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OPTIMAL EU CLIMATE POLICY

INDUCING GREENHOUSE GASES ABATING INNOVATIONS THROUGH POLICY

EX post assessments from EU sectors

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Funded by the European Union
SEVENTH FRAMEWORK PROGRAMME

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Understanding the impacts and limitations of the current instrument mix in detail

task 2.7: **Innovation**

Warsaw November 20t 2013

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Main Issues

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- **Techno organisational innovations to abate CO2**
- **Energy and environmental Policy induced effects**
  - **Over the past 10-15 years**
- **Innovation and structural change:**
  - **Sector based perspective**

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•We introduce environmental policy issues within the evolutionary based innovation perspective

.Policy induced Innovation

Michael Porter 'competitive advantages'

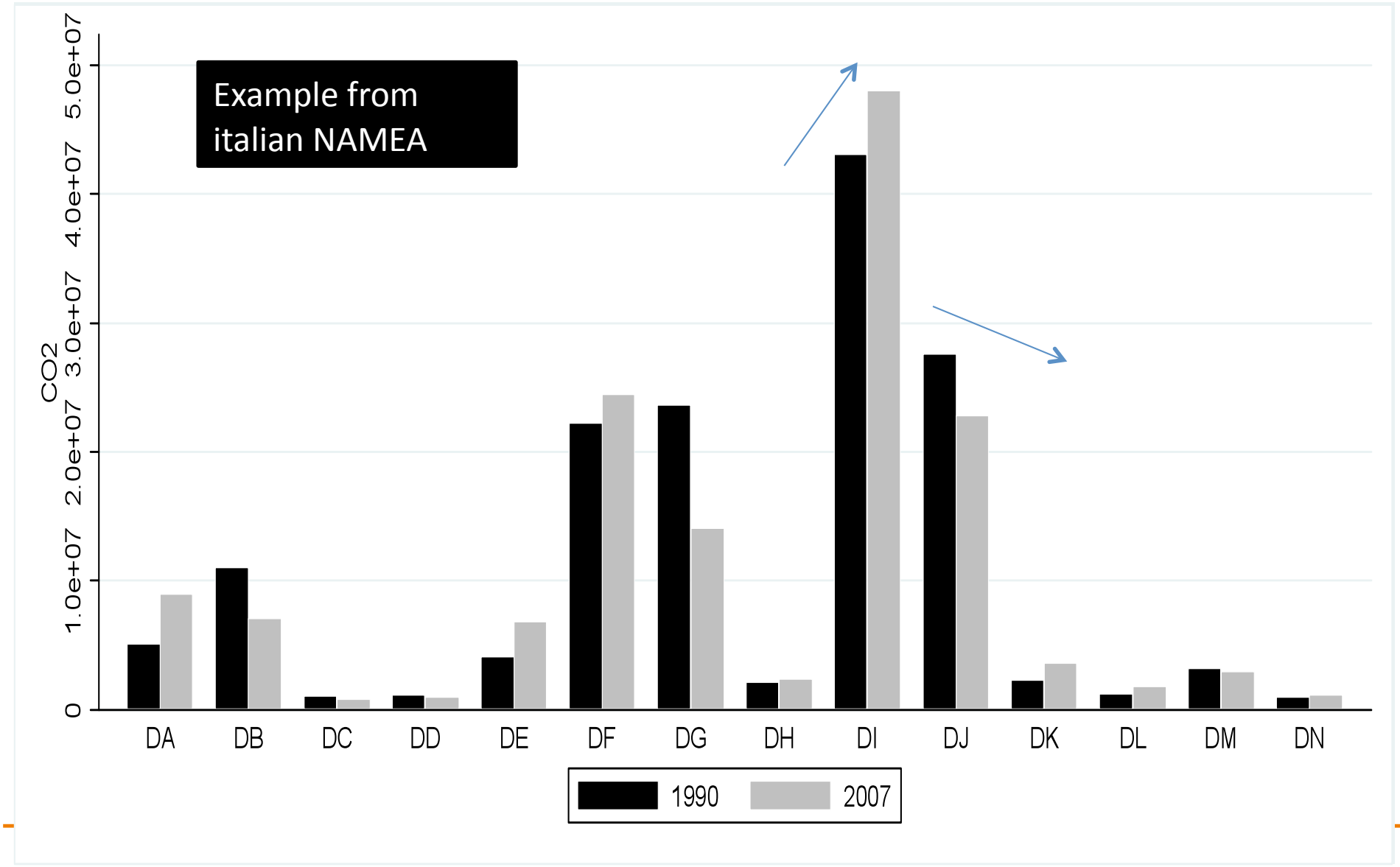
- Well designed Policy induces Innovation Offsets
- Competitiveness and sustainability can be achieved in the medium long run

