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Corruption in Procurement Auctions

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Abstract

We review different kinds of corruption that have been observed in procurement auctions and categorize them. We discuss means to avoid corruption, by choice of preferable auction formats, or with the help of technological tools, such as secure electronic bidding systems. Auctions that involve some soft elements, such as complex bids consisting of technical and financial proposals, are particularly prone to corruption. We do not believe that it is possible to eradicate corruption altogether in such situations, but we discuss means to make it less likely.

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Auctions are an efficient mechanism to procure. This is why they have been used for centuries, and are used ever more frequently. But they are not immune to manipulations through collusion and corruption. Collusion means that bidders coordinate their actions with the intention to increase the price. Corruption means that the person who runs the auction, the auctioneer, twists the auction rules in favor of some bidder(s) in exchange for bribes. Corruption and collusion are sometimes interlinked. However, in this contribution, we focus exclusively on corruption.

We describe with the term corruption all kinds of behavior where a person who is in a position of trust misuses this position to her own advantage. In its procurement guidelines, The World Bank defines a "corrupt practice" as "…the offering, giving, receiving , or soliciting, directly or indirectly, of any thing of value to influence the action of a public official in the procurement process or in contract execution".[1] In the specific circumstances of an auction, the person of trust is the auctioneer, who behaves on behalf of the procurer, and the bidders who have pledged to play by the rules. Obviously, if the procurer and the auctioneer are one and the same person, there is no room for corruption. However, if the procurer is a firm with a broad ownership (a publicly traded company, for instance), there is necessarily an agent who takes on the role of the auctioneer on behalf of the procurer. The same is true if the procurer is a public organization, such as a nation state. It is immaterial if the auctioneer is an external outside expert or a public servant. In both cases, the auctioneer and the procurer are not identical, and corruption is potentially an issue.

Corruption is a widespread problem in procurement all over the world. Recently, the World Bank estimated the volume of bribes exchanging hands for public sector procurement alone to roughly US$200 billion per year.[2] Therefore, procurers must be alerted to the different forms of corruption, and one must design mechanism that eliminate corruption or at least make it more difficult. Different forms of corruption have been observed in procurement:

- bid rigging,
- bid orchestration, and
- distortion of quality ranking.

In each of these kinds of corruption, the auctioneer may or may not have an existing relation with one or several favored bidders or the auctioneer establishes a corrupt relationship only with that bidder who offers the highest bribe. In the following we explain the major types of corruption and sketch means to restrain them.

[1] See The World Bank (2004a).
[2] See Kaufmann (2005).

Bid rigging happens whenever the auctioneer allows a favored bidder to adjust his bid after receiving information about rival bids.

2.1 *Favored bidder selection independent of the bids*

Suppose the auctioneer has established a relationship with one of the bidders already before the auction. The auctioneer allows this preferred bidder to match the bid of the lowest competing bidder.

This can mean one of two things:

- In the event in which the preferred bidder submitted the lowest bid, the auctioneer allows him to raise his bid and still win the auction, thereby increasing his payoff.
- If the preferred bidder did not submit the lowest bid, the auctioneer will allow him to match the lowest bid so as to win the auction anyway.

In all cases, the paid price is the lowest bid of the non-preferred bidders. The preferred bidder wins whenever he has incentive to adjust his bid, which occurs if and only if the lowest bid of the non-preferred bidder exceeds his own cost.

Evidently, the original bid of the preferred bidder is irrelevant, because it can be adjusted in either direction. Therefore, the auction with a preferred bidder is equivalent to a sequential auction in which the non-preferred bidders first submit their bids and then the preferred bidder can respond and has the right to match the lowest rival bid. In other words, the preferred bidder is granted a right-of-first-refusal.

Generally, if this kind of corruption occurs, the auction does not always select the least-cost bidder as winner, hence it is generally inefficient. Moreover, it tends to reduce the payoff of the procurer. [3]

This type of corruption can be remedied by running an open auction[4] or a sealed-bid second-price (Vickrey) auction.[5] Indeed, in the Vickrey auction everyone submits a bid equal to his true cost; similarly, in the English auction everyone stays active until the

[3] This follows from two facts: 1) bidders quote a price above their cost, because otherwise they cannot benefit from winning; 2) suppose the favored bidder's cost is higher than the lowest cost of all bidders but lower than the price quoted by the least cost bidder; then, the favored matches the lowest bid and wins. This shows that the auction result can be inefficient. See Arozamena and Weinschelbaum (2004), Bikhchandani, Lippman, and Ryan (2005).

