choice of strategy for each player depends on the strategy chosen by his opponent. Thus, the equilibrium concept we use is that of subgame perfection. Finally, based upon the equilibrium strategy of players, we compute the cost difference between contracting-out and in-house production.

Contracting-out

The contractor who is to be selected through "competitive bidding" must decide how much to bid and whether to carry out the job. What he will and can do depends on whether the contractor is facing an honest or opportunistic agent. If the agent is honest ($\rho = 0$), the contractor chooses his action to $max_{\psi \in \{0,1\}}$ $\{U(\cdot\, \rho = 0, \psi = 0), U(\cdot \mid \rho = 0, \psi = 1)\}$, where $U(\cdot \mid \cdot, \cdot)$ is his expected utility when he acts honestly ($\psi = 0$) or opportunistically ($\psi = 1$). Honesty gives him $\bar{U}$, whereas opportunism provides him with $U(\underline{C} - B) - E(P_C|\rho = 0, \psi = 1)\}$, where $\underline{C}$ is the winning bid of the lowest-cost contractor, B is the bond posted, $E(P_C|\cdot, \cdot)$ is the expected disutility of the penalty for negligent contractors, P_C, and $\underline{C} > B$. By neglecting work, he receives the full contract fee minus the bond. The honest agent, however, will make sure that the derelict contractor is punished sufficiently for his negligence. Alternatively, the honest agent might force the contractor to provide services by withholding payments or constantly monitoring the contractor's work. Either way, facing an honest agent, the contractor will be made better off by acting honestly. Thus, $U(\cdot\, |\rho = 0, \psi = 0) > U(\cdot\, |\rho = 0, \psi = 1)$.

If the agent acts opportunistically, the contractor runs negligible risk of being punished for negligence in return for kickbacks. We assume in Figure 2 that the agent and the contractor split the spoils evenly à la Nash Bargaining solution, but exactly how the spoils are split depends on the relative bargaining power of the two players.[32] We further assume that the contractor reneges on the contract and forfeits his bond; and that the agent provides service at the public expense. Since $\bar{C} > \underline{C} > B$ and $E(P_C|\rho = 1, \psi = 1)$ is sufficiently small, $U(\cdot\, |\rho = 1, \psi = 1) \geq \bar{U}$.

Given the choice the contractor makes, the agent in turn chooses his strategy. Honesty guarantees a reservation utility. Opportunism, on the other hand, extracts a kickback from the contractor, who would go along to share the spoils. Thus:

Proposition 3: The subgame perfect equilibrium in pure strategy of the game between the public agent and the contractor is {ρ = 1, ψ = 1}.

Proof: See Appendix 1.

In-house Production

We now consider the behavior of workers. For simplicity, we assume that workers are identical and act strategically (in unison) by choosing to act honestly or opportunistically. If the agent is honest, workers are chosen for their qualifications and compelled to perform their jobs. If the agent is opportunistic, however, workers are chosen based on their political affiliations and are assessed contributions. If workers sabotage work, they face a possible penalty. Since the agent is required to provide the output level $\bar{y}$, regardless of the agent's strategy, workers would be made to work.

Given the strategies of workers, the agent again decides on his strategies. Opportunism results in patronage. It is easy to see that an opportunistic agent has an incentive to increase the number of workers.[33] The patronage system provides the agent with votes and political campaign funds and the workers with jobs. Then,

Proposition 4: The subgame perfect equilibrium in pure strategy of the game between the agent and workers is {$\rho = 1$, $\phi = 0$}.

Proof: See Appendix 1.

With these two propositions, we now compare the cost of contracting-out and in-house production. Since contracting-out involves opportunistic behavior on the part of both the agent and the contractor, but not workers, the cost is $C_{IV} = C_{III} + C_3 - B$. In-house production, on the other hand, involves patronage, resulting in the cost of C_3. Subtracting the latter from the former, $C_{IV} - C_3 = C_{III} - B > 0$. Thus,

Proposition 5: When players behave strategically, the spoils system is more costly than the patronage system.

