

Engel, Christoph

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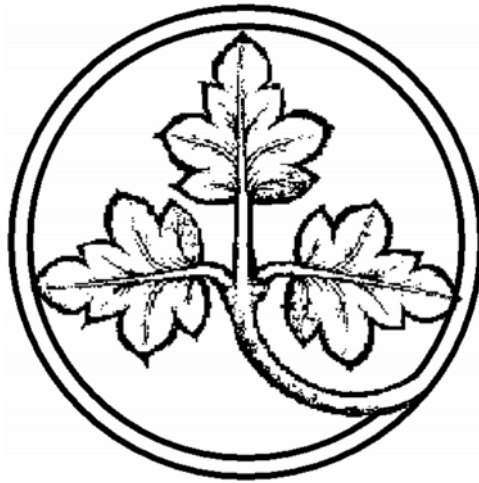
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Corporate Design for Regulability
A Principal-Agent-Supervisor Model

Christoph Engel

Corporate Design for Regulability A Principal-Agent-Supervisor Model¹

Christoph Engel

I. The Issue

“Whoever humbles himself will be exalted”, Math. 23: 12. The biblical word not only holds for God’s subjects. It holds for firms as well. Making yourself more vulnerable does not seem clever at first sight. But if your business is in a regulated environment, making yourself a better regulatory target may well pay. Regulators have considerable sanctioning power. In regulated environments, rules change frequently. If the regulator keeps you informed about likely changes, your risk of sunk investments decreases. Often you have several options for the design of your product. If you are in close contact with the regulator, you have a better chance of finding win-win-solutions. You are both getting your will, with no extra cost for the business. The regulator may even listen to your own desires. Not so rarely, regulation may be tailored such that there are beneficial side effects for business. Markets are organised, transaction cost is saved, market entry by substitutes is impeded, weaker competitors are forced to exit the market (Stigler 1971).

This is not a mere theoretical consideration. A good example stems from the Dutch markets for waste management. Originally, these markets had been dominated by small and medium enterprises. In the second half of the 1980s, American investors rightly sensed that these enterprises were neither well managed nor properly capitalised for the upcoming business opportunities. Based on what looked like a straightforward strategy, these investors quickly bought the companies and streamlined them for the generation of shareholder value. Much to their surprise, this strategy led to almost total failure. After a few years only, the American owners sold their Dutch outlets to French state-owned enterprises. From that time on, the waste management firms are indeed thriving. The American investors had overlooked the crucial importance of a healthy relationship with the regulators in this regulation-driven business (Tjiong 2003:202-207).

In principle, an individual could also invest into the relationship with a regulator. Within the rational choice framework, the options may be explained by concepts like rational trust (Engel 1999) or social capital (Coleman 1990:chapter 12). However, a corporation has several comparative advantages in this respect. It may credibly limit the scope of its activities in the corporate

1 I am grateful to Martin Hellwig, Stefan Bechtold, Felix Bierbrauer, Thomas Gaube, Isabel Schnabel and Reinhold Schnabel for helpful comments on an earlier version. Due to limited space, two sections had to be omitted: a modification of (Dewatripont and Tirole 1999), such that it fully fits the case; and a section fleshing out the normative implications. Both are accessible in the annex to the electronic preprint at p. 23.

charter. It may select its employees such that a certain outcome becomes more likely. For instance, Daimler-Benz hired the former Data Protection Commissioner of the land of Bremen to become the firm's data protection officer. It did so when the enterprise wanted to diversify into IT management. Another option is formalising the internal procedure for decision-making. This option is exploited when the firm voluntarily submits to the Eco-Management and Audit Scheme EMAS of the European Union². Most important, however, is the possibility to observe and to influence the formation of the corporate will from outside. It is true that technologies like the lie detector and, more recently, brain imaging allow to catch a glimpse of the formation of the individual will as well. But up till now, the importance of these technologies for social interaction is minimal. This is significantly different with corporate actors. For instance, the German broadcaster SAT 1 (now ProSiebenSat1) has made a former media politician a member of the board. For more than a decade, he has now served as the arbiter between the legitimate interests of his company on the one hand, and the competent regulatory authorities on the other hand.

For the sake of clarity, the paper will narrow down the field of observation to this last mechanism for making a firm a better regulatory target. Borrowing from systems theory, the arbiter will be labelled an interface actor (Hutter 1989). There are many conceptual tools for explaining how the mechanism works, ranging from LUHMANN'S systems theory (for an introduction see Luhmann 1986) to IAN MACNEIL'S and OLIVER WILLIAMSON'S relational contracts (Macneil 1971; Williamson 1985). These alternative interpretations will briefly be taken up at the end of the paper (IV). The bulk of the paper is, however, dedicated to a rational choice interpretation. The interaction between the regulator and the firm is presented as the relationship between a principal and an agent. The regulator itself is namely often unable to fully observe the firm, or to react to its disloyal behaviour. The first is due to the fact that the firm may be able to effectively conceal disobedience. The second rests on the ability of the firm to find creative ways for abiding by the letter of the applicable regulations, and still perverting the regulatory intention (Wegner 1997). In this perspective, the interface actor is seen as an atypical supervisor, i.e. as a second agent of the regulator (II). Actually, the regulator and the firm often swap roles. In having recourse to sovereign powers, the regulator is able to change the rules to the detriment of the firm. This makes the firm the principal, and the regulator the agent. Consequently, the firm may also rely on the services of an interface actor for representing its legitimate interests during the formation of the regulatory will. For instance, the Directorate General for Competition has hired a representative of the German association of telecommunication service providers VATM, "to learn more about the market"³. In a regulatory relationship, the interest in introducing such an atypical supervisor is thus reciprocal. The model allows to determine how this reciprocity serves either side (III).

2 Details from europa.eu.int/comm/environment/emas/index_en.htm (04/23/05).

3 I owe this example to Stefan Bechtold.

II. The Firm as the Regulator's Agent

1. The Story

In this section, the basic rational choice story is presented informally. The section also serves to provide empirical plausibility to parameter constellations.

Let us specify the regulatory goal as the provision of a pure public good (but in principle any other regulatory goal would do). Due to the prisoner dilemma structure, the firm has an incentive to free ride on the efforts of other firms. All firms anticipate that all other firms anticipate this. Consequently, without some form of intervention, the public good is not provided (more from Cornes and Sandler 1996). The regulator only derives utility from the provision of this one public good. In the illustrations, the data protection officer is exclusively interested in data protection, the media authority is exclusively interested in the balanced overall contents of all electronic media. Neither of them looks at welfare more generally. Public choice problems are assumed away (on these see only Brennan and Buchanan 1985). Contributions to the public good are strictly additive (Cornes and Sandler 1996:184-190). Without loss of generality, we may therefore concentrate on the contribution of one firm in isolation. All agents are risk-neutral.⁴

The legislator, or the constitution for that matter, takes a more balanced view. While these institutions do indeed want the regulator to pursue the public interest entrusted to it, they also care about the profitability of firms. Such prudence is, for instance, frequent in environmental policy. In order not to make differential treatment patent, it may be couched in generous grace periods upon the introduction of new environmental standards. The legislator is, for instance, interested in the maintenance of a large workforce. Ideally, the legislator would therefore want to discriminate between firms of high and low profitability. If profitability is high, the firm can easily afford contributing to the public good. The opportunity cost of effort is low. If profitability is low, however, the opportunity cost of contributing to the public good would be high. The legislator does not expect such firms to contribute. The regulator is not allowed to sanction them if they do not. Since we are looking at one firm in isolation, we may normalize the quantity of the firm's output to 1. This allows us to equate profitability with profit.

