

Perceived Legitimacy and Motivation Effects of Power*

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Abstract

Hierarchical structures are an important determinant of individual motivation in organizations, but the precise mechanisms through which hierarchies affect motivation are still poorly understood. We use a laboratory experiment to study the impact of legitimacy of an organizational structure in this regard. In particular, our experimental design allows us to separate any effect of legitimacy perception from monetary incentive effects. We find that legitimacy perceptions are indeed a significant determinant of motivation. In our experimental principal-agent game, agent's who perceive the organizational structure as less legitimate provide less effort. Through exogenous manipulation of the legitimacy perception, we can establish that this relationship is causal.

Keywords: Legitimacy, Organization, Motivation

JEL Classification Codes: D01, D23, D91, M5

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1 Introduction

Hierarchical relationships in which one party exercises authority over another are a defining feature of organizations. The incentive effects of allocating such authority have been studied theoretically ([Grossman and Hart, 1986](#); [Hart and Moore, 1990](#); [Aghion and Tirole, 1997](#); [Baker et al., 1999](#); [Dessein, 2002](#); [Aghion et al., 2004](#)), and to some extent empirically, both in the field and in the laboratory ([Wu, 2017](#); [Bandiera et al., 2021](#); [Fehr et al., 2013](#)). However, our empirical understanding of the motivational effects of decision hierarchies in organizations is still relatively poor. For example, [Fehr et al. \(2013\)](#) show that the allocation of decision rights within an organization in the laboratory had motivational effects that go beyond pure monetary incentive effects, suggesting that other factors that are not accounted for in standard theory may be important determinants of motivation in such settings.

In this paper, we study whether perceptions of legitimacy of a hierarchy mediate behavioral responses within the hierarchy. Legitimacy has long been argued to be a central determinant of people’s willingness to accept institutional decisions ([Weber, 1978](#)), and the sources and consequences of the legitimacy of institutions and authorities have been widely studied within the social sciences ([Parsons, 1956](#); [Dowling and Pfeffer, 1975](#); [Zucker, 1987](#); [Suchman, 1995](#)), in particular in the domain of law enforcement and following state orders. However, its impact on behavior within organizations has received surprisingly little attention, despite the fact that the leadership literature has long speculated that legitimacy is an important co-variate of power, its consequences and perceptions ([Bass and Stogdill, 1990](#)).

Legitimacy is “a psychological property of an authority, institution, or social arrangement that leads those connected to it to believe that it is appropriate, proper, and just ([Tyler, 2006](#)).” We thus hypothesize that behavioral reactions to authority structures are governed by the perceived legitimacy of the structure. For example, negative reactions to the European Union are often rooted in the perception that it lacks democratic legitimacy. Similarly, in economic organizations, the legitimacy of an organizational structure is intricately linked to aspects such as the expertise of those who hold decision authority, or the efficiency of the organizational structure to achieve organizational (rather than individual) goals. In this respect, legitimacy can provide a "reservoir of support" for institutions and authorities, something besides immediate self-interest, which shapes reactions to their policies ([Weatherford, 1992](#)).

To assess the relationship between legitimacy and motivation, we design a laboratory experiment based on the experimental authority-delegation game initially proposed by [Fehr et al. \(2013\)](#). In the authority-delegation game, building on ([Aghion and Tirole, 1997](#)), a principal and an agent must select one out of 36 potential projects for implementation. One project is best for the principal, whereas a different project is best for the agent. The principal initially

holds the right to decide which project to implement, whereas the agent can only make a recommendation. Project payoffs are unknown ex-ante, but both parties can invest effort, where higher effort increases the probability to obtain payoff information. Before the parties provide effort, the principal can delegate authority to the agent and become the subordinate party. Delegation of authority means that the agent becomes the controlling party and has the right to choose the project.

Both the controlling party (i.e. the party with the decision right) and the subordinate party have pecuniary incentives to exert effort in this setup because both parties earn only a low outside option in the absence of any information. The subordinate's incentives are lower, however, because if both parties are informed, the controlling party may overrule the subordinate's proposal and choose the project which is best for him or her. Whether or not the principal should keep decision authority or delegate it to the agent is a matter of two opposing effects: First, delegation has a positive motivation effect on the agent, from which the principal benefits. Second, there is a negative effect of losing control over project choice. In addition, delegation can have an effect on the overall efficiency of the organization, defined as the total expected payoff that will be realized. Efficiency concerns enter the equation whenever the choice of a specific project is relatively more important for one of the parties. If this is the case, it becomes socially efficient if this party becomes the controlling party.

The key idea of our experimental design is to exogenously vary the perceived legitimacy of a specific organizational form while keeping the pecuniary incentives to provide effort within this organizational form constant. This allows us to measure any potential impact of perceived legitimacy independent of any incentive effects of organizational form. In particular, we focus on agent motivation in the organizational form in which the principal chooses not to delegate, because random assignment to roles implies that there is no selection effect in this particular case.

