# Safety Nets against Corruption*

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**Abstract**

We study how institutions should protect themselves against the external influence from lobbies. We analyze internal decision mechanisms that are widespread in practice: unanimity or simple majority rule, a hierarchy and an advisory system. Institutions face a trade-off between the quality of information aggregation and the effectiveness of barriers against external influence. We provide a ranking of the different schemes. In high stake decisions, institutions should sacrifice on the quality of information aggregation in order to better protect the decision making process from outside influence.

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# 1 Introduction

It is well understood since Condorcet (1785) that decision making under uncertainty may yield better results when more than one individual gathers information and contributes to the decision process. In many cases however, an interested external party may want to influence decision makers and distort their decisions. A non-exhaustive list of examples includes credit decisions in banks, public procurement, promotions in firms, jury decisions in sports contests or tenure decisions in universities. In all these cases, interested parties frequently promise rewards or punishments for decision makers' behavior.[1]

Such external influence is likely to affect both the optimal size of a decision making body and the optimal allocation of decision rights. Recently, economic theorists have begun to address the issue of external influence in committee decision making.[2] The purpose of the present paper is to further explore appropriate organizational designs that defend a committee's decision against external influence. We find that organizations sometimes have to aggregate information inefficiently, in order to effectively limit distortionary lobbying or corruption.

In our previous work we have begun to address the question of an optimal committee design. In particular we analyzed the impact of a committee's size on the potential for distorted voting outcomes. However, the problem of optimally designing the internal voting rules has so far remained unaddressed. In the present paper we address this second dimension of the institutional design

[1] An interested party's attempts to influence the policy of a committee may take several - legal or illegal - forms. Committee members may e.g. expect to be molested by complaining individuals after having made their decision. The interested party may decide to threaten jury members, or it may promise to make monetary transfers that are conditioned on committee members' voting behavior. In our model we will stick to the latter form of interest group influence.

[2] In particular, the papers by Dal Bo (2007) and Felgenhauer and Grüner (2008) have studied the impact of the size of a committee working under majority rule on the quality of its decisions.

problem. We take the size of the decision body as given, and look at the performance of different organizational designs in the presence of external influence.

We consider a decision body that consists of at most two individuals. In this setup, we compare five different mechanisms. In the simplest case, a **single agent** makes the decision. The second scheme, which we call **majority rule**, implements a certain decision if at least one committee member votes in favor of this decision. The third rule, **unanimity**, only implements this decision if both committee members are in favor of it. The fourth scheme is called an **advisory system**. Here a low level advisor recommends a decision to his superior who is then allowed to do what he considers to be appropriate. Finally, we study a **hierarchy**. Here the subordinate has some formal decision power. He may reject one outcome at the first stage but cannot finally accept it. If he is in favor of the outcome, then he delegates the final decision to his superior.

All five mechanisms correspond to institutional setups that exist in practice. Voting rules are most common in politics, but they are also applied in private companies. Unanimity rule is e.g. frequently applied in hiring decisions.[3] The majority rule instead describes situations in which the interested party only needs the permission from one decision maker in order to see its preferred outcome implemented.[4] Hierarchies and advisory systems on the other hand are often observed in firms, but also in public administrations. The paper aims to determine the best of these organizational structures. The main result of our analysis is that there is a trade-off between information aggregation properties of the diverse organizational structures and their endogenous barriers against corruption. We then show that the trade-off also exists in a broader class of mechanisms. In high stake decisions, institutions should sacrifice on the quality of information aggregation in order to better protect the decision making

[3] Consultancies like McKinsey for example conduct several interviews with different interviewers and all of them have to approve of the candidate before a job is offered.

[4] Children and students sometimes exploit this organizational structure in their families / universities.

process from outside influence.

