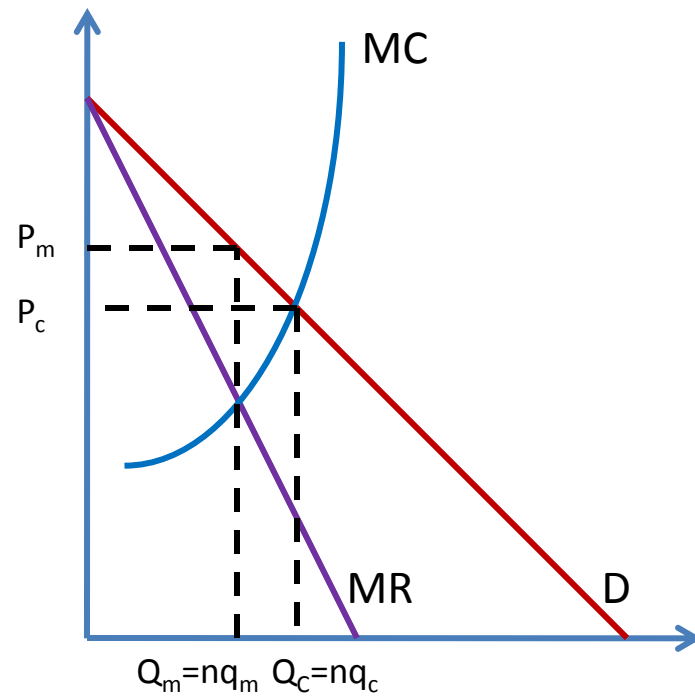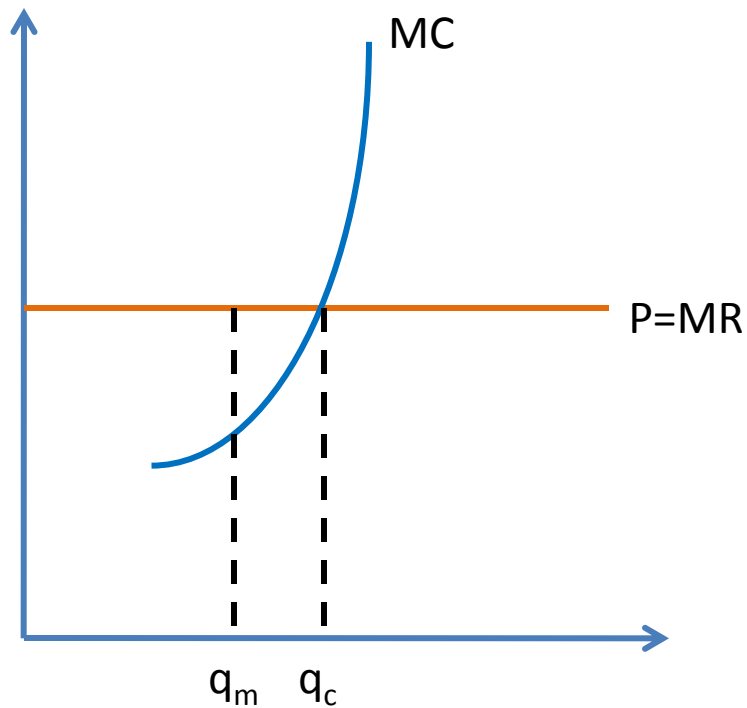# BS2243 – Lecture 6
Collusion

Spring 2012

(Dr. Sumon Bhaumik)

Cartels – why are they formed?

