“Optimal” Climate Change and “Optimal” Innovation Policies at Odds

Linda R. Cohen

presentation for the Workshop on Federal Policy to Reduce US Greenhouse Gas Emissions

Resources for the Future

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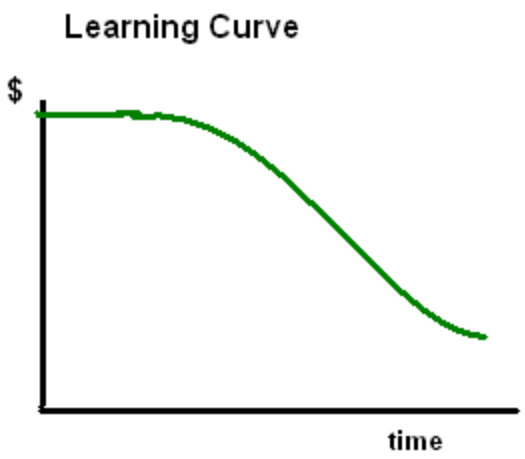
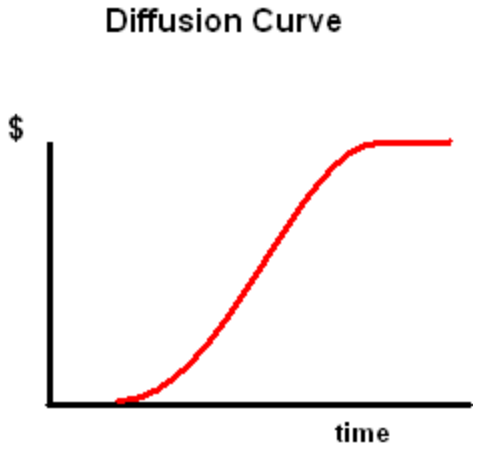
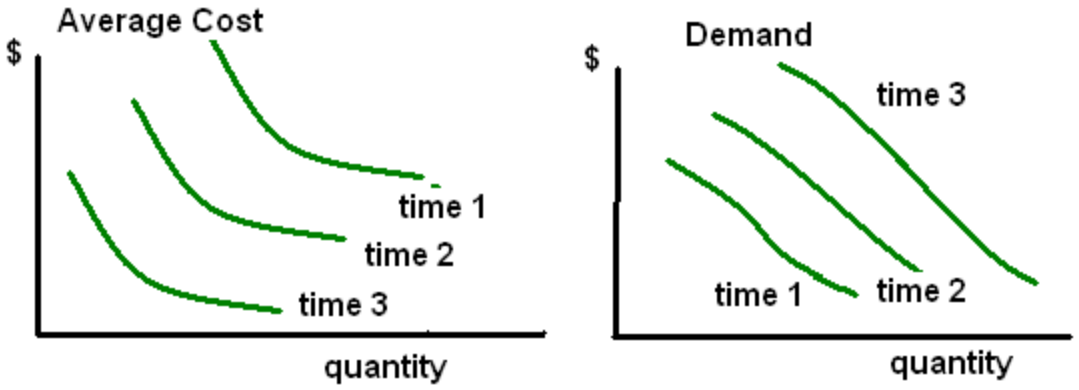
Modeling Innovation





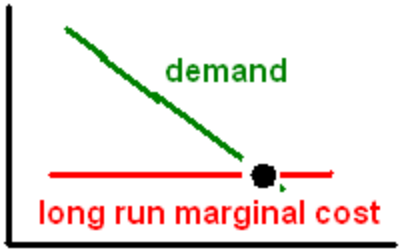
What we know about innovation

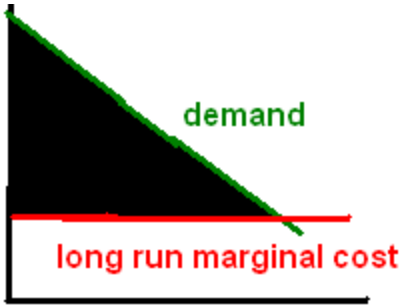
- Large fixed costs to innovation
- Innovation proceeds well beyond invention; deployment is a long process
- Learning by doing; learning by using; development of complementary technologies.
- Great uncertainty about what, who



When does private sector innovation thrive?

- Profit opportunities





- monopoly prices; price discrimination across space; price discrimination across time; durable goods conditions

Dynamic Industries, cont.

- multiple actors, options
  - public programs – EPA, DOE, NSF, DOD. Question about direction of causation
  - competitive; deregulated industries
- coordination can be problematic
- monopoly profits for innovations; competition not necessarily in conflict
  - policies for temporary monopoly condition
  - changes in relative position of firms
- differentiated consumers; early adopters

What works for government

- Institutions for supporting research
- Programs directed at government missions
- Industry/commercial
  - joint programs with industry
  - collaborations with consortia
  - actual public goods; market failures
- More money
  - increasing returns to scale for govt programs
- Deemphasized economic profits
- Energy Examples
  - photovoltaics – producer cost reductions from NASA competitions
  - wind power – cost reductions from subsidized users
  - gas turbines – spillovers from airplane R&D

Implications for climate change policies

- Areas of agreement
  - pricing emissions is crucial but inadequate
    - “fragile” commitment to prices; never high enough
  - subsidies are crucial but inadequate
    - too small; won’t get at range of incremental innovations
- Areas with less than full agreement
  - how to achieve policy stability
  - direct expenditures versus tax expenditures
  - emphasizing research versus deployment
    - are there market failures behind apparently low rates of deployment of allegedly available technology?

Climate Policy and Innovation

- Cap and trade versus price discrimination
- The “idealized scenario” retards innovation:
- perfect global trading with where and when flexibility
  - offsets, credits, banking and borrowing

versus

- price discrimination over time; among customers; Ramsay prices

Drug Analogy:

- reimportation from Canada, Brazil, India
- delay illness until generic drugs available

Suggestions

- embrace price discrimination and product differentiation
- gradual accession – identify early adopters
  - California?
- different specialties across countries?
- subsidy policy: for first n adopters per year?
- Model innovation benefits from price discrimination – the “second best” might be better than the “perfect world”