The Burden of Past Promises

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“A GOOD RELATIONSHIP TAKES TIME”

- Common view: relationships are built on trust, and trust develops over time
  (Sobel, 1985; Datta, 1996; Ghosh and Ray, 1996; Kranton, 1996; Watson, 1999; Watson, 2002; Eeckout, 2006; Fujiwara-Greve and Ohuno-Fujiwara, 2009; Halac, Forthcoming)

- Once trust is established, can motivate cooperation through promises regarding future actions

- Time is therefore the friend of a good relationship
The Burden of Past Promises

• ... but eventually, the future becomes the present

• Yesterday’s promises become today’s obligations

• Time can be the foe of a good relationship
The Jobs Bank

“The Jobs Bank is a legacy of the early 1980s, when then-Chairman Roger B. Smith was embarking on a strategy to automate GM’s North American Factories.”

The Wall Street Journal, January 7th, 2006
"In a recent interview, UAW President Ron Gettelfinger [...] said the Jobs Bank originally was a company proposal, aimed at convincing UAW leaders not to oppose new technology. ‘The idea was, “You help us get productive and we’ll bring work in”’ to occupy the displaced workers, Mr. Gettelfinger said.”
**The Jobs Bank**

“In a recent interview, UAW President Ron Gettelfinger [...] said the Jobs Bank originally was a company proposal, aimed at convincing UAW leaders not to oppose new technology. ‘The idea was, “You help us get productive and we’ll bring work in”’ to occupy the displaced workers, Mr. Gettelfinger said.”

“But that decision came back to haunt the company in later years as it began to embrace Toyota’s methods of car making [...]. But the Jobs Bank never got redefined. Instead, after fighting a series of costly strikes with the UAW in the mid-1990s, GM management concluded it was better to build a harmonious relationship than provoke fights.”

The Wall Street Journal, January 7th, 2006
PURPOSE OF THE PAPER

• Show that transition of promises into legacy costs is a natural feature of optimally managed relationships

• Examine implications for evolution of firms
Model Sketch

• Infinitely repeated delegation game a la Armstrong and Vickers
Limited Transfers in Organizations

“A striking characteristic of work life is that one cannot reward individuals in cash for some things, but can compensate them in other ways.” (Prendergast and Stole, 1999)

“a significant number of [payments within firms] are in the form of policy commitments” (Cyert and March, 1963)
Model Sketch

- Infinitely repeated delegation game a la Armstrong and Vickers
- No transfers
Model Sketch

- Infinitely repeated delegation game a la Armstrong and Vickers
- No transfers
- Characterize the optimal relational contract: PPE that maximizes principal’s expected payoff
Main Results

- Principal initially delegates with the understanding that Agent will choose Principal’s preferred project if possible.

- Agent rewarded and punished w/changes in continuation payoffs.

- Two thresholds: if continuation payoff crosses upper threshold, entrenchment. If continuation payoff crosses lower threshold, permanent centralization or exit.

- Rewards and punishments are permanent.
Main Implication 1: Inertia and Decline

“One of the most consistent patterns in business is the failure of leading companies to stay at the top of their industries when technologies or markets change” (Bower and Christensen, 1996)

- Inertia of established firms is the result of commitments that allowed these firms to adapt when they were still young.
- Firm performance declines over time
Main Implication 2: PPDs

“Organizational policies/procedures tend to be derived from the early history of the organization (Stinchcombe, 1965; Hannan and Freeman, 1977) and to be derived (or at least crystallized out of) specific noteworthy events in the early history of the organization (Schein, 1983)” (Kreps, 1996, p. 577)

- Same starting point and multiple steady states: long-run performance is history-dependent
- Differences in performance linked to differences in organization
AGENDA

• The Model

• The PPE Payoff Set

• The Optimal Relational Contract

• Public Information

• Conclusions
**Model Sketch**

- One principal and one agent
- Risk-neutral
- No transfers
- Repeated trust game
- Only agent knows what projects are available
- Common discount factor $\delta$
1: \( P \) and \( A \) simultaneously decide whether to enter the relationship. \( e_j = 1 \) if enter and \( e_j = 0 \) if not. \( j = P, A \).
2: $P$ decides whether to delegate decision making to $A$. If $P$ does not delegate, then $P$ chooses safe project, $k = S$. 
3: Nature determines which projects are available. 
   A’s project always available. P’s project available with prob $p < \frac{1}{2}$. Only A knows which projects are available.
Players

