Competitive Strategy: Week 13

Innovation

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The Origins of Competitive Advantage

• So far, in this course, we have talked about...

• How firms can exploit their competitive advantage

   – Price discrimination

   – Vertical relationships

• How firms can sustain their competitive advantage

   – Product differentiation

   – Blocking entry

• But where doe this competitive advantage come from?

Competitive Advantage

- For a firm to have a competitive advantage, its strategy must be imitation proof.

- Firm may have first–mover advantage
  - Lock in customers (e.g. switching costs or network effects)
  - Lock in inputs (e.g. SoftSoap case)
  - Nature of post–entry competition (e.g. Bertrand)

- Firm may have capabilities not possessed by rivals
  - Superior products
  - Superior processes
  - Patents

New Technology

- New technology can enhance competitive advantage of incumbent.
  - PlayStation3 (Sony)
  - Laserjet printer (Hewlett Packard)

- New technology can destroy the incumbent (creative destruction).
  - MP3 player (Sony vs. Apple)
  - Computers (Microsoft and Intel vs. IBM)

- New technology can create new markets. But who benefits?
  - Children's TV (Disney vs. Nickelodian)
  - Light motorbikes (Triumph vs. Honda)

Characteristics of New Technology

- Value enhancement
  - Pneumatic tyres (1845)
  - Cotton replaced by rayon (1938)
  - Run flat tyres (1974)
- Cost reductions
  - Banbury mixing (1916)
  - Rayon replaced by nylon (1958)
- Gradual vs. Drastic
  - Drastic can put competitor completely out of business.
  - Also called "disruptive technologies".

Incentive to Innovate: Replacement Effect

- Who innovates more: Incumbant or Entrant?
  - Innovation reduces costs to c_L
  - Let i's profit with costs (c_i, c_j) by $\Pi(c_i, c_j)$
  - Suppose opponent innovates (worst case scenario)
  - Suppose entrant enters if and only if she innovates.
- WTP of incumbent, $V^I = \Pi(c_L, c_L) - \Pi(c_H, c_L)$.
- WTP of entrant, $V^E = \Pi(c_L, c_L) - \Pi(\infty, c_L) > V^I$.
- Entrant has higher willingness to pay.
  - Incumbent cannibalises herself (e.g. Nintendo vs. Sega).

Incentive to Innovate: Efficiency Effect

- Who innovates more: Incumbant or Entrant?
  - Suppose 3rd party sells patent.
  - Suppose entrant enters if and only if she innovates.
- WTP of incumbent, $V^I = \Pi(c_L, \infty) - \Pi(c_H, c_L)$.
- WTP of entrant, $V^E = \Pi(c_L, c_H) - \Pi(\infty, c_L)$.
- Incumbent usually has higher willingness to pay
  - Monopolist makes more profits than sum of two duopolists (e.g. Cournot or Bertrand).
  - Assumes no product differentiation.
- Key: If I innovates, then E does not. Other applications:
  - I and E compete in patent race.
  - E only enters if strictly more efficient.

Innovation Competition

- History of telephone
  - A. G. Bell and Elisha Gray developed telephone simultaneously.
  - Bell filed patent two hours before Gray.
  - Bell protected patent in court.
  - Gave 17 years of protection. Worth billions of dollars.
- Race to innovation
  - File patent.
  - First mover advantage in market.

Unidimensional Innovation Strategy

- Suppose firms choose research intensity. Key features:
  - Returns to scale.
  - Strategic substitutes or compliments.

- Joint ventures
  - Important if increasing returns to scale.
  - Examples: pharmaceutical firms, oil firms.

- Disclosure of research results
  - Disclose successes if research strategic substitutes.

Multidimensional Innovation Strategy

- Riskiness of Strategy
  - Approach A: definitely innovate in three years.
  - Approach B: innovate in 1-5 years.
  - Monopolist: indifferent between approaches.
  - With competition: prefer approach B.

