EIEF WORKING PAPER SERIES

EIEF

EINAUDI INSTITUTE FOR ECONOMICS AND FINANCE

EIEF Working Paper 22/10

December 2010

Contracts as Threats: on a Rationale for Rewarding A while Hoping for B

by

Elisabetta Iossa

(Brunel University, University of Rome "Tor Vergata", CMPO, CEDI and EIEF)

Giancarlo Spagnolo

(University of Rome "Tor Vergata", SITE, EIEF and CEPR)

Contracts as Threats: on a Rationale For Rewarding A while Hoping For B*

Elisabetta Iossa† and Giancarlo Spagnolo‡

This version: 21 December, 2010
First version: 1 September 2008.

Abstract

Contracts often reward inefficient tasks and are not enforced ex post. We provide an explanation based on the relationship between explicit contracts and implicit agreements. We show that signing but then ignoring contractual clauses requiring costly, inefficient, verifiable tasks (A) may facilitate relational contracting on efficient noncontractible tasks (B) by anticipating and strengthening punishments following defections. With adverse selection, it is optimal to choose tasks A analogous to B in terms of required skills. We also explain why stipulated damages must be moderate in size. These results apply independently of whether B is a 'productive' task or a 'bribe'.

JEL Classification: C73, D86, L14.

Keywords: Governance, incomplete contracts, multi-tasking, relational contracts.

---

*For helpful comments we wish to thank Fabrizio Adriani, Sumon Bhaumik, Giacomo Calzolari, Mathias Dewatripont, Andrea Guglielmi, Bob Gibbons, Ricardo Gil, Bruno Jullien, Bentley MacLeod, Salvatore Piccolo, Gustavo Piga, Patrick Rey, Stephane Saussier, Andy Skrzypacz, Silvia Sonderegger, Pablo Spiller, Giorgio Zanarone and conference and seminars participants at ATOM Centre Paris I, Brunel University, CMPO University of Bristol, DIW Berlin, CSEF University of Naples Federico II, EIEF, University of Rome 'Tor Vergata', VTI-KTH Stockholm, the 2009 ECARES Conference on Infrastructure Procurement in Bruxelles, the 2009 ISNIE Conference in Berkley, the 50th SIE Conference in Rome.

†Brunel University; University of Rome 'Tor Vergata', CMPO, CEDI, EIEF.

‡University of Rome 'Tor Vergata', SITE, EIEF, and CEPR.

The puzzles. It is well known that explicit contracts often reward inefficient (sometimes dysfunctional) easy-to-verify tasks, apparently at the expense of efficient but hard to monitor ones. It is probably less well known that often parties do not enforce contracted provisions. The puzzle is therefore twofold: Why inefficient tasks are often contractually specified? Why penalties for noncompliance are often waived, i.e. not exercised without any contract renegotiation? In this paper we propose an 'optimistic' joint explanation for these puzzling observations based on the interaction between explicit contracts, the choice whether to fully enforce them, and implicit agreements on noncontractible dimensions of performance.

Examples abound. In many organizations, employees are contractually required to arrive at work every day at a certain time and to stay until another time. When physical presence does not facilitate monitoring and the task can be as efficiently performed at home (think about creative non-team tasks), this is of little value for the organization relative to the cost born by employees. And many organizations then do not enforce these contractual clauses but allow instead flexible working hours. Similarly, in several European countries (including Germany, Italy and France) university professors' contracts establish a large number of teaching hours and long periods of presence. However, the universities do not always apply these clauses: individual teaching loads, presence and administrative duties are often informally reduced. Debt covenants in loan contracts, in particular accounting-based ones, are typically set tight ex ante so that they are very easily violated, but in more than a third of the cases they are waived after a violation without debt renegotiation or any other negative consequence for the borrower (Chen and Wei, 1993). Analogously, 'block booking' contracts in the film distribution industry typically specify a rigid minimum exhibition time, but these clauses are often disregarded ex post, particularly when a movie is not successful (Kenney and Klein, 2000). In procurement, contractual penalties for noncompliance are often waived.[1] At the level of the social contract, there are many laws and regulations that are often not enforced, and that would produce little social value if they were. "Work-to-rule" practices, or "white strikes", where a literal application of explicit contracts is used by employees to slow down production when fighting for pay raises, reveal that employment contracts in various industries are also not fully enforced and contain dysfunctional clauses.[2]

[1] For example, third-party inspections commissioned by the Italian Public Procurement Agency (Consip) in the period 2005-2008 showed that on a total of 1455 ascertained infringements by a contractor, remedies/penalties where only enforced in 64 cases, i.e. for less than 5% of the ascertained infringements. Analogous anecdotal evidence exists for large procurement of complex services in the UK (HM Treasury, 2006).

[2] See *http://libcom.org/organise/work-to-rule* for a nice up-to-date explanation of the practice from direct users, where one also reads the following: "Almost every job is covered by a maze of rules, regulations,

This paper. We analyze the interaction between explicit contracts and implicit agreements from a novel perspective, one emphasizing the difference between the ex-ante decision to sign an explicit contract and the ex-post decision of actually enforcing its clauses. While the role of ex ante contracts in shaping ex post renegotiation has been subject to extensive inquiry, to our knowledge the possibility of strategically ignoring contractual clauses has by and large been left unexplored.

Our model shows that inefficient contractual clauses may be optimally signed ex ante, not be enforced in equilibrium and effectively used as 'threat' to discipline informal agreements on noncontractible tasks. 'Overcontracting' produces a short-run effect relevant even for one-shot or occasional transactions. Using as threat inefficient contractual clauses transforms a Prisoner Dilemma's stage-game into a sequential game. Parties get the option to react to a deviation on the noncontractible task and punish it by calling for the application of the contract as soon as the deviation is observed. Consider for example a principal and an agent interested in trading on a valuable but nonverifiable task (B) in a static framework. The principal and the agent can sign an explicit contract requiring the agent - in exchange for some payment from the principal - to perform a different task (A) that is verifiable, costly for the agent, but of little value for the principal. They can then agree that, as long as the agent provides B, the principal will not enforce the contract on A. With A costly enough, the agent will then choose to provide B and, with A valueless, the principal will not enforce the contract on A. The optimal explicit contract thus exhibits overcontracting on costly verifiable tasks of little apparent value for the principal.[3] With contract enforcement costs, valuable tasks must be used as a threat. Moral costs from violating promises further enlarge the set of clauses that would work as threat.

A second, more familiar effect of overcontracting is a long-run one: when the exchange is repeated, inefficient contractual clauses can strengthen the punishment phase that disciplines defections and facilitate dynamic relational contracting. Within a long-run relationship the inefficient contractual clauses used as threat can be valuable to the principal even absent enforcement and moral costs of breaching promises.

standing orders, and so on, many of them completely unworkable and generally ignored. Workers often violate orders, resort to their own techniques of doing things, and disregard lines of authority simply to meet the goals of the company. There is often a tacit understanding, even by the managers whose job it is to enforce the rules, that these shortcuts must be taken in order to meet targets on time."

[3]Indeed, in their account of block booking contracts in the film distribution industry Kenney and Klein (2000) write that "...transactors over-constrained exhibitor behavior while relying on the distributor's superior reputational capital to enforce the contract flexibly." (p. 435).

This line of reasoning offers a rationale for the puzzles discussed earlier: organizations do not enforce contractual provisions on working hours for collaborative employees while they may apply them to punish those who behave opportunistically. Universities accommodate teaching reductions for academics as long as they excel in teaching quality or research, or are particularly collaborative on other activities that are hard to verify. Procurers may not apply contracted penalties/deductions as long as suppliers provide noncontractible performance dimensions, but may start levying them if they behave opportunistically.[4] Accounting-based debt covenants are waived without consequences if the borrower exerts effort and chooses promising new projects, but they are enforced, causing either debt renegotiation or a change in control, if the borrower behaves poorly.[5] Minimum exhibition time clauses are waived when the movie does not attract much audience, but they are applied when the cooperative relation between distributor and exhibitor breaks down. Governments may not normally enforce some inefficient laws, unless it helps them to deal with 'troublemakers'.[6] And in several personal communications, managers from the highway construction and IT development industries openly told us that it is common to insert exclusivity clauses in contracts with core suppliers that are typically not enforced unless the supplier starts performing poorly on nonverifiable dimensions.

Contracts as threats are also effective if task A is costless for a party to undertake but generates a loss to the other party. Here one party is punishing the other by applying his own contractual obligations that are dysfunctional for the second party. This is the case of work-to-rule practices: employees normally (in equilibrium) disregard dysfunctional contractual clauses to smoothen and speed up production, but during conflicts they apply them to block production and punish managers that did not stick to promises.

An important aspect that emerges from our analysis is that a main advantage of over-contracting is its ability to make utilities nontransferable. Because contract enforcement can

[4]The importance of the interaction between explicit and relational contracts emerges clearly in HM Treasury (2006): "The Government believes that the relationship between the public and private sector in a PFI project must always ultimately be contractual but should be overlaid with partnership working to ensure that operations are effective. In order to encourage this approach the Government will promote the development of a partnership agreement or shared vision document that sits outside of the actual PFI contract. This would not be legally binding but would set out the parameters of the public sector and private sector working relationship and spell out in some detail how the contract will be managed in practice."

