

UWTSD MBA (Nov 2018 intake)

(5-2)

Advanced Topics in Business Strategy

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10 February 2019; 2:30 am to 6:00 pm

Lecture Agenda :

- Limit pricing to prevent entry
- Predatory pricing to lessen competition
- Raising rivals' cost to lessen competition
- Changing the timing of decisions or order of moves
- Penetration pricing to overcome network effects

Overview

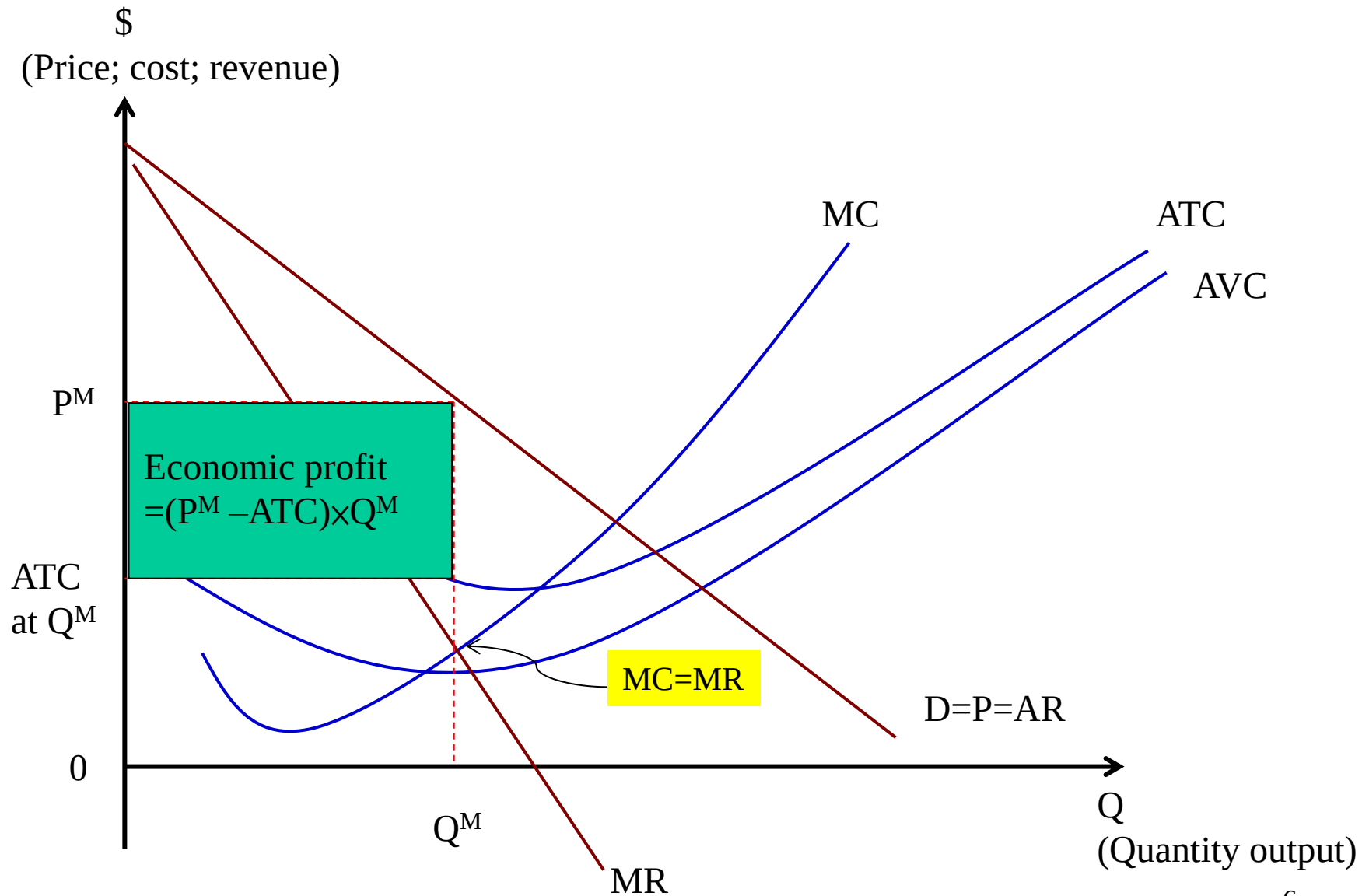
- This lecture analyzes strategies that managers can utilize to change the business environment with the aim of enhancing long-run profits.
- Limit pricing and predatory pricing are two strategies that are introduced to reduce the number of competitors.
- Another competition-reducing strategy involves raising rivals' fixed or marginal costs.
- Managers may also focus on profit strategies that change the business environment by altering the timing or sequence of the decisions.