- Correlation of Strategies
  - Two approaches, A and B, succeed with prob 1/2.
  - Success in A and B uncorrelated.
  - If everyone else chooses A, you should choose B.

- Sunk cost effect
  - Incumbents tend to be more conservative
  - They have already sunk costs into traditional approaches.

Patenting Strategy 1

- Patents vs. Trade Secrets
  - Obtain 17 yrs protection, but disclose details of innovation.
- Which is better?
  - Can the competition use information in patent disclosure?
  - Can they get around the patent?
  - Can they see through trade secrets?
  - Do you wish to licence or sell the idea?
  - Do you wish others to improve on the idea?
  - How quickly will returns come?
- Computer industry
  - IBM invests $5bn in R$D, while MS invests $6bn.
  - IBM obtained 3250 patents in 2004. Licences many of these.
  - MS obtained 650. Relies on trade secrets.

Patenting Strategy 2

- Protective patents
  - Patent all substitutes, including inferior technology.
  - Analogy: spatial preemption.
- Defensive patents
  - Patent holes in competitors process.
- Timing of Patents
  - Suppose two ideas are complements.
  - Then can wait to patent idea 2, extending effective patent.
  - Danger: someone patents before you do.

Transfer of Technology

- Innovator may not have comparative advantage in exploiting idea.

- Licensing
  - Buyer receives right to exploit innovation.
  - Receives technical assistance and pays fixed fee or royalty.
  - Example: In 2004, IBM earned $1.2bn by licensing.

- Acquisition of patent
  - Seller forgoes independent commercialisation.
  - Allows firms to specialise in innovation.
  - Buyer can assemble complimentary patents.

- Acquisition of innovator
  - Buyer purchases idea and innovator's capabilities.

Licensing

- Consider a drastic innovation between two firms.

- Auctioning one licence
  - Firms bid $\Pi(c_L, c_H) - \Pi(c_H, c_L)$

- Fixed Fee, f.
  - Both firms buy if $f \leq f_2 := \Pi(c_L, c_L) - \Pi(c_H, c_L)$.
  - One firm buys if fee $f_2 \leq f \leq f_1 := \Pi(c_L, c_H) - \Pi(c_H, c_H)$.

- Auction always outperforms fixed fee.
  - In auction, if don't buy licence then competitor wins it.
  - Hence bid to obtain licence and to deny opponent.

- Royalty rate
  - Charge fee per unit sold. This raises firm's costs.
  - Not optimal because of double markup problem.

Motivating Innovation

- How should a firm provide incentives to innovate?
  - WHO provides incentive to develop AIDS drug.
  - DARPA provides incentives to develop cheap spaceship.
  - This is important if market for final product is monopolised.

- Push strategies, whereby fund R&D directly.

- Pull strategies, whereby award winners.
  - Give one prize or many?
  - Give prizes for incremental steps?
  - Problem: definition of success.
  - Use within firm: Lockheed–Martin makes divisions compete.

Technological Adoption

- Technological progress depends on adoption of new technology.

- Adoption rarely simultaneous: usually S–shaped pattern.

- Consider cost reducing innovation.
  - Cost of adoption $c(t)$ falls over time.

- Preemption in adoption.
  - Suppose firms are Bertrand competitors.
  - After firm 1 adopts, firm 2 will refuse.
  - Firms race to be first to adopt.

- Delayed adoption.
  - Suppose duopolists make positive profits.
  - If firm 1 adopts, firm 2 may adopt to regain market share.
  - Anticipating firm 2's reaction, firm 1 refuses to adopt.

Assignment

- Read "Heartburn", Economist (17/08/2006).

- Why is the market for generics so large?

- Why did Apotex enter the market early?

- How are incumbents responding to the rise of generics?

- Does Senator Schumer's criticism of Merck's pricing policy make any sense?

Reading

- McAfee, p. 78–85.

- Cabral, chapter 16.

- Besanko et al, chapter 13.

- Carlton and Perloff, chapter 16.

- Tirole, chapter 16.