[5]See Dichev and Skinner (2002) and Chava and Roberts (2008). Particularly consistent with our idea is Chava and Robert's finding that covenant violations have no negative consequences for the borrower when this is involved in a long term relationship with the lender.

[6]A well known example is that of Al Capone, convicted for a number of rather lose tax evasion charges that were not enforced to such a detail against normal citizens.

be more costly to the agent than valuable to the principal (or vice versa), overcontracting can discipline one party without increasing the temptation to defect of the other. For this reason, overcontracting dominates standard relational contracting where incentives are provided through discretionary monetary transfers, like performance bonuses, or by rents and the threat of separation. For this same reason, overcontracting has also distributional implications: a principal with bargaining power can use it to implement the efficient relational contract without leaving any rent to the agent. Of course, as with many other contractual commitments, the possibility of swift and cheap renegotiation reduces the benefits of overcontracting. But even when renegotiation is costless, overcontracting still brings the benefit of transforming simultaneous-move stage games into sequential-move ones where a defection can be punished by exercising the contract in the same period in which it occurs.

In the dynamic setup, we offer an explanation as to why penalties for contract infringement are often moderate, although effective enforcement of contractual obligations would suggest to set them high (Becker 1968, Abreu 1988). In a long-term relationship with overcontracting increasing penalties for non compliance by the agent reduces his incentive to defect but it raises the principal's one. Contractual penalties for infringements are then optimally bounded above by the cost of the contracted action for the agent.

We also consider the effects of overcontracting when agents have private information on their types. The principal now has to solve a more complicated program than usual. He must deal with no-deviation conditions for moral hazard linked to the relational contract, with truth-telling conditions imposed by adverse selection and with a third 'mixed' type of condition that relates to both problems. A low type could now first misrepresent himself and then defect on the noncontractible task; this double deviation must also be prevented. We find that adverse selection tends to reduce the gains from overcontracting unless types able to perform efficiently the noncontractible task B also tend to be efficient in performing the contractible task A. Because of this, it is optimal for the principal to chose a contractible task A that requires skills analogous to those required for the noncontractible task B.

In some of the examples discussed above, like debt covenants and block booking or exclusivity clauses, the inefficient contractual clauses where included in the contract by the same trading parties that most likely anticipated their discretional ex post enforcement. In other cases, like implicit exchanges in European universities, centralized procurements or work-to-rule strikes, the contract was designed by third parties (the ministry of education, a procurement agency, national employers and employees representatives). Then inefficient or dysfunctional clauses may have been inherited by the trading parties because of mistakes or contract standardization needs; yet they can be used strategically. Our model applies to and sheds light on both these situations. Our perspective also appears consistent with the puzzling recent evidence in Ryall and Sampson (2009) that contracts are more detailed and more likely to include penalties when contractors engage in frequent deals, i.e. when a long-term relationship is also likely present.[7]

Note that we give an 'optimistic' explanation as to why contractual clauses are often signed but not enforced. But of course discretion in contract enforcement may be abused for private purposes. Indeed, all our results can readily be re-interpreted from a much less optimistic point of view. The principal could be a non-benevolent agent of a large firm or public organization exploiting his discretion by extracting B-ribes or other private B-enefits in exchange for not enforcing explicitly contracted clauses between his organization and outsiders. As productive nonverifiable tasks, illegal exchanges must also be part of a self-enforcing implicit agreement sustained by credible threats.

The structure of the paper. We review the related literature in Section 1. In Section 2, we consider a simple Prisoner's Dilemma game to sketch some of the issues that emerge in a simple static framework. In Section 3 we apply our ideas to a dynamic environment, a repeated Principal-Agent relationship, to highlight several additional issues that do not emerge in a static set up. Section 4 considers the effects of contracts as threat in the presence of adverse selection. Section 5 considers some extensions whilst Section 6 briefly summarizes our main results and their empirical implications and concludes. All proofs are relegated to an Appendix.

1 Relation to the literature

Our work can be seen as a contribution to the economics of 'multi-tasking' and 'job design' sparked by the seminal work of Kerr (1975) and Holmstrom and Milgrom (1991). The latter

[7] These authors study a sample of 52 joint technology development contracts in the telecommunications and microelectronics industries. In their words: "Prior deal experience with any partner increases the probability that penalty clauses are included in the sample contract by 25%. Similarly, prior deals with a specific partner increase the likelihood that penalty provisions are included in the sample contract by 51%. Further investigation of the data suggests that the firms including penalty clauses in their contracts are those with a greater number of prior deals. For example, 85% of the contracts with penalty clauses are written by firms with prior deals and 57% of the contracts with penalty clauses involve firms with extensive prior deals (i.e., greater than ten prior deals)."

stressed that when some tasks are easy to contract upon whilst others are not, providing high powered incentives on the contractible tasks may lead the agent to disregard the other important tasks. This result has been often related to Kerr's classic management science piece on "the folly of rewarding A when aiming for B". Kerr offered several negative explanations for the frequent use of biased explicit rewards, including a common fascination or preference for objective and highly visible performance measures, moral biases and hypocrisy. On the contrary, after recognizing that signing a contract ex ante and enforcing it ex post are distinct decisions, our analysis shows that contracts on seemingly inefficient tasks (A) can be a powerful instrument to elicit effort on efficient but noncontractible tasks (B).

The core of our paper is dynamic and relates to the growing literature on relational contracts and their interaction with explicit ones. The formal theory of relational contracts was developed by Bull (1987), MacLeod and Malcomson (1989), Baker, Gibbons and Murphy (1994), and Levin (2003), among others, but the complex interaction between explicit and relational contracts is not yet fully understood.[8] We know from Baker, Gibbons and Murphy (1994) and Schmidt and Schnitzer (1995) that explicit contracting may hinder relational contracts by improving parties' fallback position when relationships break down after defections. On the other hand, Baker et al. (1994) also showed that there are conditions under which the introduction of an explicit contract on a verifiable (but noisy) performance measure facilitates relational contracting by increasing the overall expected value of a relationship.[9] In this vein are also Klein's (2000) argument that parties design explicit contracts to facilitate relational contracts, and Aghion, Dewatripont and Rey's (2002) idea of 'partial contracting', where contracts allocate decision rights to maximize future cooperation. Related are also the more recent model of Baker, Gibbons and Murphy (2006), which focuses on the effects of the contractual allocation of decision or control rights on future cooperation,[10] and Zanarone (2010), where discretional enforcement of valuable contractual clauses is used within a relational agreement to provide illegal discriminatory incentives to franchisees.

[8] See MacLeod (2007) and Malcomson (Forthcoming) for excellent surveys.

[9] Their model contemplates a contractible and a noncontractible signal of performance on a single task. They show that the highest implicit monetary bonus that can be credibly promised by a principal to an agent may increase when an explicit contract is introduced, but only when the contractible performance measure is too noisy to be useful absent a relational contract. In their framework explicit contracts are always enforced if signed and relational contracts always contemplate bonuses. In contrast, in our model, contracts as threats are signed but not enforced, and discretionary monetary transfers (like bonuses) are dominated as a mean to sustain a relational contract.

[10] Arguments in this spirit have also been made in the less directly related literature on asset ownership with relational contracting (e.g. Baker et al. 2002).

Closest to us in terms of approach are probably Bernheim and Whinston (1998), although in their set up explicit and relational contracts are substitutes. They emphasize that choosing not to regulate contractible tasks may be optimal, since the additional discretion may facilitate punishment and thus cooperation on noncontractible tasks. We show that the converse may be true; if we take into account the possibility to sign and then ignore explicit contracts, overcontracting may become the most effective way to elicit provision of valuable but noncontractible tasks. The ability of overcontracting of strengthening the long term punishment phase is instead reminding of the positive effect of inefficient ownership structures on investment in long term relationships with 'hold up' problems, as highlighted by Halonen (2002). Compared to an inefficient ownership structure, we show that inefficient contracting also creates a sequentiality that adds to the effect on the punishment phase and that is present even in static settings.

Our paper also contributes to the wider literature on modes of economic governance.[11] Williamson (1983) discusses a further governance mode besides integration, explicit contracting and relational/reputational forces: the "exchange of hostages" between parties. The characteristic of a 'good hostage' is to be more valuable to one party than to the other; the latter can then credibly promise to return the hostage or keep it, depending on the former party's behavior. This makes utility nontransferable, precisely as contracts as threats. Explicit contractual clauses that, if enforced, impose a higher cost to one party than the benefit for the other can indeed be seen as fostering cooperation by making parties 'hostages of each other'.[12]

From a theoretical point of view the first mechanism we unveil is also reminiscent of the ability of 'latent contracts' to curb moral hazard, as first discussed in Hellwig (1983); and of how option contracts may solve the 'hold up' problem in Noldeke and Schmidt (1995).[13] The main differences are that latent contracts are never actually signed in equilibrium, and that option contracts are signed but always either enforced or renegotiated ex post. Related to our work are also Aghion, Dewatripont and Rey (1994) where the contract is used to 'design'

[11] See Williamson (2005) and Dixit (2009) for recent overviews.