As in Aghion and Tirole (1997), the *real decision power* in our model arises from strategic interaction. If some agent accepts a bribe, this changes the remaining agent's real decision power. Suppose for example that one agent makes a biased decision under unanimity rule. His behavior is uninformative. According to unanimity rule, in order to accept the decision, both members have to be in favor of it. Hence, the remaining agent is in the same position as a single decision maker. Bribing the committee thus costs twice as much as bribing a single individual without a safety net. The same argument applies to the hierarchy. Suppose that the subordinate in a hierarchy receives a bribe and makes a biased decision. Doing so, he in fact delegates the decision to his superior, who cannot deduce any information from the subordinate's behavior. Again the superior is in the same position as a single decision maker. Similarly, if the superior is bribed, then the subordinate has the power to reject or accept the decision. He is endowed with the power to reject, but in equilibrium he knows that the project is always accepted once he passes it on to his superior. Thus he also has the "real" power to accept the decision. Consequently, purchasing the decision of a hierarchy costs twice as much as bribing a single individual without a safety net.

Under an advisory scheme in contrast the cost to distort the superior's decision is higher than the cost to bribe a single decision maker. The reason is that the superior can rely on more information. Similarly, under majority rule, given that one member behaves sincerely, the cost of corruption for the remaining member is the same as for the superior under the advisory scheme. In order to bribe exactly one member (and therefore the decision), the lobby has to compensate two adverse signals.

We provide a ranking for the five schemes. It turns out that the delegation of the decision to a single agent never is best. This scheme is highly vulnerable to external influence and wastes information in the absence of lobbying.[5] The ranking of the remaining four alternatives results from the trade-off between information aggregation and the bribing barriers. For low valuations of the interested party, unanimity and the hierarchy are strictly worse than majority rule and the advisory system. For these valuations no agent is bribed under all schemes. However, the unanimity rule and the hierarchy do not aggregate information efficiently, rendering them inferior. For intermediate lobby valuations the result is reversed. Now, unanimity and the hierarchy are best. Under an advisory system the decision is in favor of the interest group regardless of the information available. Granting some real decision power to all agents instead makes it more expensive to bribe them.

## 2 Related literature

The model that we study is based on the information aggregation setup that has been introduced in the papers by Austin-Smith and Banks (1996) and Feddersen and Pesendorfer (1996). Feddersen and Pesendorfer (1998) explore the role of information aggregation with different voting rules, like majority rule or unanimity. However, they do not consider interest group influence. We will see later on, that lobbying may change the voting rule for the unbribed voters. In addition, we consider other schemes that are widespread in practice - like a hierarchical structure and an advisory scheme - that may also be used to aggregate information.[6]

[5] This result hinges on our simplifying assumption that the agents are costless for the institution. Introducing such costs would render the system without a safety net more attractive in comparison to the other schemes.

[6] In another related paper, Diermeier and Myerson (1999) study the organizational response of a legislature in the presence of two interest groups. In their model there is no information aggregation. Acemoglu and Verdier (2000) investigate the optimal size of bureaucracy in a setting with a trade-off between market failures and government failures. The bureaucrats may be bribed in their model.

The paper is most closely related to the recent work on external influence on committees in Dal Bo (2007) and Felgenhauer and Grüner (2008). In his seminal paper, Dal Bo has shown that it may be possible to influence the decision of a large committee at low (actually zero) cost. According to Dal Bo's analysis, an interested party can induce a decision in its favor by promising payments to all committee members in case that they turn out to be pivotal. The corresponding voting game in the committee has an equilibrium in which all members vote in favor of the interested party's desired policy. In this equilibrium no voter is ever pivotal and no payment needs to be made. In Felgenhauer and Grüner (2008), we have studied a similar problem in an information aggregation setup. In this model each committee member gets noisy information about an underlying true state of the world. Committees act under two sided influence: there is one interest group that prefers state independently a certain decision and another interest group that favors the opposite decision. Both papers predict inefficient outcomes: the committee's decision tends to be biased in many cases. Moreover, both papers also have counterexamples to Condorcet's jury theorem.

