Policy-advising competition and endogenous lobbies

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March 20, 2024

Abstract

We present a general model of Bertrand competition between experts in a policy-advising market. A policy-maker can hire one of the experts or acquire information himself. We first characterize equilibria and show that an expert is never hired under *centralization* under a weak condition on the uncertainty about the environment. Second, competition reduces the costs of advice and may even cause an expert previously hired at a positive price to then engage in *lobbying*. Finally, hiring (competition from) a good expert may decrease social welfare if the policy issue is narrow and mainly concerns the policy-maker's own voters.

JEL classification: D72, D78, D83, D82, C72.

Keywords: Policy advice, political influence, lobbying, delegation, private information, Bertrand competition.

1 Introduction

Policy-makers traditionally rely on industry experts for external advice. Having deep knowledge of issues underlying specific policies, industry experts can inform the legislative process. However, they typically also have a strong interest in those policies, and are thus known as special interest groups (Grossman and

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Helpman, 2002). Apart from "buying" influence on the legislative process via lobbying contributions,[1] industry experts may serve as advisors or be appointed to public office.[2] Their influence may reach from providing information to effective delegation of decision-making power.

A second source of external advice that has gained momentum in recent years are professional consultants. Their selling point consists of the analytical expertise to obtain and process information. These services, however, may come at a hefty cost for clients. Current public debate in developed countries such as the U.K. has focused on the government's "lazy habit" of hiring external consultants, "infantilizing" the civil service.[3]

The trade-off between access to deep, policy-relevant knowledge and allowing influence to biased political actors has been extensively discussed in the literature in Economics and Political Science (e.g., Grossman and Helpman, 2002; De Figueiredo and Richter, 2014; Bombardini and Trebbi, 2020). As the debate described above suggests, this trade-off has gained complexity in recent years, with industry experts competing against consultants.

In this paper, we present a general framework to analyze this competition and build an informational theory of endogenous lobbies. Our framework allows an expert (she) to lobby the policy-maker (he) both with information and contributions. Moreover, she may also charge a fee (positive price) for her services and work as an advisor to the policy-maker or be appointed to public office.

We characterize how the hiring decision and the associated type of hiring arrangement depend on the benefits each party derives in terms of policy and (potentially) cost savings, and on competition. We further show how these factors affect public agreement with the hiring decision and the public's opinion toward competition with external consultants.

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[1] In the period 2010-2020, the total registered expenditure on lobbying in the U.S. Congress has averaged \$3.5 trillion per year, see https://www.opensecrets.org/federal-lobbying/summary?inflate=Y, accessed January 24, 2022.

[2] In Germany, a former think-tank head was appointed top state secretary to lead the country's transition to green energy. The person was recently accused of using his position to favour friends and family, see https://www.politico.eu/article/germanys-energy-transition-chief-under-fire-over-nepotism-scandal/, accessed June 19, 2023. For related examples in the U.S., see https://www.politico.com/story/2018/05/20/john-bolton-former-lobbyist-national-security-council-597917 and https://www.economist.com/united-states/2021/11/27/joe-bidens-tech-policy-is-becoming-clearer, both accessed January 28, 2022.

[3] See https://www.politico.eu/article/uk-government-external-consultancies-big-four-theodore-agnew/, accessed January 24, 2022. For France, see https://www.politico.eu/article/how-consultants-like-mckinsey-accenture-deloitte-took-over-france-bureaucracy-emmanuel-macron-coronavirus-vaccines/, accessed January 24, 2022.

	Fee	Contribution
Centralization	*Advisor*	*Informational lobbyist (paying access cost)*
Delegation	*Appointee (to public office)*	*Quid-pro-quo lobbyist*

Table 1: Overview of the types of hiring arrangements.

In our baseline model, a policy-maker has to implement a policy whose payoff depends on the state of the world. He can either acquire information on the state *in-house*, i.e., rely on internal staff,[4] or hire an industry expert who has better information but does not share the same policy preferences. Policy preferences being only one dimension of the conflict of interest between the agents, a second dimension relates to the importance each agent assigns to the policy relative to transfers. The industry expert can either communicate her information (referred to as *centralization*) or get authority over the policy *delegated* to her. Before any information is revealed, the industry expert posts a menu of transfers. She may ask the policy-maker for a fee for her service or offer him a contribution. The policy-maker then decides whether to hire the industry expert with or without decision-making authority, or to acquire information in-house.

The type of hiring arrangement thus depends on the direction of the transfer *and* the allocation of authority. We can interpret an expert being hired at a fee as an *appointee* (to public office) if she has decision-making authority and as an *advisor* if she provides information. An expert paying a contribution is a *quid-pro-quo lobbyist* if she has decision-making authority and an *informational lobbyist* (paying an access cost) if she provides information, see Table 1 for an overview.[5]

We first show that the industry expert never offers the policy-maker a contribution in order to be hired without decision-making authority. Since hiring the expert would save the policy-maker the costs of acquiring information in-house, a contribution is required only if it leads to a worse, less informed, policy. In this case, however, the expert prefers in-house acquisition to being hired without authority, as both alternatives lead to equally biased policies from her perspective. In other words, the expert prefers the policy-maker to acquire information

[4]We thus relax the typical assumption in the literature that absent the interaction with the expert, P cannot do better than deciding with prior information only.

[5]Cf. Grossman and Helpman (2002); Schnakenberg and Turner (2023). In Section 6 we discuss the role that alternative forms of lobbying would have in our setting.

in-house to informational lobbying.[6]

Second, whether the industry expert offers the policy-maker a contribution in order to be hired under delegation depends on the conflict of interest. The expert charges a fee for her services if policy preferences are roughly aligned. In this case, the policy-maker benefits from delegation (net of transfers) because he saves on acquisition costs *and* the expert is better informed. If, however, policy preferences differ substantially, then the expert must compensate the policy-maker for the loss of control, and thus act as a (quid-pro-quo) lobbyist instead of seeking appointment to public office. She does so if her net benefit—which is strictly positive because she gains control and is better informed—exceeds the net loss of the policy-maker.

In equilibrium, the industry expert sets the transfers such that the policy-maker's hiring decision maximizes the aggregate payoff. Furthermore, we show that centralization does not occur in equilibrium if uncertainty about the environment is large enough. In our setting with transfers and the possibility to let the policy-maker acquire information in-house, this turns out to be a weak condition: it holds for virtually any prior distribution unless the expert cares much less about policy than the policy-maker. Notably, the policy-maker benefits from the availability of in-house expertise even in case he delegates the decision, because it strengthens his bargaining position vis-à-vis the industry expert.

Finally, we ask whether society agrees with the policy-maker's hiring decision. The aim is to understand in which cases we can expect public pressure to correct a hiring decision, which may lead to inefficiencies.[7] From a purely policy standpoint, hiring the expert comes with a trade-off between informational gains and loss of control. In our model, society fully internalizes the fiscal impact of both fees paid to the expert and the cost of in-house acquisition. Contributions, on the contrary, have an inherent private component accruing to the policy-maker only; we thus pose that they benefit society less (and may even harm it).[8]

We show that society disagrees with hiring the industry expert if it yields a better policy but policy is less important to society than to the policy-maker, and vice versa. In particular, hiring like-minded experts on narrow issues that mainly

[6]Note, however, that informational lobbying may occur in equilibrium once there is competition from other experts, as then in-house acquisition might not be the best alternative for the policy-maker, cf. the subsequent discussion of the general model.

[7]See footnote 2 for such cases in Germany and in the U.S. Public disagreement with regulation subject to corporate influence may also trigger NGO activism (Daubanes and Rochet, 2019), creating an environment conducive to severe inefficiencies (Egorov and Harstad, 2017).

[8]Beneficial effects of lobbying contributions include more informative political campaigns, but negative effects due to the fiscal costs of lobbying may also arise (cf. Bertrand et al., 2020).

concern the policy-maker's own voters causes disagreement because advice then comes at a 'too high' price from society's point of view. For the same reason, disagreement occurs if policy is equally important to both and the expert is hired at a contribution.

We then introduce a general model of competition between finitely many experts. We focus on a unique mode of hiring (e.g., delegation) but extend the model to multiple modes in Appendix B. In equilibrium, the policy-maker's hiring decision yields a larger gross benefit than any of his best alternatives is willing to provide. Similarly to the baseline model, the hired expert charges a fee if the net benefit from hiring her exceeds the gross benefit that his best alternative is willing to provide. Otherwise, the expert pays a contribution, and thus acts as a lobbyist. Increasing the policy-maker's outside option to a given hiring decision therefore decreases the transfer to the hired expert, such that lobbying may occur *because* of competition. Notably, an equilibrium in pure strategies may fail to exist due to the externalities from the policy-maker's hiring decision on other experts.

We then apply the results from the general model to competition between experts with different motives. Following current debate on the role of consultancy firms, we introduce an external consultant to the baseline model who does not care about policy directly. Her benefits instead depend on the quality of her advice as a proxy for reputational or career concerns (cf. Holmström, 1999). We further allow for positive externalities on related projects; e.g., the consultant may use the expertise gained in the policy-design process to advise private clients. In particular, the consultant's willingness to pay being independent of the policy-maker's best alternative yields a unique equilibrium.

Besides decreasing transfers to the industry expert for hiring her, competition with the external consultant may change the baseline hiring decision and lead to worse policies. An industry expert who would not be competitive in the baseline model may now offer contributions in order to get the decision delegated. This requires that the external consultant provides worse advice as compared to in-house acquisition. Hence, competition may induce an otherwise not competitive interest group to engage in quid-pro-quo lobbying. If the external consultant expects large future profits from active participation in the policy-design process, however, she will top the offer of the industry expert, potentially even pricing below market fares, in order to get hired.[9]

Lastly, we ask whether the availability of an external consultant is beneficial to society. As it turns out, competition may increase social welfare either because it lowers the price for advice from the industry expert or because it leads to a better hiring decision for society. In turn, welfare losses occur when competition results in either harmful lobbying contributions or a worse hiring decision. The latter may occur in two cases: Either policy is important to society and the external consultant's poor advice induces contributions by the industry expert, or policy is not important to society and the consultant provides good advice, as the policy-maker then is willing to pay 'too much' for her services.

Thus, coming back to the controversy on external consultants, our results suggest that, while the presence of able consultants on major policy issues is good as long as it does not lead to harmful lobbying contributions from interest groups, it may be bad on narrow issues.

Related literature. This paper belongs to a large literature on strategic communication of soft information initiated by Crawford and Sobel (1982), which was extended to the possibility of delegation of (real) authority by Aghion and Tirole (1997). Dessein (2002) shows that delegation to a perfectly informed expert is better than communication for a sufficiently small conflict of interest. Argenziano et al. (2016) and Ivanov (2010) find that the reverse may hold if the sender is imperfectly informed.[10] Deimen and Szalay (2019) arrive at a similar conclusion when the sender has to decide on the amount of information she observes about each of two states. Our paper builds on these intuitions, introducing competition by means of transfers among agents with access to information, and allowing the decision-maker to acquire information himself.

From the point of view of the literature on the role of lobbies in policy-making, we thus allow for both quid-pro-quo and informational lobbying; see Schnakenberg and Turner (2023) for a recent survey. As we have seen, however, centralization, and in particular informational lobbying, is rather unattractive in our model with transfers and the possibility of in-house acquisition: Dessein (2002)'s result extends to larger—even arbitrary large if the sender cares sufficiently about pol-

[9]Not only are consultancy firms often willing to provide services to governments at a fee that is below market fares (aka *lowballing*, see `https://www.mediapart.fr/en/journal/france/020422/question-influence-how-consultants-mckinsey-gave-free-services-macron`, accessed December 1, 2022), they also hire policy-makers while still in office (aka *moonlighting*, see Geys and Mause, 2013; Mazzucato and Collington, 2023).

[10]See also Fischer and Stocken (2001) and Foerster (2023), who show that communication may benefit from a worse-informed sender.

icy—conflicts of interest.

A part of the literature on transfers as means to get policy influence poses that contributions can be contingent on policy platforms, (Austen-Smith, 1987; Baron, 1994; Grossman and Helpman, 1996; Bardhan and Mookherjee, 2000). Besley and Coate (2001) and Felli and Merlo (2006) study electoral competition when interest groups decide whether to lobby the elected official. Here, the policy outcome is always a compromise between the ideological identity of the elected candidate and that of lobbies. We do not consider electoral competition but study experts who possess information and may endogenously engage in lobbying.

Callander et al. (2022) show that political protection substitutes technological investment as a source of market power, such that more competition does not translate into efficiency gains but into leverage for the policy-maker to extract rents. In a similar vein, competition in our model increases transfers from interest groups to the policy-maker. This may mean harmful lobbying contributions leading to lower social welfare, but it may also mean lower prices paid for advice if policy interests are roughly aligned, leading to higher social welfare.