In the introduction, there have been given two reasons for the principal-agent situation: the firm is able to cheat, and it possesses the power of detrimental creativity. At this point, only the first of these two reasons is investigated. Absent the interface actor, the regulator is unable to observe the profitability of the firm. Since the legislator only expects highly profitable firms to contribute to the provision of the public good, firms have an incentive to falsely report low profitability. Consequently, the regulator is faced with a problem of hidden action, or moral hazard. Thereby, the firm is the regulator's agent; the regulator assumes the role of the principal (see only Holmström 1979).

4 For the implications of risk aversion see (Faure-Grimaud, Laffont et al. 1999).

In order to keep the problem simple, potential further dimensions are assumed away. In practice, often not all firms in an industry have the same opportunity for cheating. The *ex ante* likelihood of cheating may be hidden to the regulator. If so, when deciding upon the initial intervention, the regulator faces an additional problem of hidden information, or adverse selection (Akerlof 1970).

The regulator is typically not interested in rule obedience as such. Rather the regulator pursues some ultimate goal, say the absence of toxic substances in a river. Now the area of life for which the regulated activity is relevant need not be stable. New technologies are introduced, new competitors enter the market. It may therefore well be that *ex post* the regulator would prefer the firm to act differently. If both parties anticipate this eventuality, designing the initial intervention becomes more demanding. The parties must cater for the additional problem of later renegotiation. In the relevant literature, the initial intervention is then referred to as an incomplete contract (Tirole 1999). This is, however, not considered here.

Normally, the interaction between the regulator and a firm is not *ad hoc*. Rather they both know that the concrete instance is part of an ongoing relationship. The *ad hoc* interaction may be modelled in game theoretic terms (see only Schweizer 1999). If the concrete instance is embedded in a long-term relationship, this changes the character of the game. It is repeated, if not nested (see only Milgrom and Roberts 1982). For the sake of making the main point of the paper visible, this is assumed away.

As said at the beginning of this section, the interaction between principal and agent is an instance of strategic behaviour. A rational regulator will therefore not sit by and wait until the agent cheats. Rather the regulator will aim at altering its initial intervention in a way that makes it irrational for the firm to exploit its private information to the detriment of the regulator. In the jargon of the pertinent literature, the regulator will thus strive at proposing a direct mechanism. This is possible if the contracted output may be observed (more from Schweizer 1999:69-77). Not so rarely, this is feasible in regulation. The regulator precisely defines the expected behaviour. If the regulatee does not live up to this expectation, she is sanctioned. This is the functional equivalent to strict liability in torts (Shavell 1980). It does not matter why the regulatee has been unable to deliver. However, many regulatory problems are not of this kind. Sometimes, the regulator is unable to control for quality (illustrations from Engel 2002b). Often it also is normatively not acceptable to disregard the effort of the regulatee in fulfilling the regulatory obligation. Such a situation is investigated here. The legislator is not interested in the provision of the public good, whatever its cost.

Profitability has many determinants. This explains why, in reality, a regulator is not in a position to observe profitability with certainty. However, profitability is not arcane to a degree that a regulator could never find out. Rather, with some probability the regulator will be able to demonstrate that a firm has indeed falsely reported low profitability. In principle, the regulator could exploit this feature for imposing a direct mechanism. It could rely on Gary S. Becker's advice: with rational, risk-neutral addressees, a regulator is best off committing to draconian punishment (Becker 1968). In constitutional states, however, this option is ruled out by rule of law principals.

In our case, it might also be at variance with the legislator's political will. For implementing the Draconian sanction would force the affected firm into bankruptcy. Politically, this would matter if the legislator does not trust the rationality of firms and is afraid that some of them take the irrational risk.

For legal readers, it might be worth spelling out what is meant if the relationship between the regulator and the firm is modelled in contractual terms. This is not to say that there is a contract in the legal sense. Administrative law may well reduce the regulator's action set to unilateral intervention, relying on sovereign powers. However, the logic of mutual anticipation is best understood if one assumes that the parties, relying on their respective outside options, consider concluding a regulatory contract. There are two ways of saying why this is appropriate. In the technical language of mechanism design, sovereign powers may be used to overstep the regulatee's participation constraint. But incentive compatibility is still to be respected (see only Schweizer 1999:44-52). In the less technical language of political scientists, "bargaining in the shadow of hierarchy" (Scharpf 1997:97) is a functional equivalent of unilateral intervention.

Introducing the interface actor in the interaction between regulator and firm may be modelled in a partly simplified, partly altered version of the principal-supervisor-agent model of (Tirole 1986). The interface actor is thus modelled as a supervisor. This statement must, however, be qualified. In the Tirole paper, and in the literature that built on it, the supervisor is modelled as a tool for information provision. Whatever she observes is reported back to the principal. The principal relies on this information for sanctioning purposes. The principal and the agent anticipate the additional sanctioning opportunity and conclude a different contract in the first place.

Applying this idea to the interaction between the regulator and a firm would make the model patently unrealistic. The very ability of the interface actor to observe hidden action of the firm relies on her participation in the formation of the corporate will. Were she to report back to the regulator, the remaining personnel of the firm would immediately fence her off from all internal decision-making. Rational managers of the firm would anticipate this eventuality and isolate the interface actor right from the beginning. In the concrete case, there is thus an additional technological restriction. Access to information is conditional upon the regulator credibly committing to not listening to the interface actor.

Let us first have a look at how the problem is solved in practice, before we attempt to integrate this feature into the model. In practice, the interface actor is given access to the formation of the corporate will. She is thus not only an observer, she is part of the internal decision-making machinery. In this decision-making, the interface actor serves as the representative of the regulatory cause. In the terminology of Albert Hirschman, the scheme thus works by the interface actor exercising voice (Hirschman 1970). In principle, voice may have many causes, and many effects. We are here only interested in rational choice explanations. Ideally, the interface actor's voice should be decisive whenever the profitability of the firm is high. The interface actor's concerns should be disregarded, or not raised for that matter, if profitability is low. Due to this, it would not be in the regulator's interest if the interface actor were too powerful. Using terminology from

political science, one may say that the interface actor needs veto power (Immergut 1992; Tsebelis 2002), but that the veto position should be a conditional one.

Going back to reality, there are several ways how the interface actor may make herself heard in corporate decision-making. She may appeal to the loyalty of managers or shareholders with the state of which they are citizens. She may join forces with other stakeholders that have institutionalised access to corporate decision-making. An obvious case is codetermination of the workforce in large German enterprises. In extreme situations, the interface actor may announce giving up her position if severe damage is inflicted on the good protected by regulation. Likewise, the interface actor may threaten the firm with exceptionally reporting to the regulator, or to the press. She may thus exercise her end period opportunity. This is particularly threatening if the interface actor reveals information of longer lasting relevance, e.g. the existence of a contaminated site. Alternatively, the increase in sanctioning power might be indirect. If there is an interface actor, the courts might allow the regulator to administer stricter sanctions on the firm.⁵ Note the layered structure of the concept of voice. Voice gives its holder an impact on the actual corporate decision-making. She is being heard because she can credibly threaten the firm with later imposing sufficient disutility should her legitimate concerns be disregarded. This paragraph has listed sources of threat power.

Since the interface actor never reports, she is not a supervisor in the technical sense. Nonetheless, the main complication of principal-supervisor-agent models also holds (which is why it is legitimate to refer to the interface actor as an atypical supervisor). The problem results from the fact that, within rational choice theory, the interface actor too must be modelled as a utility maximiser. Empirically, this is not far-fetched. By design, an interface actor is in a difficult position. She permanently runs the risk of acting in a way that is seen as unfair by at least one of the principals. Also, the interface actor naturally is in a position to tip the balance to either side. Corrupting the interface actor is therefore tempting for both sides. Compared to earlier models, the only difference is one of technology. Collusion no longer works by concealment, but by non-intervention. Political scientists would speak of the interface actor being captured (for an economic voice see Tirole and Laffont 1991).