- Each individual firm takes into consideration the marginal gains/losses from changing its output level, but ignores the impact on the other firms

- A cartel is able to internalise this externality, and hence produce less in equilibrium

- However, the externality provides an incentive to cheat on cartel partners

Cartels – graphical view

Types of collusion

- Types:
  - Explicit (e.g., OPEC)
  - Tacit (price fixing)

- Some alleged cases of price fixing
  - Watchdog to probe steel plate sector (in South Africa) (www.iol.co.za)
  - Genentech, Celltech colluded on patent – lawsuit (in USA) (www.reuters.com)
  - "PQ transport critic [……..] noted some studies have shown collusion and corruption add 30 per cent to the cost of work in Quebec." (http://www.montrealgazette.com)
  - Unilever fined €104 million and P&G fined €211.2 million for fixing washing powder prices in 8 countries (http://www.guardian.co.uk)
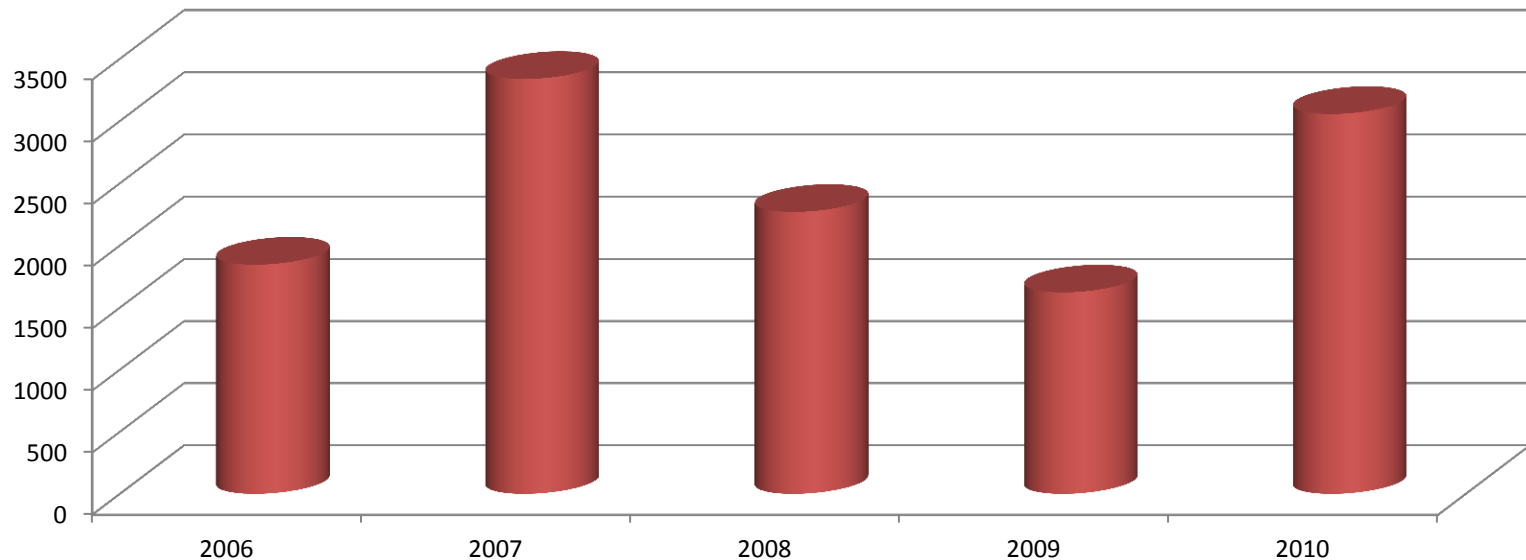
What does the law say?

- Competition law prohibits almost any attempt to fix prices - for example, **you cannot**:
  - **agree prices** with your competitors, eg you can't agree to work from a shared minimum price list
  - **share markets** or limit production to raise prices, eg if two contracts are put out to tender you can't agree that you'll bid for one and let your competitor bid for the other
  - impose minimum prices on different **distributors** such as shops
  - agree with your competitors what **purchase** price you will offer your suppliers
  - cut prices below cost in order to force a smaller or weaker competitor out of the market

- The law doesn't just cover formal agreements. It also includes other activities with a **price-fixing effect**. For example, you shouldn't discuss your pricing plans with your competitors. If you then all 'happen' to raise your prices, you are fixing prices

- The law is enforced by the OFT, which can impose a **fine** of up to 10 per cent of your turnover. It can also apply for company directors to be disqualified

Source: http://www.businesslink.gov.uk

Regulatory action

Fines imposed (Euro millions)

The figures are not adjusted for court judgements.

