

# Incentives and Award Procedures: Competitive Tendering vs. Negotiations in Procurement\*

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## Abstract

Should the buyer of a customized good use competitive bidding or negotiation to select a contractor? To shed light on this question, we offer a framework that first describes the buyer's choice of contracts, and then links this choice to the selection of competitive tendering or negotiations. The analysis suggests a number of possible limitations to the use of competitive tendering. These may perform poorly when projects are complex, contractual design is incomplete and there are few available bidders. Furthermore, competitive tendering may stifle communication between buyers and sellers, preventing the buyer from utilizing the contractor's expertise when designing the project. Implications of these results for procurement in the private and public sector are discussed.

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# 1 Introduction

Manufactured goods, such as computers, TVs and automobiles are mass produced, have standardized characteristics and are typically purchased at list price. Other goods, such as new buildings, fighter jets, custom software or consulting services are tailored to fit a procurer's specific and often unique needs. To procure these customized goods, the procurer hires a contractor who supplies the good according to a set of desired specifications. We call this the *procurement problem*.

The procurement problem has attracted much attention both in policy and in academic circles. The main focus of academic economists has been on procurement by the public sector, in part because of its sheer importance to the economy.<sup>1</sup> For example, procurement by federal, state and local government accounts for more than 10 percent of Gross Domestic Product in the United States. Many private sector transactions are also governed by procurement contracts. Prominent examples include electronics components, custom software, automobile production, and building construction.

When considering the procurement of goods and services, the procurer is faced with many challenges. First, she has to choose what exactly should be procured, and how to transmit her needs to the potential suppliers. Second, a contract must be laid out that includes contractual obligations and methods of compensation. Third, the procurer needs to decide how to award the procurement contract between the potential suppliers. Finally, the award mechanism should result in the selection of a qualified and desirable supplier and in the implementation of a cost-effective final product.

Following up on these last two points, competitive tendering is widely recognized as an attractive procurement mechanism and is commonly advocated for several reasons.<sup>2</sup> Most notably it is viewed as a procedure that stimulates and promotes competition. By its nature, open competitive tendering invites potential suppliers from many venues. Furthermore, in the face of competition from many potential suppliers each one has strong incentives not to inflate his price. Indeed, fair market price discovery is often touted as a beneficial result of such tendering. Open competitive mechanisms are also known for their transparency, making it easier to prevent corruption both in the public and private sectors where procurement managers may have incentives to rig the system

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<sup>1</sup>See also Chapter 1 AND 3 for more facts on procurement in practice.

<sup>2</sup>There has been a flurry of managerial and policy advice on using "reverse auctions" or "online reverse auctions" as these are referred to when online platforms are used. A search on the web of "reverse auction" will offer too many sites to mention.

in return for bribes and other benefits. These characteristics, as well as arguments for equal opportunity, provide a justification for statutes such as the Federal Acquisition Regulations (FARs) that strongly favor the use of competitive tendering in the U.S. public sector.

Interestingly, there is widespread use of *both* competitive tendering and negotiations in the private sector. For example, from 1995 to 2000, forty-four percent of private sector non-residential building construction projects in Northern California were procured using negotiations, while *only eighteen percent* were procured using open competitive tendering. The use of negotiations with single source suppliers is also common in high tech and software, and used for defence procurement as well. This Chapter offers a framework to compare competitive tendering with negotiations and relate these award mechanisms to the payment procedures chosen in the contract. In particular, it tries to shed light on when competitive tendering with fixed price contracts will be preferred to negotiating cost plus contracts, and when not.

To put this Chapter in perspective it is worth observing that most of the economic analysis describes the procurement problem as follows. The supplier has information about production costs that the procurer does not have. The procurer then has to consider clever ways to infer the suppliers costs, such as offering the supplier many potential projects to choose from, and having the supplier select the one that will be produced.<sup>3</sup>

In contrast, scholars and practitioners of engineering and construction management argue that the central problem in procurement is not that suppliers know so much more than procurers at the onset of the project, but that instead both procurers and suppliers share uncertainty about many important design changes that occur after the contract is signed and production begins. These changes are usually a consequence of design failures, unanticipated conditions, and changes in regulatory requirements.<sup>4</sup>

An illustrative example of the significance of ex post adaptation is the building of the Getty Center Art Museum in Los Angeles, which is a 24 acre, \$1 billion dollar facility that took over 8 years to construct (see Engineering News-Record 1994, 1997). The project design had to be changed due to site conditions that were hard to anticipate. The geology of the project included canyons, slide planes and earthquake fault lines, which posed numerous challenges for the team of architects and contractors. For instance,

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<sup>3</sup>For an excellent summary of this literature see Laffont and Tirole (1993). Analysis along these lines is the focus of Chapter 19 in this handbook.