The scheme therefore only works if the regulator can prevent the firm and the interface actor from engaging in collusion. The firm and the interface actor have every incentive to conceal that collusion has taken place. In reality, the regulator may nonetheless occasionally find out. In order to keep the model simple, however, it is assumed that collusion itself is never detected. However, the regulator has another option. In the interest of directly controlling the firm, it anyhow engages in a certain amount of information collection. Due to this, with some probability, the regulator finds false reporting by the firm when it happens. If it does, the regulator also knows that the interface actor has accepted a bribe. The regulator is thus able to kill two birds with one stone.

5 Reinhold Schnabel pointed me to this.

For the scheme to work, in expected terms, negative utility from the sanction administered on the interface actor must be larger than the utility from keeping the bribe. Ultimately, the size of the bribe depends on the distribution of gains from trade between the firm and the interface actor. If the regulator wants to be on the safe side, it will assume that the interface actor is able to squeeze the entire gains from trade out of the firm. Consequently, for the scheme to work, the regulator must credibly threaten the interface actor with a fairly severe sanction.

If draconian sanctions have been ruled out with respect to the firm, why should they be available with respect to the interface actor? The main reason why the sanctioning power of the regulator is limited with respect to the firm is rule of law. However, there are two reasons why the sanctioning power with respect to the interface actor may indeed be larger. First, firms are usually incorporated. One cannot put a legal person into jail. Even if incarcerating managers is legal, managers are compensated for the risk by a high salary.

More important, however, is the second reason. The chosen business of an interface actor is building links between politics and the economy. In order to do so effectively, an interface actor must be well connected in both communities. These connections are her main capital. If the regulator is able to conclude that the interface actor has indeed colluded with the firm, it is quite natural that the human capital of the interface actor be severely depreciated. Human capital is much more sensitive to sanctioning than financial capital. For financial capital of one owner may be easily replaced by financial capital of another owner. For its owner, replacing old by new human capital is, however, a daunting task. Moreover, the legislator has no political reason to prevent the regulator from imposing Draconian sanctions on isolated interface actors. This is not likely to have repercussions on the next election day. Thus far, the success of the mechanism thus hinges upon the differential in sanctioning power: while rule of law principles and the respect for the electorate prevent the regulator from threatening the firm with sufficiently severe punishment, the interface actor is more vulnerable.

Even if sanctioning power is not an issue, why should the interface actor be willing to expose herself to such an environment? Since it played no role, so far the interface actor's wage has not been mentioned. Since the interface actor solves the regulator's problem, one might expect that the regulator has to pay the interface actor a wage for his services. In reality, this is rare. Interface actors are not public servants. Rather they are employees of the firm, and receive a salary from it. This is understandable since, by anticipating the regulator's anticipation, the regulator's problem becomes the firm's problem. If the firm is better off by paying this wage, it is willing to do so.

There are two factors relevant for determining the wage. The interface actor will only be willing to serve if she is offered the equilibrium wage in her labour-market. This wage is, however, sufficient only if the interface actor does indeed observe the firm's type with certainty. Consequently, if the interface actor does not collude, the risk of being sanctioned is zero. The draconian sanction only specifies a payoff off the equilibrium path. This changes if one makes the model more realistic by allowing for occasional slips. If it is possible that the interface actor had been unable to observe the firm's type, or that the regulator sanctions firms with low profitabil-

ity, detecting false reporting does not necessarily imply that the interface actor and the firm have colluded. If so, the interface actor must be compensated by a higher wage for the remaining risk of being falsely sanctioned. The wage then must have two components: compensating the interface actor for the opportunity cost of giving up her best alternative outside option, plus a risk premium.

Provided the regulator can muster sufficient sanctioning power in relation to the interface actor, it is thus able to implement an incentive compatible and collusion proof mechanism. In that case, the firm loses its information rent. Now remember that, technically, the mechanism rests on the fact that the interface actor has access to the formation of the corporate will. Why would the firm agree to this, knowing that it leads to distributional loss? This translates into a participation constraint. The regulator must be able to face the firm with a choice that makes it rational to give up the information rent. In principle, this is not difficult in the dealings between governmental authority and the citizenry. For sovereign powers are unlimited by definition. This is, however, only true for the legislator (and in situations of national crisis sometimes also for the head of state). Regulators act within the limits of the statute that has brought them into being. For the scheme to work it is therefore necessary that this statute gives the regulator sufficient leeway for imposing additional disutility on the firm if this firm is unwilling to hire the interface actor.

One may wonder why the regulator does not impose this additional damage on the firm, whether it hires the interface actor or not. This would, however, not be rational for the regulator if the overall increase in utility by separating the firms of high profitability is higher than the additional utility from imposing the damage on all firms. Provided this is the case, the regulator thus does not face a commitment problem. This, however, presupposes that the regulator cannot come back to the opportunity for imposing the additional damage once the firm has hired the interface actor. Within the framework presented thus far, only the legislator can take this opportunity away from the regulator.

The distinction between the legislator and the regulator also takes care of a last concern. It has been pointed out above that the whole problem originates in the limited sanctioning power of the regulator. Seemingly, this is at variance with the statement that the regulator is able to threaten the firm with additional disutility for introducing it to hire the interface actor. The legislator can use the underlying statute for doing two things: it can prevent the regulator from exploiting these powers for sanctioning purposes. And it can limit the power of imposing disutility. Actually, both is quite realistic. If sanctions are formal, rule of law principles demand that sanctions be precisely confined *ex ante*. Aggravating these sanctions by relying on powers invested in the regulator for different purposes would be illegal as an abuse of these powers. The regulator lacks direct democratic legitimacy. Due to this, the legislator is only allowed to endow it with precisely confined powers.

Before we present the formal model, it is time to relate our approach to the literature. The principal-supervisor-agent literature started with (Tirole 1986). This model is considerably more complicated than ours. In that paper, productivity and effort are not lumped together. The supervisor

observes productivity with some probability only. Neither the supervisor nor the principal are able to observe effort. On the other hand, the principal never observes productivity. (Kofman and Lawarree 1996) has the same setup. (Strausz 1997) is interested in a situation where the principal and the supervisor have access to the same monitoring technology, whereas our model relies on superior access of the atypical supervisor to information. Similar to our approach, the supervisor in (Kessler 2000) normally impacts on agent decision-making, rather than reporting. But the viability of this relies on her ability to report back deviations to the principal. The model closest to ours is (Faure-Grimaud, Laffont et al. 1999). It, however, crucially relies on risk aversion in the supervisor. This model is also briefly sketched in (Laffont 1999:656 f.).

