

EC2212 Industrial Growth  
and Competition

Lecture 2

**Small Firms Can Be Innovative!**  
**(and Some Ways to Help)**

# Is New Technology Ever from Small Firms?

- Yes:
- Jewkes, Sawers, & Stillerman (1959), *The Sources of Invention*
- Inventions often from small firms, individuals
- Small firms: cellophane tape, Terylene; individuals: self-winding watch, penicillin
- True for invention, less for innovation

# Small Firms Are Inventive

- Large and small firms have similar R&D spending per employee (possible exception: among very small firms, spending might be low)
- Small firms average more patents per R&D dollar spent
- Literature review: Cohen (1995)

# Helping Small Firms Innovate

- Use heterogenous skills
- Fit industry-specific needs
- Look for innovative ideas outside firms
- Use regional networks of innovators

# Heterogeneous Skills

- Firms differ in employee skills, resources
- Harness the skills & resources
- E.g., radio manufacturers entering TV set production: innovated 5+ x as much, 60% lower annual exit, higher market share (Klepper & Simons, 2000 SMJ)
- E.g., automobile makers in early 1900s

# Industry-Specific Needs

- Amounts & kinds of R&D needed vary by industry

% of firms conducting R&D (1000-4999 employees)

Food & kindred products	50%
Petroleum	69.2%
Aircraft & parts	89.5%

(Jewkes, Sawers, Stillerman, 1959, p. 192)

# Innovative Ideas Outside Firms

- Innovative ideas often originate outside companies
- Johnston & Gibbons (1975), von Hippel (1988)
- E.g., in NMR spectrometers 79% of major innovations from users
- Other innovations from suppliers

# Sources of Innovations

Technology	User	Manuf.	Supplier	Other
Scientific instruments	77%	23%	0%	0%
Semiconductor & PCB process	67%	21%	0%	12%
Pultrusion process	90%	10%	0%	0%
Tractor-shovel related	6%	94%	0%	0%
Engineering plastics	10%	90%	0%	0%
Plastics additives	8%	92%	0%	0%
Industrial gas-using	42%	17%	32%	8%
Thermoplastics-using	43%	14%	36%	7%
Wire termination equipment	11%	33%	56%	0%

Von Hippel (1988, p. 4)

# Regional Networks

- Clusters of firms in an industry Marshall (1890) points out classic benefits:
  - intermediate goods supply
  - labor supply
  - knowledge spillover
- Patents (etc.) reflect clustering benefits
- E.g., tire makers: 89% in Akron (66% not) produced cord tires in 1920, yielding 3x less chance of exit (Klepper & Simons, 2000 JPE)

# Successful Innovation in Agglomerations

Silicon Valley successes (Saxenian, 1994):

- Interchange of ideas by managers, engineers
- Rapid job change
- Successful investors fund start-ups
- Links with university research, education
- Local government - executive cooperation
- Firms sharing resources

# You Have Learned

- Small firms are inventive
  - Evidence from case studies, cross-section data
  - True for invention, less for innovation
- Tailor R&D work to firm skills, industries
- Get ideas from suppliers and customers too
- Use innovative networks;  
make innovative networks successful

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Lecture 2 extra part

Cities Thrive on Innovation

# Cities as Loci of Innovation

- Jacobs (1969), *The Economy of Cities*
- “one kind of work leads to another” (p. 51)
  - Brassieres - created by Mrs. Ida Rosenthal, custom seamstress in a small shop in New York City, early 1920s
- Skills of multiple trades singly and in combination yield new kinds of work

# Example: Cities and Agriculture

- Theory of agricultural primacy
  - Agricultural improvements yielded excess food; then some people could live in cities
- Jacobs' view: city primacy
  - Cities always existed; trading centers that distributed food
  - Cities sources of innovation, including spread of new agricultural techniques

# Growth and Decline of Cities

- Diversity of industry allows continued growth
- One-industry cities (Manchester, spinning & weaving) grow while industry grows
- Many-industry cities (Birmingham and London) survive setbacks
  - People find other trades & skills
  - Diversity of approaches spurs innovation

# You Have Learned (extra part)

- Cities spread knowledge, yielding work and new kinds of work
- One-industry cities - danger of stagnation
- Many-industry cities - recover more easily: innovation creates new kinds of work