MECS 570-1: Organizational Economics I

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Decision Making in Organizations: Delegation II

Loss of Control vs. Loss of Information

The result that the allocation of control rights is irrelevant under the mechanism-design approach to delegation depends importantly on the Principal's ability to commit. The picture changes significantly if the Principal is unable to commit to a message-contingent decision rule and she is unable to restrict the Agent's decisions through formal rules (i.e., she cannot force A to choose from a restricted delegation set). When this is the case, there will be a trade-off between the "loss of control" she experiences when delegating to the Agent who chooses his own ideal decision and the "loss of information" associated with making the decision herself. This section develops an elemental model highlighting this trade-off in a stark way.

Description There is a Principal (P) and an Agent (A) and a single decision $d \in \mathbb{R}$ to be made. Both P and A would like the decision to be tailored to the state of the world, $s \in S$, which is privately observed only by A. The Principal chooses a control-rights allocation $g \in \{P, A\}$. Under allocation g, player g makes the decision. Players' preferences are given by

$$\begin{aligned} u_P(d,s) &= -(d-s)^2 \\ u_A(d,s) &= -(d-y_A(s))^2, \end{aligned}$$

where $y_A(s) = s + \beta$. Given state of the world s, P would like the decision to be $d = s$, and A would like the decision to be $d = s + \beta$. There are no transfers..

Timing The timing of the game is:

1. P chooses control-rights allocation $g \in \{P, A\}$, which is commonly observed.

2. A privately observes s.

3. Under allocation g, player g chooses d.

Equilibrium A **pure-strategy subgame-perfect equilibrium** is a control-rights allocation g^*, a decision by the Principal, d_P^*, and a decision rule $d_A^* : S \to \mathbb{R}$ by the Agent such that given g, d_g^* is chosen optimally by player g.

The Program The Principal's problem is to

$$\max_{g \in \{P,A\}} E\left[u_P\left(d_g^*(s), s\right)\right],$$

where I denote $d_P^*(s) \equiv d_P^*$. It remains to calculate d_P^* and $d_A^*(s)$.

Under $g = A$, given s, A solves

$$\max_d -(d - (s + \beta))^2,$$

so that $d_A^*(s) = s + \beta$. Under $g = P$, P solves

$$\max_d E\left[-(d - s)^2\right],$$

so that $d_P^* = E[s] = 0$.

The Principal's payoffs under $g = P$ are

$$E[u_P(d_P^*, s)] = -E\left[s^2\right] = -\sigma_s^2.$$

When the Principal makes a decision without any information, she faces a loss that is related to her uncertainty about what the state of the world is. Under $g = A$, the Principal's payoffs are

$$E\left[u_P\left(d_A^*, s\right)\right] = -E\left[(s + \beta - s)^2\right] = -\beta^2.$$

When the Principal delegates, she can be sure that the Agent will tailor the decision to the state of the world, but given the state of the world, he will always choose a decision that differs from the Principal's ideal decision.

The Principal then wants to choose the control-rights allocation that leads to a smaller loss: she will make the decision herself if $\sigma_s^2 < \alpha^2$, and she will delegate to the Agent if $\sigma_s^2 > \alpha^2$. She therefore faces a **trade-off between "loss of control" under delegation the "loss of information" under centralization**.

In this model, if the Agent is not making the decision, he has no input into the decision-making process. If the Agent is informed about the decision, he will clearly have incentives to try to convey some of his private information to the Principal, since he could benefit if the Principal made some use of that information. Centralization with communication would therefore always dominate Centralization without communication (since the Principal could always ignore the Agent's messages). Going further, if the Agent perfectly reveals his information to the Principal through communication, then Centralization with communication would also always be better for the Principal than Delegation. This leaves open the question of whether allowing for communication by the Agent undermines the trade-off we have derived.

Dessein (2002) explores this question by developing a version of this model in which under $g = P$, the Agent is able to send a cheap-talk message about s to the Principal. As in Crawford and Sobel (1982), fully informative communication is not an equilibrium if $\beta > 0$, but as long as β is not too large, some information can be communicated in equilibrium. When β is larger, the most informative cheap-talk equilibrium becomes less informative, so decision making under centralization becomes less sensitive to the Agent's private information. However, when β is larger, the costs associated with the loss of control under delegation are also higher.

It turns out that whenever β is low, so that decision making under centralization would be very responsive to the state of the world, delegation performs even better than centralization. When β is high so that decision making under centralization involves throwing away a lot of useful information, delegation performs even worse than centralization. In this sense, from the Principal's perspective, delegation is optimal when players are well-aligned, and centralization is optimal when they are not.

