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A principal wants an agent to exert unobservable research effort. Ruling out negative payments implies that (i) the principal cannot punish bad outcomes and (ii) she cannot extract rents. We disentangle these two effects by allowing the principal to place verifiable teaching duties on the agent. In the first scenario, the principal can punish the agent with completely unproductive teaching duties conditional on bad research outcomes. In the second scenario, the agent is forced to teach regardless of research outcomes, though his teaching disutility is larger than the principal's benefit. Each of the two scenarios may involve higher research efforts.

JEL Classification: D86, I23, J41, M52, O32

Keywords: N/A

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Incentivizing Research with (Un)conditional Teaching Duties: Punishment or Rent Extraction?

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Abstract

A principal wants an agent to exert unobservable research effort. Ruling out negative payments implies that (i) the principal cannot punish bad outcomes and (ii) she cannot extract rents. We disentangle these two effects by allowing the principal to place verifiable teaching duties on the agent. In the first scenario, the principal can punish the agent with completely unproductive teaching duties conditional on bad research outcomes. In the second scenario, the agent is forced to teach regardless of research outcomes, though his teaching disutility is larger than the principal's benefit. Each of the two scenarios may involve higher research efforts.

Keywords: Moral hazard; limited liability; hidden action; incentive contracts; job design

JEL classification: D86; I23; J41; M52; O32

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1 Introduction

We reconsider the relationship between a principal (e.g., a university) and an agent who is specialized in conducting research. Following the moral hazard literature, we assume that the agent's research effort is unobservable. By exerting high effort, the agent can increase the probability of a successful research outcome. The principal can condition the agent's wage on the outcome. If both parties are risk-neutral and negative payments are feasible, it is well-known that the principal will implement the first-best solution by making the agent a residual claimant.[1] Yet, as pointed out by Tirole (1999) in the context of his "R&D game", if negative payments are not feasible (limited liability), the principal must leave a rent to the agent if she wants to induce him to exert high effort. In order to avoid leaving a large rent to the agent, the principal might inefficiently implement low effort only.

In the present paper, we highlight the fact that the limited liability assumption has two distinct effects. First, when payments must not be negative, the principal loses the possibility to punish the agent for a bad outcome (therefore she must pay a larger bonus to reward a good outcome, which is costly for the principal). Second, when negative payments are ruled out, the principal loses the possibility to efficiently extract rents from the agent. We disentangle these two effects. Specifically, we derive the optimal solutions when either (i) punishments of bad outcomes but no rent transfers or (ii) inefficient rent extraction but no punishments of bad outcomes are feasible. In order to do so, we suppose that the principal can make use of two different kinds of verifiable teaching duties.

First, suppose the principal can force the agent to teach conditional on the research outcome and the principal derives no direct benefit from the teaching

[1] This is a standard result in contract theory, see e.g. Laffont and Martimort (2002, section 4.2).

activity.[2] From the agent's perspective, having to teach in case of a bad research outcome is a punishment similar to a negative payment. Therefore, the principal can reduce the wage payment that he has to make in case of a good research outcome in order to motivate the agent to exert high research effort. As a consequence, high research effort may be implemented even when this would not be in the principal's interest in the absence of the teaching activity. However, since the utility lost by the agent is not transferred to the principal, the availability of the teaching task may reduce the expected total surplus.

Second, suppose the principal can force the agent to teach a course from which the principal derives some benefit which is smaller than the agent's disutility of teaching, and the teaching task cannot be conditioned on the research outcome.[3] Thus, the teaching activity transfers utility from the agent to the principal, but in contrast to a payment the rent extraction is imperfect. Even though bad outcomes cannot be punished, the availability of the teaching task may lead the principal to induce high research effort when this would not be in her interest in the absence of teaching. The reason is that inducing high effort becomes more attractive for the principal when she can extract the agent's rent, albeit in an inefficient way only. Yet, since the principal's benefit from the agent's teaching is outweighed by the agent's disutility, overall the availability of the teaching task may again reduce the expected total surplus.