[4] This could be an open descending-bid English or an ascending-bid Dutch auction.

[5] The Vickrey format is, however, not popular because it is vulnerable to other manipulations. For example, the auctioneer has an incentive to invite a shill bidder to close the gap between the two lowest bids, and bidders may engage in self-enforcing collusion.

price reaches his cost. Therefore, the preferred bidder is treated just like all the other bidders and the outcome is the same as without corruption.

The corruption issue is slightly different if the selection of the favored bidder is based on bribe competition. Suppose the auctioneer asks bidders to simultaneously offer bribes and submit bids, with the understanding that he will collect the highest bribe in exchange for granting the preferred bidder status.

If the auction is first-price, in equilibrium, bidders submit maximum bids, and at the same time submit bribes that are such that their payoffs are the same as in a regular first-price auction without corruption. The outcome is efficient in the sense that the lowest cost bidder is awarded the contract, but the entire surplus is pocketed by the auctioneer. From the procurer's point of view this situation is most unsatisfactory.

Again, this corruption problem can be remedied by running an open-bid or a sealed-bid second-price (Vickrey) auction. Because in that case being a preferred bidder has no value, as above, and therefore, it is an equilibrium to offer no bribe and make a bid equal to one's cost.

Practical Conclusion 1. Favor a sealed-bid second-price (Vickrey) or an open-bid auction if you suspect that the auctioneer has established a favored bidder relationship before the auction or invites bribes during the auction.

2.2 *Favored bidder selection based on bids*

In the cases we have studied so far, the selection of the favored bidder does not use information revealed to the auctioneer from observed bidding behavior. Yet, it may be more advantageous for the corrupt auctioneer to delay that selection until he has observed the bids, for the following reasons:

- The auctioneer may infer the maximum gain from corruption from observed bids, and then select the most profitable bidder as favored bidder.
- By approaching only one or a few bidders, the auctioneer minimizes the number of illegal contacts and thus the risk of detection.

As before, in a first-price auction a corrupt deal can take one of two forms.[6] The auctioneer can invite the lowest bidder to raise his bid to the second highest bid, in exchange for a bribe. Alternatively, the auctioneer can invite the second highest bidder to lower his bid to the lowest submitted bid (that is, the auctioneer grants this bidder the right of first refusal), again in exchange for a bribe. Because the auctioneer has good information about the willingness to pay of the bidders (by inferring their true costs from the submitted bids), he can choose that form of corruption that gives rise to the highest possible

[6] This case has been analyzed by Lengwiler and Wolfstetter (2005).

bribery income. This form of corruption is very hard to detect — and thus involves little risk for the corrupt coalition — because only two parties have hard evidence on it.

In a second-price auction, a corrupt coalition consisting of only one bidder and the auctioneer cannot change the price paid to the seller, and thus have no possible gain from corruption to share among themselves. The minimum size of the corrupt coalition involves the auctioneer and the two lowest bidders. They can agree that the second lowest bidder withdraws his bid, so that the lowest bidder wins the auction but has to pay only the third lowest bid to the seller. We therefore conclude that the Vickrey auction proposed in the Practical Conclusion 1 is not sufficient to prevent this form of corruption.

Larger coalitions are of course also possible, and they make greater gains from corruption possible. But the detection risk obviously increases with the number of people who know about the corruption.

The corruption schemes that follow this pattern rely on the ability of the parties to change the bids after they have been submitted. If this is not possible, this form of corruption is no longer feasible. One way to make this impossible is to make the bidding process public. As a consequence, the open auction, which is also featured in the Practical Conclusion 1, suffices as an anti-corruption device simply because it destroys the secrecy required for this type of corruption.

Practical Conclusion 2. Favor an open auction if you suspect that the auctioneer tries to make a secret deal with a small number of bidders after the bidding round in an attempt to collect side payments.

An open auction may not be desirable for other reasons, such as fear of collusion. In that case one should try to make the sealed-bid auction corruption proof. This requires technology that makes it impossible to tamper with bids.