2007: This figure takes into account the amendment of 23 June 2008 to the decision of 5 December 2007 in case chloroprene rubber(see IP/07/1855).

2008: This figure takes into account the amendment of 24 July 2009 to the decision of 11 March 2008 in case international removal services.

2010: This figure takes into account the amendment of 30 September 2010 to the decision of 30 June 2010 in case pre-stressing steel.

Cartel formation – necessary conditions

- Ability to raise price above competitive levels without facing competition from non-members
  - Elasticity of demand
  - Market share of the cartel members
  - Barriers to entry

- The expected penalty should not be high

- The cost of enforcement should not be high
  - Number of cartel members (more likely in concentrated industries)
  - Geographic spread of the cartel members
  - Technological change
  - Rate of demand growth

Enforcing a cartel agreement

Necessary conditions	OPEC
There are few firms in the market	√
Prices do not fluctuate independently	Demand can fluctuate significantly
Prices are widely known	√
All cartel members sell identical products at the same point in the distribution chain	There are multiple modes of distribution, and each member has its own distribution network

Collusion vs. defection

Payoff matrix			
		Firm B	
		Collude	**Defect**
Firm A	**Collude**	(100, 100)	(25, 120)
	Defect	(120, 25)	(80, 80)

- *Defect* is the dominant strategy for both firms
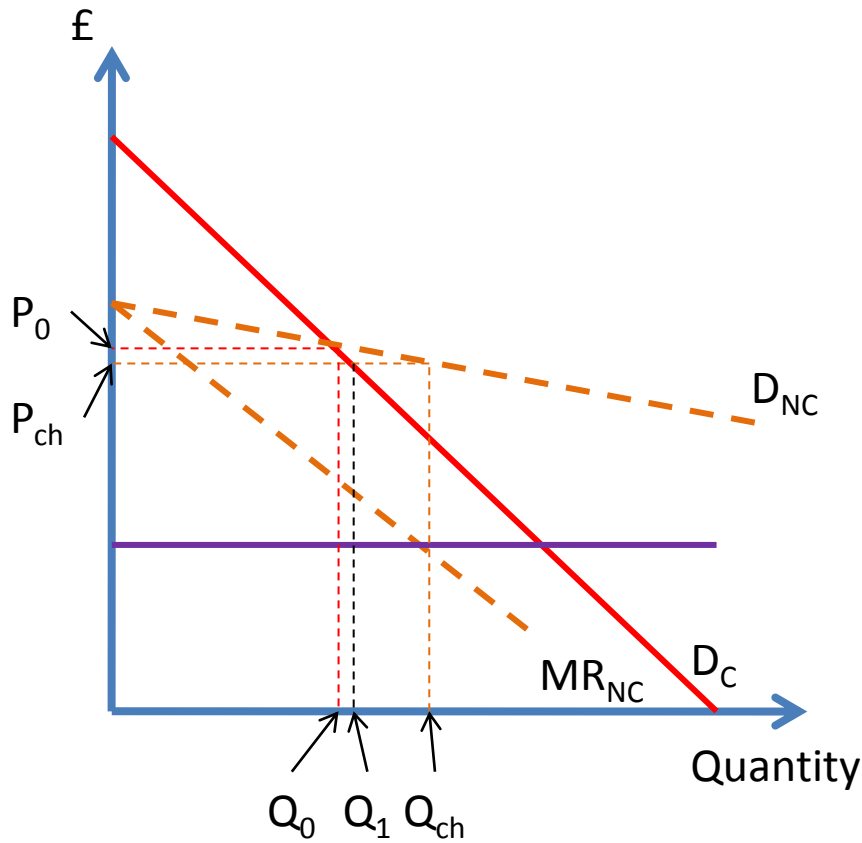- {*Defect*, *Defect*} is the dominant strategy equilibrium

