14.771 Development Economics: Microeconomic issues and Policy Models
Fall 2008

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Topics I will talk briefly about:

- Contracts and reputation (today)
- Implications for corporate finance (next time)
Basic problem: bad legal system means that contracts are hard to enforce
  - E.g., recovering debts, enforcing contract disputes, etc.

Of course, this is true everywhere to some degree
  - But this is often thought to be worse in developing countries.
  - See Doing Business 2008
  - (although note that their academic papers find only lukewarm support for this result)
Where is Enforcing Contracts Easy - and Where not?

<table>
<thead>
<tr>
<th>Easiest</th>
<th>Rank</th>
<th>Most difficult</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong, China</td>
<td>1</td>
<td>Central African Republic</td>
<td>169</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>2</td>
<td>Belize</td>
<td>170</td>
</tr>
<tr>
<td>Latvia</td>
<td>3</td>
<td>Syria</td>
<td>171</td>
</tr>
<tr>
<td>Iceland</td>
<td>4</td>
<td>Cameroon</td>
<td>172</td>
</tr>
<tr>
<td>Singapore</td>
<td>5</td>
<td>Congo, Dem. Rep.</td>
<td>173</td>
</tr>
<tr>
<td>Austria</td>
<td>6</td>
<td>Suriname</td>
<td>174</td>
</tr>
<tr>
<td>Finland</td>
<td>7</td>
<td>Bangladesh</td>
<td>175</td>
</tr>
<tr>
<td>United States</td>
<td>8</td>
<td>Angola</td>
<td>176</td>
</tr>
<tr>
<td>Norway</td>
<td>9</td>
<td>India</td>
<td>177</td>
</tr>
<tr>
<td>Korea</td>
<td>10</td>
<td>Timor-Leste</td>
<td>178</td>
</tr>
</tbody>
</table>

Note: Rankings are the average of the country rankings on the procedures, time and cost to resolve a commercial dispute through the courts. See data notes for details.

Source: Doing Business database.

Figure by MIT OpenCourseWare.
Background

Longest Court Delays in South Asia

Time to Enforce a Contract (Days)

- Eastern Europe & Central Asia: 443
- OECD high income: 443
- East Asia & Pacific: 549
- Sub-Saharan Africa: 643
- Middle East & North Africa: 699
- Latin America & Caribbean: 700
- South Asia: 1,047

Source: Doing Business database.

Figure by MIT OpenCourseWare.
## Cost (% of claim)

<table>
<thead>
<tr>
<th>Least</th>
<th>Most</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhutan 0.1</td>
<td>Comoros 89.4</td>
</tr>
<tr>
<td>Iceland 6.1</td>
<td>Cambodia 102.7</td>
</tr>
<tr>
<td>China 8.8</td>
<td>Burkina Faso 107.4</td>
</tr>
<tr>
<td>Luxembourg 8.8</td>
<td>Papua New Guinea 110.3</td>
</tr>
<tr>
<td>United States 9.4</td>
<td>Indonesia 122.7</td>
</tr>
<tr>
<td>Norway 9.9</td>
<td>Malawi 142.4</td>
</tr>
<tr>
<td>Poland 10.0</td>
<td>Mozambique 142.5</td>
</tr>
<tr>
<td>Korea 10.3</td>
<td>Sierra Leone 149.5</td>
</tr>
<tr>
<td>Finland 10.4</td>
<td>Congo, Dem. Rep. 151.8</td>
</tr>
<tr>
<td>Germany 11.8</td>
<td>Timor-Leste 163.2</td>
</tr>
</tbody>
</table>

*Source: Doing Business database.*

Figure by MIT OpenCourseWare.
So how do we enforce contracts without courts?

We’ll explore several options:

- Repeated interactions
- Collective reputations
- Networks
Suppose there is a buyer who wants one of two types of goods: red or white.

Quality can be good or bad; this is observable but non-verifiable (i.e. not enforceable by court).

Payoffs to buyer:
- If buyer orders red: utility from good quality is $H$ and utility from bad quality is $D$.
- If buyer orders white: utility from good quality is $h$ and utility from bad quality is $d$.

Assume $H > h > d > D$. Assume $d \geq 0$.

Assume that the buyer proposes the equilibrium.
Suppliers

- Suppliers have a cost $G$ per period of supplying the good quality and a cost of 0 of supplying the bad quality.
- Assume the efficient outcome is to produce high quality red, i.e. $H - G > d > h - G$.
- The supplier’s outside option is getting zero for ever. The supplier cannot be paid a negative price.
- The relation goes on till the supplier dies, which happens with probability $\lambda$ each period. No other discounting.
Equilibrium with single buyer and seller

- **One-shot game:**
  - Supplier always chooses to deviate and produce low-quality.
  - Therefore, buyers always order white at \( p = 0 \).