Competition for delegation of decision-making authority relates our work to Ambrus et al. (2021). After observing a private signal about the state, each of two biased experts proposes a decision and commits to implement it if hired. The hired expert further receives a bonus. They find that competition benefits the principal even if the second expert is more biased, because the principal can use information from both experts' private signals. Our paper differs in that experts compete à la Bertrand, including the possibility to pay contributions, and cannot commit to implement a certain policy if granted authority over the decision.

Some papers have combined the use of transfers with informative persuasion, as we do. One of the early treatments is Austen-Smith (1998), who studies lobbyists' incentives to pay for a legislator's attention to convey policy-relevant information. Because communication is strategic, like-minded lobbyists will be granted access more often and their information will be more influential; see also Cotton (2012) for a closely related approach. Bennedsen and Feldmann (2006) analyse competition among lobbies with opposite policy preferences, who can use either direct non-negative transfers or costly information to persuade a policy-maker. Krishna and Morgan (2008) study a canonical cheap-talk environment in which the receiver can commit to transfers conditional on the sender's message. They show that, although feasible, contracts inducing full revelation are never optimal.

To our knowledge, we are the first to build a general framework of Bertrand competition between experts who may either charge a fee for their services or offer contributions, while the policy-maker can commit to delegate real authority. Both transfers and expertise are thus effective means to obtain access to and influence over the policy-making process, and whether experts engage in informational or quid-pro-quo lobbying is endogenous.[11]

The rest of the paper proceeds as follows. In Section 2 we set up the baseline model. Section 3 derives the equilibria of the baseline model and asks whether society agrees with the hiring decision. In Section 4 we generalize the model to competition between a finite set of experts. Section 5 studies the special case of competition between a biased expert and an external consultant. Section 6 concludes and discusses some of our modelling assumptions.

2 Model and notation

We consider an economy populated by a continuum of citizens, an industry expert and a policy-maker. The unknown *state (of the world)* $\theta \in \Theta = [0, 1]$ is distributed according to a commonly known distribution F on Θ with continuous and strictly positive density f. The *policy-maker* P (he) has to implement a *policy* $y \in \mathbb{R}$, e.g., some environmental regulation, and can hire an *industry expert* I (she) to provide advice. P can hire I and either keep authority over y (henceforth *centralization*), or commit to delegate it to I (henceforth *delegation*).

In the first stage, I posts a menu of transfers, i.e., prices and (lobbying) contributions $(\mathbf{p}_I, \boldsymbol{\ell}_I) = \big((p_{I,C}, p_{I,D}), (\ell_{I,C}, \ell_{I,D})\big) \in \mathbb{R}^4_+$ for the job under centralization and under delegation, respectively.[12] In the second stage, P decides whether to hire I and, if he does so, whether to keep or delegate authority over y. After I has observed the state θ, she sends a *cheap-talk message* $m \in \mathbb{R}$ to P (who did not observe the state) if hired under centralization, $a = (I, C)$, and chooses the policy y herself if hired under delegation, $a = (I, D)$. If P did not hire I, $a = P$, he may *acquire information* about θ himself; the acquisition may, for instance, be done by internal staff of a governmental agency that P controls.[13]

Acquiring information about θ involves exerting effort $e \geq 0$, which has cost $c_P(e)$ and yields an unbiased noisy signal $\tilde{\theta}$ with expected residual variance $\sigma^2(e)$ about θ. We assume that $\sigma^2(e)$ and $c_P(e)$ are continuously differentiable, strictly

[11] Despite that the political access motive is dominant in lobbyists' activities (Blanes i Vidal et al., 2012), there is evidence that their expertise on specific issues is also valuable for policy-makers (Bertrand et al., 2014).

[12] According to Bombardini and Trebbi (2020), lobbying is "*the process of political influence [...] through selective communication of information and material exchange (e.g., campaign contributions or employment opportunities) with political officials*".

[13] For a short discussion of alternative ways in which P may obtain information, see Section 6.

decreasing and strictly increasing, respectively, and strictly convex in e.[14] Exerting no effort is costless but yields an uninformative signal, $c_P(0) = 0$ and $\sigma^2(0) = \text{Var}(\theta)$, with $c'_P(0) = 0 > (\sigma^2)'(0)$. In the last stage, P chooses the policy y if he did not hire I under delegation. The payoff function of a citizen j is

$$u_j(p, \ell, a, y, \theta, e) = -\gamma_j(\theta + \xi_j - y)^2 - 1_{\{a \neq P\}}(p - \alpha_0 \ell) - 1_{\{a=P\}} c_P(e), \qquad (1)$$

with $1_{\{a \neq P\}} = 1$ if I is hired and $1_{\{a \neq P\}} = 0$ otherwise. The first term of (1) represents the deviation of the implemented policy y from j's bliss point $\theta + \xi_j$, where $\gamma_j > 0$ measures the importance of the policy choice relative to money. This formulation reflects that a more strict regulation on the one hand increases j's utility, e.g., because it is associated with less negative externalities, but on the other hand comes with higher costs for regulated products. We assume that γ_j and ξ_j are taken from two independent distributions, with mean $\gamma_W > 0$ and symmetric around 0, respectively (cf. Acemoglu et al., 2013). The second term of (1) represents governmental expenses, either from hiring I or P's effort choice e, where $\alpha_0 \in (-1, 1)$ represents the extent to which citizens benefit from or are harmed by contributions, e.g., through more informative campaigns or fiscal costs of lobbying (cf. Bertrand et al., 2020), respectively. *Social welfare* (total utilitarian welfare of the citizens) then is given by

$$W(p, \ell, a, y, \theta, e) = -\gamma_W(\theta - y)^2 - 1_{\{a \neq P\}}(p - \alpha_0 \ell) - 1_{\{a=P\}} c_P(e).$$ [15]

P shares the preferences of the representative citizen except that he may put a lower or higher weight $\gamma_P > 0$ on the policy choice relative to money and benefits to a larger extent from contributions:

$$u_P(p, \ell, a, y, \theta, e) = -\gamma_P(\theta - y)^2 - 1_{\{a \neq P\}}(p - \alpha_1 \ell) - 1_{\{a=P\}} c_P(e),$$

where $\alpha_1 \in (\max\{0, \alpha_0\}, 1)$, e.g., because contributions may be viewed negatively by the public; we can thus interpret $1 - \alpha_1$ as a measure for institutional strength.

Finally, I's payoff function is

$$u_I(p, \ell, a, y, \theta, \beta_I) = -\gamma_I(\theta + \beta_I - y)^2 + 1_{\{a \neq P\}}(p - \ell),$$

[14] Our results are robust to more concrete information structures that take the form of partitions of Θ (Di Pei, 2015) or finitely many binary experiments (Argenziano et al., 2016; Foerster, 2023).

[15] Note that we omit the constant term $-\gamma_W Var(\xi)$ for ease of exposition.

with $\gamma_I > 0$ and *bias* $\beta_I \in \mathbb{R}\backslash\{0\}$, which is a constant that captures the difference in policy preference between I and the representative citizen conditional on the state θ; $\beta_I < 0$, e.g., would capture that I does not take into account negative (environmental) externalities on citizens, and hence prefers less strict regulation. Note that $\alpha_1 \in (0, 1)$ implies that contributions are inefficient in the sense that the cost to I is larger than the benefit to P.[16]

To summarize, the timing of events is as follows:

1. Nature draws the state θ.
2. I posts a menu of prices and contributions $(\mathbf{p}_I, \boldsymbol{\ell}_I)$.
3. P decides whether to hire I and, if he does so, whether to delegate authority.

4a. I observes θ and then sends a cheap-talk message m to P if hired under centralization.

4b. I observes θ and then chooses the policy y if hired under delegation.

4c. P exerts effort $e \geq 0$ to acquire information about θ if he did not hire I.

5. P chooses the policy y if he did not hire I under delegation.
6. Payoffs realize.

The solution concept we use is perfect Bayesian equilibrium in pure strategies.[17]

3 Equilibrium analysis

We proceed backwards and first consider the policy-advising stage. Second, we consider I's pricing decision and P's hiring decision.

3.1 Policy-advising stage

Suppose first that P has hired I, who is perfectly informed about θ. If P retains authority, I communicates with him via cheap talk. We know from Crawford and Sobel (1982) that equilibria are characterized by a partition of the state space Θ such that I communicates the partition element that contains the state θ. As a consequence, the expected residual variance is non-zero. We restrict attention to the equilibrium with the lowest expected residual variance, which corresponds to

[16] We consider these specific utility functions to ease the exposition, but our results hold qualitatively on a much broader class of preferences, see Section 6 for details.

[17] We will briefly discuss equilibria in mixed strategies in the general model in Section 4, where an equilibrium in pure strategies may not exist.

the partition with the largest number of elements. If P has delegated authority to I, the latter implements her bliss point, which yields zero residual variance.

Lemma 1. *Suppose that P has hired I.*

(i) Centralization yields an unbiased policy decision, i.e., $y(m^*) = E[\theta|m^*]$ upon receiving any on-equilibrium message m^*, with expected residual variance $\sigma^2_{I,C} = \sigma^2_{I,C}(\beta_I) > 0$, which is weakly increasing in $|\beta_I|$, with $\lim_{\beta_I \to 0} \sigma^2_{I,C}(\beta_I) = 0$ and $\sigma^2_{I,C}(\beta_I) = Var(\theta)$ for $|\beta_I| \geq \frac{E[\theta]}{2}$.

(ii) Delegation yields a biased policy decision $y(\theta, \beta_I) = \theta + \beta_I$ with residual variance $\sigma^2_{I,D} = 0$.

The proofs of all results are relegated to Appendix A. Details on the equilibrium under centralization can be found in the proof. Note that our analysis does not depend on the specific assumptions underlying cheap-talk communication. In particular, our results go through as long as centralization yields a decision that is unbiased from P's point of view but associated with a higher residual variance than delegation.

Second, suppose that P has not hired I. Then P will acquire information himself.

Lemma 2. *Suppose that P has not hired I. P's optimal acquisition decision $e_P = e_P(\gamma_P) > 0$ solves*

$$\max_{e \geq 0} -\gamma_P \sigma^2(e) - c_P(e).$$

The residual variance (of P) $\sigma^2_P = \sigma^2(e_P(\gamma_P))$ is strictly decreasing in γ_P, with $\lim_{\gamma_P \to 0} \sigma^2(e_P(\gamma_P)) = Var(\theta)$.

3.2 Allocation of authority and price competition

Having determined behavior in the policy-advising stage in Section 3.1, we now turn to the allocation of authority. Given a menu of posted transfers $(\mathbf{p}_I, \boldsymbol{\ell}_I)$, P will decide whether to hire I and allocate authority according to:

$$\max_{a \in \{P, (I,C), (I,D)\}} -\gamma_P \left(\sigma^2_a + 1_{\{a=(I,D)\}} \beta^2_I\right) - 1_{\{a \neq P\}} \left(p_a - \alpha_1 \ell_a\right) - 1_{\{a=P\}} c_P(e_P).$$

Finally, we turn to the price-setting stage and characterize equilibria. Fix in-house acquisition by P as the status quo. Then the (expected) *net benefit* (i.e., excluding transfers) V^a_i of $i = P, I$ from hiring decision $a \in \{(I,C),(I,D)\}$ relative to in-house acquisition is given by Lemma 1 and 2:

Remark 1. *$V_i^{I,C} = \gamma_i(\sigma_P^2 - \sigma_{I,C}^2) + 1_{\{i=P\}}c_P(e_P)$ and $V_i^{I,D} = \gamma_i(\sigma_P^2 + \beta_I^2) + 1_{\{i=P\}}(c_P(e_P) - 2\gamma_P\beta_I^2)$ for $i = P, I$. In particular, (i) $V_I^{I,D} > 0$ and (ii) $V_P^{I,C} \leq 0$ implies $V_I^{I,C} < 0$.*

Observe that $V_I^{I,D} > 0$ obtains because I benefits twofold from delegation: she is better informed than P and can take a decision in line with her preferences. Second, $V_P^{I,C} \leq 0$ implies $\sigma_{I,C}^2 > \sigma_P^2$, i.e., centralization is less informative than in-house acquisition. But in this case also $V_I^{I,C} < 0$ because I does not benefit from P's saving of acquisition costs.

We next determine the equilibrium transfers posted by I. Since contributions are inefficient ($\alpha_1 \in (0,1)$), I will either charge P a price or offer him a contribution in equilibrium. We can hence restrict attention to the *net transfer* $\mathbf{t}_I \equiv \mathbf{p}_I - \boldsymbol{\ell}_I$ from P to I. To ease the exposition, we further define

$$\tilde{\alpha}_1(V) = \begin{cases} V, & \text{if } V \geq 0 \\ \alpha_1^{-1}V, & \text{if } V < 0 \end{cases}.$$

Lemma 3. *In any equilibrium in which P hires I under centralization we have $t_{I,C}^* = V_P^{I,C} > 0$, and under delegation we have $t_{I,D}^* = \tilde{\alpha}_1(V_P^{I,D}) \geq -V_I^{I,D}$.*

First, Lemma 3 shows that, when hired, I completely extracts P's net benefit, if any, from hiring her.[18] Second, I never offers P contributions to be hired under centralization, i.e., informational lobbying does not occur in equilibrium. To see why, note that a contribution would be required in order for I to be hired only in case P suffers a net loss from hiring her. Under centralization, such a loss implies that I suffers a net loss from being hired as well because she does not benefit from P's saving of acquisition costs (Remark 1), and, therefore, is not willing to pay a contribution. Note, however, that this result hinges on in-house acquisition being the best alternative for P, which might not be the case any more once there is competition from other experts (cf. Section 4).

