OXFORD
UNIVERSITY
BUSINESS
ECONOMICS
PROGRAMME

Economics of Industry: Collusive Practices

Repeated Games, Cooperation, and Collusion

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Repeated Games and Collusion

- A particular type of dynamic game is a *repeated game.*

    - Firms do not interact only once, but have similar interactions again and again.
    - This allows players to *condition* behaviour on actions taken in the past.
    - Enabling collusion between "Bertrand" firms and larger profits.

- There are also contractual ways to facilitate collusion.

    - *Most Favoured Customer* clauses (MFC).
    - *Meet the Competition Clauses* (MCC).

- Such facilitative practices can have the additional effect of entry deterrence.

Repeated Games and Equilibrium

- Consider the following simple "stage" game. Suppose it is played twice.

	Left	**Centre**	**Right**
Top	£1 £3	0 0	0 £5
Middle	0 0	£3 £1	0 0
Bottom	£1 0	0 0	£4 £4

- Repeating any Nash equilibrium twice is an equilibrium of the repeated game.

- {**Bottom, Right**} is not a Nash equilibrium of the stage game. But...

Contingent play

- It is part of an equilibrium in the twice repeated game.

	Left	Centre	Right
Top	$£1$ / $£3$	0 / 0	0 / $\underline{£5}$
Middle	0 / 0	$\underline{£3}$ / $\underline{£1}$	0 / 0
Bottom	$\underline{£1}$ / 0	0 / 0	$£4$ / $£4$

- Consider the following strategies: Row plays {**Bottom**} and then {**Top**} if {**Bottom, Right**} was played and {**Middle**} if not. Column plays {**Right**} and then {**Left**} if {**Bottom, Right**} was played and {**Centre**} if not.

- Now $£4 + £3 > \underline{£5} + \underline{£1}$ and $£4 + £1 > \underline{£1} + \underline{£3}$. So this is an equilibrium.

Return of the Prisoners' Dilemma

- Can such a credible commitment be made in the repeated Prisoners' Dilemma?

	Cooperate	Defect
Cooperate	$$ $$	$$$ 0
Defect	0 $$$	$ $

- No. But what if the game were to be repeated indefinitely?

- In this case, the *grim strategy* will enable mutual cooperation:

"Cooperate until you defect and then defect forever."

Bertrand's Dilemma

- Of course, we are really interested in price setting firms in a Bertrand world.

- "Monopoly price until you undercut me and then price at cost forever."

- Discounted future profits versus short term deviation profits.

$$\$\$ + \$\$ + \$\$ + \$\$ + \ldots > \$\$\$ + \$ + \$ + \$ + \ldots$$

- What factors make this strategy likely to succeed? Anything that increases future discounted profits or decreases the profit from deviation.
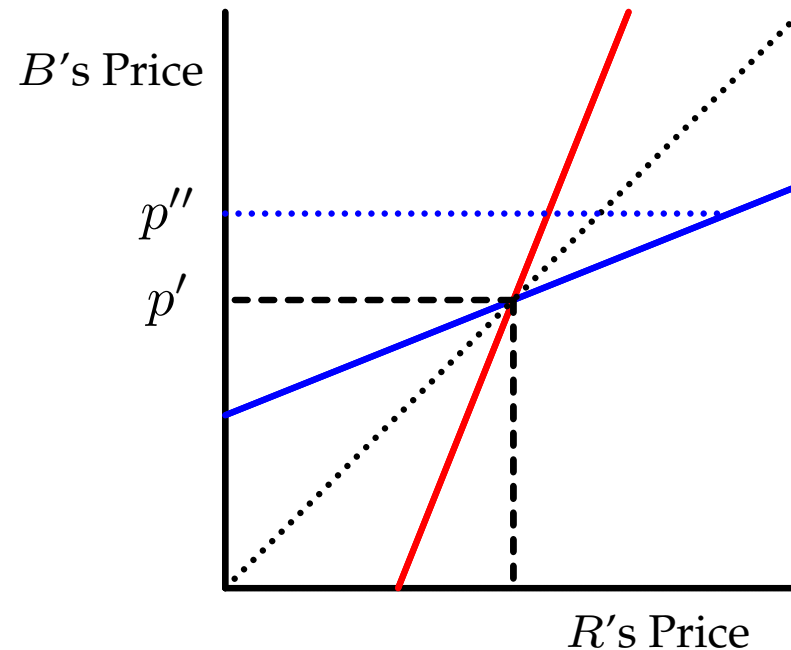
Most Favoured Customer Clauses