To exogenously induce different organizational structures that vary in perceived legitimacy but not in terms of implied monetary incentives, we exploit the abovementioned effect that social efficiency of organizational structure depends on the degree of interest alignment between the parties, whereas individual incentives only do so under specific organizational forms. In particular, we generate two different payoff structures, SYM and ASYM, in a within-subjects design. The two payoff structures only vary in the payment that the agent receives in case the principal's preferred project is chosen. Importantly, this payment only affects incentives when the agent is the controlling party, but not when the principal is the controlling party. Why is this the case? If the principal keeps the decision right, the agent understands that the principal's preferred project will be chosen whenever the principal is successful in finding

information. The agent's incentive to invest into finding information himself stems from the fact that the principal may remain uninformed and will then rubber-stamp her proposal, in which case the agent receives the payment associated with her preferred project. Thus, only the outside option payment and the payment at the own preferred project matter for the agent under P-Formal authority, and these parameters are identical across treatments. In contrast, when the agent is the controlling party, the agent's payment at the principal's preferred project matters for investment incentives. If the agent's search is unsuccessful, it may still be the case that the principal provides a recommendation (for the principal's preferred project), and thus, the agent's payment at the principal's preferred project matters because it partially determines the outcome when the agent herself is unsuccessful.

Why should the agent perceive it as less legitimate if the principal does not delegate the decision right in the ASYM treatment compared to the SYM treatment? As explained above, we hypothesize that the social efficiency of organizational structure is a source of legitimacy. In the SYM treatment, the interests of the principal and the agent are exactly identical, and delegation of the decision right simply implies reversing roles, everything else equal. From a social perspective, there is thus no reason to perceive one of the structures as more legitimate than the other. In SYM, however, project choice is relatively more important for the agent than for the principal, meaning that there is a loss of social welfare whenever the principal's preferred project is chosen. Indeed, in the equilibrium of the subgame following delegation under ASYM, both parties are better off than in the equilibrium of the subgame following non-delegation. Thus, delegation is efficient and, from a purely monetary perspective, in the interest of both parties. In consequence, non-delegation can be perceived as less legitimate.

These considerations form the basis of our legitimacy hypothesis: Under SYM, parties are fully symmetric and thus no party can derive a claim to be the legitimate holder of authority purely based on the game characteristics. In contrast, agent control is the efficient allocation of the decision right under ASYM, as delegation raises expected profits of both agent and principal, and thus the organizational structure in which the agent is the controlling party is more legitimate.

We find that our treatment manipulation worked as intended. Under SYM, the vast majority of agents consider it equally legitimate that the principal keeps the decision right or transfers the decision right to the agent. However, under ASYM, we find strongly diverging legitimacy perceptions, and agents find it significantly more legitimate that the agent becomes the controlling party. Thus, our exogenous manipulation of the payoff structure significantly affected legitimacy perceptions of organizational structure across the two treatments.

We also find that agents are significantly less motivated to provide search effort when

principals are the controlling party in ASYM compared to SYM. Despite identical monetary incentives, effort provision is reduced by approximately 7% in ASYM. At the individual level, these reductions are strongly driven by individual perceptions of legitimacy in the two treatments. Exploiting the within subject nature of our design, we can show that there is a significant correlation between changes in effort provision and changes in the legitimacy perception at the individual level, that is, reductions in effort and the strengths of the shift in perception towards finding agent control legitimate are significantly associated with each other.

Finally, an important individual determinant of effort in the strategic interaction analysed in this experiment are beliefs about effort provision of the respective other party. To this end, we measured agents' beliefs about principal effort provision when the principal keeps the decision right in both treatments, which allows us to calculate the best response to these beliefs, and to measure the difference between the actual effort provision and this theoretical best response. Indeed, we find that agents provide less effort relative to the theoretical best response, although statistical significance is somewhat weaker for this result.

Our findings provide empirical evidence that perceptions of legitimacy are a determinant of motivation within organizations. Legitimacy of organizations and its implications for organizations in outside relations as well as on the inside are an increasingly debated issue ([Bitektine and Haack, 2015](#); [Suddaby et al., 2017](#); [Haack et al., 2021](#)), and our behavioral findings on legitimacy effects within organizations complement the literature on the role of legitimacy as a determinant of compliance with rules and norms at a societal level ([Parsons, 1956](#); [Dowling and Pfeffer, 1975](#); [Zucker, 1987](#); [Suchman, 1995](#)).

Our findings also contribute to the literature in organizational economics that studies motivation within organizations and its determinants. Economists have demonstrated in incentivized experiments that if a leader exercises the power to control subordinates, this results in reduced non-pecuniary motivation ([Falk and Kosfeld, 2006](#); [Belot and Schröder, 2016](#); [Charness et al., 2012](#); [Herz and Zihlmann, 2021](#); [De Chiara et al., 2022](#)). [Fehr et al. \(2013\)](#), [Dominguez-Martinez et al. \(2014\)](#) and [Sloof and von Siemens \(2021\)](#) provide initial steps towards a better understanding of the determinants of motivation in decision hierarchies, and, relatedly, [Cassar and Meier \(2018\)](#) argue that meaning related to a job is directly related to workers' productivity and willingness to work.

The paper proceeds as follows: Section 2 presents the experimental design and derives the hypotheses. Section 3 presents our empirical results and section 4 concludes.