Third, under delegation I may pay a contribution to compensate P for a net loss, and thus engage in quid-pro-quo lobbying. I benefits from taking a decision that is both based on perfect information and in line with her preferences, and thus obtains a net benefit $V_I^{I,D} > 0$ (Remark 1). If that leads to a net loss for P, I is willing to compensate P if her benefit is (weakly) larger than the contribution that compensates his loss, $-\tilde{\alpha}_1(V_P^{I,D})$. Note that $\tilde{\alpha}_1(\cdot)$ increases the size of a contribution to account for its inefficiency.

[18] Note that I can completely extract P's net benefit because she sets the menu of transfers. We discuss alternatives to this approach in Section 6.

Finally, since I will completely extract P's net benefit from hiring her and transfers affect the aggregate payoff only insofar as they lead to inefficiencies, we obtain the following *aggregate benefit* $\overline{V}^a$ of the involved parties from hiring decision $a \in \{(I,C),(I,D)\}$ (relative to in-house acquisition):

Remark 2. $\overline{V}^a = \tilde{\alpha}_1(V_P^a) + V_I^a$ *for* $a \in \{(I,C),(I,D)\}$.

To ease the exposition, we henceforth ignore knife-edge cases in which P is indifferent between different hiring decisions. Since, by Lemma 3, I completely extracts P's net benefit when being hired, her payoff in this case equals the respective aggregate benefit. Thus, I will set transfers such that P's equilibrium hiring decision maximizes the aggregate payoff:

Proposition 1. *Any equilibrium is such that*

(i) *P hires I under centralization at transfer* $t^*_{I,C} = V_P^{I,C} > 0$ *if* $\overline{V}^{I,C} \geq \max\left\{0, \overline{V}^{I,D}\right\}$,

(ii) *P hires I under delegation at transfer* $t^*_{I,D} = \tilde{\alpha}_1(V_P^{I,D}) > -V_I^{I,D}$ *if* $\overline{V}^{I,D} > \max\left\{0, \overline{V}^{I,C}\right\}$,

(iii) *P does not hire I and acquires information in-house otherwise.*

All equilibria are payoff-equivalent.

Proposition 1 establishes that I is hired as an advisor (at a fee) if centralization maximizes the aggregate payoff. If, instead, delegation maximizes the aggregate payoff, then I charges a fee if hiring her yields a net benefit for P ($V_P^{I,D} \geq 0$) and pays contributions to compensate him for the net loss otherwise. Finally, if neither of the two maximizes the aggregate payoff, then P acquires information in-house.

We next investigate the prevalence of the different hiring decisions. We know from Dessein (2002) that even in absence of transfers P prefers delegation to centralization if uncertainty about the environment is large enough relative to the conflict of interest, as then communication would not be particularly effective. In our setting with transfers and the possibility to let P acquire information in-house, we obtain a stronger result:

Corollary 1. *Suppose that F is such that informative communication, i.e.,* $\sigma^2_{I,C}(\beta_I) < Var(\theta)$, *implies*

$$\sigma^2_{I,C}(\beta_I) > \frac{\alpha_1^{-1}\gamma_P - \gamma_I}{\alpha_1^{-1}\gamma_P + \gamma_I}\beta_I^2. \tag{2}$$

Then $\max\left\{0, \overline{V}^{I,D}\right\} > \overline{V}^{I,C}$. *In particular:*

(i) If $V_P^{I,D} \geq 0$*, then any equilibrium is such that P hires I under delegation at transfer* $t^*_{I,D} = V_P^{I,D} \geq 0$.

(ii) If $V_P^{I,D} < 0$*, then any equilibrium is such that P hires I under delegation at transfer* $t^*_{I,D} = \alpha_1^{-1} V_P^{I,D} \in [-V_I^{I,D}, 0)$ *if* $\overline{V}^{I,D} \geq 0$*. Otherwise, he does not hire I and acquires information in-house.*

All equilibria are payoff-equivalent.

Thus, centralization does not occur in equilibrium if uncertainty about the environment is large enough (condition (2)). In particular, (2) holds for virtually any prior distribution unless I cares much less about policy than P or α_1 is small. Furthermore, it is weaker than the condition in Dessein (2002), who obtains $\sigma^2_{I,C}(\beta_I) > \beta_I^2$. The following example illustrates the equilibria in Corollary 1 for the uniform distribution, which satisfies (2) regardless of preferences (as $\sigma^2_{I,C}(\beta_I) > \beta_I^2$). It shows that (quid-pro-quo) lobbying arises when policy preferences differ substantially *and* I cares sufficiently about the policy.

Example 1. *Suppose that* $F = \mathcal{U}(0,1)$, $\gamma_P = 1$, $\alpha_1 = \frac{2}{3}$, $\sigma^2(e) = \frac{1}{12(1+e)}$*, and* $c_P(e) = \frac{1}{2}e^2$*. Figure 1 illustrates the optimal hiring decision depending on* γ_I *and* $|\beta_I|$*. I gets the decision delegated at a positive price if the conflict of interest is small. Otherwise, I pays contributions to P to get the decision delegated if she cares sufficiently about the policy relative to the contribution, which is increasing in the size of her bias.*

Finally, recall that in equilibrium I completely extracts P's net benefit from hiring her (Lemma 3). Therefore, P's equilibrium utility is equal to that under in-house acquisition, $-\gamma_P \sigma_P^2 - c_P(e_P)$, regardless of the hiring decision, which yields the following result:

Corollary 2. *P's equilibrium payoff is strictly increasing in in-house expertise as measured by the decision precision* σ_P^{-2}.

Thus, P benefits from the availability of in-house expertise even in case he delegates the decision, because it reduces I's informational advantage, strengthening P's bargaining position vis-à-vis I.

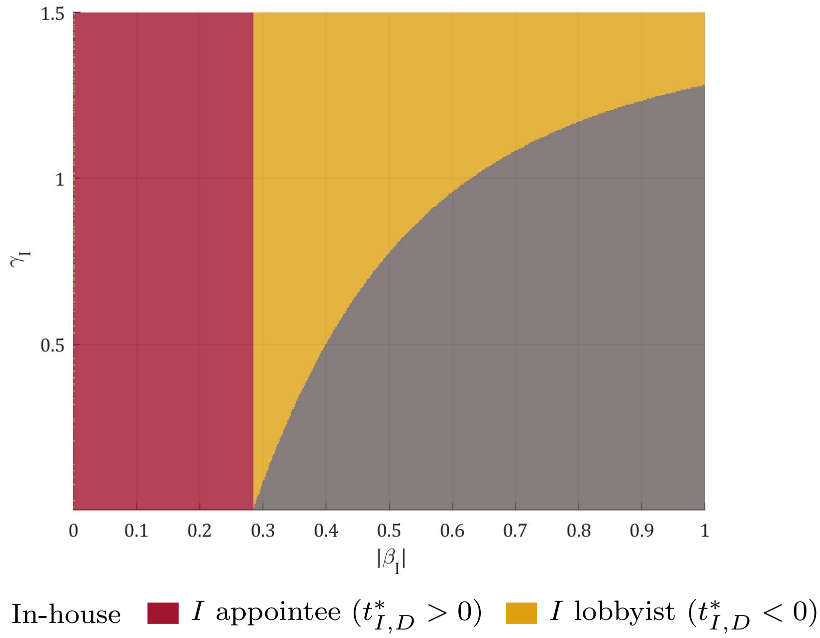

Figure 1: Optimal hiring decision depending on γ_I and $|\beta_I|$ in Example 1.

3.3 Social welfare

We now ask whether society agrees with P's hiring decision, in order to understand in which cases we can expect public pressure to correct such decision. Recall that society may put a lower or higher weight $\gamma_W > 0$ on policy relative to money and derives lower benefits (or even losses) from contributions. The net benefit for society from hiring I under delegation and centralization relative to in-house acquisition thus is $V_W^{I,D} = \gamma_W(\sigma_P^2 - \beta_I^2) + c_P(e_P)$ and $V_W^{I,C} = \gamma_W(\sigma_P^2 - \sigma_{I,C}^2) + c_P(e_P)$, respectively.

Given posted net transfers $\mathbf{t}_I$, society's optimal hiring decision solves

$$\max_{a \in \{P,(I,C),(I,D)\}} -\gamma_W \left(\sigma_a^2 + 1_{\{a=(I,D)\}}\beta_I^2\right) - 1_{\{a \neq P\}} \max\{t_a, \alpha_0 t_a\} - 1_{\{a=P\}} c_P(e_P). \tag{3}$$

Definition 1. *Society* (dis)agrees with *hiring decision $a \in \{(I,C),(I,D)\}$ at transfer t_a if it prefers (does not prefer) a to $a' = P$ according to* (3).

Note first that society disagrees with hiring decision $a \in \{(I,C),(I,D)\}$ at transfer t_a if and only if $V_W^a < \max\{t_a, \alpha_0 t_a\}$. Thus, at equilibrium (Proposition 1), society disagrees with hiring decision $a \in \{(I,C),(I,D)\}$ if and only if

$V_W^a < \max\{V_P^a, \alpha_0/\alpha_1 V_P^a\}$; note that $\alpha_0/\alpha_1 < 1$. It follows immediately from Remark 1 that society disagrees with P's hiring decision if it yields a better policy, $V_W^a > c_P(e_P)$, but policy is less important to society than to P, and vice versa. Furthermore, if policy is equally important to society and to P, then society disagreeing with P's hiring decision requires I to pay contributions in order to get the decision delegated ($V_W^{(I,D)} = V_P^{(I,D)} < \max\{V_P^{(I,D)}, \alpha_0/\alpha_1 V_P^{(I,D)}\} \Leftrightarrow V_P^{(I,D)} < 0$).

Proposition 2. *Society disagrees with equilibrium hiring decision* $a \in \{(I,C),(I,D)\}$ *if either*

(i) $V_W^a > c_P(e_P)$ *and* $\gamma_W < \gamma_P$,

(ii) $V_W^a < c_P(e_P)$ *and* $\gamma_W > \gamma_P$, *or*

(iii) $a = (I,D)$ *with* $V_W^{(I,D)} < 0$ *and* $\gamma_W = \gamma_P$.

Note that $V_W^a > c_P(e_P)$ implies that hiring decision a not only saves the acquisition costs but also yields a better policy, i.e., $\beta_I^2 < \sigma_P^2$ under delegation and $\sigma_{I,C}^2 < \sigma_P^2$ under centralization, which requires interests between P and I being well aligned. Thus, hiring like-minded experts on issues that are more important to P than to society causes disagreement—P pays 'too much' for good advice from society's point of view.

4 A general model of policy-advising competition

So far we have assumed that P acquires information himself (through internal staff) if he decides not to hire I. We now introduce competition between a finite set of experts $i \in \mathcal{I}$, i.e., $\#\mathcal{I} \geq 0$. We abstract from the specific modelling assumptions underlying the analysis in Section 3 and further consider a unique mode of hiring (e.g., delegation) for each expert.

The game otherwise proceeds as before. In the first stage, all experts $i \in \mathcal{I}$ simultaneously post their transfers $(p_i, \ell_i)_{i\in\mathcal{I}}$. In the second stage, P decides whether to hire one of the experts or to acquire information himself, $a \in \mathcal{I} \cup \{P\}$.[19] Hiring decision a yields the (expected) net benefit V_i^a to agent $i \in \mathcal{I} \cup \{P\}$ relative to in-house acquisition.

Some remarks seem in order. First, by definition $V_i^P = 0$ for all $i \in \mathcal{I} \cup \{P\}$. Second, we can think of the net benefits as capturing (dis)advantages of a hiring decision related to information, including its costs, and the allocation of authority

[19] We abstract from the possibility that P may rely on in-house acquisition in addition to hiring an expert or hire multiple experts, see Section 6 for a short discussion.

similarly to the baseline model. Furthermore, V_i^i could capture some (present or future) private rents i expects to obtain from being hired. An example of this can be found in our characterization of the external consultant's preferences in Section 5. Third, we generalize the setup to multiple modes of hiring in Appendix B.