Retroactive MFC: If at any time before the buyer takes delivery of the good, the seller offers a lower price for a comparable quantity and quality of the good to any other purchaser, the seller will also offer that lower price to the buyer.

Future price decreases must be rebated to the buyer.

- This seems good for customers — they benefit from future price decreases.

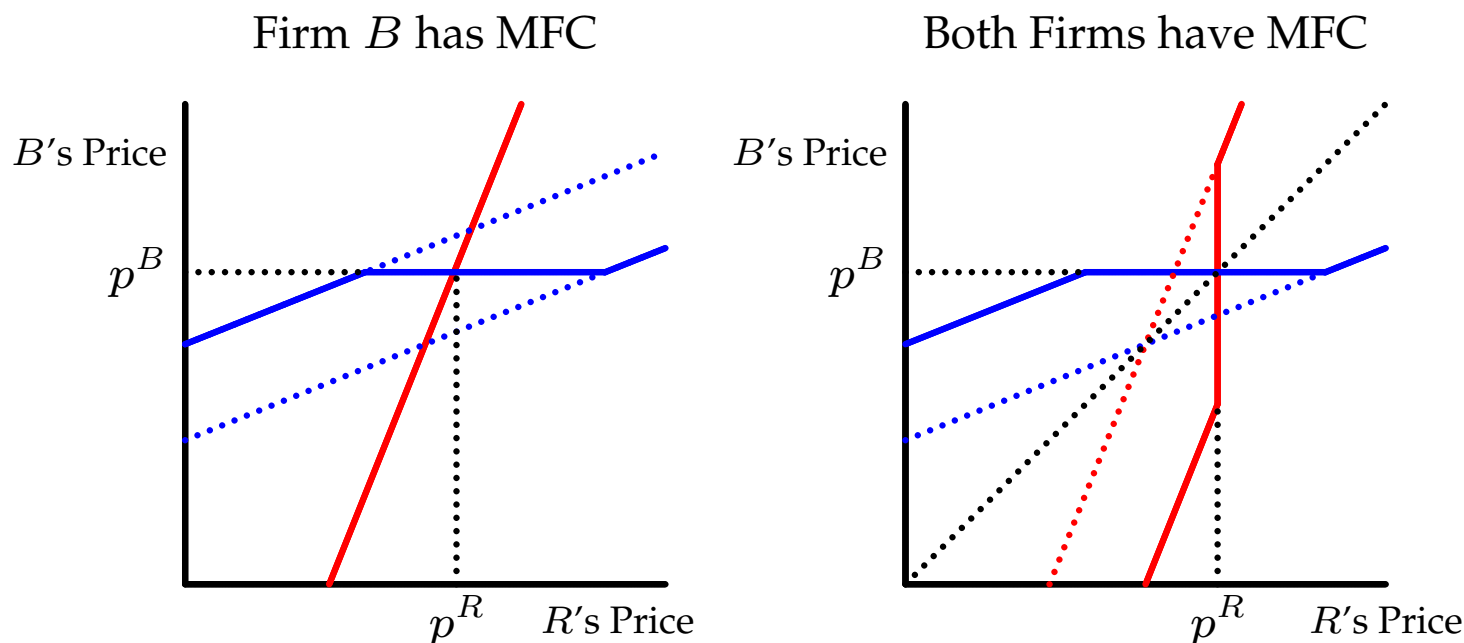- In fact, its good for firms — price decreases are costly and hence discouraged.

MFC — A Diagrammatic Exposition

- In a symmetric price setting world, firm B sets a price of p'.

