Delegation of information seeking – A comprehensive exemplification of the advocacy model by Dewatripont and Tirole

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1 Introduction

This paper is an extended presentation of a advocacy model which was firstly introduced in „Advocates“ Dewatripont and Tirole (1999) in the *Journal of Political Economy*, Vol 107, No. 1, pp.1-39. They were able to give a rational for advocacy, by introducing a model where a principal has to allocate two tasks with decision based rewards.

In practice it is observable that decision maker consult two advocates, instead of one non partisan agent to collect information. A prominent example is institutional design of the adversarial system in common law countries like the United States of America, which seems to be a template for this theoretical model.

> *The key elements in the system [are] utilization of a neutral and passive fact finder, reliance on party presentation of evidence, and use of a highly structured forensic procedure.* (Landsman, 1988, p.2) qtd. in (Kubicek, 2006, p.48).

This paper has the purpose to present the model of **?** in a way, that the proposition of Dewatripont and Tirole can be retraced. Not the whole paper is presented here, instead the main focus is on the following selected parts of the paper. Section IIA where the framework of the basic model is introduced. Section $IIIA$ where the optimality of advocacy under non manipulable information is shown. Section IVA where the model was extended by the possibility of finding counterarguments and concealment of evidence, and section IVB where the assumption of unchanged credibility was omitted. The crucial conditions and assumptions are derived comprehensively and an example where this model corresponds with reality is provided. Objections that could be investigated are brought in.

Already Holmstrom and Milgrom (1991) showed which issues can arise when a principal have to to delegate multiple tasks, and how these can be avoided. In the work of **?** in particular the decision based reward assumption stand out, as rewards are mostly conditional by the amount of output (here information) generated. Their work was not only broadly recognized, their model was also taken up and extended by for example Krishna and Morgan (2001) and Palumbo (2006).

This paper is structured as follows. Part 1 gives an introduction into the topic and motivates the relevance. Part 2 sets the framework of the model. Part 3 derives the first best solution. Part 4 analyses the optimal wage schemes. Part 5 allows manipulation of information in addition to the basic model. Part 6 compares self-advocacy to representative advocacy. Part 7 gives an example where advocacy occurs. Part 8 provides a brief summary of the learnings.

2 Basic model

The principal wants to allocate two task. The key organizational issue will be whether one agent is engaged to investigate two causes, or whether tasks are allocated to two distinct agents. **?** named the first option with one agent the *nonpartisan case*, because if only one agent is investigating both cases, he should act as an neutral investigator, who is not biased to any of the two cases. The second option with two-agent investigating the cases is named the *advocate case*, where each agent is investigating not as a neutral truthfinder, but as a partisan for their case.

2.1 Principals preferences

The preferences of the principal depends on the combined parameter $\theta = \theta_A + \theta_B$. The two parameters are independently distributed. The parameter θ_A is equal to -1 with probability α and the parameter θ_B is equal to $+1$ with probability α as well. Both θ_A and θ_B are with probability $1-\alpha$ equal to 0.

$$\theta_A = \begin{cases} -1 & \text{with probability} & \alpha \\ 0 & \text{with probability} & (1-\alpha) \end{cases} ; \ \theta_B = \begin{cases} +1 & \text{with probability} & \alpha \\ 0 & \text{with probability} & (1-\alpha) \end{cases}$$

$$\theta = \begin{cases} +1 & \text{with probability} & \alpha(1-\alpha) \\ 0 & \text{with probability} & 1-2\alpha(1-\alpha) \\ -1 & \text{with probability} & \alpha(1-\alpha) \end{cases}$$

Because parameter θ_A and θ_A are symmetrical opposites, they can cancel out and the parameter θ can take only three values $\theta \in \{-1, 0, 1\}$ (see table 1).

Under full information the organization will decide in favor of cause A for $\theta_A = -1$, the status quo Q for $\theta = 0$ and cause B for $\theta = +1$. The status quo Q obtains when there is no case for either cause $\theta_A = 0$ and $\theta_B = 0$, or there is information favorable to both causes $\theta_A = -1$ and $\theta_B = +1$.

2.2 Decision policies under uncertainty

A principal (e.g. organization, court, company) faces a ternary decision $D \in \{A, Q, B\}$ which she is doing according on her preference $\theta \in \{-1, 0, 1\}$ described above and wants to minimizes her expected losses made by her decision. She decides conditional on information I she receives by agents. The decision maker can decide to stay at the status quo $D = 0$ which is a moderate decision and would be made in absence of further information $I = 0$. Decision A ($D = A$) means that the status quo is changed in favor of cause A, and decision

B means that the status quo is changed in favor of cause B. The model is perfectly symmetric between the causes.

2.3 Collection of information and losses

The principal has a priori no information on her preference θ and can consult one or two agents. The agents can find evidence to cause A and cause B to avoid losses, which occurs when the principle makes a decision which is contrary to her preference. If the preference is $\theta_j = |1|$ the agent can find evidence for that with a probability q, when she bears cost K. The a priori probability to find evidence for a case when searching for it is $x \equiv \alpha q$.

There are three types of losses which can occur under imperfect information. To illustrate these, we define the potential losses under perfect information as follow:

Inertia: The loss under inertia L_I occurs, when $|\theta| = 1$ but the status quo prevails $D = Q$.

Extremism: The loss under extremism L_E occurs, when $\theta = 0$ but the Principal decides in favor of one of the two causes $D \neq Q$.

Misguided activism: The loss under misguided activism L_M occurs, when $\theta = +(-)1$ but the principal decides in favor of the other cause $D = A(B)$.

For a clear illustration under which circumstances losses occur, see table 2 and figure 2.

