Discussion of:

Dynamic Managerial Compensation: On the Optimality of Seniority-based Schemes

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• Very interesting paper
• A pleasure to read
• Some overlap with some work I’ve been doing (more later)
Paper is written with a lot of generality (part of the contribution)

Focus here on simple (simplest) model

- agent is risk-neutral, $\theta_t \in \{0, h\}$
- $\Pr(\theta_1 = h) = \frac{1}{2}$ and $\Pr(\theta_2 = \theta_1 | \theta_1) = \gamma \geq \frac{1}{2}$
  - so $\gamma = \frac{1}{2}$ represents no persistence

As in paper, two periods; output at time $t$ is $\theta_t + e_t$; cost of effort is $\psi(e_t)$

Given risk-neutrality, wlog postpone compensation to end

Mechanism design problem

- choose 1st-period effort $e_0, e_h$, 2nd-period effort $e_{00}, e_{0h}, e_{ho}, e_{hh}$
- and compensation payments $x_{00}, x_{0h}, x_{ho}, x_{hh}$
- to maximize firm profits
1-period problem (standard, recap)

- firm wants effort levels $e_0$ and $e_h$, so outputs are $e_0$ and $h + e_h$
- but $h$-agent can pretend to be $0$-agent, and work $e_0 - h$

$$x_h - \psi(e_h) \geq x_0 - \psi(e_0 - h)$$

- Also need $0$-agent to participate (IR):

$$x_0 - \psi(e_0) \geq 0$$

- Setting both to equality, firm pays

$$E[x] = \frac{1}{2}\psi(e_0) + \frac{1}{2}\psi(e_h) + \frac{1}{2}(\psi(e_0) - \psi(e_0 - h))$$

- Rent is due to IR: if not present, could reduce both $x_h$ and $x_0$ to eliminate
- Given rent, firm distorts $e_0$ downwards to reduce rent
2-period problem, key constraints

At date 2, $h$-agent happy to deliver desired effort

\[ x_{0h} - \psi(e_{0h}) \geq x_{00} - \psi(e_{00} - h) \tag{1} \]
\[ x_{hh} - \psi(e_{hh}) \geq x_{h0} - \psi(e_{h0} - h) \tag{2} \]

At date 1, $h$-agent happy to deliver desired effort

\[ -\psi(e_h) + \gamma(x_{hh} - \psi(e_{hh})) + (1 - \gamma)(x_{h0} - \psi(e_{h0})) \geq -\psi(e_0 - h) + \gamma(x_{0h} - \psi(e_{0h})) + (1 - \gamma)(x_{00} - \psi(e_{00})) \tag{3} \]

At date 1, $0$-agent’s IR

\[ -\psi(e_0) + (1 - \gamma)(x_{0h} - \psi(e_{0h})) + \gamma(x_{00} - \psi(e_{00})) \geq 0. \tag{4} \]

(2) is non-binding: can increase $x_{hh}$ and decrease $x_{h0}$ while leaving expected payment unchanged $\Rightarrow$ set $e_{hh}$ and $e_{h0}$ to 1st-best

But same manoeuvre with $x_{0h}$ and $x_{00}$ carries a cost: raising $x_{0h}$ tightens date-1 IC $\Rightarrow$ (1) is binding
Firm’s expected cost of effort

Substitution yields

$$E[x] \geq E[\psi(e_1) + \psi(e_2)] + \frac{1}{2} (\psi(e_0) - \psi(e_0 - h)) + \frac{1}{2} (\gamma - (1 - \gamma)) (\psi(e_{00}) - \psi(e_{00} - h)).$$

- Distort $e_0$ and $e_{00}$ downwards, everything else to 1st-best.
- No distortion of $e_{h0}$, why not?
  - already give rent to $\theta_1 = h$; use same rent for efficiency at $t = 2$.
- Distortion of $e_0$ is more severe than of $e_{00}$.
  - provided $\gamma > \frac{1}{2}$, at date 1, $h$-agent knows he might be 0-agent at date 2, so can’t shirk anyway.
- So have increasing effort result.
  - Can map into result about increasing power of incentive pay.

Surprising result

When $\theta$ has little persistence ($\gamma \to \frac{1}{2}$), $e_{00}$ approaches 1st best

At first sight, very surprising
- date 2 after low date 1 output is a one-period problem where the agent isn’t owed any rent
- so why isn’t this just the standard one-period problem, in which low-type effort distorted downwards?

I think the reason is that paper doesn’t impose IR at date 2
- so in particular, can have $x_{00} - \psi(e_{00}) < 0$

If true, a form of indentured servitude
- Although common to assume full commitment from principal in contracting problem, less clear if this is a good assumption for the agent
- Class of problems with one-sided commitment (Phelan 1995 etc)
Alternative simple model of increasing effort and pay

- self-promotion: used in Axelson-Bond (2012)
  - effort cost $\psi(e)$ to attain success probability $e$, agent r.n. with LL
- so at $t = 2$, principal must promise bonus $\psi'(e_2)$ to induce effort $e_2$
  - so agent’s rent is $e_2\psi'(e_2) - \psi(e_2)$
- to incentivize at $t = 1$, principal induces low effort at $t = 2$ after $t = 1$ failure
  - given one-sided commitment, date 2 continuation utility $\geq u$
- so date 1 IC is

\[
\psi'(e_1) = e_2\psi'(e_2) - \psi(e_2) - u
\]

- So $e_1 < e_2$, i.e., rising effort; can also show rising bonus

- One force, shared with current paper:
  - rent delivered after success also incentivizes agent initially
- Distinct force
  - one-sided commitment dampens initial incentives
Summary

- Very interesting paper
- By focusing on simple version of model, I’ve only brushed the surface of paper’s contribution
- At least for labor market applications, authors should consider adding the one-sided commitment constraint
  - i.e., no indentured servitude
- Should still get increasing effort and incentives along the high output path
  - which may match data better than unconditionally increasing effort and incentives