Political Appointment with Limited Commitment and Termination Benefits

Andong Yan

UC Riverside

May 11, 2022

Table of Contents

Research Question

- Would a principal and an agent sign a contract that both of them understand the contract would not be implemented?
- What will a principal choose to provide incentive, via a committed channel or/and an uncommitted channel?
- What is the relation between the principal's capacity to terminate a contract and the level of termination benefits?

Background

- Participants could **commit** to a contract is an important assumption in Principal-Agent Problem
- "Commitment" allows for long-term payment that might be incentive-incompatible

- In autocratic regimes, the rulers are skeptical to commit to a promise
- Myerson (2008, 2015), Egorov and Sonin (2011)
- The autocratic ruler's commitment issue results in a tension between the ruler and the subordinates

Historical Background

- In both Western and Eastern ancient history, during the process that a new dynasty is rising, the ruler would grant titles and territories to the subordinate military leaders to exchange for their supports
- e.g. rise of feudalism in the Carolingian Empire and prince kingdoms in the early Han Empire

- In modern history, Soviet Union has the *Nomenklatura* system as well as other communist states have de facto lifelong Cadre benefits

Result Preview

- Why would these autocratic regimes provide the officials with the benefits?

  The ruler could get rid of the promised payment by terminating the contract illegally, while the agent would receive termination benefits as compensation.

- Does the level of the absolute power impact the level of termination benefit provision?

  YES! In a non-monotonic way. The benefit level is highest when the absolute power is at an intermediate level.

- How does the contract provide incentives under this environment with limited commitment and termination benefits?

  With a severer commitment problem, the payment scheme would become front-loaded instead of back-loaded, and the termination benefits could work as an insurance instead of incentive.

Literature

- Dynamic Moral-Hazard Model
  - Diamond (1984), Spear and Srivastava (1987), Hart and Moore (1998), Gromb (1999)
  - DeMarzo and Sannikov (2006), DeMarzo and Fishman (2007), Sannikov (2008), He (2012)
- Non-Democratic regime
  - Myerson (2008, 2015), Egorov and Sonin (2011)
  - Egorov and Sonin (2020)
- Persistence of weak state
  - Besley and Persson (2009, 2010)
  - Acemoglu and Robinson (2008), Acemoglu et al. (2011)
  - Ma and Rubin (2019)

One-Period Model Setup

- One principal and one agent, both risk neutral
- agent chooses effort level $a \in \{0, 1\}$, which is unobserved and unverifiable
- $a = 1$, work hard; $a = 0$, corrupt and receive an income of γ
- uncertain outcome $y \in \{g, b\}$
- the good outcome $y = g$ realized:
    - with probability α if $a = 1$
    - with probability β if $a = 0$
    - $0 \leq \beta \leq \alpha \leq 1$
- At the beginning, the principal signs a contract with the agent, $\boldsymbol{w} = (w(g), w(b)) \in \mathbb{R}^{+2}$

One-Period Model Setup

- However, the contract is enforced with only $1-\kappa$ probability
- Otherwise, with κ probability, the principal could make a decision, $q \in \{0,1\}$, whether to terminate the contract
  - $q=1$ (break the promise), the contract is terminated, no wage will be realized but the principal needs to pay a replacement cost c
  - $q=0$ (keep the promise), the contracted wage will be paid

- Besides, when the contract is terminated (by the principal), a compensation $R \geq 0$ will be generated and paid to the agent
  - Abusing the definition, I define R as the **"termination benefits"** in this setup
- The infrastructure that generates R has a concave cost function $k(R) \geq 0$ with $\lim_{R\to 0^+} k'(R) = 0$