- Suppose B makes a sale to a consumer at a price above this, say at p''. Assume B has a Most Favoured Customer contract in operation. Then...

MFC — Reaction Curves

Firm B has MFC

Both Firms have MFC

- If B charges below this price, a rebate is given to the customer, increasing costs.

- Equilibrium prices rise for *both* firms — to p^B and p^R.

- What if Firm R also introduced a Most Favoured Customer contract?

Meeting the Competition Clauses

"Meet or Release" MCC: If the buyer should be offered by a responsible manufacturer a good of equal quality at a lower cost to the buyer, and the buyer gives the seller satisfactory evidence thereof, the seller shall either supply the good at the lower cost or permit the buyer to purchase elsewhere.

*Competitor's prices will be met or the buyer refunded.*

- This seems good for customers — they benefit from a competitor's lower price.

- In fact, its good for firms — one firm raises price knowing the other can follow.

MCC — A Diagrammatic Exposition
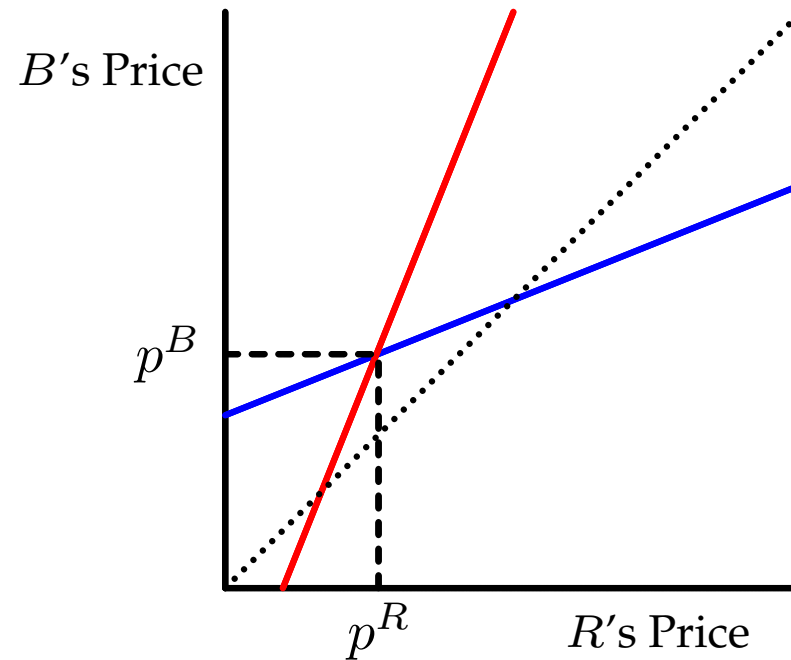
- Suppose that Firm R starts with a cost advantage over Firm B so that equilibrium prices are p^R and p^B respectively.

- Firm B introduces a Meet the Competition Clause...

MCC — Reaction Curves
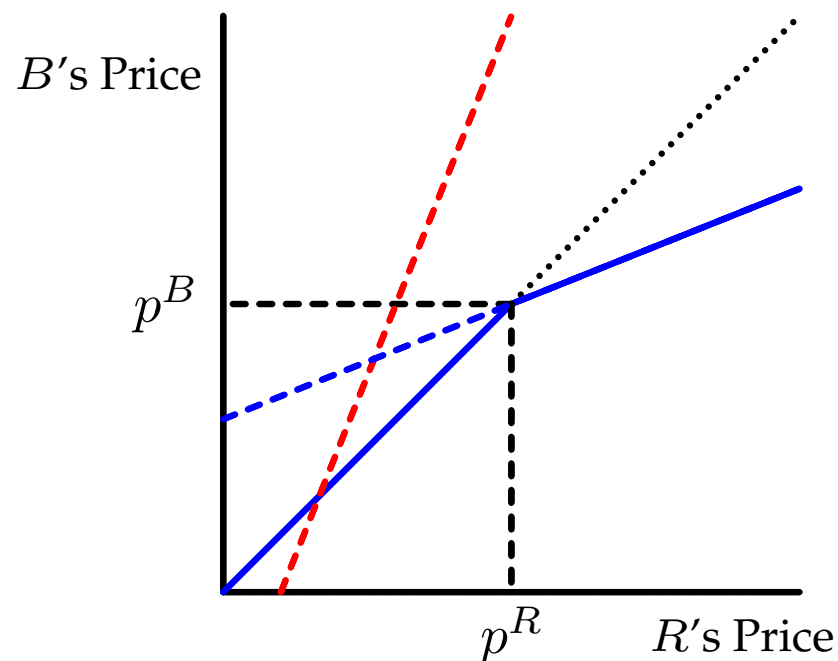
- MCC contract forces B to price at or lower than R. R knows this, so...