[12] The role of hostages in Williamson (1983) and of inefficient clauses in our set up are related to how relative performance evaluation solves the principal's commitment problem to pay informal rewards in Malcomson (1984), making him indifferent to whom to pay them. It is also related to how 'money burning' ensures truthful reporting in recent work on relational contracts with subjective evaluation like MacLeod (2003), Levine (2003) and Fuchs (2007) and in repeated games with communication like Kandori and Matsushima (1998).

[13] The sequentiality induced by contracts as threats also relates them to the mechanisms for subgame perfect implementation as studied e.g. by Moore and Repullo (1988).

the ex post renegotiation game to improve ex ante incentives and several papers that focus on how ex ante contracts can be used to affect the outcome of ex post renegotiation.[14] These mechanisms assume that actions are ex post verifiable and renegotiated and cannot explain why inefficient contractual clauses are signed but then ignored. Our focus on contact enforcement costs also relates our work to Doornik (2010), who first considered the possibility of not enforcing an existing explicit contract ex post when the cost of enforcement turns out to be larger than its benefits.

2 Contracts as Threats in a Simple Static Setting

To fix ideas, in this section we introduce some of the issues in the simplest possible static setting.

Setup. Consider the classic Prisoner's Dilemma game B below, where $b^D > b^C > b^N > b^S$. One can think of it as a bilateral specific investment problem with non contractible investment and output, or as a moral hazard in teams problem. Since actions are noncontractible, the dominant strategy is to defect (not invest, or shirk).

B	2 Cooperates	2 Defects
1 Cooperates	b^C, b^C	b^S, b^D
1 Defects	b^D, b^S	b^N, b^N

Suppose now that the players may agree, before playing B, to sign contracts on some verifiable task a_i that costs a_i to player i and produces no benefit for any players. If a player calls for the execution of the contract, the other party must comply with it.[15] Consider the following timing for this extended game.

Timing 1

Step 1: players sign some explicit contracts specifying a_i.

[14] See Evans (2008) for a very general treatment and Garlenau and Zwiebel (2009) for a recent application to debt covenants. Huberman and Kahn (1988) provided early examples of financial contracting under limited enforcement where it was optimal to introduce apparently suboptimal contractual clauses because of their effects on ex post renegotiation, a point also informally stressed by Masten (2000) in relation to non-financial transactions.

[15] This is the case under 'specific performance'.

Step 2: game B is played simultaneously.

Step 3: players observe the outcome of game B and then simultaneously choose whether to call for the application of any of the explicit contracts signed in step 1.

Benchmark. Consider the following strategy profile.

Strategies 1

In Step 1, sign two contracts prescribing $a_i > b^D - b^C$ *for each player.*

In Step 2, choose to cooperate.

In Step 3, if player j *cooperated in Step 2, ignore both explicit contracts. If player* j *defected, call for the application of the explicit contract prescribing* a_j *and ignore the one prescribing* a_i*.*

By backward induction, bilateral cooperation is now a Subgame Perfect Nash Equilibrium. If a party defects whilst the other cooperates, he will now obtain $b^D - a_i$ which by construction is lower than b^C, the payoff from cooperation. The explicit contract is used to construct a credible punishment: the contract is ignored if a player cooperates but it is executed if he does not. The contracted action a_i is valueless as otherwise a party would call for the execution of the contract even when the other party cooperated in game B.[16]

Insight 1. *Writing and ignoring explicit contracts on actions that are valueless but costly to undertake may allow to sustain the cooperative outcome in static settings.*

Dysfunctional clauses. Parties can also use as threats contractual clauses prescribing tasks that impose no cost on the performing party (e.g. prescribe to follow one particular procedure rather than another) but a substantial damage to the other (e.g. slow down production). In this interpretation, a_i is the damage suffered by party i when j executes the contract in order to punish a deviation. Impractical contractual procedures are for example often exploited by work-to-rule practices - white strikes.

Remark 1 *Contracts as threats may be effective also when they prescribe dysfunctional tasks.*

Contract enforcement costs. In reality calling for contract execution entails substan-

[16] And given that there are gains from trade, there will be ex-ante transfers ensuring that parties will sign such contracts.

tial costs.[17] Let $e > 0$ denote these enforcement costs, and suppose that the task a_i has now a value $v_j(a_i) < a_i$ to party j. The condition $v_j(a_i) < a_i$ ensures that the contract in itself is still inefficient. With $v_j(a_i) = e$, party j can again credibly threaten to call for the application of the explicit contract if i deviates on B, and can credibly promise to ignore the contract if i cooperates. With $v_j(a_i) > e$, instead, party j would always call for the application of the contract, whilst with $v_j(a_i) < e$ he would never do it and the threat would be empty. Thus, we have the following.

Insight 2. *With positive contract enforcement costs, contractual clauses requiring inefficient but valuable costly tasks can be credibly used as threats to elicit effort on efficient noncontractible tasks.*

Costs of breaching promises and substitutes tasks. The Subgame Perfect Equilibrium discussed above was sustained by a weak Nash equilibrium in the contract enforcement subgame. Recent work in behavioral and experimental economics, however, suggests that many individuals incur a substantial 'internal' cost when breaching a promise (e.g. Charness and Dufwenberg, 2006). Denote by e' this cost and assume that it is too small to directly induce cooperation on B, i.e.: $0 < e' < b^D - b^C$. If a player promises to enforce the explicit contract only if the other player defects on B, he will then incur cost $e + e'$ when the other player cooperated, and only e when the other player defected. As long as the value of the contracted task is such that $e < \nu_j(a_i) < e + e'$, the Subgame Perfect Nash Equilibrium will be supported by a strict equilibrium in the contract enforcement subgame.

An analogous result would obtain taking into account fairness concerns (see Fehr and Gaechter 2000a,b) or if the contracted tasks a_i were substitutes of the cooperative action. To see this last point in a simple way denote with $v_i(a, b)$, player i's utility, gross of any cost of undertaking actions. Contracts as threat are effective when

$$v_i(a_j, b^S) - v_i(0, b^S) \geq e + e' \geq v_i(a_j, b^C) - v_i(0, b^C),$$

where the first inequality ensures that the promise not to enforce the contract after cooperation in B is credible, whilst the second inequality ensures that the threat to enforce the contract upon a deviation in B is credible. When tasks are substitutes

$$v_i(a_j, b^S) - v_i(0, b^S) > v_i(a_j, b^C) - v_i(0, b^C),$$

[17] Djankov et al. (2003) empirically document how contract enforcement can be slow and costly even for simple contracts and in highly developed legal systems. See also http://www.doingbusiness.org/ExploreTopics/EnforcingContracts/

so that the equilibrium is strict even in the absence of enforcement costs and of costs of breaching promises.

Insight 3. *With costs of breaching promises or when tasks are substitutes, more valuable clauses can be credibly used as contracts as threats, implementing the outcome as a strict equilibrium in each subgame.*

Stipulated damages and non-transferable utility. Suppose now that in Step 1 of Timing 1 parties agree on some 'stipulated damages' F_i for contract violation: if a party i does not comply with a contract requiring action a_i, the other party is entitled to a compensation F_i. Let μF_i denote the net benefit for party j from receiving F_i, where $\mu \in [0, 1]$. In Step 3 players observe the outcome of game B and then simultaneously choose whether to levy the fine F_i if the action a_i was not undertaken. In this static framework, stipulated damages create an incentive to call for the execution of the contract independently of the occurrence of a defection in game B. This pecuniary incentive reduces the value of contracts as threats because contracts are always implemented.

Insight 4. *In static settings stipulated damages limit the effectiveness of contracts as threats.*

When parties want to use contracts as threats and forcing contracts are not feasible, they will choose a low μ, if possible, for example by introducing a third party as the recipient of the fine.[18] This highlights the importance of nontransferable utility in the mechanism we are discussing.

In the reminder of the paper we develop a dynamic principal-agent model to fully explore the role of contracts as threats in long-term relationships where actions are taken frequently within a contractual span. Among other things, we will see that in a full fledged dynamic environment contracts as threats are effective even with higher stipulated damages and fully selfish agents.

[18] In public procurement, the administration in charge of the contract is often not the recipient of the fine. Whilst this may hold because of accountability reasons, it may be valuable also for the use of contracts as threats.