4.1 Equilibrium analysis

Given transfers $(p_i, \ell_i)_{i \in \mathcal{I}}$, P will decide whether to hire one of the experts according to:

$$\max_{a \in \mathcal{I} \cup \{P\}} 1_{\{a \neq P\}} \left(V_P^a - p_a + \alpha_1 \ell_a \right).$$

We then turn to the price-setting stage. Let $t_i \equiv p_i - \ell_i$ denote the net transfer from P to $i \in \mathcal{I}$. If P's best alternative to hiring i, i.e., $a = i$, is hiring decision $a' \in \mathcal{I} \cup \{P\}$, $a' \neq a$, then $t_i = V_i^{a'} - V_i^i$ is the lowest incentive-compatible transfer for i. Therefore, P's gross benefit from hiring decision $a \in \mathcal{I}$ relative to in-house acquisition given that his best alternative is $a' \in \mathcal{I} \cup \{P\}$, $a' \neq a$, is at most

$$\widetilde{V}_P^{a,a'} \equiv V_P^a + 1_{\{a \neq P\}} \min\{\alpha_1 (V_a^a - V_a^{a'}), V_a^a - V_a^{a'}\}.$$

Note that by definition, $\widetilde{V}^{P,a'} = 0$ for all $a, a' \in \mathcal{I}$. For any $a \in \mathcal{I} \cup \{P\}$, the *set of best alternatives* to a is given by

$$\mathcal{B}(a) \equiv \underset{a' \in \mathcal{I} \cup \{P\} : a' \neq a}{\operatorname{argmax}} \widetilde{V}_P^{a',a}.$$

Incentive compatibility then requires that P's hiring decision yields a larger gross benefit than any of his best alternatives is willing to provide:

Theorem 1. *Any equilibrium is such that P's hiring decision a^* satisfies*

$$\widetilde{V}_P^{a^*,a'} \geq \widetilde{V}_P^{a',a^*} \text{ for all } a' \in \mathcal{B}(a^*).$$

If $a^* \in \mathcal{I}$, then $t_{a^*}^* = \tilde{\alpha}_1 \big(V_P^{a^*} - \max_{a' \in \mathcal{I} \cup \{P\} : a' \neq a^*} \widetilde{V}_P^{a',a^*} \big)$. In particular, there exists either an equilibrium or $a' \in \mathcal{B}(a)$ such that $\widetilde{V}_P^{a',a} > \widetilde{V}_P^{a,a'}$ for all $a \in \mathcal{I} \cup \{P\}$.

Note that if P hires an expert, then she will charge a positive price if the net benefit from hiring her exceeds the largest gross benefit that the best alternative is willing to provide. Otherwise, the expert will pay a contribution in order to be hired. Note that the transfer is chosen such that P's gross benefit from hiring the expert matches the largest possible gross benefit from the best alternative.

An equilibrium (in pure strategies) may fail to exist due to the externalities from P's hiring decision on other experts. Therefore:

Remark 3. *There exists an equilibrium if* $|\mathcal{I}| \in \{0, 1\}$.

The following example illustrates that competition between two experts may already result in non-existence of equilibria (in pure strategies). We can then nevertheless construct equilibria which involve P randomizing her hiring decision.

Example 2. *Suppose that* $\mathcal{I} = \{I, J\}$.

(i) If $\widetilde{V}_P^{I,J} > \widetilde{V}_P^{I,P} > 0 > \widetilde{V}_P^{J,I}$, *then any equilibrium is such that* $a^* = I$.

(ii) If $\widetilde{V}_P^{I,J} > \widetilde{V}_P^{J,P} > 0 > \widetilde{V}_P^{I,P} > \widetilde{V}_P^{J,I}$, *then there does not exist an equilibrium (in pure strategies), as for any hiring decision there is a better alternative* ($P \to J \to I \to P$)*. Note, however, that there is an equilibrium in which* P *chooses a mixed hiring strategy* $a^* \in \Delta(\mathcal{I} \cup \{P\})$.[20]

Finally, we show that with two experts an equilibrium exists and takes a rather simple form if one hiring decision is dominated in the sense that another hiring decision yields a larger gross benefit regardless of the alternative.

Corollary 3. *Suppose that* $|\mathcal{I}| = 2$ *and that there exist* $a, a' \in \mathcal{I} \cup \{P\}$ *such that* $\min_{a'' \in \mathcal{I} \cup \{P\}} \widetilde{V}_P^{a,a''} > \max_{a'' \in \mathcal{I} \cup \{P\}} \widetilde{V}_P^{a',a''}$. *Then there exists an equilibrium in which* P*'s hiring decision* $a^* \in \mathcal{I} \cup \{P\} \backslash \{a'\}$ *satisfies*

$$\widetilde{V}_P^{a^*,a^\dagger} \geq \widetilde{V}_P^{a^\dagger,a^*}, \text{ where } a^\dagger \in \mathcal{I} \cup \{P\} \backslash \{a^*, a'\}. \tag{4}$$

All equilibria are payoff-equivalent.

As we will see in the next section, Corollary 3 will be useful when considering competition between a biased expert as in the baseline model and an external consultant, whose utility does not depend on the alternative.

[20] Take for simplicity $\alpha_1 = 1$. Then there is an equilibrium in which each expert $i \in \mathcal{I}$ chooses $t_i^* = V_P^i$ and P chooses a mixed hiring strategy $a^* \in \Delta(\mathcal{I} \cup \{P\})$ such that

$$a^*(I) \geq \frac{\widetilde{V}_P^{J,P}}{V_J^I} \in (0,1) \text{ and } 0 < a^*(J) \leq (1 - a^*(I)) \frac{\widetilde{V}_P^{I,P}}{V_I^J} \in (0,1).$$

4.2 Comparative statics on the outside option

We now ask how changes in P's outside option affect transfers. It follows immediately from Theorem 1 that increasing P's outside option to a given hiring decision $a^* \in \mathcal{I}$, i.e., increasing $\max_{a' \in \mathcal{I} \cup \{P\}: a' \neq a^*} \widetilde{V}_P^{a',a^*}$, strictly decreases his transfer.

Corollary 4. *Consider an equilibrium in which P's hiring decision $a^* \in \mathcal{I}$ satisfies*

$$\widetilde{V}_P^{a^*,a'} > \widetilde{V}_P^{a',a^*} \text{ for all } a' \in \mathcal{B}(a^*).$$

Then increasing $\max_{a' \in \mathcal{I} \cup \{P\}: a' \neq a^*} \widetilde{V}_P^{a',a^*}$ *strictly decreases* $t^*_{a^*}$.

It follows that lobbying may occur *because of* increased competition:

Example 3. *Suppose that $\mathcal{I} = \{I, J\}$ and*

$$\widetilde{V}_P^{I,J} > \widetilde{V}_P^{I,P} > \max\{V_P^I, \widetilde{V}_P^{J,I}\} \geq \min\{V_P^I, \widetilde{V}_P^{J,I}\} > 0,$$

such that any equilibrium is such that $a^* = I$, with P's outside option being $\widetilde{V}_P^{J,I}$. Then $t^*_I > 0$ if $V_P^I > \widetilde{V}_P^{J,I}$ and $t^*_I < 0$ if $\widetilde{V}_P^{J,I} > V_P^I$.

Note that in general P's outside option may not only increase due to some of the experts becoming more competitive, but also due to the entry of additional experts. To avoid equilibrium selection problems, we relegate the analysis of market entry to the more specific setting of the next section, where the hiring decision will be unique both before and after entry of the external consultant.

5 Competition between experts with different motives

We now apply our general model to study competition between experts with different motives: An informed but biased industry expert I as in the baseline model and an *external consultant* E (she) who is not directly policy-motivated. Instead, she cares about giving good advice, and thus about policy only insofar as she is being hired, e.g., due to reputational or career concerns, or simply intrinsic motivation. The purpose of this exercise is twofold: To illustrate the richness of our framework regarding players' preferences and information structures, and to evaluate the behavioral and welfare consequences of a salient but understudied phenomenon.

E being concerned with giving good advice implies that, conditional on being hired, her preferences are aligned with those of P. We can hence assume without loss of generality that P hires E under centralization. Regarding I, we also restrict attention to one mode of hiring, namely delegation. We do so in light of results from the baseline model in Section 3 and because it will allow us to apply the general model in Section 4. Note, however, that the main result in this section can be readily generalized to multiple modes of hiring by applying Theorem 2 in Appendix B.

Similarly to before, all experts $i \in \mathcal{I} = \{I, E\}$ simultaneously post their transfers $(p_i, \ell_i)_{i \in \mathcal{I}}$, upon which P takes her hiring decision $a \in \mathcal{I} \cup \{P\}$. If P hires I or does not hire any expert, the game proceeds as described in Section 2 (except that we exclude centralization). If P hires E, the latter does not observe the state but may acquire information about it. Acquiring the unbiased signal $\tilde{\theta}$ with expected residual variance $\sigma^2(e)$ about θ requires effort $e \geq 0$ at cost $c_E(e)$, where $\sigma^2(e)$ is as described in Section 2 and $c_E(e)$ is strictly increasing and strictly convex in e, with $c_E(0) \geq 0$ to reflect potential opportunity costs.

E's payoff function is

$$u_E(p, \ell, a, y, e, \theta) = 1_{\{a=E\}} \cdot \big(-\gamma_E(\theta - y)^2 + \bar{u}_E + p - \ell - c_E(e)\big), \tag{5}$$

with $\gamma_E > 0$ and $\bar{u}_E \geq 0$. The first two terms of (5) represent E's desire to give good advice and positive externalities from being hired on other related projects, respectively, and can be viewed as a proxy for expected future profits. Note in particular that the payoff from decision y in state θ is increasing in the decision precision. We view this (arguably simple) modelling approach as a reduced-form version of the typical treatment of career-concerns with uncertainty regarding the expert's ability (e.g., Holmström, 1999; Morris, 2001; Gentzkow and Shapiro, 2006; Ottaviani and Sørensen, 2006; Foerster and van der Weele, 2021). As we will see, the essential feature of these preferences is that E does not care about policy directly.[21]

Social welfare and P's payoff function remain as described in Section 2, while I's payoff function is

$$u_I(p, \ell, a, y, \theta, \beta_I) = -\gamma_I(\theta + \beta_I - y)^2 + 1_{\{a=I\}}(p - \ell)$$

to account for the presence of E.

[21] In particular, this feature would remain with a richer modelling approach in which the external consultant faces uncertainty regarding her own ability and benefits from being perceived as a high-ability type, see our previous working paper version (Foerster and Habermacher, 2023).

5.1 Equilibrium analysis

As in the baseline model, we first consider the policy-advising stage. If P either has hired I or did not hire any expert, the behavior is as described in Section 3.1. If P has hired E, the latter will first exert effort and then communicate with P via cheap talk. As in the baseline model, we restrict attention to the equilibrium with the lowest expected residual variance. Since her payoff is increasing in the decision precision, truthful communication is an equilibrium. In turn, her information acquisition decision obtains by substituting E for P in Lemma 2:

Lemma 4. *Suppose that P has hired E. E's optimal acquisition decision solves*

$$e_E = e_E(\gamma_E) = \underset{e\geq 0}{\text{argmax}} -\gamma_E \sigma^2(e) - c_E(e).$$

E then reports her signal $\tilde{\theta}$ truthfully, $m^*(\tilde{\theta}) = \tilde{\theta}$, which yields an unbiased policy decision $y(m^*) = m^*$ with residual variance $\sigma_E^2 = \sigma^2(e_E(\gamma_E))$, which is strictly decreasing in γ_E, with $\lim_{\gamma_E \to 0} \sigma^2(e_E(\gamma_E)) = Var(\theta)$.

Next, note that the (expected) net benefits of the agents from hiring decision $a = I$ and $a = E$ are given by Remark 1 and Lemma 2 and 4, respectively:

Remark 4. *(i) $V_P^I = \gamma_P(\sigma_P^2 - \beta_I^2) + c_P(e_P)$, $V_I^I = \gamma_I(\sigma_P^2 + \beta_I^2) > 0$, and $V_E^I = 0$,*

(ii) $V_i^E = \gamma_i(\sigma_P^2 - \sigma_E^2) + 1_{\{i=P\}} c_P(e_P)$ for $i = P, I$ and $V_E^E = -\gamma_E \sigma_E^2 + \bar{u}_E - c_E(e_E)$. In particular, (iii) $\widetilde{V}_P^{I,E} > V_P^I$ and (iv)

$$\widetilde{V}_P^{E,a'} = V_P^E + \min\{\alpha_1 V_E^E, V_E^E\} \equiv \widetilde{V}_P^E \text{ for all } a' \in \mathcal{I} \cup \{P\},\ a' \neq a.$$

Similarly to the baseline model, I's willingness to pay a contribution to prevent P from hiring E, i.e. $\widetilde{V}_P^{I,E} > V_P^I$, obtains because her benefits from being hired (under delegation) are twofold: she is better informed than E and can take a decision in line with her preferences. Second, the upper bound on P's gross benefit from hiring E, $\widetilde{V}_P^E$, is independent of his best alternative. Recall further from Section 4 that, by definition, $\widetilde{V}^{P,a'} = 0$ for all $a' \in \mathcal{I}$. Hence, either in-house acquisition dominates hiring E or vice versa, such that Corollary 3 applies.

