Accounting Information, Renegotiation, and Debt Contracts

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The incomplete contracting approach

- Contractual incompleteness is the distance between the state and its measurement.
The incomplete contracting approach

- contractual incompleteness is the distance between the state and its measurement
- indirect solutions: institutional design
The incomplete contracting approach

- contractual incompleteness is the distance between the state and its measurement
- indirect solutions: institutional design
- direct solutions: better accounting measurement
Marry two literatures in debt contracts
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- endogenous accounting measurement in debt contracting
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  - joint determination hypothesis
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- we marry two literatures: endogenous measurement in an incomplete debt-contracting model
Three empirical patterns in debt contracts
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- ex-ante accounting-based covenants
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- ex-post accounting manipulation
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- ex-post renegotiation
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- ex-ante accounting-based covenants
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- ex-post renegotiation
- joint determination
Main result 1: endogenous measurement
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Manipulation is decreasing in renegotiation cost
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| Exogenous measurement | Firm value is decreasing in renegotiation cost |
Main result 1: endogenous measurement

Manipulation is decreasing in renegotiation cost

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Main result 2: endogenous contractual design
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Contractual reliance on measurement is increasing in accounting quality
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The model
Aghion and Bolton 1992 + accounting manipulation
at date 0, the owner-manager chooses a financial contract to raise capital for a project
Aghion and Bolton 1992

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  - cash flow rights \((R, r)\)
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  - non-plegible private benefit \(X\)

- at date 1, non-contractible state \(\theta\) is observed
- initial control rights are assigned
- costly renegotiation \((\lambda)\), if any, takes place
- action is taken at date 2, cash flows are allocated.
Aghion and Bolton 1992

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at date 2, cash flows are allocated.
The project continues converts cash flows to private benefit. The continuation is optimal in and only in the good state.
The project

- continuation converts cash flows to private benefit
continuation converts cash flows to private benefit
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Pecking-order of financial contracts in AB

Cash flow rights and control rights are substitutes.
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We focus on the region in which contingent debt is optimal.

- face value $d$
- measurement-based covenants $\sigma_s$
Departure: endogenous measurement

- the manager can choose manipulation $m$ to improve the report $s$

$$\Pr(s = g | s' = g, m) = 1 \quad \text{and} \quad \Pr(s = g | s' = b, m) = m.$$
Departure: endogenous measurement

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- the misallocation of control rights
  \[
  \Gamma(m) \equiv m\sigma_g + (1 - m)\sigma_b
  \]
The equilibrium definition $\langle \delta^*, \sigma^*_g, d^*, m^*, a^* \rangle$

1. On date 2, the action $a^*$ is chosen to maximize the joint surplus with possible renegotiation;
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2. On date 1, the manager chooses manipulation $m^*$ to maximize his expected payoff, condition on his private signal $\langle s' \rangle$ and state $\theta$;

3. On date 0, the manager designs debt contract $\langle \delta^*, \sigma_g^*, d^* \rangle$ to maximize his expected payoff at date 0, subject to the lender’s participation constraint.
The solution
Renegotiation and action

- renegotiation always takes place when misallocation of control rights occurs
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\[ \pi \equiv X + \kappa (1 - \lambda) L_B \]
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- ↑ in bargaining power \( \kappa \)
- ↑ in \( L_B = (1 - \gamma_B) r - X \)
Ex-post manipulation

- the first-order condition for manipulation

\[ m^{BR}(\delta) = \frac{\pi \delta}{c} \]
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- Lemma 3: determinants of manipulation for given contracts

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The lender’s ex-ante price protection

- the lender’s ex-ante participation constraint

\[ K = \gamma d^{BR} + p (1 - \gamma_B) r - p \Gamma \gamma_B \Delta d_B + (1 - p) (1 - \sigma_g) \gamma_G \Delta d_G \]
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- renegotiation in the good state \((1 - p) (1 - \sigma_g) \gamma_G \Delta d_G\)
The ex-ante contractual design