One might argue that the propositions of Model II are obtained because of the strong assumptions we made about costs and payoffs, which are biased against contracting-out. Indeed they are. The propositions however have the merit of highlighting the strategic interaction of the players. Although Model I was not able to rank the merits of the two alternative arrangements for public-good provision, Model II shows that the incidence and the cost of corruption increases under the contracting system.

The two unique subgame perfect equilibria in Propositions 3 and 4 are supported in part by the assumption that players do not gain from exposing opportunism. Contractors and workers go along with the corrupt agent by paying kickbacks or political contributions. Since players choose strategies in Model II, it is not surprising that they go along when it is in their interest to do so. What needs justification is why those who do not benefit directly do not complain to expose corruption. For example, those workers who did not get jobs because of wrong political affiliations, or those contractors who did not win contracts might try to undermine the system by registering complaints. We observe however that people are often reluctant to expose corruption, as seen, for instance, in the "blue wall of silence" in NY's police department. Such silence is maintained perhaps because they themselves want to become part of the job force or win a contract in the future. Even when corruption is exposed, the consequences and penalties actually imposed on the accused appear to be much less than expected. If honestly-acting workers or contractors do not complain, it would be in fact a dominant strategy for the agent to act opportunistically under any circumstance.

The ultimate victim of corruption is the general public. This begs the next

question. Why does the public not suspect corruption when it sees a contract at the highest cost? There are two possible reasons.

1. The public does not know the cost distribution and does not recognize the highest cost.
2. Even if the public knows the cost distribution, all contractors had submitted high bids through collusive bidding.

Alternatively, there are only few bids (at high levels): it is possible that no contractor exists who can provide service at the technologically lowest cost.

Perhaps the public does suspect corruption. Yet it takes a lot of effort and time on the part of the public to prove it and take action against the perpetrators. The corrupt public agent, contractors, and workers are all beneficiaries of public apathy and its willingness to give "the benefit of the doubt." During the latter half of the 19th-century in NY, the rapid influx of immigrants changed the demographics and political culture. When many immigrants benefited from the patronage system, the general public was not the best monitor of the affairs of the city. Machine politics relied on and exploited the patronage and spoils systems.

Does our analysis imply that contracting necessarily results in corruption in the real world? Not at all. Since it is quite possible that some players are "born principled" as in Model I and will not choose to behave "strategically" in the sense of Model II, it is possible to observe an equilibrium with $\{\rho = 0, \psi = 0\}$ or $\{\rho = 0, \phi = 0\}$. However, such an equilibrium is based on good fortune.

What will happen to the equilibrium of Model II if we have a better monitoring system? Corruption might be exposed by honest contractors or workers who can observe it first-hand. In the subgame between the agent and the contractor, however, the subgame perfect equilibrium will stay the same.[34]

In the subgame between the agent and workers, however, mutual monitoring induces a unique subgame perfect equilibrium in which both players act honestly.[35] Perhaps qualified workers who were not given jobs complain about the patronage system. Thus, the cost to the public of in-house production is reduced from C_3 to C_1. As the result, the difference in costs between contracting and in-house production becomes $(C_{III} - B) + (C_3 - C_1) > 0$, which is larger than the original cost differential. In a nutshell, Proposition 5 summarizes two crucial notions:

1. Opportunistic behavior is mutually supportive; and
2. The amount of rent to be extracted by players from contracting is larger than that from in-house production.

Of the two possible equilibria under two different procurement arrangements of In-house or Contracting-out, which one does the agent prefer?

Proposition 6: If the interval for cost distribution is sufficiently large, the agent prefers the spoils to the patronage system.