<sup>4</sup>See Bartholomew (1998), Clough and Sears (1994), Hinze (1993) and Sweet (1994).

contractors “hit a slide” and unexpectedly moved 75,000 cubic yards of earth. More severely, in 1994 an earthquake struck. Cracks in the steel welds of the building’s frame caused the contractors to reassess the adequacy of the seismic design standards that were used. The project design had to be altered also due to the regulatory environment – 107 items had to be added to the building’s conditional use permit. These problems were very hard to predict, both for the procurer and the contractor. However, it seems reasonable that once problems arose, the contractor had superior information regarding the costs and methods to implement changes. A more recent and much more contentious example is the “big dig” in Boston, where 12,000 changes to more than 150 design and construction contracts have led to \$1.6 billion in cost overruns, much of which can be traced back to unsatisfactory design and site conditions that differed from expectations.<sup>5</sup>

These observations suggest that the procurement problem may indeed be primarily one of smoothing out or circumventing adaptations after the project begins rather than information revelation by the supplier before the project is selected. In this Chapter we argue that the form of contracts and award mechanisms can be tailored in a way to help mitigate this procurement problem. In particular, a trade-off between incentives to reduce cost and incentives to facilitate changes and share information will be the key force in our arguments of contractual choice.

We argue that simple projects, which we define as easy to design with little uncertainty about what needs to be produced, ought to be procured using fixed-price contracts, should be accompanied by high levels of design completeness (to prevent the need for adaptations), and are best awarded through competitive tendering. In contrast, complex projects, which we define as hard to design with large scope for surprises in the final configuration, ought to be procured using cost-plus contracts, should be accompanied by low levels of design completeness (implying a high chance that adaptations to the contract will be needed), and should be awarded through a negotiation with a reputable and qualified supplier.<sup>6</sup>

The intuition for our prescriptions stems from a tension between providing incentives

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<sup>5</sup>According to the Boston Globe, “About \$1.1 billion of that can be traced back to deficiencies in the designs, records show: \$357 million because contractors found different conditions than appeared on the designs, and \$737 million for labor and materials costs associated with incomplete designs.” Responsibility for these cost overruns is a subject of heated debate. See

[http://www.boston.com/news/specials/bechtel/part\\_1/](http://www.boston.com/news/specials/bechtel/part_1/)

<sup>6</sup>See the first part of Chapter 19 for further discussions on contracting choices and contract types. The focus there is more adequate for simple procurement settings (standardized goods and services) where contingencies can be foreseen and controlled within the contract.

to lower costs and avoiding costly and wasteful renegotiation that follows requests for changes. The strong incentives to reduce costs that are offered by fixed-price tendered contracts will lead the parties to the transaction to dissipate valuable surplus when changes need to be renegotiated. This efficiency loss will often be due to haggling over prices when there is true lock-in of the current supplier who wishes to use the need for changes to his advantage. Cost-plus contracts, in contrast, discourage cost-saving efforts but ease the process of renegotiating changes and adaptation to the contract's original requirements.<sup>7</sup>

We continue to argue that the choice of payment procedures, such as fixed price and cost plus contracts, is tied in with the follow-up decision that a procurer faces: whether to award a procurement contract by competitive tendering or by negotiating with a potential supplier.

While our research has been motivated by practices in the private sector, it offers implications for the public sector as well. In the U.S. the public sector statutes that govern procurement, typically based on FARs, strongly favor the use of competitive bidding. For example, from 1995 to 2000, ninety-seven percent of public sector building construction projects in Northern California were procured using competitive bidding. While competitive bidding does have the advantage of unbiased awarding of projects, it fails to respond optimally to ex post adaptation. This suggests that public procurement of complex projects are suffering from efficiency losses.

