MECS 475: The Economics of Organizations

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Decision Making in Organizations: Delegation

Decision Making in Organizations (Updated: May 17 2016)

In the first couple weeks of the class, we considered environments in which one party (the Agent) chose actions that affected the payoffs of another party (the Principal), and we asked how the Principal could motivate the Agent to choose actions that were more favorable for the Principal. We considered the use of formal incentive contracts, and we also looked at environments in which such contracts were unavailable. Throughout, however, we took as given that only the agent was able to make those decisions. In other words, **decision rights** were **inalienable**. This week, we will allow for the possibility that control can be transferred from one party to the other, and we will ask when one party or the other should possess these decision rights. Parts of this discussion will echo parts of the discussion on the boundaries of the firm, where asset allocation was tantamount to decision-rights allocation, but the trade-offs we will focus on here will be different.

If in principle, important decisions could be made by the Principal, why would the Principal ever want to delegate such decisions to an Agent? In his book on the design of bureaucracies, James Q. Wilson concludes that "In general, authority [decision rights] should be placed at the lowest level at which all essential elements of information are available." A Principal may therefore want to delegate to a better-informed Agent who knows more about what decisions are available or what their payoff consequences are. But delegation itself may be costly as well, because the Principal and the Agent may disagree about the ideal decision to be made. This conflict is resolved in different ways in different papers in the literature.

First, if the Principal can commit to a decision rule as a function of an announcement by the Agent, then the formal allocation of control is irrelvant. This mechanism-design approach to delegation (Holmstrom, 1984; Alonso and Matouschek, 2008; Frankel, *Forth-*

coming) focuses on the idea that while control is irrelevant, implementable decision rules can be implemented via constrained delegation: the Principal delegates to the Agent, but the Agent is restricted to making decisions from a restricted "delegation set." The interesting results of these papers is their characterization of optimal delegation sets.

If the Principal cannot commit to a decision rule, then the allocation of control matters. The optimal allocation of control is determined by one of several trade-offs identified in the literature. The most direct trade-off that a Principal faces is the trade-off between a loss of control under delegation (since the Agent may not necessarily make decisions in the Principal's best interest) and a loss of information under centralization (since the Principal may not be able to act upon the Agent's information). This trade-off occurs even if the Agent is able to communicate his information to the Principal in a cheap-talk manner (Dessein, 2002). Next, if the Agent has to exert non-contractible effort in order to become informed, then his incentives to do so are greater if he is able to act upon that information: delegation improves incentives for information acquisition. There is therefore a trade-off between loss of control under delegation and loss of initiative under centralization (Aghion and Tirole, 1997).

The previous two trade-offs are only relevant if the preferences of the Principal and the Agent are at least somewhat well-aligned. Even if they are not, however, delegation can serve a role. It may be beneficial to promise the Agent future control as a reward for good decision making today in order to get the Agent to use his private information in a way that is beneficial for the Principal. There is threfore a dynamic trade-off between loss of information today and loss of control in the future (Li, Matouschek, and Powell, *Forthcoming*; Lipnowski and Ramos, 2016).

Mechanism-Design Approach to Delegation

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 selects (and commits to) a control-rights allocation $g \in \{P, A\}$, a mechanism (M, d), which consists of a message space M and a deterministic decision rule $d : M \to \mathbb{R}$, which selects a decision $d(m)$ as a function of a message $m \in M$ sent by the Agent, and a delegation set $D \subset \mathbb{R}$. If $g = P$, then P makes decisions according to $d(\cdot)$. If $g = A$, then A makes decision $d_A \in D \subset \mathbb{R}$. 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 $y_A(\cdot)$ is strictly increasing in s. Given state of the world s, P would like the decision to be $d = s$, and A would like the decision to be $d = y_A(s)$. There are no transfers.

Timing The timing of the game is:

1. P chooses control-rights allocation $g \in \{P, A\}$, mechanism (M, d), and delegation set D. g, M, d, and D are commonly observed.

2. A privately observes s.

3. A sends message $m \in M$ and chooses $d_A \in D$, which are commonly observed.

4. If $g = P$, the resulting decision is $d = d(m)$. If $g = A$, the resulting decision is $d = d_A$.

Equilibrium A **pure-strategy subgame-perfect equilibrium** is a control-rights allocation g^*, a mechanism (M^*, d^*), a delegation set D^*, an announcement function $m^* : S \to M^*$, and a decision rule $d_A^* : S \to D^*$ such that given g^* and (M^*, d^*), the Agent optimally announces $m^*(s)$ and chooses $d_A^*(s)$ when the state of the world is s, and the Principal optimally chooses control-rights allocation g^*, mechanism (M^*, d^*), and delegation set D^*.