- **Repeated game:**
  - Folk-theorem logic: If supplier ever deviates and supplies low quality, order white at \( p = 0 \) forever.
  - This punishment threat can sustain good behavior.
  - This will be the case if
    \[
    \sum_{n=0}^{\infty} (1 - \lambda)^n (\rho_n - G) \geq p_0
    \]
  - With constant prices, this is just
    \[
    \frac{p - G}{\lambda} \geq p
    \]
  - Since seller is willing to pay up to \( H \), this equilibrium exists as long as
    \[
    \lambda \leq 1 - \frac{G}{H}
    \]
Equilibrium with multiple types of sellers

- Suppose now there are three types of sellers:
  - Honest (fraction $\alpha$). Always produce high quality.
  - Dishonest ($\beta$). Always produce low quality.
  - Strategic ($\gamma$). Do what is in their best interest.

- How does this change the equilibrium?
  - Buyer orders red and starts with $p = 0$. This screens out the dishonest sellers.
  - After this, same equilibrium as before (order white at $p = 0$ if ever get low quality), and order red if continue to get high quality.
  - New sellers initially take a loss, but are paid higher prices later to compensate.
  - A buyer who has an established seller may refuse a new supplier even if the price is zero. Why?
Equilibrium with multiple sellers

- Now suppose there are many sellers, and a buyer is matched with a new seller each period.
- If a seller has supplied low quality at least once in the past, buyer finds out with probability $x$.
- In this model, once a strategic seller supplies low quality he will do so in the future, since his reputation is already tainted.
- Finally assume that the price of red is fixed at $B$ and that of whites is fixed at $b < B$. (In Tirole these are private benefits).
Equilibrium with multiple sellers

- Now there are multiple steady states
- Good equilibrium:
  - Suppose the seller orders red from any buyer with whom he is matched and who is not known to have delivered low quality in the past.
  - Then an untainted strategic seller may produce high quality red if $x$ is high enough and the gap $B - b$ is large enough.
  - Knowing this the buyer will order red as long as there are enough untainted strategic sellers.
- Bad equilibrium:
  - Suppose sellers are expected to always demand white in the future.
  - Then all strategic agents will produce low quality today, since there is no return to preserving reputation.
  - Given this, sellers are better off demanding white today.
Implications

- **Persistence:**
  - Suppose there is a one-time shock and everyone’s reputation is tainted. Buyers and sellers know this.
  - Now the good equilibrium can go away – even for newly born, untainted sellers.
  - Why? Suppose you don’t receive a signal that the person is tainted. What is your inference that the person is actually tainted? If $\lambda$ is sufficiently low, the person is most likely tainted and will deliver low quality.
  - Key intuition: if collective reputation is bad, new untainted people cannot distinguish themselves.

- **Information:**
  - Information structure ($x$) is crucial for this model.
  - If $x$ is very high, we are always in good state, since new agents now have an incentive to maintain individual reputation.
  - if $x$ is very low, we are always in bad equilibrium, because we cannot sustain any Folk theorem equilibrium.
Empirical implications

- Sellers may have to take a loss up front in order to establish their relationship. Contracts will therefore change as individual relationships get established.
- Reputations are valuable, and temporary shocks can have long-lasting implications (think of a financial crisis).
- Commercial networks may form where information is more observable (i.e., $\times$ is higher).
- Networks also can enhance enforcement by increasing the penalty from default (Kandori 1992, Kranton and Meinhart 2001, and others)
Banerjee and Duflo (2000)

- Setting:
  - Study of the Indian software industry, which produces customized software for large corporations.
  - Software is customized and takes time to produce. The problem is that you don’t know how difficult a software project is until you start working on it.

- Firms:
  - As in the model above, there is heterogeneity in the type of firm. Bad firms are inclined to cost overruns.

- Contracting:
  - Contracts are inadequate protection because both sides can claim that the other side was to blame for delays.
Contracts

- There are several two ways to deal with cost overruns
  - Not buying in the future, as in the above model
  - Forcing the firm to pay for it by making it responsible for the overrun. This can be achieved by fixed price contract instead of a time and material contract.

- However a fixed price contract forces the firm to bear all the risk and gives the buyer incentives to misbehave.

