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OPTIMAL DUPLICATION OF EFFORT IN ADVOCACY SYSTEMS

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Abstract

The paper focuses on the creation of information for decision-making when agents' effort is non observable and rewards are indirect, that is, only based on the final decision. Following Dewatripont and Tirole (1999), the paper shows that the creation of advocates of special interests, as opposed to non-partisans, generates an efficient mechanism of mutual monitoring that reduces the scope for manipulation. Such monitoring is preferable over imposing penalties for detected manipulation; it is also preferable to creating an agency that monitors the non partisan agent. Applications to transfer price policies and comparative judicial systems are considered.

JEL classification: D23, D74.

Keywords: advocacy, information creation, manipulation, monitoring.

Contents

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1. Introduction[1]

Efficient decision-making requires the gathering and disclosure of information that enables to assess the pros and cons of all possible alternatives and to evaluate them according to a given welfare criterion. Casual observation shows that in many real world situations the task to gather and disclose information to the decision-maker is assigned to agents with dissonant objectives, that is, agents who disagree among themselves about the relative desirability of possible decisions. For example, in courts, judges rely on evidence supplied by the prosecutor and the defense attorney: the former working completely for conviction, the latter for acquittal. In merger cases, antitrust authorities decide on the basis of the information provided by the merging partners and the rival firms: the former pushing for authorization, the latter for prohibition. At a more general level, the process of public decision making in all democratic countries is characterized by the contraposition of interests at different levels: the executive and legislative branches compete inside the Government, ministries with different goals compete inside the executive, central and local government compete for budget allocation. Competition is also widespread in private organizations. In multidivisional firms, buying and selling divisions compete for influencing transfer price choices by the top management, inside Universities different departments compete for funds allocation.

The literature on organization has provided various arguments to justify the widespread use of advocates of specific interests to provide information for decision-making. They all share the idea that the creation of agents with divergent objectives generates more information and gives rise to better decision making. Milgrom and Roberts (1986) and Lipman and Seppi (1995) notice that competition between two perfectly informed parties elicits all relevant information, even where the parties conceal evidence that is damaging to their interests. Later research shows that advocacy is preferred even under conditions of imperfect information. Specifically, Dewatripont and Tirole (1999) argue that information-gathering is less expensive with two competing agents and that advocacy enhances the integrity of decision making by creating incentives to appeal in case of an abusive decision. Shin (1998) shows that with two

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biased parties the principal can improve his ability to draw correct inferences by allocating the burden of the proof to the better informed one.

The paper offers a different explanation as to why it may be desirable to delegate information provision to agents with dissonant objectives. It argues that, when manipulation of information is possible, competition between opposing interests induces mutual monitoring. Such monitoring is efficient and preferable over imposing penalties to the agents when manipulation of information is discovered.

We consider a situation with a principal who has to decide in favor of one of two causes, but has little information about which is the best one. Information can be provided by one or two agents. The inability of the principal to monitor the agents' effort makes it necessary to give them powerful and costly incentives schemes. Designing appropriate incentives is made difficult by the fact that information is non contractible. Thus, agents' rewards can only be based on the final decision, but not on the information on the basis of which the decision is taken (*indirect rewards*). Indirect rewards are widespread and are to be viewed as a response to the difficulty in designing compensation schemes that reflect the quality of the information provided by the agents. While decisions are easily observed, it may be a more complicated matter to evaluate the arguments made to sustain a given cause.

Our analysis builds on the work of Dewatripont and Tirole (1999). Dewatripont and Tirole make the important point that with indirect rewards full disclosure of information is incompatible with effort provision. When information acquisition is assigned to one agent, incentives to look for information in both directions are provided by turning him into a "non-partisan activist", that is, the agent prefers extreme decisions to more intermediate ones. Consequently, he will be reluctant to disclose information that makes both causes appear equally desirable. When the same task is performed by two agents each investigating one cause, effort provision is ensured by making them advocates of their cause. The two advocates have thus incentive to conceal information that is unfavorable to their preferred alternative.

An important assumption in Dewatripont and Tirole is that the principal finds it optimal to have just one investigation on each cause. Consequently, their analysis cannot capture an important feature of the information-gathering under advocacy. Namely, that the parties, in addition to looking for evidence in support of their cause, devote extensive resources to searching for flaws in the opponent's arguments. The typical example of this can be found in the Anglo-Saxon adversarial trial, where the proof-taking is dominated by "cross-examination", a device enabling the parties to impeach evidence adduced by the opposition. More generally, mutual monitoring is common to most situations described above and is inherent to the competitive character of the search process in advocacy systems.

We depart from Dewatripont and Tirole by allowing for multiple investigations of the same cause. Our first observation is that mutual monitoring arises as a consequence of the advocates having known and opposing interests. Anticipating that concealment of information by one side always works to the detriment of the other side, each party has an incentive to double-check the opponent's evidence and to uncover possible distortions.

Parties' mutual monitoring is valuable but, insofar as it involves duplication of efforts, it may be costly. The principal must compensate the agents if he wants them to operate as a mutual system of checks and balances. We show that in many circumstances benefits are more than offsetting. In particular, duplication of efforts proves desirable when each cause exhibits conflicting arguments and therefore the risk of manipulations is higher. Underlying this result is the idea that, as manipulation becomes more likely, duplication of efforts not only results in higher benefits but also in lower costs. The first statement is straightforward. When evidence is likely to be manipulated, duplication of efforts is more valuable, for its contribution in reducing the incidence of erroneous decisions is greater. The second and more interesting point is that the principal will not need to offer as much rent to induce duplication of efforts. This is because, as the probability of concealment by one agent increases, so does the other agent's stake in questioning her evidence. Therefore, less incentives are necessary to induce monitoring.

One might expect, however, that manipulation could be more efficiently deterred by inflicting a punishment to the party that is caught manipulating. With a large enough penalty, truthful disclosure could be achieved also when the probability of discovery is low. We argue that parties' reciprocal monitoring is a better way to prevent manipulation than imposing penalties. The intuition is that by lowering the incentives for one party to manipulate, penalties also reduce the gains for the other party to monitor. Overall, this increases the principal's cost to reduce manipulation.