Strategy 1 – tit-for-tat

Round	Game 1		Game 2		Game 3	
	A plays Tit-for-tat	**B plays Defect**	**A plays Tit-for-tat**	**C plays Tit-for-tat**	**B plays Defect**	**D plays Defect**
1	Collude (25)	Defect (120)	Collude (100)	Collude (100)	Defect (80)	Defect (80)
2	Defect (80)	Defect (80)	Collude (100)	Collude (100)	Defect (80)	Defect (80)
3	Defect (80)	Defect (80)	Collude (100)	Collude (100)	Defect (80)	Defect (80)
….	….	….	….	….	….	….
200	Defect (80)	Defect (80)	Collude (100)	Collude (100)	Defect (80)	Defect (80)
Total profit	15,945	16,040	20,000	20,000	16,000	16,000

1. Tit-for-tat strategy therefore generates higher payoff (35,945 > 32,040)
2. Tit-for-tat did not solve prisoners' dilemma: in some rounds of the game the collusive price was not maintained
3. Tit-for-tat is a "nice" strategy
4. E.g.: Ford and Chrysler matching GM's price changes in the 1970s

Strategy 2 – grim strategy

- Setting
  - Demand: P = 100 – Q
  - Two firms with MC = AC = 10
  - If they collude they charge P = 55, Q = 45
    profit for each firm = (55 – 10) x 22.5 = 1012.50
  - If they play a Bertrand game, P = 10, Q = 90
    profit for each firm = (10 – 10) x 45 = 0

- Behavioral rules for each firm
  - Cooperate to begin with and charge P = 55
  - If other firm deviates, then charge P = 10 forever

- Profits for an infinitely repeated game
  - With collusion: $1012.50 + 1012.50/(1 + i) + 1012.50/(1 + i)^2 + ...$ forever
    (when i is the rate at which future payments are discounted)
  - With defection: $(2025 - \varepsilon) + 0$ forever
  - Defection generates higher profits only if i is very high

Collusive agreements – from one firm's view

- A firm follows the price set by a cartel (P_0)
  - Its demand curve is D_C and it sells Q_0

- It deviates from the cartel agreement and maximises profits
  - New demand curve is D_{NC}
  - New quantity is Q_{ch}
  - This quantity is sold at price P_{ch}

- If all cartel members follow, firm is back on D_C, and sells Q_1

£

P_0

P_{ch}

D_{NC}

MR_{NC}

D_C

Quantity

Q_0 Q_1 Q_{ch}

Methods of preventing cheating

- Assign cartel members their own geographical territories

- Fix market shares of individual cartel members

- "Most favoured nation" clause in sales contract

- "Meeting competition" clause in long term supply contracts

- Agreement among cartel members to raise output to the pre-cartel level if price falls below some pre-determined "trigger" level, generally for a finite period of time

How easy is it to prevent collusion? – I

- Addyston Pipe case
  - 6 firms that controlled 65% of the market divided the geographical among themselves
  - There were "pay" territories and "free" territories
  - Each firm would be the low bidder for all jobs in its respective "pay" territory
  - The key legal question was whether this led to higher prices and hence hindered interstate commerce

- Trenton Potteries case
  - 23 members of a trade association met to set standard price lists, and attempted to persuade each other not to undercut other firms
  - There was little impact on price as such, but the court rules that *any* attempt to fix price is illegal

How easy is it to prevent collusion? – II

- Container Corporation case
  - 18 manufacturers controlled 90% of the market, and exchanged price information for products among each other
  - Court rules in favour of the government, but noted that exchanging price information is not illegal as such and the structure of the market matters

- US Gypsum case
  - 8-firm concentration ratio in the market was 94, and the manufacturers exchanged price information
  - Court ruled that there was no proof of intent to fix prices through exchange of prices
  - While the Sherman (anti-trust) Act was upheld, the precedence of the Container Corporation case was severely weakened