One could require that the auctioneer breaks the seals of all bids in public, after the bidding time window is closed.[7] Yet, the bidders have an interest to inform the auctioneer about their bids, because they also profit from corruption. The auctioneer could therefore invite each single bidder to come to his office with his unsealed bid. The auctioneer records the bid, and the bidder then seals it. When all the bids are in, the auctioneer decides which bidder will be allowed to change his bid, and contacts him. The first bid of this bidder is simply destroyed, and replaced by the new, rigged bid.[8] Therefore, the conventional practice of sealing bids and requiring the seals to be broken in public is not sufficient to exclude bid rigging. What is required in addition is that no bid can be destroyed and replaced.

It is often thought that one can solve the problem of corruption by by employing a safekeeper of bids such as a notary public, who is paid a sufficiently high "wage of trust,"[9] to

[7] This is a requirement of procurements funded by *The World Bank* and the *Asian Development Bank*.

[8] However, such a scheme exposes the corrupt auctioneer to high risk since he has to establish illegal contact with each bidder.

[9] The idea of paying a surplus above the competitive wage to those who are put into a position of trust is succinctly described already in Smith (1776, Book I/8).

whom all bids are submitted. However, this is not true as long as a bid can be replaced without leaving trace of it.[10]

The latter feature can be implemented with an electronic bid submission system. Such a system must contain a logbook that records who made the submissions at what time and who viewed them at what time. This requires the use of digital signatures and time stamps. Because of the logbook, the auctioneer can no longer replace a bid without leaving a trace. As a result, a bid, once submitted, can no longer be altered.

Practical Conclusion 3. If you suspect the auctioneer to collect bribes in exchange for favorable treatment of bidders but still want to use a sealed-bid auction format, run the auction on an electronic submission system with a secure logbook. This remedy also works if the special relationship exists already before the auction (the case of Practical Conclusion 1).

2.3 *Bid orchestration*

Even if bids cannot be changed after having been submitted, corruption may still occur in the form of bid orchestration. There, the auctioneer serves as a "ring manager" of a collusive cartel among the bidders who coordinates bids before they are submitted.

A widely publicized example is the recent insurance broker scandal in the U.S. The Attorney General of New York, Eliot Spitzer, sued a leading insurance brokerage firm, alleging that it "steered unsuspecting clients to insurers with whom it had lucrative payoff agreements, and that the firm solicited rigged bids for insurance contracts."[11]

Apparently, the accused insurance brokers collected compensation for steering business to their insurance company partners, and some even solicited fake bids, which deceived their customers into thinking that true competition had taken place.

Major insurance companies in the U.S. were named in the complaint as participants in steering and bid rigging. The immediate victims of the illegal practices were the brokers' customers.

[10] An interesting early case of corruption in auctions is Goethe's dealing with his publisher Vieweg concerning one of his publications. Eager to know the true value of his manuscript, Goethe designed a clever scheme. He handed over a sealed note containing his reservation price to his legal Counsel Böttiger. At the same time he asked Vieweg to make a bid and send it to Böttiger, promising publication rights if and only if the bid is at or above Goethe's reserve price, in which case Vieweg would have to pay Goethe's reserve price (Moldovanu and Tietzel, 1998). However, Böttiger was not reliable. He opened Goethe's envelope, and maliciously informed Vieweg about its content, before he made his bid. Not surprisingly, Vieweg's bid was exactly equal to Goethe's reserve price, and thus Goethe failed to find out how much his writings are valued by his publisher.

[11] *The Economist*, "Just how rotten?", Oct. 21, 2004.

In many procurements of goods and services a bid has many dimensions. Apart from price different quality characteristics matter and require judgment. In these cases the typical procedure is the "Quality-and-Cost-Based Selection" (QCBS). There, bidders are asked to submit two bids in two separate sealed envelopes: one specifying the price ("financial proposal") and the other specifying the product or service to be delivered ("technical proposal"). The technical proposal is then reviewed by an evaluation committee that assigns quality scores without knowing the financial proposal. The financial proposals remain sealed and deposited with a public auditor or independent authority until they are opened publicly, after all technical proposals have been evaluated, and then price and quality scores are aggregated using a pre-specified scoring rule. Finally, the bid with the highest aggregate score is selected.[12]

