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Procurement Contracting Strategies

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Abstract

Quality and suppliers performance are essential for procurement. This Paper analyses these important issues from two perspectives. The first part deals with the topic of contracting. It describes the features of some common types of contracts that the buyer may choose according to the circumstances of the procurement. The central issue is how the procurer should choose and then design the contract to optimally balance the trade-off between incentives to limit the contractor's supply cost and the flexibility to ex-post adaptation to potential unforeseen events.

When important characteristics of the supply cannot be easily described in - and enforced within - the contract, the procurer must use other tools to ensure successful procurement. The second part of the Paper deals with this important problem, also known as non-contractible quality. The part provides indications about the methods the procurer may use to obtain adequate quality and customer satisfaction and illustrates which method seems to fit better in the specific procurement context.

Keywords: procurement, contracts, contractible and non-contractible quality.
Jel classification: H57, D81, K12, K40.

1 Introduction

Well designed supply contracts are essential to effective procurement.[1] By fixing obligations and promises, contracts protect each party in a procurement transaction against the risk of unexpected changes in the future behaviour of business partners, thereby allowing to safely and efficiently plan, invest, and produce in decentralized supply chains. Contract obligations ensure, for example, that a buyer will receive the right service or good when and as needed, as promised by her supplier; and that the supplier's investment specific to a particular procurement will not be 'wasted', in the sense that the buyer will indeed buy what she ordered at the agreed terms.

There are several types of contracts and very many dimensions along which apparently similar contracts differ, so that choosing the right contracting strategy is not always easy for a buyer. And a bad choice of contract can have very negative consequences for a buyer in terms of cost and quality of supply. However, economists and practitioners would agree on considering *contract flexibility,* the *incentives for quality and cost reduction,* and *the allocation of procurement risk* as the most important dimensions influencing the buyer's choice of the procurement contract.

In this Paper we offer simple and practical indications on how to choose among different types of procurement contracts. We focus on situations where the needs of the buyers are unlikely to change during the execution of the contract, so that renegotiation of the initial contract specifications, which is generally costly for the buyer, is unlikely to occur.[2] In these situations, contract flexibility plays a limited role in the choice of the procurement contract whilst incentives for quality and cost reduction as well as procurement risk allocation remain central. Also, we will discuss only briefly how the choice of the procurement contract can affect the characteristics of the suppliers that decide to participate in the procurement process.

The present Paper is organised as follows. In the first part we focus on *explicit contracts*; that is, on written and legally binding contracts that can be enforced by courts of law and therefore can govern dimensions of the procurement that can be monitored and verified by a court at a reasonable cost. Within this framework, in Section 2 we explain the importance of choosing the allocation of procurement risk and the relevance of creating incentives for quality provision and for cost reduction. In Section 3 we describe the features of the most frequently used contract types. We discuss how these contracts differ in the allocation of procurement risk and in the provision of incentives on cost and quality dimensions that are hard to contract upon explicitly. We also discuss the procurement context in which a contract type may work best. In the second part of the Paper we turn to *implicit contracts*. When important aspects of a procurement transaction are not verifiable by

third parties, implicit/relational agreements sustained by the threat of losing reputation and/or future business in case of non-compliance can be very effective in inducing the contractor to maintain promises and in general to respect the terms of the (implicit) agreement made with the buyer. In Section 4 we then discuss different types of implicit contracts and the procurement context in which they can be effective.

2. The choice of the procurement contract

2.1 The Role of Procurement Risk

Procurement risk refers to those events that may affect the realization of the contractual performance, and whose occurrence cannot be accurately *predicted* and *influenced* by contracting parties. In large and complex acquisitions, such as the construction of a new tunnel, risk may refer, among other things, to the discovery of a particularly resistant rock that needs a specifically designed drilling machine. In less complex procurements, such as the supply of milk to schools, risk may refer to late deliveries caused by bad weather conditions, or to the sudden increase in fuel price (that raises the actual delivery cost with respect to the level estimated by the contractor before the tendering process). Procurement risk affects actual production costs and it can affect the actual quality of the performance, be it on-time delivery of ink cartridges of laser printers rather than the brightness of paper for photocopiers. Most importantly, the buyer and the contractors care about 'extreme' events such as the risk of the contractor default that may disrupt the service altogether. The degree of fear of (procurement) risk, is also called *risk aversion*.[3]

In procurement contracts, it is unlikely that a contractor is able to immunize himself (say, through an insurance contract) against all unpredictable events. However, the breath and the nature of a contractor's activities may provide useful *proxies* for his ability to 'insure' himself against the vagaries of a specific procurement contract. Possible internal 'insurance policies' are thus provided by the value of the contract being only a tiny fraction of the contractor's turnover, a high degree of diversification of the contractor's activities, and, more generally, by the contractor's ease of access to the credit market.

The absolute capacity of each contracting party to bear the procurement risk is not, however, the most relevant factor for selecting the contractual form. What really matters is the contracting parties' *relative* attitude toward risk: other things being equal, efficient risk sharing calls for risk to lie with the party that is able to manage it best. The first relevant case then arises when the buyer is more concerned about risk than the suppliers. The second relevant case arises when the buyer and

the suppliers are both indifferent to risk. In this case, it is, in principle, efficient for the buyer to shift all the risk to the contractor to maximize the performance incentives. This objective can be pursued by selecting a contract in which the contractor endures the cost reducing activities, and thus bears most of the risk.

This Paper analyses the case in which the supplier is at least as concerned about risk as the buyer, as is frequently the case in procurement.[4] In this case, efficient risk sharing would call for the buyer to bear all the risk. As we shall see, though, this might have a negative impact on incentives.

2.2 The Role of incentives for cost reducing activities and quality provision

In procurement market for standardized goods/service, quality parameters can be measured at some cost. For instance, the relevant quality parameters of a laptop are the nature and type of the screen, processor, memory and external connection devices. Moreover, on–time delivery can be easily checked. Cleaning services for hospital rooms have, also, many verifiable quality dimensions. It is indeed easy to measure the bacterial concentration in the air and on the floor.

When quality is verifiable, it is always advisable to specify a quality standard in the contract, and then to impose penalties when quality falls below that standard and possibly bonuses when quality is above the standard. The penalty imposed must be such that it is convenient for the contractor to supply the quality promised at the selection stage rather than violate the contract and save money. Since suppliers may have different costs of reducing the quality agreed upon and since these costs are likely to be unknown to the buyer, establishing the level of penalty that induces the contractor to provide quality is not often an easy task. Also, in case of a dispute, too high penalties may not be enforced by the court, for instance because this may judge enforceable only reasonable damage actually suffered by the party.[5,6]

In procurement markets for non-standardized goods or services, such as clinical and educational services or complex infrastructures such as high-tech IT projects, there are dimensions of the exchange that cannot be explicitly considered in the contract even if they are observable by the contracting parties.[7] This occurs because these dimensions cannot be verified by third parties such as courts of law. The quality of the goods or service procured often comprises some unverifiable dimension.

In this Paper we shall consider both verifiable and thus contractible and non-verifiable and thus non-contractible quality and we shall discuss the incentive problem that arises because the contractor might wish to choose to deliver low quality in order to reduce its production costs or its effort.

As to production cost, aggregate costs of producing a certain good or service are in most procurement situations verifiable from accounting data. In most of this Paper we will then restrict our attention to situations where accounting data are reliable and aggregate costs are verifiable. This allows the buyer to link the payment mechanism to the realization of aggregate costs; a possibility whose pros and cons we shall discuss in depth. However, whilst aggregate costs are generally verifiable, specific actions, including the contractor's effort, undertaken by the contractor may be not. How to induce the contractor to undertake valuable cost-reducing activities that lower the possibility of cost escalating will be a central issue in what follows.

Before concluding this section, we wish to point out that different contracts are associated with different contract management cost, such as verifying the reliability of the contractor's accounting costs, measuring different level of quality standards, computing and enforcing penalties, and in general monitoring compliance with the terms specified in the original contract. Whilst for brevity we will not discuss these costs explicitly, we wish to emphasize that as a general principle more complex contracts tend to be associated with higher management costs, and that there cannot be efficient procurement without efficient contract-management.[8]

3 The Most Commonly Used Categories of Procurement Contracts: explicit contracting

The U.S. Federal Acquisition Regulation (FARs, part 16) pays considerable attention to contracting issues. The FARs describes a large variety of contracts types that may be used in acquisitions, prescribe policies and procedures and provide a guidance for selecting the appropriate contract depending on the circumstances of the procurement. The Department of Trade industry (DTI) and the Office of Government Commerce (OGC) in the U.K. provide indication on contracting choices for all procurements over £10,000 in value. Similarly to FARs, the DTI describes many types of contracts and provides indications useful to teams, consultants, professional advisers, seniors management (who need quick overviews of key principles), but also to suppliers (who can learn what the departments will expect of them).