When communication is possible, there is still a nontrivial trade-off between "loss of control" under delegation and "loss of information" under centralization, but it holds for more subtle reasons. In particular, at $\beta = 0$, the Principal is indifferent between centralization and decentralization. Increasing β slightly leads to a second-order "loss of control" cost under delegation since the Agent still makes nearly optimal decisions from the Principal's perspective. However, it leads to a first-order "loss of information" cost under centralization in the most informative cheap-talk equilibrium. This is why for low values of β, delegation is optimal. For sufficiently high values of β, there can be no informative communication. At this point, an increase in β increases the "loss of control" costs under delegation, but it does not lead to any additional "loss of information" costs under centralization (since no information is being communicated at that point). At some point, the former costs become sufficiently high that centralization is preferred.

Loss of Control vs. Loss of Initiative

Model Description There is a risk-neutral Principal and a risk-neutral Agent who are involved in making a decision about a new project to be undertaken. The Principal decides who will have formal authority, $g \in G \equiv \{P, A\}$, for choosing the project. There are four potential projects the players can choose from, which I will denote by $k = 0, 1, 2, 3$. The $k = 0$ project is the **status-quo project** and yields low, known payoffs (which I will normalize to 0). Of the remaining three projects, one is a **third-rail project** (don't touch the third rail) that yields $-\infty$ for both players. The remaining two projects are **productive projects** and yield positive payoffs for both players. The projects can be summarized by four payoff pairs: (u_{P0}, u_{A0}), (u_{P1}, u_{A1}), (u_{P2}, u_{A2}), and (u_{P3}, u_{A3}). Assume $(u_{P0}, u_{A0}) = (0, 0)$ is commonly known by both players. With probability α the remaining three projects yield payoffs $(-\infty, -\infty)$, (B, b), and $(0, 0)$, and with probability $(1 - \alpha)$, they yield payoffs $(-\infty, -\infty)$, $(B, 0)$, and $(0, b)$. The players do not initially know which projects yield which payoffs. α is referred to as the **congruence parameter**, since it indexes the probability that players' ideal projects coincide.

The Agent chooses an effort level $e \in [0, 1]$ at cost $c(e)$, which is increasing and convex. With probability e, the Agent becomes fully informed about his payoffs from each of the three projects (but he remains uninformed about the Principal's payoffs). That is, he observes a signal $\sigma_A = (u_{A1}, u_{A2}, u_{A3})$. With probablity $1 - e$, he remains uninformed about all payoffs from these projects. That is, he observes a null signal $\sigma_A = \emptyset$. The Principal becomes fully informed about her payoffs (observing signal $\sigma_P = (u_{P1}, u_{P2}, u_{P3})$) with probability E, and she is uninformed (observing signal $\sigma_P = \emptyset$) with probability $1 - E$. The players then simultaneously send messages $m_P, m_A \in M \equiv \{0, 1, 2, 3\}$ to each other. And the player with formal authority makes a decision $d \in D \equiv \{0, 1, 2, 3\}$.

Timing The timing is as follows:

1. P chooses the allocation of formal authority, $g \in G$, which is commonly observed.
2. A chooses $e \in [0, 1]$. Effort is privately observed.
3. P and A privately observe their signals $\sigma_P, \sigma_A \in \Sigma$.
4. P and A simultaneously send messages $m_P, m_A \in M$.
5. Whoever has control under g chooses $d \in D$.

Equilibrium A **perfect-Bayesian equilibrium** is set of beliefs μ, an allocation of formal authority, g^*, an effort decision $e^* : G \to [0,1]$, message functions $m_P^* : G \times [0,1] \times \Sigma \to M$ and $m_A^* : G \times [0,1] \times \Sigma \to M$, a decision function $d^* : G \times \Sigma \times \mu \to D$ such that each player's strategy is optimal given their beliefs about project payoffs, and these beliefs are determined by Bayes's rule whenever possible. We will focus on the set of **most-informative equilibria**, which correspond to equilibria in which player j sends message $m_j = k^*$ where $u_{jk^*} > 0$ if player j is informed, and $m_j = 0$ otherwise.