$P$ $A$

$t = 1, 2, 3, ...$

1. $e_A, e_P \in \{0, 1\}$ chosen
2. $P$ chooses $d \in \{0, 1\}$.
3. If $d = 0$, $k = S$
4. $K_A \in \{\{A\}, \{A, P\}\}$ chosen. $K_A = \{A, P\}$ with prob $p < 1/2$.
5. ($A$’s private info)

4: If $P$ has delegated, $A$ chooses an available project.
TIMING

Players

$e_A, e_P \in \{0,1\}$ chosen

$P$ chooses $d \in \{0,1\}$. If $d = 0$, $k = S$

$K_A \in \{\{A\}, \{A, P\}\}$ chosen. $K_A = \{A, P\}$ with prob $p < 1/2$.

($A$’s private info)

$t = 1, 2, 3, ...$

$t + 1$

$5$: Stage payoffs are realized

Payoffs $\Pi(k), U(k)$
6: The outcome, $x$, of a public randomization device is commonly observed.
Stage-Game Payoffs

Players

\[ t = 1, 2, 3, \ldots \]

- \( e_A, e_P \in \{0, 1\} \) chosen
- \( d \in \{0, 1\} \) chosen. \( k = S \) if \( d = 0 \)
- \( K_A \in \{\{A\}, \{A, P\}\} \) chosen. \( K_A = \{A, P\} \) with prob \( p < \frac{1}{2} \).
- (A’s private info)

Payoffs

\( \Pi(k), U(k) \)

\( x \) publicly observed
Stage-Game Payoffs
Stage-Game Payoffs

Exit:
\[ \Pi(E) = 0 \]
\[ U(E) = 0 \]
**Stage-Game Payoffs**

Exit:
\[ \Pi(E) = 0 \]
\[ U(E) = 0 \]

No Delegation/Safe Project:
\[ \Pi(S) = a \]
\[ U(S) = a \]
**Stage-Game Payoffs**

**Exit:**
\[ \Pi(E) = 0 \]
\[ U(E) = 0 \]

**No Delegation/Safe Project:**
\[ \Pi(S) = a \]
\[ U(S) = a \]

**Principal’s Preferred Project:**
\[ \Pi(P) = B \]
\[ U(P) = b \]

**Parameter Restrictions:**
1. \( B > a > b \)
Stage-Game Payoffs

Exit:
\[ \Pi(E) = 0 \]
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No Delegation/Safe Project:
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Principal’s Preferred Project:
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Agent’s Preferred Project:
\[ \Pi(A) = b \]
\[ U(A) = B \]

Parameter Restrictions:
1. \( B > a > b \)
Stage-Game Payoffs

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\[ \Pi(E) = 0 \]
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No Delegation/Safe Project:
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\[ \Pi(P) = B \]
\[ U(P) = b \]

Agent’s Preferred Project:
\[ \Pi(A) = b \]
\[ U(A) = B \]

Parameter Restrictions:
1. \( B > a > b \)
2. \( pB + (1 - p)b > a \)
**Stage-Game Payoffs**

Players

P  A

$t = 1, 2, 3, \ldots$

1. $e_A, e_P \in \{0, 1\}$ chosen

2. $P$ chooses $d \in \{0, 1\}$.

3. $K_A \in \{\{A\}, \{A, P\}\}$ chosen. $K_A = \{A, P\}$ with prob $p < \frac{1}{2}$.