When the principal can choose between the two scenarios, she prefers the second scenario if her benefit from the agent's teaching is relatively large (i.e., if the researcher has sufficient teaching talent), while she prefers the first scenario

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[2]For example, the agent might have to duplicate a lecture that is already given by someone else and it makes no appreciable difference for the students whether there are 400 or 200 students in the lecture hall.

[3]For example, the principal lets the agent be in charge of a course that must be taught according to the curriculum, so it is not possible to condition on the research outcome. However, the principal would derive a larger benefit from the course if from the outset someone specialized in teaching would be in charge, so letting the researcher teach is inefficient.

otherwise. Taken together, our analysis explains why a principal might want to bundle research activities with certain kinds of teaching duties, but it also shows that doing so can be welfare-reducing.

Related literature. Early contributions to the moral hazard literature were based on the trade-off between incentives and insurance when agents are risk-averse. However, by now moral hazard models with risk-neutral agents and limited liability have become an increasingly popular workhorse model in applied contract theory.[4] Our baseline model in section 2 below captures the main features of the single-task version of such a setting. In order to disentangle the effects of the limited liability assumption, we consider two different multi-task models in sections 3 and 4, and we compare them in section 5.[5] Our model is related to several papers in the literature in which the principal uses inefficient means in order to (at least partially) extract the agent's limited liability rent. For example, Macho-Stadler et al. (2008) consider a model in which the value of an innovation depends on verifiable capital investments, and according to the contract that is optimal for the principal the researcher may have to make such investments even though his capital costs are inefficiently high.[6] More-

[4]For early papers, cf. Innes (1990) and Pitchford (1998). For more recent contributions, see e.g. Au and Chen (2019), Kräkel (2021), Müller and Schmitz (2021), Pi (2021), Kräkel and Schöttner (2022), Schmitz (2022), Leshem and Tabbach (2023), and the literature discussed there.

[5]While traditional multi-task models such as Holmström and Milgrom (1991) were focused on the effort-substitution problem, we follow Bolton and Dewatripont (2005, p. 223) in assuming that the agent's effort costs in one task are independent of whether the agent is also in charge of another task.

[6]See also Schmitz (2005, 2013a), who has shown that it can be profitable for a principal to bundle two tasks both requiring non-verifiable efforts in order to reduce limited liability rents. This fact has also been emphasized in the recent literature on public-private partnerships (where building and operating an infrastructure may be bundled), cf. Schmitz (2013b), Martimort and Straub (2016), Buso and Greco (2021), and Hoppe and Schmitz (2021). See also Chwe (1990) for a moral hazard model with risk aversion and costly punishment.

over, in the finance literature on costly collaterals discussed by Tirole (2006, chapter 4), surplus may also be transferred in an inefficient way from an agent to a principal.[7] Yet, to the best of my knowledge, so far the effects of pure punishment and inefficient rent extraction have not been directly compared in a unified framework in the existing literature. Moreover, the fact that unobservable research and verifiable teaching tasks are often bundled even though empirically the required abilities seem to be unrelated (see section 6 below) has not yet been discussed along the lines of the agency-theoretic considerations highlighted in the present paper.

2 The baseline model

Consider two risk-neutral parties, a principal and an agent.[8] At date 0, the principal offers a contract to the agent. The agent accepts the contract if in expectation he will get at least his reservation utility zero. At date 1, the agent exerts unobservable effort $e \in \{e_L, e_H\}$, where $0 < e_L < e_H < 1$. The agent's disutility of effort is $\psi(e)$, where $\psi(e_H) = c > 0$ and $\psi(e_L) = 0$. At date 2, the verifiable outcome of the agent's research activity is realized. With probability e there is a success which yields benefit $B > 0$ to the principal, while otherwise there is a failure (yielding no benefit to the principal). Note that in a first-best world high effort would be exerted whenever $e_H B - c \geq e_L B$ holds.

Let w_1 and w_0 denote the wage payments that the agent gets in case of a success and a failure, respectively. Hence, the agent's expected payoff is

$$u_A = ew_1 + (1 - e)w_0 - \psi(e),$$

[7] Note that in Tirole's (2006) setting the agent (i.e., the borrower) has no effort costs (but derives a private benefit from shirking) and the principal (i.e., the lender) makes zero profits due to competition (while we follow the standard principal-agent model in assuming that the principal has all bargaining power).