Finally, we compare reciprocal monitoring by the two advocates with the creation of an agency that monitors the non-partisan activist . We show that under non-partisanship providing incentives for monitoring is more difficult because the non-activist's goals are not focused enough. Since an arbitrarily small bias towards one cause unbalances manipulation in favor of that cause, the principal needs to give up a high rent to induce monitoring in both directions.

The paper is organized as follows. Section 2 extends the model by Dewatripont and Tirole to allow for multiple investigations on the same cause. Section 3 highlights benefits and costs of duplication of efforts and gives conditions under which duplication of efforts is optimal. Section 4 analyzes the desirability of introducing penalties when the agents are caught manipulating. Advocacy and non-partisanship are compared in section 5. Finally, Section 6 summarizes the results and discusses applications to transfer price policies and comparative judicial systems. All proofs are relegated to the Appendix.

2. The model

To formalize our idea we use a generalization of the model by Dewatripont and Tirole (1999) (henceforth DT), which is described in the following sub-section.[2] In DT it is assumed that the amount of information collection is the same with one or two agents. Since we are interested in the possibility that the incentives to acquire information vary across the two regimes, in sub-section 2.2 we present an extension of DT that endogenizes the level of investigation.

2.1 *The Dewatripont and Tirole's model*

A risk-neutral principal (judge, top manager, politician) has to take one of three decisions: *A*, *B*, *0*. Decisions *A* and *B* are to be interpreted as favoring two different constituencies (prosecutor and defendant, buying and selling divisions, two regions). Depending on the context, *0* can be interpreted as an intermediate decision (a more lenient sentence, an intermediate transfer price) or as the decision of maintaining the status quo (none of the proposed projects is undertaken).

[2] For convenience and without this affecting the structure of the model, in describing DT we use a different notation than the one proposed by the authors.

The principal's preferences depend upon the realization of an unknown state of the world $\theta \in \{-1, 0, 1\}$ where $\theta = \theta_A + \theta_B$. θ_A takes value -1 with probability α and 0 with probability $1 - \alpha$. Similarly, θ_B takes value 1 with probability α and 0 with probability $1 - \alpha$. The two parameters are independently distributed and so

$$\Pr(\theta = 1) = \alpha(1 - \alpha)$$
$$\Pr(\theta = -1) = \alpha(1 - \alpha)$$
$$\Pr(\theta = 0) = 1 - 2\alpha(1 - \alpha)$$

Under full information - that is, knowing θ - the principal would take decision *A* in state $\theta = -1$, decision *B* in state $\theta = 1$ and decision 0 otherwise. Under imperfect information the principal hires one or two agents to collect information about θ_A and θ_B. A search on cause $h = A, B$ costs unverifiable disutility of effort ψ.

If $|\theta_h| = 1$, conditional on incurring ψ, the agent acquires incontestable evidence P_h that $|\theta_h| = 1$, with probability e. Otherwise, the agent either learns nothing (which will be denoted by ϕ) or observes two conflicting pieces of information - an argument P_h and a counterargument N_h - that perfectly nullify each other. We summarize $(P_h,\ N_h)$ as $\tilde{\phi}_h$ and assume that ϕ is obtained with probability $\gamma(1 - e)$ while $\tilde{\phi}_h$ is obtained with probability $(1 - \gamma)(1 - e)$. Note that in the absence of manipulation learning $\tilde{\phi}_h$ is equivalent to learning ϕ for the purpose of updating beliefs. In contrast learning P_h means that N_h does not exist and therefore $|\theta_h| = 1$ for sure. If $|\theta_h| = 0$, the agent learns ϕ with probability γ and $\tilde{\phi}_h$ with probability $(1 - \gamma)$. The agent always learns ϕ if she does not spend ψ.

Letting $\mu \equiv 1 - \alpha e$, the information structure can be thus summarized as follows. Conditional on searching on cause $h = A, B$, an agent has probability $1 - \mu$ of collecting compelling evidence in support of this cause, probability $\gamma\mu$ of learning ϕ and probability $(1 - \gamma)\mu$ of learning $\tilde{\phi}_h$.

As a first step suppose that the principal observes the information the agents acquire and therefore manipulation cannot occur. The principal takes the optimal decision conditional on the evidence gathered by the agents. Under imperfect information about its preferences the principal can incur three types of errors: *inertia*, if $|\theta| = 1$ and *0* is picked, *extremism*, if $\theta = 0$

and one of the two causes is embraced and *misguided activism*, if $\theta = -1$ $(\theta = 1)$ and *B (A)* is chosen. The losses associated with *inertia*, *extremism* and *misguided activism* are denoted by l_I, l_E and l_M, respectively. Notice that these represent the losses when the principal makes an inefficient decision but has full information about which is the correct one. The correspondent expected losses conditional on the agents' imperfect information are denoted by $\widehat{l}_I$ and $\widehat{l}_E$ and computed as follows. Suppose that both causes have been investigated. The posterior probability that $|\theta_h| = 1$ conditional on ϕ or $\tilde{\phi}_h$ having been discovered is given by

$$\hat{\alpha} = \frac{\alpha - (1 - \mu)}{\mu}$$

Thus, when the information is (P_A, ϕ), the principal assigns probability one on $\theta_A = -1$ and probability $\hat{\alpha}$ on $\theta_B = 1$. The expected loss from choosing *A* is $\hat{\alpha} l_E$ while the expected loss from choosing *0* is $(1 - \hat{\alpha})\, l_I$. Assumption 1 implies that the optimal decision is *A*:

Assumption 1 $\widehat{l}_I \equiv (1 - \hat{\alpha})\, l_I - \hat{\alpha} l_E > 0$

Similarly, when the information is (ϕ, ϕ), the expected loss from choosing *0* is $2\hat{\alpha}\,(1 - \hat{\alpha})\, l_I$ while the expected loss from choosing one of the causes is $[1 - 2\hat{\alpha}\,(1 - \hat{\alpha})]\, l_E + \hat{\alpha}\,(1 - \hat{\alpha})\, l_M$. The following assumption ensures that *0* is the optimal decision:

Assumption 2 $\widehat{l}_E \equiv [1 - 2\hat{\alpha}\,(1 - \hat{\alpha})]\, l_E + \hat{\alpha}\,(1 - \hat{\alpha})\,(l_M - 2l_I) > 0$

As one would expect, assumption 2 is always satisfied when $(l_M - 2l_I) \geq 0$.