Our paper is also related to a branch of the agency theory that studies the relationship of a principal and one or more supervisors. The principal may hire a supervisor in order to reduce the costs of asymmetric information. The problem is that the supervisor may collude with the agent.[7] Potential bribes give rise to collusion-proofness constraints on the transfer scheme. In our paper the principal corresponds to the institution, the supervising body resembles our decision makers and the lobby may be interpreted as the agent. Several authors study models with more than one supervisor.[8] Strategic interaction between the supervisors may relax the collusion-proofness constraints. The agency literature on collusion in organizations assumes that the principal can

[7] See for example Tirole (1986), Laffont and Tirole (1991), Olson and Torsvik (1998), Faure-Grimaud, Laffont and Martimort (1999), Kim, Lawarree and Shin (2004).

[8] As for example in Kofman and Lawarree (1996), Khalil and Lawarree (1995), Laffont and Martimort (1999) and Laffont and Pouyet (2003).

reward the supervisors for particular messages about the underlying state of the world. In the present paper we instead consider cases where such incentive contracts are not available at the stage of institutional design. This assumption is more appropriate when an institution is supposed to deal with several different issues in the future. In this case it may become too costly to consider the complete set of decision situations and to contract on the corresponding message spaces and transfers. All that is left to be determined is the allocation of residual (decision) rights.

# 3 The model

An institution has to make a binary decision $x \in \{0,1\}$. The institution is supposed to maximize social welfare. The optimal decision depends on the realization of an unknown state of the world $v \in \{0,1\}$, where both states are equally likely ex ante. The purpose of the institution is to match the decision and the state of the world. The institution delegates the decision to one or two agents, $i = 1, 2$.[9] Agent $i$ obtains a private signal $v_i \in \{0,1\}$ about the state $v$. Each signal is correct with probability $p \in (\frac{1}{2}, 1)$. If both signals coincide, then we assume that it is optimal that the decision matches the signals. If the signals cancel each other out, then the institution shall prefer to decide in favor of the interest group. This is plausible, since the group has a valuation for its preferred option and welfare thus increases, even though the group is small.

Social welfare is denoted by $W = y + x\varepsilon$, where

$$y = \begin{cases} 1 & \text{if } x = v \\ 0 & \text{if } x \neq v \end{cases}. \tag{1}$$

[9] Our objective is to show that there may be a trade-off between bribing barriers via real decision power and information aggregation. Even though our analysis can be extended to a framework with more decision makers, this point is most easily made in a setting with at most two agents.

Throughout the paper we consider the case where $\varepsilon$ is small but positive, ensuring that the socially best decision is in favor of the interest group if the signals contradict.

The agents choose a decision according to one of the five rules described in the introduction. We denote the individual decisions by $x_i \in \{0, 1\}$. A lobby tries to manipulate the outcome by offering bribes to the agents. We assume that it can only observe the decision $x$ and may thus only make transfers contingent on $x$.[10] For simplicity, we assume that the interest group is uninformed about $v$.[11] Agent $i$ derives the utility

$$u_i = W + t_i \tag{2}$$

where $t_i$ is the bribe to agent $i$. In the absence of bribes we thus assume that each agent prefers to choose in line with the institution's interest.

The lobby prefers $x = 1$ regardless of the state of the world and has the utility function

$$u = \theta x - \sum_{i=1}^{2} t_i, \tag{3}$$

where $\theta$ denotes the valuation for its favored decision. The parameter $\theta$ is common knowledge.

The timing is such that first the institution determines its decision rule. Then the lobby offers a transfer scheme. For simplicity we assume that the

[10] The analysis could be easily extended to cases where the interest group observes the agents' individual behavior. The lobby can then draw upon a larger set of contracts. Therefore its utility should increase and consequently the institution´s payoff should decrease. Thus the institution should have an incentive to keep the individual decisions secret, which strengthens our assumption.

[11] The analysis becomes more complicated when the interest group is informed about $v$. The bribing game then becomes a signalling game. In this case there should be a pooling equilibrium where the different lobby´s types offer the same bribes which does not alter our results. In a separating equilibrium there should also be a trade-off between information aggregation and protection against lobbying. The present paper concentrates on the simpler case where bribes are uninformative.

transfer scheme is known to all agents.[12] Next nature draws a state $v$. Each agent privately observes the signal $v_i$. Then the agents decide and finally, the transfers are paid in the pre-specified way.