This condition holds if $U((\bar{C} - \underline{C})/2 + s + B) - D(\cdot) \geq U(L\tau + s)$. Although the choice between the two is usually a political choice and one that is not made on an annual basis, the agent might be able to influence it. In 19th-century NY, the contract system was reintroduced in 1842 by the Common Council (the agent) after 12 years of in-house provision. Despite the filthy condition of streets and many incidences of contractor negligence, the contract system was not completely abandoned until 1895. This longevity perhaps reveals the preference of public agents. Thus, if the spoils are sufficiently larger than the political contributions from workers, this condition obtains. In such a case, choosing a contract system over in-house production is subgame perfect.

We illustrated that when opportunistic behavior is allowed in a game, the equilibrium may well be quite different from the "ideal" situation. In such an equilibrium, then, it is a moot question whether the most efficient contractor is more efficient than the public agency. "Competitive" bidding awards a contract to the most efficient contractor, but the benefit accrues to the public if and only if both the agent and the contractors act honestly. If either one or both act opportunistically, the benefit of competitive bidding is lost to the public.

DEPOLITICIZATION AND DEMARKETIZATION

Neither a spoils nor a patronage system is socially desirable. Temptations were seemingly, however, irresistible in New York City. That was the case partly because both public agents and contractors were motivated by "high-powered" incentives. Frant (1996) argues that when it comes to allocating resources, the basic institution in the public sector is politics, whereas in the private sector it is the market. Politicians avidly pursued re-election, while private contractors pursued profits. Both politics and the market provide high-powered incentives.

Of course, high-powered incentives could produce desirable outcomes. If the public were informed and monitoring were easy, politicians would likely be more responsive to public demand and be more accountable for their behavior to assure re-election. However, if the public is uninformed and/or apathetic, as it was in the 19th century, Frant argues that "politicians are apt to be unscrupulous about what they do to ensure re-election."

A contract system could also be made to work well. Competition, if effective, provides high-powered incentives to make clean (normal) profits. Gains from productive efficiency will then be shared by the public and the winning contractor. Although New York City installed various safeguards to promote competition

among contractors, these were undermined when many players (including judges) became willing parties to the spoils game. In a climate of graft and corruption, machine politics dictated municipal decisions, and corrupt politicians and contractors were often left unpunished.

Throughout almost the entire century, New York was presented with a choice of lesser evils. The two models we studied suggest that contracting-out offered larger payoffs for opportunism. Thus contracting-out provided incentives that were perhaps "too powerful," increasing the likelihood of egregious corruption. The prediction by Hart, Shleifer, and Vishny (1997) that corrupt public officials choose excessive amount of contracting-out was precisely the situation that obtained in our case.

How can we create a more socially desirable system? One possibility is to reduce the size of (ill gotten) payoffs from opportunism. The payoffs can be reduced by replacing high-powered incentives with "low-powered" incentives. That is what transpired in NY toward the end of the 19th century. The 1895 reform in the Department of Street Cleaning essentially depoliticized and demarketized the process of public good provision.

The impetus for this reform came from an ambitious Commissioner of the Department, Colonel Waring, who had been appointed by a Reform mayor, Mayor Strong.[36] The time was perhaps ripe for a major reform in the department. New ideas on bureaucracy, administrative control, scientific governance, etc had been advanced by the late 19th century. Waring obtained, first, strong support from the mayor to restructure the department and the assurance of political independence in terms of departmental affairs. He then introduced a professional and scientific management system, hired workers on the basis of job-related qualifications, introduced discipline, elevated the status of workers to civil servants with job security, and abandoned the contract system completely.[37] By severing hiring from political influence, he was able to put an end to the patronage system. An idealistic reformer who did not have to worry about re-election, he was able to conduct a social experiment.[38] In Frant's words, civil service systems replaced high-powered with low-powered incentives "in the personnel process." A professional manager with workers who are civil servants would have neither the need nor the means for opportunism. He would not need political contributions for re-election, would not be able to extract favors from workers, and would not have contractors to exploit.

