

**Innovation prizes:  
Connecting research to policy**

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# Motivation

- ▶ Innovation prizes have a long history
- ▶ Today, offered by gov'ts, private firms, and philanthropies
  - ▶ McKinsey (2009): 15-fold increase in value since 1970
- ▶ America COMPETES Reauthorization Act of 2010 intensified interest in how government agencies can most effectively design and apply innovation prize policies
  - ▶ Provides all federal agencies with authority to offer prizes
  
- ▶ My focus today:
  - ▶ “Voluntary” prizes (complement to patents, not substitutes)
  - ▶ Not discussing procurement mechanisms like auctions
  - ▶ Focus on “targeted” rather than “blue-sky” prizes
  - ▶ Not focused on legal/contracting issues  
(can be very important for long-term prizes)

# Objectives of innovation prizes

- ▶ Traditional focus on a single goal: incentivize the creation of a desired technology
- ▶ Two potential additional goals that focus instead on what will happen to the technology once it is developed:
  1. Orient research effort toward designing a product capable of being used at scale by consumers
    - ▶ Demonstration project: Ansari X prize
    - ▶ In contrast, Super Efficient Refrigerator Program and Advance Market Commitments (AMCs) both include market tests
    - ▶ Can include pricing conditions: Archon X Prize (\$10k or less)
  2. Encourage follow-on research
    - ▶ Can require disclosure
    - ▶ Can allocate intellectual property rights
    - ▶ Can require that the technology be placed in the public domain: patent buyouts, as with Daguerreotype photography

## Structuring prizes: Defining the product in advance

- ▶ Most prize sponsors lay out a detailed set of technical specifications in advance, clarifying the technological and market requirements that a given innovation must meet in order to be eligible to receive prize payments
- ▶ However, many inventors will have ideas that no prize sponsor will have thought of in advance
- ▶ Many commentators (e.g. NAS 2007) have argued that this feature makes prizes less useful for basic scientific research, although Kremer and Glennerster (2004) argue otherwise

## Structuring prizes: Payment reward triggers

- ▶ For all of its faults, one benefit of the patent system is that it creates a rough link between private rewards and social value: firms developing better products will earn higher profits under the patent system
- ▶ Can we replicate this link with prizes?
- ▶ Different mechanisms for triggering reward payments:
  1. Ex ante fixed technical specifications
  2. Ex post discretion (rarely ideal)
  3. Market test or metrics of ex post use

# How effective are innovation prizes?

- ▶ Requires constructing a clear counterfactual
  - ▶ Frequent sponsor view: was the technology developed?
  - ▶ But technology may have been developed without a prize
  - ▶ Also care about speed of development, product quality, etc.
- ▶ Any given prize: Case study evaluation
- ▶ Learning from broader historical examples

## Case study: Pneumococcal vaccine AMC

- ▶ 2008 monitoring and evaluability study
- ▶ Pre-committed to a set of comparator vaccines
- ▶ Imperfect, but provides a working example
- ▶ <http://www.gavi.org/results/evaluations/pneumococcal-amc-outcomes-and-impact-evaluation/>

# Historical evaluations

- ▶ Brunt-Lerner-Nicholas (2012) on Royal Agricultural Society of England (RASE) prizes between 1839-1939
  - ▶ Both pecuniary and non-pecuniary ex ante prizes increased entry and patenting
- ▶ Nicholas (2013) on Japanese prizes in 1885-1911
  - ▶ Mostly non-pecuniary ex post prizes increased patenting
- ▶ Moser-Nicholas (2013) on non-monetary awards at 1851 London Crystal Palace Exhibition
  - ▶ Both ex post non-pecuniary prizes and publicity (feature on *Scientific American* cover) increased patenting
- ▶ Burton-Nicholas (in press) on Longitude Prize, 1714 to 1828
  - ▶ Complementarity between patents (disclosure) and prize



## Summing up

- ▶ Prize design can encourage both development and diffusion
- ▶ Prize design – e.g. reward triggers – deserves careful attention
- ▶ Evaluations for any given prize are difficult, although Advance Market Commitment (AMC) evaluation is one model