We begin our analysis in the next section with a simple framework to describe the procurer's choice of devising a contract that will govern the procurement relationship with a selected supplier. We then continue to describe how the contracts chosen will dictate the use of award mechanisms. We conclude with a discussion of implications for business strategy and public procurement.

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<sup>7</sup>In fact, Williamson expresses the idea that "low powered" incentives are good to accommodate adaptations and writes that "low powered incentives have well known adaptability advantages. That, after all, is what commends cost plus contracting. But, such advantages are not had without cost — which explains why cost plus contracting is embraced reluctantly." (1985 p.140). It turns out that in many cases cost plus contracting is indeed embraced.

## 2 The Contracting Framework

### 2.1 Contractual Components: Design and Incentives

In this section we discuss and analyze the precursor to awarding a contract: devising one. Consider a procurer who wishes to procure a project (good or service) from a supplier. To facilitate the procurement and get what he desires, the procurer must provide the supplier with plans and specifications that describe the project. This is the procurer's first dimension of contractual choice: how much *design costs* to invest at the onset, where more investment (and hence costs) in design creates a more detailed set of plans and specifications. Clearly, a more detailed and accurate design of a project reduces the need to renegotiate changes after the project starts taking shape.

It is often prohibitively expensive to draft a complete design that includes all the relevant blueprints and instructions that fully describe the project exactly as the procurer's needs dictate. That is, there is always a chance that a contingency will arise for which there are no instructions, or for which the blueprints are insufficient. This in turn implies that the plan as specified may not result in the successful completion of the project, and the procurer may not obtain the value he initially expected. We refer to this problem as *contractual incompleteness* because it is generally associated with the design and specifications not being a complete description of what ought to be done, and how the supplier should proceed in all future contingencies.<sup>8</sup>

The contractual incompleteness of the project will depend not only on how much investment in design was initially performed, but will also depend on how prone the type of project is to unforeseen changes. Such unforeseen changes can arise from technological or regulatory contingencies that are just too hard to predict or plan for, or alternatively too expensive to try and draft onto the design. To capture this idea we define the *complexity* of the project as how expensive it is to provide a rather complete set of plans and contingencies. The more complex a project is, the more expensive it will be to try and prevent contractual incompleteness. Thus, the procurer's first choice is how complete a design to invest in while being aware of the costs of design and the amount of uncontrollable events that can affect the project's progression.

The procurer's second dimension of contractual choice is the payment structure of the contract. Most procurement contracts are variants of simple fixed-price or cost-plus

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<sup>8</sup>The second part of Chapter 19 discusses the impact of non-contractible quality on the procurement problem.

contracts. In fixed price contracts, the procurer offers the supplier a pre-specified price for completing the project as specified, and any changes are negotiated separately at the stage in which they arise. A cost plus contract does not specify a price, but rather reimburses the contractor for costs (time and material) with an additional stipulated fee (the “plus”). In cost-plus contracts the costs of changes are automatically built into the original contract.<sup>9</sup>

## 2.2 The Costs and Benefits of Incentives

We are now in a position to highlight some trade-offs of using either payment structure. Let us start by ignoring first any changes to the original design, and assume that the project will be executed exactly as the design specifies. If a fixed-price contract is in place then the supplier bears all of the costs of providing the project. This, of course, implies that the supplier has strong incentives to lower the cost of production, and some of these would pass on to the procurer through competitive pressures (that we discuss more in the next section).

In contrast, if a cost-plus contract is in place then the supplier knows that any extra costs he incurs will be fully compensated for, and may even generate a small profit if the fee is based on a percentage of the costs. Thus, the supplier will have no incentives to reduce the costs of production, and no such costs savings can therefore be transferred to the procurer.

To set a benchmark imagine an idealized situation where the design and specification of the project leaves no room for contractual incompleteness. For example, imagine that all the contingencies and specifications of the project are completely clear and well documented, and performance per specifications is easy to verify upon delivery. For this idealized case the observations discussed earlier lead to an obvious conclusion:

**Practical Conclusion 1:** *If contractual incompleteness is negligible and if performance is easy to verify then favor fixed-price contracts.*

This simple observation is a direct consequence of the incentives provided by each of

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<sup>9</sup>An intermediate type of contract is an incentive contract (see, e.g., the discussion in section 2 of Bajari and Tadelis, 2001). These reimburse only a fraction of the total cost to the supplier and can sometimes include quality performance incentives. See Chapter 19 for a detailed description of the features and the advantages of such a contract.

the two payment structures.<sup>10</sup> When the only dimension of interest to the procurer is the cost, then clearly one wants to achieve the lowest possible cost, and this is achieved by providing the supplier with the strongest possible incentives to lower costs.