Limit Pricing to Prevent Entry

Motivation for Limit Pricing

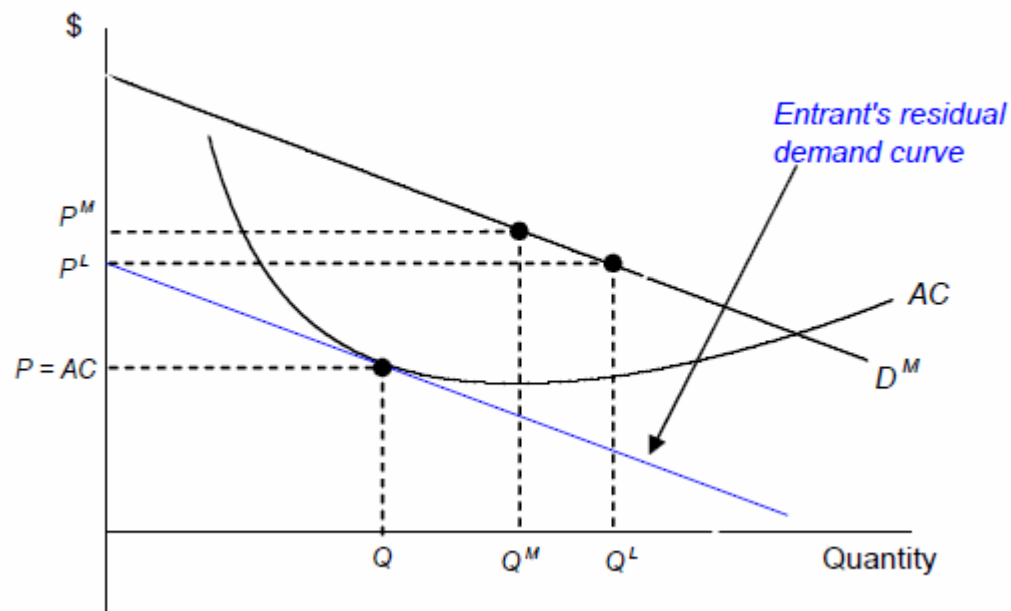
- In markets where firms receive positive profits, we would expect that over time new firms would attempt to enter the industry in order to capture some of these profits.
- Successful businesses often spawn entry of new competitors into the market, and adversely affect the profits of existing firms.
- Faced with that threat, a manager may consider limit pricing, which is a strategy where an incumbent maintains a price below the monopoly level in order to prevent entry.

Theoretical basis for limit pricing: monopoly pricing



Limit Pricing

- Incumbent produces Q^L instead of monopoly output (Q^M).
- Resulting price (P^L) is lower than monopoly price (P^M).
- Residual demand curve is the market demand (D^M) minus Q^L .
- Entry is not profitable because entrant's residual demand lies below AC.
- Optimal limit pricing results in a residual demand such that, if the entrant entered and produced Q units, its profits would be zero.



Potential problems with limit pricing

- It isn't generally profitable for the incumbent to maintain an output of Q^L once entry occurs.
- Rational entrants will realize this and enter.
- Solution: Incumbent must link its pre-entry price to the post-entry profits of the potential entrant.
- Possible links:
 - Commitments by incumbents.
 - Learning curve effects.
 - Incomplete information.
 - Reputation effects.
- Even if a link can be forged, it may not be profitable to limit price! Limit pricing is profitable only if the present value of the benefits of limit pricing exceed the up front costs:

$$\frac{\pi^L - \pi^D}{i} > \pi^M - \pi^L$$

Effective limit pricing

- For limit pricing to effectively prevent entry by rational competitors, the pre-entry price must be linked to the post-entry profits of potential entrants.
- Linking Pre-entry Price to Post-entry Profits
 - Commitment mechanisms
 - Learning curve effects
 - Incomplete information
 - Reputation effects

The time value of money

The value of one dollar at the beginning of the interest period ($t=0$)

Future value (FV)



Present value (PV)

The value of one dollar at the end of the interest period ($t=2$ years)

Assuming the annual interest rate is 10% :

$$FV = PV(1+r)^n = 1(1+0.1)^2 = 1.21$$

$$PV = \frac{FV}{(1+r)^n} = \frac{1}{(1.1)^2} = 0.826446281$$

$$PV = \frac{FV}{(1+r)^n} = \frac{1.21}{(1.1)^2} = 1$$

Net Present Value

Suppose a manager can purchase a stream of future receipts (FV_t) by spending “ C_0 ” dollars today. The *NPV* of such a decision is

$$NPV = \frac{FV_1}{(1+r)} + \frac{FV_2}{(1+r)^2} + \dots + \frac{FV_n}{(1+r)^n} - C_0$$

Decision Rule:

If $NPV < 0$: Reject project
 $NPV > 0$: Accept project

Compound interest involves interest on interest

Present Value of a Perpetuity

- An asset that perpetually generates a stream of cash flows (CF_i) at the end of each period is called a perpetuity.
- The present value (PV) of a perpetuity of cash flows paying the same amount ($CF = CF_1 = CF_2 = \dots$) at the end of each period is

$$\begin{aligned} PV_{\text{Perpetuity}} &= \frac{CF}{(1+r)} + \frac{CF}{(1+r)^2} + \frac{CF}{(1+r)^3} + \dots + \frac{CF}{(1+r)^\infty} \\ &= \frac{CF}{r} \end{aligned}$$

Firm Valuation and Profit Maximization

- The value of a firm equals the present value of current and future profits (cash flows).

$$PV_{Firm} = \pi_0 + \frac{\pi_1}{(1+r)} + \frac{\pi_2}{(1+r)} + \dots = \sum_{t=1}^{\infty} \frac{\pi_t}{(1+r)^t}$$

- A common assumption among economists is that it is the firm's goal to maximize profits.
 - This means the present value of current and future profits, so the firm is maximizing its value.

* r is the **yield to maturity**. It is the discount rate that makes the sum of the present values of all future payments of a security equal to the purchase price.

Dynamic considerations

- Even if the incumbent can link pre-entry price to post-entry profits, it may be more profitable to permit entry.
- The present value of maintaining monopoly status is:

$$\Pi^M = \pi^M + \frac{\pi^M}{(1+i)} + \frac{\pi^M}{(1+i)^2} + \frac{\pi^M}{(1+i)^3} + \dots = \left(\frac{1+i}{i} \right) \pi^M$$

- Entry from monopoly to duopoly profits, where $\pi^M > \pi^D$:

$$\Pi^{MD} = \pi^M + \frac{\pi^D}{(1+i)} + \frac{\pi^D}{(1+i)^2} + \frac{\pi^D}{(1+i)^3} + \dots = \pi^M + \frac{\pi^D}{i}$$

- Since $\Pi^{MD} < \Pi^M$, entry will harm the incumbent.

- Profits under effective limit pricing:

$$\begin{aligned}\Pi^L &= \pi^L + \frac{\pi^L}{(1+i)} + \frac{\pi^L}{(1+i)^2} + \frac{\pi^L}{(1+i)^3} + \dots \\ &= \left(\frac{1+i}{i} \right) \pi^L\end{aligned}$$

- Limit pricing is profitable when: $\frac{\pi^L - \pi^D}{i} > \pi^M - \pi^L$

Conditions for dynamic considerations

- Low interest rate environments.
- Monopoly and limit-price profits are close.
- Duopoly profits are significantly lower than limit-price profits.

Dynamic Considerations In Action: Problem

- Baker Enterprises operates a mid-sized company that specializes in the production of a unique type of memory chip. It is currently the only firm in the market, and it earns \$10 million per year by charging the monopoly price of \$115 per chip.
- Baker is concerned that a new firm might soon attempt to clone its product. If successful, this would reduce Baker's profit to \$4 million per year. Estimates indicate that, if Baker increases its output to 280,000 units (which would lower its price to \$100 per chip), the entrant will stay out of the market and Baker will earn profits of \$8 million per year for the indefinite future.
 - What must Baker do to credibly deter entry by limit pricing?
 - Does it make sense for Baker to limit price if the interest rate is 10 percent?

Dynamic Considerations In Action: Answer

- What must Baker do to credibly deter entry by limit pricing?
 - Baker must “tie its hands” to prevent itself from cutting output below 280,000 units if entry occurs, and this commitment must be observable to potential entrants before they make their decision to enter or not enter.
- Does it make sense for Baker to limit price if the interest rate is 10 percent?
 - Limit pricing is profitable if $\frac{\$8 - \$4}{0.1} > \$10 - \$8$.
 - Therefore, limit pricing is profitable.

Predatory Pricing to Lessen Competition

Some Basics

Predatory pricing is a strategy where a firm temporarily prices below its marginal cost to drive existing competitors out of the market.

- It Involves a trade-off between current and future profits, so it is profitable only when the present value of the higher future profits offsets the losses required to drive rivals out of the market.
- Strategy of pricing below marginal cost to drive competitors out of business, then raising price to enjoy the higher profits resulting from lessened competition.
- Goal is to lessen competition by eliminating existing competitors.

- A firm engaging in predatory pricing must have “deeper pockets” (greater financial resources) than the prey in order to outlast it.
- Strategies that are designed to deter rivals from competing in a market are called “predatory conduct”. A firm engaging in such conduct wants to influence the behavior of rivals, either those currently in the market or those thinking of entering it.
- Predatory conduct must be credible to be effective.