The agents receive no private benefits from the principal's decisions, therefore they must be rewarded to search for information. They are risk neutral and protected by limited liability. The reservation pay-off is normalized to zero. DT adopt an incomplete contract approach by positing that information is non contractible and therefore payments to the agents can only be made contingent on the final decision (*indirect rewards*).[3] Moreover, they restrict attention to the case where i) ψ is not too large relative to l_I and l_E so that the principal always wants to induce the collection of information about the two causes; ii) duplication of information acquisition is very costly and therefore it is never optimal for the principal to have two investigations on the same cause.

[3] A discussion of the foundations of decision based rewards is provided in DT.

Information structure and reports

information		reports					
		advocacy		non-partisanship			
P_A	P_B	P_A	P_B	P_A	ϕ	$(\phi$	$P_B)$
P_A	P_B	P_A	P_B	P_A	ϕ	$(\phi$	$P_B)$
P_A	$\tilde{\phi}_B$	P_A	P_B	P_A	$\tilde{\phi}_B$		
P_A	ϕ	P_A	ϕ	P_A	ϕ		
$\tilde{\phi}_A$	P_B	P_A	P_B	$\tilde{\phi}_A$	P_B		
$\tilde{\phi}_A$	$\tilde{\phi}_B$	P_A	P_B	P_A	$\tilde{\phi}_B$	$(\tilde{\phi}_A$	$P_B)$
$\tilde{\phi}_A$	ϕ	P_A	ϕ	P_A	ϕ		
ϕ	P_B	ϕ	P_B	ϕ	P_B		
ϕ	ϕ	ϕ	ϕ	ϕ	ϕ		

Table 1

The optimal incentive schemes under these assumptions are derived in DT; we refer the reader to this paper for a formal characterization. For our purposes it suffices to notice that they have the following properties. Let w_h and w_0 indicate the wages when cause $h = A, B$ prevails and when *0* is selected. With one agent investigation on both causes can only be obtained if $1 - \mu < \frac{1}{2}$ and the cost minimizing wage scheme is characterized by $w_A = w_B > w_0 = 0$.[4] The agent is thus made an "activist" in the sense that he is indifferent between *A* and *B* but dislikes decision *0*. We shall refer to this regime as non-partisanship. If there are two agents, *a* and *b*, searching cause *A* and *B* respectively, investigation on both causes is optimally achieved by making them "advocates" of their causes. This implies $w_A > w_B, w_0 = 0$ for agent *a* and $w_B > w_A, w_0 = 0$ for agent *b*.[5]

Let us now turn to the case where the principal does not observe the information received by the agents, so they can conceal information if they choose to. Concealment of information can take two forms: an agent can hide N_h and only disclose P_h when she observes $\tilde{\phi}_h$ or she can report ϕ when she observes P_h. The incentives given to the agents endogenously

[4] As shown in DT, if $w_A > w_B$ by reducing w_A and increasing w_B by the same amount the principal can keep the pay-off under full investigation constant while reducing the maximum pay-off under partial investigation. Thus, setting symmetric rewards $w_A = w_B$ is optimal. Moreover, since 0 is the principal's decision when no information is provided, inducing effort provision requires $w_A = w_B > w_0$. Finally, cost-minimization implies $w_0 = 0$.

[5] When *a* exerts no effort, the principal's decision is either *0* or *B*, depending on the information provided by *b*. Thus, the principal obtains effort provision at minimum cost paying *a* a positive wage when the decision is *A* and zero otherwise. Similarly for agent *b*.

Decisions

information		optimal ex-post decision	decision	
			advocacy	non-partisanship
P_A	P_B	0	0	$A\ \ (B)$
P_A	$\tilde{\phi}_B$	A	0	A
P_A	ϕ	A	A	A
$\tilde{\phi}_A$	P_B	B	0	B
$\tilde{\phi}_A$	$\tilde{\phi}_B$	0	0	$A\ \ (B)$
$\tilde{\phi}_A$	ϕ	0	A	A
ϕ	P_B	B	B	B
ϕ	$\tilde{\phi}_B$	0	B	B
ϕ	ϕ	0	0	0

Table 2

determine their preferences over decisions and hence the pattern of evidence manipulation. Under non-partisanship, the agent suppresses information in order to always make one cause appear preferable to the other and avoid that decision *0* is taken. Under advocacy instead each of the two parties conceals evidence that is damaging to their cause. Table 1 illustrates the agents' behavior under both regimes.

The principal rationally anticipates this behavior and minimizes the probability of taking an erroneous decision by appropriately discounting the information received. Under advocacy, when the report is (P_A, ϕ), there exists probability $(1-\mu)$ that party a has indeed observed P_A and probability $(1-\gamma)\mu$ that she has observed $\tilde{\phi}_A$ and concealed the negative evidence. The following assumption guarantees that A is the optimal decision when the above report is made.

Assumption 3 $(1-\mu)\widehat{l}_I > (1-\gamma)\mu\widehat{l}_E$

Note that since the two advocates never disclose unfavorable information, assumption 3 is needed to ensure that they have some influence on decision making. Note also that assumption 2 implies that *0* is the optimal decision when the advocates' report is (P_A, P_B). Under non-partisanship, the following assumption ensures that it is optimal for the principal to choose *A* when the agent discloses (P_A, ϕ_B) or $(P_A, \tilde{\phi}_B)$.

Assumption 4 $(1-\mu)\widehat{l}_I > (1-\gamma)\mu\widehat{l}_E + \frac{(1-\mu)^2}{\gamma\mu} l_E$

Table 2 summarizes the decisions taken and the losses incurred by the principal under each structure of information acquisition.