Remark 5. *Suppose that $\mathcal{I} = \{I, E\}$. If $\widetilde{V}_P^E < 0$, then E is not being hired in equilibrium, such that Corollary 1 obtains.*[22]

[22] Formally, Corollary 3 implies in this case that hiring I is an equilibrium if $\widetilde{V}_P^{I,P} \geq 0 \Leftrightarrow \tilde{\alpha}_1(V_P^I) + V_I^I \geq 0$ and in-house acquisition is an equilibrium otherwise.

If $\widetilde{V}_P^E > 0$, however, Corollary 3 implies that P's hiring decision depends on which expert is willing to provide a larger gross benefit:

Proposition 3. *Suppose that $\mathcal{I} = \{I, E\}$ and $\widetilde{V}_P^E > 0$. Any equilibrium is such that*

(i) P hires I at transfer $t_I^* = \tilde{\alpha}_1\big(V_P^I - \widetilde{V}_P^E\big)$ if $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E$.

(ii) P hires E at transfer $t_E^* = \tilde{\alpha}_1\big(V_P^E - \max\big\{\widetilde{V}_P^{I,E}, 0\big\}\big)$ if $\widetilde{V}_P^{I,E} < \widetilde{V}_P^E$.

All equilibria are payoff-equivalent.

Note first that P does not acquire information himself in equilibrium since $\widetilde{V}_P^E > 0$. Second, $\widetilde{V}_P^{I,E} < \widetilde{V}_P^E$ means that I does not care much about the policy, and thus it is more likely that P hires E on issues I deems not important. Third, Proposition 3 holds regardless of E's preferences as long as the upper bound on P's gross benefit from hiring her is independent of P's best alternative, e.g., because E does not care about policy directly. We next extend Example 1 to E.

Example 4. *Suppose that $\mathcal{I} = \{I, E\}$, $F = \mathcal{U}(0, 1)$, $\gamma_P = \gamma_E = 1$, $\alpha_1 = \frac{2}{3}$, $\sigma^2(e) = \frac{1}{12(1+e)}$, $c_P(e) = c_E(e) = \frac{1}{2}e^2$. Figure 4 illustrates the optimal hiring decision depending on γ_I and $|\beta_I|$, for a low and a high level of externalities $\bar{u}_E$. First, note that P now hires E on the parameter range where he acquired information in-house in Example 1. Second, stronger competition means that I is hired on a smaller parameter range. Third, the parameter range on which E pays contributions is increasing in the size of the externalities. In particular, when externalities are large enough, the presence of E precludes the possibility of I being hired as appointee.*

5.2 The effect of competition on prices and the hiring decision

In this section, we ask how market entry of E affects prices and P's hiring decision. We continue to restrict attention to delegation in case of expert I. It is worth to point out that $\widetilde{V}_P^{I,P} \geq 0 \Leftrightarrow \overline{V}^I = \tilde{\alpha}_1(V_P^I) + V_I^I \geq 0$, i.e., P's hiring decision in the baseline model (without centralization) is determined by the gross benefit that I is willing to provide.

It follows from Corollary 4 that introducing E may decrease P's transfer to I, if it increases his outside option. Moreover, lobbying may occur because of competition with E: Suppose that $V_P^I \geq 0$, such that in the baseline model, I charges a positive price (Corollary 1 (i)). A careful inspection of Proposition 3 (i), then, reveals that competition not only drives down the price but may even force I to turn into a lobbyist if P's net benefit from hiring her is below the largest

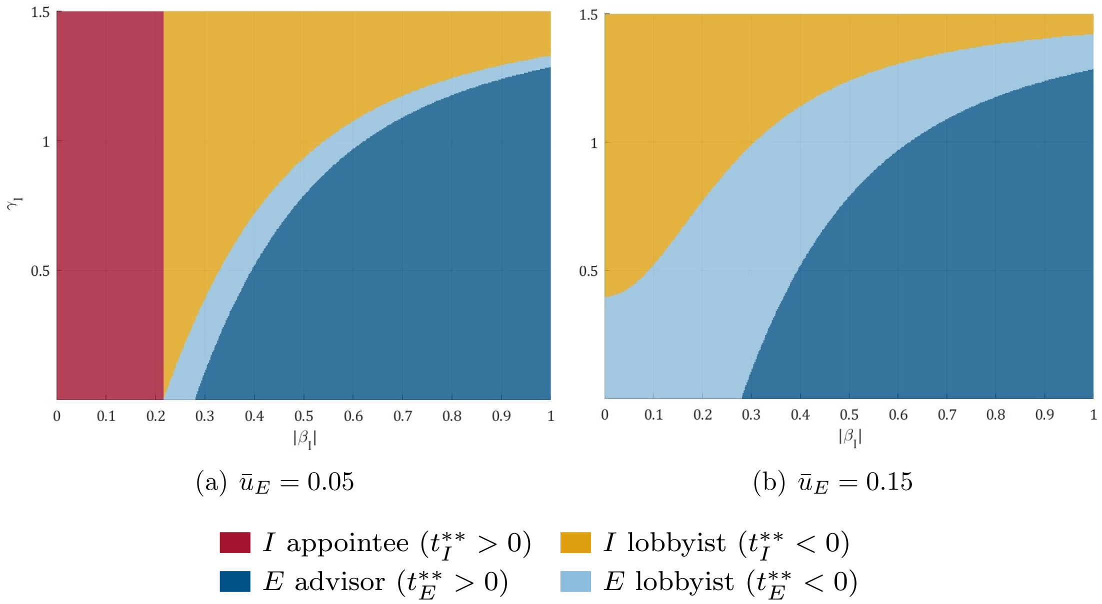

Figure 2: Optimal hiring decision depending on γ_I and $|\beta_I|$ for $\bar{u}_E = 0.05$ and $\bar{u}_E = 0.15$ in Example 4.

gross benefit that E is willing to provide, $V_P^I < \widetilde{V}_P^E$. Finally, if the gross benefit I is willing to provide is below that of E, then competition drives I out of business.

Corollary 5. *Suppose that $\mathcal{I} = \{I\}$ and $V_P^I \geq 0$, such that P hires I at transfer $t_I^* = V_P^I \geq 0$. After introducing E,*

(i) P hires I at transfer $t_I^{**} = \tilde{\alpha}_1\big(V_P^I - \max\big\{\widetilde{V}_P^E, 0\big\}\big) \leq t_I^*$ if $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E$. In particular, $t_I^{**} < 0$ if $V_P^I < \widetilde{V}_P^E$.

(ii) P hires E if $\widetilde{V}_P^{I,E} < \widetilde{V}_P^E$.

Note that in-house acquisition is excluded in Corollary 5 even if $\widetilde{V}_P^E < 0$, since $V_P^I \geq 0$ implies $\widetilde{V}_P^{I,P} > 0$ by Remark 1, i.e., P would hire I in this case.

Finally, suppose that $\widetilde{V}_P^{I,P} < 0$, such that in the baseline model, P acquires information in-house. A careful inspection of Proposition 3 (i), then, reveals that competition may force I to offer P a contribution in order to avoid that the latter hires E, which would lead to a worse decision as compared to in-house acquisition.

Corollary 6. *Suppose that $\mathcal{I} = \{I\}$ and $\widetilde{V}_P^{I,P} < 0$, such that P acquires information in-house. After introducing E,*

(i) P acquires information in-house if $\widetilde{V}_P^E < 0$,

(ii) P hires I at transfer $t_I^{**} = \tilde{\alpha}_1\big(V_P^I - \widetilde{V}_P^E\big) < 0$ *if* $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E > 0$*, and*

(iii) P hires E otherwise.

Competition from E leads to hiring I because she is willing to provide a larger gross benefit than E. This situation requires that E takes worse decisions than P would have, $\sigma_E^2 > \sigma_P^2$,[23] but E is still competitive because of the externalities she would experience if hired.

5.3 Social welfare

Finally, we investigate whether the availability of a competitive external consultant, $\widetilde{V}_P^E > 0$, is beneficial to society. Note that the net benefit for society from hiring E relative to in-house acquisition is $V_W^E = \gamma_W(\sigma_P^2 - \sigma_E^2) + c_P(e_P)$. Recall from Section 5.2 that in the baseline model (without centralization), P hires I, at transfer $t_I^* = \tilde{\alpha}_1(V_P^I)$, if and only if

$$\widetilde{V}_P^{I,P} \geq 0. \tag{6}$$

After introducing E, P hires I, at transfer $t_I^{**} = \tilde{\alpha}_1\big(V_P^I - \widetilde{V}_P^E\big)$, if

$$\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E \tag{7}$$

and E, at transfer $t_E^{**} = \tilde{\alpha}_1\big(V_P^E - \max\big\{\widetilde{V}_P^{I,E}, 0\big\}\big)$, otherwise. We proceed by case distinction with respect to (6) and (7). We find that introducing the external consultant may not only lead to a better hiring decision for society but also increase social welfare due to a lower price of advice from I.

Proposition 4. *Suppose that* $\widetilde{V}_P^E > 0$*. Social welfare is higher after introducing E to the baseline model (without centralization) if and only if either*

(i) $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E$ *and*

- *(a)* $\widetilde{V}_P^{I,P} \geq 0$ *and* $\max\{t_I^*, \alpha_0 t_I^*\} > \max\{t_I^{**}, \alpha_0 t_I^{**}\}$ *or*
- *(b)* $\widetilde{V}_P^{I,P} < 0$ *and* $V_W^I > \alpha_0 t_I^{**}$*, or*

(ii) $\widetilde{V}_P^{I,E} < \widetilde{V}_P^E$ *and*

- *(a)* $\widetilde{V}_P^{I,P} \geq 0$ *and* $V_W^E - \max\{t_E^{**}, \alpha_0 t_E^{**}\} > V_W^I - \max\{t_I^*, \alpha_0 t_I^*\}$ *or*
- *(b)* $\widetilde{V}_P^{I,P} < 0$ *and* $V_W^E > \max\{t_E^{**}, \alpha_0 t_E^{**}\}$.

[23] To see this, note that in this case $\widetilde{V}_P^{I,E} > 0 \Leftrightarrow \widetilde{V}_P^{I,P} > \alpha_1\gamma_I(\sigma_P^2 - \sigma_E^2)$.

Note that Proposition 4 holds regardless of E's preferences as long as the upper bound on P's gross benefit from hiring her is independent of P's best alternative. First, if P hires I before and after introducing E (part (i, a)), then the policy remains the same but P's transfer will be lower due to his improved bargaining position (cf. Corollary 5). Society thus benefits from the lower price of advice unless I pays lobbying contributions in a context where they are harmful to society ($\alpha_0 < 0$). The following result describes the latter situation.

Corollary 7. *Suppose that $\widetilde{V}_P^E \geq V_P^I > 0$, such that P hires I at transfer $t_I^* > 0$ when $\mathcal{I} = \{I\}$. Social welfare is lower after introducing E if $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E$ and $\alpha_0 < \frac{t_I^*}{t_I^{**}}$. In other words, I cares sufficiently about policy*[24] *such that she is willing to pay a contribution, $t_I^{**} < 0$, which is sufficiently harmful.*

Second, part (i, b) describes the case where P does not hire I in the baseline model but does so under competition from E. Here, I offers P a contribution $t_I^{**} < 0$ to prevent him from hiring an E who would provide poor advice.[25] Society thus benefits if hiring I yields a sufficiently high net benefit despite the worse policy ($V_W^I > \alpha_0 t_I^{**}$ despite $V_P^I < 0$). This requires that society cares little about the policy, such that cost savings from not acquiring information in-house and I's contribution outweigh the worse policy.[26] In turn, if policy is sufficiently important to society then welfare losses will occur in this case.

Similarly, if competition induces P to hire E (part (ii)), then society benefits when doing so leads to a higher gross benefit than the baseline. Roughly speaking, E must provide relatively good advice at a reasonable cost. Thus, welfare losses occur if P pays 'too much' for good advice from society's point of view, i.e., if society cares less about policy than P.

Corollary 8. *Suppose that $\widetilde{V}_P^E > 0$ and $\widetilde{V}_P^{I,P} < 0$, such that I's poor advice ($\beta_I^2 > \sigma_P^2$) induces P to acquire information in-house when $\mathcal{I} = \{I\}$. Social welfare is lower after introducing E if either*

(i) $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E$, i.e., E's poor advice ($\sigma_E^2 > \sigma_P^2$) induces I to offer P a contribution, and society cares sufficiently about policy ($\gamma_W > \frac{c_P(e_P) - \alpha_0 t_I^{**}}{\beta_I^2 - \sigma_P^2}$).

(ii) $V_P^E > c_P(e_P)$, i.e., P hires E who provides good advice ($\sigma_E^2 < \sigma_P^2$), but society cares less about policy than P ($\gamma_W < \gamma_P$).

[24] To see this, note that $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E \Leftrightarrow \gamma_I > \frac{\widetilde{V}_P^E - V_P^I}{\alpha_1(\sigma_E^2 + \beta_I^2)}$.

[25] Note that $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E$ and $\widetilde{V}_P^{I,P} < 0$ imply $V_P^I < 0$ and $\sigma_E^2 > \sigma_P^2$.

