A diffusion based approach to policy intervention

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Technology generation vs. diffusion

- Technology policy frequently is assumed to encompass R&D and the generation of new products and processes.
- In the short term only existing technologies are available and it is thus it use rather than generation that is important.
- In the long term new technologies only yield benefits to the extent that they are introduced.
- Thus use i.e. diffusion also matters.

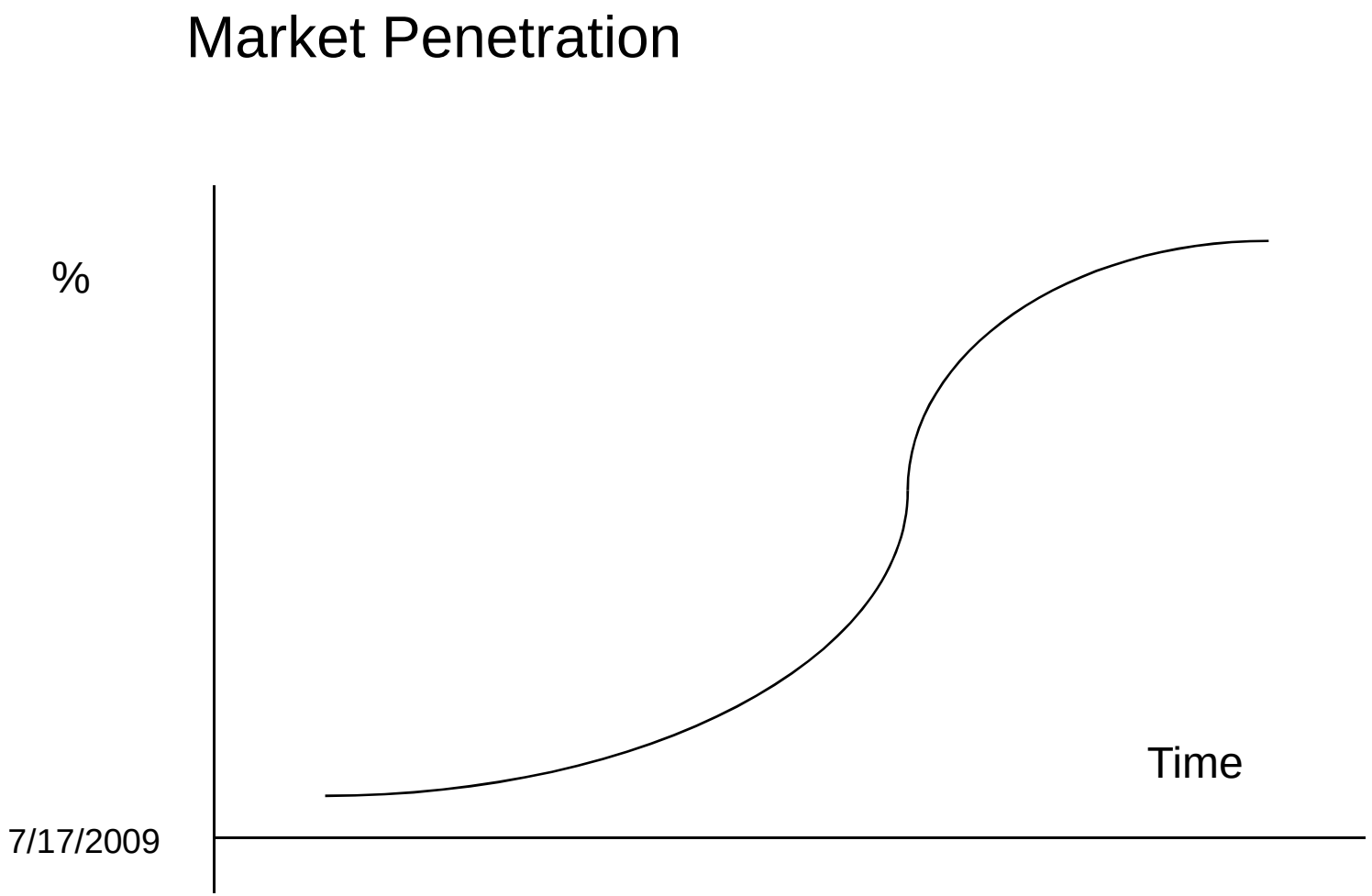
Some references

- D Popp, R Newell and A Jaffe, *Energy, the Environment and Technological Change*

- P. Stoneman and G Battisti, *The Diffusion of New Technology*

both to be found in Bronwyn H Hall and Nathan Rosenberg (eds.), *Handbook of the Economics of Technical Change*, North Holland, Elsevier, forthcoming 2010.

The diffusion process



Why a time intensive process?

Self propagating vs.equilibrium explanations

Equilibrium Example

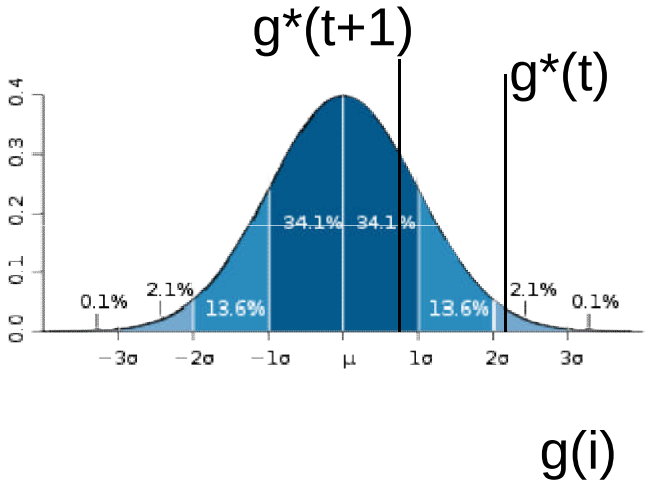
New consumer durable (non durable) or embodied process of production, only ever buy one unit, no depreciation.
Price of acquisition P(t) in time t with expected change dP(t)
Interest/discount rate r(t)
Population of potential purchases i = 1……..N
Annual benefit from ownership g(i)

Profitability condition, buy at first t when
$g(i) \geq r(t).P(t)$
Arbitrage condition, buy when gain is greatest
$g(i) \geq r(t).P(t) - dP(t)$

Generating the diffusion curve

- Concentrate on the profitability condition i.e. buy when $g(i) \geq r(t).P(t)$.
- Allow that g(i) is distributed according to F(.), then buyers will have values for g(i) such that $g(i) \geq g^*(t) = r(t).P(t)$.
- Diffusion results as P(t) falls over time.
- Early users are those showing greatest gain

The probit model



Why intervene?

- Possibly
  - Faster is better?
  - International comparisons?
  - Him too?

- Probably market failure e.g.
  - Private and social valuations
  - Welfare optimality and supply market structure (technology pricing)

Policy Tools

- Subsidies (taxes)
- Expectations
- Additionality (supply side)

- **Plus**
- Regulations (unleaded petrol)
- Standard determination (HDTV)
- Financing?
- Information Provision

Conclusions

1. Diffusion matters in itself and as an incentive to R&D.
2. What drives diffusion?
3. Why does usage need stimulating?
4. Is more (faster) necessarily better?
5. What are the tools?
6. Will they work?