2 Research Design

The basis of our experimental design is in many parts identical to the authority game in [Fehr et al. \(2013\)](#), which in turn is build on the model of formal and real authority developed in [Aghion and Tirole \(1997\)](#). As a consequence, the description of the experiment presented below borrows heavily from [Fehr et al. \(2013\)](#).

2.1 The Authority Game ([Fehr et al., 2013](#))

In each period, a principal is matched with an agent and shown a set of 36 cards on her computer screen representing potential projects.¹ One of these cards has a small positive payoff for both players and is placed face up representing the outside option (project O). The remaining thirty five cards are shuffled face down so that the location of each project is unknown. One of these cards is red and represents the principal's preferred project (project P). A second card is blue and represents the agent's preferred project (project A). The remaining thirty-three cards are white and result in zero payoff for both parties (projects N). The task of each principal-agent pair is to select a project which will be used for payment. The payoffs ensure that individuals prefer to implement the outside option relative to picking a project at random.

Play of the game is done in six stages which are illustrated in [Figure 1](#) and discussed here. Initially, principals are given the decision right which corresponds to being able to select a project at the end of the round in stage 6.

In the first stage of the game, each principal is asked whether she wishes to keep the decision right or to transfer it to the agent. Giving the right to the agent is binding and irreversible.

In the second stage, subjects choose their effort levels simultaneously and in private. Both subjects select their effort in increments of 5 from $\{0, 5, \dots, 95, 100\}$. This effort corresponds to the probability that the subject learns the location of all projects. Effort has an associated cost generated via a quadratic cost function which is constant across treatments and player types:

$$g_P(E) = 25 \left(\frac{E}{100} \right)^2, \quad g_A(e) = 25 \left(\frac{e}{100} \right)^2. \quad (1)$$

Subjects are presented information on the cost of effort in a table where each possible effort and its associated cost is displayed. The effort levels of agents are recorded using the strategy method, which elicits an effort level for both cases, when the principals retain decision rights and when these rights are delegated.² Thus, agents choose their effort levels before they know

¹Subjects are randomly assigned the role of a principal or an agent and remain in this role throughout the experiment. In the instructions, they were referred to as participant A (principal) and participant B (agent).

²[Fehr et al. \(2013\)](#) test whether the strategy method influences their results by comparing the results of three sessions of the SYM treatment where the strategy method was run ($N = 70$) to one session of the SYM

whether the principal delegated the decision right to them.

In the third stage, we elicit beliefs of both subjects. Both principals and agents are asked about their beliefs regarding the effort of the other party in cases where decision rights are retained and where they are delegated. To prevent hedging, no incentives are used in the elicitation of beliefs.

In the fourth stage, the agent is informed about whether the principal kept or transferred the decision right. Given a subject's effort for the principal's assignment of authority, a random process determines whether that subject learns the payoffs of all projects or whether the subject stays uninformed. The effort of the other party is not revealed, nor is information indicating the success or failure of the other party's effort. All information gained at this stage is private.

In the fifth stage, the subordinate is given the ability to recommend a project to the controlling party. This is accomplished by visibly marking a single project on the computer screen, which can include the outside option. The recommended project is shown to the controlling party.

In the final stage, after seeing the recommended project of the subordinate and the information about the projects that result from own effort, the controlling party selects a project. Payment for the round is based on the selected project and the costs of effort of each subject.

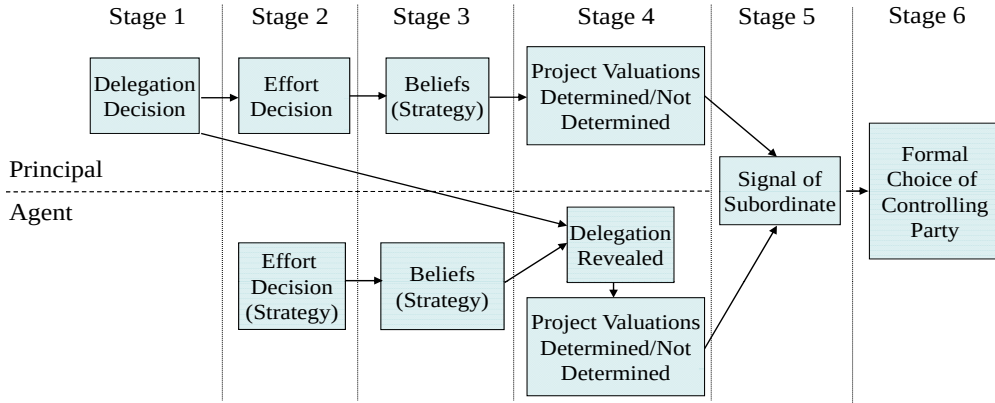


Figure 1: Experimental procedures in the authority game

The experimental setup allows us to derive precise theoretical predictions. Recall that there are four types of projects, P, A, N and O , the payoffs of which to the principal (P_i) and to the agent (A_i) can be ordered as follows: $P_P > P_A > P_O > P_N$ and $A_A > A_P > A_O > A_N$. The potential values of all projects are known, but all projects initially look identical ex ante (except for the outside option). Information must be collected in order to differentiate between them, at the costs specified in equation 1.

treatment where a standard elicitation method was used ($N = 30$). They find no differences in behaviors across treatments.