2.2 *Allowing for duplication of effort*

Our objective in this section is to alter one assumption of the previous framework, namely the assumption that each cause is investigated once. This enables us to illustrate the main idea of the paper that the delegation of information acquisition to agents with conflicting interests can be an efficient way to reduce the manipulation of information that comes from the necessity to motivate effort. To this purpose, we introduce the simplifying assumption that the signals are perfectly correlated:

Assumption 5. If a cause is investigated twice, the same signal is observed.

Notice that perfect correlation is here interpreted in extensive way, also including that if *a*'s search on cause $h = A, C$ is unsuccessful so is *b*'s. Assumption 5 plays a double role in our analysis. First, it rules out the possibility that an agent wishes to look twice on the same cause in order to increase the probability to discover information. The case where the probability of finding information depends on the intensity of the effort spent by the agent, while interesting, is orthogonal to the problem addressed here. Second, it implies that when *two different* agents search on *the same* cause they always observe the same piece of information. This assumption is only made for simplicity. An imperfect but sufficiently high degree of correlation would yield the same qualitative results. An immediate implication of assumption 5 is stated below.

Under non-partisanship, each cause is only investigated once whereas under advocacy the agents may still want to search on both causes to check against one other.

This result plays a crucial role in our analysis for it suggests that different regimes respond differently to the manipulation of information. The intuition lies in the fact that the two advocates have known and opposing goals. Anticipating that concealment by one side is always harmful to the other side, each party has an incentive to check the opponent's evidence and uncover possible distortions. A similar mechanism is not present under non-partisanship, where one agent works for both causes.

3. Optimality of duplication of effort

We model the advocacy game as a two-stage game. In the first stage, the parties simultaneously decide whether to allocate effort only to their cause or to both. In the second stage, they chose which part of the information gathered to disclose to the principal. The principal's goal is to choose the reward structure that minimizes the total expected loss due to the manipulation of information. The latter is given by the sum of the expected loss of making a wrong decision and the rent paid to the parties.

For some of our examples the above timing is not descriptive. For instance, in antitrust cases the merging partners submit documents at the European Commission before the hearing, so that the rivals can have access to them before looking for counterarguments. Similarly, in courts the parties are often asked to disclose some of their evidence before the trial so as to give the other party the possibility to prepare her defense. It will be evident, though, that the insights we wish to highlight do not depend on whether the process of searching for concealed information in the opposite party's case is simultaneous or sequential. Because the simultaneous case is analytically simpler, we shall focus on this and content ourselves with discussing the sequential case later.

3.1 *Disclosure stage*

Because of symmetry, the behavior of the parties at the disclosure stage can be analyzed focusing on one cause. Suppose that both agents have investigated cause *B*. Agent *b* still finds it optimal to reveal only evidence supporting this cause, while agent *a*'s optimal strategy is to report N_B when $\tilde{\phi}_B$ is observed and ϕ when P_B is observed. Note that these strategies are (weakly) dominant, provided that the parties are not punished when caught manipulating. Hence, they do not depend on whether each agent observes what the other agent knows (whether she has investigated both causes and what the outcome of the investigation was) before disclosing information. We shall discuss the case where the principal punishes detected manipulation in Section 4. Similarly, they do not depend on the timing (sequential vs simultaneous) of the disclosure by the two parties. Given Assumption 5, it immediately follows that duplication of effort by both parties induces full disclosure of information.

3.2 *Investigative stage*

The level of investigation performed by the agents is determined as solution of a Nash implementation problem in the game where each agent (*a* and *b*) chooses one of three actions: not investigation, investigation on one cause, investigation on both causes. The actions chosen determine the information that is disclosed to the principal and therefore the decision that will prevail. Thus, the principal can influence the agents' action choice by selecting appropriate (indirect) reward schemes.

Let us first compute the principal's optimal decisions, contingent on each action pair. Suppose that cause *B* (but not *A*) is investigated by both parties. When the information on this cause is ϕ or $\widetilde{\phi}_B$, the principal assigns probability $\widehat{\alpha}$ on $\theta_B = 1$. Thus, depending on the report on cause *A*, assumptions 2 or 3 apply. When the information is P_B, the principal assigns probability one on $\theta_B = 1$. Thus, if ϕ is reported on cause *A*, he optimally chooses B (assumption 1); if P_A is reported, either *0* or *B* can be optimal. We assume that it is best for the principal to follow the agents' advice and to choose *0* and discuss this assumption in footnote 5.

Assumption 6 Suppose that agent *a* reports P_A on cause *A*, either because she has observed P_A or because she has observed $\widetilde{\phi}_A$ and concealed the negative evidence. The optimal decision when the principal receives this report and has full information that $\theta_B = 1$ is *0*.

When both causes are investigated by both agents the optimal decisions are given by assumptions 1 and 2.

The solution to the principal's implementation problem in the game described above is summarized in the following proposition.

Proposition 1 *i) if $\gamma \leq \frac{1}{2}$ the strategy in which both agents investigate both causes can be implemented as a unique Nash equilibrium without leaving any rent to the agents; ii) if $\gamma > \frac{1}{2}$ the same equilibrium can be obtained leaving to each agent a positive rent $U_{(AB,AB)} = \frac{2\gamma-1}{1-\gamma}\psi$. Conversely, the strategy in which both agents only investigate their cause can be implemented as a unique Nash equilibrium at zero rent.*

Proposition shows that the cost for the principal to induce the agents to check on one other is inversely related to the agents' stakes, i.e. to the probability of discovering distortions in the opponent's evidence. Since manipulation only occurs when the information is $\widetilde{\phi}$, i.e., with probability $(1-\gamma)\mu$, the smaller is γ, the less expensive is to implement duplication of efforts.[6]

3.3 *Optimality*

Let $L_{(A,B)}$ and $L_{(AB,AB)}$ denote the expected losses associated with the manipulation of information when *a* and *b* only search one cause and when they investigate both. Assumption 5 implies $L_{(AB,AB)} = 0$ and from table 2 we obtain:

$$L_{(A,B)} = 2(1-\gamma)\mu[(1-\mu)\widehat{l}_I + \gamma\mu\widehat{l}_E] \tag{1}$$

Note that the above expression equals zero for $\gamma = 1$ and is decreasing in γ for $\gamma > \frac{1}{2}$. Intuitively, when $\gamma = 1$, manipulation never occurs and therefore the principal gains nothing form duplication of efforts. Instead, when $\gamma < 1$, manipulation occurs when the parties only search one cause and duplication of efforts is beneficial. Comparing costs and benefits yields the following result.