- Therefore firms will prefer to move to a time and material contract, but the buyers will not agree unless the firm has a reputation for being good.
Predictions

- Firms that are in a repeat contract is more likely to have time and material contracts.
- Firms that work for 'parent companies' are more likely to have time and material contracts.
- Assume that a firm that does not get some repeat buyers goes out of business. Older firms are therefore less likely to be bad firms. Then older firms are more likely to have a time and material contract.
  - Alternatively, could get a similar result if firms’ past behavior with other clients is imperfectly observable to new clients.
• Collected data on contracts from a survey of Indian software firms
• Define contract type $C_{ic}$ to be 1 for fixed-price, 2 for mixed, and 3 for time and materials
• Estimate ordered probit

$$C_{ic} = \alpha R_{ic} + \beta X_{ic} + \gamma Z_{ic} + \delta M_{ic} + \nu_i + \omega_{ic}$$

where $R$ is reputation variables, $X$ is project characteristics, and $M$ is client characteristics.
• Estimate analogous models for:
  • Whether firm paid for any actual overrun
  • Whether there was an overrun
### Results

<table>
<thead>
<tr>
<th>Choice of contract ordered probit</th>
<th>Share of overrun paid by the firm</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unconditional</td>
<td>Conditional</td>
</tr>
<tr>
<td></td>
<td>Random effect</td>
<td>Fixed effect</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Reputation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young firm</td>
<td>-0.69* (0.25)</td>
<td>15* (8.5)</td>
</tr>
<tr>
<td>Repeated contract</td>
<td>0.22 (0.24)</td>
<td>-17* (8.8)</td>
</tr>
<tr>
<td>ISO-certified firm</td>
<td>-0.27 (0.32)</td>
<td>17 (13)</td>
</tr>
<tr>
<td>Internal project</td>
<td>0.87* (0.31)</td>
<td>-25* (11)</td>
</tr>
</tbody>
</table>

Figure by MIT OpenCourseWare.
## Results

<table>
<thead>
<tr>
<th>Reputation</th>
<th>Total overrun</th>
<th>Overrun due to the firm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unconditional</td>
<td>Conditional</td>
</tr>
<tr>
<td></td>
<td>Random effect</td>
<td>Random effect</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Reputation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young firm</td>
<td>-0.48</td>
<td>-3.8</td>
</tr>
<tr>
<td></td>
<td>(5.0)</td>
<td>(5.0)</td>
</tr>
<tr>
<td>Repeated contract</td>
<td>1.8</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>(4.9)</td>
<td>(4.8)</td>
</tr>
<tr>
<td>ISO-certified firm</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>(7.9)</td>
<td>(7.7)</td>
</tr>
</tbody>
</table>

Figure by MIT OpenCourseWare.
Networks

- Greif (1993)
  - Studies the Maghribi traders, a network of Jewish traders
  - Because they shared a common language and were within a common network, it was easier to share information about counter-parties (i.e., high $x$)
  - If someone deviated, entire network would punish the deviant trader. This created stronger incentives for honest behavior
  - People who were suspected of cheating would have to invest in rebuilding their reputation
McMillan and Woodruff (1999)

- Study provision of trade credit in Vietnam
- Trade credit requires trust, because you are paid after delivery of goods
- Networks provide both information and enforcement, as in Greif

Data on firms in Vietnam

- Key dependent variable: percent of bill paid by customer after delivery
- Key independent variable: talk to other suppliers of customer at least monthly, so in a network of information about customer
- Also examine duration (as in above model)
### Results

<table>
<thead>
<tr>
<th>Manufacturer information:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of relationship (years)</td>
<td>0.08 (2.96)</td>
<td>0.07 (2.61)</td>
<td>0.07 (2.51)</td>
</tr>
<tr>
<td>Duration^2</td>
<td>-0.005 (2.15)</td>
<td>-0.004 (1.95)</td>
<td>-0.004 (1.74)</td>
</tr>
<tr>
<td>Visited customer before first sale</td>
<td>0.08 (1.63)</td>
<td>0.07 (1.71)</td>
<td>0.06 (1.33)</td>
</tr>
<tr>
<td>Currently visit customer at least weekly</td>
<td>-0.03 (0.46)</td>
<td>-0.06 (1.03)</td>
<td>-0.05 (0.84)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Network membership:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First information from other manufacturers</td>
<td>0.20 (3.36)</td>
<td>0.16 (2.83)</td>
<td>0.10 (1.99)</td>
</tr>
<tr>
<td>Talk to other suppliers of customer at least monthly</td>
<td>0.19 (2.36)</td>
<td>0.19 (2.63)</td>
<td>0.18 (2.31)</td>
</tr>
<tr>
<td>First information from family member</td>
<td>0.04 (0.60)</td>
<td>-0.01 (0.17)</td>
<td>-0.08 (1.34)</td>
</tr>
</tbody>
</table>

Figure by MIT OpenCourseWare.
Brands

- All of this has been about reputations vis-a-vis other firms in business to business transactions

- Similar logic may apply to reputations vis-a-vis consumers:
  - Companies invest in building a brand (e.g., "Tata" in India), which is difficult to do
  - And then use that brand to build a wide variety of products

- This provides one potential explanation for why we observe large, diversified conglomerates in developing countries

- More reasons for the presence of conglomerates next time.