

Innovation Policy and the Environment

Joshua Gans
Centre for Ideas and the Economy
Melbourne Business School

Outline

- How emissions policy and innovation policy interact
- Options for innovation policy in environmental matters
 - Allocation of research funds
 - Government procurement
 - Use of prizes
 - Facilitating adoption



Interactions between emissions and innovation policy

Emissions Policy

- Theory #1: If we ‘get the prices right,’ innovation will take care of itself.
- Theory #2: Innovation involves market failures that need to be dealt with independently from environmental policy.
- Theory #3: ‘Getting the prices right’ might make innovation policy more difficult.

Environmentally friendly innovation

- Fossil fuel augmenting
 - These are technologies that improve the productivity of goods that rely on fossil fuels
 - Examples: more fuel efficient cars, light bulbs
- Alternative fuel augmenting
 - These are technologies that improve the productivity of goods that rely on alternative fuels
 - Examples: solar hot water heaters, geothermal electricity
- Offset technologies
 - These are technologies that improve the efficiency of drawing carbon from the atmosphere.
 - Examples: tree planting or algae growth, carbon storage

Impact of emissions policy

- Suppose that we put a more stringent cap on emissions so there is less fossil fuel that can be used.
- As fossil fuels are more scarce, two effects:
 - this increases the price of products utilising them
 - this increases the market demand for products utilising alternative fuels
- One effect (the *price* effect) stimulates the profits of entrepreneurs with more efficient fossil fuel technologies. The other effect (the *market size* effect) stimulates the profits of entrepreneurs with alternative fuel technologies.
- Scale dominates: so the market size effect outweighs the price effect
 - Stringent emissions policy = relatively more alternative fuel innovation.

What about offset technology?

- For offset technology, in an emissions trading regime,
 - The price effect allows those technologies to earn higher margins
 - The market size effect reduces the direct competitor (permits) and so increases the demand for offset solutions
- Thus, offset innovation will be stimulated by more stringent emissions policy

Overall innovation

- Emissions policy changes relative innovation direction
- However, it reduces the availability of funds for research and development.
- It can be demonstrated that this:
 - Reduces the rate of innovation on both fossil and alternative fuel technologies
 - Has an ambiguous impact on the rate of innovation on offset technologies

Conclusions

- ‘Getting the prices right’ implies more incentive for public support of innovation (not less or independence).
- If emissions policies are adopted globally, the best opportunities for commercialisation from Australia are in offset technologies.

Policy Options

Allocation of Research Funds

- When governments allocate funds for research, cannot easily evaluate social rate of return
- For emissions policy with a price established,
 - The carbon price is the marginal social value
 - Hence, can allocate funds on the basis of expected reduction in emissions multiplied by the price (or weighted futures prices)
- This makes it easier to evaluate different disciplinary or industry-based approaches.

The matching problem

- “One day in 1943, Edwin Land’s three-year-old daughter asked why she could not immediately see the picture he had just taken of her. Within an hour, this scientist conceived the camera that would transform his company. In other words, Land’s vision was the synthesis of the insight invoked by his daughter’s question and his vast technical knowledge.”

How does need and innovation come together?

Coordination

- Many good technical solutions exist within the community
 - Users have solved their own problems
 - Problems could be easily solved but for clear articulation and communication of a need
- Current policies: aimed at making it less costly to generate solutions (Supply push)
- Need policies that are aim at making it easier to articulate needs and gaps (Demand pull)

It “might be more efficient to have problems seeking solutions than solutions seeking problems.”

Demand-Pull Policies

- Prizes
 - Examples: X-Prize, google.org, Netflix
- Tournaments
 - Examples: race for synthetic insulin
- Advance purchase commitments
 - Examples: vaccines
 - Similar: PBS

Don't need to pay unless a solution is found.

Using procurement

- Government is a large purchaser but not necessarily with unique needs
- Ex post: can use its role as a large buyer to promote services that will be developed for uses beyond government
- Ex ante: can specify advance purchase commitments for solutions to existing problems (“fuzzy RQFs”)

Experience in the UK

- 2007 Report on *Transforming Government Procurement*

“It is much easier to evaluate the costs and benefits of a tried and tested product, rather than something that may not have previously been used in practice, or may not even exist at the time the Government first considers using procurement as a means of solving a complex delivery problem. However, if a new and better solution is already developed or could be made available, this might provide better value for money than a tried and tested product.”

- Whitehall area combined power and heat system: better management to reduce emissions
- Prison mattress purchases and disposal: used advanced purchase commitments to solicit 35 innovative solutions (including different materials to alternative recycling systems). Zero-waste mattress solution options were considered including a full management of ‘cradle to cradle’ supply management.

Facilitating adoption

- New technologies will be patented.
- But this will reduce the speed of adoption.
- Should the government subsidise adoption?
 - Negotiate subsidy in exchange for low price
 - Like Pharmaceutical Benefits Scheme
 - Needs an assessment body for technologies to be considered

Summary of Options

- Use carbon price to allocate research funds
- Increase use of prizes
- Change government procurement policies
- Facilitate adoption through PBS-like arrangements