The practice of procurement contracts distinguishes three broad categories of contracts: fixed-price, cost reimbursement or cost-plus and incentive contracts (the most commonly used forms are fixed-price and incentive contracts). Many procurement contracts are in fact a combination of the three broad categories, specifying incentives on some aspects and fixed-price on other aspects, and

combining contract types in order to adapt the contract to the specific circumstance faced by the buyer.

3.1 Cost-Reimbursement Contracts.

The distinguishing feature of cost-reimbursement contracts (CRCs) is that the buyer agrees to reimburse all (documented) production costs related to the project and to pay a fee for supervision (also defined cost-plus-fixed-fee contract according to the FARs). Thus the contractor does not have to worry about the possible discrepancies between estimated and actual production costs, hence he is fully insured against any cost overrun. However, for the same reason, CRCs have the disadvantage of not providing the contractor with incentives to undertake cost-reducing activities or effort in order to limit costs. However, if the contractor's actions in cost-reducing activities have no bite because, say, unpredictable events adversely affect the completion of the project, he cannot be held responsible for discrepancies between estimated and actual production costs.[9]

A special form of CRC is the capped price contract (CPC) which is frequently used by the UK Department of Trade and Industry, particularly for professional and consultancy services. CPCs are similar to cost-reimbursement contracts in that a daily fee, that includes also a profit component, is agreed for a certain number of capped days. For instance, the contract would specify a fee of £500 per day at a maximum of 30 days, so the cap is fixed at £15.000. The cap is clearly indicated in the contract/purchase order. If the contractor is able to complete the task within the stipulated number of days then his bill will be less than the capped amount. If, however, the contractor needs additional days to complete the task, he has to make the case for the cap to be increased. The rationale behind such a contract is that the buyer is sometimes unable to estimate how much work is needed to produce, say, a financial report. However, it is necessary to explicitly include a cap otherwise the contractor would always have an incentive to put little effort, thus stretching the duration of the project and raising the bill.[10]

Unit price contracts (UPCs) are similar to CPCs in that the buyer asks suppliers to submit offers specifying a separate unit price for each input factor, but does not include any cap. Moreover, the buyer announces an estimate of the quantity of the input factors needed to complete the project. For each incoming offer, the buyer evaluates the overall expected cost, or the "score'' of this offer. The buyer awards the contract to the firm with the lowest score (cost), but is obliged to pay for the input factor needed to complete the project.[11]

The above variants to CRC attenuate the incentive problem typical of CRCs contracts, but do not fully solve it. Thus, CRC contracts are not suitable in situations where the total costs of a

procured project greatly depend on the incentives of the contractor to contain project costs, and lack of adequate incentives for the contractor to contain cost could easily result in cost escalating during the project realization.

Another drawback of CRCs is that they affect the screening process at the tendering stage. More precisely, when the buyer faces a reasonably large pool of potential contractors and is truly uncertain about their intrinsic efficiency levels, the use of cost-reimbursement contracts may not select the most efficient supplier. Since all costs are reimbursed, efficient and non-efficient suppliers will have an incentive to submit the same offer at the selection stage, thus preventing the buyer from selecting the most efficient supplier. The prospect of being fully reimbursed once the project is undertaken provides the least efficient supplier an extra incentive to bid aggressively for the contract.[12] This observation implies that CRCs should never be awarded through a competitive tendering process since they may jeopardize the buyer's goal to select the most efficient supplier.[13]

There are, however, cases where CRCs can perform well. In particular this is the case when contract flexibility is important. When important design changes are likely to occur *after* the contract is signed and production begins - because of design failures, unanticipated site and environmental conditions changes in regulatory requirements - then , CRCs can be a suitable contractual form because they reduce the costs (or even eliminate) of renegotiating the contract.

CRCs can also be suitable in situations where quality is non-verifiable and it plays an important role in the procurement market. This is because CRCs have the advantage of not giving the contractor incentives to cut quality in order to save on the monetary cost of quality provision. As we have seen, with a CRC cost savings do not accrue to the contractor. Thus, the lack of incentives for cost reduction that characterises CRCs may actually work well in terms of provision of non-verifiable quality. However, under a CRC contract, the contractor will generally still have incentives to cut quality in order to save on the non-monetary dimensions (e.g. time and effort) of the cost of quality provision.

3.2.Fixed-Price Contracts

A fixed-price contract (FPC) is a contractual agreement whereby the contractor is paid a fixed price for realizing a project that satisfies a predetermined quality standard. The fixed price usually comes out of a competitive tendering process. While the contractors receive no additional payment for achieving higher quality standards, penalties are typically included in the contract to be levied if the delivered quality is below the agreed standard. Clearly, in order to deter the

contractor's opportunism, penalties have to be high enough relatively to the value of the contract, otherwise they have no bite in preventing quality reduction on the side of contractors.[14]

Under a FPC, the contractor bears all the costs incurred in providing the good or service specified in contract. The contractor then fully enjoys the benefits of possible cost savings realized in proving a project with the agreed quality standard. It follows that FPCs spur the contractor's investment in cost-reducing activities. However, under a FPC the contractor fully bears the risk of sustaining higher production costs than those estimated before submitting his bid, and it is then crucial that the contractor is able to control production costs, that is, that unexpected events do not play a crucial role in determining actual production costs. Such a situation typically arises when the project is not very complex and markets for the relevant production inputs do not suffer much from potentially unexpectedly adverse shocks.

The class of fixed-price contracts comprises also some variants. One example is provided by fixed-price contracts with economic price adjustment (FPCPAs) that take into account fluctuations of inputs prices (labour and material) used by the contractor. Adjustments typically take place according to indexed prices that are explicitly indicated in the contract.[15] The logic behind such a contract is to reduce the risk faced by the contractor.

FPCs are then appropriate for projects involving little complexity and uncertainty, that is, for standardized products/services. If the actual production costs of the projects depend heavily upon the contractor's actions/investments to reduce costs (or to increase quality) and very little on events out of his control, the buyer may find it profitable to make the contractor bear all the burden for cost savings, thus providing an incentive scheme that reconciles both the buyer's and the contractor's interests.[16] The following example, borrowed from a procurement competition organized by the Italian Procurement Agency (Consip S.p.A.), illustrates some of the circumstances under which a fixed-price contract may become the appropriate contractual form.

Example 1: Standardized software package and helpdesk service

A group of local public authorities wished to procure a software package for treating financial data (e.g., cash flows) together with a centralized helpdesk service. The features of the software package as well as the related costs (e.g., licenses) were considered sufficiently predictable. It was not a contract for the development of a new software, rather for the provision of an existing, standard application software for end-users.

Potential suppliers were believed heterogeneous with respect to their ability to provide a certain quality level of the *bundle* software/helpdesk. The sources of potential opportunism were mainly concentrated in setting up and running the helpdesk service. Suppose indeed that a user

suddenly found it difficult to activate one particular command of the software. She then decides to ring up the helpdesk. How long is she going to wait to talk to the operator?

Upon designing the contract, the procurement agency was in a position to take these contingencies into account by establishing *ex ante* a minimal quality standard of the helpdesk service. For instance, queries had to be answered within x minutes. Not only could such contingencies be observed by both parties (contractor and user), they could also be verified, that is, it was feasible to conceive, at a reasonable cost, a monitoring mechanism producing pieces of evidence (e.g., phone calls records) that could be brought to a court of justice had a formal complaint arisen from either party.

The nature of such a contract has now become clear enough to draw some practical conclusions. The intrinsic features of the software package being standard, production costs were predictable and reasonably little affected by unexpected events. The minimal quality standards of the helpdesk service being observable and verifiable, each potential supplier could reasonably estimate the cost of running such a service. Thus the overall cost of supplying both the software and the helpdesk service could be estimated *ex ante* quite accurately by competing suppliers. It was then decided to adopt a fixed-price contract that consisted in a fixed price for the bundle of services (software and helpdesk line), plus a series of penalties to be levied if the *ex post* quality of the service had fallen below the contractual minimal standards, to be awarded through competitive tendering.

Example 2: Public private partnerships in the construction industry

A common form of public private partnership (PPP) for the provision of public services in the UK involves the purchase of services associated with a facility (e.g. a school, a hospital or a road) for a fixed number of years. The contractor, commonly a consortium of firms, takes responsibility for all stages of the project – typically, the design, building and operation of the facility and the finance of the project against a fixed fee for a certain number of years. The contractor therefore fully bears the risk of cost overruns, but also enjoys the benefit of any cost reduction that a better facility or project design generates. As reported by National Audit Office (2005), PPP construction projects are about two thirds better (in % of project) in terms of delivering on time and within budget than conventionally procured projects.

The above examples emphasize the advantages of FPCs in terms of incentives for cost reduction. However, precisely because of these incentives, FPCs may be unsuitable in situations

where quality is unverifiable. Strong cost-reduction incentives can induce the contractor to save on non-verifiable activities, at the (buyer's) costs of quality degradation. If the contractor has something to gain from providing unverifiable quality (e.g. reputation), and would indeed provide it if it were not under pressure to reduce cost, then FPCs may not be the most suitable procurement contract, unless, as we shall see in section 8., there are other ways (namely, implicit contracting) for the buyer to induce the contractor to supply non-verifiable quality.