CONCLUDING REMARKS

We intentionally kept our models simple, but simplicity has its costs. First and the most important is the assumption of a single-period game. If players worry about the impact of their behavior on future periods, outright corrupt behavior will be reduced (except in the end period). For example, doing no work on the part of

opportunistic contractors would likely be suboptimal. Informational asymmetry as to the type of workers, which might exist at the time of hiring, would dissipate rather quickly as workers were supervised on the job. In a multi-period or repeated game setting, one would expect the level of corruption to be lower, although the same underlying forces would be at work.

Secondly, the type distribution in our models was either predetermined or chosen as a strategic variable. Other formulations might be possible.

1. The type distribution is determined by the player's role. It is possible that certain types of individuals self-select to become public agents, contractors, or municipal workers.
2. The principal might be able to devise mechanisms to screen out opportunistic types and monitor behavior. Neither perfect screening nor monitoring is possible, but any reduction in opportunistic type or behavior decreases the cost of opportunism.
3. A similar effect is achieved by increasing the cost of opportunistic behavior (e.g., higher penalties and/or a higher probability of detection). Administering screening and monitoring, however, is also costly.

Of the two models we analyzed in this paper, Model II clearly applies better to the NY case. Nevertheless, we investigated the two versions of the rotten apple theory, since they suggest starkly different policy implications. If one believes that Model I is right for a particular environment, the solution to stamping out corruption is simply to identify and remove rotten apples. A cynic might even argue that since every barrel is likely to have at least one rotten apple, corruption is ubiquitous. Corruption in NY was unfortunate but inevitable. Since it is not symptomatic of underlying organizational problems, providing low-powered incentives would not work in this environment; better screening and monitoring are required.

Model II, on the other hand, highlights the importance of institutional environment and incentives. As transaction economics emphasizes, certain types of transactions will be less costly in one institutional setting than in another. Since players choose their strategy, it should be possible to influence behavior by changing the available strategies and/or the expected payoffs.

Are these models applicable to contemporary settings? Clearly the details differ from situations in contemporary America. Bureaucratization of public agencies has reduced patronage, but introduced other problems such as lack of accountability and entrenched bureaucracy. The increasing power of unions has strengthened the bargaining position of workers. Most importantly, the general public is more informed.[39] Better internal control of public agencies and monitoring of contracting process have possibly reduced the opportunities for bribery. Yet scandals involving contractors abound today.[40] Thus we believe our analysis

illustrates underlying forces still at work. An important point the models highlight is that the question of contracting-out versus in-house production is not necessarily one of productive efficiency, but rather of the overall performance of the entire agency relationship.

Acknowledgments: The author is grateful to Moshe Adler, Sara Berman, Peter Lindert, Peter Holmes, Tom Russell, Bharat Sarath, Neal Stoughton, Fred Thompson, and the participants at the seminars at Tsukuba University and Hong Kong University of Science and Technology for helpful comments and suggestions. This research was supported in part by the Graduate School of Management, the University of California, Davis.

NOTES

1. As the trend continues, there will be a growing body of empirical data to shed light on this issue. Some of the more recent analyses include Savas (1982); Borcherding, et al. (1982); Megginson, et al. (1994); and La Porta and Lopez-de-Silanes (1997).
2. Street cleaning and refuse collection are public goods, especially in dense and high-rise urban areas. It is impossible to make residents responsible for cleaning streets and removal of trash, since it is difficult to identify the ownership of either street or trash.
3. At the local level, privatization might be carried out in different forms such as contracts, franchises, and vouchers. By far the most common method of privatization is contracting-out. See Valente and Manchester (1984).
4. See Adler and Darrough (1998).
5. The city cleaned the streets between 1804–06, 1826–42, and from 1881 to present.
6. For example, Mayor Woodhull stated in 1849 that "the system of cleaning the streets by contract, has signally failed of fulfilling public expectations. . ." Similarly, the City Inspector concluded in his annual report in 1863 that "the experiment of cleaning the streets by contract, whenever made, has, in every instance, proved a most signal failure. . ." (Documents of the Board of Aldermen).
7. Benson (1988), p.149.
8. By "filthy," we do not mean occasional litter on the streets. The accounts from this century describe two to three foot high piles of garbage (including ashes, construction materials, and dead animals) in some streets, and consequent obstruction of traffic and serious health hazard.
9. Prior to that, street cleaning and garbage collection were administered—not provided—by various officials, including the Superintendent of Scavengers, the City Inspector, and by agencies such as the Department of Health, and the Police Department. Contracts were usually awarded by the City Council.
10. Similar reforms took place in various departments, including the Police Department and Buildings Department. Bureaucratization and professionalism were the most prominent features of these early 20th century reforms.
11. In a report by Campbell (1909) of the study sponsored by the Merchants' Association of San Francisco to examine the street cleaning methods.
12. Bribery and kickbacks offer a high-powered incentive like those in a market place a là Williamson (1985), while, according to Frant (1996), votes and political contributions offer a high-powered incentive in a political setting.
13. Benson (1988) gives a detailed analysis of how corrupt criminal justice officials use their power to enforce laws to their advantages.