Notice, however, that two qualifications were stated in practical conclusion 1. The first qualification is that contractual incompleteness is negligible. This means that the procurer can avoid the need to ask for any changes or modifications after the project commences, and no redrafting or renegotiating will be needed to complete the project according to the procurer's needs. The second qualification is that performance is easy to verify. This means that the procurer can easily detect any departures from the design and specification as well as any shortfalls that deviate from the specified requirements. Furthermore, the fact that performance can be verified means that any such deviations from the design and specifications can be used as a hold on payments to the supplier. This guarantees that if the supplier wishes to receive payment, he must satisfy all the requirements that meet the procurer's needs.

Now imagine that the second qualification is violated. For example, there may be performance dimensions that can either not be detected by the procurer or even if detected, can not be used as a reason to hold back payments because third parties such as courts or arbitrators cannot verify them. If, furthermore, the supplier can save costs by cutting back on these performance dimensions, then it is quite obvious that providing the supplier with cost-cutting incentives will create a tension. Namely, by shaving back on certain areas of performance for which contractual ramifications cannot be enforced, the supplier can save on costs and increase his profits. This suggests the following:

**Practical Conclusion 2:** *If it is impossible or extremely costly to contractually verify important performance measures, and if the contractor can save on costs by cutting back on these performance dimensions, then favor cost-plus contracts.*

Practical Conclusion 2 resonates with the old saying of “you get what you pay for”.<sup>11</sup> If the supplier is bound to a fixed price contract he will, as mentioned earlier, have strong incentives to cut on costs. When cutting corners is one way to achieve costs savings, then it better be easy to deter such behavior if the procurer is harmed by it. This simple

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<sup>10</sup>This result, in fact, resurfaces in Chapter 19. Indeed, it is a rather obvious and intuitive conclusion that one would expect from a variety of approaches to this problem.

<sup>11</sup>This issue was broadly discussed in Kerr (1975) and analyzed more completely and carefully by Holmstrom and Milgrom (1991) and Baker (1992). Again, it resurfaces in the first part of Chapter 19, that allows for a more flexible range of cost incentives.

observation is often recognized by practitioners, but when ignored, can lead to extremely undesirable outcomes. Thus, cost-plus contracts have merits by inhibiting a supplier's incentives to cut costs by cutting back on important, yet hard to monitor performance dimensions.

It turns out that cost-plus contracts have another appealing feature, which has been recognized at least by some scholars and practitioners in the area of construction management: facilitating changes and modifications to the original designs and specifications.<sup>12</sup> For example, the most common sources of changes in building construction are defective plans and specifications, changes in project scope and differing conditions than expected at the site of construction. In other words, *contractual incompleteness* will often lead to the need for renegotiating the original specifications of the project.

Conventional wisdom in the industry is that cost plus contracts are better suited to facilitate such change and to reduce the amount of adversarial relations and frictions between the procurer and the supplier when such changes are required. To see why, imagine a situation where at some advanced stage of the project's development it turned out that the plans and specifications are defective, or lacking some directive for an unforeseen issue that arises.

Consider the effects of having a fixed price contract in place when the procurer asks the supplier to adopt some changes to the original plan. The original plans and fixed price compensation take the form of a specific-performance contract that binds the supplier to the original plans and does not oblige him to agree to the changes proposed by the procurer. Thus, the procurer will have to negotiate any changes with the supplier. The procurer's objective is to get the changes done in the most cost effective way according to his needs while the supplier wishes to make as high a profit as he can from the potential windfall. The supplier would like to take advantage of this situation since he is in a unique position of being able to hold up the procurer as a consequence of being in the midst of the project, and has no competitive pressure to discipline his behavior. Knowing this, the procurer may expect to be overcharged and the two parties are likely to engage in contentious adversarial negotiations.