3.3. Incentive Contracts

In between the two extremes of CRCs and FPCs lie incentive contracts (ICs). Incentive contracts typically include a target cost, a target profit, and a profit adjustment formula which ensures that (*i*) actual cost or quality that meets the target will result in the target profit or fee; (*ii*) actual cost that exceeds the target will result in downward adjustment of target profit or fee; and (*iii*) actual cost or quality that is below the target will result in upward adjustment of target profit or fee. While the amount of profit or fee payable under the contract is related to the contractor's performance the contractor is never left entirely responsible for fluctuations in production costs.[17]

3.3.1 Linear incentive contracts

ICs have been extensively used in complex procurements, in construction industry and in the U.S. defence as an alternative to CRCs. ICs often take the form of *cost* incentive contracts. The most common form of cost incentive contracts is linear and can be described by the following compensation scheme for the contractor:

$$T = P + b(C-P),$$

where T is the total transfer to the contractor, P is the target cost (or bid price) , C is the realized (verifiable) cost and b is the (positive) parameter representing the share of costs borne by the buyer. If $P > C$ then the buyer enjoys a fraction b of the cost saving. Instead, if $P < C$, the buyer pays for a fraction b of cost overrun.

Analogous incentive contracts can also be used to stimulate quality provision of the good/service rather than cost reduction. In this case, an IC normally specifies a base payment P for minimum performance q_{min} (e.g. shipping the good within a certain date), typically a quality measure, and additional higher target levels $q_1,\ldots,q_n$ with corresponding bonuses $B_1,\ldots, B_n$ so that

if target q_i is reached (delivery takes place x_i days before the deadline), the buyer pays an additional bonus B_i.

3.3.2 Balancing risk sharing and incentives

An incentive contract stimulates the contractor to limit costs by leaving him a fraction of cost savings, but at the same time it reimburses him some money in case of cost overrun. Similarly, a quality incentive contract stimulates the contractor to provide better quality by including (possibly increasing) bonuses if the achieved quality levels are higher than the minimal performance. In both cases, the incentive scheme designed in the contract balances *risk sharing and incentives*.

As explained above, the cost-sharing parameter **b** plays a crucial role on the contractor's incentives to reduce cost. The higher **b** the less the contractor is responsible for cost overruns and the less the contractor benefits from cost reduction, thus the higher the cost-sharing parameter **b** the lower the incentives of the contractor to reduce cost (that is, using economics terms, the lower "power of the incentive scheme"). [18]

What criteria should the buyer adopt to set the cost-sharing parameter **b**? Three factors affect the choice of **b**:[19] the ability of the contractor to bear the procurement risk, the predictability (i.e., the variability) of the shock affecting production costs, and the responsiveness of the actual production cost to cost-reducing activities (investment, effort, care…).

The first factor, as we explained earlier in this section, becomes relevant if the contractor is unable to insure himself against unexpectedly high production costs, thus it measures the contractor's aversion to receiving variable payments. The higher the contractor's risk aversion, the less willing he is to agree on a contract that is sensitive to the difference between the estimated and the realized production costs. The second factor captures the extent to which the contracting parties are able to predict shocks that might affect productions costs. When such shocks are highly unpredictable, then the contractor is less willing to accept a high-powered incentive contract, that is, a low cost-sharing parameter **b**.[20] The third factor provides a measure of the contractor's return from investing in (costly) activities to keep production costs low. More concretely, when uncertainty about shocks is low, when the contractor is moderately concerned about risk (his business activities are sufficiently diversified, the value of the procurement contract is small with respect to the contractor's turnover), and when the expected impact on project costs of cost-reducing activities or effort by the contract is large, then **b** can be optimally set closer to 0. Instead, when the expected impact on project costs of cost-reducing activities or effort by the contract is

low, when shocks are highly unpredictable and when the contractor's risk aversion is high, then the cost-sharing parameter **b** should be set closer to 1.

In a procurement environment where both unpredictable events and the contractor's actions/investments affect the level of actual production costs, but neither of them is *the* crucial dimension, ICs can be a good choice for the buyer for they (*i*) motivate the contractor to undertake or cost-reducing actions, *and* (*ii*) offer the contractor a form of insurance against adverse exogenous events.

The following example describes an incentive contract in which the quality of the performance can be easily measured in monetary units.

Example 1: Real Estate Management

The contractor undertakes the conversion of series of buildings into commercial outlets and rents them on behalf of a local buyer. The contractor binds himself to guarantee a minimum level of rent per year (minimum performance). The incentive scheme takes the form of a percentage on the difference between the actual rental price the contractor agrees with tenants and the minimum rental price the contractor has to guarantee to the owner. The higher the actual rental price, above the guaranteed minimum level, the higher the payment to the contractor. Obviously, the higher effort (intensity of search) the contractor spends in looking for (possibly wealthy) tenants the higher the probability that the actual rent will be above the guaranteed minimum level, which, in turn, generates a high profit share to the contractor. However, the actual outcome is also affected by events that escape the contractor's control: sudden slowdown of demand in the real estate rental market, lower transaction costs that favour the selling market etc. Given that the contractor is less able than the buyer to bear the risk linked to those events, it is optimal that the buyer share with the contractor their effects through an IC.

3.3.3 Incentive contracts and transaction costs.

How costly is it to manage an incentive contract? The incentive contract just described looks like quite easy to handle. Both the procurer and the contractor need one piece of information: The actual rental price. However, in many contractual environments, especially those where the incentive schemes rely on the difference between actual and estimates production costs, the contractor bears the brunt of providing precise accounting measures of realized production costs while the procurer has to measure quality levels. These pieces information are necessary for the computation of the incentive component or fee specified by the contract.

All costly activities related to the management of an incentive contract constitute in fact transaction costs. Sizeable transaction costs may undermine the feasibility of incentive contracts. If the expected benefits of adopting an incentive contract, namely an efficient risk-sharing between the contracting parties, are outweighed by the value of transaction costs, the procurer may find it in her interest to adopt a different class of incentive schemes that is easier and thus less costly to manage: a fixed-price contract. While a fixed-price contract shifts completely the procurement risk to the contractor's side, it allows the procurer to ignore possible discrepancies between estimated and realized productions costs and requires a minimal amount of information collection on her side.

Moreover, lack of reliable accounting measures may further undermine the effectiveness of incentive contracts, particularly in industries or countries where accounting and auditing standards are low. Auditors have traditionally emerged as market institutions certifying the reliability of audited firms' accounting data. However, it has recently become clear that, even in more developed economies, the reliability of auditors' certificate becomes questionable when the auditors themselves are stakeholders in the audited firms' business. Unreliable accounting data may then induce the procurer to opt for a fixed-price contract that does rely on information produced by the contractor.

3.3.4 Multiple Performance Dimensions and Tasks Heterogeneity

Another important issue with ICs is to identify the key aspects/variables on which to design performance incentives. As a general rule, the buyer should base incentives on all measurable aspects that provide information about the effort the contractor exerts on the various tasks implied by the contract.[21]

Procurements contracts usually include many heterogeneous tasks, and the effort put by the contractor on some activities may be measured better (subject to lower exogenous uncertainty) than that put on others, so that an analogous IC has a stronger impact on the former than on the latter.[22] An efficient incentive contract makes the power of incentives over highly measurable dimensions necessarily stronger than that designed for less measurable ones. An immediate consequence of this is that a contractor facing high-power incentives on better measurable tasks will tend to allocate most of its efforts and abilities to these, thus depriving quality over the remaining tasks even though these may be very important for the buyer.

For example, consider a contract for the procurement of PCs plus assistance and maintenance services. The effort put on the side of delivery of the machines is more likely to influence the actual

performance on that task than the effort put on services does. Great effort put on the supply services may not ensure that results are as good as in the case of the supply of machines, since in the former case the contractor may take much time to solve (or to learn how to solve) particularly technical problems and/or the machines may badly respond to first, possibly imperfect, corrections.

One possible solution to this problem, when technologically feasible, is *unbundling with split award*, which consists in grouping tasks into contracts/lots as homogeneous as possible in terms of measurability and to award them to different suppliers. [23] In other words, more measurable tasks should be all included in one contract/lot and awarded to one supplier, while less measurable tasks should be all included in a separated contract/lot and awarded to another supplier. This would enable the buyer to elicit the 'right' effort on each task, by design incentives in the efficient manner, namely by putting high powered incentives on the former contract/lot and low powered incentives on latter contract/lot.

In some cases, splitting tasks can be rather easy. Apart from duplication contract management costs and possible economies of scale, the supply of PCs can be in principle kept separated from the provision of the services so as to the buyer can design appropriate incentives schemes. Even when unbundling differently measurable tasks and re-grouping them in internally homogeneous bundles/contracts is technologically feasible at low cost, the fact that the newly created bundles differ a lot among each other may come at the cost of reducing the buyer's ability to compare them and give suppliers' incentives based on their *relative* performance.