Let us call the stage, where the agents interact taking bribes as given, the "stage game". Depending on the decision rule, the stage game may be static or dynamic. The equilibrium concept in a static stage game is Bayesian Nash equilibrium. In the dynamic variant the equilibrium concept is weak perfect Bayesian equilibrium.[13] The lobby anticipates the behavior in the stage game and offers the transfers that maximize its utility. We exclusively focus on pure strategy equilibria and use the Pareto criterion as a selection device if several equilibria coexist in the stage game.

# 4 The decision body's behavior for given bribes

We will now describe the agents' interaction in the stage game for given bribes. The lobby´s transfer choice then boils down to a simple decision problem.

## 4.1 No safety net

As a benchmark case consider a single decision maker. In the limit, as $\varepsilon$ disappears, he always decides according to his signal if

$$p \geq (1-p) + t, \tag{4}$$

i.e. if his bribe $t$ does not exceed $2p-1$.[14] Otherwise he is in favor of the lobby even if his signal is against this choice.

[12] Alternatively, one could consider the case where the transfers are only known to the respective agent. In this case the strategy of an agent would be a mapping from the individual transfer(s) to the vote.

[13] The beliefs on the equilibrium path are obtained by Bayesian updating and otherwise have to fulfill Kreps and Wilson‘s condition C.

[14] For expositional convenience, all of the following arguments are made on the understanding that we consider the limit of $\varepsilon$ going to zero, without explicitly pointing it out.

The lobby´s optimal bribing strategy is to purchase the agent only if $\theta - (2p-1) \geq \frac{\theta}{2}$ which simplifies to $\theta \geq 4p-2$. Otherwise the lobby´s valuation is too low and it prefers a fifty percent chance to win at zero costs.

### 4.2 Advisory system

Here, the advisor (agent 1) does not hold any formal decision power whereas his superior (agent 2) is always pivotal. Still, the advisor is not completely powerless. By sending sincere messages he may influence the decision. In particular he may render bribing the superior more expensive. The reason is that without the advisor, the bribes only matter for the superior if his own signal is zero. By adding an (in equilibrium) sincere advisor, the bribes only matter when $v_1 = v_2 = 0$. Otherwise the decision should be in favor of the lobby anyway. Two zero signals strongly suggest that the true state of the world is $v = 0$. This makes bribing potentially expensive. The superior´s gross payoff from deciding insincerely if he observes two zero signals is $\frac{(1-p)^2}{(1-p)^2+p^2}$, whereas the benefit from a truthful decision is $\frac{p^2}{p^2+(1-p)^2}$. Thus, after observing two zero signals he only decides insincerely if the transfers more than compensate the difference, i.e. $t_2 \geq \frac{2p-1}{2p^2-2p+1}$. We can easily see that these transfers are larger than in the case without a safety net.

We now claim that there is a Pareto dominant weak perfect Bayesian equilibrium where all agents are sincere as long as $t_2 < \frac{2p-1}{2p^2-2p+1}$ and $t_1 < k$, where $k > 0$ is some constant that is not too large.[15] In this equilibrium the decentralized information is aggregated efficiently. As long as the superior decides based on all information available, the advisor faces a cost from being insincere. He is decisive if the superior´s signal is zero. Thus, if the bribes to the advisor are too small, then he does not have an incentive to deviate. As argued above, given that the advisor is sincere, the superior also does not have an incentive to

[15] We will see later on that it is not necessary to explicitly calculate the maximum $k$. All that we need is that the maximum $k$ is greater than zero.

deviate. In any other equilibrium for these bribes, both agents clearly have to be worse off.[16]

For $t_1 < k$ and $t_2 \geq \frac{2p-1}{2p^2-2p+1}$ there is an equilibrium where exclusively the superior is bribed and the advisor sends truthful messages. Given that the superior is bribed, any of the advisor´s strategies is a best response and so is truthtelling. Given that the advisor is sincere, the superior observes all signals and is thus only willing to decide insincerely if he is compensated in case that $v_1 = v_2 = 0$. Here we see nicely the advisor´s real influence. It is more expensive to bribe the superior than in the single agent case - even if he is not more capable than the single decision maker - because he can rely on more information.[17] All other potential equilibria have to be Pareto inferior. By offering the transfer scheme, the lobby buys its favored decision with probability one.