Table 1: Compound preference

		θ_A	
		-1	0
θ_B	$+1$	0	$+1$
	0	-1	0

Table 2: Losses

		Decision D		
		A	Q	B
Preference θ	$+1$	L_M	L_I	—
	0	L_E	—	L_E
	-1	—	L_I	L_M

2.4 Objective function of the principal

The principal wants to minimize the expected loss, which is dependent on the belief of alpha and the effort made by the agent or agents. While her belief of a positive evidence for an cause j is a priori α, she is updating her belief, when she receive a message from an agent that she did not found any evidence, according to Bayes' theorem[1]. Alpha hat $\hat{\alpha} \equiv Pr(|\theta_j| = 1 \mid \phi_j)$ is defined as the posterior belief that $|\theta_j| = 1$, conditional on no information favorable to cause j have been discovered and the agent j sends message $M_j = \phi_j$. In

[1] Bayes' theorem states :$P(A \mid B) = \frac{P(B|A)P(A)}{P(B)}$

this case the posterior belief is strictly smaller than the a priori probability α, because for $\alpha \in (0,1)$ and $q \in (0,1)$ holds:

$$\hat{\alpha} = \frac{Pr(\phi_j \mid |\theta_j| = 1) Pr(\theta_j| = 1)}{Pr(\phi_j)} = \frac{(1-q)\alpha}{\alpha(1-q) + (1-\alpha)} = \frac{a-x}{1-x} < \alpha.$$

Further all posterior beliefs conditional on the information passed over by the agent(s) are summed up in table 3.

Table 3: Ex ante and ex post probabilities, if investigating both cases was induces

Information of agent	Ex ante probability	Ex post efficient decision	Ex post beliefs/probabilities of θ		
			-1	0	$+1$
(P_A, P_B)	x^2	0	0	1	0
(P_A, ϕ)	$x(1-x)$	A	$(1-\hat{\alpha})$	$\hat{\alpha}$	0
(ϕ, P_B)	$(1-x)x$	B	0	$\hat{\alpha}$	$(1-\hat{\alpha})$
(ϕ, ϕ)	$(1-x)(1-x)$	0	$\hat{\alpha}(1-\hat{\alpha})$	$(1-\hat{\alpha})^2 + \hat{\alpha}^2$	$\hat{\alpha}(1-\hat{\alpha})$

The four stages of the model, which are displayed in figure 1, are solved by backward induction.

Stage 1	Nature draws the state θ_A and θ_B.
Stage 2	Principal offers contracts to agents to collect information.
Stage 3	Agents accept or decline contracts and collect information.
Stage 4	Principal makes decision and pays agents according to this.

Figure 1: Sequence of events

First we make plausible assumptions about the decision making of the last stage. It is obvious, that if the principal receives the message (P_A, P_B) he decides for $D = Q$, because there is no uncertainty about his actual preference, and his expected loss is zero. When there is a piece of evidence in favor for cause A and none for cause B, we assume that the optimal decision is to choose cause A. This is fulfilled, if after receiving the message (P_A, ϕ), the expected loss of choosing A is smaller than the expected loss of choosing the status quo.

$$EL\Big(A|(P_A, \phi)\Big) < EL\Big(Q|(P_A, \phi)\Big) \Leftrightarrow \hat{\alpha} L_E \ < (1-\hat{\alpha}) L_I$$

The assumption for optimality of choosing cause B after receiving the message (ϕ, P_B) is equivalent. Now it is possible to define the expected loss $\hat{L}$, conditional on the agents imperfect information, as a composition of the inertia and extremism loss. Because of the symmetry of the causes and optimality of the decision the expected loss of choosing B when learning (ϕ, P_B) or choosing A when learning (P_A, ϕ) is:

Assumption 1. $\hat{L}_I \equiv (1-\hat{\alpha})L_I - \hat{\alpha}L_E > 0$.

When there is no evidence in favor of any cause, we assume that it is optimal to choose the status quo. This is fulfilled, if after receiving the message (ϕ, ϕ), the expected loss of choosing the status quo $D = Q$ is smaller than the expected loss of choosing $D = B$.

$$EL\Big(Q|(\phi,\phi)\Big) < EL\Big(B|(\phi,\phi)\Big) \Leftrightarrow 2\hat{\alpha}(1-\hat{\alpha})L_I < \hat{\alpha}(1-\hat{\alpha})L_M + \Big[1-\hat{\alpha}(1-\hat{\alpha})\Big]L_E$$

Similar to before we can now define the expected loss $\hat{L}_E$ of choosing the status quo $D = Q$ when the principal receives the message (ϕ, ϕ) as follows:

Assumption 2. $\hat{L}_E \equiv \hat{\alpha}(1-\hat{\alpha})(L_M - 2L_I) + \Big[1-\hat{\alpha}(1-\hat{\alpha})\Big]L_E > 0$.

Because $\hat{\alpha} \in (0,1)$ both $\hat{\alpha}(1-\hat{\alpha})$ and $1-\hat{\alpha}(1-\hat{\alpha})$ are strictly positive, the condition is always satisfied when the loss of misguided activism is equal or bigger than the double loss of inertia $L_M \geq 2L_I$.

In figure 2 the expected losses under imperfect information and the the optimal decisions, which are induced by assumption 1 and 2 can be seen.

It is also assumed that it is too costly to investigate one cause twice, hence each cause is only investigated once. Later we assume that the cost of investigating a cause K is not too large relative to the avoiding losses. So in equilibrium the principal favorite full information collection instead of partial or none information collection.

2.5 Objective function of the agents

Agents receive a monetary reward w which is contingent on the decision made by the principal. They are protected by limited liability, so that the wage w can be only greater than or equal to zero. The agents cost to exert effort is K per task. Agents are risk neutral and they have no reservation utility. Her utility is her received wage minus her cost: $U^{Agent} = w - nK$. It is assumed that in case of equivalence of the net utilities, the agents choose the effort level which is preferred by the principal.

3 First best solution

As a baseline the first best solution of the model is derived, which could be for example reached if agents receive effort-based rewards. With no effort, no information can be found and the principal will choose the status quo for sure. Only the inertia loss can occur which is the case if the organizational preference θ was unequal to zero.