4. If $d = 1$, $A$ chooses $k \in K_A$

5. $x$ publicly observed

6. $B > a > b$

$$pB + (1 - p)b > a$$
**Repeated Game**

Players

<table>
<thead>
<tr>
<th>P</th>
<th>A</th>
</tr>
</thead>
</table>

\[ t = 1, 2, 3, \ldots \]

1. \( e_A, e_P \in \{0, 1\} \) chosen
2. \( P \) chooses \( d \in \{0, 1\} \).
3. If \( d = 0 \), \( k = S \)
4. \( K_A \in \{\{A\}, \{A, P\}\} \) chosen. \( K_A = \{A, P\} \) with prob \( p < \frac{1}{2} \).
5. \( (A's\ private\ info) \)
6. x publicly observed

\[
\pi_t = (1 - \delta)E_t \left[ \sum_{\tau=t}^{\infty} \delta^{t-\tau} e_{P,t} e_{A,t} \Pi(k_t) \right]
\]

\[
u_t = (1 - \delta)E_t \left[ \sum_{\tau=t}^{\infty} \delta^{t-\tau} e_{P,t} e_{A,t} U(k_t) \right]
\]

\[ B > a > b \]

\[ pB + (1 - p)b > a \]
Solution Concept

- (Pure Strategy) Perfect Public Equilibrium

- **Optimal relational contract**: PPE that maximizes $P$’s average payoff

- Goal: characterize the dynamics of the optimal relational contract
AGENDA

• The Model

• The PPE Payoff Set

• The Optimal Relational Contract

• Public Information

• Conclusions
PPE Payoff Set

- Abreu-Pearce-Stacchetti: characterizes PPE payoff set
PPE Payoff Set

\[ \pi \]

\[ u \]
1. PPE set $\mathcal{E}$ is convex and compact
**PPE Payoff Set**

1. PPE set $\mathcal{E}$ is convex and compact

2. $\mathcal{E}$ is convex hull of its frontier:

$$\pi(u) = max\{\pi | (u, \pi) \in \mathcal{E}\}$$
PPE Payoff Set

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PPE Payoff Set

1. PPE set $\mathcal{E}$ is convex and compact
2. $\mathcal{E}$ is convex hull of its frontier:
   \[ \pi(u) = \max\{\pi | (u, \pi) \in \mathcal{E}\} \]
3. $\pi(\cdot)$ is self-generating
PPE Payoff Set

- Abreu-Pearce-Stacchetti: characterizes PPE payoff set

- Can focus exclusively on frontier
**Actions?**

- Abreu-Pearce-Stacchetti: characterizes PPE *payoff set*

- Can focus exclusively on frontier

- Also want to characterize *actions* taken at each point on the frontier

- Any eqbm payoff pair on frontier either generated by pure actions or by randomization b/t two eqbm payoff pairs generated by pure actions
FOUR CLASSES OF ACTIONS IN EQUILIBRIUM

- Centralization ($C$)
  both enter, $P$ does not delegate

- Cooperative Delegation ($D_C$)
  both enter, $P$ delegates,
  $A$ chooses $k = P$ whenever possible

- Uncooperative Delegation ($D_U$)
  both enter, $P$ delegates,
  $A$ always chooses $k = A$

- Exit ($E$)
  neither enter
Four Classes of Actions in Equilibrium

If supported at \((u, \pi(u))\), then:

- Centralization (\(C\))
  both enter, \(P\) does not delegate
Four Classes of Actions in Equilibrium

- Centralization (C)
  both enter, $P$ does not delegate

If supported at $(u, \pi(u))$, then:

$$u = (1 - \delta)a + \delta u_C$$
Four Classes of Actions in Equilibrium

- **Centralization** ($C$)
  - both enter, $P$ does not delegate

If supported at $(u, \pi(u))$, then:

$$u_C(u) = \frac{u - (1 - \delta)a}{\delta}$$
Four Classes of Actions in Equilibrium

- **Centralization** ($C$)
  - both enter, $P$ does not delegate

- **Cooperative Delegation** ($D_C$)
  - both enter, $P$ delegates,
  - $A$ chooses $k = P$ whenever possible

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**Four Classes of Actions in Equilibrium**

- **Centralization (C)**
  - both enter, $P$ does not delegate

- **Cooperative Delegation ($D_C$)**
  - both enter, $P$ delegates,
  - $A$ chooses $k = P$ whenever possible

If supported at $(u, \pi(u))$, then:

$$u_C(u) = \frac{u - (1 - \delta)a}{\delta}$$

There must be two continuation values, $u_l$ and $u_h$ satisfying:

$$(1 - \delta)b + \delta u_h \geq (1 - \delta)B + \delta u_l$$

and

$$u = p[(1 - \delta)b + \delta u_h] + (1 - p)[(1 - \delta)B + \delta u_l]$$
**Four Classes of Actions in Equilibrium**