[8] Our baseline model builds on the complete contracting variant of Tirole's (1999, p. 745) "R&D game".

the principal's expected payoff is

$$u_P = e(B - w_1) - (1 - e)w_0,$$

and the expected total surplus is

$$S = eB - \psi(e).$$

The principal sets w_1 and w_0 in order to maximize u_P subject to the relevant constraints. Specifically, the agent is willing to accept the contract whenever the participation constraint $u_A \geq 0$ holds. Moreover, the agent chooses high effort ($e = e_H$) whenever the incentive compatibility constraint

$$e_H w_1 + (1 - e_H)w_0 - c \geq e_L w_1 + (1 - e_L)w_0$$

holds. As is well-known, if negative payments are feasible, then the principal will implement the first-best solution that maximizes the expected total surplus by making the agent a residual claimant.[9]

Yet, in the remainder of the paper we assume that the payments cannot be negative, so the limited liability constraints $w_1 \geq 0$, $w_0 \geq 0$ must hold. It is optimal for the principal to set the wages equal to zero if she wants to induce low effort only. If she wants to implement high effort, it is straightforward to show that the incentive compatibility constraint and the constraint $w_0 \geq 0$ are binding.[10]

Proposition 1 *If $B \geq \frac{e_H}{(e_H - e_L)^2}c$, it is optimal for the principal to set $w_1^{LL} = \frac{c}{e_H - e_L}$ and $w_0^{LL} = 0$, such that $e^{LL} = e_H$, $u_A^{LL} = \frac{e_L}{e_H - e_L}c$, $u_P^{LL} = e_H(B - \frac{c}{e_H - e_L})$, and $S^{LL} = e_H B - c$. Otherwise, it is optimal for the principal to set $w_1^{LL} = w_0^{LL} = 0$, such that $e^{LL} = e_L$, $u_A^{LL} = 0$, and $u_P^{LL} = S^{LL} = e_L B$.*

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[9] If $B \geq \frac{1}{e_H - e_L}c$, it is optimal for the principal to set $w_1^{FB} = c + (1 - e_H)B$ and $w_0^{FB} = c - e_H B < 0$, such that $e^{FB} = e_H$, $u_A^{FB} = 0$, and $u_P^{FB} = S^{FB} = e_H B - c$. Otherwise, it is optimal for the principal to set $w_1^{FB} = w_0^{FB} = 0$, such that $e^{FB} = e_L$, $u_A^{FB} = 0$, and $u_P^{FB} = S^{FB} = e_L B$. Observe that in the first case the payment w_0^{FB} is strictly negative.

[10] See e.g. Laffont and Martimort (2002, section 4.3) for the standard way to solve moral hazard models with risk neutrality and limited liability.

Thus, if $\frac{1}{e_H - e_L}c < B < \frac{e_H}{(e_H - e_L)^2}c$ holds, only low effort is implemented, while high effort would be first-best. Observe that ruling out negative payments has two distinct effects. First, the agent cannot be punished for a bad outcome. Second, utility cannot be efficiently transferred from the agent to the principal. In the standard moral hazard model with limited liability both effects emerge simultaneously. In what follows, we allow the principal to use two different kinds of verifiable tasks (i.e., teaching duties) in order to disentangle these two effects.

3 Scenario PU: Punishment

Suppose that there is a teaching task that can be conditioned on the outcome of the agent's research activity. When the agent has to teach $x \geq 0$ hours, he incurs a disutility kx, where $k > 0$. The principal derives no direct benefit from the agent's teaching activity. Thus, the principal can tailor the teaching duty in order to punish the agent, but teaching does not transfer any utility from the agent to the principal.[11]