In other circumstances the nature of the procurement makes unbundling extremely costly or even impossible. In this case provision of efforts on all incentive areas may be achieved by lowering the intensity of incentives (increasing **b**) over the more measurable tasks relative to what would be optimal if tasks were not bundled, although this solution comes at the cost of reducing the incentive to put effort in general.

Similar problems of task design also arise when cost, instead of effort, can be object of "arbitrage" by the contractor. That is, when the contractor is allowed to allocate the *common production costs* among several differently powered contracts/lots. The problem is as follows. When the production/supply of goods/services involves some common (indirect) costs, since by standard accounting practices these costs are split among the goods produced (usually on basis of labour intensity), the contractor may switch (labour and thus) the burden of these costs from most powered to least powered contracts, to increase reimbursements. This phenomenon has been emphasized in defence procurement[24], where often suppliers are asked to produce several related weapons. For instance, we expect a Government procuring a new missile and a traditional type of tank to treat the former as a CRC (due to R&D investment and production schedule uncertainty) and

the latter as a FPC. To avoid the cost substitution effect, the Government may simply allocate the lots/contracts to different contractors, just as in the case of effort substitution described above.

3.3.5 Incentive Contracts and Tendering Procedures

Incentive contracts trade off the buyer's need to provide appropriate incentives to the contractor in order to be handled high quality (or low cost) projects and the latter's demand for insurance due to unpredictable events affecting the realization of the project. Such a feature of incentive contracts is then relevant *after* a contractor has been selected. A crucial question for any buyer is also how the provision of incentives schemes, be it in the form of a linear incentive contract rather than in the more extreme version of a fixed-price contract, is likely to affect the competitive bidding for winning such a contract. In other words, what is the impact of the choice of different incentive schemes on the buyer's screening process for the intrinsically most efficient (best price/quality combination) contractor?

In order to answer this crucial question let us abstract from the potentially higher transaction costs of ICs. Consider first a scenario where the buyer wishes to select the most efficient supplier from a pool of quite heterogeneous firms whose efficiency levels are known only to themselves. Efficiency here is to be interpreted as the supplier's ability to perform the contract at a low cost, although exogenous events may affect the actual level of production costs. The buyer manages a large variety of procurement contracts so that she is less concerned about the procurement risk of the single specific supply, whereas suppliers are small and conduct rather undiversified activities, and hence dislike risk. Then a *linear*[26] *incentive contract* with an appropriately chosen cost-sharing parameter **b** ensures that (*i*) the most efficient supplier is selected *and* (*ii*) that the right trade-off is achieved between giving the contractor an incentive to limit cost and sharing risks. In other words, a linear incentive contract in which the power of incentive scheme is set by the buyer at the outset while suppliers submit tenders for the fixed part, **P**, yields the appropriate balancing between selecting the lowest cost (or best price/quality) supplier, providing him the right incentives to control *ex post* supply costs and quality performance while leaving the buyer bear part of the risk.

Even when suppliers are indifferent to risk, so that risk-sharing is not an issue, the buyer may still find it in her interest to stick to a linear incentive contract since the latter remains instrumental to select the most efficient supplier. Hence suppliers' indifference to risk does not completely justify the adoption of the most extreme form of incentive contract, that is, a fixed-price contract, *unless* screening at the tendering stage is not a relevant issue for the buyer. If the buyer is

reasonably confident that suppliers are not too heterogeneous in terms of intrinsic efficiency, the adoption of a fixed-price contract efficiently allocates the procurement risk to a risk-insensitive contractor.

Suppose now that suppliers' efficiency refers not only to their ability to perform at a low cost, but also to the effectiveness of their cost-reducing investments/actions. If suppliers are indifferent to risk, thus risk-sharing is not a problem, the buyer may find it in her interest to let suppliers choose their most preferred cost-sharing fraction **b** at the tendering stage. Why? Intuitively, more efficient suppliers are more confident on the effectiveness of their cost-reducing efforts, so they prefer to cash in a higher fraction of cost savings (low **b**). If they are allowed to do so at the tendering stage, they can be more aggressive on the fixed part of the contract thus benefiting the buyer through a lower awarding price.

Let us wrap all this up. A buyer wishing to minimize the awarding price of a contract while (i) selecting the most efficient from a pool of suppliers indifferent to procurement risk and (ii) inducing the highest possible level of cost-reducing (or quality-enhancing) effort form the selected contractor can indeed reach this goal. All the buyer has to do is to let bidders compete for an incentive contract in which both the fixed part (**P**) and the cost-sharing fraction (**b**) are chosen by suppliers at the tendering stage.[27]

We are now in a position to summarize the discussion of the first part of the paper with following

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Practical Conclusion 1

Favour fixed-price contracts when suppliers are relatively insensitive to procurement risk and when they appear rather homogenous in their ability to control production cost. Fixed-price rules are also appropriate when contract management costs are expected to offset the benefits of risk-sharing in incentive contracts.

Use incentive contracts when (i) procurement risk is important; (ii) suppliers are more sensitive to it than the buyer, and (iii) accounting costs are fully reliable. If a linear IC is adopted, the cost-sharing parameter(s) should be larger:

- *the higher is the contractor's fear for risk;*
- *the less predictable are the shocks affecting production costs;*
- *the lower the contractor's ability to control cost;*
- *the more cost-reducing activities can be detrimental to aspects of quality that are not perfectly measurable.*

When suppliers are insensitive to procurement risk and appear quite heterogeneous in terms of their ability to control production costs, they should be allowed to choose the cost-sharing parameter(s) at the tendering stage.

Reduce the power of incentives if there are tasks that are hard to monitor.

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4. Non-contractible quality and implicit contracting

Until now we have focused our attention on *explicit contracts*. However, when quality is observable but unverifiable and therefore non-contractible (for brevity, in the following we will generically indicate non-contractible dimensions with the single term non-contractible "quality"), implicit contracts can be powerful tools to ensure that the contractor delivers the good or service at desirable quality standards. The main underlying idea for implementing non-contractible quality (hereafter NCQ) is to build *implicit contractibility* based on self-enforcing promises by the two parties, the buyer and the seller(s). The term *implicit* here refers to the fact that if incentives for NCQ are put in action, they automatically or implicitly emerge as optimal actions on the part of contractors and not as formal obligations enforced by a contract. This broad idea will be widely analyzed in this part of the paper.

Implicit contractibility may come in by linking observable but NCQ to credible promises on the buyer's behavior with the supplier. The buyer can credibly announce to the supplier(s) he will make use of his discretion outside contractual terms so as to penalize observable opportunism and /or reward observable but NCQ.

4.1. Implicit contracting methods for NCQ

There is certainly not a unique way of grouping and organizing the (luckily) numerous methods of implicit contractibility. Here we propose a classification which groups then on the basis of the different moments in which the buyer's behavior induces firms' incentives to procure NCQ. We can then identify:

    (a) **Selection or pre-contractual methods** which are activated when designing the environment for contract assignment, for example by limiting competition for the contract and in general by discriminating among competitive tendering and bilateral negotiation.

    (b) **Within-contract methods** which operate during the contract execution and refer to the buyer's exercise of discretionary power to induce within-contract competition, for example, selecting more than one supplier (which is named dual sourcing).

    (c) **Post-contract methods** which affect the profits the suppliers can expect from future contracting with the buyer (as exclusion from future procurements).

All these methods can be combined in different ways. We will list them according to the previous classification, illustrating their costs and benefits for the buyer, and suggesting when and how they should be used independently or together.

4.2 NCQ and procurement discretion

Before proceeding with a detailed analysis on the methods, it is worth investigating the need of discretion to implement them. The power to penalize or punish observable opportunism or reward observable but not contractible quality requires ability to act /react to changes in observable but non-contractible variables with some *degree of discretion* on the part that observes non-contractible dimensions. Absent some discretionary power, no implicit contracting method can be effectively put in action.

Notice that, if discretion is necessary for implicit contracting, it also opens the doors to opportunistic behaviors by whoever is in charge of observing non-verifiable variables, the buyer herself or some party to whom the buyer delegates observation. Since third parties such as courts cannot observe quality, a buyer may not give the promised bonus and /or inflict penalties although quality was at the desired level. However, it is clear that if a buyer abuses her discretion in administering bonuses and penalties, she will lose any credibility with the consequence of averting serious contractors and making implicit contracting methods ineffective, at best. These methods will then be effective only if the buyer is able to build her own reputation on a fair behavior; reputational forces are generated both for the buyer and for suppliers by frequent and repeated interactions.