- **Centralization (C)**
  both enter, $P$ does not delegate

- **Cooperative Delegation ($D_C$)**
  both enter, $P$ delegates,
  $A$ chooses $k = P$ whenever possible

If supported at $(u, \pi(u))$, then:

$$u_C(u) = \frac{u - (1 - \delta)a}{\delta}$$

There must be two continuation values, $u_l$ and $u_h$ satisfying:

$$(1 - \delta)b + \delta u_h = (1 - \delta)B + \delta u_l$$

and

$$u = p[(1 - \delta)b + \delta u_h] + (1 - p)[(1 - \delta)B + \delta u_l]$$
Four Classes of Actions in Equilibrium

If supported at \((u, \pi(u))\), then:

\[ u_C(u) = \frac{u - (1 - \delta)a}{\delta} \]

- Centralization \((C)\)
  both enter, \(P\) does not delegate

- Cooperative Delegation \((D_C)\)
  both enter, \(P\) delegates,
  \(A\) chooses \(k = P\) whenever possible

There must be two continuation values, \(u_l\) and \(u_h\) satisfying:

\[(1 - \delta)b + \delta u_h = (1 - \delta)B + \delta u_l\]

and

\[ u_h(u) = \frac{u - (1 - \delta)b}{\delta} \quad u_l(u) = \frac{u - (1 - \delta)B}{\delta} \]
**Four Classes of Actions in Equilibrium**

- **Centralization** \((C)\)
  
  both enter, \(P\) does not delegate

- **Cooperative Delegation** \((D_C)\)
  
  both enter, \(P\) delegates, \(A\) chooses \(k = P\) whenever possible

If supported at \((u, \pi(u))\), then:

\[
\begin{align*}
  u_C(u) &= \frac{u - (1 - \delta)a}{\delta} \\
  u_H(u) &= \frac{u - (1 - \delta)b}{\delta} \\
  u_l(u) &= \frac{u - (1 - \delta)B}{\delta}
\end{align*}
\]
Four Classes of Actions in Equilibrium

- Centralization ($C$)
  both enter, $P$ does not delegate

- Cooperative Delegation ($D_C$)
  both enter, $P$ delegates,
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  both enter, $P$ delegates,
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- Exit ($E$)
  neither enter

If supported at $(u, \pi(u))$, then:

\[
\begin{align*}
    u_C(u) &= \frac{u - (1 - \delta)a}{\delta} \\
    u_H(u) &= \frac{u - (1 - \delta)b}{\delta} \\
    u_I(u) &= \frac{u - (1 - \delta)B}{\delta} \\
    u_D(u) &= \frac{u - (1 - \delta)B}{\delta} \\
    u_E(u) &= \frac{u}{\delta}
\end{align*}
\]
AGENDA

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• Conclusions
The PPE Payoff Frontier

\[ p(b, B) + (1 - p)(B, b) \]
The PPE Payoff Frontier

\[
\pi(\mathcal{u}) = p(b, B) + (1 - p)(B, b)
\]
**Actions Supporting the Frontier**

\[
p(b, B) + (1 - p)(B, b)
\]

Diagram showing points (0,0), (a, a), (b, B), and (B, b) with lines and curves indicating relations among them.
Optimal Relational Contract
Optimal Relational Contract

Period 1: $D_C$
Optimal Relational Contract

Period 1: $D_C, P$ chosen
**Optimal Relational Contract**

Period 1: $D_C, P$ chosen
Period 2: $D_C$
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, P$ chosen
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, P$ chosen
Optimal Relational Contract

Period 1: $D_C$, $P$ chosen
Period 2: $D_C$, $P$ chosen
Randomization
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, P$ chosen
Randomization

$(0,0)$
$(a, a)$
$(B, b)$

$\pi$
**Optimal Relational Contract**

Period 1: $D_C, P$ chosen
Period 2: $D_C, P$ chosen
Randomization
Period 3: $D_U$
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, P$ chosen
Randomization
Period 3: $D_U, A$ chosen
**Optimal Relational Contract**