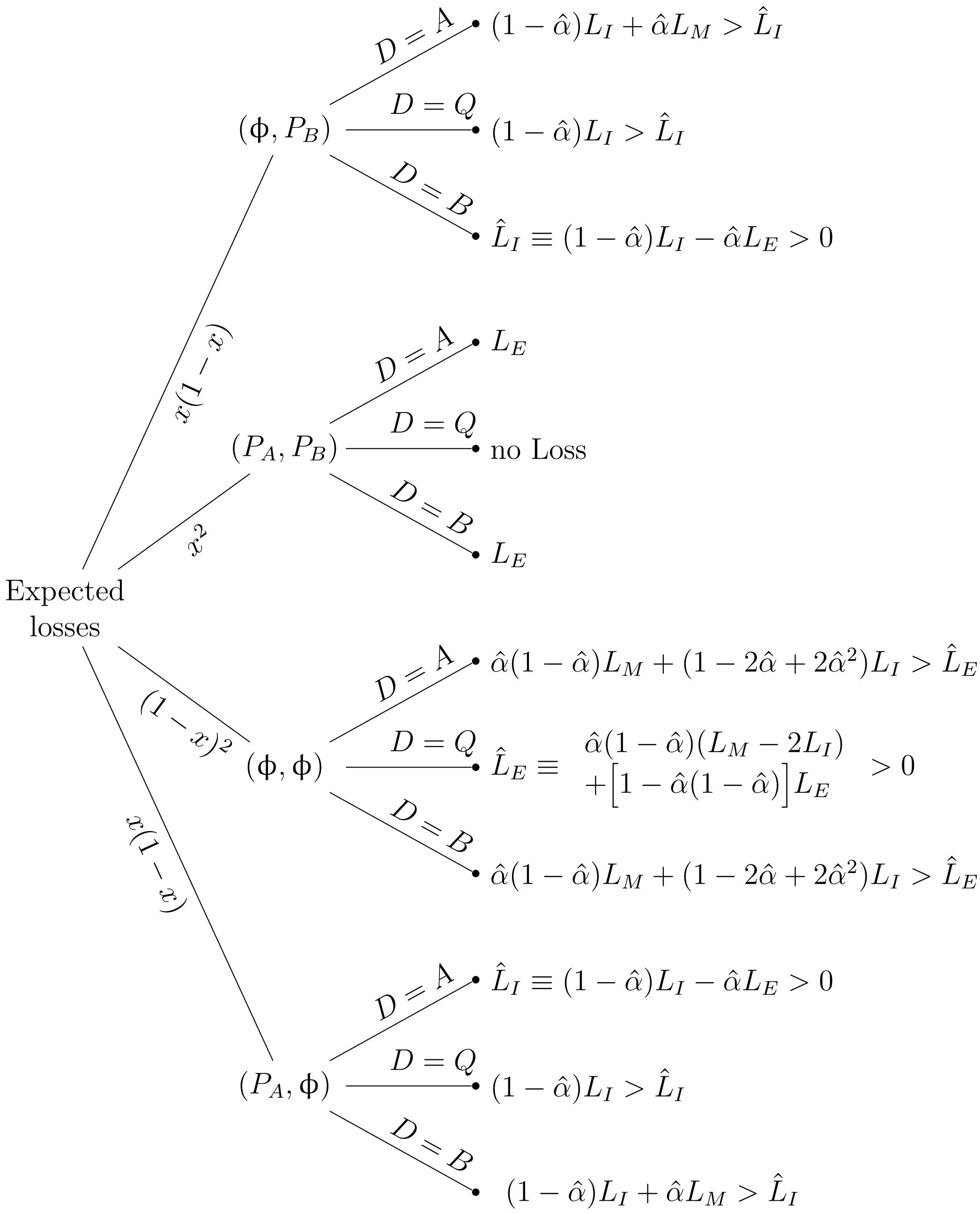

Figure 2: Expected losses under imperfect information, when inducing two efforts

Therefore the expected loss with zero effort is:

$$Pr(\theta \neq 0)L_I = 2\alpha(1-\alpha)L_I \tag{1}$$

The loss with one effort is:

$$\begin{aligned} x\Big[\alpha L_E + (1-\alpha) * 0\Big] + (1-x)\Big[\alpha(1-\hat{\alpha}) + (1-\alpha)\hat{\alpha}\Big] L_I + K \\ = \alpha^2 q L_E + \alpha(1-\alpha)(2-q)L_I + K \end{aligned} \tag{2}$$

When both causes are investigated, and evidence for one cause is found, but not for the other, even though there was evidence for both causes, extremism occurs. If no evidence was found at all (posterior belief $\hat{\alpha}$ is built), but there was evidence for exactly one of the causes inertia occurs. Double cost 2K incurred for sure.

The loss with two efforts is:

$$\begin{aligned} x^2 0 + 2x(1-x)\hat{\alpha}L_E + (1-x)^2 2\hat{\alpha}(1-\hat{\alpha})L_I + 2K \\ = 2\alpha^2 q(1-q)L_E + 2\alpha(1-\alpha)(1-q)L_I + 2K \end{aligned} \tag{3}$$

When like in this basic model above counterarguments are excluded and assumptions (1) and (2) regarding the decision making are made, misguided activism can not appear.

If the overall cost with two efforts are smallest, therefore (1) > (3) and (2) > (3) it is optimal to induce two efforts.

$$\begin{aligned} 2\alpha(1-\alpha)L_I > 2\alpha^2 q(1-q)L_E + 2\alpha(1-\alpha)(1-q)L_I + 2K \\ \Leftrightarrow aq\Big((1-\alpha)L_I - \alpha(1-q)L_E\Big) > K \end{aligned} \tag{4}$$

$$\begin{aligned} \alpha^2 q L_E + \alpha(1-\alpha)(2-q)L_I + K > 2\alpha^2 q(1-q)L_E + 2\alpha(1-\alpha)(1-q)L_I + 2K \\ \Leftrightarrow aq\Big((1-\alpha)L_I - \alpha(1-q)L_E\Big) + a^2q^2L_E > K \end{aligned} \tag{5}$$

Because $a^2q^2L_E$ is bigger than zero, constraint (4) is stricter than constrain (5), and constraint (5) can be left out for further investigation.

To ensure that eliciting two efforts is optimal, it must not be to costly to investigate the cases.

Assumption 3. $aq\Big((1-\alpha)L_I - \alpha(1-q)L_E\Big) > K$

4 Nonmanipulable information

Under asymmetric but non manipulatable information, where the principal cannot observe the effort of the agent(s), a hidden action type of moral hazard occurs. Hence the principal has to give incentives to ensure that the agents choose the optimal effort. In this section the message which the agent(s) send to the principal can not be manipulated, such that the message of the agent are equivalent to the information found by the agent(s) $M = I$.