We can solve for the subgame perfect equilibria of this game under the assumption that the principal and agent are risk neutral. For a given effort level and implemented project k , the principal's utility is $P_k - g_P(E)$, and the agent's utility is $A_k - g_A(e)$.

We denote the party that has authority as the controlling party while the party without authority is called the subordinate. For each party, the expected value for selecting a project at random is less than their respective outside option. Thus, under the assumption of risk neutrality or risk aversion, the subordinate prefers to recommend the outside option rather than a random project. Similarly, an uninformed controlling party never chooses unilaterally to undertake a project other than the outside option.

Given that $A_A > A_P > A_O$, and $P_P > P_A > P_O$, the subordinate always has an incentive to recommend his or her preferred project to the controlling party. The controlling party has an incentive to follow this recommendation if uninformed and to overrule the project and implement his or her preferred project if informed. It follows that if the principal keeps control, the utilities of a risk-neutral principal and agent are

$$EV_P = E\hat{P}_P + (1 - E)e\hat{P}_A + P_O - g_P(E), \quad (2)$$

$$EV_A = E\hat{A}_P + (1 - E)e\hat{A}_A + A_O - g_A(e), \quad (3)$$

where

$$\hat{P}_i = P_i - P_O, \text{ for } i \in \{1, 2\}, \quad (4)$$

$$\hat{A}_i = A_i - A_O, \text{ for } i \in \{1, 2\}. \quad (5)$$

If the agent receives control, the utility of the principal and agent are

$$EV_P^d = (1 - e)E\hat{P}_P + e\hat{P}_A + P_O - g_P(E), \quad (6)$$

$$EV_A^d = (1 - e)E\hat{A}_P + e\hat{A}_A + A_O - g_A(e), \quad (7)$$

where the superscript d denotes the expected payoffs in the delegation case.

From Equations 2 and 3, the reaction functions if the principal keeps control are the solutions to the following first order conditions:

$$\hat{P}_P - e\hat{P}_A = g'_P(E), \quad (8)$$

$$(1 - E)\hat{A}_A = g'_A(e). \quad (9)$$

If the agent receives control, the reaction functions of the principal and agent are the

solutions to:

$$(1 - e)\hat{P}_P = g'_P(E), \quad (10)$$

$$\hat{A}_A - E\hat{A}_P = g'_A(e), \quad (11)$$

The subgame perfect equilibria of both the subgame in which the principal keeps and the subgame in which the principal delegates control follow directly from these reaction functions.

2.2 Treatments and Hypotheses

We implemented two treatments in a within-subjects design. Treatments vary in the amount that the agent is paid for the selection of the principal’s preferred project P . Table 1 summarizes the value of projects across the two treatments. The two treatments are identical to the SYM and ASYM treatments in Fehr et al. (2013). In each treatment, each party earns 40 points for the selection of their preferred project and a smaller amount for the other party’s preferred project. In the SYM treatment, the payoffs from the other party’s preferred project are symmetric for the principal and agent. In the ASYM treatment, the payoffs from the other party’s preferred project are symmetric with a payoff of 35 for the principal, but 20 for the agent.

Table 1: Overview of Project Payoffs

	Project P		Project A		Outside	Other
	Principal	Agent	Principal	Agent	Option	Projects
SYM	40	35	35	40	10	0
ASYM	40	20	35	40	10	0

Table 2 shows the predicted Nash equilibrium effort levels and expected profits for each treatment and the respective cases in which authority is kept and transferred. As can be seen in table 2, the principal should optimally delegate authority in both treatments because expected profits are higher in case of delegation (SYM: $EV_P = 23.3$ vs. $EV_P^d = 24.0$; ASYM: $EV_P = 25.6$ vs. $EV_P^d = 20.1$).

The main focus on this study will be on effort provision of agents. Importantly, table 2 shows that the predicted effort levels of principal and agent under principal control are identical across the two treatments. The reason for this can be seen in the first-order conditions derived above. The payoff to the agent when the principal’s preferred project is chosen, $\hat{A}_P$, is the only parameter that varies across the two treatments. This parameter does not impact either first-order condition under principal control. It only affects incentives and subgame perfect

Table 2: Predicted Nash effort levels and expected profits

	Principal has control				Agent has control				Delegation?
	E^{NE}	e^{NE}	EV_P	EV_A	E^{dNE}	e^{dNE}	EV_P^d	EV_A^d	
SYM	45	35	23.3	24.0	35	45	24.0	23.3	Yes
ASYM	45	35	23.3	17.2	25	55	25.6	20.1	Yes

Nash equilibrium predictions for the principal's effort are denoted by E^{NE} in case of keeping authority and E^{dNE} in case of delegating the decision right to the agent. Nash equilibrium predictions for the agent's effort are denoted by e^{NE} in case the principal keeps the decision right and e^{dNE} in case the principal delegated the right to the agent. EV_P , and EV_P^d denote expected equilibrium profits for the principal depending on the decision right allocation. EV_A and EV_A^d denote expected equilibrium profits for the agent depending on the decision right allocation.

equilibria in the delegation subgame. Thus point predictions under kept control are identical across treatments.