Predatory Pricing Counterstrategies

To significantly reduce the profitability of predatory pricing, the prey may:

- Stop production entirely and cause the predator to lose more money each period.
- Purchase the product from the predator and stockpile it to sell when predatory pricing ceases.

Legality of predatory pricing

- Engaging in predatory pricing is vulnerable to prosecution under the Sherman Antitrust Act; however, it is often difficult to prove in court.
- Some legitimate business practices/scenarios might be deemed “predatory” under legal definitions
 - Fierce competition with substantial fixed cost may lead to the departure of the weakest firm.
 - Firms attempting to penetrate a market with a new product often find it advantageous to sell the product at a low price or give it away for free initially.

Predatory pricing in action: Problem

- Baker Enterprises operates a mid-sized company that specializes in the production of a unique type of memory chip.
- If Baker were a monopolist, it could earn \$10 million per year for an indefinite period of time by charging the monopoly price of \$115 per chip.
- While Baker could have thwarted the entry of potential rivals by limit pricing, it opted against doing so, and it is now in a duopoly situation, earning annual profits of \$4 million per year for the foreseeable future.

- Baker drops its price to \$68 per chip and holds it there for one year, it will be able to drive the other firm out of the market and retain its monopoly position indefinitely.
- Over the year in which it engages in predatory pricing, however, Baker will lose \$60 million. Ignoring legal considerations, is predatory pricing a profitable strategy?
- Assume the interest rate is 10 percent and, for simplicity, that any current period profits or losses occur immediately (at the beginning of the year).

Predatory Pricing In Action: Answer

- If Baker does not engage in predatory pricing, the present value of its earnings (including its current \$4 million in earnings) will be

$$\begin{aligned}\Pi^D &= \$4 + \frac{\$4}{(1 + 0.1)} + \frac{\$4}{(1 + 0.1)^2} + \frac{\$4}{(1 + 0.1)^3} + \dots \\ &= \left(\frac{1 + 0.1}{0.1} \right) \$4 = \$44 \text{ million}\end{aligned}$$

- If Baker uses predatory pricing, the present value of its current and future profits will be $\Pi^D = -\$60 + \$4 + \frac{\$4}{(1 + 0.1)} + \frac{\$4}{(1 + 0.1)^2} + \frac{\$4}{(1 + 0.1)^3} + \dots = -\$60 + \$40 = -\$20$ million

$$\begin{aligned}\Pi^D &= \$4 + \frac{\$4}{(1 + 0.1)} + \frac{\$4}{(1 + 0.1)^2} + \frac{\$4}{(1 + 0.1)^3} + \dots \\ &= \left(\frac{1 + 0.1}{0.1} \right) \$4 = \$44 \text{ million}\end{aligned}$$

- Profits are lower under predatory pricing.

Predatory Pricing and limit pricing

- Predatory pricing is a form of predatory conduct used to try to force current firms to exit. By “irrationally” lowering their prices in the short-term (to a level below long-run average costs, and possibly even below short-run marginal cost) firms seek to force their rivals to receive negative profits, and to exit the industry.
- This is only rational if the firm can recoup its short term losses later by exploiting its market power. This requires that there are entry costs or entry barriers, otherwise the rival could simply re-enter the market in the future.

- A similar strategy can be used to deter entry. Keeping prices lower than they would otherwise be could deter entrants from entering the market – this is known as limit pricing.
- Courts and policy-makers have traditionally been much more concerned with predatory pricing than limit pricing, partly because there is a clear victim in predatory pricing, whereas it is harder to prove a victim in limit pricing.
- These strategies typically require; it might be possible for a large firm to muscle out a small rival in this way, but it is much more likely to be optimal to accommodate an equally sized rival.