2. The Formal Model

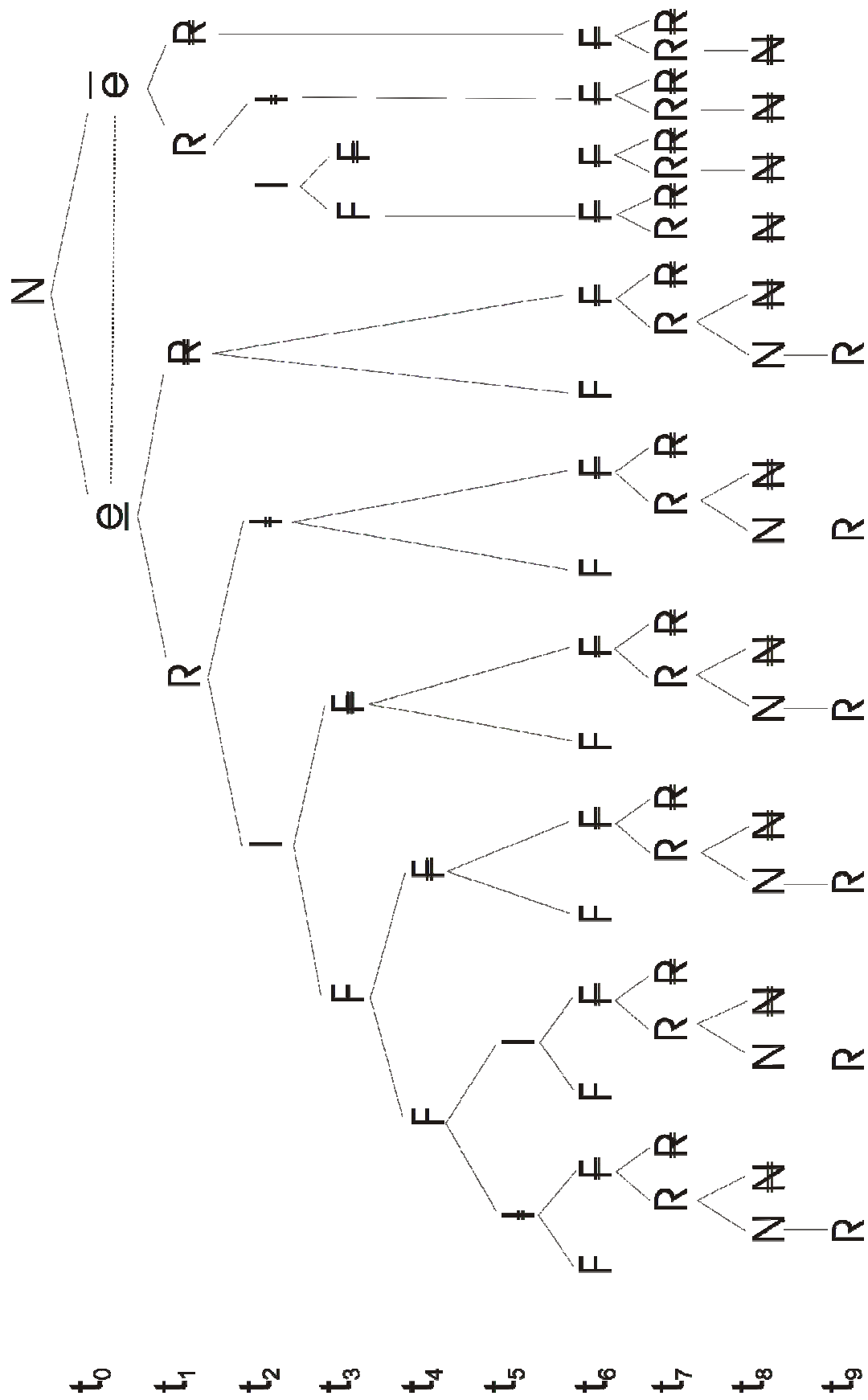
The story told above may be formally modelled in game theoretic terms. This game has three players: the regulator R (it), the firm F (he), and the interface actor I (she). The legislator is not a player. Its interventions are part of the opportunity structure within which the game is played.

The game has the following timeline:

- t_0 Nature selects actors of types \underline{e} and \bar{e}
- t_1 R offers I to serve as an interface actor, or not
- t_2 I accepts the offer, or not
- t_3 F hires I , or not. If not, R imposes additional damage d
- t_4 F offers I a bribe b , or not
- t_5 I accepts the bribe, or not
- t_6 F exercises effort for the provision of the public good, or not
- t_7 R buys the chance of Nature signalling F 's type, or not
- t_8 Nature makes F 's type visible for R , or not
- t_9 R sanctions F , if F is of type \underline{e} , this has been revealed by Nature, and F has not contributed
 R sanctions I , if she has accepted a bribe
 I sanctions F , if F is of type \underline{e} , has not contributed, and R has not found out

This results in the following game tree⁶:

6 In this tree, crossed letters represent the „or not“ branches.



R cannot observe Nature's move at t_0 . All other moves are common knowledge. F knows his type with certainty. If I is hired, she can observe F 's type with certainty. Specifically, I knows even before contracting with F that she will observe F 's type with certainty, once the deal is struck. She also knows that she will be able to impose a sufficiently large sanction σ on F , should he be of type \underline{e} and choose not to contribute to the public good.

Nature chooses F to be of type \underline{e} with probability $p \in [0,1]$, and to be of type \bar{e} with corresponding probability $1-p$. At t_8 , Nature makes F 's type visible for R with probability $q \in [0,1]$. With corresponding probability $1-q$, F 's type remains concealed. Probabilities p and q are independent. Both probabilities are common knowledge throughout the game.

Payoffs are as follows: if F is of type \underline{e} , he makes high profit $\bar{\pi}$. If he is of type \bar{e} , he makes low profit $\underline{\pi}$. The legislator does not expect firms of type \bar{e} to contribute to the provision of the public good. If firms of type \underline{e} abide by the statutory provision, their payoff is reduced by $-\underline{e}$. If the firm hires the interface actor, he has to pay a wage. This reduces the firm's payoff by $-w$. For one of three reasons, there may be no interface actor: R has not proposed to I ; I has not proposed to F ; F has not accepted the proposal. In either case, the regulator imposes additional damage on F . This reduces F 's payoff by $-d$, irrespective of F 's type. If F offers and I accepts a bribe, F 's payoff is reduced by $-b$. If F is of type \underline{e} , I has not accepted the bribe, and F has not contributed to the public good, I exercises her voice option. This results in a reduction of F 's payoff by $-\sigma$. For ease of exposition it is, however, assumed that I imposes $-\sigma$ only if R does not impose $-s$. This assumption could, however, be dropped without changing the results. If F is of type \underline{e} , if he has not contributed to the public good, if R has bought Nature's signal, and if Nature reveals F 's type at t_8 , R sanctions F . This reduces F 's payoff by $-s$.

If I is not hired, she receives no wage. If she is hired, she receives wage w , irrespective of F 's type. If I accepts the bribe, her utility increases by b . If the regulator finds collusion, I 's payoff is reduced by $-t$.

If a firm of type \underline{e} contributes to the public good, R receives payoff e . If R imposes additional damage, it receives payoff d from all firms, irrespective of type. If R imposes sanctions, it receives additional payoffs s and t , respectively. In order for Nature to reveal F 's type at t_8 with probability q , R must incur cost $-c$.

Parameter b is endogenous. All other parameters are exogenous.

The players may choose among the following strategies: R has two choices. It may propose to I at t_1 . And R may buy Nature's signal at t_7 .

I has two choices as well. Shall she accept R 's proposal at t_2 , and hence make a binding proposal to F ? If she does, if F accepts, and if F proposes a bribe at t_4 , I must decide whether to accept.

F has the following choices: shall she accept an offer by I at t_3 ? Shall she offer a bribe at t_4 ? Shall she exercise effort at t_6 ?

3. The Equilibrium

The purpose of the model is defining the conditions under which proposing to the interface actor solves the regulator's problem. This is the case if the following is the only equilibrium of the game: R proposes to I at t_1 . I accepts at t_2 . F accepts at t_3 . F does not propose a bribe at t_4 . F contributes to the public good at t_6 , if he is of type \underline{e} . To determine the equilibria, we are reasoning backwards. Since R cannot observe Nature's move at t_0 , we must look for subgame perfect equilibria. In order to avoid repetitions, we are not analysing each subgame separately, but proceed backwards along the timeline.

The last point on the timeline t_9 is relevant only if F is of type \underline{e} and has not contributed to the public good at t_6 . Moreover, Nature must have revealed F 's type at t_8 . In these six cases, R always imposes sanction $-s$ on F .

Nature's move at t_8 is relevant if F has not contributed to the public good at t_6 and if R has bought the signal at t_7 . This is possible in ten cases.

R buys Nature's signal at t_7 whenever $pqs > c$. R takes this decision in the same ten cases.