4.1 One agent (nonpartisanship)

In this case we assume that the principal can offer the agent a contract, which specifies the wage depended on the decision. The principal wants to offer the single agents a contract where she induces the investigation of both causes. Assuming that the agents investigates both causes her overall loss function is

$$\min_{w_0,w_1,w_2} x^2(0 + w_0) + x(1 - x)2(\hat{L}_I + w_1) + (1 - x)^2(\hat{L}_E + w_2) \tag{6}$$

The single agent can decide to shirk, to investigate one cause or to investigate both causes. The resulting expected utilities are can be seen in figure 3.

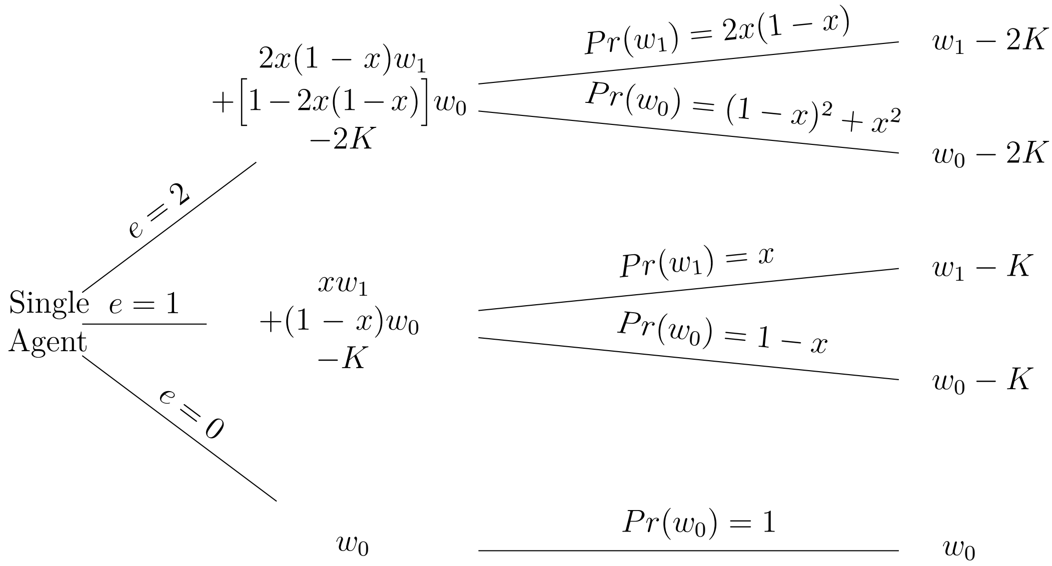

Figure 3: Expected utilities of an single agent by effort level

If the agents find evidence for one of the causes but not the other $I = 1$, the principal will decide for the cause the agents found evidence for, and the agent gets w_1. If the agents find no evidence for any cause $I = 0$, or for both causes $I = 2$, the information is equivalent for the principal and the agent earns $w_2 = w_0$. Because the principal decides depended on the on the information which the agent collected, the net utility of the agent is the wage conditional of the information collected, minus the effort made by the agent: $w(I(x)) - eK$. The agent can choose not to search and his expected utility will be:

$$Pr(I = 0 \mid e = 0)w(I(0)) - 0K = w_0 \tag{7}$$

The agent can choose to search for information for one of the causes A or B and the expected utility will be:

$$\begin{aligned} Pr(I = 0 \mid e = 1)w(I(0)) + (I = 1 \mid e = 1)w(I(|1|)) - 1K & \qquad (8) \\ = (1 - x)w_0 + xw_1 - K & \qquad (9) \end{aligned}$$

The agent can choose to search information for both causes and gets:

$$\begin{aligned} Pr(I = 0 \mid e = 2)w(I(0)) + (I = 1 \mid e = 2)w(I(|1|)) & \qquad (10) \\ +(I = 2 \mid e = 2)w(I(|2|)) - 2K & \\ = (1 - x)^2 w_0 + 2(1 - x)xw_1 + x^2 w_0 - 2K & \qquad (11) \end{aligned}$$

To ensure that the agents agree to the contract his expected utility has to be at least zero, hence the following participation constraint has to be satisfied:

$$PC_2 \qquad (1 - x)^2 w_0 + 2(1 - x)xw_1 + x^2 w_0 - 2K \geq 0 \tag{12}$$

To give the agent an incentive to investigate both causes, his expected utility to do so has to be equal or bigger than his expected utility when he investigates no or one cause:

$$IC_{2.0} \qquad (1 - x)^2 w_0 + 2(1 - x)xw_1 + x^2 w_0 - 2K \geq w_0 \tag{13}$$

$$IC_{2.1} \qquad (1 - x)^2 w_0 + 2(1 - x)xw_1 + x^2 w_0 - 2K \geq (1 - x)w_0 + xw_1 - K \tag{14}$$

This yields

$$x(1 - 2x)(w_1 - w_0) \geq K \tag{15}$$

$$x(1 - x)(w_1 - w_0) \geq K \tag{16}$$

$IC_{2.1}$ is not binding, and only if $x \leq 0.5$ the incentive-compatibility constrain and limited liability are satisfied. If $x > 0.5$ there is no wage structure which can give the agent an incentive to search for evidence, because the probability that evidence for both cases are found and the agent gets w_0 is too high. The principal will offer the following wage structure to a single (nonpartisan) agent.

$$w_0^S = 0; \qquad w_1^S = \begin{cases} \frac{K}{x(1-2x)} & \text{if} \quad x \leq 0.5 \\ 0 & \text{if} \quad x > 0.5 \end{cases} \tag{17}$$

The single agent (nonpartisan) expected utility is positive, so he enjoys a rent:

$$U^S = 2x(1-x)w_1^S - 2K = \frac{2x}{1-2x}K. \tag{18}$$

The agent is an activist in the sense that he is better off moving policy away from its status quo.

4.2 Two agents (advocacy)

Now two agents i and j are hired by the principal. The first agent i has the option to shirk or to investigate the one cause A (or B) and get the reward w_i in case of decision A (or B). The other Agent j can also choose to shirk or to investigate the other cause B (or A) and get the reward w_j in case of decision B (or A). Because of the models symmetry the results are independent for agent i choosing investigating cause A or cause B. Below the the first proposition of Dewatripont and Tirole (1999) is derived.