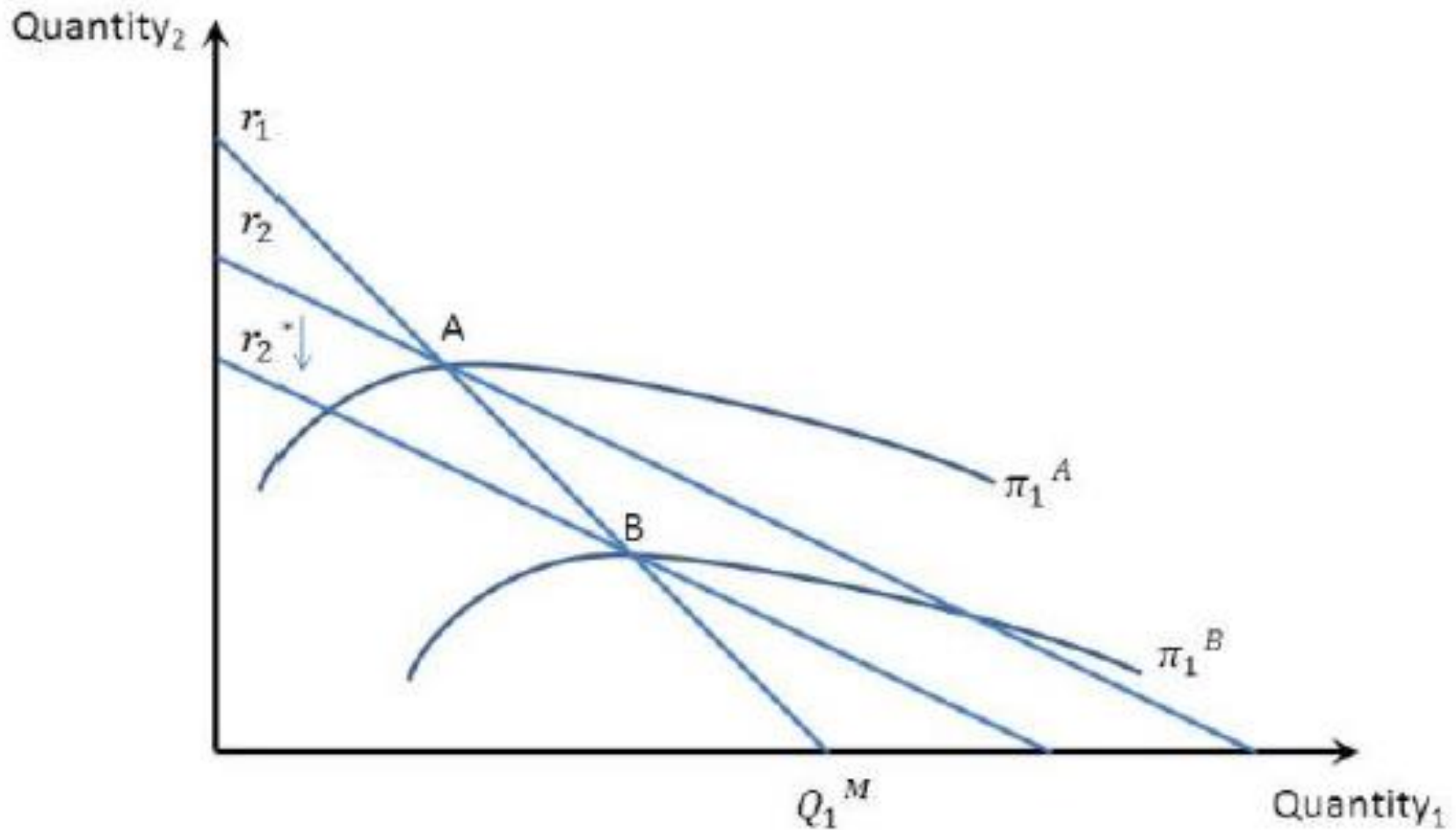
Raising Rivals' Cost to Lessen Competition

Some Basics

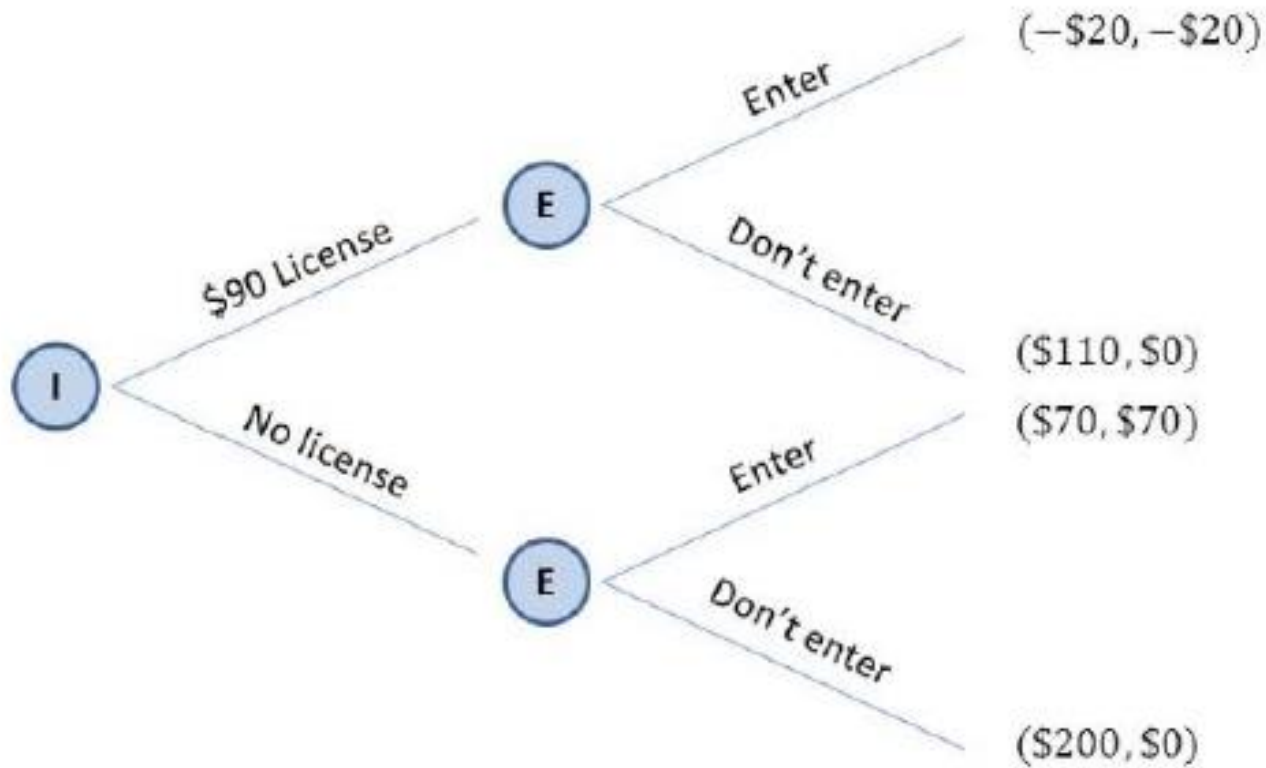
Raising rivals' costs is a strategy in which a firm gains an advantage over competitors by increasing their costs.