14. The public agent might be referred to as the "primary contractor," who hires another agent, who might be called the "second agent" or the "subcontractor."
15. Agency problems typically arise because of the unobservability of some crucial information, such as effort expended by the agent, or private information of the agent. Private information might be about the agent's type that is ascribed (such as his ability, the degree of effort and/or risk aversion, or willingness to "bend the rules") or about the information he has acquired (such as the cost or benefit of a project).
16. A hierarchy with three-tiers has been analyzed in various contexts. For example, in Melumad et al. (1995), a principal hires an agent, who in turn hires another agent. They show that for a hierarchy to achieve the same result as that arrived at under a centralized system, it is crucial that the principal exercise appropriate monitoring and control. Shleifer and Vishny (1994) focus on bargaining between the second (politicians) and the third-tier (managers) when the treasury is the principal. Since the principal is passive, the politicians and managers maximize their utilities at the expense of the treasury. The results of Nash bargaining are shown to depend on how ownership and control rights of the enterprise are distributed. Bribes, if permitted, are used as a mechanism of allocating the joint rent between the politicians and the managers.
17. One might argue that similar free-rider problems exist in private corporations. Yet, to the extent that voting rights are proportional to stock ownership, the benefits and costs of control are better aligned. In addition, there is an active market for corporate control.
18. If the public agent is elected, his (re)appointment is governed by election cycle. If the agent is appointed indirectly, then the public cannot directly vote on that issue.
19. The contractor hired might be a publicly listed company, but the principal in this case is not interested in the overall performance of the contractor, but only in his performance of the public-good provision to the public.
20. Some might argue that top management of many companies are paid exorbitantly at the expense of shareholders' welfare. Hence the agency cost in the private sector could (also) be quite high. One redeeming aspect of this phenomenon is that at least it is done aboveboard and not under the table.
21. Frant (1996) argues that the city manager's desire to keep a job would be a low-powered incentive.
22. Technically speaking, the city council represents the legislative branch; the mayor and the department heads represent the executive branch of the municipal government, whose authority in turn is derived from the state. The distinction between the city council, the mayor's office, and the state was often blurry in 19th-century New York.
23. Political campaign funds can be raised either through patronage or kickbacks/bribery. The patronage system was also useful in mobilizing campaigns activities.
24. In most agency models, effort shirking or effort aversion would not be called "opportunistic." Effort is just costly. However, the underlying assumption is that without an appropriate incentive or a penalty, a player will shirk. An incentive scheme such as outcome-based compensation, where outcome depends on effort, is necessary to ensure effort. For simplicity, we call this type of effort aversion opportunistic.
25. Again, for simplicity, we do not differentiate among different opportunistic behaviors. We recognize that there is significant difference between effort shirking and bribery.
26. The winning bid would likely include an information rent, which would be small if there were many competitors. For simplicity of exposition, we speak as if the rent is zero to the contractor.
27. Any bid below $\bar{C}$ will not be credible, since the distribution of costs is known as $[\bar{C}, \bar{C}]$. An alternative formulation is to assume that contractors collude to bid the highest cost, $\bar{C}$
28. It is straightforward to incorporate the possible correlation between worker-type and contractor-type. Added complication in the resulting expression does not seem warranted.

