

Suppose that in an industry there are currently at least two firms that sell identical products, and that they are earning collusive profits.

What will be the likely effects on the ability to maintain collusion of: (a) an increase in the number of firms; (b) a rise in the real interest rate; (c) an anticipated one-period increase in industry demand; and (d) the introduction of a leniency programme?

- Introduction – collusion is when firms cooperate with each other to increase their own profits, by agreeing to limit output to below the competitive quantity (or prices above the competitive level).

- The threat of punishment over an infinite time horizon is what enables cooperation to be sustained. All the changes mentioned in the question affect this.

- Set up the model: we can treat this like an infinitely-repeated prisoners dilemma where the cooperative action is to collude and defection means cheating by increasing output.

- For simplicity, suppose that output is either *high* or *low* (i.e. we use the Bertrand model of monopoly)? *oligopoly?*
 - By the Folk Theorem, with sufficiently patient agents it is possible to sustain the cooperative average payoff profile
 - The punishment is for other firms in the scheme to increase their own output to high for all the rest of time if any firm is detected to be cheating: “grim trigger strategy”

- (a) an increase in number of firms will make it harder to maintain collusion, as it requires each firm to be more patient to sustain cooperation

- Work through the maths: since the industry’s collusive profits are shared between firms, more of them means that each must be more patient in order for cooperation to remain SPE
 - In addition to this mathematical effect, in practice there being more firms creates practical difficulties for detecting cheaters, coordinating on what to set the output level at, and also raises the risk of being caught by the authorities (see (d))

- (b) a rise in the real interest rate will make it harder to maintain collusion, as it means that firms are less patient

- The intertemporal discount factor d is tied to the real interest rate r . In particular, $d = 1/(1+r)$ as this gives us the present value of future income.
 - An increase in r means that current profits are relatively more valuable than future profits. This translates to an increase in the discount factor
 - But the folk theorem holds only with sufficiently patient agents. The decrease in d may mean that our firms are no longer sufficiently patient for collusion to be sustainable
 - Intuitively, the one-time gain from cheating may now outweigh the future losses from punishment

- (c) an anticipated one-period increase in industry demand will make it harder to maintain collusion, as it increases the one-time benefits of cheating

- Holding quantity supplied constant, an increase in demand will drive up the price. This means that marginal revenue is now greater than marginal cost at the current level of production and so it is profit-maximising to produce more (from

Inconsistencies in the set-up. I would use an n -player Bertrand game. Describe the grim strategy that supports collusion – and show that it is SPE for δ sufficiently large.

why? smaller share of the same size pie.

PRICE! – according to your set-up.

in what way do intertemporal incentives matter? Talk about δ .

not in Bertrand...

It matters that you have a clearly specified model in order to answer this question fully. In the Bertrand case, what happens to the eqn condition on δ in the period of anticipated increase?

the perspective of a firm in a competitive industry and also from the perspective of the joint production in this collusive industry).

- The benefits from cheating in this single period are larger than from cheating in any other period, and so firms are more likely to do so. But because the strategies employed are a “grim trigger”, any cheating in this period will lead to the collapse of the collusion
- [but surely if everybody in the industry is anticipating this increase in demand, they could all coordinate to ensure that the industry output during that period adjusts to a higher quantity that is optimal for joint profits?]
- [also, can “grim trigger with forgiveness” be SPE? *meaning? (in principle, yes)*]
- (d) the introduction of a leniency programme will make it harder to maintain collusion, as it creates an incentive for parties to the scheme to report it to the authorities and thus destabilises the cooperation
 - ✓ ○ Generally leniency programmes will exempt the first firm to report a cartel from punishment. So, this creates a race between participating firms to report the scheme.
 - Firms have at least two incentives pushing them to report – first, there’s some probability that the authorities will discover the scheme anyway, so reporting means they won’t have to pay fines in that case. But moreover, by reporting the scheme they impose costs onto their competitors, which indirectly may produce benefits for them (e.g. rival firms have less money available for investments to scale up production, are subject to higher interest rates, etc).
- Conclusion – in addition to the factors discussed above, high frequency of sales, interactions across multiple markets, price transparency, ease of detecting cheaters, and symmetrical cost functions all make collusion easier to maintain, generally by making punishment of cheaters more painful or enforceable.

ok good. See Motta for the role of surprises.