Proposition 2 *There exists a* $\gamma^* > \frac{1}{2}$ *such that duplication of efforts is optimal if* $\gamma \leq \gamma^*$.

Proposition is intuitive but not trivial. Key to our analysis is the idea that the conflict of interests between the two advocates creates a mechanism of mutual monitoring that limits the scope for manipulation. Proposition shows that such mechanism has also efficiency properties. Efficiency stems from the "congruence of interests" between the agents and the principal concerning the level of investigation. Duplication of efforts is likely to confer more benefits to the principal when information is more susceptible of manipulation (high probability of $\widetilde{\phi}$).

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[6] We have assumed that when both agents search on cause *B* and learn P_B but only agent *a* investigates cause *A* and reports P_A it is optimal for the principal to choose *0* (Assumption 6). In fact the decision that minimizes the expected loss is *0* only when $(1-\gamma)\mu l_E \geq (1-\mu)\widehat{l}_I$ while *B* should be preferred when the inequality is reversed. Whether the principal chooses *B* or *0* has little impact on our results. The agents' behavior at the disclosure stage is not affected nor is the expected loss of manipulation given that Assumption 6 refers to a strategy off-the-equilibrium. Thus, relaxing Assumption 6 would only make duplication of efforts less appealing for the parties. This is because by choosing *B* the principal increases the expected pay-off of *b*, that is, of the agent that has only searched on her cause. This suggests that the principal may find it optimal to set suboptimal off-the-equilibrium decision rules in order to extract some of the rent required to induce monitoring.

Indeed, this is also the case in which the two advocates have more to gain from monitoring each other. This enables the principal to enjoy the benefits of the additional information provided by duplication of efforts while limiting the increase in costs. By contrast, when manipulation is less likely (low probability of $\widetilde{\phi}$) duplication of efforts becomes too expensive relative to the induced benefits and therefore only one investigation by each agent is the efficient solution.

We have assumed that the process of searching for concealed information in the opposite party's case is simultaneous. However, as observed, in many instances the parties observe the arguments made by their opponent before looking for counterarguments. In the context of our model, introducing sequential investigations would have little impact on the insights. Full disclosure of information could still be implemented at a cost increasing in γ, although the principal would need to compensate the agents also when $d = 0$. This in order to induce monitoring when the party has a "weak case", i.e., when she observes ϕ on her cause. A proper comparison of the simultaneous and sequential cases would require extending the model in various directions. For example, one would want to incorporate the cost of waiting, i.e., the possibility that the success of the search is endangered by lack of time. This cost should then be compared with the benefit that searching for a counterargument is cheaper when the party already has the argument. We leave the endogenization of the timing for future research.

4. Penalties

So far we have assumed that there are no penalties for the agents when they are caught manipulating. One may argue, though, that the principal could prevent concealment of information by making it arbitrarily costly. Suppose that a party receives a non monetary penalty when discovered manipulating. If the size of the penalty can be made large enough, an arbitrary small probability that the opponent investigated the same cause and therefore has evidence should suffices to induce each party to reveal the truth between P_h and $\widetilde{\phi}_h$.

We argue that penalties are not optimal for they destroy incentives to monitor. The logic of the argument is that with penalties the agents manipulate less. This reduces the gain from checking one other, and makes it more expensive for the principal to induce reciprocal monitoring.

Let G^S denote a game with the same characteristics as the advocacy game described in the previous sections, except for a non monetary penalty $S \in [0, \infty)$ that is imposed on the parties when caught manipulating. As before the principal has two goals: minimize the expected loss of erroneous decision-making due to information manipulation and extract the parties' rent.

Assume that $\gamma > \frac{1}{2}$, which is the relevant case. We know from Proposition that under G^0 the principal obtains full disclosure of information ($L_{(AB,AB)} = 0$) at a cost $\frac{2\gamma-1}{1-\gamma}\psi$. One implication of introducing penalties is that full disclosure of information can no longer be achieved. This point is illustrated most simply by focusing on a single cause, cause *B*. Suppose that the information about cause *A* once created is observed by the principal (i.e., is non manipulable) and takes value P_A with probability $1-\mu$ and value ϕ with probability μ. On cause *B*, the information structure is the same as in Section 2. If *b* always reports the truth on cause *B*, no investigation is the best response for *a*. On the other hand, *b* always manipulates when she observes $\widetilde{\phi}_{_B}$ if *a* never searches, regardless of the size of the penalty. Hence, for any $S > 0$, the equilibrium must be a mixed strategy equilibrium where *b* manipulates with probability x when observing $\widetilde{\phi}_{_B}$ and *a* searches (also) cause *B* with probability y.[7] More formally, let $\overline{w}$ denote the wage paid to party *a(b)* when *A(B)* is chosen. The expected pay-off of party *b* under G^S is

$$\mu(1-\mu)\overline{w} - \psi + \mu(1-\gamma)x\left[\mu(1-y)\overline{w} - yS\right] \tag{2}$$

where the last term measures the net gain from manipulation. The expected pay-off for party *a* is

$$(1-\mu)\left[\mu - \mu(1-\gamma)x\right]\overline{w} - \psi + y\left[(1-\mu)\mu(1-\gamma)x\overline{w} - \psi\right] \tag{3}$$

[7] Note that with imperfect correlation of the signals, penalties may become ineffective if the level of punishment is bounded above by law. Imperfect correlation lowers the probability that party *a* discovers the manipulation when party *b* observes $\widetilde{\phi}_B$ and reports P_B and she also investigates cause *B*. In this case, a sufficiently large punishment is necessary to discourage manipulation.

where the last term is the net gain from monitoring.[8] From (2), the probability of party *a*'s searching y is given by

$$y = \frac{\mu \overline{w}}{\mu \overline{w} + S} \tag{4}$$

At $S = 0$, *b* manipulates and y is equal to one; at $S > 0$, $y < 1$: any increase in the level of penalty reduces monitoring.