A contract can now specify a wage and teaching pair (w_1, x_1) for a good research outcome and (w_0, x_0) for a bad outcome. The agent's expected payoff now reads

$$\hat{u}_A = e(w_1 - kx_1) + (1 - e)(w_0 - kx_0) - \psi(e),$$

while the principal's expected payoff remains unchanged,

$$\hat{u}_P = e(B - w_1) - (1 - e)w_0,$$

so the expected total surplus is

$$\hat{S} = e(B - kx_1) - (1 - e)kx_0 - \psi(e).$$

It is optimal for the principal to set the wages and teaching loads equal to zero if she wants to induce low research effort only. If the principal wants

[11] Note that in a first-best world x would always be set equal to zero.

to induce high effort, she designs a contract maximizing her expected payoff subject to the incentive compatibility constraint

$$e_H(w_1 - kx_1) + (1 - e_H)(w_0 - kx_0) - c \geq e_L(w_1 - kx_1) + (1 - e_L)(w_0 - kx_0),$$

the participation constraint

$$e_H(w_1 - kx_1) + (1 - e_H)(w_0 - kx_0) - c \geq 0,$$

and the limited liability constraints $w_1 \geq 0$, $w_0 \geq 0$. It is straightforward to see that the principal does not want to punish the agent for a good outcome and she does not want to reward him for a bad outcome, so $x_1 = 0$ and $w_0 = 0$. In the optimal solution, the incentive compatibility constraint, the participation constraint, and the constraint $w_0 \geq 0$ are binding.

Proposition 2 *Consider scenario PU (punishment).*

(i) If $B \geq \frac{(1-e_L)e_H}{(e_H-e_L)^2}c$, it is optimal for the principal to set $w_1^{PU} = \frac{1-e_L}{e_H-e_L}c$, $x_1^{PU} = 0$, and $w_0^{PU} = 0$, $x_0^{PU} = \frac{1}{k}\frac{e_L}{e_H-e_L}c$, such that $e^{PU} = e_H$, $\hat{u}_A^{PU} = 0$, and $\hat{u}_P^{PU} = \hat{S}^{PU} = e_H(B - \frac{1-e_L}{e_H-e_L}c)$. Otherwise, it is optimal for the principal to set $w_1^{PU} = w_0^{PU} = 0$, $x_1^{PU} = x_0^{PU} = 0$, such that $e^{PU} = e_L$, $\hat{u}_A^{PU} = 0$, and $\hat{u}_P^{PU} = \hat{S}^{PU} = e_L B$.

(ii) The availability of the teaching task increases the research effort ($e^{PU} > e^{LL}$) if $\frac{(1-e_L)e_H}{(e_H-e_L)^2}c < B < \frac{e_H}{(e_H-e_L)^2}c$.

(iii) The availability of the teaching task is welfare-reducing ($\hat{S}^{PU} < S^{LL}$) if $B > \frac{e_H}{(e_H-e_L)^2}c$.

Even though in scenario PU the principal does not directly benefit from the teaching task, the possibility to punish the agent implies that the principal may induce a larger research effort. Yet, if the benefit derived from successful research is sufficiently large, the principal would induce high research effort anyway, so the availability of the punishment opportunity can actually reduce the expected total surplus.

4 Scenario RE: Rent extraction

Suppose now that there is a teaching task that cannot be conditioned on the outcome of the agents' research activity. When the agent teaches $y \geq 0$ hours, he incurs a disutility κy and the principal derives a benefit by, where $\kappa > b > 0$. Hence, teaching transfers utility from the agent to the principal, though in an inefficient way.[12]

A contract can now specify a teaching duty y and, as before, wages w_1 and w_0 depending on the outcome. The agent's expected payoff is

$$\tilde{u}_A = ew_1 + (1-e)w_0 - \kappa y - \psi(e),$$

the principal's expected payoff reads

$$\tilde{u}_P = e(B - w_1) - (1-e)w_0 + by,$$

and the expected total surplus is

$$\tilde{S} = eB - (\kappa - b)y - \psi(e).$$

Note that the agent's incentive compatibility constraint remains the same as in the baseline model, while the participation constraint now is $\tilde{u}_A \geq 0$. Moreover, the limited liability constraints $w_1 \geq 0$, $w_0 \geq 0$ must be satisfied. If the principal wants to induce high research effort, in the profit-maximizing solution the incentive compatibility constraint, the participation constraint, and the constraint $w_0 \geq 0$ are binding.