The interest group may also attempt to bribe exclusively the advisor. Notice that there is babbling equilibrium where the advisor sends uninformative messages, which is known by the superior. The latter therefore ignores these messages. This equilibrium exists for all transfers to the advisor, but as argued above for $t_1 < k$ and $t_2 < \frac{2p-1}{2p^2-2p+1}$ it is Pareto dominated by a sincere equilibrium. Thus bribing exclusively the advisor is not costless. However if the advisor is bribed in equilibrium then again this is expected by the superior who

[16] For $t_1 < k$ and $t_2 \geq 2p - 1$ there is an equilibrium where the advisor sends uninformative messages and the superior is bribed. The superior ignores the advisor's messages since they are uninformative and the advisor´s uninformative messages are a best response, given that they are ignored anyway. In this equilibrium the superior is in the same position as a single decision maker without a safety net. He thus accepts the bribe if $t \geq 2p - 1$. However this equilibrium is Pareto dominated by an equilibrium where all officials are sincere.

[17] Notice that for these transfers there is a second (Pareto equivalent) equilibrium where the advisor sends uninformative messages and the superior decides in favor of the lobby. Both equilibria yield the same payoff for the agents and are equivalent for the lobby.

This equilibrium however is Pareto dominated for transfers $t_2 < \frac{2p-1}{2p^2-2p+1}$ and $t_1 < k$ by a sincere equilibrium, as argued before. The advisor´s real influence here means that he induces a Pareto dominant sincere equilibrium even if the superior´s transfers are relatively large.

then ignores the messages and decides exclusively based on his own signal. The probability that the lobby wins its favored decision is merely $\frac{1}{2}$.

The interest group thus never bribes the advisor but it may occur that the top level agent is corrupted. Bribing exclusively the superior is cheapest for transfers $t_1 = 0$ and $t_2 = \frac{2p-1}{2p^2-2p+1}$ and yields a favorable decision with certainty. Bribing both agents is weakly more expensive but yields the same probability to win. However, bribing no agent - in contrast to the case without a safety net - yields a probability to win equal to $(p - p^2 + \frac{1}{2})$ which is greater than $\frac{1}{2}$. The reason is that the decision is only against the lobby if both signals suggest that the state of the world is 0. In the other three signal constellations the decision is in favor of the lobby. Thus the lobby optimally purchases exclusively the superior and thus the decision if $\theta - \frac{2p-1}{2p^2-2p+1} \geq \theta(p - p^2 + \frac{1}{2})$ which simplifies to $\theta \geq \frac{4p-2}{(-2p+2p^2+1)^2}$.

## 4.3 Majority rule

Under majority rule each committee member has the power to choose in favor of the lobby. This is different from the advisory scheme, where the advisor is not formally allowed to decide. Even though the formal decision power under both schemes differs, we obtain the following.

**Remark 1** *For each lobby valuation $\theta$, the outcome $x(v_1, v_2)$ is the same under majority rule and an advisory system for all signal constellations $(v_1,v_2)$.*

Once a committee member gets a signal which is in favor of the lobby, then the other´s opinion cannot alter the decision. If one member $i$ is thus bribed, any behavior of $-i$ is a best response. In a sense $-i$ becomes a powerless advisor. Given that $-i$ is sincere, the bribe to $i$ only matters in case that both agents observe a zero signal. Hence, the same argument as in the previous section applies and an equilibrium with one sincere and one member in favor of the lobby exists and is Pareto dominant for bribes $t_1 < k$ and $t_2 \geq \frac{2p-1}{2p^2-2p+1}$.[18] Bribing one committee member costs as much as bribing the decision maker in the advisory system.[19]

The interest group again purchases the decision only if $\theta \geq \frac{4p-2}{(-2p+2p^2+1)^2}$.