Schumpeterian approach

- Central role to innovation
- Evolutionary
- sector based

- Malerba (2006) J ev olutionary economics
  - "innovation and industry evolution is the results of competitive and cooperative, market and non market interactions….some of which are national while other are specific to the sector"

CO_2 emissions of manufacturing sectors: different dynamics



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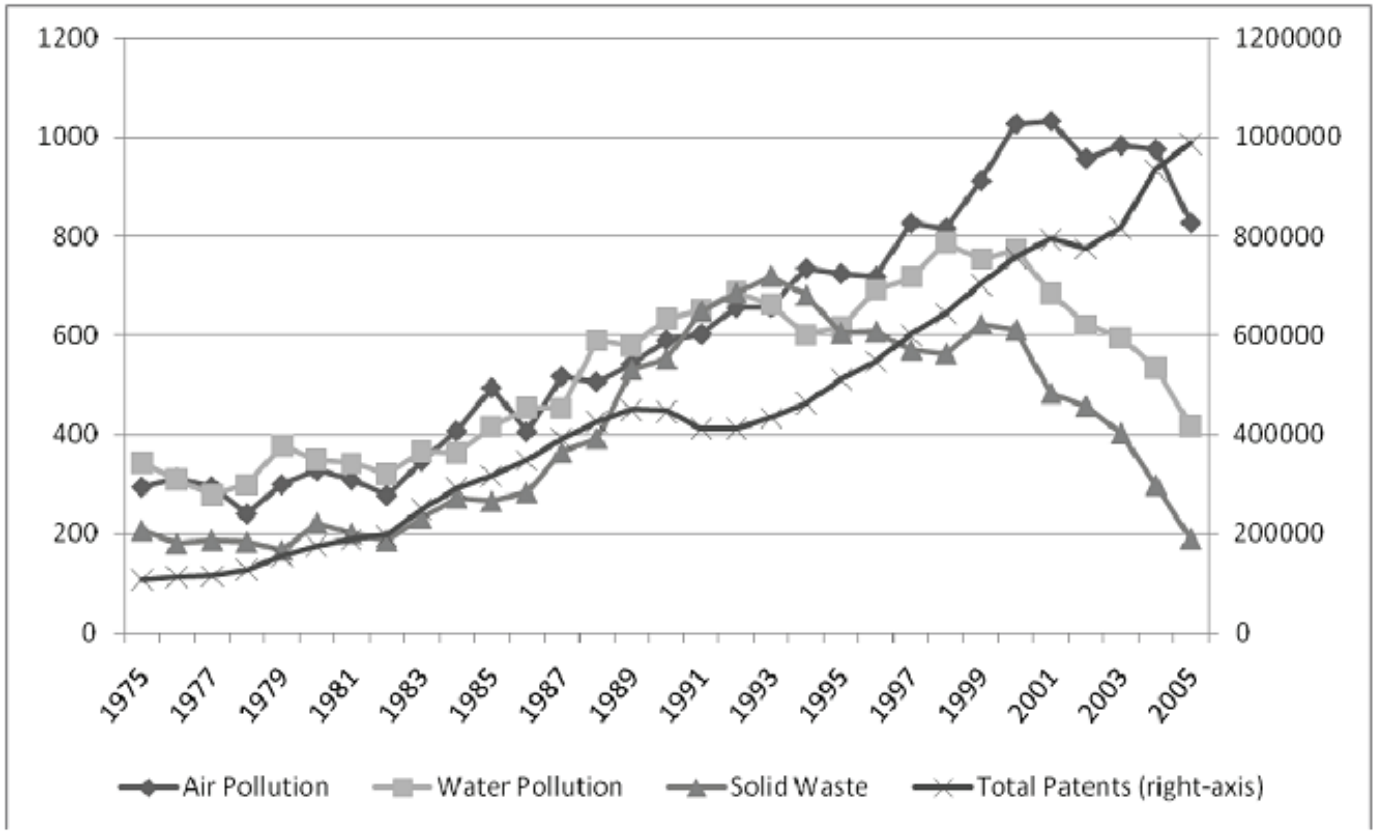
.Eco innovation and inventions

