Strategic Delegation

Fershtman & Judd (87')

The principal can strategically manipulate and "distorts" the incentive contract he offers to the agent, and thereby creates advantage than he otherwise will not have.

Consider a model of duopoly.

Two firms, $i=1,2$ compete in Cournot fashion with cost function $c(q)=cq$

Market demand: $P = a - bQ; Q = q_1 + q_2$

Profit of firm i is thus $\pi_i = (a - bQ)q_i - cq_i$

- Suppose each firm hires a manager to run the business.
- Suppose there is no agency problem, and the optimal contract offered to the agent is linear:

$$u_i = \alpha\pi_i , \quad 0 < \alpha < 1.$$

u_i is wage of firm *i*'s manager

- One of the firms, say 2, can actually make more profit by "distorting" the incentive contract.
- This can be achieved by setting $u_2 = \beta\pi_2 + (1-\beta)R_2,\ 0 \le \beta < 1$.

R_2 is firm 2's revenue.

- By setting contract in this fashion the firm can make its manager more aggressive in a credible way.

- The Cournot equilibrium is characterized by

$$\max_{q_1} (a - bQ)q_1 - cq_2$$

$$\max_{q_2} \beta\left(\left(\alpha - bQ\right)q_2 - cq_2\right) + \left(1 - \beta\right)\left(\alpha - bQ\right)q_2$$

FOC:

$$a - bQ - bq_1 - c = 0$$

$$a - bQ - bq_2 - \beta c = 0$$

This implies that $q_2 = q_1 + b^{-1}c(1 - \beta) > q_1$

Solving for price and quality:

$$q_1^{**} = \frac{a - c(2 - \beta)}{3b};\; q_2^{**} = \frac{a + c(1 - 2\beta)}{3b};\; p^{**} = \frac{a + (1 + \beta)c}{3}$$

Compare this to the standard Cournot equilibrium:

FOC:

$$a - bQ - bq_1 - c = 0$$

$$a - bQ - bq_2 - c = 0$$

$$q_1^* = q_2^* = \frac{a-c}{3b} \qquad \pi_1^*, \pi_2^*$$

$$p^* = \frac{a+2c}{3}$$

Obviously,

$$q_1^{**} + q_2^{**} = \frac{2a-(1+\beta)c}{3b} \geq q_1^* + q_2^* = \frac{2(a-c)}{3b}$$