Exerting effort is strictly dominant, if $w_0 = 0$, as we see in Table 4.

Table 4: Payoff matrix and Nash equilibrium

		Agent j: E	Agent j: S
Agent i	E	$w_i x(1-x) + \big(1 - x(1-x)w_0\big) - K$, $w_j x(1-x) + \big(1 - x(1-x)w_0\big) - K$	$(1-x)w_0 - K, w_0$
	S	$w_0, w_i x + (1-x)w_0 - K$	w_0, w_0

The principal faces her loss function, which she wants to minimize and the incentive-compatibility and participation constraints for the agents. In the Nash equilibrium, where both agents exerts effort these are:

$$\min_{w_0,w_i,w_j} \quad x^2(0+w_0) + x(1-x)(2\hat{L}_I + w_i + w_j) + (1-x)^2(\hat{L}_E + w_0) \tag{19}$$

$$IC_i \qquad w_0 \leq w_i x(1-x) + (1 - x(1-x))w_0 - K \tag{20}$$

$$IC_j \qquad w_0 \leq w_j x(1-x) + (1 - x(1-x))w_0 - K \tag{21}$$

$$PC_i \qquad 0 \leq w_i x(1-x) + (1 - x(1-x))w_0 - K \tag{22}$$

$$PC_j \qquad 0 \leq w_j x(1-x) + (1 - x(1-x))w_0 - K \tag{23}$$

$$LL \qquad w_0 \geq 0, w_i \geq 0, w_j \geq 0 \tag{24}$$

The incentive-compatibility constraints and the limited liability $w_0 \geq 0$ leads to redundant participation constraints of the agents. Binding incentive-compatibility constraints and limited liability leads to $w_0^A = 0$ and $w_i^A = w_j = w^A = \frac{K}{x(1-x)}$. [2]

$$U_i^A = U_j^A = U^A = x(1-x)w^A - K = x(1-x)\frac{K}{x(1-x)} - K = 0. \tag{25}$$

This incentive scheme induce the effort to search for evidence in both cases, but fully extract the agents rent.

Because the principal had to concede the agent a rent in the nonpartisan case, it is always more expensive to induce the effort investigating both cases with one agent, than with two agents.

$$2U^A = 0 < U^S = \frac{2x}{1-2x}K \quad \forall \, x < \frac{1}{2} \tag{26}$$

Proposition 1. *Optimality of advocacy under nonmanipulable information.* — Having two advocates strictly dominates having a single (nonpartisan) one:

(a) (i) If $x \leq 1/2$, there exist no incentive scheme that induces the investigation of both causes by a single agent.
   (ii) If $x < 1/2$, there exist such an incentive scheme, but concede a rent of $2xK/(1-2x)$ to the single agent.

(b) For any value of x, an advocacy system with two partisan agents generates full information collection and the principal extracts the full rent from the agents.

5 Concealment of information

Dewatripont and Tirole (1999) extended their basic model by introducing an counterargument and the possibility to conceal information. In addition to the basic model the agent has some probability of finding a counterargument N_i on top of the favorable evidence P_i, which perfectly offsets the argument found $(P_i, N_i = \tilde{\phi})$. Dewatripont and Tirole (1999) define finding an *argument and a counterargument* $\tilde{\phi}$ in a way, that it is equivalent to *no arguments* ϕ found at all,

[2] Proof by contradiction: Lets suppose $w_0 > 0$, then the principle can decrease w_0 to reduce her expected loss without violating any of the side constraints. Therefore $w_0 > 0$ can not be part of a loss minimizing wage scheme. Lets suppose $w_j > \frac{K}{x(1-x)}$, then the principle can decrease w_j to reduce her expected loss without violating any of the side constraints. Therefore $w_j > \frac{K}{x(1-x)}$ can not be part of a loss minimizing wage scheme. Lets suppose $w_i > \frac{K}{x(1-x)}$, then the principle can decrease w_j to reduce her expected loss without violating any of the side constraints. Therefore $w_i > \frac{K}{x(1-x)}$ can not be part of a loss minimizing wage scheme.

in purpose of updating beliefs, when there is no concealment. This assumption is arguable because it would be also plausible to assume, that the principal knows for sure that no further argument can be found, when an argument and counterargument was already found.

The probability of finding a favorable piece of information P_i is z.The probability to find a counterargument N_i when already found an argument for the cause is $(1-\beta)$. The probability of truly finding an positive argument for a case (the counter evidence is absent) is $z\beta$. For the sake of clarity, the probability tree that the agents face when searching for evidence of one cause is shown in figure 4. Agents can hide evidence they found, but they can not make up evidence. So Agents only show the evidence which is favorable for their payout. Concealment leads to either announcing ϕ which means no information found when the agent actually found P_i which is a kind of activism. Or announcing P_i, when actually the available information of the agent is P_i, N_i, which means that she found a counterargument but she does not show it.

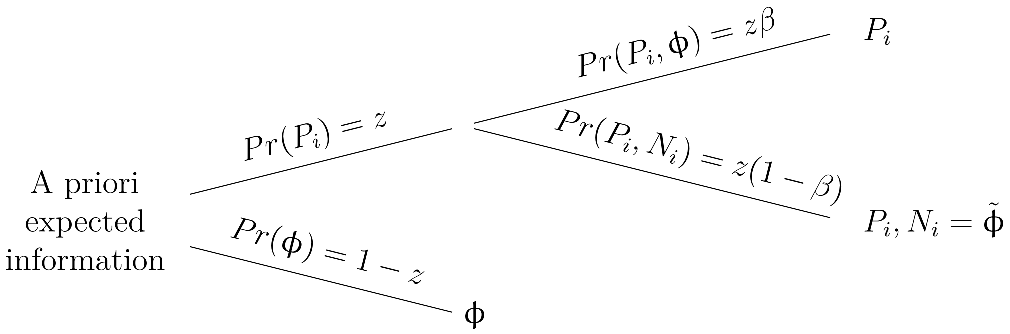

Figure 4: Information collection of a single cause

The probability of finding truly favorable information is $x^C = \alpha^C q^C = z\beta$. The posterior belief that $|\theta_i| = 1$ when learning no information ϕ or learning an argument and a counterargument $|\tilde{\phi}_i| = (P_i, N_i)$ is given by

$$\hat{\alpha}^C = \frac{Pr(\tilde{\phi}_i \cup \phi_i \mid |\theta_i| = 1)Pr(\theta_i| = 1)}{Pr(\tilde{\phi}_i \cup \phi_i)} =$$
$$\frac{(1 - \frac{z\beta}{\alpha^C})\alpha^C}{(1-z) + z(1-\beta)} = \frac{\alpha^C - z\beta}{1 - z\beta} < \alpha^C. \tag{27}$$