- Strategies involving marginal cost.
- Strategies involving fixed cost.
- Strategies for vertically integrated firms.

Raising rivals' costs: Marginal cost



Raising rivals' costs: Fixed costs



Raising Rivals' Costs: Vertically Integrated Firms

A vertically integrated firm with market power in the upstream (input) market may be able to exploit this power to raise rivals' costs in downstream markets.

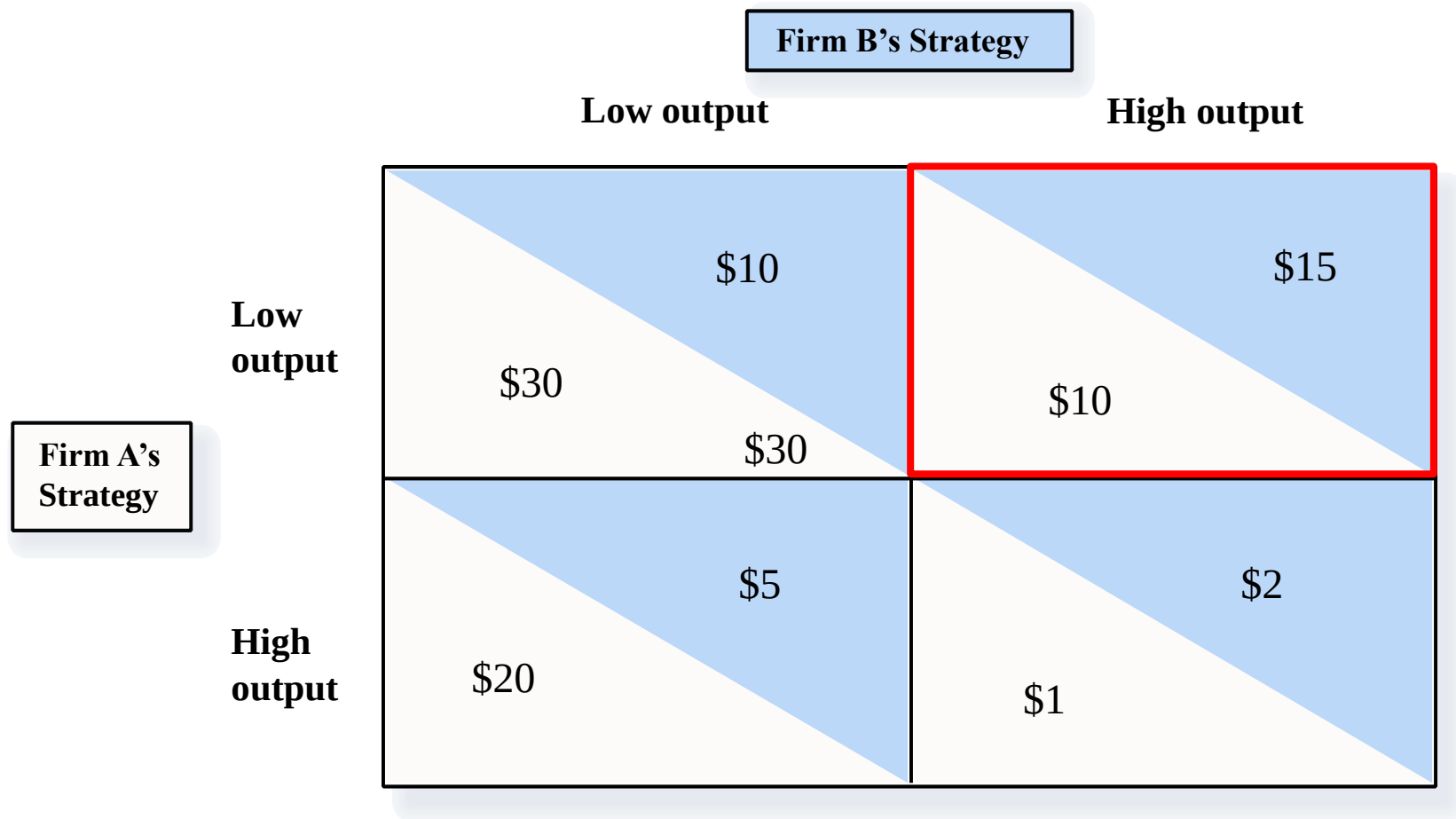
- **Vertical foreclosure**: Strategy wherein a vertically integrated firm charges downstream rivals a prohibitive price for an essential input, thus forcing rivals to use more costly substitutes or go out of business.
- **Price-cost squeeze**: Tactic used by a vertically integrated firm to squeeze the margins of its competitors.