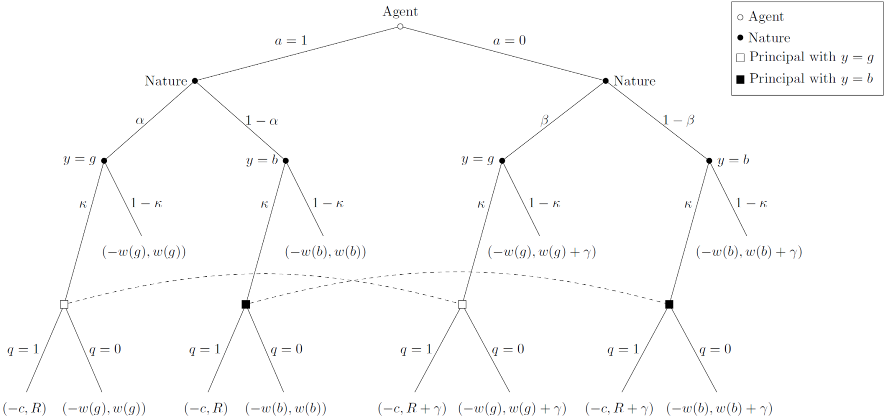
interpretations

One-Period Timeline

- the principal proposes a contract $\boldsymbol{w}$ alongside R
- the agent determines action a
- the outcome y realized and observed by both parties
- The power to terminate the contract arrives at probability κ, the principal makes a termination decision q
- Given the decision, either contract is realized or the contract is terminated

- Goal: How to design $\boldsymbol{w}$ and R under different κ values?

One-Period Timeline



One-Period Optimization Problem

- **Assumption.** The “bad” outcome is a political crisis that could result in the principal’s stepping down from power, so the principal wants a “good” outcome at any cost. Thus, the principal writes a contract that always incentivize the agent to choose $a = 1$
- The agent chooses action to maximize her expected income from wage, termination benefits and/or corruption income
- The principal designs the contract to minimizes his expected total cost of the contract before the period; then determines whether to terminate the contract when the power arrives
- Solution concept: subgame perfect Nash equilibrium (SPNE)

Optimal Contract

Backward induction: the principal makes termination decision q based on the comparison between $w(y)$ and c

- (Certainly Terminate) $q = 1$ for both $y = g, b$, which requires $w(g) \geq c$, $w(b) \geq c$
- (Possibly Terminate) $q = 1$ only for $y = g$, which requires $w(g) \geq c$, $w(b) < c$
- (Never Terminate) $q = 0$ for both $y = g, b$, which requires $w(g) < c$, $w(b) < c$

Optimization Problem

One-Period Result

- (Certainly Terminate) The incentive constraint could be simplified as $w(g) - w(b) \geq \frac{\gamma}{(1-\kappa)(\alpha-\beta)}$, and the optimal contract is

$$w(b) = c, \quad w(g) = c + \frac{\gamma}{(1-\kappa)(\alpha-\beta)}, \quad R = 0$$

- (Never Terminate) The incentive constraint could be simplified as $w(g) - w(b) \geq \frac{\gamma}{\alpha-\beta}$, and the optimal contract is (if $c > \frac{\gamma}{\alpha-\beta}$)

$$w(b) = 0, \quad w(g) = \frac{\gamma}{\alpha-\beta}, \quad R = 0$$

"Possibly Terminate" Result

- if $\alpha > \frac{k'(R)}{\kappa}$

$$w(b) = 0, \quad w(g) = c, \quad R = c + (\frac{\gamma}{\alpha - \beta} - c)\frac{1}{\kappa}$$

