

Incentives for Contract Designers and Contractual Design

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Contracts are critical business instruments

However,

- those responsible for drafting contracts are rarely responsible for delivering the anticipated outcome.

Moreover,

- relationships between contract designers and those who employ them typically involve several contractual frictions such as moral hazard, adverse selection, and limited liability.

This paper:

- **contract drafting as an agency problem;**
- **implications for contractual design.**

Hold-up Problem

Buyer contracts on the production of a good from a **Seller**.

(**Default**) design D delivers $V > 0$ to the buyer with probability $1 - \beta_0$.

With probability β_0 ,

- **new, initially indescribable** design N delivers value $V > 0$ to the B,
- whereas D delivers δV , $\delta < 1$.

If D is specified but N is appropriate \implies renegotiation:

$$\text{ex post surplus} = V - \delta V - \gamma > 0$$

- Buyer collects $\alpha [V - \delta V - \gamma]$,
- Seller collects $(1 - \alpha) [V - \delta V - \gamma]$.

The Contract Design Stage is delegated to the Agent

- ① a higher effort is required to be more likely to discover the appropriate design at the outset, and the agent's *effort is not observable* ([moral hazard](#));
- ② a contract designer is *better informed* regarding the probability of discovering the new design at the outset ([adverse selection](#));

"Design-Bid-Build" is a project delivery method in which the buyer contracts with **separate entities** for the **design** and **implementation** of a project

- initial project design is changed due to discovered site conditions.
- ① engineers may choose to save the cost of the seismic surveys;
- ② engineers may interpret the publicly available information differently.

The Contract Design Stage is delegated to the Agent

$A \downarrow$ the chances of renegotiation by learning the appropriate design:

If N is the appropriate design, A discovers it with probability e .

If D is appropriate, A never discovers design N no matter the effort.

B does not directly observe the effort choice e (**moral hazard**).

A is privately informed about the probability that design N is appropriate (**adverse selection**):

$$\beta_0^\theta = \Pr(\text{design } N \text{ is appropriate} \mid \text{project type } \theta),$$

where $\theta \in \{L, H\}$ and $\beta_0^H > \beta_0^L$.

The B-Agent Contract

A contract is defined formally by

$$\omega^\theta = \{e^\theta, w_N^\theta, w_{DD}^\theta, w_{DN}^\theta\},$$

where

- w_N^θ is the agent's wage in case he specifies N as the appropriate design;
- w_{DD}^θ is the agent's wage in case he does not specify N and D turns out to be the appropriate design;
- and w_{DN}^θ is the agent's wage in case he does not specify design N but it turns out to be the appropriate one.

The Buyer-Seller Contract: Probability of Renegotiation

If A exerts effort e working on type θ project and does not discover N , the (posterior) probability of renegotiation is

$$\beta^\theta(e) = \frac{\beta_0^\theta(1-e)}{1-\beta_0^\theta e}.$$

and is decreasing in the agent's effort level,

$$\frac{d\beta^\theta(e)}{de} < 0.$$

$B - S$ contract is less incomplete if chances of renegotiation are smaller:

- $\beta \approx$ degree of contract incompleteness.

The Buyer-Seller Contract: (N, p_N) and (D, p_D)

- The price p_N does not depend on the degree of contract incompleteness since by asking the seller to deliver design N the B fully reveals that it is the appropriate design:

$$p_N := k + (1 - \alpha)(V - k).$$

- The price p_D is decreasing in the degree of contract incompleteness:

$$p_D := k + (1 - \alpha)(V - k - \beta(1 - \delta)V).$$

θ and e are Observed by the Buyer: The Intuitive Monotonicity

B chooses e_{FB}^θ given by:

$$\beta_0^\theta \left(\underbrace{\gamma}_{\text{social benefit}} + \underbrace{(1-\alpha)[(1-\delta)V - \gamma]}_{\text{the seller's share}} - \underbrace{\beta_{FB}(1-\alpha)(1-\delta)V}_{p_N - p_D} \right) = c'(e_{FB}^\theta)$$

If the B's bargaining power becomes smaller,
a higher effort is devoted to learning the design right at the outset:

- $\frac{d\beta_{FB}}{d\alpha} > 0$.

Consequently, p_D becomes higher, $\frac{dp_D(\beta_{FB})}{d\alpha} < 0$.