Figure 1 General "Environmental" Technologies by Environmental Medium
(Number of patent applications – claimed priorities, worldwide)



Patent data were extracted from the PATSTAT database (EPO 2008) using

ECO INNOVATION

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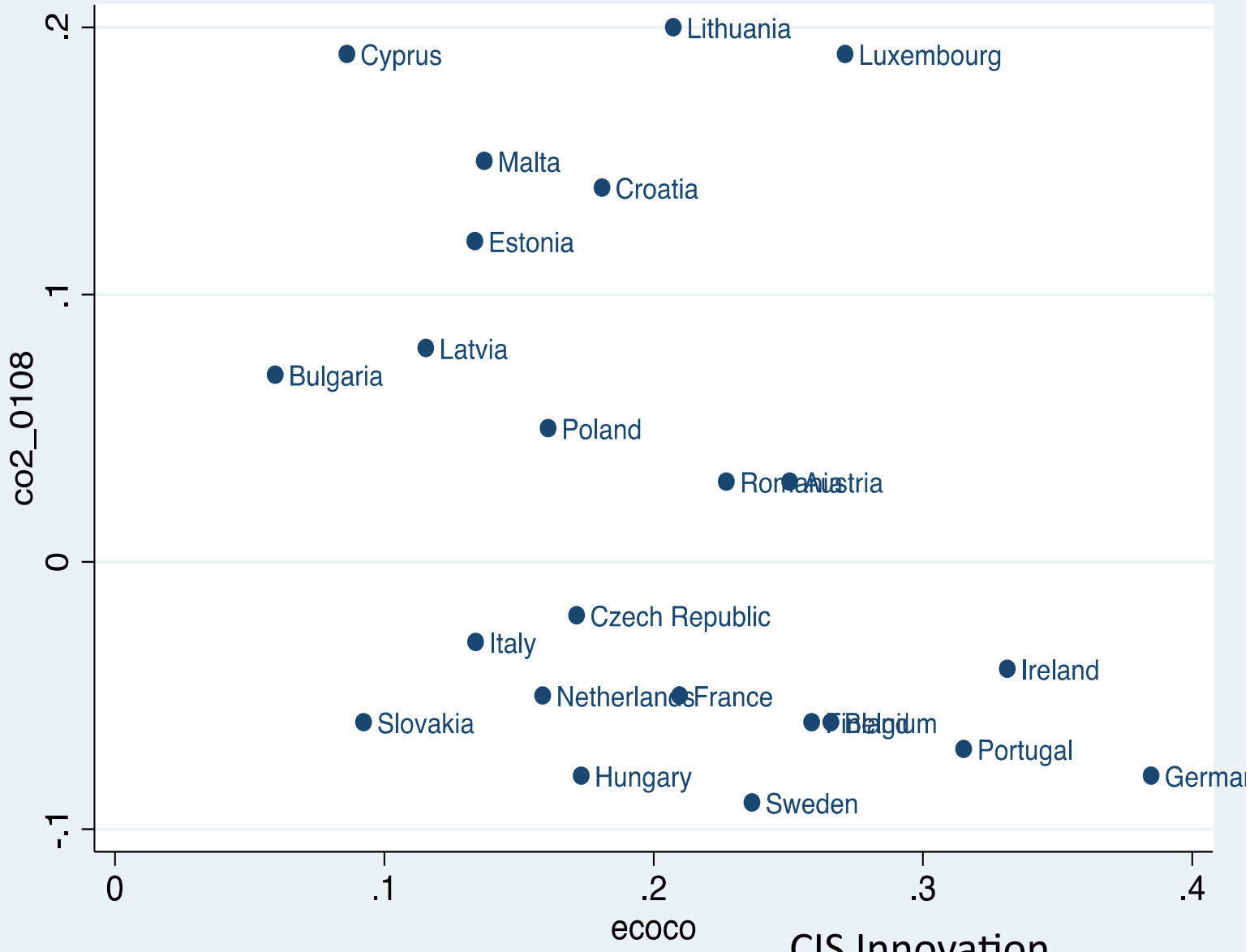
"the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organisation (developing or adopting it) and which results, throughout its life-cycle, in a reduction of environmental risks, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives".