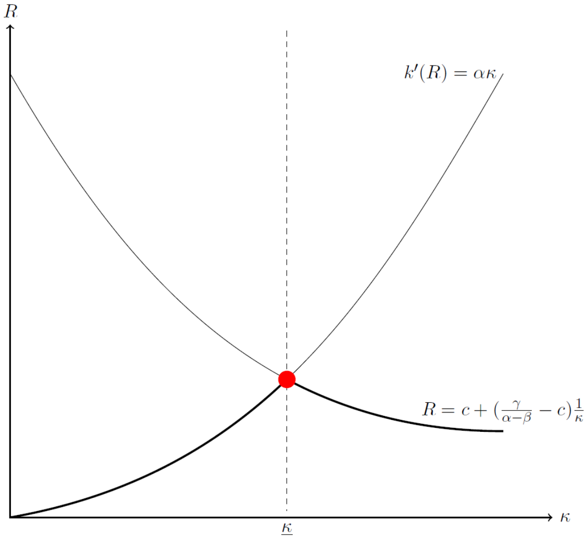
- if $\alpha \leq \frac{k'(R)}{\kappa}$

$$w(b) = 0, \quad w(g) = \frac{\gamma}{\alpha - \beta} - \frac{\kappa}{1-\kappa}R, \quad R = \min_{R^*}\{k'(R^*) = \alpha\kappa\}$$

- There exists $\underline{\kappa}$ such that for any $0 < \kappa \leq \underline{\kappa}$, we have $\alpha \leq \frac{k'(R)}{\kappa}$; and for $1 > \kappa > \underline{\kappa}$, $\alpha > \frac{k'(R)}{\kappa}$.

Optimization Problem

"Possibly Terminate" Result



One-Period Result

Compare the expected cost of three contracts:

- if $c > \frac{\gamma}{\alpha-\beta}$:

$$\text{Never Terminate} > \text{Possibly/Certainly Terminate}$$

  (This is also true for the two-period model)
- if $c \leq \frac{\gamma}{\alpha-\beta}$, "Never Terminate" is not available, then we have

$$\text{Possibly Terminate} > \text{Certainly Terminate}$$

Two-Period Model Setup

- period $t = 1, 2$
- outcome $y_t \in \{g, b\}$
- history of outcome at $t = 2$, $h \in \{g, b, \emptyset\}$
- wage $w_1(y_1)$ and $w_2(y_2, h)$
- termination decision $q_1(y_1)$ and $q_2(y_2, h)$
- R remains constant once determined by the principal before period 1
- For simplicity, assume both the principal and the agent have discount factor of 1
- Other settings remain the same

Two-Period Optimization Problem

Lemma

In the optimal contract, conditionally on the outcome realization is "bad", i.e., $y_t = b$, we have

$$w_1(b) = 0,\ \ w_2(b, h) = 0$$

for any history h.
Consequently, the termination decision for $y_t = b$ must be

$$q_1(b) = 0,\ \ q_2(b, h) = 0$$

for any history h.

This rules out the possibility of "Certainly Terminate" contract already.

Optimization Problem

Two-Period Optimization Problem

Proposition

Assuming $\frac{\gamma}{\alpha-\beta} > c$, "Never Terminate" contract is not available, and the principal will only terminate the contract under the situation that the contract is designed to make a payment to the agent, i.e.,

$$q_1(g) = \mathbb{I}(w_1(g) > 0),\ q_2(g,h) = \mathbb{I}(w_2(g,h) > 0)$$

for all $h \in \{g, b\}$.

Sketch Proof:
Early terminating the contract will ask the principal to pay c which is unnecessary. If the principal is willing to pay a wage but not to terminate the contract if possible, this payment must be lower than c, which will incentive-incompatible.

Two-Period Result

Different candidates in the "Possibly Terminate" category:

- Pay at first period only (not incentive-compatible)
- Pay at second period only
- Pay at both periods