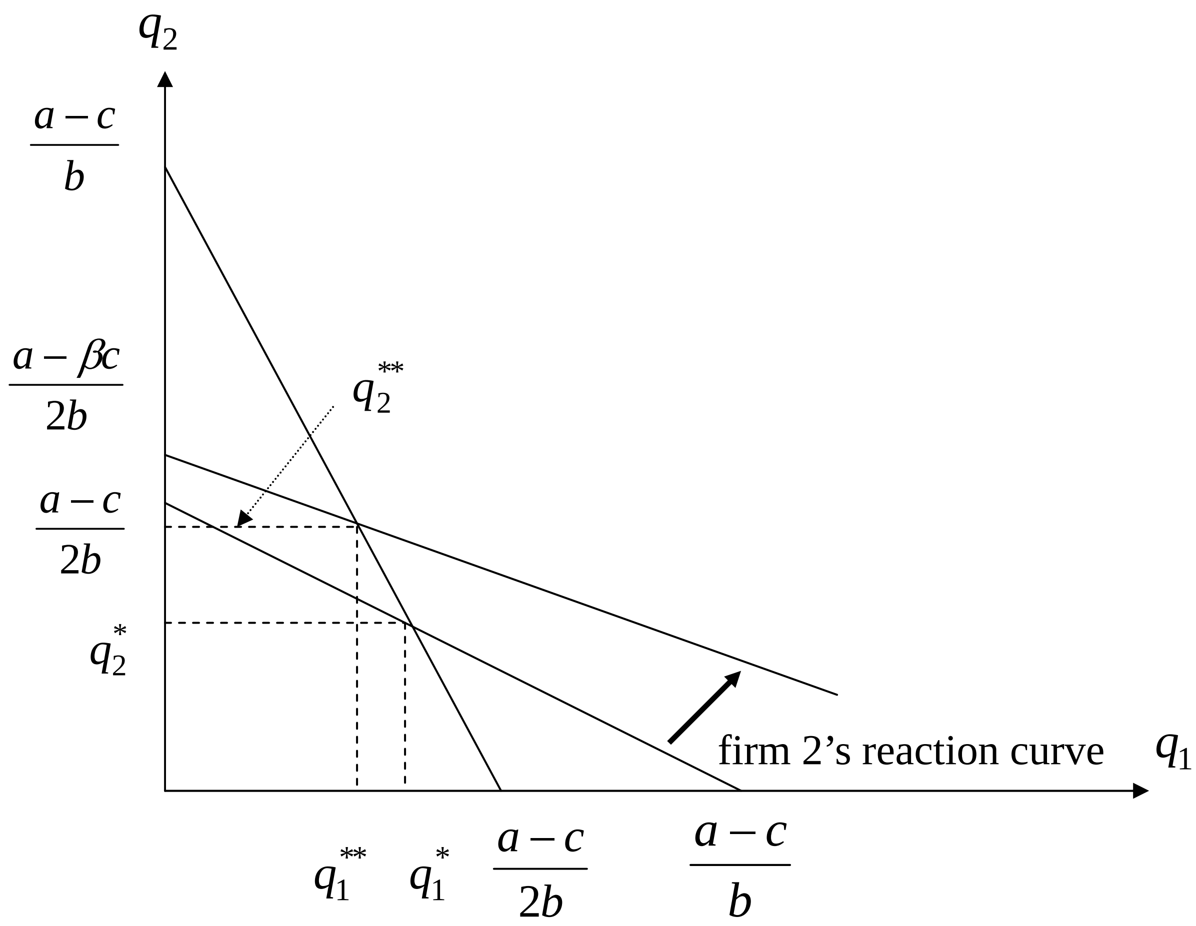
$$p^* \geq p^{**}$$

It can be easily computed that

$$\pi_1^* > \pi_1^{**}, \pi_2^{**} > \pi_2^*$$

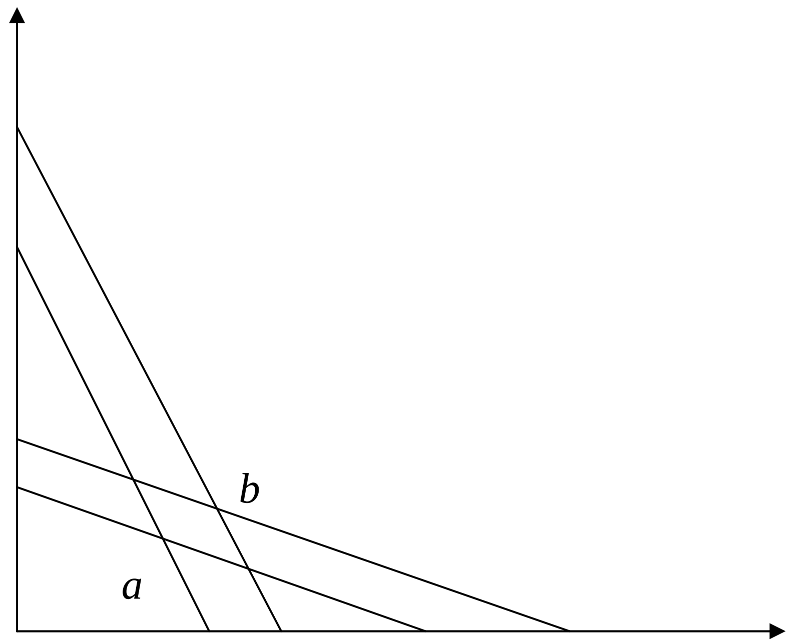
- That is, firm 2 gains at the expense of firm 1.
- By making manager’s pay depend on revenue, firm 2 has made its manager more aggressive in producing output, and forces firm 1’s manager to cut down its output in response.

- A simple graphical analysis



- Firm 2’s strategic delegation has actually shifted its reaction curve outwards. Thus $q_1 \downarrow$ and $q_2 \uparrow$.
- Note that if not for strategic motivation, firm 2’s contract to its manager does not make economic sense. It should reward its manager by profit, not by revenue.
- However, by doing so it has prompted its manager to produce “too much”. And this forces firm 1 to reduce its output, and thus gains at firm 1’s loss.

- Note that if <u>both</u> firms act strategically then both lose. E.g., they both choose $\beta < 1$.



Output increases, price falls, and both have lower payoffs.