CO2 reduction and innovation adoption



Eurostat data

CIS Innovation data: CO2 abatement

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.Empirical applications

main research question:

to what extent energy and environmental policy instruments have driven adoption of environmental innovations to abate CO2 in the EU?

- **Sectoral / geographical perspective**
- **Manufacturing focus**
  - **recall the EU2020 target to move from 16 to 20% of manufacturing share**
- **Two kinds of innovation:**
  - Technical
  - Organizational

.Two complementary empirical settings

Interview based analysis

- 45 interviews on 6 manufacturing sectors – energy, chemical, paper and card board, ceramics and cement, steel, coke and refinery
  - R&D managers, technology developers….
  - 8 EU countries:
-

Econometrics

- Sector based analyses at EU27 level by using ***Community Innovation Survey 2006-2008 dataset***

.Main insights

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Policy effects

- policies appear to be of high relevance in some sectors, namely **Energy, Coke and refinery** and, to a more limited extent, **paper and cardboard.**
- **Ceramics** appear to have invested following 90's regulatory waves
  - Environmental performance not improving recently

Diverse Eco innovation drivers

- Energy and emission intensity emerges as a factor correlated with innovation also from econometrics.
- Eco innovation to abate CO2 is interestingly positively correlated also with
  - **External knowledge sources**
  - **Integration with other sectors**

- Some sectors as steel recognise the (indirect) role played by high **energy taxation**
- Steel realise they have exploited most **low hanging fruits**… the future challenge is to cope with more public good values
- **Networking , economies of scale, mergers are eventually relevant**

- **Knowledge sharing and firm's interactions** confirm their relevance
- The Policy is not only targeting a firm and a specific technology
- Environmental policy to be intended in a broad meaning (with innovation/industrial policy)

Beyond Technological Innovations

- **Technological and organisational innovations** appear highly complementary and equally crucial
- Green **Training** is complementary to and driven by energy efficiency investments

Policy Interactions

- In some sectors – energy, chemical, ceramics, paper and cardboard, detrimental types of **interactions** were signaled, specifically between climate change and energy policies (coke and refinery is an exception, again signaling potential sector-specific issues).

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.The expected sector heterogeneity in how innovation responds to policy and market factors is evident

Sector's interactions and integration is also relevant

Food for policy Debate

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- **Environmental taxation revenue to fund specific R&D and/or adoption with sector targets and involvement?**
  - Instead/in addition to cuts in labor costs?

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