Two-Period Result

Assuming the marginal cost of R is low,

- Pay at second period only

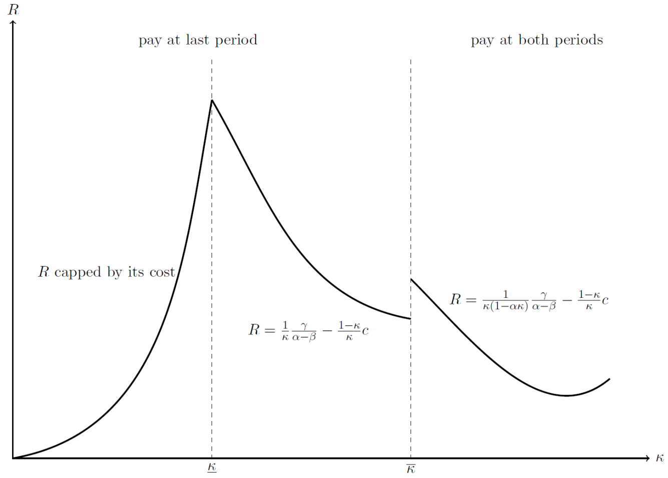
$$w_2(g,b) = c,\ w_2(g,g) = c + \frac{\gamma}{\alpha(1-\kappa)(\alpha-\beta)},\ R = \frac{1}{\kappa}\left(\frac{\gamma}{\alpha-\beta} - c\right) + c$$

- Pay at both periods

$$w_1(g) = c,\ w_2(g,h) = c,\ R = \frac{1}{\kappa(1-\alpha\kappa)}\frac{\gamma}{\alpha-\beta} - \frac{1-\kappa}{\kappa}c$$

for all $h \in \{g, b\}$.

Two-Period Result



Two-Period Result

- When κ is low, "Pay at second period only" is preferred by the principal
- it provides the principal more chance to terminate a contract

- When κ is high, "Pay at both periods" becomes better
- the agent worries about the termination and discount the future reward a lot
- paying at both periods becomes the cheaper way

- in the low range of κ, incentive effect dominates so $R \nearrow$ as $\kappa \nearrow$
- in the high range of κ, insurance effect dominates so $R \searrow$ as $\kappa \nearrow$

Compare one-period and two-period

One-period model

- the agent has no future reward, thus no need for insurance
- high effort implies higher possibility of good outcome, and also the following contract termination
- then "termination benefit" works solely as an incentive for the agent
- when κ increases, "termination benefit" arrives with more chance, the principal only needs to provide less R

Compare one-period and two-period

Two-period model

- the agent could work hard in the first period and expect a higher payment at the end of the second period
- this future reward is risky due to the termination possibility
- insurance for termination is beneficial

Result Summary

- A model that explicitly allows the principal to terminate the contract and provide termination benefits
- A contract is likely to be terminated when the cost of preventing corruption is less than the cost of replacing the agent, while termination benefits provision helps incentivize the agent in this case
- Termination benefit provision could be limited by its cost, if not, when the principal has more power to terminate the contract, the provision level first decreases due to the incentive effect, then increases due to the insurance effect
- When both parties have longer time horizon, the optimal contract could switch among different payment schemes

Political Economics Implication

- Source of weak state
- An autocratic ruler with low absolute power would grant high privilege/social status/benefit to the subordinates
- This share of power creates a tension between the ruler and his subordinates, which could block the path to a more centralized government
- The granted privilege could be a disincentive for the agency problem in a democratic regime

Further Research – Theoretical

- Foreseeing an end date of the contract might distort the incentive of the wage scheme, as the contract will end no matter the outcome
- When a contract could exist for infinite periods, termination means a huge loss to the agent, thus the termination benefits has a stronger insurance effect

- Infinite horizon; Continuous-time
- Myerson (2015), Sannikov (2008), Demarzo and He (2021)
- front-loaded and back-loaded payment

- Risk-averse principal/agent with Non-binary outcome
- General form of the principal's utility function
- "Hard" and "Soft" Budget Constraint

Further Research – Empirical

- Historical data on the privileges of the ancient Chinese literal class during Ming/Qing
- e.g. Quota in Chinese Imperial Examination; tax exemption
- Frequency and intensity of peasant wars, Bai and Jia (2016), Kung and Ma (2014)

- Empirical test on whether the privilege provision affects the collaboration between the local elites and the central government
- Garfias and Sellars (2021)
- In more privileged regions, the local elites had more incentives to help the central government suppress the peasant wars

Thank You!