3 Contracts as Threats and Relational Contracts

3.1 Basic Setup

Consider a long term (infinite horizon), bilateral, repeated interaction between a principal and an agent. Time is discrete and both parties discount future payoffs through a common and strictly positive factor $\delta < 1$. For the sake of crispness we normalize contract enforcement costs to zero ($e = 0$), disregard costs of breaching promises and consider only separable tasks. Let $c_J(j)$ denote the agent's increasing and convex cost of providing intensity $j \in I^J$ in task $J = A, B$, and let $v_J(j)$ denote the corresponding value to the principal, increasing in j and weakly concave. Both the principal and the agent are risk neutral and receive zero if they choose not to trade.[19]

The relationship between the principal and the agent is characterized by an explicit contract on a verifiable task A, and by an implicit agreement on A and on a nonverifiable task B. The explicit contract prescribes task intensity a, a per-period price p_A, and stipulated damages or fines (we shall use these terms interchangeably) F^α and F^P for the agent' and the principal's nonperformance, respectively. The implicit contract prescribes task intensity b and a per-period discretionary transfer t_B.

We start by assuming that the principal and the agent can commit to a long-term contract and that renegotiation is prohibitively costly. We will relax this assumption later to study the effect of renegotiation and short-term contracting.

The timing is as follows:

period 0: *The principal and the agent sign an explicit contract and/or agree on an implicit/relational contract.*

period 1: *An infinite repetition of the following stage game takes place:*

Stage Game (simultaneous actions):

Step 1: *The principal and the agent simultaneously choose verifiable and nonverifiable actions.*

Step 2: *The principal and the agent observe each other's Step 1 choices and, if violations of an explicit contract took place, they choose whether or not to impose fines* (F^α, F^P).

[19] Linearity in income is a convenient simplification and, with no uncertainty in the model, the degree of risk aversion plays no role.

We will also discuss the case of sequential timing, where in Step 1 the principal moves and pays any discretionary transfer before the agent chooses his actions (this is w.l.o.g. as the inverse timing leads to the same qualitative results).

3.2 Benchmark: Standard Relational Contracting

Suppose the principal and the agent informally agree that in each period the agent undertakes task B at level b and the principal operates a discretionary transfer t_B, with per-period payoffs $\{t_B - c_B(b),\ v_B(b) - t_B\}$. Parties use grim strategies to sustain the agreement: if either party deviates, the principal withholds payments forever and the agent never exerts effort in the future. We refer to this type of relational contracting, based on the use of discretionary transfers, as "standard relational contracting" (ST).

The principal and the agent will accept to participate to the contract if their respective expected payoff is nonnegative, that is

$$IR^{ST} - P \quad : \quad V \equiv \frac{v_B(b) - t_B}{1-\delta} \geq 0, \tag{1}$$

$$IR^{ST} - \alpha \quad : \quad U \equiv \frac{t_B - c_B(b)}{1-\delta} \geq 0. \tag{2}$$

The principal will not defect from the implicit agreement by withholding payment, if saving t_B in the current period does not compensate for the loss of future surplus $\frac{\delta(v_B(b)-t_B)}{1-\delta}$. His relational incentive constraint is then given by

$$RIC^{ST} - P : V \equiv \frac{v_B(b) - t_B}{1-\delta} \geq v_B(b). \tag{3}$$

The agent will undertake task B at intensity b in the current period if enjoying the surplus $t_B - c_B(b)$ in all future periods is better than saving $c_B(b)$ in the current period. Thus, the agent's relational incentive constraint is

$$RIC^{ST} - \alpha : U \equiv \frac{t_B - c_B(b)}{1-\delta} \geq t_B. \tag{4}$$

When instead the timing of the exchange is sequential, if the principal deviates by not paying t_B, the agent reacts immediately by not delivering b, so that the RHS of (RICST-P) becomes zero, making the constraint redundant.

As well known in the literature on relational contracting, the following result, to be used as benchmark, applies.

Lemma 1 ***(Standard Relational Contracting)*** *With demand for a single nonverifiable task and no explicit contracting on other tasks, the set of sustainable noncontractible task intensities are: (i) when actions are simultaneous*

$$\Phi^{ST}_{Sml} = \left\{ b \in I^B : \delta^2 v_B(b) - c_B(b) \geq 0 \right\}; \tag{5}$$

and (ii) when actions are sequential

$$\Phi^{ST}_{Seq} = \left\{ b \in I^B : \delta v_B(b) - c_B(b) \geq 0 \right\}; \tag{6}$$

where, from (5), $\Phi^{ST}_{Seq} \supseteq \Phi^{ST}_{Sml}$*.*[20]

Proof: see the Appendix.

3.3 Contracts as Threats: (Over)Contracting on A to Obtain B

Suppose that the implicit contract prescribes $a = 0$ and $b > 0$ on the equilibrium path, sustained by the threat of enforcing the explicit contract on A in case of defection. Thus, if the agent deviates by not undertaking B or if the principal deviates by not paying t_B, a grim punishment phase is triggered in which the explicit contract is enforced, requiring the agent to exert a (or incur fine $F^\alpha \geq a$) forever after. Suppose also that task A is valueless: $v_A(a) = 0$. In this setting, the participation constraints of the principal and the agent are respectively given by

$$\begin{aligned} IR^{OV} - P \quad &: \quad \frac{v_B(b) - p_A - t_B}{1-\delta} \geq 0, \\ IR^{OV} - \alpha \quad &: \quad \frac{t_B + p_A - c_B(b)}{1-\delta} \geq 0. \end{aligned}$$

Suppose that $t_B \geq 0$: the discretionary transfer takes the form of a payment from the principal to the agent. A deviation by the principal then consists in not paying t_B when b was observed and in levying the fine F^α on the agent for not exerting a.[21] After such a

[20] In the sequential game we have assumed that first the principal pays t_B and then the agent chooses task intensity. As the only possible deviation is from the agent, giving all the surplus to the agent by setting $t_B = v_B(b)$ maximized cooperation. If we invert the sequence of moves and assume that first the agent chooses verifiable and non-verifiable actions and then the principal pays any explicitly and implicitly contracted transfers, then the relevant constraint becomes (RIC-P). The set of sustainable actions remains the same and it is now found by setting $t_B = c_B(b)$ and thus giving all the surplus to the principal.

[21] Deviating by not paying the transfer p_A at the beginning is not profitable, as then the agent will not perform and will exercise the penalty $F^P \geq p_A$.

defection, the principal will have to pay p_A forever after (optimal if $F^P \geq p_A$) or otherwise pay the fine F^P (optimal if $F^P < p_A$). The relational incentive constraint of the principal is therefore

$$RIC^{OV} - P : \frac{v_B(b) - p_A - t_B}{1-\delta} \geq v_B(b) - \min\left[p_A, F^P\right] + \mu F^\alpha - \frac{\delta \min\left[p_A, F^P\right]}{1-\delta}. \tag{7}$$

Conversely, the agent can defect from the relational contract by not providing b, but then he will have to provide a (optimal if $F^\alpha \geq c_A(a)$) or pay the fine F^α (optimal if $F^\alpha < c_A(a)$). Therefore, the relational incentive constraints of the agent is

$$RIC^{OV} - \alpha : \frac{t_B + p_A - c_B(b)}{1-\delta} \geq t_B + p_A - \min\left[F^\alpha, c_A(a)\right] + \delta \frac{\min\left[p_A, F^P\right] - \min\left[F^\alpha, c_A(a)\right]}{1-\delta}. \tag{8}$$

From the incentive constraints above we obtain the following.

Proposition 1 ***(Optimality of Low Fines).*** *The set of sustainable relational contracts with explicit overcontracting is nonempty. Its maximal element is obtained by setting the fines at the minimum level necessary to induce compliance with the explicit contract, i.e.* $F^\alpha = c_A(a)$ *and* $F^P = p_A$.

Proof: see the Appendix.

Proposition 1 provides a novel rationale as to why contractual remedies for underperformance are often rather low.[22] Higher contracted fines have a stronger deterrence effect but with overcontracting they also reduce the feasibility of cooperation by giving stronger incentives to defect from the relational contract and cash the fine even when the other party complied with the informal agreement.

In the light of Proposition 1, the two relational constraints reduce to

$$R\tilde{I}C^{OV} - P : \frac{\delta v_B(b) - t_B}{1-\delta} \geq \mu c_A(a),$$

and

$$R\tilde{I}C^{OV} - \alpha : c_A(a) \geq c_B(b) - \delta t_B.$$

By cooperating, the principal gains the surplus $v_B(b)$ from the valuable task in all future periods and gives up the gain $\mu F^\alpha = \mu c_A(a)$ from levying the fine in the current period. By

[22] See e.g. the evaluation of standard penalties for late delivery in US highway construction in Bajari and Lewis (2010).

cooperating, the agent incurs the cost $c_B(b)$ in the current and in future periods, it secures t_B in all future periods and it saves the cost $c_A(a)$ of undertaking the explicitly contracted task A in the current and in future periods. These relational constraints are independent of p_A since p_A must be paid regardless of whether b is performed. Summing up the two constraints, we obtain

$$RIC^{OV} : \delta v_B(b) - c_B(b) - (1-\delta)\, t_B + c_A(a)\,(1 - \mu\,(1-\delta)) \geq 0. \tag{9}$$

Since the LHS of this constraint decreases with t_B and it is not affected by p_A, the highest sustainable level of b is obtained for $t_B = 0$ with p_A chosen so as to satisfy IR^{OV}. This leads us to the following Lemma.