The Program In a most-informative equilibrium in which $g = P$, the Principal makes the decision d that maximizes her expected payoffs given her beliefs. If $\sigma_A \neq \emptyset$, then $m_A = k^*$ where $u_{Ak^*} = b$. If $\sigma_P = \emptyset$, then P receives expected payoff αB if she chooses project k^*, she receives 0 if she chooses project 0, and she receives $-\infty$ if she chooses any other project. She will therefore choose project k^*. That is, even if she possesses formal authority, the Agent may possess **real authority** in the sense that she will rubber stamp a project proposal of his if she is uninformed. If $\sigma_P \neq \emptyset$, then P will choose whichever project yields her a payoff of B. Under P-formal authority, therefore, players' expected payoffs are

$$\begin{aligned} U_P &= EB + (1-E)\, e\alpha B \\ U_A &= E\alpha b + (1-E)\, eb - c(e)\,. \end{aligned}$$

In period 2, anticipating this decision rule, A will choose e^{*P} such that

$$c'\left(e^{*P}\right) = (1-E)\, b.$$

Under P-formal authority, the Principal therefore receives equilibrium payoffs

$$V^P = EB + (1-E)\, e^{*P} \alpha B.$$

In a most-informative equilibrium in which $g = A$, the Agent makes the decision d that maximizes his expected payoffs given his beliefs. If $\sigma_P \neq \emptyset$, then $m_P = k^*$ where $u_{Pk^*} = B$. If $\sigma_A = \emptyset$, then A receives expected payoff αb if he chooses project k^*, 0 if he chooses project 0, and $-\infty$ if he chooses any other project. He will therefore choose project k^*. If $\sigma_A \neq \emptyset$, then A will choose whichever project yields himself a payoff of b. Under A-formal authority, therefore, players' expected payoffs are

$$\begin{aligned} U_P &= e\alpha B + (1-e)\, EB \\ U_A &= eb + (1-e)\, E\alpha b - c(e)\,. \end{aligned}$$

In period 2, anticipating this decision rule, A will choose e^{*A} such that

$$\begin{aligned} c'\left(e^{*A}\right) &= b\,(1-E\alpha) = (1-E)\, b + (1-\alpha)\, Eb \\ &= c'\left(e^{*P}\right) + (1-\alpha)\, Eb. \end{aligned}$$

The Agent therefore chooses higher effort under A-formal authority than under P-formal authority. This is because under A-formal authority, the Agent is better able to tailor the project choice to his own private information, which therefore increases the returns to becoming informed. This is the sense in which (formal) delegation increases the agent's initiative.

Under A-formal authority, the Principal therefore receives equilibrium payoffs

$$\begin{aligned} V^A &= e^{*A}\alpha B + E\left(1-e^{*A}\right) B \\ &= EB + (1-E)\, e^{*A}\alpha B - Ee^{*A}B\,(1-\alpha)\,. \end{aligned}$$

The first two terms correspond to the two terms in V^P, except that e^{*P} has been replaced with e^{*A}. This represents the "increased initiative" gain from delegation. The third term, which is negative is the "loss of control" cost of delegation. With probability $E \cdot e^{*A}$, the

Principal is informed about the ideal decision and would get B if she were making the decision, but the Agent is also informed, and since he has formal authority, he will choose his own preferred decision, which yields a payoff of B to the Principal only with probability α.

In period 1, the Principal will therefore choose an allocation of formal authority to

$$\max_{g \in \{P,A\}} V^g,$$

and A-formal authority (i.e., delegation) is preferred if and only if

$$\underbrace{(1-E)\,\alpha B\left(e^{*A}-e^{*P}\right)}_{\text{increased initiative}} \geq \underbrace{EBe^{*A}\,(1-\alpha)}_{\text{loss of control}}.$$

That is, the Principal prefers A-formal authority whenever the increase in initiative it inspires outweights the costs of ceding control to the Agent.

Discussion This paper is perhaps best known for its distinction between formal authority (who has the legal right to make a decision within the firm) and real authority (who is the actual decision maker), which is an interesting and important distinction to make. The model clearly highlights why those with formal authority might cede real authority to others: if our preferences are sufficiently well-aligned, then I will go with your proposal if I do not have any better ideas, because the alternative is inaction or disaster. Real authority is therefore a form of informational authority. Consequently, you have incentives to come up with good ideas and to tell me about them.

One important issue that I have not discussed either here or in the discussion of the "loss of control vs. loss of information" trade-off is the idea that decision making authority in organizations is unlikely to be formally transferable. Formal authority in firms always resides at the top of the hierarchy, and it cannot be delegated in a legally binding manner. As a result, under A-formal authority, it seems unlikely that the Agent will succeed in implementing a project that is good for himself but bad for the Principal if the Principal knows that there is another project that she prefers. That is, when both players are informed, if they disagree about the right course of action, the Principal will get her way. Baker, Gibbons, and Murphy (1999) colorfully point out that within firms, "decision rights [are] loaned, not owned," (p. 56) and they examine to what extent informal promises to relinquish control to an agent (what Li, Matouschek, and Powell (2017) call "power") can be made credible.