A typical scoring rule as it is used in practice is the following: each member of the evaluation committee rates the technical proposals on a score between 0 and 100; the *quality score* of the bid is then computed as the arithmetic mean of the individual evaluators' scores; in a second step, the financial proposals are opened and the quoted prices are transformed into relative *price scores*, according to the following formula,

$$\text{price score} = 100 \cdot \frac{\text{smallest submitted price}}{\text{submitted price}}.$$

Thus, the cheapest proposal gets a price score of 100; all other bids get a smaller price score. Finally, quality and price scores are combined into a total score using a convex linear combination of the two, for example by giving 80% weight to quality and 20% to price, as in the following formula:

$$\text{total score} = 80\% \cdot \text{quality score} + 20\% \cdot \text{price score}.$$

Finally, the proposal with the highest total score is selected.[13] The winner is typically paid the price he requested in his financial proposal; alternatively, the winner may be paid the highest price he could have quoted while still winning the auction (generalized Vickrey pricing rule).

In dealing with the corruption problem, first we need to take care of the bid rigging, as discussed in the previous sections. This is relevant here both with respect to the financial and the technical proposal. Note that the use of an open auction (Practical Conclusion 2),

[12] The terms employed here are used in the *World Bank Guidelines* which offer a good example for a set of well-thought out procurement rules for goods and services. See The World Bank (2004a,b), and for similar rules The Asian Development Bank (2002).

[13] This rule differs considerably from the standard model of scoring auctions in the economics literature (Che, 1993, Asker and Cantillon, 2004). That literature assumes that the procurer computes the total score of a proposal by estimating the value of the technical proposal and deducting the price quoted in the financial proposal. In practical applications it is, however, often impossible to compute the economic value of the technical proposal. This has lead to the adoption of somewhat problematic scoring rules like the one described in the text (see Wolfstetter, 2006).

is generally not applicable to the technical proposal because that bid is typically a complex document rather than a single number. Therefore, the technical proposal has to be an electronically secure sealed-bid auction (Practical Conclusion 3), as explained above.

For the financial proposal one has more options. One can either also use the same electronic bid submission system with a secure logbook or use an open auction format. An open decreasing-price bid auction should take place after the technical proposals are evaluated and the quality scores are published. The best way to run it is a clock auction in wich, however, the usual price clock is replaced by a score clock. Given his quality score, each bidder can then compute the price that corresponds to a given score.

Practical Conclusion 4. Make the technical proposals tamper-proof by using an electronic bid submission system with a secure logbook. Make the financial proposals either in the same form or use an open score clock format, where price bidding takes place after all technical proposals have been evaluated.[14]

Even after bids have been made tamper-proof, corruption may still be an issue in the evaluation of technical proposals. Bidders may attempt to bribe members of the evaluation committee in exchange for biased quality scores. Having bribed one or more evaluators allows the bidder to ask for a higher price.

We believe that there is no perfect remedy for this problem. Yet, there are ways to make this type of corruption more difficult, more costly, or more risky for the involved parties.

One way is to reduce the weight of quality to account for the fact that the quality signal is less reliable due to the possibility of manipulation.[15] Another way is to draw evaluators at random from a large pool after bids have been submitted. This decreases the influence of a single member of the pool of evaluators and thus makes it more costly for bidders to "buy" a good quality assessment.

Practical Conclusion 5. If possible, draw evaluators at random from a large pool of potential evaluators *after* bids have been submitted. Of course, one should always make sure that evaluators are not in conflict with past or present obligations with any bidder.

One should also analyze the distribution of quality scores in order to detect bias in the assessment of individual evaluators. If evaluators agree on a quality ranking it is unlikely that an evaluator has been bribed.[16] If an evaluator has been bribed he will submit an

[14]For example, the World Bank permits electronic bid submission but insists that "… the system is secure, maintains the confidentiality and authenticity of proposals submitted, uses an electronic signature system … and only allows proposals to be opened with due simultaneous electronic authorization of the consultant and the Borrower" (The World Bank, 2004b, p. 21).

[15]This has been suggested by Burguet and Che (2004).

[16]It could of course mean that all evaluators have been bribed by the same bidder, but this would be hard to detect unless one can observe the transfer of bribes.

assessment that is biased in favor of his client. In principle, such a bias could be detected with statistical test. However, in practice, the power of such a test will be weak because the number of evaluators is typically small.