Limiting the cost of discretion. It is also important to notice that, when the buyer is an agent of a final user or consumer of the procured service or good, as it frequently happens in public procurement and within large firms, the buyer can use its discretion in a self-interested way, i.e. exchanging a discretionary bonus against a "bribe" from the contractors. In this respect, buyer's discretion can be reduced by publicly conditioning bonuses/penalties on measures of "customer satisfaction" that should be correlated with the level of NCQ provided. Still, two important problems emerge, both linked to "customer satisfaction" surveys which are collectively subjective – and therefore not auditable evaluations.[28] If an end user of a supplied good/service declares that he is satisfied not because the good/service is actually of good quality but because the supplier "bribed him" with a favor or money, there is no way to demonstrate that the end user was lying (unless hard evidence of the bribery is produced). Thus, in general, we can identify two types of issues related to the correct use of discretionary bonuses and penalties on the basis of "soft" information.

Conflicts of interest. The first problem is linked to the need of limiting the buyer's discretion by conditioning bonuses/penalties on the (soft) information of "customer satisfaction" surveys. This issue is one of *conflict of interests* and credibility, and is typical of situations where the end users of

the procured good/service are also those that pay for the good/service. Conflict of interest arises if the person who assesses the contractor's performance is the same that pays the bonus because then the evaluator has incentives never to assess a good performance, thereby avoiding to pay the costly bonus. Customer satisfaction collects soft information about the perceived quality of the good/service exactly from end users. If these are also paying for the good/service, they will have incentives to always untruthfully report unsatisfactory performance in order to avoid having to pay the bonus, as there is no risk that their report can ever be proved to be untruthful. Anticipating this, rational suppliers will provide minimal levels of non-contractible quality. However, this problem can be partly overcome by linking customer satisfaction to *in-kind* bonuses (e.g. as we shall see, contract renewals is a form of in-kind bonus) instead of monetary bonuses, since it will always be in the interest of the buyer to renew the contract to a good and efficient supplier.

Corruption. The second problem linked to limiting the buyer's discretion by conditioning bonuses/penalties on "customer satisfaction" surveys, is one of *corruption* and is relevant in situations in which the one who pays for the procured good or service is not its end user. When the users of the good/service are not those who pay for it, as is often the case in public procurement and frequently also in large firms where the sourcing function is "far" in organizational terms from headquarters, the risk of corruption - i.e. of the contractor trying to "bribe" end users to report high satisfaction that triggers the bonus - is serious. In private procurement, instead, the buyer is generally also the final user of procured goods and services so that discretion can be eased. In this respect, implicit contracting may result more effective in private than in public procurement.

In the next pages we will discuss implicit contracting methods with the understanding that they are certainly applicable to private procurement, while for public procurement their applicability depends on country-by-country ruling national legislations and the associated discretion which is in the end left in the hands of the public buyer. It should be clear that the various methods we will discuss are generally non mutually exclusive and some of them may be pooled to form a corpus of instruments aimed at stimulating provision of non contractible quality.

4.3 Selection or pre-contractual methods

When all dimensions relevant to the procurement relationship are contractible (in the sense discussed in the previous pages), strong price competition in the awarding process of the procurement contract is always desirable. Indeed, with full contractibility the formal agreement controls all the relevant ingredients in the relationship and strong price competition is always

desirable because it helps the buyer to obtain any given quality aspect at lower prices, or a better balance between price and properties of the supply (in case a scoring rule is used).

The desirability of price competition at the contract awarding phase becomes much less clear when some variables of the procurement relationship fall into the category of non-contractibles. In some cases the object of procurement is a complex project, such as, for example, when it consists in supplying a large IT infrastructure or when it involves several, complex and interacting tasks and requires highly customizable goods /services (typical in the defense sector), or when it consists in a complex real estate to be built. In all such cases strong price competition may not be the best solution, since price is not necessarily the most important factor and quality can be highly non-contractible.[29] In this case, the price squeezing effect of competition generally increases the likelihood to select low quality suppliers (which face lower costs and can therefore offer lower prices) and may induce contractors to further reduce non-contractible and costly quality at the execution stage. This may become particularly relevant when some R&D activity is necessary to finalize procurement (for example in defense or hospital contracting). Indeed, R&D for innovative projects is often non-contractible because it refers to activities that are at the frontier of technological knowledge and effort towards improvement is difficult to measure. Here, we note that high-tech procurement that involves R&D may well require a reduction of competition at the final tendering phase. The problem is that too strong competition at the production stage tends to undermine incentives for investment at the preceding R&D stage.[30] Indeed, we observe that in some innovative procurement projects for the defense sector, a maximum of two firms are often admitted at the competitive phase that awards the contract. The idea is that a pre-selection phase limiting the number of firms in the pool of potential providers reduces prices competition and increases the chances of winning the contract, inducing participants to invest more before the competition stage and leaving the selected contractor with higher (expected) margins to employ/invest in NCQ provision or R&D. Nevertheless, it is obvious that restricting competition does not come with no costs (comes at some cost) for the buyer. First, larger market power in the hands of few competing firms tends *per se* to induce price increases. Second, larger prices are also a consequence of less effective selection of the most efficiently producing firm from a restricted pool of competitors.

Our brief discussion and illustrate that softening price competition and creating larger margins on contractors' profits is very often a necessary precondition for NCQ provision. However, nothing, at the moment, assures that contractors will indeed find the right incentives to use those margins (or part of them) to provide quality. After all, those margins could be kept by contractors as extra-profits induced by softened competition, unless this opportunistic behavior induces some negative consequences that the contractor may want to avoid. Here is exactly where all the other

methods for implementing NCQ based on within-contract or post-contract incentives come in to help the buyer, as we show below.

Practical Conclusion 2

When the procurement involves very important non-contractible dimensions like R&D it may be useful to soften price competition at the selecting stage, for example limiting the number of competing suppliers,.

4.4 Within-contract methods

4.4. 1. Dispensing "stick-and-carrots" within contract execution

Rewards or penalties to be delivered within the contract (and /or after its completion) could be introduced conditioning on observed quality, where bonuses and penalties may be both in monetary terms but also in-kind as we will illustrate next. The threat to lose bonuses or being inflicted penalties should discipline the contractor to provide NCQ. As we have pointed out in Section 2, buyer's discretion can be reduced by publicly conditioning rewards/penalties on measures of "customer satisfaction" that should be correlated with the level of NCQ provided.

A particular penalty sometimes adopted to provide incentives to the supplier on NCQ is the threat of early unilateral contract termination. It should be now clear that contract termination is not based in this case on explicit contractual infringements. Rather, when the procurement selection process is being designed, it can be established contractually that if during contract execution non-contractible quality performance - as measured by some customer satisfaction indicators – falls below a predefined thresholds, the buyer is free to renege the contract and find alternative procurement channels. Finding an alternative supplier may be costly however, and the higher this cost, the less likely will be that the buyer will renege when facing low performance, the less effective will be the reneging threat in terms of eliciting a satisfactory performance from the initially selected contractor. The role of the methods we are now going to discus will be mainly one of reducing the cost of finding an alternative supply channel, so to increase the credibility the threat of reneging and switching to an alternative supplier, and hence its effectiveness in stimulating high NCQ provision. Note, though, that all these methods will naturally tend to increase the price at which suppliers will be willing to perform a contract, both because they anticipate that will need to

provide better NCQ, and because some uncertainty about the actual duration of the contract is introduced.

4.4.2. Within-contract competition

A main way to put pressure on the contractor so as to induce desirable levels of non-contractible quality consists in keeping open the possibility to shift to different suppliers within contract execution in case NCQ is too low. Again, this form of competition during the execution of a procurement contract requires a considerable amount of discretion on the part of the buyer, but may be effective for non-contractible quality because the entire procurement contract or sub parts of it remain subject to the threat of switching to an alternative supplier. Within-contract competition in procurement with its several forms that we will illustrate next has been and is currently employed for example in the automotive industry by important carmakers in the US, Europe and Asia.[31]

Switching to lower-ranked offers. One simple way for the buyer to replace a contractor is switching directly to the second best supplier selected in the initial competition. This allows to save time and to avoid the costs of a new competition in case of switching to an alternative supplier. Once the first procurement selection process is performed[32], the buyer ends up with a ranking of potential suppliers and chooses the top-ranked one as contractor (or more of them in case of multisourcing that will be discussed in the sequel), also establishing that if during contract execution NCQ does not satisfy some predefined requirements, the buyer is free to renege the first contractor and ask the second ranked supplier if it wants to step in at the conditions of its initial offer at the selection process. If the second ranking supplier does not want to step in, the buyer may ask the third ranked one, then the fourth, and so on; if offers are not good enough, it may always choose to incur the cost of arranging a new procurement competition.[33]

The contractual option to switch to the second or third best supplier in case customer satisfaction falls below a minimal threshold level can be seen as a special case of what is named *second sourcing* whereby the incumbent contractor is replaced with a rival supplier (in our case, the second best supplier) in case of unsatisfactory performance.[34] The low cost of switching to other suppliers without running a new selection process implied by this contractual option makes the threat credible, and should in turn discipline the top-ranked supplier to offer a good service, so that a switch never actually occurs. In addition, rational suppliers are then induced not to underbid at the selection process with a view – in case of victory – to cut on NCQ, because they know they would lose the contract at a later stage by doing this.[35]

Some drawbacks and applicability limits of this procedure are worth emphasizing. Reneging may involve discontinuing procurement that in certain cases may be impossible. In fact, unforeseen interruption of the contract can be very costly for the buyer so as to make unilateral reneging not credible, also because finding and establishing a supply relation with a substitute provider requires always a minimum lag and some adjustments. In some cases interrupting provision of the good or service even for a very short period may be very costly if not totally unfeasible for the buyer (e.g. in case of procurement for hospitals, production chains etc.). Further, it should be clear that if a switch occurs during provision, the contract will be carried out at worse economic/technical conditions because typically a supplier ranked second in the contract awarding process is asked to supply at the condition he offered at the selection stage.[36] Hence, if the conditions proposed by non-first-ranked suppliers are particularly onerous for the buyer, it may rather prefer to run a new selection process. These difficulties and costs reduce the effectiveness of the threat to renege early and replace the contractor.