Lemma 2 ***(Suboptimality of Discretionary Transfers).*** *With overcontracting, discretionary transfers are suboptimal: in any relational efficient equilibrium $t_B = 0$.*

Proof: see the Appendix.

Monetary transfers make utilities transferable, they can discipline one party but only at the cost of increasing the temptation to defect of the other. Instead, overcontracting makes utilities nontransferable, disciplining one party without increasing the temptation to defect of the other.

Proposition 2 *(**Rewarding** A **to Obtain** B) Inefficient (over-)contracting on a verifiable task A allows to sustain higher levels of the nonverifiable task B than standard relational contracting under both sequential and simultaneous timing. In particular, the set of sustainable task intensities is*

$$\Phi^{OV} = \left\{ b \in I^J : \delta v_B(b) - c_B(a)\mu\,(1-\delta) \geq 0 \right\}, \tag{10}$$

with

$$\Phi^{OV} \supset \Phi^{ST}_{Seq} \supset \Phi^{ST}_{Sml}.$$

Proof: see the Appendix.

Compared to standard relational contracting, overcontracting generates two effects. First, it gives the principal the ability to levy a contracted fine after observing a deviation by the agent. This effect is analogous to that discussed in Section 2. By allowing the principal to react immediately to a deviation by the agent, overcontracting generates a sequentiality that facilitates cooperation, strictly so when the stage game is simultaneous. With an intensity of task A such that $c_A(a) = c_B(b)$, the agent is made indifferent between complying with the implicit contract, exerting b, and deviating, exerting a (or paying the fine $F^{\alpha} = c_A(a)$). Overcontracting can then do at least as well as standard relational contracting with sequential timing where the agent moves first and only the principal's incentive constraint matters.

Second, by requiring parties to comply with an inefficient explicit contract if cooperation on B breaks down, overcontracting strengthens the punishment phase starting from the period after a defection takes place. This effect explains why overcontracting can also do strictly better than standard relational contracting with sequential timing.

4 Adverse Selection

Suppose now that the costs for the agent of undertaking tasks A and B are private information. Let θ denote the agent's type, with $\theta \in \{\underline{\theta}, \overline{\theta}\}$ and $\Pr(\underline{\theta}) = \gamma$, and suppose that $\underline{\theta}$ has cost $\underline{c}_B$ of undertaking task B and cost $\underline{c}_A$ of undertaking task A, whilst these costs for type $\overline{\theta}$ are respectively $\overline{c}_B$ and $\overline{c}_A$. We assume that $\overline{c}_B(b) > \underline{c}_B(b)$ and refer to $\underline{\theta}$ as the "efficient" type. We shall say that costs are 'positively correlated' across types if $\overline{c}_A(a) > \underline{c}_A(a)$, so that $\underline{\theta}$ is also more efficient at undertaking A. We shall say that costs are 'negatively correlated' if $\overline{c}_A(a) < \underline{c}_A(a)$.

Suppose that the principal wants to induce both types to exert effort on B.[23] Applying the revelation principle, we consider a direct truthful mechanism and let $\{\underline{t}, \underline{a}, \underline{b}\}$, $\{\overline{t}, \overline{a}, \overline{b}\}$ denote the contract, specifying both implicit and explicit terms, offered to the agent when he reports $(\underline{\theta}, \overline{\theta})$ respectively. The participation constraints for the agent are now

$$\overline{IR} \quad : \quad \frac{\underline{t} - \underline{c}_B(\underline{b})}{1+\delta} \geq 0, \tag{11}$$

$$\underline{IR} \quad : \quad \frac{\overline{t} - \overline{c}_B(\overline{b})}{1+\delta} \geq 0. \tag{12}$$

The incentive compatibility conditions for each type are given by a set of three conditions, one for each possible deviation. Consider type $\underline{\theta}$. First, the contract must ensure that the

[23] If instead he wants to induce only $\overline{\theta}$ to work, then it suffices to offer $t = \underline{c}_B(b) = \underline{c}_A(a) < \overline{c}_A(a) = \overline{c}_B(b)$. Type $\overline{\theta}$ will then be indifferent between exerting effort and shirking on B, and he will get zero rent. Type $\underline{\theta}$ will not accept the contract.

agent has incentive to undertake task B when he truthfully reports his type. The following moral hazard constraints must then be satisfied

$$\begin{aligned}
\overline{RIC} \quad &: \quad \frac{\underline{t} - \underline{c}_B\left(\underline{b}\right)}{1+\delta} \geq \frac{\underline{t} - \underline{c}_A\left(\underline{a}\right)}{1+\delta}; \\
\underline{RIC} \quad &: \quad \frac{\overline{t} - \overline{c}_B\left(\overline{b}\right)}{1+\delta} \geq \frac{\overline{t} - \overline{c}_A\left(\overline{a}\right)}{1+\delta}.
\end{aligned}$$

Second, the agent must have incentive to truthfully report his type when he complies with the relational contract and undertakes B. That is, the following adverse selection constraint must be satisfied

$$\begin{aligned}
\underline{IC} \quad &: \quad \frac{\underline{t} - \underline{c}_B\left(\underline{b}\right)}{1+\delta} \geq \frac{\overline{t} - \underline{c}_B\left(\overline{b}\right)}{1+\delta}; \\
\overline{IC} \quad &: \quad \frac{\overline{t} - \overline{c}_B\left(\overline{b}\right)}{1+\delta} \geq \frac{\underline{t} - \overline{c}_B\left(\underline{b}\right)}{1+\delta}.
\end{aligned}$$

Third, the agent must have incentive to truthfully report his type and at the same time comply with the relational contract by undertaking B. That is, the following novel constraint, combining both adverse selection and moral hazard, must be satisfied

$$\begin{aligned}
\overline{IC} - \overline{RIC} \quad &: \quad \frac{\overline{t} - \overline{c}_B\left(\overline{b}\right)}{1+\delta} \geq \frac{\underline{t} - \overline{c}_A\left(\underline{a}\right)}{1+\delta}; \\
\underline{IC} - \underline{RIC} \quad &: \quad \frac{\underline{t} - \underline{c}_B\left(\underline{b}\right)}{1+\delta} \geq \frac{\overline{t} - \underline{c}_A\left(\overline{a}\right)}{1+\delta}.
\end{aligned}$$

The interaction between the implicit and the explicit contract in the presence of adverse selection gives then the following result.

Proposition 3 *When there is a strong positive cost correlation among tasks, asymmetric information has no impact on the set of task intensities sustainable through overcontracting. In all remaining cases (weak positive correlation, negative correlation or no correlation), asymmetric information reduces the level of sustainable task intensities.*

As in standard principal agent models, the efficient agent must receive an informative rent to induce truthful revelation of his type. Since the efficient type can obtain $\overline{t}$ whilst saving on the cost of undertaking B, this rent must be at least equal to[24]

$$\underline{U} = \Delta_B\left(\bar{b}\right),$$

where $\Delta_B\left(\bar{b}\right) \equiv \bar{c}_B\left(\bar{b}\right) - \underline{c}_B\left(\bar{b}\right)$. With $\underline{U} = \Delta_B\left(\bar{b}\right)$ and $\overline{U} = 0$, the set of incentive compatibility constraints can then be rewritten as

$$\bar{c}_A\left(\underline{a}\right) \geq \underline{c}_B\left(\underline{b}\right) + \Delta_B\left(\bar{b}\right), \quad (13)$$

$$\underline{c}_A\left(\underline{a}\right) \geq \underline{c}_B\left(\underline{b}\right), \quad (14)$$

$$\bar{c}_A\left(\bar{a}\right) \geq \bar{c}_B\left(\bar{b}\right). \quad (15)$$

Constraints (14) and (15) are the standard relational constraint under known costs. Constraint (13) is new and it arises from the interaction between adverse selection and relational contracting. In standard adverse selection models, the inefficient type has no incentive to mimic the efficient type because he would be unable to cover his costs for the same transfer as the efficient type. This is also true in our setting, where the inefficient type would incur a loss if he undertook the level of task B designed for the efficient type, $\bar{b}$, for a transfer $\bar{t}$. Now, however, the temptation to mimic the efficient type is stronger because the agent can also choose to shirk on task B. If then constraint (13) is binding in equilibrium, the level of $\underline{a}$ will need to increase to ensure truthtelling, thus increasing the incentives of the principal to defect.