The Program The Principal chooses (g, M, d, D) to solve

$$\max_{g,M,d,D} \int_s \left[u_P\left(d\left(m^*\left(s\right)\right), s\right) 1_{g=P} + u_P\left(d_A^*\left(s\right), s\right) 1_{g=A}\right] dF\left(s\right)$$

subject to

$$m^*\left(s\right) \in \underset{m \in M}{\operatorname{argmax}} \int_s u_A\left(d\left(m\right), s\right) dF\left(s\right)$$

and

$$d_A^*\left(s\right) \in \underset{d \in D}{\operatorname{argmax}} \int_s u_A\left(d, s\right) dF\left(s\right).$$

Functional-Form Assumptions We will assume that $s \sim U\left[-1, 1\right]$ and $y_A\left(s\right) = \beta s$, where $\beta > 1/2$.

Outline of the Analysis I will begin by separating out the problem of choosing a mechanism (M, d) from the problem of choosing a delegation set D. Define

$$V^P = \max_{M,d} \int_s u_P\left(d\left(m^*\left(s\right)\right), s\right) dF\left(s\right)$$

subject to

$$m^*\left(s\right) \in \underset{m \in M}{\operatorname{argmax}} \int_s u_A\left(d\left(m\right), s\right) dF\left(s\right)$$

and define

$$V^A = \max_{D} \int_s u_P\left(d_A^*\left(s\right), s\right) dF\left(s\right)$$

subject to

$$d_A^*\left(s\right) \in \underset{d \in D}{\operatorname{argmax}} \int_s u_A\left(d, s\right) dF\left(s\right).$$

The Coasian program can then be written as

$$\max_g V^g.$$

I will now proceed in several steps, for the most part following the analysis of Alonso and Matouschek (2008).

1. First, I will show that under $g = P$, there is an analog of the revelation principle that simplifies the search for an optimal mechanism: it is without loss of generality to set $M = S$ and focus on incentive-compatible decision rules $d(s)$ that satisfy

$$u_A(d(s), s) \geq u_A(d(s'), s) \text{ for all } s', s \in S.$$

2. I will then show that all incentive-compatible decision rules have some nice properties.

3. Further, each incentive-compatible decision rule $d(s)$ is associated with a range $\tilde{D} = \{d(s) : s \in S\}$, and the incentive-compatibility condition is equivalent to

$$u_A(d(s), s) \geq u_A(d', s) \text{ for all } d' \in \tilde{D}.$$

   This result implies that **the allocation of control is irrelevant**. For any incentive-compatible direct mechanism (Θ, d), there is a delegation set D such that under either control-rights allocation g, the decision rule is the same: $d(s) = d_A(s)$, which implies that $V^A = V^P$. It is therefore without loss of generality to solve for the optimal delegation set D.

4. I will restrict attention to **interval delegation sets** $D = [d_L, d_H]$, which under the specific functional-form assumptions I have made, is indeed without loss of generality. The Principal's problem will then be to

$$\max_{d_L, d_H} \int_s u_P(d_A^*(s), s)\, dF(s)$$

   subject to

$$u_A(d_A^*(s), s) \geq u_A(d, s) \text{ for all } d_L \leq d \leq d_H.$$

Step 1: Revelation Principle Given $g = P$, any choice (M, d) by the Principal implements some distribution over outcomes $\sigma(s)$, which may be a nontrivial distribution, since the Agent might be indifferent between sending two different messages that induce two different decisions. Since $y_A(s)$ is strictly increasing in s, it follows that $\sigma(s)$ must be increasing in s in the sense that if $d \in \operatorname{supp}\sigma(s)$ and $d' \in \operatorname{supp}\sigma(s')$ for $s > s'$, then $d > d'$. This distribution determines some expected payoffs (given state s) for the Principal:

$$\pi(s) = E_{\sigma(s)}\left[u_P\left(d(m), s\right)\right],$$

where the expectation is taken over the distribution over messages that induces $\sigma(s)$. For each s, take $\hat{d}(s) \in \operatorname{supp}\sigma(s)$ such that

$$u_P\left(\hat{d}(s), s\right) \geq \pi(s).$$

The associated direct mechanism (S, d) is well-defined, incentive-compatible, and weakly better for the Principal, so it is without loss of generality to focus on direct mechanisms.

Step 2: Properties of Incentive-Compatible Mechanisms The set of incentive-compatible direct mechanisms $d : S \to \mathbb{R}$ satisfies

$$u_A(d(s), s) \geq u_A(d(s'), s) \text{ for all } s, s' \in S.$$

or

$$|d(s) - y_A(s)| \leq |d(s') - y_A(s)| \text{ for all } s, s'.$$

This condition implies a couple properties of $d(\cdot)$, but the proofs establishing these properties are fairly involved (which correspond to Proposition 1 in Melumad and Shibano (1991)), so I omit them here. First, $d(\cdot)$ must be weakly increasing, since $y_A(\cdot)$ is increasing. Next, if it is strictly increasing and continuous on an open interval (s_1, s_2), it must be the case that

$d(s) = y_A(s)$ for all $s \in (s_1, s_2)$. Finally, if d is not continuous at s', then there must be a jump discontinuity such that

$$\lim_{s \uparrow s'} u_A(d(s), s') = \lim_{s \downarrow s'} u_A(d(s), s'),$$

and $d(s)$ will be flat in an interval to the left and to the right of s'.