Changing the Timing of Decisions or Order of Moves

First-Mover Advantages

- A first-mover advantage permits a firm to earn a higher payoff by committing to a decision before its rivals get a chance to commit to their decisions.
- Changing the timing of a game to move from a simultaneous-move to sequential-move game can yield one player a first-mover advantage.

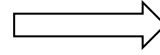
First-mover advantages In action: Simultaneous-move production game



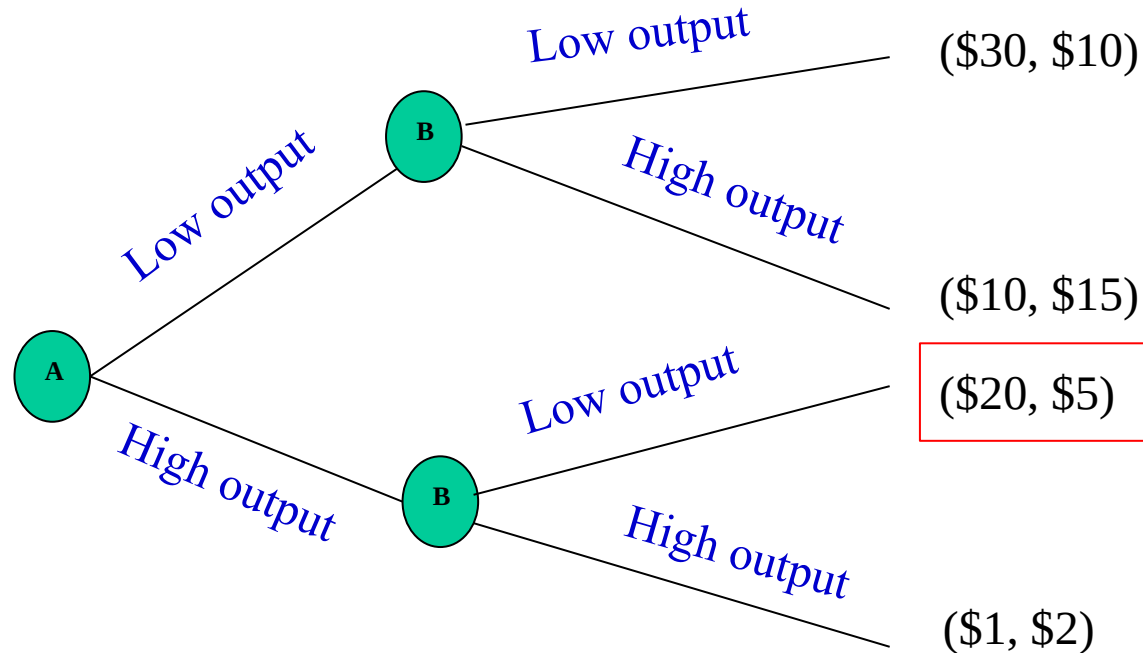
Firm A has a dominant strategy: Low output

Nash equilibrium: Firm A produces Low output, Firm B produces High output.

Changing the timing of the game,
Firm A gets to move first.



First-move advantage permit Firm
A to earn \$20 instead of \$10



Unique, subgame perfect equilibrium is:

Firm A should produce high output

Firm B should produce low output, if Firm A produces high output
should produce high output, if Firm A produces low output

Second-Mover Advantages

- A second-mover advantage can permit a firm to earn a higher payoff by free-riding on the investments made by the first mover and produce at lower costs.