In addition, if reneging takes place after some completion of the procurement process, the buyer and the stepping-in supplier have to find an agreement on how much the incoming supplier should serve, either the remaining part for completing procurement or the whole one. In presence of economies of scale the second solution is of course optimal in terms of making the acceptance by the second ranked supplier more likely and the threat to renege more effective, and should therefore pre-announced and established contractually in order to induce supplier to take full account of it at the initial tendering stage. Note that if non-first-ranked suppliers systematically deny the buyer's offer to step-in, the threat of contract termination loses its power and the first-ranked firm regain room for opportunistically reduce NCQ.

Full—fledged dual or multi-sourcing. If the option to renege and switch to not-first ranked suppliers still hinges on a single supplier at any point in time (whose identity can nevertheless change over time, as we have seen), an alternative method to encourage suppliers to provide NCQ is to have two or more suppliers active at the same time. This within-contractual method is known as *dual- or multi-sourcing* (depending on how many suppliers are involved at the same time, this is also known as 'split-award procurement'). This method has been used for example in defense procurement by the US Defense of Department (DoD), such as for Air Force engine contracts and in missile systems procurement.[37] Dual sourcing means having the supply contract split between two contractors, who then supply simultaneously (substitute) products. Even if it is not exactly as second sourcing, the presence of alternative suppliers reduces the potential for contractor opportunism because the buyer is free to choose whether having both of them active or what part of

procurement allocate to one or the other, depending on the NCQ level each of them provides. Dual sourcing may then serve to discipline suppliers when doing so contractually is simply not feasible.

However, also dual sourcing (comes at some cost) does not come without costs. In particular, splitting procurement (i) reduces the economies of scale of each supplier, implying a duplication of the fixed costs, including those linked to setting up and managing two contractual relationships instead of one, and by increasing uncertainty in procurement (ii) almost surely includes one supplier that is not at least cost.[38]

Continuous 'contestability'. An other close alternative to reneging and switching to other providers has been recently proposed.[39] The idea in this case is to award a long-term procurement contract which is continuously under the threat of competition (this is also known as *contestability*) from new potential supplier even if these were not present at the time of the initial tendering.[40] The buyer awards a contract that specifically contemplates the possibility that a competitor of the current contractor may make a better offer to the buyer as compared with the ruling contract. If this happens, the current contractor has the possibility to match the competitive offer or recede letting the competitor to step-in at his place.

For contestability to work as a disciplining device it is needed that the buyer accords her preference to the current contractor instead of an *equally good* competitive offer, if the current contractor has always offered acceptable NCQ. This simple and reasonable preference accorded to the ruling firm is capable to both make the contractor prefer providing high quality and being unmatched by rival suppliers (independently of whether they plan to offer high quality or to cheat on quality) so that alternation does not occur in practice. On the positive side of this method stands also the fact that whenever incentives to provide NCQ are assured by competition, the buyer may also increase the power of incentives on contractible dimensions without risking that the buyer is induced to save on costs by cheating on quality. On the negative side of this procedure we have that continuous competition produces a more uncertain environment for the contractor and this may (backfire) fires-back to the buyer in terms of higher prices and reduced incentives to invest. However, the buyer clearly expects to pay more to obtain higher levels of NCQ.

Practical Conclusion 3

When using within-contract methods, balance the goal of higher NCQ with:

- *increased uncertainty in contract duration/quantity supplied*
- *the cost of interrupting the contract and switching to worse price/quality conditions in case of second sourcing;*
- *economy of scales and contract management costs in case of dual sourcing.*

4.5. Post-contractual methods

The last set of tools that we investigate refers to the buyer's possibility to react *after* the execution of the contract in case low quality has been provided, or in general to take decisions concerning future contractual relationship on the basis of past performance of suppliers.[41] These methods are close in spirit to the idea of reneging the contract and switching to alternative suppliers in case of low quality procurement. However, it should be noted that relying on *post*-contractual discretionary decisions may produce less legal litigations with respect to within-contract actions on the basis of non-contractible dimensions.[42]

Considering these methods based on past performance will also allow us to discuss an ingredient that has been partially neglected in our previous analysis, namely the effect that the 'shadow' of future interactions has over today's decisions of contractors. When procurement is inherently a dynamic process, because the buyer needs to be served time over time, specific dynamic methods can be employed to cope with NCQ. In this dynamic context suppliers' profits are not limited to the ones coming from the current contract, but also contemplate profits potentially accruing to suppliers from future contracts (i.e. the flow of expected future discounted profits). It is material to realize that if the shadow of these future profits on present suppliers' decision is sufficiently important then future profits may well play a crucial role in the provision of NCQ.

The novelty we are introducing in this part of the analysis with respect to the previous discussion relies on the possibility that repeated interactions between the buyer and suppliers opens the door to reciprocal reputation of 'correct' behavior. On their side, suppliers have the possibility to build a good reputation that is of value for buyer's decisions in future interactions. On the part of the buyer, repeated interaction may make credible her discretionary decisions towards outperforming or poorly-performing firms. As an example of this mechanism, in the U.S. a part of the past performance information refers to customer satisfaction and it is used to select suppliers in public contracts. Interestingly, in the UK, within the context of the newly developed PPPs for the provision of public services, the National Audit Office has recommended that customer satisfaction surveys become part of the evaluation process aimed at testing the contractor's performance following the commencement of the service.

We now discuss some simple instruments that the buyer can use to penalize badly performing suppliers or favor good performing ones on the basis of future repetition of procurement. As within-contract methods discussed earlier, these instruments will share the characteristics: they will induce suppliers to require higher compensation to cover the costs of

providing higher NCQ; and being based on decisions based on non-verifiable performance measures or non-auditable customer satisfaction reports may widen the door for conflict of interests and collusion.

4.5.1. Contract renewals and contract length

An important way to reward a performing contractor or to punish a cheating one hinges on contract renewals. For example, IBM stimulates chip manufacturers to maintain high-quality with the 'carrot' of contract renewal (or the threat of non-renewal).[43] This method also has the mentioned advantage of moderating the problems generated by monetary incentives linked to observable but not verifiable performance measures as uses *in-kind* rewards for good performance (in terms of an extension of the supply contract or an automatic renewal of it).

The effectiveness of renewals as performance incentives can be reinforced by substantially shortening the basic duration/size of the supply contract, that can be seen as a tryout period, and then by allowing the buyer to renew the supply contract several time if the supplier's performance is satisfactory. The fact that the buyer within the contract period can only procure from the selected contractor even it this decides to degrade NCQ is generally refereed as within-contract or static lock-in. Shortening contract duration then reduces lock-in by increasing the ability of the buyer to react to contractor's low performance.

However, shortening the contract duration (comes at some cost) does not come with no cost. Large/long lasting contracts can be good since the contractor can exploit economies of scales and recoup investment costs which then translate into higher efficiency of contractor and larger savings for the buyer. Cost savings from large production is clearly relevant also in a dynamic context, where, in addiction, there are elements of future uncertainty playing an important role. Indeed, a small supplier winning a ten years procurement contract will face much smaller uncertainty on his future profitability than if he were awarded a one year contract. Depending on the ability of mangers and owners to bear the procurement risks, this smaller uncertainty may well translate into smaller price for each single unit of procured good or service. On the same side one should also consider that searching for (most preferable) procuring partners is always a costly process (for example the mere costs for organizing and advertising the competitive tendering). It may then be difficult to credibly commit to replace the actual contractor for poor performance. Switching costs must therefore be kept sufficiently low. In this respect note also that reputation on past performance may become a barrier to entry because new comers arrive with no reputation thus being ill-favored. This can be avoided with neutral valuation for new comers.

Second, the tryout period should be chosen carefully. In fact, especially for complex products/services, the contractor needs time to learn how to work and how to deal with the difficulties that may arise in the execution of the contract and in the relationship with the buyer. If the tryout period is not sufficiently long, temporary lower-than expected performance are "unfairly" punished and this will be reflected in higher price and possibly also lower quality offered by contractors.