Note also that aggregate expected profits $EV_P + EV_A$ are independent of the allocation of authority under SYM. In contrast, both parties are better off in the equilibrium of the subgame following delegation under ASYM. Thus, delegation is efficient and, from a purely monetary perspective, in the interest of both parties under ASYM.

The differential payoff consequences of delegation in SYM and ASYM form the basis of our legitimacy hypothesis: Under SYM, parties are fully symmetric and thus no party can derive a claim to be the legitimate holder of authority purely based on the game characteristics. In contrast, agent control is the efficient allocation of the decision right under ASYM. Delegation raises expected profits of both agent and principal in ASYM, and thus the legitimacy for the agent obtaining the decision right can be derived from the game structure.

If the principal retains her decision right, the agent may not perceive this action as illegitimate under SYM. However, the agent should be more likely to perceive the principal as holding illegitimate authority under ASYM. These considerations lead to our first hypothesis, which at the same time serves as a manipulation check for treatment effects on perceived legitimacy:

Hypothesis 1. *When project payoffs are asymmetric and adverse for agents (ASYM), agents perceive the principal retaining her decision right as illegitimate, compared to when project payoffs are symmetric (SYM).*

We have seen before that predicted effort levels of agents remain unaffected by the treatment when the principal does not delegate. If, however, perceptions of legitimacy affect motivation, this prediction may not hold.

Hypothesis 2. *When the principal does not delegate the decision right, agents provide lower effort in a situation in which they perceive the allocation of the decision right to be rather*

illegitimate (ASYM), compared to a situation in which they perceive the allocation as rather legitimate (SYM).

Of course, if perceptions of legitimacy have an effect on agent motivation, principals may anticipate such an effect and adjust their own effort provision, which in turn may be anticipated by agents. Thus, as an additional assessment of effects of perceptions of legitimacy on agent motivation, we assess the difference in actual effort provision to the best-response, based on agents' beliefs. If legitimacy indeed affects motivation, agent effort should be lower under principal control in ASYM, relative to the best-response:

Hypothesis 3. *When the principal retains the decision right, agents provide lower effort relative to the theoretical best-response to their beliefs in a situation in which they perceive the allocation of the decision right to rather illegitimate (ASYM) compared to a situation in which they perceive the allocation as rather legitimate (SYM).*

2.3 Procedures

The experiment was computerized using the software oTree ([Chen et al., 2016](#)) and conducted at FriLab, the laboratory of the University of Fribourg, Switzerland. Sessions took place in November and December 2021 and in February 2022.

In total, 202 subjects participated in the experiment, divided into 13 sessions. An average session thus featured around 16 participants. A session lasted on average 75 minutes. Participants received a show-up fee of CHF 10 and a variable part depending on their choices in the game. The variable payoff amounted on average to approximately CHF 33, yielding an average total payout of approximately CHF 43. This translates to an average hourly compensation of approximately CHF 34 (which is about \$37 or €34 as of 3 January 2023.)

The subject pool is composed of students of the bilingual University of Fribourg, which is why the experiment was conducted either in German or French. 116 subjects participated in a French session and 86 subjects participated in German sessions.³

The order of the within-subject treatments SYM and ASYM was randomized within session, allowing us to control for order effects. Each treatment was played for five rounds. Thus, the experiment lasted a total of 10 rounds.

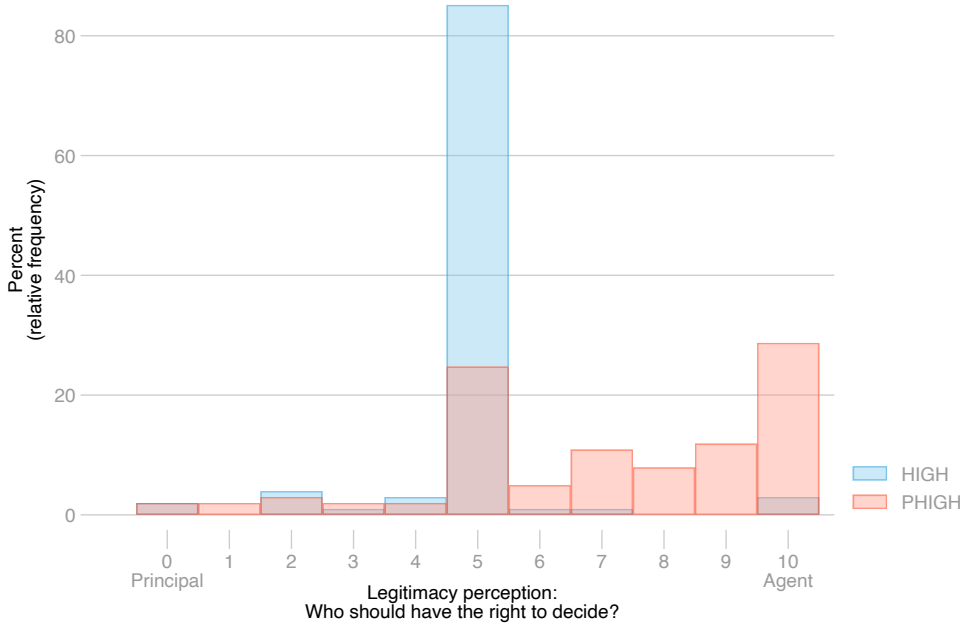
³Note that some subjects may speak both languages. As a result, the language of the experimental session does not need to — but in most cases very likely does — align with subjects' mother tongue.

