Patterns of Industry Evolution are in part Determined by Technology
Definition of an Industry

• Different ways to define an industry

• Standard industrial classification (SIC)
  – Categories chosen by government
  – Used to analyze census data on firms
  – SIC codes are hierarchical
  – Data commonly at 2- or 4-digit levels
  – Firms in SIC class usually not competitors
  – So competitive dynamics are hidden
SIC Code Hierarchy

• Major groups:
  – 01-09 Agriculture, forestry, fishing
  – 20-39 Manufacturing
  – 60-67 Finance, insurance, real estate

• 2-digit groups:
  – 20 Food and kindred products
  – 37 Transportation equipment

• 4-digit groups:
  – 3711 Motor vehicles & passenger car bodies
  – 3724 Aircraft engines & engine parts
Competitive Industry Definition

• Firms compete: produce “same” product
• Product variants substitutable for most customers
• Example: automobiles
  – Sports cars, small cars, 8-seaters — fairly substitutable
  – Motorcycles, trucks, buses — serve quite different needs
• Could define as, e.g., substitutability $\geq 20\%$
• In practice, guesstimate given market knowledge
Alternative Industry Definitions

• Industries defined by:
  – Substitutability (for competition analysis)
  – Price identical for all buyers (for market analysis)
  – Oligopolies if present could influence prices (for antitrust analysis)
  – Economies of scope in technology of product or production (for diversification analysis)

• This course: mainly substitutability
Patterns of Industry Evolution

• Traits that evolve: supply and demand
• Focus on supply side
• Typology of industries
  – Classify industries by evolutionary type?
  – Shakeout & concentration in some industries; some early entrants dominate
  – Non-shakeout in other industries; sometimes market leaders are replaced
  – Technology: what role does it play?
Supply and Demand Traits

• Supply-side
  – Firms in the industry: entry, exit
  – Technology of product and production
  – Firm growth, market share, concentration

• Demand-side
  – Number of customers & individual demand
  – Tendency to stick with a brand; switching costs
  – Spread of information and fads
Shakeout in Some Industries

- Gort & Klepper (1982), Klepper & Graddy (1990)
  - 47 new products
  - First several decades or more of market
  - Initial rise in number of producers
  - Then in most products a shakeout of producers
  - Despite continued growth in output
- Greater shakeout with more technological change (Agarwal, 1998)
- Some early entrants dominate through technology (Klepper & Simons, 1997, …)
Number of Manufacturers versus Time of Various US and UK Products

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Number of Manufacturers versus Time of Various US and UK Products

No Shakeout in Some Industries

- Number of firms may fall none or little
  - Ball-point pens in the US
  - Zippers in the US
- No early-mover advantage, unlike in shakeouts
- In other cases, late-mover advantages
  - Mechanical to electronic calculators
The Role of Technology

• Technology is a powerful competitive force
• If (1) large firms have most R&D incentive, and (2) technology fits firms’ abilities, then: technology reinforces the leading firms
• If (1) R&D matters little to competition, or (2) new firms better at relevant R&D, then: leading firms have no advantage
A Validity Check

• Do technology and market traits really determine industry evolution?
• Or are outcomes just random?
• If just random, should often differ across countries
• Simons (2002) compares 18 products in US & UK
• Degree and time of shakeout very similar
• Common process at work in both nations
• Not just random
You Have Learned

• Technology, other market traits, affect industry evolution

• Types of industry evolution:
  – Market leadership turnover: aided by disruptive technology
  – Continued entry & exit possible: technology leadership is unimportant
  – Shakeout: market leaders use technology to dominate, non-disruptive technology
  – Market niches protect firms