At t_6 , F decides whether to exercise effort. If F is of type \bar{e} , he never does since he is not expected to. This is true in four cases. If F is of type \underline{e} and contributes to the public good, this reduces its payoff to $\bar{\pi} - \underline{e}$ in all six cases. F compares this payoff to the alternative payoff. It depends on the branch of the game tree. If R has not proposed to I at t_1 and F does not contribute to the public good, F 's expected payoff is $\bar{\pi} - qs$. If $\bar{\pi} - qs < \bar{\pi} - \underline{e}$, or $qs > \underline{e}$, the regulator has no problem to begin with. Considering the introduction of an additional (atypical) supervisor is only meaningful if $qs < \underline{e}$. The calculations remain the same in the two cases where I or F do not accept at t_2 and t_3 respectively, and in a third case where F has not offered a bribe at t_4 . If F offers and I accepts the bribe, F 's payoff is $\bar{\pi} - b - qs$. If this is less than $\bar{\pi} - \underline{e}$, F does not contribute. If I rejects the bribe and F does not contribute, he expects $\bar{\pi} - qs - (1 - q)\sigma$. If this is smaller than $\bar{\pi} - \underline{e}$, introducing the interface actor is useless for R . R will thus only consider the scheme if the exogenously determined voice option σ results in $\bar{\pi} - qs - (1 - q)\sigma < \bar{\pi} - \underline{e}$.

At t_5 there is only one case to be considered: F has offered a bribe at t_4 . I either accepts or rejects. If I rejects, her payoff is w . If she accepts, her payoff is $w + b - qt$. Hence I rejects if $w + b - qt < w$, or $b < qt$. While q and t are exogenous, b is endogenous. Ultimately, its size depends on the negotiations between I and F . The lower bound of the settlement range is determined by qt . I will only accept if $b \geq qt$.

At t_4 there is again only one case to be considered: F has hired I at t_3 . F is of type \underline{e} . If I accepts the bribe at t_4 , F is better off if $b < (1-q)\sigma$. Hence the settlement range is $(1-q)\sigma \geq b \geq qt$. Since F and I are engaged in a bargaining game with multiple equilibria, it is impossible for F to predict the exact size of b at t_4 . Due to the distributional conflict between F and I , F is not even able to predict with certainty that I will accept any $b < (1-q)\sigma$. But due to the assumption of utility maximisation, F may be sure that I will accept $b = (1-q)\sigma$. For any $b < (1-q)\sigma$, F would have to rely on his subjective expectations about bargaining outcome.

At t_3 , there are two cases to be considered: one where F is of type \bar{e} , and one where F is of type \underline{e} . If F 's profitability is low, F expects $\underline{\pi} - w$ when hiring I , and $\underline{\pi} - d$ if he does not. Consequently, F will only hire I if $d > w$. If F 's profitability is high, due to the previous considerations, F compares the payoffs in the following way: if he does not hire I , he expects $\bar{\pi} - d - qs$. If he hires I , he expects $\bar{\pi} - \underline{e} - w$. This is due to the fact that, given the right exogenous parameters of q, s, t , offering or accepting a bribe is not an equilibrium. Also given the right exogenous parameter of σ , not contributing if I has been hired is not an equilibrium. Consequently, F hires I if $\bar{\pi} - \underline{e} - w > \bar{\pi} - d - qs$, or if $d + qs > \underline{e} + w$. Note that either of the two conditions may be stronger. If qs is much larger than \underline{e} , the condition $d > w$ from the other subgame is stronger. If, however, \underline{e} is large and qs is comparatively small, the condition $d + qs > \underline{e} + w$ may be stronger. Subgame perfection requires that both conditions be met.

At t_2 , there are again two cases: one where F is of type \bar{e} , and one where F is of type \underline{e} . According to the assumptions about the information environment, I does not know F 's type before she has entered into contractual relations with F . She however knows even before contracting with F that she will observe F 's type with certainty, once the deal is struck. She also knows that she will be able to impose a sufficiently large sanction σ on F , should he be of type \underline{e} and choose not to contribute to the public good. In this information environment, I need not take probabilities p and $1-p$ into account when deciding whether to accept R 's

proposal. Rather she will consider payoffs separately for both types of F . If I rejects R 's offer, she receives 0 in both cases. If F is of type \bar{e} and I accepts, she gets w . In principle, if F is of type \underline{e} , there would be many possibilities. However, from the foregoing it results that under the parameter constellations relevant for the regulator, the following holds: if I proposes, F accepts. If F accepts, he does not offer a bribe, and he contributes to the public good. Consequently if F is of type \underline{e} , I faces the same choice as if F is of type \bar{e} . She proposes to F whenever $w > 0$.

Consequently, for the relevant parameter constellations, R is indeed in a position to direct the entire game by deciding at t_1 whether to propose to I or not. If R does not propose, it expects $d + pqs - c$. Since I is not hired, the statutory provisions empower R to impose d on all firms. The scheme makes only sense if $pqs > c$. In that case, R invests c to acquire the opportunity that Nature reveals F 's type with probability q at t_8 . This increases R 's payoff in the p cases where F is of type \underline{e} , multiplied by the q cases where Nature reveals this at t_8 . Alternatively,

R proposes to I . R then expects $pe - c$. F always contributes when of type \underline{e} . R incurs cost c in all cases. Hence R proposes whenever $pe - c > d + pqs - c$, or when $pe > d + pqs$.

The game theoretic analysis does thus indeed back up the informal story presented above. There is a set of exogenous parameters $p, q, \bar{\pi}, e, \underline{e}, d, w, s, \sigma, t, c$ such that, by proposing to I , R can make it the only equilibrium that firms with high profitability contribute to the provision of the public good. The conditions formulated informally have all proven relevant. The expected disutility from being sanctioned qs must be sufficiently small; otherwise the problem disappears. I 's voice option σ must be sufficiently strong; otherwise F will hire I , but ignore her. I 's sensitivity to sanctions t must be strong; otherwise I will be bribed. R needs threat power $d > w$; otherwise F will not accept I 's proposal.

The formal analysis adds two insights. First and foremost, it establishes the exact relations between parameters that are necessary for the scheme to work. Second, it points to two further conditions. If F is to hire I , not only $d > w$ must hold, but also $d + qs > \underline{e} + w$. Moreover, R faces a more subtle trade-off than stated informally. It will only opt for imposing the interface actor if the condition $pe > d + pqs$ holds. What looked as a mere device for getting the whole scheme going, R 's ability to threaten F with d , turns out to be the major opportunity cost for R . This also has a practical implication. The model is biased against the scheme in two respects. Within the model, both s and d directly and fully increase R 's utility. The scope for the scheme increases if the potential damage to F is larger than the corresponding utility for R .

III. The Regulator as the Firm's Agent

In the foregoing, the regulator's sovereign powers have only been needed as the source of the regulator's threat power. From the firm's viewpoint, an additional interpretation is natural. Ex ante, the firm is unable to predict when and in which ways the regulator is going to have recourse to its powers. This leads to a swap of roles. Now, the regulator is the agent, and the firm is the principal. More importantly even, in this relationship, the interface actor may be no less useful for the firm than it had been useful for the regulator in the reciprocal perspective. We will show that this relationship can be modelled in a way that is fully symmetrical to the reverse interpretation where the firm is the agent (1). Actually, if the interface actor serves as an atypical supervisor for the respective other player, this makes the scheme more powerful in both directions (2).

1. The Unilateral Story

F maximises profit. Relying on sovereign powers, R is able to impose disutility on F . The constitution limits R 's powers by the principle of proportionality. Roughly speaking, R is thus obliged to engage in cost benefit analysis (on this see only Adler and Posner 2000; Posner 2000). The cost in terms of lost business opportunities must be outweighed by the benefit in terms of a public good. In legal practice, so many features of the case have to be factored in this assessment

that court supervision is minimal. Usually courts confine themselves to the statement that the regulator has not overstepped the limits of its balancing power (more from Engel 2002a).