29. The isomorphism between bribery and competitive bidding was shown by Beck and Maher (1986) in a setting where a principal selects one contractor among many. Thus, in their model, the benefit of competition or bribery accrues to the principal. When a primary agent selects a sub-agent, however, the benefit is transferred to the principal, *if and only if* both are honest.
30. The most egregious example of corruption in 19th-century NY is the case of the Tweed Ring. Among others, the Ring required city contractors to add 15% to 60% over and above the contract amount; the extra percentage would be paid to Ring members. For over two decades, the Ring defrauded the city on a large scale without being caught.
31. The costs, C_{II} and C_{IV}, have already incorporated the equilibrium behavior of workers, which is to act honestly.
32. An alternative Nash bargaining solution is that the agent and the contractor split $\bar{C} - B$, since both players understand that the contractor is awarded a contract of $\bar{C}$, reneges on the contract, and forfeits the bond. In that case, the agent's monetary payoff is $(\bar{C} - B)/2 + s$, which is strictly larger than the payoff in Figure 2 if $\bar{C} > 3B$.
33. When the introduction of street sweeping by machines was delayed by many years, the New York Herald commented that city officials did not want to adopt machines because they "cannot vote." See Duffy (1968), p. 367.
34. Alternatively, if we view the game as a simultaneous-move game, there will be two Nash equilibria: (1) one with both the agent and the contractor acting honestly; and (2) the other with both acting opportunistically. The first Nash equilibrium is supported by the assumption that when honestly-acting contractors expose the agent for demanding a kickback, the agent is punished with a high enough probability that his expected disutility outweighs the benefit from kickbacks. Note, however, that of the two equilibria, the expected utility of each player is higher in (2) than in (1). Thus, the players are better off if they can coordinate their actions (to act opportunistically). Such coordination is easily achieved if players can send signals to the other about their preference by "hinting" about a kickback or a bribe.
35. The possibility of an equilibrium in which both the agent and workers act opportunistically is ruled out since we assume that workers ultimately have to be made to work.
36. Under Strong's leadership, Theodore Roosevelt also reformed the Police Department of NYC.
37. The fact sheet for 1996 of the Department of Sanitation, the current name of the original Department of Street Cleaning, states that Waring "instituted efficiencies and waste reduction programs that foretold the programs of today—including recycling, street sweeping and a dedicated uniformed cleaning and collection force." In 1896, workers marched the streets of New York City in their white uniforms in a street-cleaners' parade.
38. According to Burrows and Wallace (1999), the reformers "adored" Waring, since he "proved there were viable alternatives to machine rule. . ."
39. Boss Tweed of Tammany Hall was not concerned with any newspaper article on his fraudulent activities. Only when Thomas Nast started publishing cartoons, he became concerned since his voters could not read but could understand cartoons.
40. For more current examples of corruption involving contractors, see AFSCME (1983).

Appendix One

Proof of Proposition 1:

Taking partial derivatives of Δ with respect to ϕ, ψ, and ρ, we obtain $\partial\Delta/\partial\psi = (1 - \rho)C_1 + \rho C_3 + \phi\delta - B > C_1 + \phi\delta - B > 0$, $\partial\Delta/\partial\phi = -(1 - \psi)\delta < 0$,

and $\partial\Delta/\partial\rho = (C_{III} - C_I) - (1 - \psi)(C_3 - C_1)$, where $(C_{III} - C_I)$ is the maximum kickback and $(C_3 - C_1)$ is the proceeds from patronage.QED

Proof of Proposition 2:

When the agent is of type O, the cost differential between contracting-out and in-house production from the viewpoint of the public is $C_{III} - \psi(C_3 + \phi\delta) - \psi B$. The cost of contracting out increases with C_{III}, but decreases with C_3. For the agent, on the other hand, the benefit from contracting out increases with C_{III} and decreases with C_3, since the size of kickbacks is $C_{III} - C_I$ and the patronage benefit is $C_3 - C_1$. QED.