Step 3: Control-Rights Allocation is Irrelevant For any direct mechanism d, we can define the range of the mechanism to be $\tilde{D} = \{d(s) : s \in S\}$. The incentive-compatibility condition is then equivalent to

$$u_A(d(s), s) \geq u_A(d', s) \text{ for all } d' \in \tilde{D}.$$

That is, given a state s, the Agent has to prefer decision $d(s)$ to any other decision that he could induce by any other announcement s'. Under $g = P$, choosing a decision rule $d(s)$ therefore amounts to choosing its range $\tilde{D}$ and allowing the Agent to choose his ideal decision $d \in \tilde{D}$. The Principal's problem is therefore identical under $g = P$ as under $g = A$, so that $V^P = V^A$. Therefore, the allocation of control rights is irrelevant when the Principal has commitment either to a decision rule or to formal constraints on the delegation set. It is therefore without loss of generality to solve for the optimal delegation set D, so the Principal's problem becomes

$$\max_D \int u_P(d_A^*(s), s)\, dF(s)$$

subject to

$$u_A(d_A^*(s), s) \geq u_A(d', s) \text{ for all } s \text{ and for all } d' \in D.$$

Step 4: Optimal Interval Delegation Under the specific functional-form assumptions I have made, it is without loss of generality to focus on interval delegation sets of the form

$D = [d_L, d_H]$, where $d_L \leq d_H$ and d_L can be $-\infty$ and d_H can be $+\infty$ (this result is nontrivial and follows from Proposition 3 in Alonso and Matouschek (2008)). Any interval $[d_L, d_H]$ will be associated with an interval of states $[s_L, s_H] = [d_L/\beta, d_H/\beta]$ such that

$$d_A^*(s) = \begin{cases} d_L & s \leq s_L \\ \beta s & s_L < s < s_H \\ d_H & s \geq s_H. \end{cases}$$

The Principal's problem will then be to

$$\max_{d_L, d_H} \int_{-1}^{s_L} u_P(d_L, s)\, dF(s) + \int_{s_L}^{s_H} u_P(\beta s, s)\, dF(s) + \int_{s_H}^{1} u_P(d_H, s)\, dF(s)$$

or since $dF(s) = 1/2ds$, $s_L = d_L/\beta$ and $s_H = d_H/\beta$,

$$\max_{d_L, d_H} -\frac{1}{2}\left[\int_{-1}^{d_L/\beta} (d_L - s)^2\, ds + \int_{d_L/\beta}^{d_H/\beta} (\beta s - s)^2\, ds + \int_{d_H/\beta}^{1} (d_H - s)^2\, ds\right].$$

Applying the Kuhn-Tucker conditions (using Leibniz's rule), with some effort, we get

$$d_L^* = \max\left\{-\frac{\beta}{2\beta - 1}, -1\right\}, d_H^* = \min\left\{\frac{\beta}{2\beta - 1}, 1\right\},$$

if interior.

It is worth noting that if $\beta = 1$, so that P and A are perfectly aligned, then $d_L^* = -1$ and $d_H^* = 1$. That is, the Principal does not constrain the Agent's choices if their ideal decisions coincide. If $\beta > 1$, $d_L^* > -1$ and $d_H^* < 1$. In this case, the Agent's ideal decision is more responsive to the state of the world than the Principal would like, and the only instrument the Principal has to reduce the sensitivity of the Agent's decision rule is to constrain his decision set.

Finally, if $\beta < 1$, then again $d_L^* = -1$ and $d_H^* = 1$. In this case, the Agent's ideal decision is not as responsive to the state of the world as the Principal would like, but the Principal cannot use interval delegation to make the Agent's decision rule more responsive to the state of the world. Alonso and Matouschek (2008) provide conditions under which the Principal may like to remove points from the Agent's delegation set precisely in order to make the Agent's decision rule more sensitive to the state of the world.

Exercise If in addition to a message-contingent decision rule, the Principal is able to commit to a set of message-contingent transfers, it will still be the case that the allocation of control is irrelevant. Show that this is the case. In doing so, assume that the Agent has an outside option that yields utility $\bar{u}$ and that the Principal makes a take-it-or-leave-it offer of a mechanism (M, d, t), where $d : M \to \mathbb{R}$ is a decision rule and $t : M \to \mathbb{R}$ is a set of transfers from the Principal to the Agent.

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 $y_A(s) = \alpha + s$. Given state of the world s, P would like the decision to be $d = s$, and A would like the decision to be $d = \alpha + s$. There are no transfers. Assume $s \sim U[-1,1]$.

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

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

so that $d_A^*(s) = \alpha + s$. 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

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

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

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

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 $Var(s) < \alpha^2$, and she will delegate to the Agent if $Var(s) > \alpha^2$. 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 $\alpha > 0$, but as long as α is not too large, some information can be communicated in equilibrium. When α 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 α is larger, the costs associated with the loss of control under delegation are also higher.

It turns out that whenever α 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 α 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 $\alpha = 0$, the Principal is indifferent between centralization and decentralization. Increasing α 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 α, delegation is optimal. For sufficiently high values of α, there can be no informative communication. At this point, an increase in α 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

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

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 (*Forthcoming*) call "power") can be made credible.