To ensure that the agent remains credible and the principal will choose $D = A$, when receiving the information P_A, his expected loss have to be bigger for choosing the status quo over the case A.

$$EL\Big(Q|M = P_A\Big) > EL\Big(A|M = P_A\Big)$$
$$\Leftrightarrow Pr\Big(P_A|M = P_A\Big)\hat{L}_I > Pr\Big(\tilde{\phi}_A|M = P_A\Big)\hat{L}_M \Leftrightarrow \beta\hat{L}_I > (1-\beta)\hat{L}_E \tag{28}$$

Assumption 4. $\beta\hat{L}_I > (1-\beta)\hat{L}_E$

5.1 One agent

The activist agent can choose not to search and his expected utility will be:

$$U_0^{AA} = w_0 \tag{29}$$

The agent can choose to search for information for one of the causes A or B and to conceal the counterargument then the expected utility will be:

$$U_1^{AA} = (1-z)w_0 + zw_1 - K \tag{30}$$

The agent can choose to search information for both causes and to conceal the counterargument and the second positive information, then she gets:

$$U_2^{AA} = (1-z)^2 w_0 + 2(1-z)zw_1 + z^2 w_1 - 2K \tag{31}$$

To give the activist single agent an incentive to investigate both causes, his expected utility to do so has to be equal or bigger than his expected utility when he investigates no or one cause:

$$IC_{2.0}^{AA} \qquad (1-z)^2 w_0 + 2(1-z)zw_1 + z^2 w_1 - 2K \geq w_0 \tag{32}$$

$$IC_{2.1}^{AA} \qquad (1-z)^2 w_0 + 2(1-z)zw_1 + z^2 w_1 - 2K \geq (1-z)w_0 + zw_1 - K \tag{33}$$

This yields

$$z(1-\frac{z}{2})(w_1 - w_0) \geq K \tag{34}$$

$$z(1-z)(w_1 - w_0) \geq K \tag{35}$$

$IC_{2.0}^{AA}$ is not binding, because $IC_{2.1}^{AA}$ is stricter. To ensure that the agents agree to the contract following participation constraint has to be satisfied:

$$PC_2^{AA} \qquad (1-z)^2 w_0 + 2(1-z)zw_1 + z^2 w_1 - 2K \geq 0 \tag{36}$$

Furthermore the agent is protected by limited liability, such that the principal can not offer her a negative wage $w_0 \geq 0; w_1 \geq 0$. The $IC_{2.0}^{AA}$ and limited liability, makes the participation constrain redundant.

The $IC_{2.1}^{AA}$ and $w_0 \geq 0$ is binding and leads to the following wage structure.

$$w_0^{AA} = 0; \qquad w_1^{AA} = \frac{K}{z(1-z)}. \tag{37}$$

The single agent (nonpartisan) expected utility is positive, so he enjoys a rent of

$$U^{AA} = (1-(1-z)^2)w_1^{AA} - 2K = \frac{z}{1-z}K. \tag{38}$$

The agent is an activist in the sense that he is better off moving policy away from its status quo and by concealing information he is able to do so. The possibility of concealing information makes it always feasible to induce full information collection by a single agent (contrary to the non-partisan case without concealment), but leaves the agent a rent.

5.2 Two agents

The possibility of concealment can lead to two opposite strategies of agents when the principle consult two agents to investigate the cases.

First it might be optimal for the agents to conceal only the positive evidence P_A and P_B and only show either ϕ or $\tilde{\phi}_A$ and $\tilde{\phi}_B$. Concealing the favorable information is labeled by Dewatripont and Tirole *prosecution*.

Second it might be optimal for the agents to conceal only the negative evidence N_A and N_B and only show either ϕ or P_A and P_B. Concealing the counterargument is labeled by Dewatripont and Tirole *advocacy*. The probabilities and the messages, which are the manipulated information the principal receives, can be found in table 5. If agents are prosecutors or advocates depends on the incentive scheme.

5.2.1 Prosecution

Both agents are prosecutors and agent i gets wage w_j if the principals decides for the other cause j. Agent i gets paid w_i when the information combination $(\tilde{\phi}_A, P_B)$ or $(\tilde{\phi}_A, \phi)$ appears, because the principals makes decision $D = j$. Otherwise he gets payed w_0, because the principal decides for the status quo or for case i. The Principal is minimizing the wages he has to pay, to induce effort in both agents:

$$IC_i^P \qquad w_0 \leq w_0 + (w_j - w_0)\Big[z(1-\beta)z\beta + z(1-\beta)(1-z)\Big] - K \tag{39}$$

$$IC_j^P \qquad w_0 \leq w_0 + (w_i - w_0)\Big[z(1-\beta)z\beta + z(1-\beta)(1-z)\Big] - K \tag{40}$$

$$PC_i^P \qquad 0 \leq w_0 + (w_j - w_0)\Big[z(1-\beta)z\beta + z(1-\beta)(1-z)\Big] - K \tag{41}$$

$$PC_j^P \qquad 0 \leq w_0 + (w_i - w_0)\Big[z(1-\beta)z\beta + z(1-\beta)(1-z)\Big] - K \tag{42}$$

$$LL \qquad w_0 \geq 0, w_i \geq 0, w_j \geq 0 \tag{43}$$

The participation constraints are redundant because of the incentive constraints and the limited liability. $LL \leq PC_i^P \leq IC_i^P$; $LL \leq PC_j^P \leq IC_j^P$

$$0 \leq w_0 \leq w_0 + (w_j - w_0)\Big[z(1-\beta)z\beta + z(1-\beta)(1-z)\Big] - K \tag{44}$$

$$0 \leq w_0 \leq w_0 + (w_i - w_0)\Big[z(1-\beta)z\beta + z(1-\beta)(1-z)\Big] - K \tag{45}$$