Proof of Proposition 3:

Facing an honest agent, the contractor chooses his action to $max_{\psi\in\{0,1\}}\{U(\cdot \rho = 0,\psi = 0), U(\cdot|\rho = 0,\psi = 1)\}$, where $U(\cdot|\rho = 0,\psi = 0) = \bar{U}$ and $U(\cdot|\rho = 0,\psi = 1) = U(\underline{C} - B) - E(P_C|\rho = 0, \psi = 1)$. An honest agent will make sure that $U(\underline{C} - B) - E(P_C|\rho = 0, \psi = 1) < \bar{U}$. If the agent acts opportunistically, the contractor chooses to $max_{\psi\in\{0,1\}}\{U(\cdot|\rho = 1, \psi = 0), U(\cdot|\rho = 1, \psi = 1)\}$, where $U(\cdot|\rho = 1, \psi = 0) = \bar{U}$ and $U(\cdot|\rho = 1, \psi = 1) = U((\bar{C} + \bar{C})/2 - B) - E(P_C|\rho = 1, \psi = 1)$. Since $\bar{C} > \bar{C} > B$ and $E(P_C|\rho = 1, \psi = 1)$ is sufficiently small, $U(\cdot \rho = 1, \psi = 1) \geq \bar{U}$.

Given the best responses of the contractor, the agent chooses to $max_{\rho\in\{0,1\}}\{\bar{U}, U((\bar{C} - \bar{C})/2 + s + B) - D(\cdot) - E(P_A|\rho = 1, \psi = 1)\}$, where $D(\cdot)$ is the disutility of having to do the work neglected by the contractor. The expected disutility from the penalty is however negligible, since the contractor himself would be acting also opportunistically. With a reasonably large kickback to compensate for the work, the expected utility of the agent is larger from opportunistic behavior. Thus, $U((\bar{C} - \bar{C})/2 + s + B) - D(\cdot) - E(P_A|\rho = 1, \psi = 1) \geq U(s) = \bar{U}$. QED.

Proof of Proposition 4:

If the agent is honest, each worker receives expected utility of $U(w) - D(e) = \bar{U}$ from being honest, or $U(w) - E(P_W|\rho = 0, \phi = 1)$ from being opportunistic, where $E(P_W)$ is the penalty for sabotaging work. Since the honest agent supervises workers on a continuous basis, they receive wages only if they work, i.e., $U(w) - D(e) > U(w) - E(P_W|\rho = 0, \phi = 1)$. Thus, facing an honest agent, workers choose to act honestly as well. When the agent is opportunistic, however, workers are chosen based on their political affiliations and assessed contributions. Each worker's choice is between $U(w' - \tau) - D(e) = \bar{U}$ by acting honestly and $U(w' - \tau) - E(P_W|\rho = 1, \phi = 1)$ by acting opportunistically, where w' is the wage under patronage and τ is the political contribution. Since the agent has to provide the public service in any event, again workers are induced to work, i.e., $U(w' -$

$\tau) - E(P_W|\rho = 1, \phi = 1) < U(w' - \tau) - D(e)$. Opportunistically-acting and ill-qualified workers, however, are less efficient than qualified and honest workers, so the cost is higher ($C_3 > C_1$), as in Model I.

Given the workers' strategy, the agent decides whether to act honestly, in which case he gets $\bar{U}$, or opportunistically, in which case he gets $U(s + L\tau) - E(P_A|\rho = 1, \phi = 0)$, where N is the total number of workers and $E(P_A)$ is the expected disutility from the penalty. If $L\tau$ is large enough, which we assume is the case, the agent will choose to act opportunistically. The political contribution, τ, is by necessity bound by $w' - U^{-1}(\bar{U} + D(e))$. Again, $E(P_A)$ in this case is relatively small, since workers are happy to get jobs even though they have to contribute to the political fund. QED.