3 Results

3.1 Agents' perception of legitimacy

Hypothesis 1 examines whether agents perceive the principal's retention of decision-making authority as more legitimate when project payoffs are symmetric between the principal and the agent (SYM) than when payoffs are asymmetric and adverse for the agent (ASYM).

Figure 2: The perception of legitimacy



Note: The graph displays a histogram of how legitimate the agents perceive the allocation of the decision right. On a 11-point Likert scale, agents were requested to state who they think should legitimately have the right to decide, with the midpoint of the scale, i.e., 5, representing indifference. The two groups significantly differ among their mean and median (paired t test: $p < .001$, Wilcoxon signed-rank: $p < .001$) as well as their distribution (Kolmogorov-Smirnov: $p < .001$).

Figure 2 provides strong support for Hypothesis 1. When project payoffs are symmetric (SYM), 85.15% of the agents indicate indifference whether the principal or the agent should have the decision right, and only 4.95% of agents perceive it as illegitimate that the principal has the decision right.

In sharp contrast, a striking majority of agents (64.36%) believe that they should have the decision-making authority instead of the principal when project payoffs are asymmetrically in favor of the principal. The share of indifferent agents decreases to 35.64% in the asymmetric treatment, compared to 85.15% in the symmetric treatment.

Therefore, agents perceive the allocation of the decision right to the principal as significantly less legitimate when project payoffs are asymmetrically in favor of the principal, which confirms

our pre-registered Hypothesis 1 (paired t test: $p < .001$, Wilcoxon signed-rank: $p < .001$).

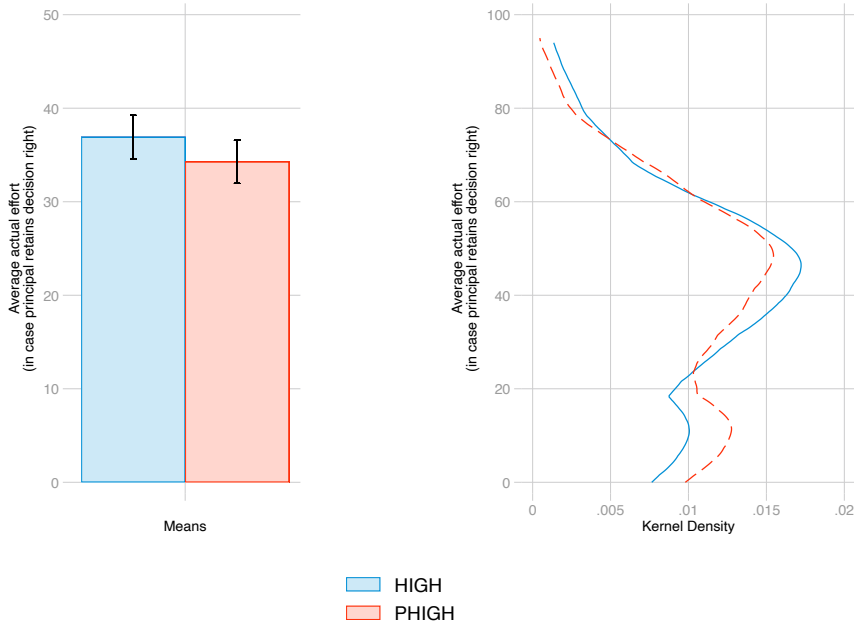
Result 1. *The principal always has the right to decide whether to delegate or not. Agents perceive this circumstance as significantly less legitimate when project payoffs are asymmetrically adverse for them than when project payoffs are symmetric between principal and agent.*

Result 1 confirms that we successfully induced a perception of illegitimacy in the ASYM treatment.

3.2 Agents' effort

Hypothesis 2 investigates whether this change in the perception of legitimacy also translates to behavior. Recall that the Nash equilibrium is identical in both conditions. Therefore, when agents choose the game-theoretic effort level, effort should be independent of the treatment condition. However, we hypothesize that agents will reduce their effort when they perceive the allocation of the decision right as illegitimate. As a result, we predict that agents will exert lower effort in the ASYM treatment than in the SYM treatment.

Figure 3: Exerted effort in case of no delegation



Note: The left panel of the graph displays by treatment the means of agents' average effort over the five periods in case the principal retains decision right. Whiskers indicate standard errors of the mean. The right panel displays by treatment the kernel density estimates of agents' average effort over the five periods. Epanechnikov kernel with the optimal bandwidth is used. The two groups significantly differ among their mean and median (Paired t test: $p = .086$, Wilcoxon signed-rank: $p = .067$) as well as their distribution (Kolmogorov-Smirnov: $p < .001$).

The left panel of Figure 3 plots the means of agents' average effort in the five periods in

case the principal retains the decision right.⁴ In the symmetric treatment SYM, agents provide on average an effort of 36.91 when principals do not delegate. In the asymmetric treatment ASYM, agents exert on average an effort of 34.27. Therefore, in line with our hypothesis, agents reduce effort by 2.64 or approx. 7% in the illegitimate situation. This difference, however, is only marginally significant (paired t test: $p = .086$, Wilcoxon signed-rank: $p = .067$) and above our pre-registered significance level of 5%.