Period 1: $D_C, P$ chosen
Period 2: $D_C, P$ chosen
Randomization
Period 3: $D_U, A$ chosen
Period 4: $D_U, A$ chosen

Entrenchment
Optimal Relational Contract

Period 1: $D_C$
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C$
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C$
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C$
Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
**Optimal Relational Contract**

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Period 5: $C, S$ chosen

$(a, a)$ $\pi(u)$ $B, b$
Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Period 5: $C, S$ chosen
Period 6: $C, S$ chosen
\vdots
Permanent Centralization

Optimal Relational Contract
**Optimal Relational Contract**

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization

$\pi$ vs $u$ graph with points $(0,0)$ and $(a,a)$.
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
**Optimal Relational Contract**

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Period 5: $D_C$
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Period 5: $D_C, A$ chosen
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Period 5: $D_C, A$ chosen
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Period 5: $D_C, A$ chosen

Randomization
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Period 5: $D_C, A$ chosen
Randomization
**Optimal Relational Contract**

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Period 5: $D_C, A$ chosen
Randomization
Period 6: $E$
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, A$ chosen
Period 3: $D_C, A$ chosen
Period 4: $D_C, A$ chosen
Randomization
Period 5: $D_C, A$ chosen
Randomization
Period 6: $E$
Period 7: $E$
\vdots
Exit
Optimal Relational Contract Properties

• Start off with cooperative delegation

• If reward (uncooperative delegation), reward forever

• If punish (permanent centralization or exit), punish forever

• Multiple steady states. Will eventually reach one of them and stay.
Implications

- Firm performance declines over time

- Initially flexible firms develop inertia and stop adapting to the private information of the agent

- Same starting point and multiple steady states: long-run performance is history-dependent

- Differences in performance linked to differences in organization
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  • Public Information
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Frontier of Baseline Model

$$\pi(u) = p(b, B) + (1 - p)(B, b)$$
In each period, with probability \( q \), new centralized project becomes available permanently.
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Must characterize two frontiers: post-opportunity $\pi_2(\cdot)$ and pre-opportunity $\pi_1(\cdot)$.

First characterize $\pi_2(\cdot)$; then characterize $\pi_1(\cdot)$, taking $\pi_2(\cdot)$ into account.
In each period, with probability $q$, new centralized project becomes available permanently.

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In each period, with probability $q$, new centralized project becomes available permanently.

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First characterize $\pi_2(\cdot)$; then characterize $\pi_1(\cdot)$, taking $\pi_2(\cdot)$ into account.
NEW PROJECT BECOMES AVAILABLE

In each period, with probability $q$, new centralized project becomes available permanently.

Must characterize two frontiers: post-opportunity $\pi_2(\cdot)$ and pre-opportunity $\pi_1(\cdot)$.

First characterize $\pi_2(\cdot)$; then characterize $\pi_1(\cdot)$, taking $\pi_2(\cdot)$ into account.

Each point on $\pi_1(\cdot)$ specifies an action and continuation payoffs if opportunity unavailable and if available.
Optimal Relational Contract

\[
\begin{align*}
\pi & = \pi(u, a), \\
\pi_1(u) & = \pi_{1}(u), \\
\pi_2(u) & = \pi_{2}(u), \\
(a, a) & = (a, a), \\
(0, 0) & = (0, 0), \\
(\hat{u}_N, \hat{\pi}_N) & = (\hat{u}_N, \hat{\pi}_N), \\
\{D_C\} & = \{D_C\}.
\end{align*}
\]
Optimal Relational Contract

\[ \pi(\tilde{u}, \tilde{\pi}) \]

Period 1: \( D_C, P \) chosen
Optimal Relational Contract

$(\pi_1(u), \pi_2(u))$

Period 1: $D_C, P$ chosen
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C$
Optimal Relational Contract

\[
\pi(\tilde{a}, \tilde{a}) (\tilde{B}, \tilde{b}) (0,0)
\]

Period 1: \( D_C, P \) chosen
Period 2: \( D_C, P \) chosen
Optimal Relational Contract

\[ \pi(\tilde{u}_N, \tilde{\pi}_N) \]