Specifically, output become

$$q'_1 = q'_2 = \frac{a - \beta c}{3b} \equiv q'$$

It is easy to see that

$$q_2^{**} > q' > q_1^{**},\ q' > q_1^{*} = q_2^{*}$$

$$p' < p^{*}$$

It becomes a prisoners' dilemma

	Strategic delegation	no Strategic delegation
Strategic delegation	π_{11} π_{12}	π_{21} π_{22}
no strategic delegation	π_{31} π_{32}	π_{41} π_{42}

Case study: Anglo-Dutch Trade Rivalry

D. Irwin (1991)

In the 17th century East India trade rivalry, Dutch East India Company enjoyed early prevails. This is explained in terms of Dutch use of strategic trade policy.

Background:

- Goods from India and Indonesia are mainly spices and silk.
- Trade prospered 1 century after a new route was discovered via Cape of Good Hope.
- English East India Company (EEIC) was found in 1660 as joint-stock company, and royal charter granted it monopoly power.

- During 1600~10, one ship per year. 4 ships per year in mid 1620s.
- 7% of roughly 135 voyages were not returned. Profits are high.

English East India Company Profitability

Years	Voyages	Total Profits (%)	Average Annual Return to Stockholders (%)
1606-08	3rd-5th	234	…
1609	6th	121 2/3	14
1610	7th	218	26 1/3
1611	8th	211	66
1611	9th	160	26 2/3
1611	10th	148	24 1/2
1613-20	1st joint stock	87 1/2	> 7 1/4

Source.— Chaudhuri (1965), pp. 211-17.

- Dutch United East India Company (VOC) was founded in 1602, and was granted exclusive monopoly right.
- VOC dominated early East India Trade. Returned 65 ships, as compared to England's 35 during 1615~25.
- VOC was aggressive from the beginning: sought monopoly contracts with local supplies, empowered to make treaties, acquire land, build fort, etc.
- After mid 1620s, English gradually ceded trade and retreated to for western parts of Southeast Asia.

The rival between English and Dutch fits well with Cournot model:

1. Partial equilibrium--- East India trade constitutes only a small fraction of intra Europe trade.

2. Single homogeneous good--- pepper (over 60%) and other spices.

3. Duopoly with no entry--- That Dutch and English monopoly are obvious. Other European countries were not competitors because their maritime capacities were not advanced enough. France did not have East India Company until 1664.

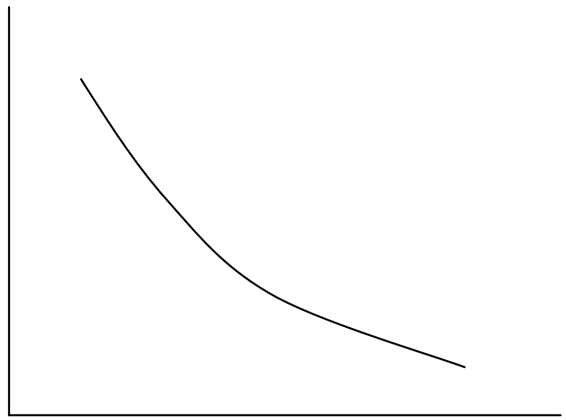
Spain and Portugal ruled sea in 16th century. However, by papal decree in 1493, Spain were only allocated trade with South America. Portugal declined fast in 17th century.

4. Cournot game--- competition is clearly non-cooperative judged by intense relationship between the 2 countries. They make the decision of how many ships to return at roughly the same time because of nature of monsoon. Goods are auctioned off once ship returns.

5. Quantity competition--- choice variables are of ships, and thus quantity.

6. Constant cost--- ships have perfect rental market, and rental is not based on fixed charge per ship, but on a flat freight rate on required tonnage. Moreover, British and Dutch India Company purchased only a fraction of goods in East India, so were not able to influence price.

$$\frac{F + q \cdot x}{q} \longrightarrow$$



- English vs. Dutch East India Company:

  India Company:

  The former is private company with no governmental stake. For VOC, governmental role is visible. Charter of 1602 created a managerial group with interests deviating from investors. <u>They derived income both from dividends and percentage of gross revenue</u>.
- By committing to aggressive trade policy Dutch succeeded in preempting rival from spice islands of Indonesia. England diverted their trade to India, and prospered in cotton tetile trade.

TABLE 2