The gain from this double deviation is however affected by the cost correlation across types for the two tasks. With sufficiently correlated tasks, for any given $\underline{b}$ and $\underline{a}$ such that $\underline{c}_A\left(\underline{a}\right) = \underline{c}_B\left(\underline{b}\right)$, we have that $\bar{c}_A\left(\underline{a}\right)$ is sufficiently high that constraint (13) is slack at the optimum. Take for example academic research as the unverifiable task B and teaching hours as the verifiable task A waived if quality research is observed. Whilst, say, 80 hours may be sufficient to induce a good researcher to do quality research in exchange of the teaching reduction, they maybe too low for a bad quality researcher not to be attracted by the prospect of taking the research position and then do low-quality research and 80 more hours of teaching. This temptation is enhanced (resp. weakened) if skills in teaching and research are negatively (resp. positively) correlated in the sense that the type who is inefficient at undertaking research is instead good (resp. bad) at teaching. Since raising a (and thus

[24] From $\underline{IC} - \underline{IC}$ and $\overline{IR}$, we have

$$\frac{\underline{t} - \underline{c}_B\left(\underline{b}\right)}{1+\delta} \geq \frac{\bar{t} - \underline{c}_A\left(\bar{a}\right)}{1+\delta} \geq \frac{\bar{c}_B\left(\bar{b}\right) - \underline{c}_B\left(\underline{b}\right)}{1+\delta} > 0.$$

$\overline{c}_A(a)$ and $\underline{c}_A(a)$) increases the incentives of the principal to deviate, the intensity of task B sustainable with overcontracting is maximized when task A is positively correlated with task B, like for consultancy in our previous example rather than teaching. To emphasize:

Corollary 1 *In the presence of asymmetric information on costs, overcontracting on task A is most effective to induce effort on task B when the costs of undertaking these tasks are positively correlated across types.*

5 Extensions

The value of contracted tasks A. We have so far considered the case where enforcing the contract on A is valueless to the principal if the agent performed on B. The proposition below extends the analysis.

Proposition 4 *(**The value of** A) In a dynamic setting, positive levels of the noncontractible task B are sustainable in equilibrium with overcontracting on a verifiable task A even if enforcing compliance on A is valuable to the principal. However, the sustainable task intensity for the noncontractible task B that is achievable through overcontracting on a verifiable task A is maximized when enforcing the contract on A produces no net value for the principal.*

Proof: see the Appendix.

When explicit contracts are only used as threats, lower values of A reduce the principal's incentive to enforce the explicit contract even when the agent cooperates, and thus they help to enforce cooperation. However, in a dynamic setting, contractual clauses on tasks with strictly positive net value for the principal can also consistently be used as threats, the punishment phase helping to discipline the incentive of the principal to enforce the contractual clause even if the agent cooperates.

Renegotiation and short-term contracts. In situations such as national university contracts or employment contracts in unionized industries, actions are chosen repeatedly and frequently within a contractual span and the parties can commit to long-term explicit contracts. Renegotiation is also forbidden in many public procurements legislations. In other situations however actions are taken less frequently and the time and cost of renegotiation are moderate relative to the gains renegotiation may bring ex post, as in our examples of debt covenants and exclusive contracts. To take these situations into account, suppose now that signed contracts can be renegotiated at the end (or beginning) of each stage game, as typically assumed in the literature on relational contracting (see Halonen, 2002; Levin 2003). After a deviation is observed, at the renegotiation stage, the principal and the agent will bargain to share the gain from not implementing the inefficient explicit contract in the future. Assuming for simplicity that $\mu = 1$, the gain from renegotiation is: $\frac{\delta c_A(a)}{1-\delta} - z$. When $z \geq \frac{\delta c_A(a)}{1-\delta}$ at $c_A(a) = c_B(b^{OV})$, no renegotiation takes place, so we focus here on $z < \frac{\delta c_B(b^{OV})}{1-\delta}$. Assuming $0 \leq z < \frac{\delta c_A}{1-\delta}$ and 50:50 Nash bargaining in the renegotiation phase, the agent obtains

$$\frac{\delta (p_A - c_A)}{1-\delta} + \frac{1}{2}\left(\frac{\delta c_A}{1-\delta} - z\right) = \frac{\delta \left(p_A - \frac{1}{2}c_A\right)}{1-\delta} - \frac{z}{2},$$

whilst the principal obtains

$$\frac{-\delta p_A}{1-\delta} + \frac{1}{2}\left(\frac{\delta c_A}{1-\delta} - z\right) = -\frac{\delta \left(p_A - \frac{1}{2}c_A\right)}{1-\delta} - \frac{z}{2}.$$

We then obtain the following Proposition.

Proposition 5 ***(Overcontracting with Renegotiation).*** *Renegotiation reduces the task intensities that are sustainable with overcontracting. The set of sustainable task intensities is now*

$$\begin{matrix} \tilde{\Phi}^{OV} = \left\{b \in I^B : \delta v_B(b) - c_B(a)(1-\delta) \geq 0\right\} \\ \tilde{\Phi}^{OV} = \left\{b \in I^B : \delta v_B(b) - c_B(b) + (1-\delta)z \geq 0\right\} \end{matrix} \left\{ \begin{matrix} if & \frac{\delta c_B\left(b^{OV}\right)}{1-\delta} < z \\ if & \frac{\delta c_B\left(b^{OV}\right)}{1-\delta} \geq z \end{matrix} \right. , \qquad (16)$$

with the maximum element of $\tilde{\Phi}^{OV}$ increasing in z and with $\tilde{\Phi}^{OV} \subseteq \Phi^{OV}$. However: (i) As long as $z \neq 0$, overcontracting allows to sustain higher levels of noncontractible task intensities b than standard relational contracting: $\tilde{\Phi}^{OV} \supset \Phi^{ST}_{Seq} \supset \Phi^{ST}_{Sml}$. (ii) At $z = 0$, overcontracting weakly dominates standard relational contracting and strictly dominates it when the timing of the stage game is simultaneous.

Proof: see the Appendix.

By increasing the payoffs of the parties in the punishment phase, renegotiation reduces the sustainability of relational contracts with overcontracting. As payoffs raise more the lower the renegotiation cost, the maximum sustainable task intensity decreases as z decreases. However, even in the degenerate case of $z = 0$ renegotiation does not eliminate the value of overcontracting because of the ability of overcontracting to create sequentiality within the stage game. Indeed, by inspection, at $z = 0$, $\tilde{\Phi}^{OV} = \Phi^{ST}_{Seq}$ in (6).

The same result obtains when only one-period explicit contracts are available and renegotiation can occur only at the beginning/end of the game.

Corollary 2 ***(Overcontracting with Short-term Contracts)*** *The set of sustainable relational contracts with overcontracting when only short term contracts are feasible is the same as that with long-term overcontracting and costless renegotiation ($z = 0$).*

Proof: see the Appendix.

Distributional effects. Under standard relational contracting, $t_B \geq c_B(b)/\delta$ is necessary for (RIC$^{\text{ST}}$-α) to be satisfied: the agent must be given a rent of at least $(1-\delta)c_B/\delta$. Under overcontracting, instead, an agent who gets no surplus can still get a long-term benefit from continuing the contract because there is a cost of deviating. In the absence of renegotiation, for example, choosing a such that $c_A(a) = c_B(b)$ suffices to remove any incentive to deviate. Overcontracting has thus important distributional effects:

Corollary 3 *(**Distributional Effects of Overcontracting**) Overcontracting on A allows the principal to implement any level of B that is feasible under standard relational contracting whilst retaining a greater share of the surplus.*

Proof: see the Appendix.

6 Conclusions

We have shown that explicit contracts can not only be seen as safe "boundaries" within which relational contracts operate better, as suggested by Klein (2000), or as constraints on discretion that hinder relational contracting, as suggested by Bernheim and Whinston (1998), but also as credible "threats" that are not applied on the equilibrium path but actively help governing relationships. Our results offer a novel 'optimistic' explanation why contracts often include clauses rewarding apparently suboptimal tasks; why these are often not applied, i.e. waived without renegotiation or other consequences; and why it is optimal in these situations to limit explicit penalties for infringements. To the extent that in countries with higher enforcement costs we have greater noncontractibility, our analysis suggests that we should observe overcontracting more often in environments where enforcement costs are larger. We also show that the value of contractible tasks used as threats should be larger the larger are contract enforcement costs. When adverse selection is also a problem, the contractible task chosen as a threat should require skills analogous or correlated to those necessary to perform the needed noncontractible task.

As mentioned earlier, we have mainly focused on legal and productive noncontractible tasks B (effort or investments). However, overcontracting could also be used to govern exchange of illegal tasks, such as bribes. The trade off between the positive and negative effects of overcontracting and the optimal regulatory response to it in different legal and cultural environments appears an important question to address in future work.