[26] If $V_P^I < 0$, then $V_W^I > \alpha_0 t_I^{**} \Leftrightarrow \gamma_W < \frac{c_P(e_P) - \alpha_0 t_I^{**}}{\beta_I^2 - \sigma_P^2}$. Note that the right-hand side is negative if contributions are sufficiently harmful, i.e., $\alpha_0 < c_P(e_P)/t_I^{**} (< 0)$.

6 Discussion and conclusion

Empirical research in Economics and Political Science shows that both expertise and contributions are effective means to obtain access to influential policy-makers; yet, theoretical papers have mostly studied them separately. In the studies that combine both, (positive) transfers are monopolized by one of the involved parties and, thus, these studies refer to either advisors or lobbyists.

In this paper, we have presented a general framework of Bertrand competition between experts for access to a policy-maker. Experts can either charge a fee for their services or offer contributions in exchange for policy influence. Our results show that centralization, and in particular informational lobbying, does not occur in equilibrium if uncertainty about the environment is large enough. Quid-pro-quo lobbying, on the other hand, arises endogenously under two conditions: Firstly, policy preferences differ substantially, such that hiring the expert yields a net loss for the policy-maker. Secondly, the expert cares enough about the policy in order to be willing to compensate the policy-maker for the loss.

We then presented a general model of competition between finitely many experts. In any equilibrium, transfers posted by the hired expert depend on the policy-maker's best alternative hiring decision. This means that a more competitive environment will reduce the cost of advice and may even result in lobbying; higher competitiveness may arise from improved state capacity, experts with higher stakes in the policy, or market entry. While in general a pure equilibrium may fail to exist due to the externalities from the policy-maker's hiring decision on other experts, the application to competition between an industry expert and an external consultant had a unique (pure) equilibrium.

Our results further suggest that hiring like-minded experts on narrow issues that mainly concern the policy-maker's own voters may decrease social welfare, as he then is willing to pay a 'too high' price for advice. Similarly, also competition from external consultants may decrease social welfare—not only on narrow issues but also if it leads to harmful lobbying contributions from interest groups.

Our findings also offer an alternative mechanism to explain why there is so little money in politics (Ansolabehere et al., 2003): It is not needed when an interest group monopolizes information about an issue and policy interests do not differ too much. Furthermore, both state capacity and competition are substitutes in alleviating the interest group's informational advantage. Thus, lobbying may occur *because of* either high state capacity or competition.

Finally, we can view the experts in our general model as bidding in a first-price auction for access to the policy-maker—reminiscent of a public tender procurement. This relates our paper to the literature on auctions with externalities (Jehiel et al., 1996, 1999). Notably, Jehiel et al. (1996)'s results suggest that the policy-maker in our model could improve by collecting contributions also from experts which he does not hire (cf. Austen-Smith, 1998).

Modelling assumptions. In our baseline model we have considered quasilinear utility functions which feature quadratic losses associated with a deviation of the implemented policy from an agent's bliss point. We have then shown that our model does not only generalize to competition but also to a much broader class of preferences, as we only require that utility is quasilinear in money. Note that we can further dispense with the property that contributions are inefficient in the sense that the cost to the expert is larger than the benefit to P (i.e., set $\alpha_1 = 1$). Our results on social welfare are derived under more specific assumptions but will hold as long as preferences are also quasilinear in P's acquisition costs.

Second, we have assumed that the experts first commit to transfers and P then decides whether to hire one of them. This allows the hired expert to completely extract P's net benefit, if any, relative to his best alternative. Although we believe that this approach is rather natural (cf. the discussion regarding the relation to auctions above), let us briefly discuss an alternative approach. Consider the baseline model and suppose that, instead, P commits to a menu of transfers and I then decides whether to accept. In this case, P can completely extract I's net benefit from being hired. Thus, lobbying contributions would be more common but equilibrium hiring decisions remain unchanged.

Third, we have abstracted from alternative ways in which P may obtain information. Consider communication previous to the hiring decision. Note that such communication is never optimal for I in the baseline model, as it will reduce her informational rents and thus lead to lower transfers. Under competition, however, an expert may benefit from 'casual' communication with the policy-maker because it will reduce the latter's informational gains from hiring another expert. As a result, all experts may be forced to offer higher contributions,[27] as the hiring decision will be less based on informational grounds—and probably more on transfers. This could change the policy-maker's hiring decision, which suggests a role for purely informational lobbying (i.e. no transfers involved) in our environment. Similar results would obtain if an interested party subsidized in-house acquisition via implementation subsidies (cf. Blumenthal, 2023; Ellis and Groll, 2020).

[27]The effect amounts to a decrease of V_P^a for all $a \in \mathcal{I}$ in Theorem 1.

Finally, P may also acquire information after he has hired I under centralization, which would result in a communication game with two-sided information à la Moreno de Barreda (2013). This may make hiring I under centralization relatively more attractive for P (when the decrease in residual variance dominates the extra acquisition costs) but would not change our results qualitatively. Allowing P to hire E as a second expert would have a similar effect (Krishna and Morgan, 2001).

Extensions. First, on the policy side, there may be multiple political actors who have specific "gatekeeping" positions over the policy. The effect of such competition will naturally depend on whether each principal has some degree of veto power (as in a legislature) or controls a given aspect of the policy process. For concreteness, consider an independent governmental agency which can release a public report (noisy signal) prior to the price-posting stage. Such release of information would reduce the industry expert's informational advantage, strengthening the principal's bargaining position (cf. Corollary 2). If now transfers from the expert to the agency were allowed, part of the rents the former extracts when being hired may be transferred to the latter to prevent the release. This may result in a different hiring decision in case the agency's information would induce the policy-maker not to hire the expert. In other words, civil servants who are willing to use their position to extract rents from interested parties can harm the policy-maker and society if 'technical' state capacity is high—in the form of access to high-quality information (cf. Harstad and Svensson, 2011).

Second, we could allow the policy-maker to invest in state capacity prior to the price-setting stage (e.g., by hiring an industry insider as in Hübert et al., 2023). Such investment then would decrease the cost of in-house information acquisition. Similarly to Hübert et al. (2023), higher state capacity thus strengthens the policy-maker's bargaining position vis-à-vis the experts (Corollary 2), such that the policy-maker may invest in it even if he anticipates hiring one of the experts.

Third, our model captures a fundamentally dynamic, long-term relationship between policy-makers, industry experts/consultants, and society in a single-period model. We believe there are many additional insights associated with the dynamics of the relationship, given the different time horizons of the agents involved. For instance, a policy-maker who is up for re-election soon may avoid hiring decisions that would cause public disagreement. Exploring these and related questions is of considerable importance and will be subject of future research.

Acknowledgements

We would like to thank Berno Buechel, Benjamin Blumenthal, Nicolás Figueroa, Tibor Heumann, Juan Pablo Montero, and seminar participants at the University of Chile, EWET 2022, PUC Chile, at the 33rd Stony Brook International Conference on Game Theory, at Bielefeld University, and at the 2023 Annual Conference of the German Economic Association for helpful comments and discussions. Daniel Habermacher gratefully acknowledges research funding by the Agencia Nacional de Investigación y Desarrollo (ANID) through project Fondecyt Iniciación en Investigación 11230013.

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A Appendix: Proofs

Proof of Lemma 1. Consider centralization. By Theorem 1 in Crawford and Sobel (1982), the most-informative equilibrium of the stage game under conflicting interests, $|\beta_I| > 0$, is characterized by the finite consecutive partition[28] $Q = \{Q_1, Q_2, \ldots, Q_L\}$ of Θ with the largest number of elements $L = L(\beta_I)$ such that for all $l = 1, 2, \ldots, L$ (-1 in (c)),

1. I sends message m_l if $\theta \in Q_l$,
2. P chooses policy $y_l = \text{argmax}_y\, E[u_P(p, \ell, y, \theta, e)|\theta \in Q_l]$, and
3. $E\left[u_I(p, \ell, y_l, \theta, \beta_I)|\theta = \inf Q_{l+1}\right] = E\left[u_I(p, \ell, y_{l+1}, \theta, \beta_I)|\theta = \inf Q_{l+1}\right]$.

In particular, the policy decision $y_l = E[u_P(p, \ell, y, \theta, e)|\theta \in Q_l] = E[\theta|\theta \in Q_l]$ upon message m_l is unbiased for all $l = 1, 2, \ldots, L$, with expected residual variance $\sigma^2_{I,C} = \sigma^2_{I,C}(\beta_I) > 0$.

Second, it follows from Lemma 6 and Theorems 3 and 4 in Crawford and Sobel (1982) that $\sigma^2_{I,C}(\beta_I)$ is weakly increasing in $|\beta_I|$. In particular, the main result in Spector (2000) yields $\lim_{\beta_I \to 0} \sigma^2_{I,C}(\beta_I) = 0$. Corollary 1 in Crawford and Sobel (1982) shows that there exists a sufficiently large $\bar{\beta} > 0$ such that for all $|\beta_I| \geq \bar{\beta}$ equilibrium communication is characterized by $L = 1$, which implies that $\sigma^2_{I,C}(\beta_I) = \text{Var}(\theta)$. It is easily shown that $\bar{\beta} = \frac{E[\theta]}{2}$ for quadratic preferences. The result on delegation is obvious. □

Proof of Lemma 2. Since P's signal $\tilde{\theta}$ is unbiased, it is optimal to implement $y = \tilde{\theta}$. Thus, P chooses her effort e as to maximize

$$-\gamma_P E[(\tilde{\theta} - \theta)^2|e] - c_P(e) = -\gamma_P \sigma^2(e) - c_P(e),$$

which has a unique and strictly positive solution by strict convexity of residual variance and costs and the assumptions on the first derivatives at zero. The second part follows immediately because the solution is strictly increasing in γ_P. □

Proof of Lemma 3. We first show that in any equilibrium in which P hires I, either $p^*_a = 0$ or $\ell^*_a = 0$ for $a = \{(I, C), (I, D)\}$. Suppose, on the contrary, that P hires I and that $p^*_a > 0$ and $\ell^*_a > 0$, which yields payoffs

[28] A consecutive partition $Q = \{Q_1, Q_2, \ldots, Q_L\}$ is such that $\sup Q_l = \inf Q_{l+1}$ for all $l = 1, 2, \ldots, L - 1$.

$$-p_a^* + \alpha_1 \ell_a^* - \gamma_P(\sigma_a^2 + 1_{\{a=(I,D)\}}\beta_I^2) \text{ and } p_a^* - \ell_a^* - \gamma_P(\sigma_a^2 + 1_{\{a=(I,C)\}}\beta_I^2)$$

for P and I, respectively. Consider the alternative transfers

$$(\tilde{p}_a\,,\,\tilde{\ell}_a) = \begin{cases} (p_a^* - \alpha_1 \ell_a^*\,,\,0) & \text{if } p_a^* - \alpha_1 \ell_a^* \geq 0 \\ (0\,,\,\ell_a^* - \frac{p_a^*}{\alpha_1}) & \text{otherwise.} \end{cases}$$

It is easy to check that P is indifferent between (p_a^*, ℓ_a^*) and $(\tilde{p}_a, \tilde{\ell}_a)$ but that I strictly prefers $(\tilde{p}_a, \tilde{\ell}_a)$ to (p_a^*, ℓ_a^*), a contradiction.

We now prove that $p_{I,C}^* > 0 = \ell_{I,C}^*$ in all equilibria in which P hires I under centralization. Suppose to the contrary that $\ell_{I,C} \geq 0 = p_{I,C}$ and note that this will only occur if there is no $p_{I,C} > 0$ that induces P to hire I under centralization, i.e., for any $0 < p_{I,C} < c_P(e_P)$, P prefers to acquire information himself:

$$-p_{I,C} + V_P^{I,C} < 0 \Leftrightarrow c_P(e_P) - p_{I,C} < \gamma_P(\sigma_{I,C}^2 - \sigma_P^2),$$

which implies $\sigma_{I,C}^2 - \sigma_P^2 > 0$. Moreover, communication at transfer $\ell_{I,C}$ must be cost-effective for I relative to letting P acquire information himself:

$$-\ell_{I,C} - \gamma_I(\sigma_{I,C}^2 + \beta_I^2) \geq -\gamma_I(\sigma_P^2 + \beta_I^2) \Leftrightarrow \gamma_I(\sigma_P^2 - \sigma_{I,C}^2) \geq \ell_{I,C},$$

which implies $\ell_{I,C} < 0$, a contradiction. In particular, in equilibrium the price will be such that P is indifferent between hiring and not hiring I, i.e., $p_{I,C} = V_P^{I,C}$.