That full disclosure of information cannot be achieved implies that a *necessary* condition for penalties to be optimal is that the rent paid to the parties at the equilibrium of G^S is lower than $\frac{2\gamma-1}{1-\gamma}\psi$, for some $S > 0$. From (3), the cost minimizing wage $\overline{w}$ that ensures monitoring is

$$\overline{w} = \frac{\psi}{(1-\mu)\mu(1-\gamma)x} \tag{5}$$

Substituting in (3), gives party *a*'s monetary rent[9]

$$U_{(x,y)} = \frac{1-2(1-\gamma)x}{(1-\gamma)x}\psi \tag{6}$$

which is decreasing in x and equal to $\frac{2\gamma-1}{1-\gamma}\psi$ at $x = 1$. Intuitively, G^S with $S > 0$ can be interpreted as a game where manipulation occurs with probability one as in G^0, but where the probability of observing ϕ relative to $\widetilde{\phi}$ is higher than in G^0, i.e., γ is higher. By Proposition , this implies that inducing monitoring is more costly when $S > 0$.

The optimal level of penalty is then obtained as a solution of the following problem

$$\begin{gathered} \underset{S}{min} \quad \mu(1-\gamma)x(1-y)\left[\mu\widehat{l}_E + (1-\mu)\widehat{l}_I\right] + \frac{1-2(1-\gamma)x}{(1-\gamma)x}\psi \\ s.t. \quad (4),\ (5), S \geq 0 \end{gathered}$$

which yields a corner solution $S^* = 0$.

Proposition 3 *It is not optimal for the principal to punish detected manipulation.*

[8] In both expressions (2) and (3), use has been made of the result in Proposition 1 that rewarding party *a(b)* when $d = 0$ or $d = B(A)$ is not optimal.

[9] Note that the incentives for party *a* to monitor only depend on the probability that party *b* conceals evidence. Thus, the same expression would obtain also if we assumed that the information on cause A is manipulable.

It is noteworthy that our result is consistent with real observation. For instance, at trial the defense attorney is supposed to represent the interests of his clients and to exploit any advantages the legal system allows for them, including the concealment of contrary evidence. No penalties are contemplated for not disclosing evidence. Moreover, the lawyer-client privilege *prohibits* the defense attorney to divulge statements made to him by his client in the course of their professional relation, also when this could help ascertain the truth. [10]

5. Advocacy vs non-partisanship

The analysis in the previous sections suggests that the case for advocacy is further enhanced (relative to what illustrated by DT) when we take into account the response of the two regimes to the manipulation of information. To give a formal argument, we now briefly recall what can be obtained when information acquisition is delegated to one non-partisan agent. From Result 1 we know that under non-partisanship duplication of efforts never occurs. Moreover, effort provision requires that the agent is made an activist in the sense that he prefers decisions *A* or *B* to *0*. As shown by DT, the cost minimizing scheme that induces (one) investigation on both causes is given by $w_A = w_B = \frac{\psi}{\gamma\mu(1-\gamma\mu)}$ and $w_0 = 0$ (a formal derivation is reported in the Appendix). This wage scheme leaves the agent a net rent $U_{NP} = \frac{1-\gamma\mu}{\gamma\mu}\psi$ and generates *extremism*. From table 2, the expected loss associated with this *extremism* is:

$$L_{SA} = (1-\mu)^2 l_E + (1-\gamma)^2\mu^2\widehat{l}_E + 2\gamma(1-\gamma)\mu^2\widehat{l}_E \tag{7}$$

Thus, relying on a single agent is costly and leads the principal to take inefficient *extreme* decisions. Comparing expressions (1) and (7) it follows that when the two advocates only search in one direction (no duplication of efforts), non-partisanship dominates if l_I is sufficiently large relative to l_E and ψ (Proposition 3 of DT). Moreover, the smaller γ, the lower the relative cost of inertia that ensures that non-partisanship is optimal. Interestingly, Proposition tells us that duplication of efforts by the two competing advocates is desirable exactly when γ is small, that is, when *ceteris paribus* non-partisanship is more likely to be optimal.

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[10] The right to conceal unfavorable evidence, however, should not be confused with the right to forge false evidence. In all legal systems forging is forbidden and punished as perjury. In our setting forging is ruled out by the assumption that evidence is verifiable.

One may object that our analysis has ignored the possibility that an external agency is set to control the agent's activity under non-partisanship. If the latter can be given adequate incentives, monitoring could be enhanced also in this case. There are at least two reasons why inducing monitoring is difficult under non partisanship. The first relates to the fact that monitoring destroys the activist's incentives. As noted by DT, when concealment of information is not possible (either because the principal observes the information gathered by the agent or because concealment is detected ex post), a wage scheme that induces investigation on both causes exists only if $1-\mu<\frac{1}{2}$. Intuitively, since the activist receives no compensation when both causes look equally desirable, a search must be more likely to fail than succeed in order for the activist to look in both directions. The second reason is related to the difficulties in providing incentives for monitoring. Suppose that the principal hires a second agent whose task is to detect manipulation by the non-partisan activist. Incentives can be provided by creating some conflict of interests between the monitor and the activist. For example, one can imagine a wage scheme that pays the monitor w^M whenever he discloses information that leads the principal to modify his decision. The latter can be viewed as an "appeal" procedure in which rewards are related to the appeal being successful, i.e., to the appeal leading to a reversal in the first decision.[11] Suppose that the monitor believes that the activist has a bias towards, say, cause *A* and as a result puts probability one on $(P,\widetilde{\phi})$ being reported when $(\widetilde{\phi},\widetilde{\phi})$ is observed, and on (P,ϕ) being reported when (P,P) is observed. The monitor's perceived utility is

$$\left[(1-\mu)^2+\mu^2(1-\gamma)^2+\mu^2(1-\gamma)\gamma\right]w^M-\psi \tag{8}$$

when searching on cause *A* and

$$\left[(1-\mu)^2+\mu^2(1-\gamma)^2+2\mu^2(1-\gamma)\gamma\right]w^M-2\psi \tag{9}$$

when searching on both causes. Searching only cause *B* is clearly dominated, while not searching at all gives the monitor zero.[12] A quick inspection of expressions (8) and (9) shows that ensuring full monitoring requires the principal to set a wage $w^M=\frac{\psi}{\mu^2(1-\gamma)\gamma}$. The monitor

[11] Similar results obtain assuming that the monitor is rewarded when $d=0$.