## 4.4 Unanimity rule

Unanimity rule aggregates information inefficiently. In the absence of bribes there is no equilibrium, where both committee members decide truthfully. The reason is as follows. Given that $-i$ decides truthfully, member $i$ does not wish to do so as well. He is only decisive if $-i$´s signal is in favor of the lobby. But in this case the decision should be $x = 1$ anyway. Thus, he prefers to decide in favor of the lobby regardless of his signal and for all transfers.

It can easily be seen that there is an equilibrium, where one member $i$ decides in favor of the lobby regardless of his signal for all transfers and the other member $-i$ decides sincerely as long as $t_{-i} < 2p - 1$. A deviation of member $i$ is not profitable, as just argued. Given $i$´s behavior, the sincere member $-i$ also does not have an incentive to deviate. He is always decisive and $i$´s behavior is uninformative. Thus, $-i$ is in the same position as a single decision maker without a safety net. He will thus only decide sincerely if the transfers do not exceed $2p - 1$. In a sense, the interest group can "bribe" one committee member at zero costs. Any other potential pure strategy equilibrium for these transfers clearly is Pareto inferior.[20]

[18] Similarly for $t_1 < k$ and $t_2 < \frac{2p-1}{2p^2-2p+1}$ a sincere equilibrium exists.

[19] Bribing two agents is weakly more expensive, since there is a sincere equilibrium for some $k > 0$ where $t_1 < k$ and $t_2 < \frac{2p-1}{2p^2-2p+1}$ that is Pareto superior for these transfers. But since the decision is already bought if one agent is bribed for $t_2 \geq \frac{2p-1}{2p^2-2p+1}$ where the other one gets nothing, the lobby does not gain by paying transfers to both.

[20] A symmetric mixed strategies equilibrium in which agents with negative results vote insincerely with positive probability also exists. This equilibrium also has a counterpart in the case of a hierarchy. The main result of the present paper also holds if one considers the mixed srategies equilibrium to be the most obvious way to play this game.

Bribing two members however requires positive transfers. Suppose that for given bribes there is an equilibrium, where both members decide in favor of the lobby. From the above arguments it can be seen that each member is always pivotal and the other´s behavior is uninformative. Thus, each member is in the same position as a single decision maker without a safety net. Bribing him therefore requires transfers greater than $2p-1$. For $t_i \geq 2p-1$ and $t_{-i} \geq 2p-1$ the unique equilibrium is where both committee members decide in favor of the lobby.

Thus, if the interest group optimally purchases both members, then it has to pay $t_i = t_{-i} = 2p-1$. Doing so is best if $\theta - 2(2p-1) \geq \frac{\theta}{2}$, which simplifies to $\theta \geq 8p-4$. Otherwise it does not pay any bribes.

## 4.5 The hierarchy

In a hierarchy the subordinate (agent 1) has the power to decide against the lobby, but not to finally decide in favor of it. Final acceptance is delegated to a superior (agent 2). Similar to unanimity rule, information aggregation works poorly under this scheme even without transfers. The reasoning however is different. Under unanimity there is no sincere equilibrium as shown above. In a hierarchy, in contrast, we will show that there is a sincere equilibrium, where everyone decides based on all information available to him. The problem causing the inefficiency is that the sincere subordinate chooses $x = 0$ if his own signal is zero, regardless of the superior´s information.

Let us check whether there is indeed such a sincere equilibrium for low bribes. Suppose the transfers are $t_1 < 2p-1$ and $t_2 \geq 0$. If agent 1 is sincere and delegates the decision to the superior, then the latter knows that at least one signal is positive and in this case the decision should be in favor of the lobby anyway. The superior therefore does not have an incentive to deviate. Given the superior´s behavior, agent 1 knows that the agent 2 chooses $x = 1$ as soon as the decision is delegated to him. The subordinate is in the same position as a single decision maker and thus is sincere if $t_1 < 2p-1$. We now easily see that the overall decision is based on only a single agent´s - namely the subordinate´s - signal. The superior can be "bribed" at zero costs. The result is analogous to the one under unanimity rule.

