



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

Ex post analysis – preliminary results

Maciej Bukowski PhD

2nd DYNAMIX Policy Platform, 24th October 2013, Brussels



DYNAMIX is a project funded
under the European Union
Seventh Framework Programme





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case study analysis – aims in DYNAMIX

- Aim of the case studies was to identify potential success stories that can be adapted in Europe as well as failures to show what problems can diminish the effectiveness of policies
- We present preliminary results of quantitative analysis of two case studies:
 - Aggregates use in UK
 - Fertilizers in Denmark



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case study analysis - characteristics

- Both case studies are based on physical flows – so efficiency improvement is visible and can be expressed in physical flows
- Analysis based on generalized Cobb-Douglas production function:

$$Y_t = A_t \prod_i F_{it}^{\alpha_i}$$

- Constant technological progress: $A_t = A_0 e^{\beta t}$
- Ex-post analysis shows the use of different resources in alternative case of “no policy” or “no structural change”



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UK aggregates

- **Problem:**
 - Externalities caused by extraction of aggregates such as noise, dust, traffic, visual impacts, and blasting, ground water, surface water and loss of amenity were very high and could be easily reduced via recycling
- **Three policies:**
 - Introduction of the Landfill Tax (in 1996)
 - Introduction of the Aggregates Levy (in 2002)
 - increase in the Landfill Tax and the Aggregates Levy (in 2008 and 2009)

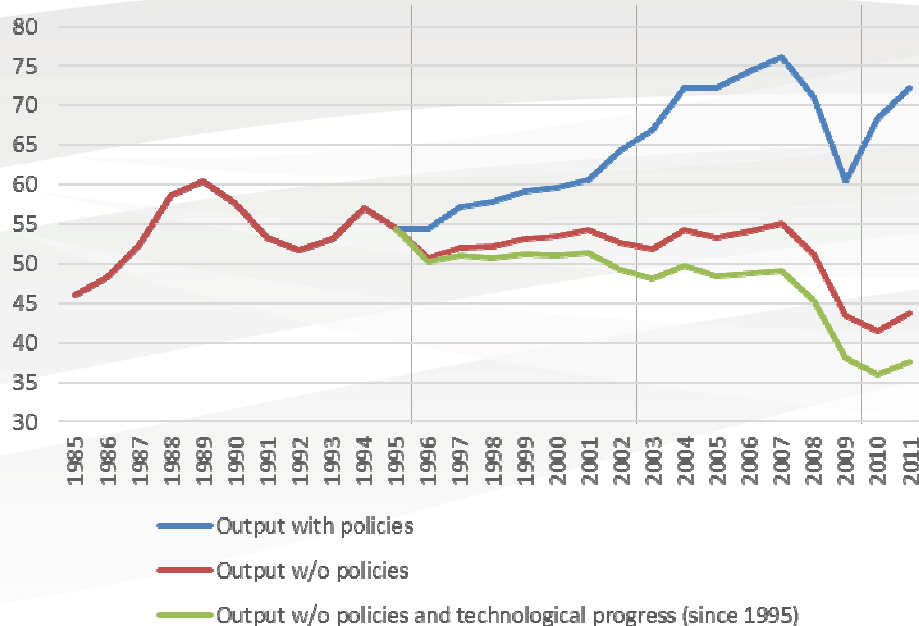


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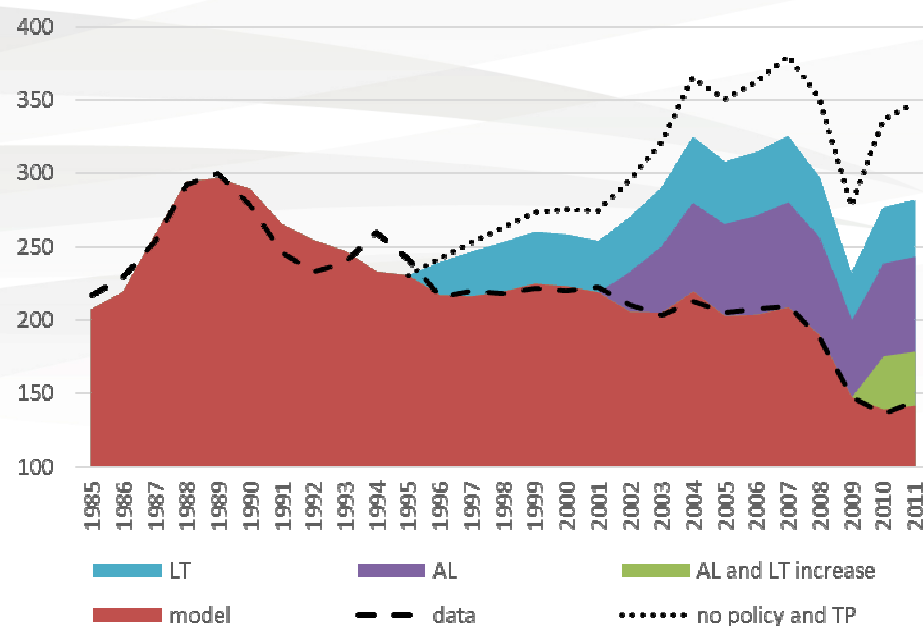
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aggregates in the UK - results