This situation may be portrayed within the model the following way. There are two elements that should go into the weighing. The normative weight of the public good, is high \bar{G} with probability $1 - g$, and low \underline{G} with corresponding probability g . It is to be weighed against the opportunity cost for the firm, which seems constitutionally acceptable if \bar{G} , and unacceptable if \underline{G} . In order to square this with the logic of the model, we must put these two parameters upside down. If the public good is not of high relevance, the constitution wants R to forgo potential benefit to the public by abstention from intervention. What had been effort in the relation between F as the agent and R as the principal now becomes high \bar{a} or low abstention cost \underline{a} . The benefit of abstention for F is a .

However, due to incomplete court control, improper balancing by R is only sanctioned with probability r . In that case, the court imposes sanction x on R . This only happens if F takes R to court, which has cost k . The assumption $x - \underline{a} > 0$ makes sure that the sanction is relevant if the court indeed intervenes. Of course, in court practice neither R as a public body nor the individual public servants working for the regulator are openly sanctioned. However, if the court strikes a regulatory decision down, the effect of this is normally not confined to the case at hand. In so doing, the court cannot avoid enunciating interpretations of the underlying legal provisions that are relevant for future cases as well. It is not unrealistic to assume that R cares about further limitations of its powers.

As in the opposite case, the principal-agent problem stems from the fact that $r\bar{G}x + (1 - r)\underline{G} > \underline{G} - \underline{a}$. In principle, the effect could have two reasons. Either the sanction is not strong enough, or the probability of sanctioning is too low. In reality, both is true. Sanctioning power is in the hands of the courts, not F . F is therefore not able to increase it at will. Moreover, the courts will only intervene in exceptional cases. This reduces sanctioning probability significantly. Consequently, F is not able to compensate for low probability by increasing the sanction, and vice versa. Absent I , F must be prepared to an overly active regulator.

In reality, the situation is typically not fully symmetrical. I is an employee of F , not (also) a public servant. This, however, is also not necessary. It suffices if I has privileged access to the regulatory arena. Specifically she must be able to intervene into the formation of the regulatory will, i.e. in the actual weighing of public benefit with private cost. This is not far-fetched. Interface actors typically are former politicians or regulators. They thus naturally have standing in the regulatory context. They speak the regulator's language, and they are able to credibly transmit information about the actual opportunity cost of a planned intervention for F .

Again, the benefit of privileged access would go away if I were to show up in court and plead to the detriment of R . Consequently, I must again assume the role of an atypical supervisor. The task is not reporting back, but representing the commercial cause in regulatory decision-making. Again, the effectiveness of the scheme rests on voice. Primarily, voice results from the symmet-

rical character of the I 's task. She may credibly threaten R with losing its privileged access to commercial decision-making, should it falsely report a public good of high relevance where the actual relevance is low. Voice thus translates into the ability of I to impose additional sanction ξ . With this ability, assuming the same timeline as before, R 's problem changes to $r\bar{G}x + (1-r)(\underline{G} - \xi) < \underline{G} - \underline{a}$. This is incentive compatible. R will only report \bar{G} if this is indeed true.

In our model, R is not corrupt, but it is a maximiser of public benefit irrespective of private cost. Consequently, R has an incentive to bribe I . R could do this by offering I side payment z , if she is willing not to exercise her sanctioning power. Again, in most contexts, a literal side payment, i.e. the transfer of a certain sum, is unlikely. But R has other benefits on offer. One possibility is promoting I at the interior of the regulatory organisation. Another is promising I a reciprocal favour in the future. This makes sense if I considers moving on to another firm, or if she represents several firms at a time.

For F , the scheme will therefore only work if it can be made collusion proof. As in the symmetrical case, F may exploit the fact that he anyhow observes the true character of the public benefit with probability r . If I is able to observe the true character of the public benefit in all cases, false reporting by R is tantamount to collusion between R and I .

However, again three follow up questions must be answered. Why is there sanctioning power with respect to I where there is none with respect to R ? The question may be answered along the same lines as before. If F ostensibly breaks with I , the human capital of I is impaired. This allows F to impose a sufficiently high sanction y on I in case R is caught with false reporting.

Why is I willing to serve F in the first place under these conditions? If the assumption holds that I always observes the true type of the public project, the draconian sanction is off the equilibrium path. It then has no impact on the participation constraint for a risk neutral interface actor. If the assumption is relaxed, I must be compensated for the ensuing risk of being falsely sanctioned by a higher wage.

Finally, why is R willing to agree to a scheme that destroys its information rent? F must be able to threaten R with a sufficiently large misfortune m .

2. The Reciprocal Story

Intuitively, the reciprocal character of the principal-agent relationship leads to a situation similar to the Cold War between the US and the USSR. A balance of terror prevents either side from exploiting the information asymmetry to the other side's detriment. F contributes to the public good if this is affordable. R abstains from exercising its sovereign powers if the cost for F would be out of proportion. The formal model allows to say under which conditions this intuition does indeed prove true. For the reciprocal character of the relationship allows to endogenize two variables that must be exogenous in the unilateral models. Variables d and m result from the

respective other half of the joint model. It results from this that the metaphor of a "balance" of terror may not be taken literally. It is not necessary that $d = m$. Rather the following six conditions must hold: $d > w$, $d + qs > \underline{e} + w$ and $pe > d + pqs$ for the first game; $m > 0$, $m + rx > \underline{a}$, $ga > m + grx$ for the second game⁷.

Moreover, the reciprocal nature of the game allows to endogenize a further element that had been exogenous in the unilateral versions of the game. In either of these versions, the respective principal needed the legislator to solve a commitment problem. R could not unilaterally commit to abstain from imposing d at a later stage of the game, should F have hired I . Likewise, F could not unilaterally commit to abstain from imposing m at a later stage of the game should R have granted I access to the regulatory arena. In the reciprocal game, both commitment problems are solved without external intervention. If R were to impose d at a later stage, F would retaliate by imposing m , and vice versa.

IV. Discussion

1. Robustness

Seemingly, the practical relevance of the model is reduced by the fact that there is a host of statutory provisions obliging firms to hire representatives for public concerns, be that the health of the workforce, the safety of the workplace, all kinds of environmental protection issues, data protection or the prevention of money laundering (for details see Haouache 2003). At closer sight, this does not make much of a difference. This is due to the fact that the legislator may only guarantee that such a representative is on the firm's payroll. Neither the legislator nor the regulator can prevent the firm from fencing off the formation of the corporate will from the representative's oversight, let alone impact. Within the model, the firm at t_3 then decides whether to give the interface actor true influence.

Within the model, the probability q of type revelation at t_8 is exogenous, as is the price c the regulator has to pay for buying this lottery. In reality, it may be possible that R increases the probability of learning F 's type if it is willing to spend more resources on search. However, there will always be a technological limitation, implying that q is never equal 1. R 's problem changes in two respects. If the additional cost for making type revelation more likely is sufficiently low, and if $\underline{e} - s$ is small, R may prefer not to propose that I be hired. On the other hand, R may want to invest a higher c in order to make up for a smaller σ , and in order to make I reject a bribe.

Within the model, the only cost of hiring I is w . In a richer model, one might add a second cost component. The presence of the interface actor may make it more difficult for the firm to exploit business opportunities, to sell new shares, or to get new credit (more from (Haouache 2003)).

⁷ There is no equivalent to w in the second game due to the assumption that the entire wage is borne by F .

This component drives a wedge between the utility of I and F . The scope for using I as a solution of R 's problem shrinks.

Within the model, R 's information problem is simple. Ideally, R would want to know two things: which is F 's type? Has F contributed to the public good? In reality, the information problem is often much more complex. R considers the introduction of I precisely in the interest of reducing this complexity. As an insider, I stands a greater chance of finding the relevant information without, however, being sure. This can be integrated into the model the following way. At t_8 , there are three possibilities: R learns F 's type; I does; or the type remains concealed to both.