We finally derive the conditions under which I posts $p_{I,D} = 0$ and $\ell_{I,D} > 0$ to induce P to hire him under delegation. Similar to the case of communication, there should be no $p_{I,D} \geq 0$ (and thus $\ell_{I,D} = 0$) that induces P to hire her:

$$-p_{I,D} + V_P^{I,D} < 0 \,\forall p_{I,D} \geq 0 \Leftrightarrow V_P^{I,D} < 0, \tag{8}$$

while $\ell_{I,D} > 0$ would do so:

$$\alpha_1 \,\ell_{I,D} + V_P^{I,D} \geq 0 \Leftrightarrow \ell_{I,D} \geq -\alpha_1^{-1} V_P^{I,D}. \tag{9}$$

Moreover, $\ell_{I,D}$ must be cost-effective for I:

$$-\ell_{I,D} + V_I^{I,D} \geq 0 \Leftrightarrow V_I^{I,D} \geq \ell_{I,D}. \tag{10}$$

Now, we obtain from Equation (8) that $p_{I,D} = V_P^{I,D} \geq 0 = \ell_{I,D}$ if $V_P^{I,D} \geq 0$. Otherwise, there is no positive price that would induce P to hire him under delegation. For I to be willing to offer a contribution in such cases, it must satisfy (9) and (10), which together imply that $V_P^{I,D} \in \big[-\alpha_1 V_I^{I,D}, 0\big)$. In this case, $\ell_{I,D} = -\alpha_1^{-1} V_P^{I,D}$. □

Proof of Proposition 1. We first consider expert I and communication. Incentive compatibility requires that I is at least as well off when hired than when not hired. By Lemma 3, we can restrict the analysis to $p_{I,C} > 0$:

$$p_{I,C} + V_I^{I,C} \geq 0 \Leftrightarrow p_{I,C} \geq -V_I^{I,C}.$$

Similarly, P needs to be at least as well off when hiring I than when not hiring I:

$$-p_{I,C} + V_P^{I,C} \geq 0 \Leftrightarrow V_P^{I,C} \geq p_{I,C}. \tag{11}$$

Hence, a necessary condition for P to hire I under centralization is:

$$\overline{V}^{I,C} = V_P^{I,C} + V_I^{I,C} \geq 0. \tag{12}$$

Next we consider delegation. Incentive compatibility for I requires:

$$p_{I,D} - \ell_{I,D} + V_I^{I,D} \geq 0 \Leftrightarrow p_{I,D} - \ell_{I,D} \geq -V_I^{I,D}. \tag{13}$$

And similarly for P:

$$-p_{I,D} + \alpha_1\, \ell_{I,D} + V_P^{I,D} \geq 0 \Leftrightarrow V_P^{I,D} \geq p_{I,D} - \alpha_1\, \ell_{I,D}. \tag{14}$$

Furthermore, the expert prefers communication to delegation if

$$p_{I,C} + V_I^{I,C} \geq p_{I,D} - \ell_{I,D} + V_I^{I,D}. \tag{15}$$

Similarly, P prefers communication to delegation if

$$-p_{I,C} + V_P^{I,C} \geq -p_{I,D} + \ell_{I,D} + V_P^{I,D}. \tag{16}$$

Recall from Lemma 3 that equilibrium prices satisfy $\hat{p}_{I,C} = V_P^{I,C}$ if I is hired under centralization and $\hat{p}_{I,D} - \alpha_1\, \hat{\ell}_{I,D} = V_P^{I,D}$ if I is hired under delegation. We proceed by case distinction:

1. $V_P^{I,D} \geq 0$. In this case $\hat{p}_{I,D} = V_P^{I,D}$ and $\hat{\ell}_{I,D} = 0$, such that (13) and (14) yield

$$\overline{V}^{I,D} = V_P^{I,D} + V_I^{I,D} \geq 0,$$

which always holds as $V_I^{I,D} > 0$ by Remark 1. Next, we can rewrite (15) as

$$V_P^{I,C} + V_I^{I,C} \geq V_P^{I,D} + V_I^{I,D} \Leftrightarrow \overline{V}^{I,C} \geq \overline{V}^{I,D}. \tag{17}$$

Let(X^*) denote inequality (X) with the inequality sign reversed, e.g., (17*) reads $\overline{V}^{I,C} \leq \overline{V}^{I,D}$. We obtain, first, that P hires I under centralization if (12) and (17) hold, which is equivalent to $\overline{V}^{I,C} \geq \overline{V}^{I,D}$, with transfers $p^*_{I,C} = \hat{p}_{I,C}$ consistent with Lemma 3 and $(p^*_{I,D}, \ell^*_{I,D})$ such that (16) holds. Second, he hires I under delegation if either [(12) and (17*)] or [(12*)] holds, which is equivalent to

$$V_P^{I,D} + V_I^{I,D} \geq V_P^{I,C} + V_I^{I,C} \Leftrightarrow \overline{V}^{I,D} \geq \overline{V}^{I,C},$$

with prices $(p^*_{I,D}, \ell^*_{I,D}) = (\hat{p}_{I,D}, \hat{\ell}_{I,D})$ consistent with Lemma 3 and $p^*_{I,C}$ such that (16*) holds.

2. $V_P^{I,D} < 0$. In this case $\hat{p}_{I,D} = 0$ and $\hat{\ell}_{I,D} = -\alpha_1^{-1} V_P^{I,D}$, such that (13) and (14) yield

$$\overline{V}^{I,D} = \alpha_1^{-1}\, V_P^{I,D} + V_I^{I,D} \geq 0. \tag{18}$$

Next, we can rewrite (15) as

$$V_P^{I,C} + V_I^{I,C} \geq \alpha_1^{-1} V_P^{I,D} + V_I^{I,D} \Leftrightarrow \overline{V}^{I,C} \geq \overline{V}^{I,D}. \tag{19}$$

We obtain, first, that P hires I under centralization if either [(12), (18) and (19)] or [(12) and (18*)] hold, which is equivalent to

$$V_P^{I,C} + V_I^{I,C} \geq \max\left\{0, \alpha_1^{-1} V_P^{I,D} + V_I^{I,D}\right\} \Leftrightarrow \overline{V}^{I,C} \geq \max\left\{0, \overline{V}^{I,D}\right\},$$

with transfers $p^*_{I,C} = \hat{p}_{I,C}$ consistent with Lemma 3 and $(p^*_{I,D}, \ell^*_{I,D})$ such that (16) holds. Second, he hires I under delegation if either [(12), (18) and

(19*)] or [(12*) and (18)], which is equivalent to:

$$\alpha_1^{-1} V_P^{I,D} + V_I^{I,D} \geq \max\left\{0, V_P^{I,C} + V_I^{I,C}\right\} \Leftrightarrow \overline{V}^{I,D} \geq \max\left\{0, \overline{V}^{I,C}\right\},$$

with prices $(p^*_{I,D}, \ell^*_{I,D}) = (\hat{p}_{I,D}, \hat{\ell}_{I,D})$ consistent with Lemma 3 and $p^*_{I,C}$ such that (16*) holds. Third, she does not hire I if (12*) and (18*) hold, which is equivalent to

$$\max\left\{\overline{V}^{I,C}, \overline{V}^{I,D}\right\} = \max\left\{V_P^{I,C} + V_I^{I,C}, \alpha_1^{-1} V_P^{I,D} + V_I^{I,D}\right\} \leq 0,$$

with transfers $(p^*_{I,C}, \ell^*_{I,C})$ and $(p^*_{I,D}, \ell^*_{I,C})$ such that (11*) and (14*) hold, respectively. Finally, note that there are multiple equilibria for each choice of P but that all equilibrium price menus yield the same payoffs. Furthermore, whenever I is indifferent between two equilibria that differ in P's choice, then so is P. □

Proof of Corollary 1. We show by case distinction that $\max\left\{0, \overline{V}^{I,D}\right\} > \overline{V}^{I,C}$:

1. $\sigma^2_{I,C} < \mathrm{Var}(\theta)$ and $V_P^{I,D} \geq 0$. Suppose without loss that $\overline{V}^{I,C} \geq 0$ (otherwise the claim would follow immediately). Note that (2) implies

$$\sigma^2_{I,C} > \frac{\gamma_P - \gamma_I}{\gamma_P + \gamma_I}\beta_I^2.$$

Together with $V_P^{I,D} \geq 0$, we obtain

$$\overline{V}^{I,D} = V_P^{I,D} + V_I^{I,D} = \gamma_P(\sigma^2_{I,C} - \beta_I^2) + V_P^{I,C} + \gamma_I(\sigma^2_{I,C} + \beta_I^2) + V_I^{I,C} > \overline{V}^{I,C}.$$

2. $\sigma^2_{I,C} < \mathrm{Var}(\theta)$ and $V_P^{I,D} < 0$. Analogously to the previous case, suppose that $\overline{V}^{I,C} \geq 0$. Since $V_P^{I,D} < 0$, we obtain

$$\begin{aligned}\overline{V}^{I,D} &= \alpha_1^{-1} V_P^{I,D} + V_I^{I,D} = \alpha_1^{-1}\gamma_P(\sigma^2_{I,C} - \beta_I^2) + \alpha_1^{-1} V_P^{I,C} + \gamma_I(\sigma^2_{I,C} + \beta_I^2) + V_I^{I,C} \\ &> \alpha_1^{-1} V_P^{I,C} + V_I^{I,C} \\ &> \overline{V}^{I,C},\end{aligned}$$

where the inequalities follow from (2) and since $\overline{V}^{I,C} \geq 0$ implies $V_P^{I,C} \geq 0$, respectively.

3. $\sigma^2_{I,C} = \text{Var}(\theta)$. We obtain

$$\begin{aligned}\overline{V}^{I,C} = \tilde{\alpha}_1(V_P^{I,C}) + V_I^{I,C} &= \tilde{\alpha}_1\left(\gamma_P(\sigma_P^2 - \sigma^2_{I,C}) + c_P(e_P)\right) + \gamma_I(\sigma_P^2 - \sigma^2_{I,C}) \\ &< \tilde{\alpha}_1\left(\gamma_P\sigma_P^2 + c_P(e_P) - \gamma_P\text{Var}(\theta)\right) \\ &< 0,\end{aligned}$$

where the inequalities follow from $\sigma_P^2 < \text{Var}(\theta) = \sigma^2_{I,C}$ and optimality of $e_P > 0$, respectively.

The second part follows immediately from Proposition 1. □

Proof of Theorem 1. Consider any hiring decision $a \in \mathcal{I} \cup \{P\}$. For any expert $i \in \mathcal{I}$, $i \neq a$, incentive compatibility requires

$$V_i^a \geq p_i - \ell_i + V_i^i,$$

which yields $\underline{t}_i = V_i^a - V_i^i$ as the lowest incentive-compatible transfer for i. Thus, the largest gross benefit i is willing to provide to P for being hired against the alternative of a relative to in-house acquisition is

$$V_P^i - \max\{\alpha_1 \underline{t}_i, \underline{t}_i\} = V_P^i + \min\{\alpha_1(V_i^i - V_i^a), V_i^i - V_i^a\} = \widetilde{V}_P^{i,a}. \tag{20}$$

Note that in case $a \neq P$, we have $\widetilde{V}^{P,a} = 0$ by definition. This yields the set of P's best alternatives to a,

$$\mathcal{B}(a) = \underset{a' \in \mathcal{I} \cup \{P\}: a' \neq a}{\text{argmax}} \widetilde{V}_P^{a',a}.$$

Analogously to (20), the largest gross benefit of P from hiring decision a against any of the best alternatives $a' \in \mathcal{B}(a)$ is $\widetilde{V}_P^{a,a'}$, with $\underline{t}_a = V_a^{a'} - V_a^a$ being the corresponding lowest incentive-compatible transfer if $a \in \mathcal{I}$. Incentive compatibility for P then implies that a is part of an equilibrium if and only if

$$\widetilde{V}_P^{a,a'} \geq \widetilde{V}_P^{a',a} \text{ for all } a' \in \mathcal{B}(a).$$

If $a \in \mathcal{I}$, then her transfer will set P indifferent between hiring her and his best alternative, i.e., $t_a = \tilde{\alpha}_1\big(V_P^a - \max_{a' \in \mathcal{I} \cup \{P\}: a' \neq a} \widetilde{V}_P^{a',a}\big)$. The last claim then follows immediately. □

Proof of Corollary 3. Note first that there exists $a^* \in \mathcal{I} \cup \{P\} \backslash \{a'\}$ such that (4) holds, and note that, by assumption, $\widetilde{V}_P^{a^*,a} \geq \widetilde{V}_P^{a,a^*}$ for all $a \neq a^*$. The main claim then follows by Theorem 1. Finally, analogously to Proposition 1, all equilibria are payoff-equivalent. □

Proof of Proposition 4. Recall that we restrict attention to delegation in case of expert I. Suppose first that $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E$, such that by Proposition 3, P hires I at transfer $t_I^{**} = \tilde{\alpha}_1\big(V_P^I - \widetilde{V}_P^E\big)$ after introducing E. Note that social welfare if P hires I at transfer t_I is given by

$$-\gamma_W \beta_I^2 - \max\{t_I, \alpha_0 t_I\}. \tag{21}$$

We proceed by case distinction:

(a) $\widetilde{V}_P^{I,P} \geq 0$. Recall that $\widetilde{V}_P^{I,P} \geq 0 \Leftrightarrow \overline{V}^I \geq 0$, such that by Corollary 1, P hires I at transfer $t_I^* = \tilde{\alpha}_1(V_P^I)$ in the baseline model (without centralization). Social welfare is higher after introducing E if and only if

$$\max\{t_I^*, \alpha_0 t_I^*\} > \max\{t_I^{**}, \alpha_0 t_I^{**}\}.$$

(b) $\widetilde{V}_P^{I,P} < 0$. Note that then also $V_P^I < 0$ and thus $t_I^{**} < 0$. By Corollary 1, P acquires information in-house in the baseline model, which yields social welfare

$$-\gamma_W \sigma_P^2 - c_P(e_P). \tag{22}$$

Hence, social welfare is higher after introducing E if and only if

$$-\gamma_W \beta_I^2 - \max\{t_I^{**}, \alpha_0 t_I^{**}\} > -\gamma_W \sigma_P^2 - c_P(e_P) \Leftrightarrow V_W^I > \alpha_0 t_I^{**},$$

which proves part (i).