Alternatively, consider the effects of having a cost plus contract in place when the procurer asks the supplier to adopt some changes to the original plan. Unlike the specific-performance nature of a fixed price contract, a cost plus contract effectively has a built

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<sup>12</sup>See Ibbs et al. (1986) who quantify the impact of 96 different contract clauses on project performance in building construction by surveying buyers and contractors for 36 building construction projects. They claim to verify aspects of cost plus and fixed price contracting that are discussed below.

in mechanism to compensate the supplier for any changes that are required. Namely, any additional costs that the supplier incurs are automatically compensated for through the cost-plus structure.<sup>13</sup> In other words, the lack of cost-reducing incentives serves as a lubricant for smooth and cooperative implementation of changes when contractual incompleteness gives rise to the need for changes. Thus, we can conclude:

**Practical Conclusion 3:** *If contractual incompleteness is anticipated and the need for flexibility to implement changes is foreseen then favor cost-plus contracts.*

We can now conclude this section with a recommendation that follows from the trade-offs identified above such that a procurer can follow before making the two contractual choices of investing in design and choosing a compensation structure. Recall that a project is said to be *complex* if the procurer anticipates it to be difficult to describe, specify and monitor, so that a rather complete design will be exceptionally costly to provide (or maybe even impossible). In contrast, a project is *simple* if it is easy and rather inexpensive to design and it is straightforward to predict and monitor performance. Since the costs of design and engineering efforts are an integral part of the total project costs we can conclude our recommendations as follows:

**Practical Conclusion 4:** *For simple projects favor a complete investment in design and specification followed by a fixed-price contract, while for complex projects favor a low investment in design followed by a cost-plus contract.*

It is worth explaining the reason for favoring savings on design for complex projects. At first it may seem that complex projects would require an extra effort in trying to provide more details into the design. However, the complexity of such projects implies that many changes are expected even if design efforts are high. Thus, if a cost-plus contract is in place to deal with such changes, the added benefits of extra design efforts are small. This follows because it will not be too costly to implement changes in the aftermath of unforeseen issues, which makes the benefits of a more complete design less pronounced. A caveat is that one would wish to avoid changes that will completely

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<sup>13</sup>Furthermore, if the fee is a percentage fee then implementing costly changes includes a small increase to compensate the contractor for any opportunity costs of extra time and potential overhead. This, of course, adds the risk that the contractor has incentives to increase costs and get a higher fee, which favors fixed-fees. With fixed fees the procurer and contractor may need to bargain over a fair fee for the opportunity costs of time, but this is typically a fraction of the labor and material costs of change over which no bargaining is needed with a cost-plus contract.

disrupt the projects production plan and cause expensive changes to the infrastructure as it develops. Thus, some initial investment in planning will be necessary to predict how complete the design ought to be to at least set the stage for proceeding with the project.

Now that we have set up the contractual framework and offered some insights about the trade-offs facing our procurer in designing the contract's structure, we proceed to explore the connection between the contract's structure and the award mechanisms that the procurer can choose.

### 3 Competitive Tendering vs. Negotiations

We proceed to argue that the choice of a contract's payment structure should be tied to the choice of award mechanism, namely, the choice between a process of competitive tendering and a negotiation with a selected supplier. To set the stage, recall the many known benefits of competitive tendering. First, it promotes competition among potential suppliers. Second, it offers a kind of transparency that helps mitigate favoritism and corruption. The question is then, what is the object over which bids are solicited and what form should these bids take?

Consider our contractual framework and imagine that a simple project is at stake where our procurer follows Practical Conclusion 4 and chooses to invest in a rather complete design that is accompanied by a fixed-price contract. This implies that our procurer is in a position to give a very detailed description of the project to potential suppliers, and all the procurer wishes to receive in return is a single price that will be paid once the project is completed according to the plans and specifications. In this situation a competitive tendering mechanism will offer the procurer all its benefits. Suppliers will have to compete their surplus away, and the procurer is getting exactly what he wants: a well defined project at the lowest possible price. If the procurer instead chooses to negotiate a price with a single supplier, the competitive pressure is weak and the procurer will not achieve all the possible cost-savings that he can. Therefore we conclude:

**Practical Conclusion 5:** *For simple well specified projects favor a fixed-price contract to be awarded by a competitive tender.*

Now turn to the other case of a complex project with an incomplete design and which the procurer plans to award using a cost-plus contract. As most practitioners would

readily agree, “[a] cost-plus contract does not lend itself well to competitive bidding,” and in the area of construction management, “[m]ost negotiated contracts are of the cost-plus-fee type.”<sup>14</sup>

To try and implement a competitive tender for a cost-plus contract one might suggest that bidders can bid over the “plus” portion of the compensation. In this way the procurer can choose the supplier who requests the lowest compensation for his management, and the production costs of labor and material will be automatically paid for through the cost-plus structure. However, as the “plus” is often only a small fraction of the costs, this can be quite a disastrous way to select a contractor for what is in essence a challenging and complex project.