There is a simple way in which the effect of such outliers can be reduced. It is usual to compute the quality score as the simple average of the assessments of the individual evaluators. Simple means that each evaluator's score is given the same weight. Yet, we would like to give less or even no weight to outliers.

One can do this by using a *trimmed mean* instead. The x%-trimmed mean is the mean calculated after removing the top x% of the observations from the top and bottom of data sets.[17] For instance, a simple implementation of this idea would be to remove, for each proposal, the highest and the lowest quality score over all evaluators, and then compute the mean of the remaining evaluators.

Going one step further, one can compute the *median* of the quality scores of all evaluators. The median is the quality score of the evaluator who is "in the middle": one half of the evaluators rate the proposal higher, the other half rate it lower than the median evaluator. Unlike the mean, the median is not affected by outliers. An extreme evaluation by a single, biased evaluator (possible because he has been bribed) has no effect on the median score.

Table 1 illustrates the effect of this alternative aggregation method. There are three proposals and seven evaluators. The evaluators cannot measure the objective quality of the proposals precisely, so their quality scores are not perfectly precise. We simulate this by adding some noise when simulating the evaluators' quality scores.[18] As we can see from the true quality scores, proposal A has the highest quality. It is also the most expensive, but according to the scoring rule, it is this proposal that should be chosen. Proposal B is of somewhat lower quality but is also cheaper. According to the scoring rule, it comes in second. In the example, evaluator 1 has been bribed by the suppliers of proposal B: he inflates his quality score for proposal B, and biases his quality score against the strongest competitor, proposal A, in an attempt to turn the decision in favor of B.

The average quality scores of the three proposals, using simple averages over all seven evaluators, are 56.1 for A, 58.1 for B, and 48.4 for C, respectively. The total scores are 56.9, 60.0, and 58.7, respectively, so that proposal B is chosen. Evaluator 1's bias has tipped the balance away from the better choice A. If, however, the aggregate quality score would have been evaluated using the median instead of the mean, evaluator 1 would not have been able to make a difference, as can be seen from the table. In this case, the aggregate quality scores are 58.0, 53.0, and 45.0, respectively, and proposal A wins with a total score of 58.4 against 55.9 for proposal B.

We have estimated the robustness of this finding with a Monte-Carlo simulation.[19] We

[17] Bryan and Cecchetti (1994) have used this idea to compute inflation rates that are less affected by extreme price fluctuations of single commodities.

[18] Specifically, we add normally distributed noise to the evaluators' quality scores, plus some bias in evaluators' scoring, while truncating scores to $[0, 100]$.

[19] We ran 10,000 draws using R. B. Myerson's SimTools utility, see `http://home.uchicago.edu/`

Table 1: Mean vs. Median Aggregation in Scoring Auctions

proposal	*A*	*B*	*C*
price	45	40	27
price score	60.0	67.5	100.0
true quality score	60	55	45
true total score	**60.0**	57.5	56.0
quality score evaluator 1	46	75	44
2	53	53	45
3	65	48	58
4	59	64	63
5	58	49	50
6	60	67	42
7	52	51	37
result using mean aggregation			
quality score	56.1	58.1	48.4
total score	56.9	**60.0**	58.7
result using median aggregation			
quality score	58.0	53.0	45.0
total score	**58.4**	55.9	56.0

find that, with the particular parameters we have chosen, the aggregation of the quality scores using simple means correctly selects proposal A only with 23% probability. This probability increases to 47% if the median is used instead.[20] However, the flip side is that median aggregation also chooses the least attractive proposal *C* with higher probability, which is of course undesirable.[21]

Practical Conclusion 6. In scoring auctions, consider using the median of the evaluators' quality scores instead of the usual mean.

Even if a statistical test is not available, inspection of the scores in Table 1 makes evaluator 1 appear suspicious. In such circumstances, one obvious course of action is to start an investigation. Independently, one should ask for a second opinion from a separate team of evaluators. An investigation could involve questioning the evaluators and possibly checking their recent bank transactions. Once an evaluator has aroused suspicion

`~rmyerson/addins.htm`. The worksheet that contains the specification of evaluators' bias and the assumed random errors is available for download from our websites.