Renewals conditioned on customer satisfaction indicators have been recently used in Public Procurement, for example, for the procurement of IT services in the Italian Procurement Agency (Consip S.p.A). One of the reasons for their adoption was that as a form of implicit contract, contract renewals conditioned to customer satisfaction are less subject to the problems of conflict of interest and corruption discussed in Section 2. If bonuses are contract renewals and the end-users of the good/service untruthfully reports good performance in exchange of a "bribe" from the supplier, this will then suffer the cost of another period of bad supply, and the end-users will therefore require a much higher bribe or – more likely – report truthfully that the supplier performed badly and must be replaced. This ensures that the cost of misreporting performance is born exactly by who reports the performance. Similarly, by untruthfully reporting bad performance when performance was good, the buyer cannot gain anything, and incurs the cost of loosing a well performing supplier.

Practical Conclusion 4

Choose the contract duration so as to optimally balance the goal of NCQ with economies of scale and incentives to invest.

4.5.2 Past performance scores, exclusion, consortia and negotiation

Past performance scores, exclusion. Very close in spirit to contract renewal is the possibility for the buyer to penalize in term of lower score, or even complete exclusion from future contract awarding contests suppliers that performed poorly in the past. Clearly, the supplier rationally anticipates that the cost-savings which materialize by shirking and reducing procured quality (and the associated increase of profits), have to be traded off with future profits which are lost because of exclusion from future contracting.[44] A sufficiently long exclusion paired with not excessively

high/costly required quality are then clearly capable to break the tie of this trade-off in favor of quality provision. It is self-evident that all this is effective in inducing quality provision only if future exclusion of shirking supplier is feasible for the buyer, if it can be anticipated by suppliers and, ultimately, if it is credible. Shortening contract duration will have positive effects on the effectiveness of this mechanism, much like for renewals, though in stable, repeated contexts it may facilitate suppliers' collusion, besides generating the costs discussed in the previous section. [45] Of course if the buyer uses exclusion of badly performing suppliers she should avoid being left with very few suppliers that could admitted at the selecting phase in consequence of several exclusions because, if this happens, additional exclusions may become very costly for the buyer (in terms of reduced competition) and then non credible, thus mining all the reputational incentives for quality provision.

Consortia. We have argued that when reputational forces are at play in NCQ provision, then the most competitive procuring mechanism may not be desirable for a buyer who cares a lot for the quality of the goods or services, such as, for example, in health procurement. Further exploring this point, there are other methods which can be even more effective by mediating the need for larger profits with more efficient production. It may be desirable from the buyer's standpoint to stimulate the formation of *consortia* among suppliers that may alternatively compete each other. Even if the formation of consortia tends to increase the prices for procurement, this very same fact would make the consortia's profit also high so that the incentives to cheat on quality would be reduced by appropriate threats of termination following bad performance. It is interesting to notice that consortia are often blocked in standard procurement on the basis that they behave very closely to illegal cartels. When NCQ is a crucial success factor for the procurement the buyer should be ready to pay higher prices even if they result from agreements between suppliers because high prices also imply lower incentives to cheat on quality and then larger implementable quality.[46] Consortia may be even better as for NCQ and reputation than limiting the number of competitors *tout court*. In fact, frequently interacting suppliers (e.g. in the "great market" for office equipments, as PC, laptop, printers, etc.) very often know each other, their technologies, their costs and production advantages much better than a buyer, so that a pre-selection phase performed by a less informed buyer (with the aim of reducing competition for quality concerns) may well be dominated by informed decisions of suppliers. Consortia have the information and all the incentives to maximize their overall profits also by individuating the most efficient allocation of production among its members. This means that consortia have the potential to pair larger reputational concerns necessary for high NCQ provision, with more efficient procurement.

Negotiation. Our previous analysis on reputational incentives for procurement has clearly highlighted a positive relationship between the future rents a supplier may expect and the NCQ it is ready to provide. This idea can be further exploited to some extreme implications. In fact, it is clear that with dynamic procurement the largest future profits for a firm materialize when the buyer is ready to renew the contract to a contractor that has procured the desired amount of NCQ without going to the market at all. It is evident that this type of bilateral contracting can be very costly in terms of (lost) efficiency (and then of high prices paid for procurement) if the buyer is stuck with an inefficient supplier. On the other hand, when quality is very important, the buyer may prefer to build a long lasting relationship assuring future rents and incentives for quality provision, even though the supplier is not the most efficient one.[47]

Finally, we conclude this analysis on *reputational mechanisms* for NCQ emphasizing again that the key factor for these mechanisms is suppliers' expectation of future profits.[48] This allows to identify an instance where reputational incentives may fail, namely when a supplier has a very short horizon for his activities, as it may happen in case of financial distress possibly leading to bankruptcy. In this situation the supplier has nothing to lose from disappointing the buyer and saving on costs for quality provision. It follows that when the buyer intends to implement reputational incentives for quality, she may want to envisage a pre-selection phase, not only limiting firms' participation to increase suppliers' future profits, but also to exclude from the pool of participants all suppliers under financial distress which may be insensitive to reputational forces.[49]

5 CONCLUSIONS

In this paper we reviewed the theory and practice of procurement contracting with the aim of offering simple, practical indications on how to arrange procurement contracts in different situations. In the first part we have seen how the variety of contracts available makes the choice of the appropriate contractual setting not easy to take for any buyer. We illustrated the conditions in which some types of contracts are likely to work better than others, and where general linear incentive contracts are an effective compromise between providing the contractor the incentives to be efficient and risk sharing for ex-post unforeseen events.

We then proceeded by illustrating the tools the buyer can use to obtain adequate performance over the non-contractible dimensions at the different stages of the procurement process, namely, in the selection phase (e.g. by limiting price competition) and during the execution

of the supply (e.g. with bonuses, renewals, reputation, dual sourcing and other competitive devices). These methods come with their costs though, and must be used with care, when non-contractible dimensions of the procurement are really important.

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Notes

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[1] The origin of the word contract is the Latin contractus, from contrahere, to draw together, while vocabulary definitions of term include "an agreement between two or more parties, especially one that is written and enforceable by law", or more specifically "an agreement between two or more parties that creates in each party a duty to do or not do something and a right to performance of the other's duty or a remedy for the breach of the other's duty" (Dictionary.com).

[2] A brilliant, in-depth treatment of the economic effects of explicit procurement contracting is in Laffont and Tirole (1993). An equally brilliant and in depth discussion of the achievements of contract theory is Bolton and Dewatripont (2003). Both these contributions are rather technical. Some non-technical synthetic discussions of contracting issues are offered by an interesting book of McMillan (1992). As for the practice of procurement contracting, see FARs (2005) part 16 and Office of Government Commerce guidelines, that we both mention in the next section.

[3] We clarify the concept of risk aversion with the following example. Suppose that a firm has to choose between two possible investment decisions, A and B. Option A yields 100€ for sure, option B yields zero with probability 1/2 and 200€ also with probability 1/2. A firm is said to fear for risk (or risk-averse) if she prefers option A to B, that is, if she prefers a riskless investment whose (certain) monetary value is exactly equal than the expected monetary value of the

risky investment, where the latter is a weighted average of the risky outcomes whose weights are given by the probabilities that each outcome occurs (1/2 * 0€ + 1/2*200€ = 100€). Indifference to risk (or risk neutrality), instead, arises when the firm is indifferent between A and B. In other words the firm is indifferent between a sure bet and a risky bet whose expected monetary value is equal to the one of the sure bet.

[4]Competition for procurement contracts very often involve small and medium enterprises, that by features and size, may fear risk more than large firms. Additional potential source of risk arising in public procurement is the (typical) delayed payment of public administrations. In contrast to large firms, who benefit from diversification of activities and/or more general financial solidity, small firms incur very high costs when buyers do not pay timely, since their current production/activities/investments can heavily rely on those cash flows. This is a clear source of risk, but also a potential entry barrier to the market for procurement contracts. Another potential source of uncertainty is that very often small suppliers group together to bid for a public contract (or are subcontracted part of the supply), but grouping/subcontracting makes the performance of each single supplier depending on the performance of all others. Default/poor performance of a single supplier can compromise the other's performance and overall results.

[5] This is the principle of 'liquidated damage' actually informing the contracting laws in the U.K. An interesting discussion on the topic is provided by Anderlini and Felli (2005).

[6] Suppose the penalty for not providing what promised on a certain quality dimension is €100, and that there are three competing suppliers, A, B, and C, who can save €20, €90, €150, respectively in providing less than the promised quality. While A and B always prefer delivering what promised, C does not since he can earn €50 if he violates the contract. However, if the buyer can in some ways learn such costs he can fix the penalty at €160 and induce all suppliers to keep promises.

[7] For instance, in the case of consultancy services, even though the contractor promises to employ highly qualified and referenced professionals, their ability to perform required tasks may be lower than expected. This dimension is hard or even impossible to specify in the contract.

[8] Iossa and Legros (2004) show for example how it might be desirable to choose the procurement contract in such a way as to induce information acquisition and revelation on the contractor's performance from future potential contractors.