To see this we begin by considering what will determine a supplier’s desired compensation when bidding for a contract. Clearly, a supplier will not wish to settle for less than he could obtain in some alternative job. If, as one would imagine, more cost efficient and able suppliers have better alternative opportunities, then their bid for a fee in a cost-plus contract will be higher than less able and cost efficient suppliers. This argument implies that is the *highest cost and least able* supplier who will win such a competitive tender for a cost-plus fee. Furthermore, if complex projects that are tied to cost plus contracts require suppliers that have more expertise, then hiring the least able supplier can be devastating.

Instead of using a competitive tender the procurer can search the market for those able and reputable suppliers and choose one to negotiate with in order to set the fee for the cost-plus contract. In this way the procurer guarantees himself a qualified and able supplier. Furthermore, since the fee is expected to be a small fraction of the costs, the lack of competitive pressure on the supplier will not have a large effect on final costs. Therefore we conclude:

**Practical Conclusion 6:** *For complex and incompletely specified projects favor a cost-plus contract to be awarded using a negotiation with a reputable supplier.*

We have described a link between the choice of contractual payment structure and the way in which such contracts ought to be awarded. As it turns out, there is a complementary reason to favor negotiations with a reputable supplier over tendering when complex projects are to be awarded. Practitioners have recognized that competitive tendering stifles valuable coordination between the procurer and the potential supplier

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<sup>14</sup>These quotes are from Hinze ( p. 144) and Clough and Sears (p.10) respectively.

before the plans and specifications are finalized. To see this note that the primary information that the procurer receives from suppliers in a competitive tender is their bid. A supplier has no incentive to offer the procurer advice on how to improve the plans or avoid certain pitfalls. In fact, a supplier would have the incentive to keep any findings of this kind to himself as they offer him a competitive advantage over his rivals in a competitive tendering process.

For example, it is widely believed in the construction industry that when competitive tendering is used to award a fixed-price contract, the contractors strategically read the plans and specifications to determine where they will fail. Suppose that some contractor sees a flaw in the plans that will cause a change leading to \$1 million dollars of profits, and that the other contractors do not. Our savvy contractor will likely win the job since he would be willing to bid less than contractors who do not see the flaws in the plans. Competitive tendering may therefore leads to a problem of ex-ante opportunism that is more problematic when projects are complex. After he is awarded the project, the pitfalls he anticipated will materialize and he will be in a position to reap excessive profits from the required changes.

In negotiations, however, the procurer and supplier typically spend a good deal of time discussing the project before work begins. During such negotiations the procurer can elicit the supplier's views about where the designs and specifications can be improved, so that negotiations might be preferable to competitive tendering. The construction industry literature suggests that one merit of cost plus contracting and negotiation is that procurers and contractors spend more time discussing the project and ironing out possible pitfalls before work begins.<sup>15</sup> Thus, we conclude:

**Practical Conclusion 7:** *For complex projects for which the expertise and input of an experienced supplier is essential at the design stage, favor a cost-plus contract to be awarded using a negotiation with a reputable supplier.*

We conclude this section with some insights and recommendations for projects that are not clearly categorized as very simple or complex, and for which the choice of contract structure and award procedure is not obvious. First, consider the effects of market

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<sup>15</sup>As Sweet (1994) puts it, “[s]eparation of design and construction deprives the owner of contractor skill during the design process, such as sensitivity to the labor and materials markets, knowledge of construction techniques, and their advantages, disadvantages and costs. A contractor would also have the ability to evaluate the coherence and completeness of the design and, most important, the costs of any design proposed.”