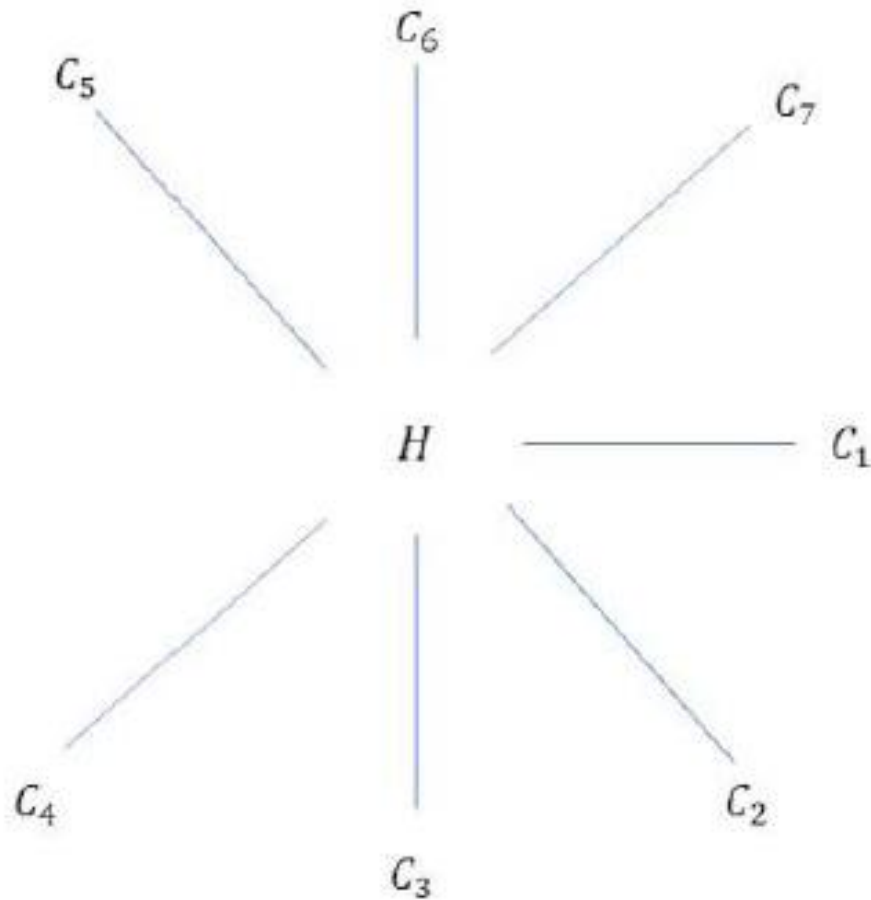
Penetration Pricing to Overcome Network Effects

Some basics

A network consists of links that connect different points (called nodes) in geographic or economic space.

- One-way networks
- Two-way networks (Two-way, Star networks)

Two-way, Star networks



Direct Network Externalities

- Two-way networks that link users exhibit positive externalities called **direct network externalities**.
 - The direct value enjoyed by the user of a network because others also use the network.
- Principle: Direct network externalities
 - A two-way network linking n users provides $n(n-1)$ potential connection services. If one new user joins the network, all the existing users directly benefit because the new user adds $2n$ potential connection services to the network.

Indirect Network Externalities

An Indirect network externality is the indirect value enjoyed by the user of a network because of complementarities between the size of a network and the availability of complementary products or services.

Negative Network Externalities

Negative network externalities exist when an additional user to the network decreases the value per user of the services.

- Congestion
- Bottlenecks

First-Mover Advantages Due to Consumer Lock-In

The presence of network externalities often make it difficult for new networks to replace or compete with existing networks; even a technologically superior network.

- Existing network likely have an installed user base and complementary services compared to a new network.
- Network externalities can create consumer lock-in: a scenario in which consumers are stuck in a situation (equilibrium) where they are using an inferior network.

Penetration Pricing to “Change the Game”

- Consumer lock-in resulting from an existing network might be easily resolved by communication between two users; however communication is not feasible with potentially hundreds of millions of users because of transaction costs.
- What hope does a firm have of establishing its new network?
 - One strategy, penetration pricing, involves charging a low price initially to penetrate a market and gain a critical mass of customers; useful when strong network effects are present.

Conclusion

A number of strategies may enhance profits by changing the nature or timing of the game: Limit pricing. Predatory pricing. Raising rivals' costs. Exercising first- or second-mover advantage. Penetration pricing. These strategies are not always the best ones, though, and care must be taken when using any of the above strategies.

Thank you
for your attention !