Period 1: \( D_C, P \) chosen

Period 2: \( D_C, P \) chosen
Optimal Relational Contract

Period 1: $D_C, P$ chosen
Period 2: $D_C, P$ chosen
Period 3: $D_C$
Optimal Relational Contract

\[ u \pi(a, a) (B, b) \]

Period 1: \( D_C, P \) chosen
Period 2: \( D_C, P \) chosen
Period 3: \( D_C, P \) chosen
Optimal Relational Contract

Period 1: \( D_C, P \) chosen
Period 2: \( D_C, P \) chosen
Period 3: \( D_C, P \) chosen
Period 4: \( D_U \)
Optimal Relational Contract

\[ 𝑢(\pi(\mathbf{a}, \mathbf{a})) \]

\[ \pi(\mathbf{b}, \mathbf{b}) \]

\[ (0,0) \]

Period 1: \( D_C, P \) chosen
Period 2: \( D_C, P \) chosen
Period 3: \( D_C, P \) chosen
Period 4: \( D_U, A \) chosen
**Optimal Relational Contract**

\[
\pi
\]

Period 1: \(D_C, P\) chosen
Period 2: \(D_C, P\) chosen
Period 3: \(D_C, P\) chosen
Period 4: \(D_U, A\) chosen
Period 5: \(D_U, A\) chosen
Period 6: \(D_U, A\) chosen

\[
\text{Entrenchment}
\]
Results from Public Opportunity Case

- The breadth of promises is also an important design variable
- Broad promises may lead to rigidity with respect to public information
- Older firms less likely to adapt to new public information
Agenda

• The Model
• The PPE Payoff Set
• The Optimal Relational Contract
• Public Information
• Conclusions
Conclusion

“Corporate cultures do change over time, and modeling the endogenous evolution of trust and incentives to invest in it would be a fascinating avenue for future research.” (Bloom, Sadun, and Van Reenen, 2012)

- View that good relationships take time suggests that trust increases over time, and discretion is positively related to trust.

- Our model suggests that trust (cooperative delegation) decreases over time, while discretion may move in the opposite direction.

- Interaction between trust and discretion and their evolution depend on whether there is uncertainty about employees’ types or about their actions.
EXTRA SLIDES
The PPE Payoff Frontier

\[ \pi(u) = \max_{q_j \geq 0, u_j \in [0,B]} \sum_{j \in \{C,D_C,D_U,E\}} q_j \pi_j(u_j) \quad \text{st} \quad \sum_{j \in \{C,D_C,D_U,E\}} q_j = 1 \quad \& \quad \sum_{j \in \{C,D_C,D_U,E\}} q_j u_j = u \]

if \( q_C = 1 \),
\[ u_C(u) = \frac{u - (1 - \delta)a}{\delta} \]
\[ \pi_C(u) = (1 - \delta)a + \delta \pi(u_C(u)) \]

if \( q_{D_C} = 1 \),
\[ u_h(u) = \frac{u - (1 - \delta)b}{\delta} \quad u_l(u) = \frac{u - (1 - \delta)B}{\delta} \]
\[ \pi_{D_C}(u) = p[(1 - \delta)B + \delta \pi(u_h(u))] + (1 - p)[(1 - \delta)b + \delta \pi(u_l(u))] \]

if \( q_{D_U} = 1 \),
\[ u_{D_U}(u) = \frac{u - (1 - \delta)B}{\delta} \]
\[ \pi_{D_U}(u) = (1 - \delta)b + \delta \pi(u_{D_U}(u)) \]

if \( q_E = 1 \),
\[ u_E(u) = \frac{u}{\delta} \]
\[ \pi_E(u) = \delta \pi(u_E(u)) \]
New Project Becomes Available

Region 1: Mix b/t N and C
Region 2: Mix b/t C and CD
Region 3: CD
Region 4: Mix b/t UD and CD

Actions supporting these PPE frontier payoffs

\( (a, a) \)

\( (b, B) \)

\( (B, b) \)

\( (0,0) \)
New Project Becomes Available

Region 1: Mix b/t N and C
Region 2: Mix b/t C and CD
Region 3: CD
Region 4: Mix b/t UD and CD

Actions supporting these PPE frontier payoffs

\[
p(b, B) + (1 - p)(B, b)
\]