conditions on the choice of contracts and award procedures. It is well known that the benefits from a competitive tender will generally depend on the number of qualified bidders who will participate. In particular, the more potential suppliers are available for bidding, the higher the benefits from promoting competition. We have:

**Practical Conclusion 8:** *For moderately complex projects that can be specified at moderate costs, if there is more potential competition then favor a more complete design and a fixed-price contract to be awarded using a competitive tender. If potential suppliers are scarce then save on design costs and favor a cost-plus contract negotiated with a qualified supplier.*

Finally, we consider the difference between an open competitive tender in which any supplier can submit a bid to the procedure of “invited bidders” in which only a handful of suppliers are invited to participate in the competitive tender. To analyze potential differences between these procedures consider the response of suppliers to a request for bids for a rather complex, but somewhat well specified project. Preparing the bid will be more challenging and costly the more complex and large the project is. If qualified suppliers expect that less qualified suppliers may try to compete and offer low bids, then this may deter the qualified suppliers from exerting the time and costs of preparing the bids.

Hence, a procurer may not be able to attract qualified suppliers if price competition is expected to be fierce. If the procurer can prevent less qualified suppliers from bidding and in this way restrict competition to guarantee a reasonable rate of return then the qualified suppliers will have incentives to invest in preparing these bids and compete.<sup>16</sup> Thus,

**Practical Conclusion 9:** *For moderately complex projects for which several qualified bidders exist, and for which preparing bids includes significant costs on the suppliers, favor a fixed price contract to be awarded by inviting a small number of qualified suppliers to a competitive tender.*

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<sup>16</sup>Ye (2006) investigates the problem of costly bidding, and how restricting the number of bidders may help the procurer.

## 4 Discussion

### 4.1 Lessons for Business Strategy

The widespread benefits offered by competitive tendering to set a project's price are well known: promoting competition and hampering corruption. We have shed some light, however, on some of the costs of using this popular mechanism. In fact, in a recent study of contracts awarded in the construction industry in Northern California<sup>17</sup> we have shown that in the private sector there is widespread use of negotiations. Specifically, more than 43% of over 4,000 private sector contracts between 1995 and 2000 were awarded using negotiations with a sole supplier, while only 18% were awarded using open competitive tendering (most of the rest were awarded using a select group of invited bidders). An analysis of the data suggests that the choices made are consistent with the trade-offs we have laid out in our analysis above.

As we have argued, there are two channels through which cost-plus contracts awarded through negotiations can be more attractive than fixed-price contracts awarded through competitive tendering. The first is the need for flexibility and changes to incompletely specified designs of complex projects. A response to this problem is choosing a cost-plus contract that cannot be competitively tendered in a sensible way. The second channel, which has been emphasized by some industry participants, is using the knowledge and experience of a contractor before the designs are complete and construction begins. As we have argued, if a project will be awarded using competitive bidding then a contractor has an incentive to hide information about possible design flaws, submit a low bid, and recoup profits when changes will be required.

The procurement problem we investigate is generally applicable, be that of an automobile manufacturer who needs to procure a braking system, an accounting firm who needs to procure information technology services, or a city government that needs to provide garbage collection and disposal services for its residents. This problem is also related to the “make-or-buy” problem of the organization of production, which is the choice of which activities to produce oneself, and which to outsource to an external supplier. If we consider the procurement of goods and services that are repeated over time, then we can view internal organization and self production as buying the time of employees and paying directly for the input materials, much like a sequence of cost-plus contracts (where the fee is not spent but absorbed as part of the organization's profits).

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<sup>17</sup>See Bajari, McMillan and Tadelis (2006).

Alternatively, outsourcing transactions for a predetermined price that depends on output performance.<sup>18</sup>

Our analysis suggests that for long term and steady provision, goods and services that are simple in our contractual framework should be outsourced with fixed-price contracts, while goods and services that are complex should be internally produced as if they are procured with a cost-plus contract. The benefits of internal production are also that the procurer retains control over the process, which may indeed be a valuable option when complex issues are at hand and direction and flexibility are needed throughout the process of production. Casual observation suggests that in many cases employees have directives that specify their work, but these are often verbal and not specified in a detailed contract. Outside contractors are subject to very detailed contracts and contractual compliance is measured vis-a-vis these formal specifications.