2. Alternative Interpretations

As mentioned in the introduction, (atypical) supervision is not the only possible interpretation of an interface actor. In the following, alternative interpretations will be briefly sketched. A first alternative is interpreting the interface actor as an advocate in the sense of (Dewatripont and Tirole 1999). The firm voluntarily hires the interface actor in the interest of successfully navigating in a regulated environment. The focus is thus on the uncertainty originating in the potential future recourse of the regulator to its sovereign powers. Such a firm faces the following choice: is it better off by confining the interface actor's task to representing the regulatory cause, or should one and the same information agent also take the potentially opposing interests of shareholders into account? Moreover, if properly predicting the future course of regulation is the issue, why does the firm not simply bring in one of the regulators themselves?

A second option is interpreting the introduction of the interface actor as the governance structure of a relational contract between the regulator and the firm in the sense of (Macneil 1971; Williamson 1985). Especially lawyers might find this interpretation surprising on first reading. Regulation epitomises unilateral intervention, not voluntarily concluded contract. Speculating about the regulator and the firm being members of a corporate group seems even further remote. However, the key to Williamson's work is what he has dubbed opportunism. One party knowingly and willingly breaks a given promise. This is exactly what becomes possible in a principal-agent relationship. Williamson's ideas have therefore been the starting point for quite some principal-agent theorising (see only Schweizer 1999:3). Moreover, Laffont and Tirole have taught policymakers that public enterprises are not necessarily such a bad idea as neoliberal economists tend to claim. Of course, public choice considerations explain why government is not the best entrepreneur, all others being equal. But if legitimate regulatory goals make it necessary to engage in micromanagement, it may well be easier to solve the ensuing principal-agent problems within the confines of one and the same organisation (Laffont and Tirole 1993:637-660; Engel 1998). This insight seemingly presents the institutional designer with a hard choice. Much like Williamson's hybrid, relational contracts, the introduction of an interface actor much less impinges on the autonomy of both the regulator and the firm. It may be seen as a customised solu-

tion, opening the internal decision-making of the respective partner up to just the degree necessary for solving the principal-agent problem.

The very term "interface actor" is culled from a subfield of sociology, namely systems theory (Hutter 1989). In terms of systems theory, the regulator is part of the political subsystem of society, whereas the firm is part of the economic subsystem. Both subsystems are endowed with autopoiesis. They autonomously decide whether they want to react to their environment, or simply ignore the emanations of other subsystems as pure noise. Whether they are responsive depends on the possibility to make sense of incoming signals within their internal communication. In the economic subsystem, all communication is organised along the code of price. In the political subsystem, all communication is organised along the code of power. Consequently, the firm will react to regulatory intervention only to the degree that it is price relevant. Likewise, the regulator will react to the firm's activities only to the degree that its power might be affected. However, it is possible for institutional intervention to make one subsystem more resonant to signals from another. This is precisely what interface actors are doing (for an easily accessible introduction see Luhmann 1986).

A fourth interpretation takes a broader view on the role of the interface actor. Rather than directly impacting on the concrete decision-making within either arena, it is seen as an instrument for establishing mutual trust. In this perspective, not exploiting opportunities for immediate gain is seen as a risky decision. Neither the firm nor the regulator may be fully certain that the strategy will eventually pay. However, they are taking the risk in the expectation that, in the long run, both sides will be better off. These statements is about all trust researchers are willing to agree on. Some try to explain trust, to the utmost degree possible, in rational choice terms (Engel 1999). Others feel that without a genuinely social (Hardin 2002) or an emotional perspective the very essence of trust is missed (Lahno 2002). Obviously, trust relaxes the demands on individual advantage in the isolated instance where the interface actor becomes active. That way, the trust perspective may be read as a complement of the rational choice perspective presented here. To the extent that the interface actor indeed builds trust, she generates additional benefit for both sides. But the paper demonstrates that the establishment of trust is not a necessary precondition for the interface actor to be beneficial.

The same remark holds for discourse theory (a key text is Habermas 1984). It is constructivist in nature (see only Berger and Luckmann 1967). Constructivists start from the assumption that humans do not routinely have an unobstructed view of reality. Therefore, reality may legitimately be interpreted differently from different vantage points. Moreover, the mental models used for constructing an understanding are culturally contingent (more from Thompson, Ellis et al. 1990). Actually, systems theory is one brand of constructivism. However, the focus of systems theory is on social construction as an explanation for differentiation. Discourse theory is more interested in the ensuing scope for arguing (Risse 2000). It points to the fact that, by honestly struggling for forging a joint understanding, apparent conflict may often be turned into an opportunity. The focus is thus on creatively generating win-win solutions. Both the firm and the regulator may legitimately hope that the participation of the interface actor in internal decision-making may indeed have this effect. It is, however, a benefit on top of the ones analysed in this paper.

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I. Annex

Due to limited space, the following two sections had to be taken out of the printed version. They are, however, added to this electronic version.

1. Successfully Navigating in a Regulated Environment

In an alternative rational choice perspective, F voluntarily hires I in the interest of successfully navigating in a regulated environment. In this perspective, the problem is exclusively one of F , not of R . The focus is thus on the uncertainty originating in the potential future recourse of R to its sovereign powers. The uncertainty may rest in either rule application or rule generation. Both ways the contents of rules may change over time. If R is identical with the legislator, or if it has easy access to the legislator, rules may openly be changed. It has the same effect if R is given discretion. Even if none of these holds, there is uncertainty. For rule application is not mechanical. Abstract rules must be applied to concrete cases. This hermeneutical procedure inevitably gives R some leeway for implicitly changing the rules (more from Engel 2004).

In this perspective, F hires I in the interest of reducing regulatory uncertainty. The examples given in the introduction illustrate the obvious: firms do not pick interface actors at random. Rather they hire a former politician or administrator. The main reason for bringing in I is thus a difference in human capital. I brings to bear her expertise in the regulatory arena when it comes to forming the corporate will. There are, however, two more questions: is F better off by confining I 's task to representing the regulatory cause, or should one and the same information agent also take the potentially opposing interests of shareholders into account? In stylised facts, Daimler-Benz seems to have opted for the first solution, while SAT 1 seems to have preferred the second. Moreover, if properly predicting the future course of regulation is the issue, why does F not simply bring in one of the regulators themselves? Again, there is an obvious counterargument: the firm may be interested in hiding information from R . But this may not be the entire truth.

The two additional questions may be answered in terms of the model of advocacy developed by (Dewatripont and Tirole 1999). For the purposes of this paper, it is not necessary to present the full model. The following, grossly simplified version suffices. F has to choose between projects A , B , and inactivity. Both projects are diametrically opposed to each other. Say project A is in line with the philosophy of R , but yields a small profit only. Project B promises a larger increase of shareholder value, but may meet with regulatory opposition. F prefers project A if there is exclusively information \mathcal{G}_A . Say F learns that the R is enthusiastic about this project. F prefers project B if there is exclusively information \mathcal{G}_B . Say there is a business opportunity that is socially detrimental, but R is unlikely to intervene. If there is information \mathcal{G}_A and \mathcal{G}_B , the expected benefit and the expected regulatory cost cancel out. Illustrations are: The regulation-proof project is prohibitively costly. Or R is likely to intervene into the socially detrimental project. In such cases, F prefers to remain inactive.

Management, i.e. the principal, cannot himself observe the information parameters. The principal needs either one information agent for both causes, or two agents, one for each cause. Agents observe the information with certainty. The principal is, however, not able to observe the agents' search. Say management lacks regulatory expertise, and does not have judgement about the profitability of a new line of business either. If the information is presented to the principal, it is verifiable. The agents are thus empowered to come up with "hard" information. Say the regulatory agent is able to produce documents that could be presented in court. And the business agent is able to produce a business plan the quality of which may be assessed by auditors. Consequently, the contract between the principal and the agent can only condition on the eventual adoption of a project. The principal offers the following contract: If project A is realised, the regulatory agent receives positive wage w_A . If either project B or no project is realised, the regulatory agent only receives the equivalent of his outside option w_0 . Likewise for the business agent.