- R picks a price on B's reaction curve. Identical prices lead to equal market shares. So R chooses the price pair $\{p^R, p^B\}$ to maximise joint profits.

Entry Deterrence

- Recall the simple entry game of the previous lecture. Deterrence is not credible.

- Now suppose I introduces a Meet the Competition Clause prior to entry.

Fight $-\$, -\$$

Enter I

Acquiesce $\$, \$$

E

Stay Out $0, \$\$$
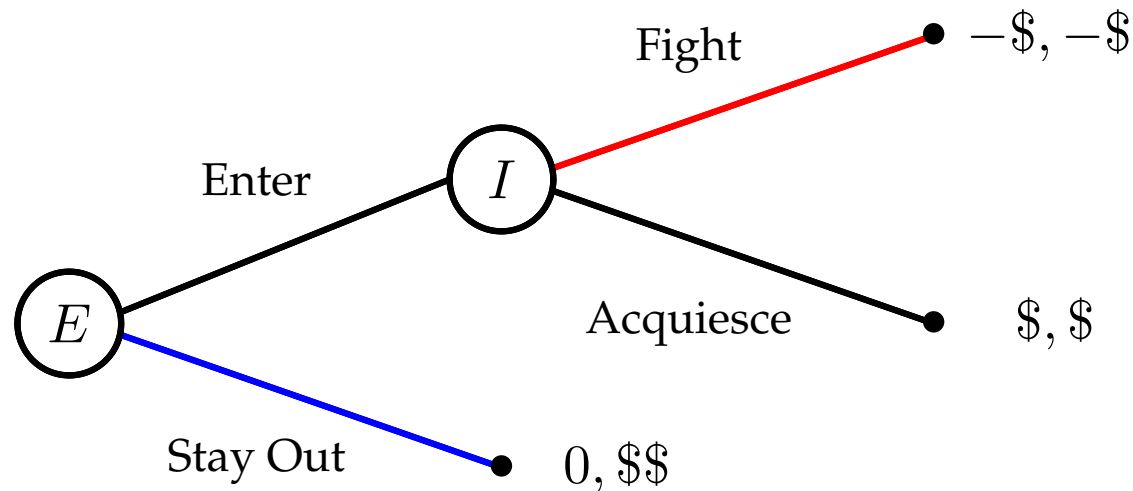
- I must price at or below the entrant's level. It is no longer possible to acquiesce and keep prices high. I can credibly commit to fight, and hence deter entry.

(Not Quite) The Whole Story...

- Repeated Games are a particularly common type of dynamic game.

- Strategies can be conditioned on previous behaviour.

  – Contingent play of this sort enables otherwise impossible outcomes to arise in equilibrium.
  – In particular, collusion is enabled in repeated duopoly interactions.

- Collusion is also facilitated by means of credible contractual clauses.

- Even though MFC and MCC contracts at first appear to benefit the customer, in fact they benefit the firms and can be used to facilitate collusion.

Syndicate Tasks

1. How might multi-market contact between firms affect their ability to collude?

2. What other factors affect the likelihood of collusion in an industry?

3. Most Favoured Customer clauses can also be *contemporaneous* — where no one customer is favoured over another. What happens?

4. What might happen if a MFC clause was combined with a MCC contract?

5. What other facilitating practices are there?