The problem

\[
\max_{(\sigma_g, \delta)} V(\sigma_g, \delta) \equiv V^{FB} - (1 - p)(1 - \sigma_g)\lambda L_G - p\Gamma \lambda L_B - \frac{c}{2}m^2
\]

s.t. \quad m = \min\{1, \frac{\pi \delta}{c}\}

\quad 0 \leq \delta \leq \sigma_g \leq 1
The ex-ante contractual design

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$$\max_{(\sigma_g, \delta)} V(\sigma_g, \delta) \equiv V^{FB} - (1 - p)(1 - \sigma_g)\lambda \lambda_G - p\Gamma \lambda \Lambda_B - \frac{c}{2} \lambda^2$$

s.t.  
$$m = \min\{1, \frac{\pi \delta}{c}\}$$

$$0 \leq \delta \leq \sigma_g \leq 1$$

- the central trade-off for using measurement:

$$\frac{dV}{d\delta} \bigg/ p = \frac{\partial \Gamma}{\partial \delta} \lambda \Lambda_B$$

improve allocation
The ex-ante contractual design

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\frac{dV}{d\delta} / p = \underbrace{\frac{\partial\Gamma}{\partial \delta} \lambda L_B}_{\text{improve allocation}} - \left( \frac{\partial\Gamma}{\partial m} \lambda L_B + cm \right) \frac{\partial m^{BR}(\delta)}{\partial \delta} \underbrace{\text{induce manipulation}}_{\text{improve allocation}}
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\]

- Proposition 1:

\[
\delta^* = \min\left\{\frac{c}{C}, 1\right\}, \sigma_g^* = 1
\]
The comparative statics
The firm value

\[ V(\sigma_g^*, \delta^*) = V^{FB} - p\Gamma^* \lambda L_B - p\frac{c}{2} (m^*)^2 \]
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▶ a lower \( \lambda \) reduces renegotiation cost
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- a lower \( \lambda \) reduces renegotiation cost
- a lower \( \lambda \) also increases manipulation, which lowers firm value
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- \( V^* \) is increasing in \( c \) and decreasing in \( \kappa \)
The equilibrium use of accounting measurement

\[ \delta^* = \min \left\{ \frac{c}{\bar{c}}, 1 \right\} = \min \left\{ \frac{c\lambda L_B}{\pi(\pi + 2\lambda L_B)}, 1 \right\} \]
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- induced by \( \delta \), manipulation is secondary
- for interior \( \delta \), \( \frac{d\delta^*}{dc} > 0 \), \( \frac{d\delta^*}{d\lambda} > 0 \), \( \frac{d\delta^*}{d\kappa} < 0 \)
The equilibrium manipulation

\[ m^* = \min \left\{ \frac{\pi}{\bar{c}}, \frac{\pi}{c} \right\} = \min \left\{ \frac{\pi \lambda L_B}{\pi(\pi + 2\lambda L_B)}, \frac{\pi}{c} \right\} \]
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\[ m^* = \min\left\{ \frac{\pi}{\bar{c}}, \frac{\pi}{c} \right\} = \min\left\{ \frac{\pi \lambda L_B}{\pi (\pi + 2 \lambda L_B)}, \frac{\pi}{c} \right\} \]

- \( m^* \) has an upper bound of \( \frac{\pi}{\bar{c}} \)

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- the joint determination hypothesis
The equilibrium misallocation of control rights (renegotiation frequency)

\[ \Gamma^* = 1 - (1 - m^*) \delta^* \]
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- increasing in managerial bargaining power \( \kappa \)
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\[
\frac{d^*}{K} = \frac{K - p(1 - \gamma_B) r}{\gamma K} + \frac{p \Gamma^* \gamma_B (\pi + \lambda L_B)}{\gamma K}
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- the interaction effects
Take-away

- two solutions to contractual incompleteness
  - directly measuring the state, endogenizing contractual incompleteness
  - indirectly designing institutions as a response

- renegotiation and accounting-based covenants interact as substitutes to deal with incompleteness

- contractual use of measurement and manipulation are jointly determined

- the joint determination changes empirical predictions about manipulation and interest rate
Thank you!