

Innovation Systems for Environmental Management

Innovation Systems, Complex Systems and Sustainable Development
Research Seminar: Free University of Bolzano

30th – 31st March 2009

Presented by:
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Overview

- Key concepts
- Implications for innovation systems
- Specific relevance to environmental systems
- Issues for further (urgent?) investigation

Key Concepts

- Path dependence (*Arthur, David*)
 - The menu of choice changes depending on the choices we have already made
- Increasing returns
 - Economists throughout history
 - Network externalities (*Katz and Shapiro*)
- Social theory – societal change
 - Structuration / reflexivity (*Giddens, Lash, Beck*)
- Co-evolution (*Rindos*)
 - Fitness landscapes (*Wright*)
 - (Technological webs)
 - The fitness of (inter-related) technologies is determined by fit with institutions

Key Concepts

- Evolution(ary economics) (*cf Hodgson*)
 - Many in ‘the tradition’
 - Schumpeter
 - Neo-Schumpeterians
 - Kondratieff, Mensch, Rosenberg, Nelson and Winter, Dosi, Freeman, Peretz
- Innovation systems
 - Technological trajectories (innovation as ‘routine’)
 - Technoeconomic paradigm

Implications for Innovation Systems

- Path dependence and increasing returns
 - We can ‘lock-in’ to ‘ways of doing things’
 - We can ‘lock-out’ other ‘ways of doing things’
 - Environmentally superior ways? (*Hogg*)
- Co-evolution of technologies and institutions
 - Trajectories are difficult to ‘shift’
 - If technologies and institutions co-evolve to form trajectories....
 - ... and if institutions shape, and are shaped by individuals
 - ... then to change trajectories, we need to change institutions
 - ... and only WE (people) can do that

Implications for Economics

- Limits of ‘marginalist’ economics
 - Get the prices (incentives) right
 - The market will deliver the efficient outcome
 - Efficient with respect to what?
 - How efficient are prices (alone) in delivering change?
 - Induced innovation (Hayami, Ruttan, Binswanger)
 - Prices and incentives are important, but they may not be sufficient
 - They also tend to be incremental

Implications for Economics

- Need for ‘induced induced innovation’
 - Public opinion –
 - Induces politicians to consider sufficient incentives to call forward innovation
 - How will innovation occur?
 - Institutions (rules and norms)
 - Public v private sector?
 - Any barriers? (regulatory reform)
 - Any inconsistencies?
 - Appropriate networks
 - Induced induced technological change becomes
 - Induced induced innovation