The binding incentive-compatibility constraints and limited liability leads to the following wage structure:

$$w_0^P = 0; \qquad w_i^P = w_j^P = w^P = \frac{K}{(z(1-\beta)(z\beta - z + 1)}. \tag{46}$$

The prosecutors rent is fully extracted by the principal, so his expected utility is:

$$U^P = 0. \tag{47}$$

5.2.2 Advocacy with concealment

Both agents are advocates similar to part 4.2 but they are concealing counter-arguments when they appear. Agent i gets wage w_i if the principals decides for the other cause i. Agent i gets paid w_i when the information combination (P_A, ϕ) or $(\tilde{\phi}_A, \phi)$ appears, because the principals makes decision $D = i$. Else he gets payed w_0, because the principal decides for the status quo or for the case of the other agent j. The principal is minimizing the wages he has to pay, to induce effort in both agents:

$$IC_i^{AC} \qquad w_0 \leq w_0 + (w_i - w_0)\Big[z\beta(1-z) + z(1-\beta)(1-z)\Big] - K \tag{48}$$

$$IC_j^{AC} \qquad w_0 \leq w_0 + (w_j - w_0)\Big[z\beta(1-z) + z(1-\beta)(1-z)\Big] - K \tag{49}$$

$$PC_i^{AC} \qquad 0 \leq w_0 + (w_i - w_0)\Big[z\beta(1-z) + z(1-\beta)(1-z)\Big] - K \tag{50}$$

$$PC_j^{AC} \qquad 0 \leq w_0 + (w_j - w_0)\Big[z\beta(1-z) + z(1-\beta)(1-z)\Big] - K \tag{51}$$

$$LL \qquad w_0 \geq 0, w_i \geq 0, w_j \geq 0 \tag{52}$$

The binding participation constraints and limited liability leads to the following wage structure:

$$w_0^{AC} = 0; \qquad w_i^{AC} = w_j^{AC} = w^{AC} = \frac{K}{z(1-z)}. \tag{53}$$

The prosecutors rent is fully extracted by the principal, so his expected utility is:

$$U^{AC} = 0. \tag{54}$$

The *single activist* shows evidence for one cause but hide evidence for the second causes.

Two advocates show their positive arguments to the principal, but never show counterarguments.

Two prosecutors are showing only N_i and P_i together but never a single P_i. The Principal chooses P_i when he has counter evidence for the other chase $P_j, N_j = \tilde{\phi}_j$.

Table 5: Manipulation of information

Information of Agent(s)	Ex ante probability	Ex post efficient decision	Single activist		Two advocates		Two prosecutors	
			Message	Decision	Message	Decision	Message	Decision
(P_A, P_B)	$z\beta z\beta$	Q	(P_A, ϕ) or (ϕ, P_B)	A or B	(P_A, P_B)	Q	(ϕ, ϕ)	Q
(P_A, ϕ)	$z\beta(1-z)$	A	(P_A, ϕ)	A	(P_A, ϕ)	A	(ϕ, ϕ)	Q
$(P_A, \tilde{\phi}_B)$	$z\beta z(1-\beta)$	A	(P_A, ϕ)	A	(P_A, P_B)	Q	$(\phi, \tilde{\phi}_B)$	A
$(\tilde{\phi}_A, P_B)$	$z(1-\beta)z\beta$	B	(ϕ, P_B)	B	(P_A, P_B)	Q	$(\tilde{\phi}_A, \phi)$	B
$(\tilde{\phi}_A, \phi)$	$z(1-\beta)(1-z)$	Q	(P_A, ϕ)	A	(P_A, ϕ)	A	$(\tilde{\phi}_A, \phi)$	B
$(\tilde{\phi}_A, \tilde{\phi}_B)$	$z^2(1-\beta)^2$	Q	(P_A, ϕ) or (ϕ, P_B)	A or B	(P_A, P_B)	Q	$(\tilde{\phi}_A, \tilde{\phi}_B)$	Q
(ϕ, P_B)	$(1-z)z\beta$	B	(ϕ, P_B)	B	(ϕ, P_B)	B	(ϕ, ϕ)	Q
(ϕ, ϕ)	$(1-z)^2$	Q	(ϕ, ϕ)	Q	(ϕ, ϕ)	Q	(ϕ, ϕ)	Q
$(\phi, \tilde{\phi}_B)$	$(1-z)z(1-\beta)$	Q	(ϕ, P_B)	B	(ϕ, P_B)	B	$(\phi, \tilde{\phi}_B)$	A

5.3 Comparison of advocacy with nonpartisanship and prosecution

In order to be able to compare the publication standards and their welfare implications later, Dewatripont and Tirole (1999) derived the welfare losses and calculated the differentials:

$$L^{advocacy} - L^{nonpartisanship} = \left[2z^2\beta(1-\beta)\right]\hat{L}_I \tag{55}$$

$$-\left[z^2(1-\beta)^2\right]\hat{L}_E - z^2\beta^2 L_E - \left(\frac{z}{1-z}\right)K \tag{56}$$

$$L^{advocacy} - L^{prosecution} = \left[2\beta z(2z - z\beta - 1)\right]\hat{L}_I. \tag{57}$$

Dewatripont and Tirole (1999) summarized the insight of Part 5 as follows:

Proposition 2. *Information concealment: possible organizations.* —
Under information concealment, three possible organization may emerge.

(a) A single agent is a nonpartisan activist, and errors take the form of extremism.

(b) Advocates defend a cause and conceal evidence contrary to it. They generate both inertia and extremism.

(c) Prosecutors look for evidence contrary to a cause and conceal evidence favorable to it. They too generate both inertia and extremism.

(d) The status quo is more likely to prevail under either advocacy or prosecution than under nonpartisanship.

Proposition 3. *Information concealment: comparative statics.* —

(a) A single nonpartisan agent is optimal if, ceteres paribus, L_I is large enough relative to L_E and K.

(b) Bilateral advocacy is optimal if, ceteris paribus, $\beta \to 1$.

(c) Bilateral prosecution is optimal if, ceteris paribus, $z \to 1$.

Proposition 4. *Information concealment: possible organizations.* —
If the organization were able to detect and punish the concealment of information, it would always want to do so with advocates and prosecutors (except for $\beta = 0$). By contrast, the prohibition of information concealment may hurt the organization in the case of a single agent.