[20] One caveat is in order here: we do not model the strategic aspects of the evaluators' assessments. A corrupt evaluator may behave differently depending in whether the mean or the median is used for computing the quality score. What remains true, nonetheless, is that the median is much less affected by extreme points of view. Because corrupt evaluators are more likely to make extreme (i.e. biased) assessments, using the median reduces the power of corrupt evaluators, and thus decreases the bidders' willingness to pay for corruption.

[21] Mean aggregation selects project *C* with 4% and median aggregation with 10% probability.

he should be blacklisted. Moreover, second-opinions should be routinely solicited at random even if there is no indication of a bias. Of course, this policy should be advertised to all involved parties as a deterrent.

Practical Conclusion 7. Inspect the individual quality scores and check for indications of an outlier. If manipulation is suspected, consider soliciting a second opinion or initiating a criminal investigation. It is also advisable to make this policy known to all involved parties before the auction takes place, as a deterring device.

Apparently some agencies do not record the scores of individual evaluators and their evaluation committees report only their average score. Evidently, this hides important information, which is not advisable.

4 THE SPECIAL CASE OF OBJECTIVE QUALITY MEASURES

In some rare cases, the relevant quality is readily measurable without complex evaluation. In these cases one can execute a scoring auction essentially in the same manner as a standard one dimensional auction, where bidding in scores takes the place of price, and all the issues and advice we gave in Sect. 2 apply with some slight reinterpretation.

A case in point is the so called "A+B Bidding" procedure employed by Federal and State Highway Administrations in the U.S. in their selection of contractors for highway repair work.[22] There, a major quality concern is the duration of construction work, which causes costly traffic delays.

"A+B Bidding" requires bidders to submit a financial proposal (estimated cost) and a time completion estimate, and uses the following linear scoring rule

$$\text{total cost score} = \text{estimated cost} + \text{time completion estimate} \times \text{time unit cost},$$

based on a stipulated completion time unit, and then awards the contract to the proposal with the lowest totals cost score.[23]

In such an auction bidding can be viewed (and could actually be implemented) as a one dimensional auction, where each bidder submits a score, the lowest score bid wins, with the understanding that the winner is free to select his preferred combination of cost and time for completion as long as it delivers the promised total score. Of course, the bidding of scores can be either sealed-bid or an open-bid format. Manipulation of the quality assessment is not an issue, and therefore corruption can only take the form of bid rigging which we have discussed in Section 2.

[22] The U.S. Federal Highway Administration (FHWA) initiated this format already in 1990, and it is now widely and successfully used (see for example the performance evaluation by the State of Arizona (1999)).

[23] Of course, the rules also stipulate an incentive/disincentive for early/late completion of the construction job.

In QCBS based procurement one usually requires a short-list of a given size, typically six bidders, regardless of how many bidders have submitted their Expression of Interest.[24] This rigid requirement is made with the intention to assure transparency, fairness, and competition. However, it is often counterproductive because it brings low quality bidders into the bidding.

A low quality bidder is a bidder who has a low level of technical expertise and is unable to deliver a high quality product or service. If high quality bidders participate in the bidding, a low quality bidder has little or no chance of winning without corruption. Therefore, he is particularly inclined to bribe evaluators in exchange for a favorable quality assessment or for insider information concerning unspecified yet desired product characteristics. This is how low quality bidders may turn into "rotten apples," and thus rigid short-listing requirements may contribute to corrupt the procurement process.

A potential remedy for this problem is to keep the size of the short-list somewhat flexible, and allow a shorter short-list in the event when not enough high quality bidders have submitted their Expression of Interest.

Practical Conclusion 8. In QCBS procurement keep the size of the required short-list of bidders who are invited to submit their technical and financial proposals flexible. In that short-list you should not include bidders who are known or suspected of low quality, because they are most likely to corrupt the procurement process.

Permitting some flexibility in choosing the size of the evaluation committee runs counter the philosophy that is currently prevalent at the EC and various international agencies. They firmly believe in rigid prescriptions of competition as the best safeguard against corruption. However, practical experience suggests that these very rules often open the door to bidders who are particularly prone to corruption.

Of course, the following precaution should be taken.

Practical Conclusion 9. The short-list should not be prepared by those who serve later as evaluators of technical proposals. Otherwise, evaluators may be tempted to include "rotten apples" with the expectation that these will most likely offer bribes to them.