[12] Note that in this example what matters is not whether the activist is actually biased, but whether the monitor believes he is.

enjoys a rent

$$U^M = \frac{(1-\mu)^2 + \mu^2(1-\gamma)^2}{\mu^2(1-\gamma)\gamma}\psi$$

The example shows that, under non-partisanship, inducing monitoring is costly because the activist's preferences are not focused enough. Since manipulation can be unbalanced in one direction or another, the principal needs to pay a high rent to induce monitoring on both causes.

6. Concluding remarks and applications

Competition among advocates of special interests involves duplication of efforts and hence added costs. The paper's main contribution was to show that such duplication may yield more than offsetting benefits. Having two opposing agents, each looking in both directions, guarantees reciprocal control and thus helps mitigate the manipulation of information that comes from the use of biased agents. Parties' reciprocal monitoring is shown to be preferable to imposing penalties for detected manipulation. Clearly, in a complete contract set up, there would be better ways of limiting the manipulation of information than creating biased agents, but when contracts are incomplete, the creation of conflicts can be an efficient way to guarantee some monitoring. Our insight is related to the more general point that the creation of conflicts between agents plays an important role in generating a system of checks and balances in public life as well as in private organizations (see e.g. McCubbins and Schwarts, 1984 and Laffont and Tirole, 1990).

We believe that our analysis contributes to rationalize some organizational arrangements that are often observed in practice. Two examples, one related to transfer pricing policies in multidivisional firms and the other to comparative judicial systems, are illustrated above.

6.1 *Transfer pricing policies*

The empirical evidence on transfer price policies in multidivisional firms, as documented by Eccles and White (1988), supports our point that conflict between opposing interests may have beneficial effects because it offers a potential for control and additional information creation. Eccles and White's analysis is based on interviews with 13 manufacturing firms. They find that in most cases firms prioritize internal transfers by prohibiting external trade or even mandating internal trade. The mandate transfer price is either based on cost (mandated full cost transfer pricing) or on market alternatives (mandated market price transfer pricing). After noticing that these transfer pricing methods vary from those recommended by theoretical economists, that is, from pricing at marginal cost, they claim that departures from efficiency criteria have a twofold motivation. They are justified by lack of information and by the goal, explicitly pursued by senior managers, to create a conflict of interests between the buying and selling divisions. The reason is that mandated policies (full cost or full price) involve exercise of authority by senior management who must determine the cost or price at which trades should occur. This in turn generates competition between the interested divisions to provide information and try to influence the senior management's decision. Eccles and White (1988, p. 30) argue that some executives see such competition as quite valuable, because it generates information.

First, conflict often results in each profit center manager's monitoring the performance of the other. This is a form of indirect control from top management and is important because it helps to reduce the amount of time top management must spend on monitoring divisional affairs. Second, conflict makes information available to top management that otherwise might not be known or would be difficult or expensive to obtain

This is in line with our theme that the informational benefits of conflict may often outweigh its costs. Also in line with our result is the point that conflict is not necessarily beneficial. In some cases a policy of exchange autonomy, which does not require internal transactions and therefore has the potential to eliminate conflicts, should be preferred. In particular, exchange autonomy based on market prices performs well when the market approximates the perfectly competitive benchmark and therefore market prices embody all the information that is relevant to the transaction.[13]

6.2 *Comparative judicial systems*

The way in which the proof-taking process is managed under different judicial systems also provides a good illustration of our results. There are two distinct traditions in judicial process: the inquisitorial system, mainly adopted in Continental Europe, and the adversarial

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[13] The idea that competition may generate efficient transfer pricing policies is also present in Holmstrom and Tirole (1991). Their approach is quite different, however. The problem they analyze is one of providing incentives to the managers to invest in quality and cost reduction. They show that decentralization, by allowing the units to trade outside and to bargain over the transfer price, may be beneficial for it generates competition and market monitoring.

system, widespread in the Anglo-Saxon world. In the inquisitorial system, the evidence search takes the form of an official inquiry by which the material is collected by an impartial investigator and presented to the judge for decision. Other parties, including the defense attorney, play a very limited role. By contrast, the adversarial method is characterized by party prosecution and by the extensive use of cross-examination. Cross-examination is recognized a very important role in adversarial trials as a way to discover distortions in the evidence presented by the two sides. This point is also emphasized in Posner (1999). Posner claims that the competitive character of the adversarial method enhances the agents' incentives to search. This, not only by inducing greater efforts by each side to find evidence than the investigator in the inquisitorial system would exert, but also by inducing greater efforts to find the flaws in the other side's evidence. Consistent with our results, Posner notices that such duplication of efforts may be efficient.

If the size of the stakes in a case is at least a rough proxy for the social costs of an inaccurate decision, there may at least a rough alignment between the amount of search that is actually conducted and the amount that is socially optimal. It is true that the amount of search is driven not by the stakes alone but also by the likely effect of the marginal bit of evidence on the outcome. This implies that, other things being equal, more evidence will be obtained the closer is the case, because the closer the case is, the more effect on the outcome additional evidence is likely to have]....[And this is efficient too.

This last point is the equivalent of our result that the amount of rent to be given to induce parties' reciprocal monitoring is lower when the gains' for the parties, as captured by the probability of finding distortions in the opponent's report, are higher.