7 The Appendix

Proof of Lemma 1. **(i)** With standard relational contracting and simultaneous timing, the set of feasible relational contracts maximizes b subject to ($\mathrm{IR}^{\mathrm{ST}}$-P), ($\mathrm{IR}^{\mathrm{ST}}$-$\alpha$), ($\mathrm{RIC}^{\mathrm{ST}}$-P) and ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$). When ($\mathrm{RIC}^{\mathrm{ST}}$-P) and ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$) are satisfied, ($\mathrm{IR}^{\mathrm{ST}}$-P) and ($\mathrm{IR}^{\mathrm{ST}}$-$\alpha$) are also satisfied, thus we can ignore the latter two constraints. Now let $b^{ST}(\delta)$ denote the highest sustainable b under standard relational contracting. We show that at b^{ST}, both ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$) and ($\mathrm{RIC}^{\mathrm{ST}}$-P) must be binding. Suppose by contradiction that ($\mathrm{RIC}^{\mathrm{ST}}$-P) is binding whilst ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-$\alpha$) is slack at $b^{ST}(\delta)$. Then b can be increased, which increases $c_B(b)$ and $v_B(b)$, keeping both ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$) and ($\mathrm{RIC}^{\mathrm{ST}}$-P) satisfied: a contradiction. Suppose next that ($\mathrm{RIC}^{\mathrm{ST}}$-P) is slack whilst ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-$\alpha$) is binding at $b^{ST}(\delta)$. Then b can be increased, whilst $t_B(b)$ is increased so that ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$) and ($\mathrm{RIC}^{\mathrm{ST}}$-P) remain satisfied: a contradiction. Finally, at the optimum ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$) must also be binding (which implies that ($\mathrm{RIC}^{\mathrm{ST}}$-P) is also biding), since if it was not, it would be possible to increase b and thus $c_B(b)$, keeping both ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$) and ($\mathrm{RIC}^{\mathrm{ST}}$-P): a contradiction. We then obtain: $t_B = \frac{c_B(b)}{\delta}$ and substituting for this value in ($\mathrm{RIC}^{\mathrm{ST}}$-P), we get condition (5). **(ii)** With sequential timing, the set of sustainable relational contracts satisfies ($\mathrm{IR}^{\mathrm{ST}}$-P), ($\mathrm{IR}^{\mathrm{ST}}$-$\alpha$) and ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$), and again we can ignore ($\mathrm{IR}^{\mathrm{ST}}$-$\alpha$) implied by ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$). Noting that ($\mathrm{RIC}^{\mathrm{ST}}$-$\alpha$) is easier to satisfy the higher is t_B, the highest sustainable b is obtained by taking the highest t_B compatible with (IR^{ST}-P), which gives $t_B = v_B(b)$. Substituting for $t_B = v_B(b)$ in (RIC^{ST}-α) we obtain expression (6).■

Proof of Proposition 1. Summing up (RIC^{OV}-P) and (RIC^{OV}-α), we obtain

$$\begin{aligned} RIC^{OV} \quad : \quad & \frac{v_B(b) - c_B(b)}{1-\delta} \geq v_B(b) + p_A + t_B - \min\left[p_A, F^P\right] + \\ & +\mu F^\alpha + \frac{\delta p_A - \delta \min\left[p_A, F^P\right] - \min\left[F^\alpha, c_A(a)\right]}{1-\delta}. \end{aligned}$$

By inspection, F^P should be maximized as it appears with a negative sign on the RHS of the inequality; thus $F^P = p_A$. Now suppose $F^\alpha \leq c_A(a)$, then (RIC^{OV}) becomes

$$\frac{v_B(b) - c_B(b)}{1-\delta} \geq v_B(b) + t_B - \frac{1 - \mu(1-\delta)}{1-\delta} F^\alpha,$$

and as F^α appears with a negative sign on RHS, the set of sustainable contracts is found by maximizing F^α, giving $F^\alpha = c_A(a)$. Similarly, if $F^\alpha \geq c_A(a)$, then the RHS of (RIC^{OV}) increases in F^α and the highest b is found for $F^\alpha = c_A(a)$.■

Proof of Lemma 2. When $t_B \leq 0$ by deviating the principal can only levy the fine whilst the agent can withhold payment to the principal. The relational incentive constraints therefore become

$$\begin{aligned} R\tilde{I}C^{OV} - P \quad &: \quad \frac{v_B(b) - p_A - t_B}{1-\delta} \geq v_B(b) - t_B - p_A + \mu F^\alpha - \frac{\delta \min\left[p_A, F^P\right]}{1-\delta}, \\ R\tilde{I}C^{OV} - \alpha \quad &: \quad \frac{t_B + p_A - c_B(b)}{1-\delta} \geq p_A - \min\left[F^\alpha, c_A(a)\right] + \delta \frac{p_A - \min\left[F^\alpha, c_A(a)\right]}{1-\delta}. \end{aligned}$$

Summing up these two constraints (fines are unchanged), we have

$$RIC^{OV} : \ \delta v_B(b) + (1-\delta)t_B - c_B(b) + c_A(a)\left(1 - \mu(1-\delta)\right) \geq 0,$$

where the LHS is increasing in t_B, thus suggesting the optimality of $t_B = 0$ and choose p_A to satisfy (IR-P) and (IR-α).■

Proof of Proposition 2. The set of feasible relational contracts with overcontracting maximizes b subject to (IR^{OV}-P), (IR^{OV}-α), ($\tilde{\text{RIC}}^{\text{OV}}$-$\alpha$) and ($\tilde{\text{RIC}}^{\text{OV}}$-P). Since p_A only affects

($\mathrm{IR}^{\mathrm{OV}}$-P), ($\mathrm{IR}^{\mathrm{OV}}$-$\alpha$), then any $p_A \in [c_B(b), v_B(b)]$ is feasible. Now let $b^{OV}(\delta)$ denote the highest sustainable b. We show that at b^{OV}, both ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-$\alpha$) and ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-P) must be binding. Suppose by contradiction that ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-P) is binding whilst ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-$\alpha$) is slack. Then $c_A(a)$ can be reduced so as to keep ($\mathrm{RIC}^{\mathrm{OV}}$-$\alpha$) satisfied whilst loosening ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-P), making higher levels of b implementable: a contradiction. Suppose next that ($\mathrm{RIC}^{\mathrm{OV}}$-$\alpha$) is binding whilst ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-$\alpha$) is slack. Then, we can increase b and a so as to leave ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-$\alpha$) binding and keep ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-P) satisfied. Setting both ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-$\alpha$) and ($\tilde{\mathrm{RIC}}^{\mathrm{OV}}$-$P$) binding we obtain expression (10).■

Proof of Proposition 4. With $v_A(a) > 0$, a term $\frac{v_A(a)}{1-\delta}$ is added to the RHS of (RIC^{OV}-P) whilst ($\mathrm{RIC}^{\mathrm{OV}}$-P),($\mathrm{IR}^{\mathrm{OV}}$-P) and ($\mathrm{IR}^{\mathrm{OV}}$-$\alpha$) remain unchanged. ($\mathrm{RIC}^{OV}$-P) can then be satisfied for sufficiently high δ, which proves the first statement. Since the LHS of ($\mathrm{RIC}^{\mathrm{OV}}$-P) is independent of $v_A(a)$ whilst the RHS is increasing in $v_A(a)$ and since (RIC^{OV}-P), the second statement follows.■

Proof of Proposition 5. With renegotiation, the relational incentive constraints of the principal and the agent become respectively (fines are unchanged and $t_B = 0$)

$$\begin{aligned} R\hat{I}C^{OV} - P &: \frac{v_B(b) - p_A}{1-\delta} \geq v_B(b) - p_A + c_A(a) - \delta\frac{p_A - \frac{1}{2}c_A(a)}{1-\delta} - \frac{z}{2}, \\ R\hat{I}C^{OV} - \alpha &: \frac{p_A - c_B(b)}{1-\delta} \geq p_A - c_A(a) + \delta\frac{p_A - \frac{1}{2}c_A(a)}{1-\delta} - \frac{z}{2}. \end{aligned}$$

Suppose that $\frac{\delta c_B(\hat{b}^{OV})}{1-\delta} \geq z$. The two relational constraints simplify to

$$\begin{aligned} R\hat{I}C^{OV} - P &: \delta v_B(b) \geq c_A(a)[\mu(1-\delta) + \frac{\delta}{2}] - (1-\delta)\frac{z}{2}; \\ R\hat{I}C^{OV} - \alpha &: c_A(a)(1 - \frac{\delta}{2}) \geq c_B(b) - (1-\delta)\frac{z}{2}. \end{aligned}$$

and following the same reasoning as in the proof of Proposition 2, the set of sustainable relational contracts is found by choosing a and b such that ($\hat{\mathrm{RIC}}^{OV}$-α) and ($\hat{\mathrm{RIC}}^{OV}$-P) are binding. This gives

$$\begin{aligned} c_A(\hat{a}^{OV})(1 - \frac{\delta}{2}) &= c_B(\hat{b}^{OV}) - (1-\delta)\frac{z}{2}, \\ \delta v_B(\hat{b}^{OV}) - c_B(\hat{b}^{OV})\frac{2(1-\delta)\mu + \delta}{2-\delta} + (1-\delta)z\frac{1+\mu(1+\delta)}{2-\delta} &= 0, \end{aligned}$$

with $\frac{\delta}{1-\delta}c_A(\hat{a}^{OV})-z=2\frac{\delta c_B(b^{OV})-z(1-\delta)}{(1-\delta)(2-\delta)}>0$ for $\frac{\delta c_B(\hat{b}^{OV})}{1-\delta}\geq z$. Then the parties will prefer not to renegotiate the contract during the punishment phase and the analysis is equivalent to the case developed in Section 3.3.■