Efforts to curb corruption have been increased in recent years, due to new legislation that makes companies liable for bribes paid by their branches and affiliates and also for bribes paid to third parties. Another important milestone is the U.S. Foreign Corrupt Practices Act (FCPA) that was passed by the Congress in 1977 and later ratified by several other countries. That act prescribes the prosecution of companies involved in corrupt practices in and outside their home country.[25] In the past many countries permitted their national

[24] See for example the short-listing requirements of the European Community, The World Bank, and the Asian Development Bank.

[25] See `http://www.state.gov/p/inl/rls/rpt/c6698.htm`.

firms to tax deduct bribes paid abroad as business expenses. In view of this practice the proliferation of legislation like the FCPA is an important change of direction.

Finally, we mention that corruption often extends to the time after the contract has been awarded, during the execution of the job. There, corruption takes the form of granting the contractor generous change orders that inflate the price above the level stated in the original financial proposal. The door for this kind of corruption is generally wide open if the Terms of Reference that state the technical specifications and cost estimate are imprecise. Therefore, one should always insist on a carefully worked out and detailed Terms of Reference.

Practical Conclusion 10. Make sure that the Terms of Reference for the technical proposal are well researched and worked out in detail. Consider setting up a review process for all change orders that may be requested by the contractor during the contract execution. Without these precautions the door is open for excessive change orders and subsequent cost overruns.

Of course, the need for change orders can never be ruled out altogether. Depending upon the nature of the procured good or service, it is more or less common that the contractor's tasks must be adjusted to unforeseen events.[26] Therefore, the relationship between contractor and procurer needs constant governance.

6 BIBLIOGRAPHIC NOTES

The theoretical literature views corruption in auctions as a manipulation of the quality assessment in complex bids or as bid rigging. And it distinguishes between corruption based on a predetermined relationship between the procurer and a favored bidder and on an endogenous selection of the favored bidder.

The first theoretical contribution is probably by Laffont and Tirole (1991). They assume that the auctioneer has some leeway in assessing complex multidimensional bids, and is predisposed to favor a given bidder. That framework was later adopted and extended by several authors (for example Celantani and Ganuza (2002) and Burguet and Che (2004)).

A second branch of the literature considers a particular form of bid rigging, in which the auctioneer grants a "right of first refusal" to a favored bidder. This right gives the favored bidder the option to match the highest bid and win the auction (see, for example Burguet and Perry (2003), Arozamena and Weinschelbaum (2004), and Koc and Neilson (2005)). This scheme implies that *all* bidders know about the corruption, and thus entails a large risk of detection. An auctioneer who cares about the risk of detection should consider proposing corruption only to a small set of bidders.

[26] Change orders are particularly frequent in construction and in engineering and architectural services. For an interesting case study of private sector building contracts in Northern California see Bajari, McMillan, and Tadelis (2002).

This takes us to the third branch of the literature which assumes that bid rigging is arranged by the auctioneer after he has observed all the bids. This allows him to approach only a minimum number of bidders, and select the bidder(s) whose collaboration delivers the highest profit (see Lengwiler and Wolfstetter, 2005, Menezes and Monteiro, 2003). Another paper on bid rigging by Compte, Lambert-Mogiliansky, and Verdier (2005) assumes that bribes cannot exceed a small upper bound. This is meaningful in some contexts; however, bribes are often accepted only if they are sufficiently high to compensate for the risk of detection and punishment.

The practical problems of fighting corruption in procurement are documented in many publications by international agencies such as The World Bank, The Asian Development Bank, the WTO, and the European Community (see for example Aguilar, Gill, and Pino (2000) and Trepte (2004, Ch.6)). Awareness of corruption and efforts to curb it — ranging from hot-lines and rewards for "whizzle blowers," to blacklisting of contractors who were caught in corruption, and staff rotation — have increased both in the private and in the public sector. An interesting collection of case studies drawn from private and public sector experience, including an account of the remarkable case of the reform of the public sector in Singapore by Lee (1999), is in Stapenhurst and Kpundeh (1999) and Arvis and Berenbeim (2003).

References

Aguilar, M., J. Gill, and L. Pino (2000): *Preventing Fraud and Corruption in World Bank Projects. A Guide for Staff*. The World Bank, Washington, D. C.