Proposition 3 *Consider scenario RE (rent extraction).*

(i) If $B \geq \frac{e_H - \frac{b}{\kappa}e_L}{(e_H - e_L)^2}c$, *it is optimal for the principal to set* $w_1^{RE} = \frac{c}{e_H - e_L}$, $w_0^{RE} = 0$, $y^{RE} = \frac{1}{\kappa}\frac{e_L}{e_H - e_L}c$, *such that* $e^{RE} = e_H$, $\tilde{u}_A^{RE} = 0$, *and* $\tilde{u}_P^{RE} = \tilde{S}^{RE} = e_H(B - \frac{c}{e_H - e_L}) + \frac{b}{\kappa}\frac{e_L}{e_H - e_L}c$. *Otherwise, it is optimal for the principal to set* $w_1^{RE} = w_0^{RE} = 0$, $y^{RE} = 0$, *such that* $e^{RE} = e_L$, $\tilde{u}_A^{RE} = 0$, *and* $\tilde{u}_P^{RE} = \tilde{S}^{RE} = e_L B$.

[12] Note that in a first-best world y would be set equal to zero.

(ii) The availability of the teaching task increases the research effort ($e^{RE} > e^{LL}$) if $\frac{e_H - \frac{b}{\kappa}e_L}{(e_H - e_L)^2}c < B < \frac{e_H}{(e_H - e_L)^2}c$.

(iii) The availability of the teaching task is welfare-reducing ($\tilde{S}^{RE} < S^{LL}$) if $B > \frac{e_H}{(e_H - e_L)^2}c$.

Even though in scenario RE the principal cannot condition the teaching task on the research outcome, the research effort may be larger when the teaching task is available.[13] Yet, if the benefit derived from successful research is sufficiently large, the principal would induce high research effort anyway, so she uses the teaching task only to inefficiently extract rents from the agent. Thus, the availability of the teaching task can reduce the expected total surplus.

5 Comparison

We can now compare the two scenarios.

Proposition 4 *(i) Suppose that $\frac{b}{\kappa} < e_H$. If $B > \frac{(1-e_L)e_H}{(e_H - e_L)^2}c$, the principal prefers scenario PU ($\hat{u}_P^{PU} > \tilde{u}_P^{RE}$). If in addition $B < \frac{e_H - \frac{b}{\kappa}e_L}{(e_H - e_L)^2}c$, the research effort is larger in scenario PU ($e^{PU} > e^{RE}$).*

(ii) Suppose that $\frac{b}{\kappa} > e_H$. If $B > \frac{e_H - \frac{b}{\kappa}e_L}{(e_H - e_L)^2}c$, the principal prefers scenario RE ($\tilde{u}_P^{RE} > \hat{u}_P^{PU}$). If in addition $B < \frac{(1-e_L)e_H}{(e_H - e_L)^2}c$, the research effort is larger in scenario RE ($e^{RE} > e^{PU}$).

When both kinds of teaching tasks are available, the solution is as described in scenario PU if $\frac{b}{\kappa} < e_H$, while it is as in scenario RE if $\frac{b}{\kappa} > e_H$. Thus, the principal prefers scenario RE if the principal's benefit from the teaching activity is sufficiently large relative to the researcher's disutility of teaching.

[13] The reason is that the principal can use the teaching task to extract rent from the agent, which implies that inducing high effort becomes more attractive for the principal.

6 Concluding remarks

Researchers who are specialized in conducting research may not be talented teachers. Indeed, empirical studies have found almost no correlation between the quality of research and the quality of teaching (see Hattie and Marsh, 1996; Marsh and Hattie, 2002).[14] Nevertheless, universities place teaching duties on researchers. In the present paper, we have shown that when negative wage payments are not feasible, universities may bundle unobservable research tasks with different kinds of verifiable teaching tasks in order to (i) punish bad research outcomes and (ii) extract rents from researchers. However, while forcing researchers to teach can be a profitable strategy for universities, we have found that overall it may actually be welfare-reducing.

