PRICE COMPETITION

Context and concepts
- Context: You’re in an industry with one competitor. If you cut your price to gain market share, how is she likely to respond? What is the outcome if you get into a spiral of competitive price cuts?
- Concepts: Bertrand price-cutting game, reaction curve, Nash equilibrium.

Price-cutting game
- Players: two firms produce identical products
- Each has constant marginal cost c
- Strategies: each chooses a price for its product
- Rules:
  - Firms set prices simultaneously
  - If one price is lower, it gets the whole market
  - If the prices are the same, they split the market
- Total demand is $Q = D(p)$, where $p$ is the low price
- Referred to as “Bertrand” game after its inventor.

Firm 1’s reaction curve
- Firm 1’s reaction curve, $p_1(p_2)$, gives Firm 1’s optimal price for a given value of $p_2$.

Firm 2’s reaction curve
- Symmetric:

Outcome of price-cutting game
The Nash equilibrium is where the reaction curves cross:
- $p^* = c$
The “Bertrand trap”

- Even with two firms, price is driven down to the competitive price (marginal cost). Economic profits are zero; accounting profits could be negative if there are sunk costs.
- Note that neither higher demand nor lower costs (if both firms have the same cost) increase profits.
- Examples: airlines, fiber-optic cable, CD phone books
- Avoid this game if you can!

E-commerce

- Are we in a Bertrand trap?
- Is e-commerce particularly prone to this? What is special about e-commerce (and, more generally, the new economy) that makes the Bertrand trap a dangerous trap?
- How can e-commerce firms avoid the trap?

Benefits of low cost

Suppose Firm 1 has lower costs:

- Firm 1 prices just under Firm 2’s (higher) cost.

Takeaways

- Price-cutting is a dangerous game
- Price competition can be severe, even with a small number of firms.
- Avoid hazards of price competition by
  - Having lower costs
  - Colluding on price
  - Limiting capacity
  - Differentiating your product
**Sensitrum**

You are the sole domestic producer of the generic antidepressant sensitrum. Your marginal cost is $2 per dose. Demand is given by \( Q = 400 - 50 \ p \) (in millions of doses, \( p \) in $). There is a second producer in India whose marginal cost is INR 145 (including transportation cost to the US). Firms set prices simultaneously.

a) What is your equilibrium profit at the current exchange rate of INR 48 / US$?

b) An advertising and retailing campaign costing $80m is expected to increase demand by 40%. Should your firm go ahead with it?

c) One macroeconomics expert tells you that "it is likely that the dollar will depreciate in the near future." How would this influence your decision?

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**Sensitrum solution**

- Indian firm's marginal cost in US$ is \( 145/48 = $3.021 \).
- Price equilibrium: you set a price just under foreign firm's marginal cost and get the whole domestic market. Your profit is \((400 - 50 \cdot 3.021) \cdot (3.021 - 2) = 248.95 \times 1.021 = $254\text{mm} \).
- Advertising campaign would increase profits by \( 40\% \times 254 = $101.6 \). This is more than cost. You should therefore go ahead with it.
- The possibility of the dollar depreciating only makes things better. Let \( e \) be the exchange rate INR/US$. A depreciation of the dollar means \( e \) goes down. This implies that the Indian firm's marginal cost in US$, \( 145/e \), goes up. This in turn implies both that profits are higher and the gains from the advertising campaign are higher.

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**Trium X406**

Two firms produce a specialized microchip (Trium X406) used in certain home appliances. Demand is given by \( Q = 100 - 2p \) (in thousands of units, \( p \) in $). Both producers have a marginal cost of $30. A cost-reducing innovation would allow Firm 1 to decrease its cost down to 20. The cost of the innovation is $520k per period.

a) Should Firm 1 go ahead and acquire the innovation?

b) Macroeconomic conditions indicate that demand is expected to increase by up to 40% in the future? Would this change your answer?

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**Trium X406 solution**

- If Firm 1 acquired the cost-reducing innovation, its profit would be \((100 - 2 \times 40) \cdot (40 - 30) = $400k \). This value is obtained by assuming that Firm 2 will price at marginal cost and Firm 1 will slightly undercut it.
- Since the innovation costs $520k, it's not worth it to Firm 1.
- If demand increases by 40%, then profit would be $$400k \times (1 + 40\%) = $540k \). In this case, the innovation pays off.