General Case: The Second-Best Inefficiency

Contract designer is

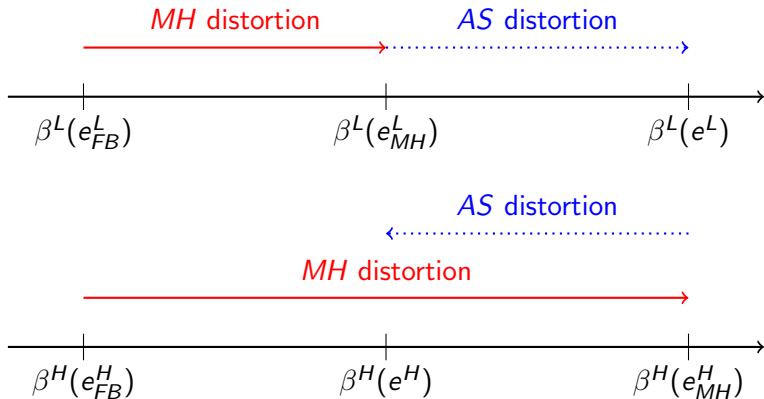
- ① **rewarded for getting the design right at the outset**
- ② **regardless of the project type:**

$$w_N^H = w_N^L > 0 = w_{DD}^H = w_{DN}^H = w_{DD}^L = w_{DN}^L.$$

Intuition:

- ① $w_N^\theta > 0$: reward only when certain the agent has worked;
- ② $w_N^H = w_N^L$: common value problem \implies *pooling*
 - efficiency ($w_N^H < w_N^L$) vs screening ($w_N^H \geq w_N^L$)

The Role of MH and AS: $w_N^H = w_N^L$



The Role of Adverse Selection

If the portion of the high type project is high enough,
the contract is less incomplete and the default price is higher
due to adverse selection:

$\exists 0 < \underline{\nu} < 1$ such that $\beta < \beta_{MH}$ and $p_D(\beta) > p_D(\beta_{MH})$ if $\nu > \underline{\nu}$.

More/Less Incomplete if the bargaining power is smaller?

If

- ① the adverse selection problem is severe enough,
- ② and value of Buyer-Seller is not too high,

the contract is more incomplete if the buyer's bargaining power is smaller:

$\forall \beta_0^H \in (0, 1) \exists 0 < \bar{\beta}_0^L(\beta_0^H) < \beta_0^H, \bar{V} > 0, 0 < \underline{\gamma} < (1 - \delta)V$ such that

if $\beta_0^L < \bar{\beta}_0^L, V < \bar{V}$, and $\underline{\gamma} < \gamma < (1 - \delta)V$ then $\frac{d\beta}{d\alpha} < 0$.

the "intuitive monotonicity" might no longer hold!

Intuition:

- AS rent vs ↓ chances of renegotiation

The Literature on

- ① incomplete contracts (the costs of writing contracts)
Battigalli and Maggi (2002, 2008)
 - **endogenize the cost of writing contracts**
by presenting contract drafting as an agency problem;
- ② procurement problems (project management)
Bajari and Tadelis (2001)
 - **endogenize the probability of renegotiation** and connecting it to the asymmetric information generated at the contract-drafting stage;
 - the **implications for the optimal prices**;
- ③ P-A contracts with endogenous info gathering (MH+AS)
Gerardi and Maestri (2012), Gottlieb and Moreira (2017), Chade and Swinkels (2021)
 - **the role of endogenous information gathering on the degree of contract incompleteness and the prices**;
 - the economic focus is different.

a Link between the B-S and the B-A Problems

- ① the B does not screen the A by offering a menu of contracts, and the A is **rewarded for getting the design right at the outset**:
 - consistent with the contract management literature.
- ② the $B - S$ contract might be **less incomplete and the default price might be higher due to adverse selection**:
 - consistent with the empirical IO literature on procurement: prices are over-evaluated due to the contracts being incomplete
 - consistent with Bajari et al. (2014), our analysis suggests that the higher prices due to adverse selection are associated with a lower probability of ex-post renegotiation. [NEW Channel!](#)
- ③ if the adverse selection problem is severe enough, a B with a smaller bargaining power might pay a smaller price:
 - one explanation: the countervailing buyer power hypothesis
 - B with a smaller bargaining power offers a more incomplete contract
[NEW Channel!](#)