Proof of Corollary 2. Under a short term contracting, the relational incentive constraints become respectively (fines are unchanged and $t_B=0$)

$$\begin{aligned} RIC^{OV}_{Short}-P &: \frac{v_B(b)-p_A}{1-\delta}\geq v_B(b)-p_A+c_A(a), \\ RIC^{OV}_{Short}-\alpha &: \frac{p_A-c_B(b)}{1-\delta}\geq p_A-c_A(a). \end{aligned}$$

Simplifying and summing up the two constraints we obtain $\delta v_B(b)-c_B(b)\geq 0$,which characterizes Φ^{OV}_{Short}, with $\Phi^{OV}_{Short}=\tilde{\Phi}^{OV}$at $z=0$.(16). This proves the first statement. The second one follows directly from the Proposition.■

Proof of Corollary 3. In the light of 1, p_A does not affect the incentive constraints. With renegotiation, it then suffices to set $p_A(b)=c_A(a)=c_B(b)$ to leave no rent to the agent whilst at the same time satisfy $RIC^{OV}-\alpha$ and $RIC^{OV}-P$. With renegotiation, $p_A(b)=c_B(b)$ and $c_A(a)\left(1-\frac{\delta}{2}\right)=c_B(b)-(1-\delta)\frac{z}{2}$ will do the job.■

References

[1] **Abreu, Dilip.** 1988. "On the Theory of Infinitely Repeated Games with Discounting." *Econometrica,* 56(2): 383-396.

[2] **Aghion, Philippe, Mathias Dewatripont, and Patrick Rey**. 1994. "Renegotiation Design with Unverifiable Information." *Econometrica,* 62(2): 257-282.

[3] **Aghion, Philippe, Mathias Dewatripont, and Patrick Rey**. 2002. "On Partial Contracting." *European Economic Review,* 46(4-5): 745-753.

[4] **Bajari, Patrick, and Gregory Lewis.** 2010. "Procurement Contracting with Time Incentives: Theory and Evidence." http://www.econ.umn.edu/~bajari/research/procurement.pdf

[5] **Baker, George, Robert Gibbons, and Kevin J. Murphy.** 1994. "Subjective Performance Measures in Optimal Incentive Contracts." *Quarterly Journal of Economics*, 109(4): 1125-56.

[6] **Baker, George, Robert Gibbons, and Kevin J. Murphy.** 2002. "Relational Contracts and the Theory of the Firm." *Quarterly Journal of Economics*, 117(1): 39-84.

[7] **Baker, George, Robert Gibbons, and Kevin J. Murphy.** 2006. "Contracting for Control." Unpublished.

[8] **Bernheim, Douglas, and Michael Whinston**. 1998. "Incomplete Contracts and Strategic Ambiguity." *American Economic Review,* 88(4): 902-32.

[9] **Becker, Gary.** 1968. "Crime and Punishment: An Economic Approach." *Journal of Political Economy,* 76(2): 169-217.

[10] **Bull**, **Clive**. 1987. "The Existence of Self-Enforcing Implicit Contracts." *Quarterly Journal of Economics*, 102(1): 147-159.

[11] **Charness**, **Gary**, **and Martin Dufwenberg**. 2006. "Promises and Partnership." *Econometrica* 74(6): 1579-1601.

[12] **Chava**, **Sudheer, and Michael R. Roberts**. 2008. "How Does Financing Impact Investment? The Role of Debt Covenants." *The Journal of Finance*, 63(5): 2085–2121.

[13] **Chen**, **Kevin C.W.**, **and John K**. **C**. **Wei**. 1993. "Creditors' Decisions to Waive Violations of Accounting-Based Debt Covenants." *The Accounting Review*, 68(2): 218-232.

[14] **Dichev, Ilia D.**, **and Douglas J. Skinne**r. 2002. "Large Sample Evidence on the Debt Covenant Hypothesis." *Journal of Accounting Research,* 40(4): 1091 - 1123.

[15] **Dixit, Avinash**. 2009. "Governance Institutions and Economic Activity." *American Economic Review*, 99(1): 5-24.

[16] **Djankov, Simeon, Rafael La Porta, Florencio Lopez-De-Silanes, and Andrei Shleifer**. 2003. "Courts." *Quarterly Journal of Economics*, 118(2): 453-517.

[17] **Doornik, Katerine**. 2010. "Incentive Contracts with Enforcement Costs." *Journal of Law, Economics and Organization*, 26(1): 115-143.

[18] **Evans, Robert A.** 2008. "Simple Efficient Contracts in Complex Environments." *Econometrica,* 76(3): 459-491.

[19] **Fehr, Ernst, and Simon Gächter**. 2000a. "Fairness and Retaliation: The Economics of Reciprocity." *Journal of Economics Perspectives*, 143(3): 159-81.

[20] **Fehr, Ernst, and Simon Gächter**. 2000b "Cooperation and Punishment in Public Goods Experiments." *American Economic Review*, 90(4): 980-994.

[21] **Fuchs, William** .2007. "Contracting with Repeated Moral Hazard and Private Evaluations." *American Economic Review*, 97(4): 1432-1448.

[22] **Garleanu, Nicolae, and Jeffrey Zwiebel**. 2009. "Design and Renegotiation of Debt Covenants." *Review of Financial Studies*, 22(2): 749-781.

[23] **Halonen, Maija**. 2002 "Reputation and The Allocation of Ownership." *The Economic Journal*, 112(July): 539-558.

[24] **Hellwig, Martin**. 1983. "On Moral Hazard and Non-price Equilibria in Competitive Insurance Markets." Unpublished.

[25] **Holmstrom, Bengt, and Paul Milgrom**. 1991. "Multi-task Principal-Agent Analysis: Incentive Contracts, Asset Ownership and Job Design." *Journal of Law, Economics and Organization*, 7(Special Issue): 24-52.

[26] **Huberman, Gur, and Charles M. Kahn**. 1988. "Limited Contract Enforcement and Renegotiation." *The American Economic Review*, 78(3): 471 - 84.

[27] **Kandori, Michihiro, and Hitoshi Matsushima**. 1998. "Private Observation, Communication and Collusion." *Econometrica*, 66(3): 627-652.

[28] **Kenney, Roy W., and Benjamin Klein**. 2000, "How Block Booking Facilitated Self-Enforcing Film Contracts." *Journal of Law and Economics* 43(2): 427-435.

[29] **Kerr, Steven**. 1975. "On the Folly of Rewarding A, While Hoping for B" *Academy of Management Journal*, 18(4): 769-783.

[30] **Klein, Benjamin**. 2000. "The Role of Incomplete Contracts in Self-Enforcing Relationships." *Revue D´Economie Industrielle,* 92(1): 67-80

[31] **Levin, Jonathan** .2003. "Relational Incentive Contracts." *American Economic Review*, 93(3): 835-847.

[32] **MacLeod, Bentley W., and James M.Malcomson**.1989. "Implicit Contracts, Incentive Compatibility, and Involuntary Unemployment." *Econometrica*, 57(2): 447-480.

[33] **MacLeod, Bentley W**. 2003. "Optimal Contracting with Subjective Evaluation.-" *American Economic Review*, 93(1): 216-240.

[34] **MacLeod, Bentley W.** 2007. "Reputations, Relationships and Contract Enforcement." *Journal of Economic Literature*, 45(3): 595-628.

[35] **Malcomson, James M.** 1984. "Work Incentives, Hierarchy, and Internal Labor Markets." *Journal of Political Economy* 92(3): 486-507.

[36] **Malcomson, James M**. Forthcoming. "Relational Incentive Contracts." Chapter for the *Handbook of Organizational Economics* (edited by Robert Gibbons and John Roberts), Princetown University Press

[37] **Masten, Scott**. 2000. "Contractual Choice," in *Encyclopedia of Law and Economics*, B. Boukaert and G. De Geest (Ed.), Cheltenham Edward Elgar.

[38] **Moore, John, and Rafael Repullo**. 1988. "Subgame Perfect Implementation." *Econometrica*, 56(5): 1191-1220.

[39] **Noldeke, Georg, and Klaus M. Schmidt**. 1995. "Option Contracts and Renegotiation: a Solution to the Holdup Problem." *Rand Journal of Economics* 26(2): 163-179.

[40] **Ryall, Michael D., and Rachelle C. Sampson**. 2009. "Formal Contracts in the Presence of Relational Incentive Mechanisms: Evidence from Technology Development Projects." *Management Science* 55(6): 906-25

[41] **Schmidt, Klaus, and Monika Schnitzer**. 1995. "The Interaction of Explicit and Implicit Contracts." *Economic Letters*, 48(2): 193-199.

[42] **Williamson, Oliver**. 2005. "The Economics of Governance." *American Economic Review*, 95(2): 1-18.

[43] **Williamson, Oliver**.1983. "Credible Commitments: Using Hostages to Support Exchange." *American Economic Review,* 73(4): 519-40.

[44] **Zanarone, Giorgio**. 2010. "Fiat without Authority in Firms (and Markets)." Unpublished.