6 Self advocacy vs representative advocacy

In addition to Part 4.1 agents have not only the positive wage as an incentive to manipulate the information such that the message sent to the principal do not include the full information, but also a intrinsic positive utility of "winning" a cause. E.g. a manager of a devision want to have a bigger budget, not only because he gets a higher wage within the promotion, but additional to that he likes the increased prestige of such a promotion. The information technology is the same as in section 5 but now cost of concealing contrary evidence are introduced. To conceal the unfavorable information N_i so that the agent is signaling P_i instead of P_i, N_i costs her f. Her gain for winning a cause is not only the wage received by the principal, but additionally to that she has a intrinsic utility of G. To ensure that forging is attractive for the self advocate it is assumed that the cost of forging is smaller than the gain when winning the cause $f < G$. Forging is not observable, but the Principal anticipates forging and adjust her beliefs. Now we allow abolish assumption 4, which ensured that even under concealment, the agents remain credible. It can be shown that, if the self-advocate are getting non-credible $((\beta\hat{L}_I < [1-\beta]\hat{L}_E))$, it is not only better for the principal, but also for the agent to weaken the incentive to manipulate the information and to be represented by a third credible instance. Dewatripont and Tirole (1999) summarized this as follows:

Proposition 5. *Optimality of delegated advocacy —*
Ignore any agency cost of delegation to a representing agent. Then

(a) when forging does not alter much the reliability of information $(\beta\hat{L}_I < [1-\beta]\hat{L}_E)$, the principal wants to impose delegated advocacy.

(b) when forging substantially alters the reliability of information $(\beta\hat{L}_I < [1-\beta]\hat{L}_E)$, both the principal and the constituency are better off under delegated advocacy.

7 Application

That advocacy might be the best solution ca be seen in german law.

In German supervisory boards, especially in the iron and steel industry, the institutional design is such that they make use of the advantages of advocacy. In 1951 there was a law introduced regarding the participation of employees on the boards of directors in these industries.

> *Der Aufsichtsrat besteht aus elf Mitgliedern. Er setzt sich zusammen aus*
>
> *a) vier Vertretern der Anteilseigner und einem weiteren Mitglied,*

b) vier Vertretern der Arbeitnehmer und einem weiteren Mitglied,

c) einem weiteren Mitglied. (§4 Abs.1 MontanMitbestG)

The law is required to have a supervisory board that consists of eleven members. It is composed of four shareholder representatives and one further member, four employee representatives and one further member, and one additional member. The additional member, is elected by the rest of the board, and can be seen as the principal and nonpartisan decision maker, who wants to avoid long term losses which can occur when a bad decision was made. Actually, she is the one who decides in favor of one of the policies or for the status quo, because the rest of the board is equally distributed.

Now suppose the supervisory board wants to increase their production and they want to know if they have to invest into a new facility or if they have to hire more employees, or neither or both. The shareholder representatives can be seen as an advocacy agent who are searching for evidence for the cause of *hiring employees*. The stakeholder representatives can be seen as an advocacy agent searching for evidence for the cause of *new facility*. For each group it is the goal to push their own agenda while blocking the agenda of the other group. The shareholder representatives are searching for evidence that the company can increase profit by hiring more employees, and they find it with probability x. The stakeholder representatives are searching for evidence that the firm can increase profit by building a new facility, and find evidence for it with probability x.

There is a decision based reward, because if the board decides in favor of hiring more and cheap laborer, the shareholder representatives get a reward, due to increasing utilization of facilities and therefore the increased return on assets (w_i). If the board decides in favor of the new technology, the employee representatives get a reward, as the employees prefer to work under better working conditions in the new facility instead of the old one w_j. If the board decides in favor of the status quo, there are two possibilities, which are reward wise equivalent, because they have no impact on the existing employees and the existing shareholder. First, no new facility is build and no more laborer are hired, because both is too expensive. There is no reward for both advocates, because neither the returns on assets increase nor has the staff better working conditions in the new facility. The second possibility is to build a new facility and new employees are hired, then there is no reward for neither advocate. Under the second possibility the new workers are located in the new building, while existing employees have no improvement of their working conditions. The old facility can not be used more efficient such that the return on assets is not increasing. The assumption is made that the new facility is financed in a way that the return of investment remains stable. Losses occur only in the long term, such that the board members can not be rewarded conditional on these losses.

If probability of finding evidence is high $x > 1/2$, they are searching for both causes only when they are searching as two distinct advocates. If they would collude and work together as one agent, they would not search for the second cause, because the probability would be to high, that the status quo prevails. The decision maker prefers that the board is compound by two advocate groups, as the law provides, instead of a nonpartisan group,

8 Conclusion

Creation of conflicts between agents plays a crucial role when tasks are allocated among agents. The insights of this paper suggests that in many contexts enhancing competition might be more promising than enhancing neutrality.

It was possible to show that in this decision rewarding model, it is optimal for a decision maker to consult two advocate agents instead of one non partisan agent to search for evidence. It is not possible to find a wage scheme which gives a single agent an incentive to search for both cases , when the probability of finding evidence is too high.

If agents have the possibility to conceal information, there is no incentive scheme which ensures full information disclosure. It is interesting to mention that the status quo prevails more likely under advocacy than under non partisanship. Advocate's activism neutralize each other in competition, while a nonpartisan agent can coordinate the concealment such that he can move the decision towards one cause.

If self advocates have a strong intrinsic incentive to push their own cause, they lack credibility and it might be better for the principal and the self advocate agent to hire another agent without intrinsic incentives, so that credibility can be restored.

In this paper, main parts of the model in Dewatripont and Tirole (1999) have been presented in a comprehensive way. I was able to show that advocacy is observable in German supervisory boards and discussed the advantages and disadvantages of the law, which enforces parity in these boards. With the model explained in this paper, a rationale for advocacy could have been provided. A minor drawback of the model is, that it is not always plausible that the update of believe is the same when learning nothing compared to learning an argument and a counterargument. Further, it might be plausible to introduce economies of scale and allow a non linear cost structure. It might be revealing to find the condition under which the single agent is preferred, when he has decreased costs to investigate the second cause.

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