The Existence of Self-Enforcing Implicit Contract Bull (1987)

Kong-Pin Chen

Academia Sinica

Bull (1987)

- This paper studies incentive-provision when very little information can be contracted on.
- Specifically, neither effort nor output is contractible.
- Effort level can be observed by the employer, but not the court.
- The contract can thus only designate how much to pay the worker for their employment relationship, but this payment cannot be contingent on performance (therefore a fixed wage).
- Any additional incentive must be provided in non-legal way.

- This type of contract is called "implicit contract".
- Since effort is observed by the employer, the firm can promise to pay "bonus" to the worker (in addition to the fixed wage), depending on whether the worker exerts effort.
- Since court cannot enforce any performance-based contract, the terms of the contract must be self-enforcing, in the sense that they be equilibrium outcomes.
- The employer is long-lived. The need for good reputation helps to enforce the employer to fulfill promise.

Model

- An employer lives for an infinite horizon.
- Worker s enters in period s, and lives for 2 periods.
- A worker's utility depends on his consumption and effort in both periods:

$$U_L^s = U(c_s^s, e_s^s) + \beta U(c_{s+1}^s, e_{s+1}^s);$$

  where c_t^s is worker s's consumption, and e_t^s his effort level, in period t. β is discount factor.
- Unlike the standard moral hazard literature, effort is observable to both parties.
- $e^s \equiv (e_s^s, e_{s+1}^s)$, $c^s \equiv (c_s^s, c_{s+1}^s)$, $w^s = (w_s^s, w_{s+1}^s)$.

- Assumptions:

$$\lim_{c\to 0} U_c(\cdot) = \infty, \quad \lim_{c\to\infty} U_c(\cdot) = 0,$$

$$\lim_{e\to 0} U_e(\cdot) = 0, \quad \lim_{e\to\infty} U_e(\cdot) = -\infty.$$

  The employer's profit from hiring worker s is

$$\Pi(w^s, e^s) = \pi(w_s^s, e_s^s) + \beta\pi(w_{s+1}^s, e_{s+1}^s).$$

- Assumptions: $\lim_{e\to 0} \pi_e(\cdot) = \infty$, $\lim_{e\to\infty} \pi_e(\cdot) = 0$.

- For each agent s, the firm will

$$\max_{w^s, e^s} \Pi(w^s, e^s)$$

$$\text{s.t. } U_L^s \geq \underline{u}, \ e_{s+t}^s \geq 0, \text{ and } w_{s+t}^s \geq 0, \ t = 0, 1.$$

- Let $(\hat{w}^s, \hat{e}^s)$ be the solution.
- In the absence of performance-based payment, it is impossible to implement $(\hat{w}^s, \hat{e}^s)$.

Implicit Contract

- Suppose the contract designates that a worker be paid a contractual wage $\hat{w}$ in the two periods working in the firm.
- Let R be the bonus the firm promises to pay worker s if it observes that the effort level $\hat{e}^s$ is exerted.
- Let p^H be the probability that the worker believes the firm is honest.
- $EU(p^H, w, R)$: Expected utility of a worker jointing the firm and exerts effort $\hat{e}^s$, when his belief is p^H.
- $EU(\hat{w})$: The expected utility of worker joining the firm and does nothing.

- Assume p^H be such that there exists at least one $\hat{w}$ and R so that $EU(p^H, \hat{w}, R) \geq \underline{u}$ and $EU(p^H, \hat{w}, R) \geq EU(\hat{w})$.
- Consider the following strategy of worker s (Call it strategy W):
  (i) If worker $s-1$ provides $\hat{e}_s^{s-1}$ and receives (does not receive) R, then s provides $\hat{e}_{s+1}^{s}$ (zero effort).
  (ii) If worker $s-1$ does not provide $\hat{e}_s^{s-1}$, then s provide zero effort.
- Under this strategy, if a firm cheats worker i, all the workers after i only provide effort in the first of their two working periods.

- Let

$$\Pi_t^H = \pi(\hat{w}_t^t, e_t^t) + \beta\pi(\hat{w}_{t+1}^t - R, \hat{e}_{t+1}^t)$$
$$\Pi_t^D = \pi(\hat{w}_t^t, e_t^t) + \beta\pi(\hat{w}_{t+1}^t, 0).$$

- Proposition: The firm's strategy always to honor promise and the worker's strategy W constitute a SPE iff, for all s,

$$\Pi(\hat{w}_{s+1}^s - R, \hat{e}_{s+1}^s) + \sum_{t=s+1}^{\infty} \beta^{t-(s+1)}\Pi_t^H$$
$$> \Pi(\hat{w}_{s+1}^s, \hat{e}_{s+1}^s) + \sum_{t=s+1}^{\infty} \beta^{t-(s+1)}\Pi_t^D.$$

- Intuition: Once the firm reneges its promises, it lost trust of all incoming workers (who then exert zero effort in 2nd stage). Honoring promise is thus its best response.
- The workers are willing to exert effort because they know they will receive bonus: It is the firm's best interest to do so.
- Under the strategy, bonus for the first period effort is enforced by the worker and all later workers. Bonus for second period effort is only enforced by later workers.

Conclusion

- Even if output is unobservable, as long as effort can be jointly observed by both parties, efficient contracting is possible.
- This is done by an implicit contract in which each side retaliates against the other for breaching promise.
- Since workers exert effort first, there is no need for further punishment beyond loss of ex post bonus.
- For the firm, however, it has to be an long-lived entity to suffer future loss of trust, which serves as a threat of the workers as a punishment against renege of contract.

Conclusion

- The overlapping setup enables worker $S+1$ to observes worker S's effort level and whether he's paid bonus.
- However, model is inconsistent, as P^H is not endogenous.