[14] See also Stappenbelt (2013), who concludes that teaching and research activities should be unbundled from the students' perspective. Matthews and Kotzee (2022) point out that according to what universities themselves write in institutional texts, teaching and research may not be in a mutually beneficial entanglement.

References

Au, P.H., Chen, B.R., 2019. Objective and subjective indicators in long-term contracting. *Journal of Economic Behavior and Organization* 166, 309–331.

Bolton, P., Dewatripont, M., 2005. *Contract Theory.* MIT Press.

Buso, M., Greco, L., 2021. The optimality of public-private partnerships under financial and fiscal constraints. Marco Fanno Working Paper No. 276.

Chwe, M.S.Y., 1990. Why were workers whipped? Pain in a principal-agent model. *Economic Journal* 100, 1109–1121.

Hattie, J., Marsh, H.W., 1996. The relationship between research and teaching: A meta-analysis. *Review of Educational Research* 66, 507–542.

Holmström, B., Milgrom, P., 1991. Multitask principal-agent analyses: Incentive contracts, asset ownership, and job design. *Journal of Law, Economics and Organization* 7, 24–52.

Hoppe, E.I., Schmitz, P.W., 2021. How (not) to foster innovations in public infrastructure projects. *Scandinavian Journal of Economics* 123, 238–266.

Innes, R.D., 1990. Limited liability and incentive contracting with ex-ante action choices. *Journal of Economic Theory* 52, 45–67.

Kräkel, M., 2021. On the delegation of authority. *Journal of Economic Behavior and Organization* 191, 965–981.

Kräkel, M., Schöttner, A., 2022. The impact of haggling costs on the optimal organizational design for sales forces. *Management Accounting Research* 54, 100770.

Laffont, J.-J., Martimort, D., 2002. *The Theory of Incentives.* Princeton University Press.

Leshem, S., Tabbach, A., 2023. The option value of record-based sanctions. *Games and Economic Behavior* 137, 1–22.

Macho-Stadler, I., Pérez-Castrillo, D., Veugelers, R., 2008. Designing contracts for university spin-offs. *Journal of Economics and Management Strategy* 17, 185–218.

Marsh, H.W., Hattie, J., 2002. The relation between research productivity and teaching effectiveness: Complementary, antagonistic, or independent constructs? *Journal of Higher Education* 73, 603–641.

Martimort, D., Straub, S., 2016. How to design infrastructure contracts in a warming world: A critical appraisal of public-private partnerships. *International Economic Review* 57, 61–88.

Matthews, A., Kotzee, B., 2022. Bundled or unbundled? A multi-text corpus-assisted discourse analysis of the relationship between teaching and research in UK universities. *British Educational Research Journal* 48, 578–597.

Müller, D., Schmitz, P.W., 2021. The right to quit work: An efficiency rationale for restricting the freedom of contract. *Journal of Economic Behavior and Organization*, 184, 653–669.

Pi, J., 2021. An investigation of seeming favoritism in public procurement. *Manchester School* 89, 128–137.

Pitchford, R., 1998. Moral hazard and limited liability: The real effects of contract bargaining. *Economics Letters* 61, 251–259.

Schmitz, P.W., 2005. Allocating control in agency problems with limited liability and sequential hidden actions. *RAND Journal of Economics* 36, 318–336.

Schmitz, P.W., 2013a. Job design with conflicting tasks reconsidered. *European Economic Review* 57, 108–117.

Schmitz, P.W., 2013b. Public procurement in times of crisis: The bundling decision reconsidered. *Economics Letters* 121, 533–536.

Schmitz, P.W., 2022. How (not) to purchase novel goods and services: Specific performance versus at-will contracts. *Economic Journal* 132, 2563–2577.

Stappenbelt, B., 2013. The effectiveness of the teaching-research nexus in facilitating student learning. *Engineering Education* 8, 111–121.

Tirole, J., 1999. Incomplete contracts: Where do we stand? *Econometrica* 67, 741–781.

Tirole, J., 2006. *The Theory of Corporate Finance.* Princeton University Press.