Arozamena, L., and F. Weinschelbaum (2004): "The Effect of Corruption on Bidding Behavior in First-Price Auctions," Discussion paper, Universidad de San Andrés.

Arvis, J.-F., and R. Berenbeim (2003): *Figthing Corruption in East Asia: Solutions from the Private Sector*. The World Bank, Washington, D. C.

Asker, J., and E. Cantillon (2004): "Properties of Scoring Auctions," Working paper, Harvard Business School.

Bajari, P., R. McMillan, and S. Tadelis (2002): "Auctions vs. Negotiations in Procurement: An Empirical Analysis," Working paper, Department of Economics, Stanford University.

Bikhchandani, S., S. A. Lippman, and R. Ryan (2005): "On the Right-of-First-Refusal," *Advances in Theoretical Economics*, 5, 1–42.

Bryan, M. F., and S. G. Cecchetti (1994): "Measuring Core Inflation," in *Monetary Policy*, ed. by N. G. Mankiw, pp. 195–215. University of Chicago Press, Chicago.

Burguet, R., and Y.-K. Che (2004): "Competitive Procurement with Corruption," *Rand Journal of Economics*, 35, 50–68.

Burguet, R., and M. Perry (2003): "Bribery and Favoritism by Auctioneers in Sealed-Bid Auctions," Discussion paper, Institute of Economic Analysis, UAB, Barcelona.

Celantani, M., and J.-J. Ganuza (2002): "Corruption and Competition in Procurement," *European Economic Review*, 46, 1273–1303.

Che, Y.-K. (1993): "Design competition through multidimensional auctions," *Rand Journal of Economics*, 4, 669–680.

Compte, O., A. Lambert-Mogiliansky, and T. Verdier (2005): "Corruption and Competition in Public Market Auctions," *Rand Journal of Economics*, 35, (forthcoming).

Kaufmann, D. (2005): "Six Questions on the Cost of Corruption with World Bank Institute Global Governance Director Daniel Kaufmann," in *News-The World Bank, 2005*. Washington, D. C.

Koc, S., and W. Neilson (2005): "Bribing the Auctioneer in First-Price Sealed-Bid Auctions," Discussion paper, Texas A&M University.

Laffont, J.-J., and J. Tirole (1991): "Auction design and favoritism," *International Journal of Industrial Organization*, 9, 9–42.

Lee, T. A. (1999): "The Experience of Singapore in Combating Corruption," in *Curbing Corruption. Toward a Model for Building National Integrity*, ed. by R. Stapenhurst, and S. Kpundeh, pp. 59–66. Economic Development Institute of The World Bank, Washington, D. C.

Lengwiler, Y., and E. Wolfstetter (2005): "Bid Rigging. An Analysis of Corruption in Auctions," Discussion paper, Humboldt-University at Berlin.

Menezes, F., and P. Monteiro (2003): "Corruption and Auctions," Discussion paper, Australian National University.

Moldovanu, B., and M. Tietzel (1998): "Goethe's Second-Price Auction," *Journal of Political Economy*, 106, 854–859.

Smith, A. (1776): *The Wealth of Nations*. Cannan Edition, Modern Library, New York, 1937.

Stapenhurst, R., and S. J. Kpundeh (eds.) (1999): *Curbing Corruption. Toward a Model for Building National Integrity*. EDI Development Studies, The World Bank, Washington, D. C.

State of Arizona (1999): "Arizona Department of Transportation A+B Bidding, Performance Audit," Discussion Paper Report No. 99-22, Office of the Auditor General.

The Asian Development Bank (2002): *Handbook for Users of Consulting Services: Procedures and Practices*. Asian Development Bank, Manila.

THE WORLD BANK (2004a): *Guidelines: Procurement of Goods and Services by World Bank Borrowers*. The International Bank for Reconstruction and Development. The World Bank, Washington, D. C.

——— (2004b): *Guidelines: Selection and Employment of Consultants by World Bank Borrowers*. The International Bank for Reconstruction and Development. The World Bank, Washington, D. C.

TREPTE, P. (2004): *Regulating Procurement*. Oxford University Press.

WOLFSTETTER, E. (2006): "Procurement of Goods and Services. Scope and Government," in *Corporate Governance, Firm Performance, and Economic Growth*, ed. by Q. Su, and X. Li. Economic Science Press, Bejing.