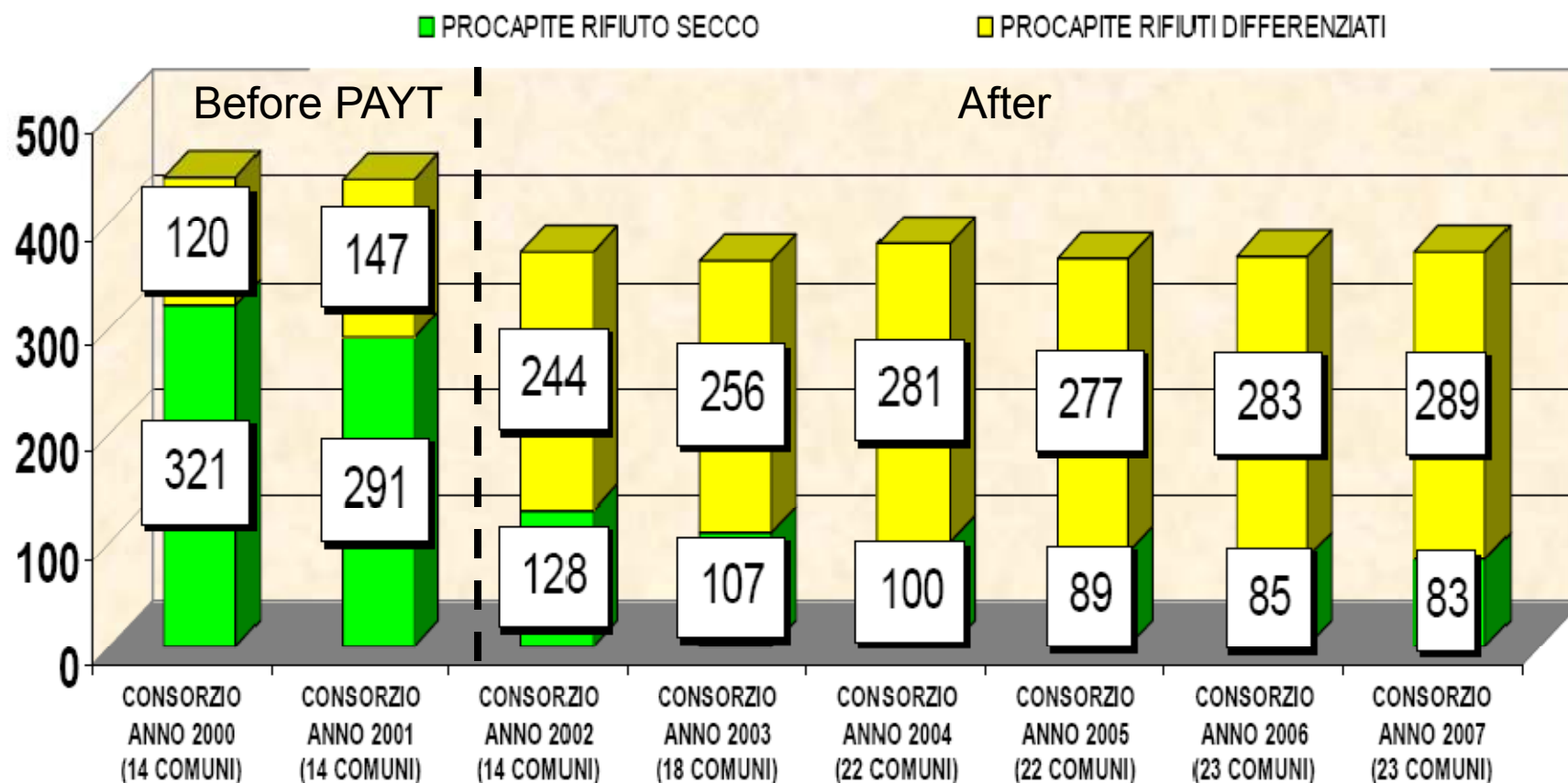
Relevance to Environmental Systems

- Environmental taxes and charges
 - Own-price effects (demand)
 - Cross-price effects (substitutes / technical change)
- Most dramatic changes are differentials
 - Leaded or unleaded petrol?
 - Variable charging - refuse or recycling?
 - The change is dramatic once the alternative system is in place
- Non-differential taxes
 - More limited response
 - Typically quite inelastic ($\epsilon = - 0.2$)

Relevance to Environmental Systems

Recyclables and residual waste (kg/person.y)