The full distribution of agents' effort is displayed in the right panel of Figure 3, in which the kernel densities of the two groups are plotted. We observe that treatment ASYM has indeed more mass than SYM around lower effort levels, indicating that agents' effort is lower in this condition. In contrast, in ASYM, there is less mass at medium to SYM effort levels. The two distributions significantly differ (Kolmogorov-Smirnov: $p < .001$), which suggests that agents indeed reduce their effort in the asymmetric treatment ASYM.

Result 2. *Agents reduce effort in situation ASYM, in which they perceive the allocation of the decision right to the principal as more illegitimate. However, this difference is statistically only marginally significant.*

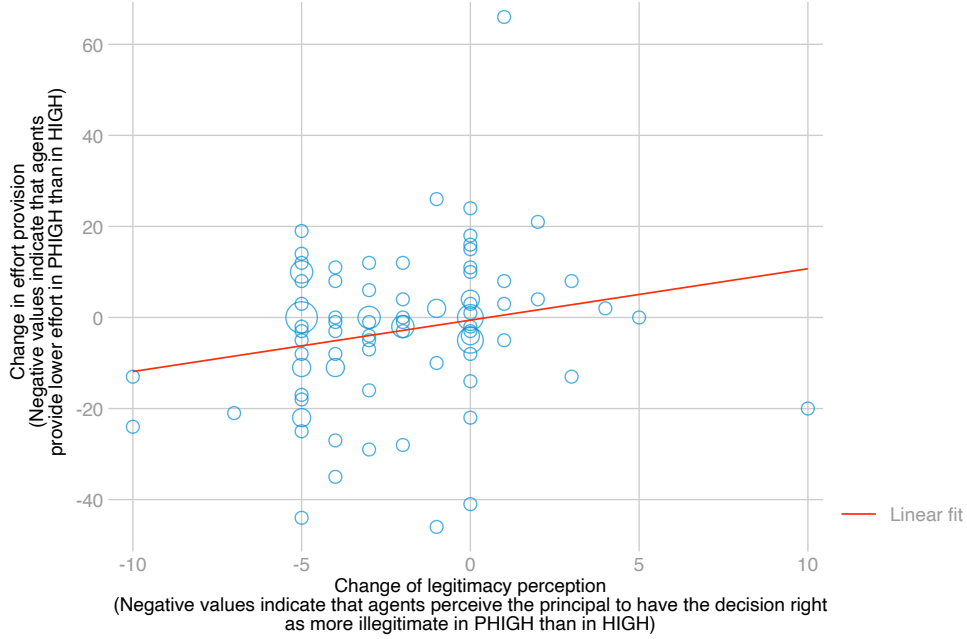
Interestingly, agents effort provision in both treatments does not significantly differ from the Nash strategy. In contrast, their effort level is surprisingly close to and statistically indistinguishable from the Nash equilibrium, which is 35 in either condition. In SYM, agents provide an effort of 36.91 and therefore on average overprovide effort by 1.91 relative to the Nash equilibrium, but insignificantly so (t test against the theoretical value of 0: $p = .412$). In ASYM, agents provide an effort of 34.27 and therefore on average underprovide effort by -.73 relative to the Nash strategy. Again, this difference is not distinguishable from zero (t test against the theoretical value of 0: $p = .752$). Thus, our data is in sharp contrast to Fehr et al. (2013) who find a substantial and significant underprovision of effort relative to Nash of 8.5 in SYM and 17.7 in ASYM.

Our data also allows us to assess the impact of legitimacy perceptions on behavior at the individual level. To this end, we compute the first difference between perceived legitimacy in SYM and ASYM, as well as the change in effort provision from SYM to ASYM. If perceived illegitimacy of the decision right translates into behavior, we would expect a significant correlation between these two variables.

Figure 4 shows a scatterplot of these data together with a regression line. It can be seen

⁴For the ease of visualization and analysis, we average effort across the five periods by each participant and conduct simple paired tests. This is because using the panel structure of the dataset and clustering standard errors on matching group level does not lead to substantially different p values than the paired tests. For example, for the paired t test reported in Figure 3, a random effect panel regression with clustered standard errors reveals a p value of $p = .084$, compared to the paired t test of $p = .086$.

Figure 4: Relationship between the change in provided effort and the change in legitimacy perception



Note: The scatter plots the change in effort provision from SYM to ASYM against the change in perceived legitimacy. The solid red line represents fitted values from a simple linear regression.

that there is a positive relationship, meaning that a stronger shift in the legitimacy perception is associated with a stronger change in effort. Indeed, the correlation is statistically significant (Pearson’s $r = .19, p = .057$; Spearman’s $\rho = .21, p = .035$). This suggests that agents who perceive project ASYM as more illegitimate also reduce effort accordingly.

Synthesizing these results, we find that agents perceive the principal to have the decision right as less legitimate in ASYM, and in turn their motivation to provide effort is reduced, at least marginally.