## 4.2 Lessons for Public Sector Policy

In the public sector, statutes such as the US FARs (and the many statutes that are modeled after the FARs) strongly favor the use of competitive bidding, and particularly open competitive bidding when feasible. For instance, in our study of the building construction industry in Northern California mentioned above, 97% of the projects awarded in the public sector were awarded using open competitive bidding as compared to only 18% in the private sector. As private sector firms are more sensitive to cost minimization, it is reasonable to conclude that their behavior is more responsive to optimal choices.

As mentioned above, competitive bidding is perceived to select the lowest cost bidder, prevent corruption and favoritism that are opposed to efficiency, and it offers a clear yardstick with which to compare offers. According to an Ohio Court, competitive bidding "...gives everyone an equal chance to bid, eliminates collusion, and saves taxpayers' money... It fosters honest competition in order to obtain the best work and supplies at the lowest possible price because taxpayers' money is being used. It is also necessary to guard against favoritism, impudence, extravagance, fraud and corruption."<sup>19</sup> This is the main rationale for requiring competitive tendering in the public sector.

Our results suggest that for complex projects, there is a downside to the use of fixed-price contracts awarded through competitive tendering and that selecting a contractor and negotiating with him may be the favorable course of action. This downside of open

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<sup>18</sup>See Chapter 16 on the design of repeat-purchase contracts.

<sup>19</sup>See Sweet (1994, p. 379).

competitive bidding can arise from a lack of input by contractors at the design stage, from the need to proceed quickly without the ability to complete detailed plans and specifications, and from the expectations that ex post haggling and frictions might occur when changes are needed. An important practical question for public procurement is whether one can design a set of objective rules for awarding negotiated contracts that minimize transaction costs, but that are not easily subject to manipulation, corruption, or blatant favoritism.<sup>20</sup>

Indeed, here has been mounting criticism of the LOGCAP contracts awarded to Haliburton by the US Army that were no-bid cost-plus contracts. Whistle-blowers who worked at Haliburton claimed that there was no incentive or process to reduce costs when possible, and that the motto at the time in the company was “Don’t worry about price, it’s cost-plus”.<sup>21</sup> The design of novel rules that on one hand allow the use of flexible-cost plus contracts while on the other hand offer some controls that reduce the possible scope of opportunistic behavior is beyond the scope of this article. That said, our analysis suggests that there may be large gains and savings of tax-payers’ money from designing and successfully implementing cost-plus negotiations in the public sector with better controls.

## 5 Bibliographical Notes

The analysis provided above is based primarily on Bajari and Tadelis (2001) and Bajari, McMillan and Tadelis (2006). The implications of how complexity of a process may affect the choice to outsource or self-produce is analyzed in Levin and Tadelis (2006) who apply their framework to procurement by local governments. An attempt to measure the transactions cost impact of changes to contracts in highway procurement was done by Bajari, Houghton and Tadelis (2006). Related to this agenda is a paper by McLeod and Chakravarty (2004) who show that current contracts use by the American Institute of Architects is helpful for the problem of procuring large, complex projects when unforeseen contingencies are inevitable. Corts and Singh (2004) show the relationship between contractual choice and project complexity in the face of repeat business. (Banerjee and Duflo (2000) offer some evidence that correlates the choice of cost-plus contracting with

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<sup>20</sup>See Chapter16 for more on corruption.

<sup>21</sup>This is documented in a letter from two members of congress, Henry A. Waxman and John D. Dingell to William H. Reed, Director of the Defense Contract Audit Agency. A copy currently exists at: [http://www.house.gov/reform/min/pdfs\\_108\\_2/pdfs\\_inves/pdf\\_admin\\_halliburton\\_contract\\_inves\\_feb\\_12\\_let.pdf](http://www.house.gov/reform/min/pdfs_108_2/pdfs_inves/pdf_admin_halliburton_contract_inves_feb_12_let.pdf)

reputable suppliers in the Indian software industry.

A classical analysis of competitive tendering versus negotiations was offered by Bulow and Klemperer (1996). They emphasize the competitive advantages of these procedures, and hence ignore the issues of adaptation due to changes. Manelli and Vincent (1996) introduce quality concerns, and show that sometimes competitive tendering will be dominated by sequential negotiations with suppliers. For a treatment of tendering contracts that are not fixed price contracts, see McAfee and McMillan (1986).

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