Priula 2000-2007

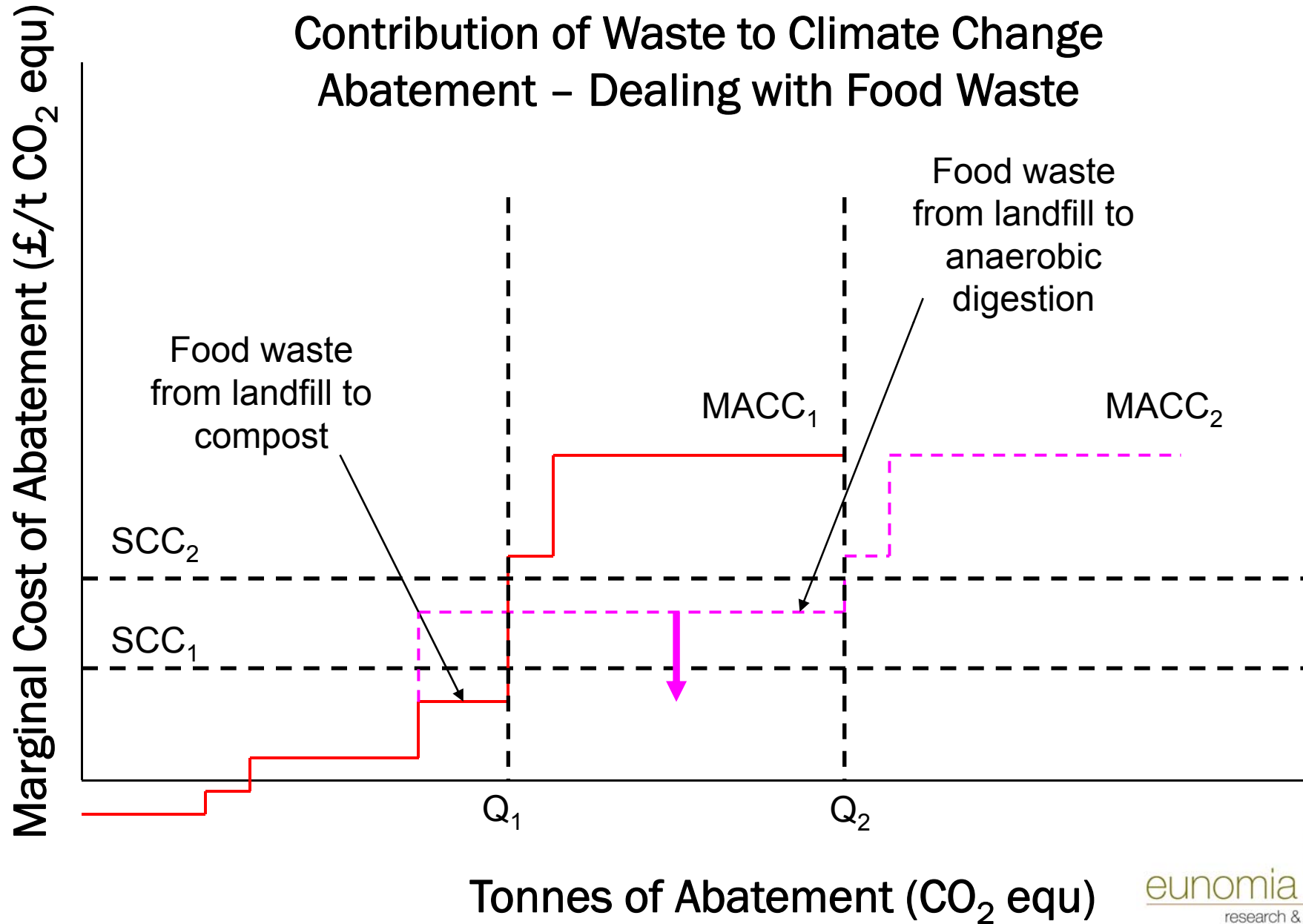


Relevance to Environmental Systems

- Abatement of pollutants - GHGs
 - What are the social costs of GHGs (carbon equ)?
 - What are the *marginal* costs of abating GHGs?
 - Target level of abatement determined by these two
- Issues
 - Myriad problems with the execution of the theory
 - However...
 - Today's 'Social Cost' determines tomorrow's menu
 - What if it's too low?
 - Problem of sunk costs

Relevance to Environmental Systems

Contribution of Waste to Climate Change Abatement – Dealing with Food Waste



Issues for Further Investigation

- How do we make inelastic responses more elastic?
 - Prices work but they are not enough
 - Alternative systems have to be ‘on offer’...
 - ... the ‘no brainer’
 - Institutional changes required to break ‘lock-out’
 - ... so requires social change
 - We get the institutions we ask for ...
 - ... and the market does not fail to deliver the outcome consistent with them
- Can we afford not to be ambitious?
 - The alternative
 - Investments will either be stranded or will prevent improvement



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