REFERENCES

Adler, Moshe and Masako N. Darrough, 1998, *The Little-Known History of Privatization: A Case Study of New York City in the 19th Century.* Working Paper.

AFSCME, 1983. *Passing the Bucks: The Contracting Out of Public Services.* Washington, D.C.: American Federation of State, County, and Municipal Employees.

Bac, Mehmet, 1996. "Corruption and Supervision Costs in Hierarchies." *Journal of Comparative Economics*, 22: 99–118.

Bag, Parimal Kanti, 1997. "Controlling Corruption in Hierarchies," *Journal of Comparative Economics*, 25: 322–344.

Beck, Paul and Michael Maher, 1986. "A Comparison of Bribery and Bidding in Thin Market," *Economics Letters*, 20: 1–5.

Becker, Gary, 1994. "To Root Out Corruption, Boot Out Big Government," *Business Week*, Jan. 31, p 18.

———, 1995. "If You Want to Cut Corruption, Cut Government," *Business Week*, December 11, 26.

———, and George Stigler, 1974. "Law Enforcement, Malfeasance, and the Compensation of Enforcers," *Journal of Legal Studies*, 3: 1–19.

Benson, Bruce L., 1988. "An Institutional Explanation for Corruption of Criminal Justice Officials," *Cato Journal*, 8/1: 139–163.

Borcherding, Thomas, Werner Pommerehne, and Friedrich Schneider, 1982. "Comparing the Efficiency of Private and Public Production: A Survey of the Evidence from Five Federal States," *Zeitschrift fuer Nationaloekoenomie*, (Suppl.) 2: 127–156.

Burrows, Edwin G. and Mike Wallace, 1999. *A History of New York City to 1898.* New York: Oxford University Press.

Campbell, H. A., 1909. *Report on the Street Cleaning Problem in San Francisco.* The Merchants' Association of San Francisco.

Duffy, John, 1968. *A History of Public Health in New York City, 1625–1966.* New York: Rusell Sage Foundation.

Frant, Howard, 1996. "High-Powered and Low-Powered Incentives in the Public Sector." *Journal of Public Administration Research and Theory,* (July): 365–81.

Hart, Oliver, Andrei Shleifer, and Robert Vishny, 1997. "The Proper Scope of Government: Theory and Application to Prisons." *Quarterly Journal of Economics,* 112/4 (November): 1127–1161.

La Porta, Rafael and Florencio Lopez-de-Silanes, 1997. *"The Benefits of Privatization: Evidence from Mexico." Quarterly Journal of Economics,* 114/4 (November): 1193–1242.

Megginson, William L. Robert C. Nash, and Matthias van Randenborgh, 1994. "The Financial and Operating Performance of Newly Privatized Firms: An International Empirical Analysis." *Journal of Finance,* 49/20 (June): 403–452.

Melumad, Nahum, Dilip Mookherjee, and Stefan Reichelstein, 1995. "Hierarchical Decentralization of Incentive Contracts." *Rand Journal of Economics,* 26/4 (Winter): 654–72.

Rose-Ackerman, Susan, 1978. *Corruption: A Study of Political Economy.* New York: Academic Press.

Savas, E.S., 1982. *Privatizing the Public Sector: How to Shrink Government.* Chatham, New Jersey: Chatham House Publisher.

Shleifer, Andrei and Robert Vishny, 1993. "Corruption." *Quarterly Journal of Economics,* 108/3 (August): 599–617.

Valente, Carl F. and Lydia D. Manchester, 1984. *Rethinking Local Services: Examining Alternative Delivery Approaches.* Washington, D.C.: International City Management Association.

Williamson, Oliver, 1985. *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting.* New York: Free Press.