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

$$E[x] = \overbrace{\frac{1}{2}\psi(e_0) + \frac{1}{2}\psi(e_h)}^{\text{agent's cost of effort}} + \frac{1}{2}\overbrace{(\psi(e_0) - \psi(e_0 - h))}^{\text{rent captured by } h\text{-agent}}$$

- 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

$$x_{0h} - \psi(e_{0h}) \geq x_{00} - \psi(e_{00} - h) \quad (1)$$
$$x_{hh} - \psi(e_{hh}) \geq x_{h0} - \psi(e_{h0} - h) \quad (2)$$

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

$$\begin{aligned} & -\psi(e_h) + \gamma(x_{hh} - \psi(e_{hh})) + (1-\gamma)(x_{h0} - \psi(e_{h0})) \\ \geq \quad & -\psi(e_0 - h) + \gamma(x_{0h} - \psi(e_{0h})) + (1-\gamma)(x_{00} - \psi(e_{00})) \quad (3) \end{aligned}$$

- At date 1, 0-agent's IR

$$-\psi(e_0) + (1-\gamma)(x_{0h} - \psi(e_{0h})) + \gamma(x_{00} - \psi(e_{00})) \geq 0. \quad (4)$$

- (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

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

- 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 θ 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 $x_{00} - \psi\left(e_{00}\right) < 0$
- 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
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  - 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 $\geq \underline{u}$
- so date 1 IC is

$$\psi'(e_1) = \overbrace{e_2\psi'(e_2) - \psi(e_2)}^{\text{utility after success}} - \underline{u}$$

- 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