Model Setup Interpretation

- Principal could be understood as the autocratic ruler
- Agent is the subordinate duke/prince/aristocrat who is ruled by the principal
- κ measures the absolute power that the ruler owns over his subordinates, i.e., higher κ meaning the principal could more easily trespass the constraint of the rule of law
- γ could be interpreted as any utility difference between working hard and corrupting for the agent
- R is the benefit that the agent could earn by investing her time into the privilege/social status that was granted. Within the contract, the agent could only invest her time in the duty.

model setup

One-Period Optimal Contract

Then the contract needs to satisfy the agent's incentive constraint to induce $a = 1$

- (Certainly Terminate)

$$\alpha[\kappa R + (1-\kappa)w(g)] + (1-\alpha)[\kappa R + (1-\kappa)w(b)] \geq \beta[\kappa R + (1-\kappa)w(g)] + (1-\beta)[\kappa R + (1-\kappa)w(b)] + \gamma$$

- (Possibly Terminate)

$$\alpha[\kappa R + (1-\kappa)w(g)] + (1-\alpha)w(b) \geq \beta[\kappa R + (1-\kappa)w(g)] + (1-\beta)w(b) + \gamma$$

- (Never Terminate)

$$\alpha w(g) + (1-\alpha)w(b) \geq \beta w(g) + (1-\beta)w(b) + \gamma$$

Finally, the contract is designed to minimize the total expected cost. One-Period Contract

One-Period Result

- (Possibly Terminate) The optimization problem is:

$$\max_{\boldsymbol{w},R} \alpha[\kappa(-c)+(1-\kappa)(-w(g))]+(1-\alpha)(-w(b))-k(R)$$

$$\textbf{s.t.}\ \ (\alpha-\beta)\kappa R+(1-\kappa)(\alpha-\beta)w(g)-(\alpha-\beta)w(b)\geq\gamma$$

$$w(g)\geq c,\ 0\leq w(b)<c$$

- Either provide higher $w(g)$ or higher R to satisfy the incentive constraint
- Compare the marginal cost of incentive provision for $w(g)$ and R (or use Lagrangian to find the same condition)
- When $\alpha > \frac{k'(R)}{\kappa}$, providing R is cheaper than $w(g)$ for the principal; vice versa

"Possibly Terminate" Contract

Optimization Problem Details

$$\max_{\boldsymbol{w},R} \alpha\Big\{(1-\kappa)(-w_1(g)+V^P(g))+\kappa[(1-q(g))(-w_1(g)+V^P(g))+q(g)(-c)]\Big\}$$
$$+(1-\alpha)V^P(b)-k(R)$$

$$\textbf{s.t.}\quad q_1(y)=\arg\max_{q_1(y)}\,(1-q_1(y)(-w_1(y)+V^P(h))+q_1(y)(-c+V^P(\emptyset))\quad \text{(IR1)}$$

$$q_2(y,h)=\arg\max_{q_2(y,h)}\,(1-q_2(y,h)(-w_2(y,h))+q_2(y,h)(-c)\quad \text{(IR2)}$$

where

$$V^P(h)=\alpha(1-\kappa q_2(g,h))(-w_2(g,h))+\alpha\kappa q_2(g,h)(-c)$$

Optimization Problem Details

(constraints continued)

$$(1-\kappa q_1(g))w_1(g) + (1-\kappa q_1(g))V^A(g) - V^A(b) + \kappa q_1(g)R \geq \frac{\gamma}{\alpha-\beta} \quad \text{(IC1)}$$

$$(1-\kappa q_2(g,h))w_2(g,h) + \kappa q_2(g,h)R \geq \frac{\gamma}{\alpha-\beta} \quad \text{(IC2)}$$

where

$$V^A(h) = \alpha(1-\kappa q_2(g,h))w_2(g,h) + \alpha\kappa q_2(g,h)R$$

for all y, h.

Two-Period Contract