Appendix

Proof of proposition 1 Since the game is symmetric, we simplify the notation as follows. We let $\overline{w}$ and $\underline{w}$ denote the wages paid to agent *a (b)* when *A (B)* is chosen and when *B (A)* is chosen. As before, we denote by w_0 the wage when *0* is selected. This yields $\overline{w} \equiv w_A$, w_0, $\underline{w} \equiv w_B$ for agent *a* and $\overline{w} \equiv w_B$, w_0, $\underline{w} \equiv w_A$ for agent *b*. Risk neutrality implies that setting $\underline{w} = 0$ is optimal for the principal. Under assumptions 1 to 3 and 6, the strategy pair where both agents investigate both causes is a Nash equilibrium if:

$$\mu(1-\mu)\overline{w} + (1-2\mu(1-\mu))w_0 - 2\psi \geq \gamma\mu(1-\mu)\overline{w} + (\gamma\mu^2 + (1-\gamma\mu)(1-\mu))w_0 - \psi \tag{a1}$$

and

$$\mu(1-\mu)\overline{w} + (1-2\mu(1-\mu))w_0 - 2\psi \geq \gamma\mu w_0 \tag{a2}$$

where constraint (a1) says that investigating both causes is preferred to investigating one and constraint (a2) says that this is also preferred to investigating none. Rearranging, the above constraints can be written as

$$\overline{w} \geq \frac{\psi}{\mu(1-\mu)(1-\gamma)} + \frac{(1-2\mu)\mu}{\mu(1-\mu)}w_0 \tag{a3}$$

and

$$\overline{w} \geq \frac{2\psi}{\mu(1-\mu)} + \frac{\gamma\mu - (1-2\mu(1-\mu))}{\mu(1-\mu)}w_0 \tag{a4}$$

The optimal wage scheme that implements this equilibrium minimizes

$$U_{(AB,AB)} = \mu(1-\mu)\overline{w} + (1-2\mu(1-\mu))w_0 - 2\psi$$

subject to (a3), (a4) and $U_{(AB,AB)} \geq 0$.

We have two cases. If $\gamma \leq \frac{1}{2}$, the principal can obtain the first best by paying each agent

$w_0 = 0$ and (from constraint (a4) which is the binding constraint in this case)

$$\overline{w} = \frac{2\psi}{\mu(1-\mu)}$$

This wage scheme fully extracts the agents' rent.

If $\gamma > \frac{1}{2}$ the cost minimizing scheme that induces the agents to investigate both causes is $w_0 = 0$ and (from constraint (a3) which is the binding constraint in this case)

$$\overline{w} = \frac{\psi}{\mu(1-\mu)(1-\gamma)}$$

This scheme leaves each agent a rent $U_{(AB,AB)} = \frac{2\gamma-1}{1-\gamma}\psi$. In both cases duplication of efforts by the two parties is the unique Nash equilibrium of the game.

Using the same kind of reasoning, the strategy pair where both agents search only one cause is a Nash equilibrium if:

$$(1-\gamma\mu)\gamma\mu\overline{w} + (1-2\gamma\mu(1-\gamma\mu))w_0 - \psi \geq \qquad \text{(a5)}$$
$$(1-\gamma\mu)\mu\overline{w} + (\gamma\mu^2 + (1-\gamma\mu)(1-\mu))w_0 - 2\psi$$

and

$$(1-\gamma\mu)\gamma\mu\overline{w} + (1-2\gamma\mu(1-\gamma\mu))w_0 - \psi \geq \gamma\mu w_0 \qquad \text{(a6)}$$

Constraint (a5) says that investigating one cause is preferred to investigating two. Constraint (a6) ensures that this is also preferred to no investigation. Solving both inequalities yields:

$$\overline{w} \leq \frac{\psi}{(1-\gamma)\,\mu(1-\gamma\mu)} + \frac{1-2\gamma\mu}{1-\gamma\mu}w_0$$

$$\overline{w} \geq \frac{\psi}{\gamma\mu\,(1-\gamma\mu)} - \frac{(1-\gamma\mu)-\gamma\mu}{\gamma\mu}w_0$$

For $\gamma > \frac{1}{2}$ the wage scheme $\overline{w} = \frac{\psi}{\gamma\mu(1-\gamma\mu)}$ and $w_0 = 0$ ensures that investigating one cause is the unique Nash equilibrium of the game. This wage scheme leaves no rent to the agents. ■

Proof of Proposition 2 From proposition we know that $\gamma \leq \frac{1}{2}$ yields $U_{(AB,AB)} = 0$. Therefore $\gamma^* > \frac{1}{2}$. Our result then follows by noting that $\frac{\partial U_{(AB,AB)}}{\partial \gamma} > 0$ and $\lim_{\gamma \to 1} U_{(AB,AB)} = \infty$ whereas $\frac{\partial L_{(A,B)}}{\partial \gamma} < 0$ for $\gamma > \frac{1}{2}$ and $L_{(A,B)} = 0$ at $\gamma = 1$. ■

The optimal wage scheme under non-partisanship As shown in Section 2 note 3, it is optimal for the principal to set $w_A = w_B$ and $w_0 = 0$. Let $w_{NP} \equiv w_A = w_B$. From table 1 it follows that the agent's utility is 0 when not searching; $(1 - \gamma\mu)w_{NP} - \psi$ when searching only one cause and $(1 - \gamma^2\mu^2)w_{NP} - 2\psi$ when searching both causes. Incentive compatibility for full investigation requires the agent to prefer searching in both direction to focusing on a single one or none. This implies

$$(1 - \gamma^2\mu^2)w_{NP} - 2\psi \geq (1 - \gamma\mu)w_{NP} - \psi$$

and

$$(1 - \gamma^2\mu^2)w_{NP} - 2\psi \geq 0$$

The minimum wage that satisfies both inequalities is $w_{NP} = \frac{\psi}{\gamma\mu(1-\gamma\mu)}$ which leaves a net rent $U_{NP} = \frac{1-\gamma\mu}{\gamma\mu}\psi$ to the agent. ■

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