In this framework, a single agent cannot be prevented from concealing either piece of information. It therefore is obvious that the principal will not want this solution. For if one agent is responsible for the entire search, she will stop searching once she has found the first piece of information. She has zero interest in searching for both causes¹. The problem disappears with two agents.

Is it better for the firm to rely on the services of I for learning about R 's likely moves, rather than having R representing itself? Within the model, an additional argument may be uncovered the following way. If the agent says there is a risk of regulatory intervention, this is no longer hard information. Rather, the principal takes this as a signal σ . The reliability of the signal is $\rho \in [0,1]$. While the principal is unable to verify the signal, he is able to assess ρ . In the context of this paper, these are realistic assumptions. Within F , both the agent for the regulatory and for the business causes will be pleading their cases. Management will often indeed be unable to check the quality of search. It will in particular usually not be able to exclude that either agent has overlooked relevant information. However, from the way how the agents plead, and from the evidence they present for their causes, management will gain a good sense of the relative strength of the competing arguments. Both projects still point into opposite directions. In this environment, management needs a tiebreak rule. Since the strength of the arguments is allowed to vary, it is less likely that they literally cancel out. Formally, management must thus define a parameter $\Delta := |\rho_A \sigma_A - \rho_B \sigma_B|$ that suffices for the project with stronger support to be adopted².

In this context, an additional question becomes meaningful. The quality of the signal will be partly exogenous and partly endogenous. If there is no evidence to be found, no investment in search or rhetoric has an impact. But normally, management will not consider the adoption of a

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- 1 On p. 12 f., DEWATRIPONT and TIROLE add a more complicated argument. If the ex ante probability of finding hard information for either cause is below 0.5, the single agent may engage in search for both causes, but will have to keep a positive rent. This result however only holds under the unrealistic assumption that the single agent must commit to a search strategy before starting search for one of the causes. Why should this be, if the principal is unable to observe search?
 - 2 This formalism would allow to make a model even more realistic. σ_A need not be identical with σ_B . That way, greater reliability of the signal could be traded against greater attractiveness of a project.

project for which no support may be mustered at all. In the remaining cases, the quality of the signal is thus at least partly a function of the respective agent's effort. As previously assumed, the principal is not able to observe search. Hence, the contract between the principal and the agent may not condition on ρ ; the strength of the argument may result from exogenous, rather than endogenous factors. Instead, as before, the regulatory agent receives w_A if project A is adopted, and only the equivalent of the outside option w_0 otherwise. Consequently, the regulatory agent's wants to maximise expected utility or $w_A - e_A$ (1), where e_A is the effort she invests in search and rhetoric. Likewise for the business opportunity agent. Note that maximising effort up till it is infinitely smaller than w is a dominant strategy for both agents. For they are engaged in hit and run competition. If the other project wins, all effort has been futile. Consequently, the principal need not worry about strategic interaction among the agents.

Against this backdrop, the regulatory agent may be compared to the regulator itself. If the regulator is allowed to plead its own cause, the effort is no longer under the firm's control. For if it succeeds, the regulator stands to gain in the political arena, and the principal has no control over the size of this gain. Consequently, the services of the information agent for management are deteriorated. Management has to fear that the regulator overinvests in search and rhetoric, such that the ultimate decision is biased to the detriment of business opportunities. Since there is no longer an upper bound, management is also not able to discount the relevance of regulatory information. For management does not have any criteria for determining the appropriate discount factor³.

2. Normative Assessment

All the interpretations offered in the paper and in this annex may also be read as normative arguments in favour of opening the internal decision-making up to an interface actor. This is a way of overcoming or at least easing the reciprocal principal-agent problems. Both arenas become more resonant to the legitimate concerns of the other, and hence to their environments. Trust has a chance to be built. Creative solutions are more likely to be found.

There are two more ways of saying why interface actors are helpful. From the regulator's perspective, introducing an interface actor is a way of increasing its problem solving capacity (more on this from Scharpf 2000). One more tool is added to the arsenal of regulatory instruments (cf. Schmidt-Aßmann and Hoffmann-Riem 1997). It is a way of marrying the logic of regulation with the logic of markets. The regulator makes a more intelligent use of sovereign powers in transforming them into bargaining chips when it comes to negotiating about the introduction of the interface agent (Scharpf 1997:97). Thereafter, firms see it as their own interest to collaborate in designing the most effective policy for attaining the regulatory goal.

3 DEWATRIPONT and TIROLE are using a somewhat different cover story for comparing what they call self-advocacy versus representative advocacy (p. 20-23). Information is still hard, and information value is normalised to 1. However, agents face a positive probability of also uncovering evidence pointing into the opposite direction. At a cost f , they are able to conceal this conflicting evidence.

From the firm's perspective, the degree and the scope of regulability is turned into a strategic parameter. Not all firms will in all contexts want to be maximally regulable. If making oneself more vulnerable to regulatory intervention is, however, beneficial, a firm is able to do so. The differences in the machinery for decision-making between individuals and firms thus turn out to be an additional reason why there are firms. One more element may be added to the puzzle that haunted so many: why are there firms? How is it to be explained that islands of centralised decision-making have emerged in markets (Coase 1937; Foss 2000)?

Readers might have been tempted to read this as a paper in praise of an institutional innovation. This has not been the intention. The institution is not without its downsides. Before introducing it, both the regulator and the firm should carefully weigh the pros and cons.

The cost on the side of the firm is best characterised by what corporate lawyers typically refer to as the stakeholder problem. In actual fact, corporations are rarely just tools for the maximisation of shareholder value. This is obvious in countries like Germany where corporation law is rife with mandatory provisions meant to give stakeholders in general, and the workforce in particular, organised influence on corporate decision-making. While there has been praise for this throughout history (prominently Rathenau 1917; Riechers 1996), currently the opposition is more vocal (see Kraakman and Hausmann 2003). It is particularly impressed by yet another principal-agent problem, the one between shareholders and management. There is fear that too much stakeholder involvement in corporate decision-making might actually shield management from any effective control. Moreover, if regulators are given institutionalised access to corporate decision-making, other stakeholders, and the workforce in particular, may also lose influence. To this, the old concern may be added that direct governmental influence on commercial decision-making stifles innovation and puts the benefit of decentralised coordination in markets at risk (see only von Hayek 1945). Systems theorists would add that dedifferentiation reduces the overall ability of the system to handle higher degrees of complexity (Luhmann 1986:202-226).

The cost on the side of the regulator is best framed in constitutional terms. For the regulator has been introduced by the state for governance purposes. The normatively relevant question is therefore not how the regulator is best able to impose its own will on society. Rather one should wonder whether society is best served by a regulator that has recourse to the services of an interface actor.

The first cost concerns democratic control. If the actual effect of the regulator on the firm is through the conduit of the interface actor, it largely escapes public scrutiny. Borrowing from the representation of the workforce, one may call the effective introducing of an interface actor governmental codetermination. In rational choice terms, the agency problem between Parliament or government on the one side and the regulator on the other side aggravates. Conceptually, this is in full parallel to the aggravation of the agency problem between shareholders and management.

The second cost concerns rule of law. The constitution empowers government to exercise sovereignty. The ensuing danger of abuse is at least partly kept in check by formality and judicial con-

trol. Neither of these is present if governance is via interface actors. The regulator need not even raise an eyebrow to achieve its normative goals. Rather the interface actor is expected to prevent the regulated firm from even conceiving action that is contrary to regulatory intentions. The resulting governance effect never becomes manifest such that the firm might take the regulator to court.

Interface actors, and corporate design for regulability more generally, are thus no one size fits all solutions. But they may be a perfectly logical response to the reciprocal principal-agent problems in the relationship between regulators and firms.

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