Second, suppose that $\widetilde{V}_P^{I,E} < \widetilde{V}_P^E$, such that by Proposition 3, P hires E at transfer $t_E^{**} = \tilde{\alpha}_1\big(V_P^E - \max\big\{\widetilde{V}_P^{I,E}, 0\big\}\big)$ after introducing E, which yields social welfare

$$-\gamma_W \sigma_E^2 - \max\{t_E^{**}, \alpha_0 t_E^{**}\}.$$

We proceed by case distinction:

(c) $\widetilde{V}_P^{I,P} \geq 0$. Recall from (a) that P hires I at transfer $t_I^* = \tilde{\alpha}_1(V_P^I)$ in the baseline model, which yields social welfare (21). Thus, it is higher after introducing E if and only if

$$\begin{aligned} & -\gamma_W \sigma_E^2 - \max\{t_E^{**}, \alpha_0 t_E^{**}\} > -\gamma_W \beta_I^2 - \max\{t_I^*, \alpha_0 t_I^*\} \\ \Leftrightarrow & V_W^E - \max\{t_E^{**}, \alpha_0 t_E^{**}\} > V_W^I - \max\{t_I^*, \alpha_0 t_I^*\}. \end{aligned}$$

(d) $\widetilde{V}_P^{I,P} < 0$. Recall from (b) that P acquires information in-house in the baseline model, which yields social welfare (22). Thus, it is higher after introducing E if and only if

$$-\gamma_W \sigma_E^2 - \max\{t_E^{**}, \alpha_0 t_E^{**}\} > -\gamma_W \sigma_P^2 - c_P(e_P) \Leftrightarrow V_W^E > \max\{t_E^{**}, \alpha_0 t_E^{**}\}. \square$$

Proof of Corollary 7. Suppose that $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E \geq V_P^I > 0$. By Corollary 1 (i) and 3 (i), P hires I before and after introducing E, at transfer $t_I^* > 0$ and $t_I^{**} < 0$, respectively. Since $V_P^I > 0$ implies $\widetilde{V}_P^{I,P} > 0$, it follows from Proposition 4 (i, a) that welfare losses occur if

$$\max\{t_I^*, \alpha_0 t_I^*\} < \max\{t_I^{**}, \alpha_0 t_I^{**}\} \Leftrightarrow t_I^* < \alpha_0 t_I^{**} \Leftrightarrow \frac{t_I^*}{t_I^{**}} > \alpha_0. \qquad \square$$

Proof of Corollary 8. Suppose that $\widetilde{V}_P^E > 0$ and $\widetilde{V}_P^{I,P} < 0 \Leftrightarrow \overline{V}^I < 0$, such that by Corollary 1 (ii), P acquires information in-house before introducing E. Note further that $\widetilde{V}_P^{I,P} < 0$ implies $V_P^I = \gamma_P(\sigma_P^2 - \beta_I^2) + c_P(e_P) < 0$ by Remark 1, and thus $\beta_I^2 > \sigma_P^2$.

For the first part, suppose that $\widetilde{V}_P^{I,E} \geq \widetilde{V}_P^E$. Since $V_P^I < 0$, we obtain from Proposition 3 (i) that P hires I at a contribution after introducing E. Note further that we have

$$0 < \widetilde{V}_P^{I,E} = V_P^I + \alpha_1(V_I^I - V_I^E) = \widetilde{V}_P^{I,P} - \alpha_1 V_I^E < -\alpha_1 \gamma_I(\sigma_P^2 - \sigma_E^2) \Leftrightarrow \sigma_E^2 > \sigma_P^2.$$

It then follows from Proposition 4 (i, b) that welfare losses occur if

$$V_W^I < \alpha_0 t_I^{**} \Leftrightarrow \gamma_W \underbrace{(\sigma_P^2 - \beta_I^2)}_{<0 \text{ as } V_P^I < 0} < \alpha_0 t_I^{**} - c_P(e_P) \Leftrightarrow \gamma_W > \frac{c_P(e_P) - \alpha_0 t_I^{**}}{\beta_I^2 - \sigma_P^2}.$$

Second, suppose that $V_P^E > c_P(e_P)$, i.e., $\sigma_E^2 < \sigma_P^2$. In particular, $\widetilde{V}_P^{I,P} < 0$ then implies $\widetilde{V}_P^{I,E} < 0$, such that by Proposition 3 (ii), P hires E at transfer

$t_E^* = V_P^E > 0$ after introducing E. It thus follows from Proposition 4 (ii, b) that welfare losses occur if

$$V_W^E < \max\{t_E^{**}, \alpha_0 t_E^{**}\} \Leftrightarrow V_W^E < V_P^E \Leftrightarrow \gamma_W < \gamma_P. \qquad \square$$

B Online Appendix: Policy-advising competition with multiple modes of hiring

We generalize the model with finitely many experts studied in Section 4 to multiple *modes of hiring* per expert, for instance centralization and delegation as in the baseline model. Suppose that each expert $i \in \mathcal{I}$, with $\#\mathcal{I} \geq 0$, may be hired in a finite set of 'modes' $a \in A(i)$, with $\#A(i) \geq 1$, and let $\mathcal{A} = \bigcup_{i \in \mathcal{I}} A(i) \cup \{P\}$.

In the first stage, all experts $i \in \mathcal{I}$ simultaneously post their menus of transfers $(\mathbf{p}_i, \boldsymbol{\ell}_i)_{i \in \mathcal{I}}$, with $(\mathbf{p}_i, \boldsymbol{\ell}_i) = (p_a, \ell_a)_{a \in A(i)}$ for all $i \in \mathcal{I}$. In the second stage, P takes her hiring decision $a \in \mathcal{A}$, which yields the (expected) net benefit V_i^a to agent $i \in \mathcal{I} \cup \{P\}$ relative to in-house acquisition.

B.1 Equilibrium analysis

Given transfers $(\mathbf{p}_i, \boldsymbol{\ell}_i)_{i \in \mathcal{I}}$, P will decide whether to hire one of the experts and on the mode of hiring according to:

$$\max_{a \in \mathcal{A}} 1_{\{a \neq P\}} \left(V_P^a - p_a + \alpha_1 \ell_a \right).$$

Finally, we turn to the price-setting stage. Let $\mathbf{t}_i \equiv \mathbf{p}_i - \boldsymbol{\ell}_i$ denote the net transfer from P to $i \in \mathcal{I}$ and note that the gross benefit of P from a relative to in-house acquisition given that his best alternative to a is $a' \in \mathcal{A} \backslash \{a\}$, $a' \notin A(i)$ if $a \in A(i)$, is at most

$$\widetilde{V}_P^{a,a'} = V_P^a + 1_{\{a \neq P\}} \min\{\alpha_1 (V_{A^{-1}(a)}^a - V_{A^{-1}(a)}^{a'}), V_{A^{-1}(a)}^a - V_{A^{-1}(a)}^{a'}\}.$$

Thus, the set of best alternatives to hiring decision a is given by

$$\mathcal{B}(a) \equiv \underset{a' \in \mathcal{A} \backslash \{a\}:\ a' \notin A(i) \text{ if } a \in A(i)}{\operatorname{argmax}} \widetilde{V}_P^{a',a}.$$

Theorem 2. *Any equilibrium is such that P's hiring decision a^* satisfies*

$$\widetilde{V}_P^{a^*,a'} \geq \widetilde{V}_P^{a',a^*} \text{ for all } a' \in \mathcal{B}(a^*) \tag{23}$$

and, if $a^* \in A(i)$, solves

$$\max_{a \in A(i)} V_i^a + \tilde{\alpha}_1 \Big(V_P^a - \max_{a' \in \mathcal{A} \backslash A(i)} \widetilde{V}_P^{a',a^*} \Big).$$

In this case, $t^*_{a^*} = \tilde{\alpha}_1\Big(V_P^{a^*} - \max_{a'\in\mathcal{A}\setminus A(i)} \widetilde{V}_P^{a',a^*}\Big)$.

Proof of Theorem 2. Consider any hiring decision $a \in \mathcal{A}$. Analogously to Theorem 1, condition (23) is necessary for a being part of an equilibrium. Note that it is not necessarily sufficient as the set of best alternatives disregards potential other modes of hiring in case $a \in \bigcup_{i\in\mathcal{I}} A(i)$. Consequently, condition (23) is also sufficient if $a = P$.

Otherwise, there exists $i \in \mathcal{I}$ such that $a \in A(i)$. Note that in this case we can write

$$\mathcal{B}(a) = \underset{a'\in\mathcal{A}\setminus\{a\}:\ a'\notin A(i) \text{ if } a\in A(i)}{\operatorname{argmax}} \widetilde{V}_P^{a',a} = \underset{a'\in\mathcal{A}\setminus A(i)}{\operatorname{argmax}} \widetilde{V}_P^{a',a}.$$

Analogously to Theorem 1, i's transfer will set P indifferent between hiring her and his best alternative, i.e., $t_a = \tilde{\alpha}_1\big(V_P^a - \max_{a'\in\mathcal{A}\setminus A(i)} \widetilde{V}_P^{a',a}\big)$. Finally, i may have incentives to switch to another mode of hiring $a' \in A(i)$, $a' \neq a$. Given that the other experts expect hiring decision a, P is indifferent between a' and his best alternative if $t_{a'} = \tilde{\alpha}_1\big(V_P^{a'} - \max_{a''\in\mathcal{A}\setminus A(i)} \widetilde{V}_P^{a'',a}\big)$. Thus, a also has to solve

$$\max_{a'\in A(i)} V_i^{a'} + t_{a'} = V_i^{a'} + \tilde{\alpha}_1\Big(V_P^{a'} - \max_{a''\in\mathcal{A}\setminus A(i)} \widetilde{V}_P^{a'',a}\Big).$$

□

As in Section 4, an equilibrium may fail to exist due to the externalities from P's hiring decision on other experts. In case of a single expert, we obtain a generalization of Proposition 1, namely that the hiring decision maximizes the aggregate benefit:

Corollary 9. *Suppose that* $\mathcal{I} = \{I\}$*. Any equilibrium is such that* P*'s hiring decision* a^* *solves*

$$\max_{a\in\mathcal{A}} \tilde{\alpha}_1(V_P^a) + V_I^a.$$

If $a^* \in A(I)$*, then* $t^*_{a^*} = \tilde{\alpha}_1(V_P^{a^*})$*.*

Proof. Note that, in case P hire I in mode a^*, $\mathcal{B}(a) = P$ and $\widetilde{V}_P^{P,a} = 0$ for all $a \in A(I)$. Therefore, the conditions in Theorem 2 simplify to

$$\widetilde{V}_P^{a^*,P} = V_P^{a^*} + \min\{\alpha_1(V_I^{a^*}), V_I^{a^*}\} \geq 0 \Leftrightarrow V_I^{a^*} + \tilde{\alpha}_1(V_P^{a^*}) \geq 0$$

and

$$a^* \in \operatorname*{argmax}_{a \in A(I)} \tilde{\alpha}_1(V_P^a) + V_I^a.$$

Since by definition $V_I^P + \tilde{\alpha}_1(V_P^P) = 0$, this is equivalent to

$$a^* \in \operatorname*{argmax}_{a \in \mathcal{A}} \tilde{\alpha}_1(V_P^a) + V_I^a.$$

The transfer simplifies to

$$t_{a^*}^* = \tilde{\alpha}_1\Big(V_P^{a^*} - \max_{a' \in \mathcal{A} \setminus A(i)} \widetilde{V}_P^{a',a^*}\Big) = \tilde{\alpha}_1\Big(V_P^{a^*} - \widetilde{V}_P^{P,a^*}\Big) = \tilde{\alpha}_1(V_P^{a^*}).$$

Similarly, in case P acquires information in-house, $a^* = P$, the conditions in Theorem 2 simplify to

$$\widetilde{V}_P^{a,P} = V_P^a + \min\{\alpha_1(V_a^a), V_a^a\} \leq 0 \text{ for all } a \in A(I),$$

which is equivalent to

$$P \in \operatorname*{argmax}_{a \in \mathcal{A}} \tilde{\alpha}_1(V_P^a) + V_I^a.$$

□