Lecture 14: Relational Contracts

Compensation in Organizations

Jacob Kohlhepp

December 19, 2025

Table of Contents

Discussion: Cheveleir and Ellison (1998)

Aside: Discounting

- The discount rate δ captures how much a dollar tomorrow is worth (to someone) today.
- If $\delta = 0.9$, a dollar tomorrow is worth 90 cents today.
- If $\delta = 0.99$, a dollar tomorrow is worth 99 cents today.
- Interpretation 1: If I have a higher δ, I am more patient.
- Interpretation 2: δ is the chance we meet again tomorrow.
  - Then the probability we meet again T times (assuming independence) is just δ^T

Aside: Discounting

- Suppose I receive a payment (or utility) u for T periods. The present value of this stream of payments is:

$$\sum_{t=0}^{T} \delta^t u = u + \delta u + \delta^2 u + ... + \delta^T u$$

Aside: Discounting

- Suppose I receive a payment (or utility) u for T periods. The present value of this stream of payments is:

$$\sum_{t=0}^{T} \delta^t u = u + \delta u + \delta^2 u + \ldots + \delta^T u$$

- Suppose $T \to \infty$. Then:

$$\begin{aligned}\sum_{t=0}^{\infty} \delta^t u &= u + \delta u + \delta^2 u + \ldots \\ &= u + \delta(u + \delta u + \delta^2 u \ldots) \\ &= u + \delta \sum_{t=0}^{\infty} \delta^t u\end{aligned}$$

$$\sum_{t=0}^{\infty} \delta^t u = u + \delta \sum_{t=0}^{\infty} \delta^t u \leftrightarrow (1-\delta) \sum_{t=0}^{\infty} \delta^t u = u \leftrightarrow \sum_{t=0}^{\infty} \delta^t u = \frac{u}{1-\delta}$$

Model

- A firm and a worker both have discount rate δ and interact for many periods $(t = 1, ..., \infty)$
- At each period t the following occur:
  - First the firm offers a flat wage w
  - Second the worker chooses high (H) or low (L) effort
- High effort has cost c, low effort has cost 0.
- High effort yields revenue v, low effort yields revenue 0.
- Firm outside option is 0, worker outside option is $\bar{u}$.
- Assume the firm wants to motivate high effort.

Quick Tutorial: Infinitely Repeated Games

- We will not fully cover how to solve infinitely repeated games.
- For this class you only need to be able to solve variants of the exact problem in this lecture.
- The procedure is as follows:
  - We guess a simple strategy for the firm and the worker.
  - We verify that there are no one-shot deviations.
- For more information on infinitely repeated games see the slides from my game theory course.

Step 1: Guess a simple strategy

- Nothing stops the firm and worker from choosing different wages and efforts at each point in time.
- They can even condition their choices on the past in complicated ways!
- We will look for equilibria where strategies are simple.
- We guess that the firm pays a wage w_H as long as the worker exerts high effort, and a wage w_L forever after the worker does not exert high effort (outside option or low effort).
- We guess that the worker exerts high effort as long as they are paid w_H. As soon as they are paid anything else, they either exert low effort or take the outside option.

Step 2: Verify

- We now need to verify that our guess is an equilibrium.
- This means we need to check that both the firm or the worker cannot gain from using some other strategy.
- We will focus on the worker's incentives to deviate.
- In general there are many other possible strategies, many of which can be complex.
- We have a shortcut: the one shot deviation principle.

Step 2: Verify

Definition 1

The **one-shot deviation principle** states that a strategy profile is a subgame-perfect Nash equilibrium if and only if no player can increase their payoff by changing a single decision in a single period.

- Our guess generates a very simply set of outcomes.
- On path: the worker exerts high effort and is paid w_H forever.
- Off path: the worker slacked off in the past, is paid w_L forever and exerts low effort forever.
- The one-shot deviation principle means we only need to check for deviations in these two cases.
- Further, we only need to consider one-shot (single period) deviations.

Solving the Model

See the board!

Model Solution

Theorem 2

If $\delta(v - \bar{u}) \geq c$, there is a subgame perfect Nash equilibrium where the firm offers a wage of $w_H^* = \frac{c}{\delta} + \bar{u}$ as long as the worker exerts high effort, and a wage of $w_L^* = 0$ forever after the worker exerts low effort once.

- We say "there is" because this is only one of many equilibria.
- Notice that whenever the firm offers $w_L^* = 0$ the worker takes the outside option.

Why is this "Relational"?

- The firm pays the worker a high wage and "trusts" the worker will work hard.
- The worker then works hard because they value the future relationship with the firm.
- Suppose one party breaks this trust (by exerting low effort or not paying a high wage).
- Both players stop working together forever after.
- In this way the value of employment encourages high effort.
- Employment is valuable because the worker is paid more than their outside option.

Working Hard to Keep a Good Job

- The firm does not use performance pay in this model.
- There is a fixed wage that is paid regardless of output.
- The worker works hard because they want to keep their job.
- But the worker only wants to keep their job because it pays better than "the market."
- Thus high salaries paired with the possibility of termination can work like performance pay!
- I would argue most US workers are motivated this way.

When Do Relational Contracts Work?

Recall that our result only holds when:

$$\delta(v - \bar{u}) \geq c$$

Relational contracts are more likely when...

- everyone is more patient ($\uparrow \delta$)
- the value of working together is higher ($\uparrow v$)
- the worker's outside option is worse ($\downarrow \bar{u}$)
- effort is less costly ($\downarrow c$)

Other Equilibria

- The firm's strategy we studied is rather harsh: if the worker slacks, they are essentially fired forever.
- Sometimes there are other equilibria with less severe or less eternal consequences.
- For example: after low effort pay the low wage for some $T < \infty$ periods, then revert to high wage.
- However these work "less of the time" (for fewer values of $c, \delta, v, \bar{u}$)
- Our harsh strategy works "more of the time" (for many values of $c, \delta, v, \bar{u}$)
- It is a grim trigger strategy (discuss this).

Efficiency Wages

Definition 3

Efficiency wages refers to the practice of paying workers above the market rate in order to improve productivity.

- We can think of a worker's productivity as their effort.
- On path, the worker exerts high effort and is productive.
- If they ever exert low effort (are unproductive) they never work with the firm again.
- Thus the worker is more "efficient" when wages are higher.
- This is a microfoundation (discuss this word) for efficiency wages.