[9]Practical guidelines are explicit in restricting the use of cost-reimbursement contracts to special circumstances, that is, "[…] when uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy to use any type of fixed-price contract". See FARs (2005), 16.301-3.

[10] This simple observation is consistent with the OGC's guidelines stating that the capped price contract should never be let solely on the basis of an agreed daily (or other period) fee, without including a cap on time or cost.

[11] Ewerhart and Fieseler (2003) analyze the consequences of suppliers' strategic bidding in a UPC competitive tendering.

[12] McAfee and McMillan (1986) on this point.

[13] We refer the reader to an in-depth analysis of the circumstances under which the buyer may prefer negotiation to a competitive tendering process for selecting the contractor(s).

[14] In Italy, for instance, the value of penalties cannot exceed 10% of the overall contract value.

[15] FPCEAs may become an appropriate solution when there is uncertainty about the stability of market or labour conditions during the period of contract performance and when 'contingencies that would otherwise be included in the contract price can be identified and covered separately in the contract'. See FARs (2005), Vol.1, 16.203-2.

[16]The contractual practice in the US is consistent with our main conclusion. The Federal Acquisitions Regulation (FARs) advises the contracting officer to adopt a (firm-)fixed-price contract for 'acquiring commercial items or for acquiring other supplies or services on the basis of reasonably functional or detailed specifications when the contracting officer can establish fair and reasonable prices at the outset, such as when – […] Available cost or pricing information permits realistic estimates of the probable cost of performance; or [p]erformance uncertainties can be identified and reasonably estimates of their cost impact can be made […]', Vol.1, 16.202-2.

[17] 'Most incentive contracts include only cost incentives, which take the form of a profit or fee adjustment formula, and are intended to motivate the contractor to effectively manage costs. No incentive contract may provide for other incentives without also providing a cost incentive'. See FARs (2005), 16.402-1.

[18] McMillan (1992) provides an interesting non-technical discussion on performance incentives.

[19] See Weitzman (1980).

[20] In U.S. defence procurement contracts, **b** typically varies between 0.1 and 0.3 (See Laffont and Tirole 1993, Ch. 1).

[21] This idea relates to the *informativeness principle*, which states that any measure of performance that provides information about the effort level should be included in the compensation contract (Holmstrom, (1979)). For instance, in a contract for IT help desk services, the performance of interventions on workstations might be measured in terms of the restoring speed, which is usually traceable and thus verifiable.

[22]The importance of ensuring effort on all incentives aspects is underlined by the U.S. federal procurement regulation (FARs 16.402.4), that establishes that "a properly structured multiple-incentive arrangement should motivate the contractor to strive for outstanding results in all incentive areas".

[23] Note that lots division should also account for other important factors as competition and market structure.

[24]See Rogerson (1994).

[26] This result is obtained by McAfee and McMillan (1986).

[27] This result is analytically deriverded by McAfee and McMillan (1987), and, slightly differently, by Laffont and Tirole (1986). Riordan and Sappington (1987) independently derived similar results.

[28] This kind of information, often called 'soft' by economists. The benefits and cost of more flexibility in public procurement are the focus of Banfield (1975), and Kelman (1990).

[29] Sometimes lessening competition can take the form of a two-stage selection procedure. The first stage is open to all suppliers, the buyer then negotiate with the most preferred (reputable) in the second stage. In public procurement two-stage procedures seem to be increasingly attractive. For instance, FARs (14.502) establish that two-step procedure 'may be used in preference to negotiation' when the acquisition requires technical proposals and/or it is referred to complex items. In the FARs' view, the first step selects the best quality proposal, while the second step is for price bidding. Further, the recent European Directive explicitly introduces the 'online-auction', which may follow pre-qualification stage for suppliers based price and/or quality offer.

[30] See Rob (1986) for a discussion on similar arguments for defence procurement.

[31] To quote a famous example, Toyota uses dual sourcing awards (that we will illustrate in the sequel) for same parts (e.g. wheels) of different models (e.g. Toyota Corolla, Toyota Carina) to different firms.

[32] It can be either an open procurement auction or a restricted procedure or any other negotiations with more suppliers.

[33] Of course a new competition may be also desirable when the item being procured is subject to high obsolescence, as IT products, and the contract is almost expired. In this case, a new competitive tendering allows the buyer to procure possibly more advanced and cheaper item with respect to those offered at 'obsolete' conditions by the second best supplier.

[34] This is the definition of second sourcing, provided by Lyon (2002). It fits the idea of switching to the second best supplier. However, second sourcing can take several different forms. In the seminal work of Anton and Yao (1987), second sourcing takes place when the buyer announces that she will re-open the competition between the incumbent contractor and a rival supplier at some point of the supplying phase.

[35] This method of within-contract reneging and switching to second-ranked firms is already established by the Italian law for public works when the procurement does not involve discretionary bid evaluation and it has also been recently proposed for acquisitions of goods/services managed by Consip, the Italian public procurement agency. See Guriev and Kvasov (2005) for a theoretical argument. See also Ellman (2005).

[36] Alternatively, at the beginning of the procurement process the buyer could ask this second-ranked supplier if he is ready to commit the conditions offered by the first supplier in case it is named for procurement. However, suppliers may well refuse this proposal when first-ranked conditions are too demanding.

[37] See Lyon (2000) for more details.

[38] Nevertheless, dual sourcing is applied with success by public and private procurement agencies. Consip, the Italian central procurement agency adopted dual sourcing in a contract for the procurement of complex IT infrastructures (mainframes) run on the behalf of the Italian Ministry of Economy and Finance. Other examples of agencies using dual sourcing are the DoD, U.S Department of Defense, for the procurement of missiles; Solectron a leading provider of electronics manufacturing and integrated supply chain services and Toyota. It should be note however that, while dual- or multi sourcing can be freely adopted by private companies, procurement laws may restrict the use of it on the part of public agencies

[39] See Neeman and Orosel (2004).

[40] Despite both identify a competitive environment, 'contestability' and 'competition' are different concepts. A market is said to be contestable (i.e., competitive) even though there is just one (or few) incumbent firm(s) in the market, which is (are), however, constantly put under the pressure of a potential new entry of a rival firm. The simple credible threat of a new entry, coupled with the absence of entry barriers, makes the market as competitive as one composed on many incumbent firms. For further details on contestability see the seminal contribution of Baumol, Panzer and Willig (1986).

[41] Past performance is widely used in private procurement. Although policies are different across countries due to legislative reasons, past performance is receiving increasing attention also by public buyers. For instance, article 48 of the 2004 European Directive establishes that the supplier can prove his ability to perform by a list of references regarding the most important works carried out in the last five years. The International Bank for Research and Development considers experience and past performance on similar contracts one of the key element of suppliers' evaluation, especially for large, complex projects (guidelines provided to institutions using the funds of the Bank, 2004). In Australia, the Department of Finance and Administration also provides guidelines for Australian public agencies. In the section 'Principle of Value for Money', the Commonwealth Procurement Guidelines (2005) states that among costs other factors must be considered when assessing suppliers. One of these is 'the performance history of each prospective supplier'. In the U.S. the FARs (Federal Acquisition Regulation, 2005) specifically regulates the issue of past performance for all U.S. federal agencies. In particular the FARs suggest agencies how and what type of information should be collected to evaluate contractors' PP.

[42] For an analysis of evaluation of past performance in US public procurement see Guerrero and Kirkpatrick (2001). For a discussion on past performance and an overview of recent evolutions of public procurement in the U.S. see Kelman (2002).

[43] See McMillan (1992) for more examples. The book also offers a interesting discussion on the instruments to stimulate contractor's performance and how to design incentive schemes.

[44] See Kim (1998), Doni (2005) and Calzolari and Spagnolo (2005).

[45] See again Calzolari and Spagnolo (2005). The buyer might even ask the contractor to put in its hand some 'hostage bonds' (or guarantees) that will not be given back in case of poor performance. Such a method may be a disciplining one only if the buyer is able to build a reputation of fairness which is difficult to obtain if the provided quality is not observable outside the contractual relationship.

[46] Calzolari and Spagnolo (2005) illustrate this point with a formal model.

[47] Fehr et al. (2004) show experimentally how in a dynamic exchange environment, when non contractible aspects become important, agents do not search for the best offer each period but rather stick to the same partner and cooperate with him as long as possible.

[48] Very often feedback (or reputation) mechanisms are used in marketplaces and e-procurement platforms to improve trade efficiency. Ebay, Amazon, Yahoo, and many other well-known e-markets use feedback systems to cope with high level of non-contractibility (or even with the absence of any formal contract) and opportunism in transactions.

[49] It is worth noticing that reputational incentives may also work when suppliers are uncertain about their future interaction(s) with the buyer. The simple possibility of future profits issued from this relationship may be sufficient to discipline suppliers' behavior as for NCQ provision. Also note that a supplier which plans to shut down its activities may prefer to sell its good reputation, namely its goodwill, instead of destroying it to save on costs for quality provision.

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