Introduction to Information goods and network economics

Information products
- Information infrastructure:
  - High fixed costs of production, low marginal costs
  - Similar to railroads, power plants, etc.
  - Generally have capacity constraints.
- Information goods
  - Anything that can be digitized.
  - High fixed cost of production, low marginal costs.
  - Often without capacity constraints

Ownership of Information goods
- Ownership of duplication, distribution technology important.
- As duplication, distribution technologies are democratized, legal protection of information—copyrights, patents—becomes more important.
Network effects

• Network externalities
• Demand-side externalities
• Positive feedback effects
• “Tippy”-ness

• Consumer utility: \( r + v(x) \)
  • Where \( r \) is the consumer’s intrinsic value from the good.
  • \( x \) is the number of other users
  • \( V'(x) > 0 \)

Effect of network externalities

• Coordination on one standard in the case of an “open standard”
• Domination of a single supplier in the case of a “closed standard”

Economies of Scale

• \( AC = C(q)/q \) declining, at least for some range of output.
Economies of scale vs. network externalities

- Both can lead to concentration, though for network that doesn’t necessarily mean concentration at the firm level.
- Tendency toward concentration mitigated by demand for variety.
- In both cases, cost savings/demand externality can be "inframarginal" and die out.

Network externality example

- Value of a car is enhanced by the ready availability of parts.
- The ready availability of parts is a function of the number of other buyers.
- So there IS a network effect.
- But, there is some number of other owners that pretty much assures the ready availability of parts, after which, the network effect dies out.

Network Externality example II

- V(x) function in the car example
Taste for variety can “kill” network effects and scale economies

- Two “representative consumers”, A & B
  \[ U^A_1 = r_L + v(x) \]
  \[ U^A_2 = r_S + v(x) \]
  \[ U^B_1 = r_S + v(x) \]
  \[ U^B_2 = r_L + v(x) \]
  Where \( r_L > r_S \)

Number of products that survive is a function of:

- The number of consumers of each type A and B
- The shape of the \( v(x) \) function
- The relative magnitudes of \( r_A \) and \( r_B \)
- The taste for variety, combined with the “dying out” of the network effect explains why we don’t all drive the same car.

Changing standards

- Usual adoption decision (with no network effect):
  Adopt new good if:
  \[ r^{\text{NEW}} - r^{\text{OLD}} - C^{\text{NEW}} - s > 0 \]
  Where \( C^{\text{NEW}} \) is the cost of the new good and \( s \) is the switching cost.

In some scenarios, could take into account the scrap value of the old, but here, I consider the old sunk.
Switching decision for network good

Adopt new good if:
\[ r_{NEW} + v(x_{NEW}) - r_{OLD} - v(x_{OLD}) - C_{NEW} - s > 0 \]

Problems:
- At the time of the decision, you have to guess what \( x_{NEW} \) and \( x_{OLD} \) are going to be.
- Delay can be valuable to see what happens.
- But, if everyone delays, there can be no switch.
- When switching occurs, negative externality on the non-switchers (MS Office upgrade story).

QWERTY debate

• Legend: QWERTY keyboard was designed
  – to slow down typists because early keyboards jammed.
  – So that salesmen could type typewriter using only the top line.
• Claim: Dvorak keyboard much more efficient
  (US Navy study in the 1940s)
• Claim: Switching cost high due to training of touch typists.
• Claim: we’re “stuck” in an inefficient standard.
• Great story, actually dubious. Easy to switch computer keyboards.

Issues to consider when attempting a standards change

• Magnitude of innovation
  – Example CD vs. VCR vs. DVD player
• How big is the switching cost?
  – Example CD vs. VCR vs. DVD player
• Is side by side use feasible? Backward compatibility? Other uses?
  – Examples: train gauges, color TV broadcast standard
  – Problem: building in backward compatibility can lead to compromised performance.
• How long is the window of opportunity?
  – CD vs. DAT
• Mechanisms for subsidizing the build-out of the network?
  – Rental units
    • Eliminates risk
    • But you don’t achieve beneficial lock-in
  – Adobe Acrobat strategy: free reader, charge for writer
Go it alone vs. licensing/coordinated standard?

- Shapiro and Varian:
  Profits = size of pie x share of pie
- Be careful in thinking about this; consider consumer’s share of the pie.
- Another way to think of the tradeoff: probability of acceptance vs. payoff if accepted?

Did Sony make a mistake with VCRs?

- JVC widely licensed the VHS standard, Sony "went it alone" with the Beta standard.
  - Judgment about size of network externality
    - Time shifting vs. movie rentals
  - Judgment about the quality of the product
    - Picture quality versus record length.
  - Judgment about the rapidity of acceptance
    - Totally new product not replacing an existing technology.
  - Huge payoff to Sony if they had "won" with Beta.

How to make money with an open standard?

- Leverage innovator knowledge to achieve technological leadership in terms of product performance features.
- Brand name, reputation, strength in distribution channels.
- Economies of scale
Risks from licensing/open standard

- Competitors can out-execute you with your own technology
  - Example: BEA and IBM make more money from Java than Sun.