14.771 Development Economics: Microeconomic issues and Policy Models

Fall 2008

14.771: Firms and Contracts Lecture 1

Ben Olken

October 2008

Outline

- Topics I will talk briefly about:
  - Contracts and reputation (today)
  - Implications for corporate finance (next time)

Background

- 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)

Background

Where is Enforcing Contracts Easy - and Where not?

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

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

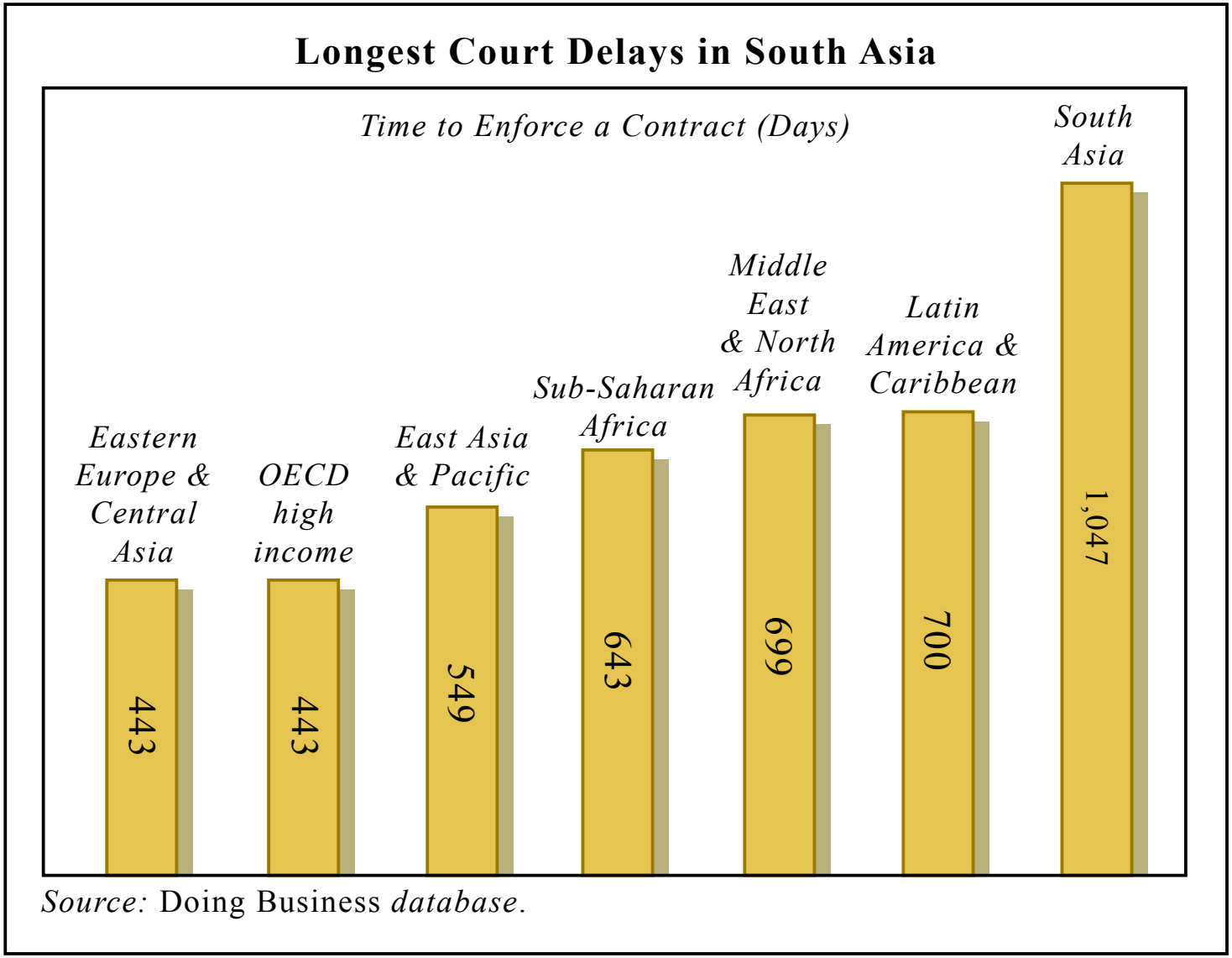

Figure by MIT OpenCourseWare.

Background

Cost (% of claim)

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

Source: Doing Business *database*.

Figure by MIT OpenCourseWare.

Models of Reputations

- So how do we enforce contracts without courts?
- We'll explore several options:
  - Repeated interactions
  - Collective reputations
  - Networks

Tirole (1996)

- 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 uility 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 λ 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

$$\sum_{n=0}^{\infty} (1-\lambda)^n (p_n - G) \geq p_0$$

  - 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

$$\lambda < 1 - \frac{G}{H}$$

Equilibrium with multiple types of sellers

- Suppose now there are three types of sellers:
  - Honest (fraction α). Always produce high quality.
  - Dishonest (β). Always produce low quality.
  - Strategic (γ). 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 λ 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., x 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.

Empirics

- 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

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

  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

	Choice of contract ordered probit		*Share of overrun paid by the firm*					
			Unconditional				*Conditional*	
			Random effect		*Fixed effect*		*Random effect*	*Fixed effect*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Reputation								
Young firm	-0.69* (0.25)		15* (8.5)				9.0 (8.6)	
Repeated contract	0.22 (0.24)		-17* (8.8)		-20 (16)		-15* (8.7)	-19 (17)
ISO-certified firm	-0.27 (0.32)		17 (13)				16 (13)	
Internal project		0.87* (0.31)		-25* (11)		-64* (26)		

Figure by MIT OpenCourseWare.

Results

	Total overrun		*Overrun due to the firm*	
	Unconditional	*Conditional*	*Unconditional*	*Conditional*
	Random effect	*Random effect*	*Random effect*	*Random effect*
	(1)	*(2)*	*(3)*	*(4)*
Reputation				
Young firm	-0.48 (5.0)	-3.8 (5.0)	2.5 (3.4)	1.5 (3.5)
Repeated contract	1.8 (4.9)	1.5 (4.8)	-0.92 (3.5)	-1.2 (3.5)
ISO-certified firm	15 (7.9)	16 (7.7)	5.4 (5.4)	6.1 (5.5)

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

Networks

- 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

Manufacturer information:				
Duration of relationship (years)	0.08 (2.96)	0.07 (2.61)	0.07 (2.51)	0.07 (2.42)
Duration^2	-0.005 (2.15)	-0.004 (1.95)	-0.004 (1.74)	-0.004 (1.78)
Visited customer before first sale		0.08 (1.63)	0.07 (1.71)	0.06 (1.33)
Currently visit customer at least weekly		-0.03 (0.46)	-0.06 (1.03)	-0.05 (0.84)
Network membership:				
First information from other manufacturers	0.20 (3.36)	0.16 (2.83)	0.10 (1.99)	0.17 (2.98)
Talk to other suppliers of customer at least monthly		0.19 (2.36)	0.19 (2.63)	0.18 (2.31)
First information from family member	0.04 (0.60)	-0.01 (0.17)	-0.08 (1.34)	-0.13 (2.11)

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.