Actually, for $t_1 \geq 0$ and $t_2 < 2p-1$, there is also an equilibrium, where agent 1 always delegates the decision and agent 2 decides exclusively based on his own information. Here, the subordinate's "message" is uninformative and hence ignored by the agent 2. The superior is in the same position as a single decision maker and thus decides sincerely based exclusively on his own information if $t_2 < 2p-1$. Given the superior´s behavior, agent 1 clearly does not have an incentive to deviate.[21]

Therefore, once a single agent is bribed and the transfers to the other do not exceed $2p-1$, then the latter behaves sincerely based on his own message. Since the superior as well as the subordinate has the power to choose against the lobby, the probability to win its favored decision is $\frac{1}{2}$. The same probability can be obtained cheaper by not paying any bribes.

Bribing both agents is as expensive as doing the same under unanimity rule. Given that agent $i$ is bribed, the other one $-i$ is in the same position as a single decision maker without a safety net. For $t_i \geq 2p-1$ and $t_{-i} \geq 2p-1$ the unique equilibrium is where both agents decide in favor of the lobby. This immediately yields the following.

**Remark 2** *For each lobby valuation $\theta$, the outcome $x(v_1, v_2)$ is the same under the unanimity rule and a hierarchy for all signal constellations $(v_1, v_2)$.*

Again, the interest group bribes the agents only if $\theta \geq 8p-4$.

[21] Notice that there are some transfer schemes such that the two equilibria are possible. However, they are Pareto equivalent for the agent 1 and 2. In addition, the decision quality in both equilibria is the same.

## 5 The optimal safety net

Given the bribing strategies we can now derive the optimal safety net. No safety net is never (strictly) best. Remark 1 states that majority rule and an advisory system are equivalent for the lobby and thus are equally valuable for the institution. Similarly, Remark 2 implicitly finds that unanimity and the hierarchy yield the same benefit for the institution. Comparing the efficiency properties of the schemes and their vulnerability against external influence yields:

**Proposition 1** *The institution´s ranking of the organizational designs depends on the lobby´s valuation $\theta$ and the signal quality $p$ as shown in Figure 1:*

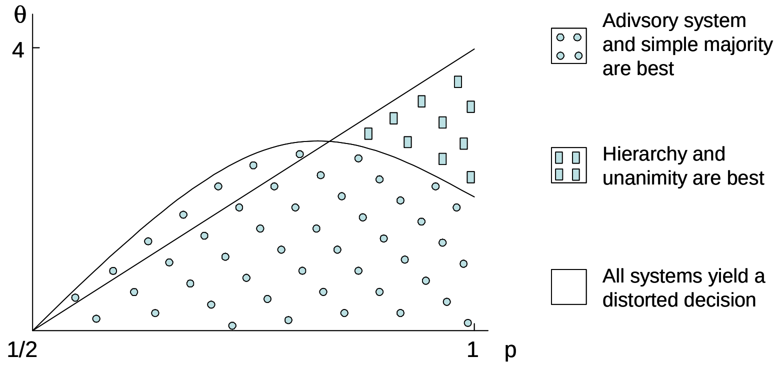


*Figure 1: The optimal safety net*

The curves represent the critical $(p, \theta)$ constellations, where the lobby is just indifferent between purchasing the decision under the respective regimes. Below the straight line no agent is bribed under the hierarchy and the unanimity rule. Similarly, below the reversed parable no agent is bribed under the advisory system and majority rule. Above the curves the lobby valuation is so high such that the decision is bought with probability one under the respective schemes. Notice that the protection against influence increases in the signal quality of the agents under the hierarchy and the unanimity rule. The better the agents are informed the more expensive it becomes to bribe them. Under the advisory system and majority rule the protection may decrease as the signal quality increases. The reason is that the probability to win the favored decision without paying bribes is greater for intermediate signal qualities than for high signal qualities.[22] Thus, the lobby's incentive to purchase the decision may increase as the signal quality increases. This is also why bribing one agent under majority rule and the advisory scheme may be more expensive than bribing two agents under the other two systems.