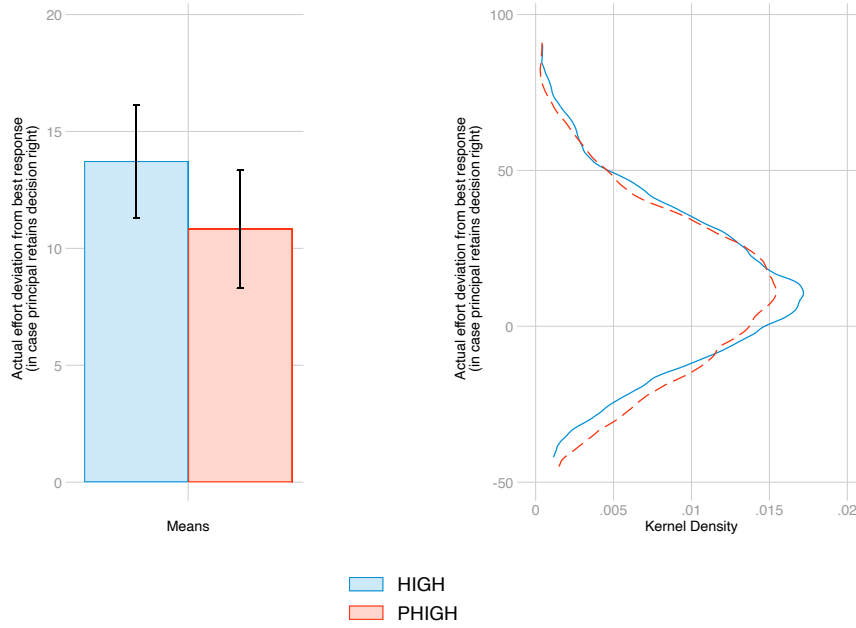
3.3 Agents’ deviation from the best response to their beliefs

While our experiment was designed to keep monetary incentives under agent control exactly identical across treatments, agents may have believed that principals change their behavior across treatments (possibly in response to an anticipated reaction of the agent to the legitimacy of the organizational structure). However, since effort levels are strategic substitutes in this game, a reduction in own motivation could then also partially be a response to an increase in believed principal effort. We find that agents believe that principals will exert on average an effort of 61, regardless of the treatment condition (61.37 in SYM and 60.93 in ASYM). This implies that agents believe that the principal will overprovide effort relative to Nash, and indeed

beliefs are substantially and significantly different from the predicted Nash level (t test against the theoretical value of 0: $p < .001$ in both treatments).

Based on these beliefs, equation 8 provides the individual best response, based on individual profit maximization. Figure 5 plots the difference of agents' actual exerted effort against this theoretical best-response. We find that agents significantly overprovide effort relative to the theoretical best response, regardless of the treatment condition. In SYM, agents overprovide on average an effort of 13.73 relative to the best response (t test against the theoretical value of 0: $p < .001$). This overprovision is a bit lower in ASYM, but still highly substantial with 10.83 (t test against the theoretical value of 0: $p < .001$). Treatment differences, however, are only marginally significant in a one-sided test (Two-sided Paired t test: $p = .108$). Hence, we only find weak evidence for our hypothesis that agents in ASYM provide lower effort relative to the best response than agents in SYM.

Figure 5: Average deviation of agents' effort provision from the best response to their beliefs



Note: The left panel of the graph displays by treatment the means of agents' average effort deviation over the five periods to the best response to their beliefs, for the case when the principal retains decision right. Whiskers indicate standard errors of the mean. The right panel displays by treatment the kernel density estimates of agents' average effort deviation to the best response over the five periods. Epanechnikov kernel with the optimal bandwidth is used. The two groups do not significantly differ among their mean and median (Paired t test: $p = .108$, Wilcoxon signed-rank: $p = .174$) but regarding their distribution (Kolmogorov-Smirnov: $p < .001$).

Result 3. *Agents best response effort deviation to their belief about the principals' effort is lower in ASYM relative to SYM, but statistical significance of this result is weak.*

4 Conclusion

In this paper, we designed an experiment to study the impact of perceptions of legitimacy of organizational structure on motivation of agents. While the mediating role of legitimacy has received considerable attention when studying behaviors such as obedience with rules or social norms at a societal level, its mediating role to explain behavior within organizations, and in particular its role as a determinant of motivation, have received only limited attention.

Our data provides evidence that perceptions of legitimacy indeed mediate behavior, and that agents reduce their work motivation if they consider organizational structure as inappropriate. Our results thus provide evidence that legitimacy can indeed be a "reservoir of support" for institutions and authorities, something besides immediate self-interest, which shapes reactions to their policies ([Weatherford, 1992](#)), and suggests that organizational legitimacy is not only of relevance for organizations in their interactions with the world outside of the organization, but also matter at the inside.

While we exploit variations in social welfare and social efficiency to exogenously manipulate perceptions of legitimacy, this is obviously not the only source that affects legitimacy perceptions of organizations. The role of expertise, history, legacy or personality as determinants of legitimacy in hierarchies, as well as a more in depths study of how perceptions of legitimacy within organizations and with respect to organizational structure are formed at the individual level, provide interesting avenues for future research.

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