The regions in Figure 1 result from the trade-off between information aggregation and the endogenous barriers to corruption. For low lobby valuations no member is bribed under all organizational designs. However, information aggregation works better under the advisory system and majority rule, which renders these systems superior in this region. However, for high signal qualities and an intermediate lobby valuation the decision is bought under these schemes but not under a hierarchy and unanimity. Under the latter two systems the decision is exclusively based on the signal of one agent. We thus have at least some information aggregation and a better defense against external influence. Finally, if the lobby's valuation is sufficiently high, then no system offers protection against corruption.

Let us finally consider a broad class of mechanisms.

**Proposition 2** *Consider the class of direct mechanisms. Mechanisms that aggregate information efficiently in the absence of lobbying are strictly inferior if the lobby valuation is sufficiently high. The superior mechanisms in the latter case aggregate information inefficiently in the absence of lobbying. There is no*

[22] As noted above, without paying bribes the lobby only loses if both signals are against it. In the other three signal constellation it wins. For example, if $p = 1$, then the probability that both signals are equal is one and the ex ante probability that the decision is in favor of the lobby is $\frac{1}{2}$. If $p < 1$, then it is ex ante more likely that at least one signal is 1. This argument is similar to the non-monotonicity result in Felgenhauer and Grüner (2008).

*mechanism that aggregates information inefficiently in the absence of lobbying but is efficient for some $\theta > 0$.*

Proof. The proof proceeds in three steps.

(i) Are there allocation rules that aggregate information inefficiently for $t_1 = t_2 = 0$ (e.g. due to a build in bias) but aggregate information efficiently for other transfers? Stochastic allocation rules cannot guarantee an efficient outcome. A non-stochastic rule that aggregates information efficiently yields $x = 1$ iff at least one signal is equal to one, i.e. since the agents choose their strategies non-cooperatively, each agent must have the power to induce a decision in favor of the lobby regardless of the other agents behavior. If this is possible for transfers different from $t_1 = t_2 = 0$, then it must also be possible for $t_1 = t_2 = 0$. But then in equilibrium an agent $i$ induces $x = 1$ after observing $v_i = 1$ in the absence of bribes, since this maximizes $i's$ utility regardless of the other agent's behavior. Hence, there are no such rules.

(ii) Majority rule (being a direct mechanism) does not provide protection for $\theta > \frac{4p-2}{(-2p+2p^2+1)^2}$, but aggregates information efficiently for $\theta < \frac{4p-2}{(-2p+2p^2+1)^2}$, as shown previously. The only other rule that aggregates information efficiently in the absence of bribes is where the $x = 1$ iff at least one message is zero. But here the agents in equilibrium send the message zero if their signal is one, which is just a relabeling of the equilibrium messages under majority rule. The threshold for the critical $\theta$ are the same as under majority rule.

(iii) Unanimity provides partial protection for some $\theta > \frac{4p-2}{(-2p+2p^2+1)^2}$, but always aggregates information inefficiently as shown previously. Q.E.D.

Our above results are thus general in the sense that in the class of direct mechanisms the nature of the mechanism which is optimal has to change when the interest group's valuation becomes sufficiently large. Otherwise optimal mechanisms have to be replaced by otherwise suboptimal mechanisms.

# 6 Discussion

Some procedural rules, such as sequential hierarchical decision making, make it difficult to aggregate information efficiently. According to our analysis, this inefficiency may have to be taken into account when interested external parties have a sufficiently large valuation for a favorable decision. In a hierarchy with two corrupt agents, each agent considers himself as decisive. This makes it costly to buy a favorable decision. On the other hand, small bribes may be sufficient to distort all agents' decisions under other organizational schemes that, in the absence of bribes, aggregate information efficiently.

So far, theorists of interest group influence have emphasized the social cost that is directly connected to rent seeking expenditures (e.g. Tullock (1967), Congleton, Hillman and Konrad (2008)) and the resulting direct distortions of collective decisions (e.g. Dal Bo (2007)). Our analysis suggests that there may be a social cost of lobbying even if the lobby does not successfully distort the actions of any decision maker (and even if the lobby does not invest any resources in equilibrium). This cost arises when the organization needs to be structured inefficiently in order to make it harder for the lobby to bias the organization's decision.

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