Volume of construction output assuming actual
extraction of aggregates



Use of aggregates use in different scenarios
assuming actual output





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fertilizers in Denmark – problem and policies

- **Problem:**

- Poor quality of water in Denmark caused mainly by pollution from agriculture. Along with technological progress, use of inorganic fertilizer increased. As some of them were used inappropriately, they leached into water bodies causing pollution, extensive fish deaths and loss of biodiversity;

- **Policies:**

- Policies were gradually introduced starting from 1985;
- Policy mix included ban of direct discharge of fertilizer, regulations regarding rules of fertilizer use, introduction of fertilizer account.



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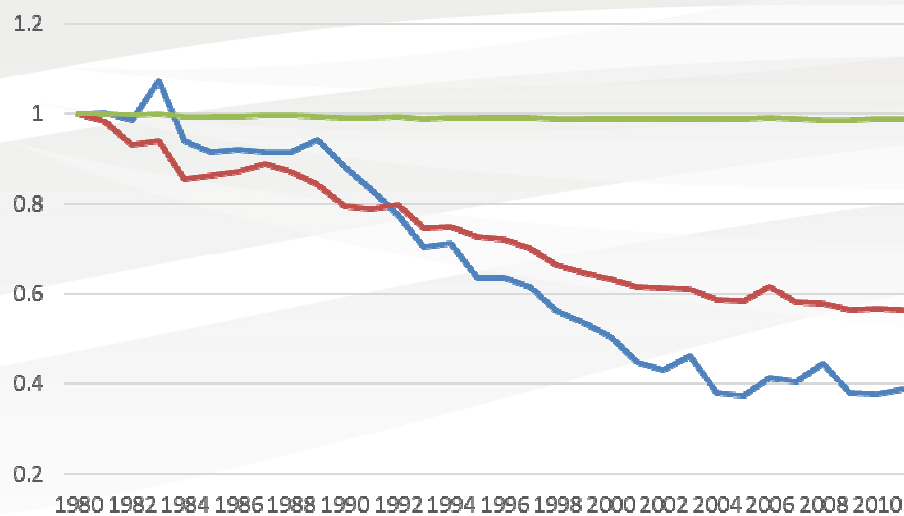
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fertilizers in Denmark – results

Denmark

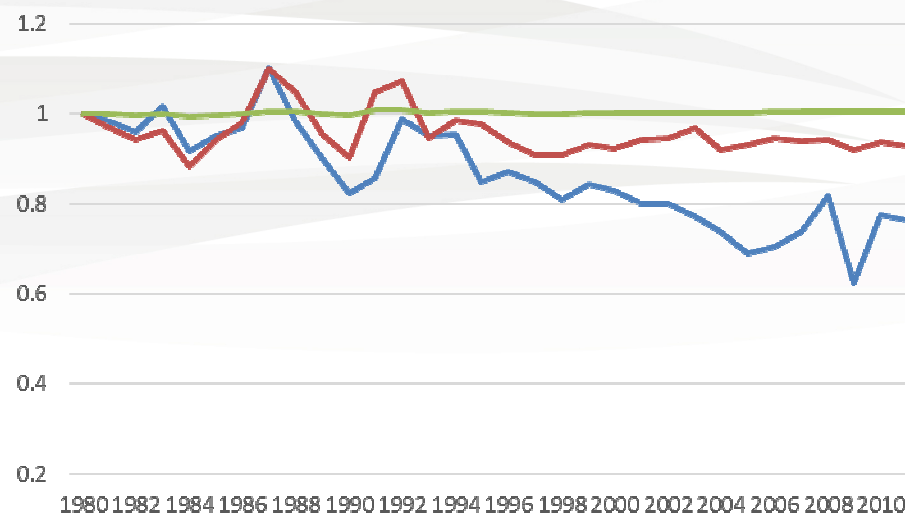
Sweden

Nitrogenous fertilizers use per unit of output



— actual — no struct. change — no struct. change and TP

Nitrogenous fertilizers use per unit of output



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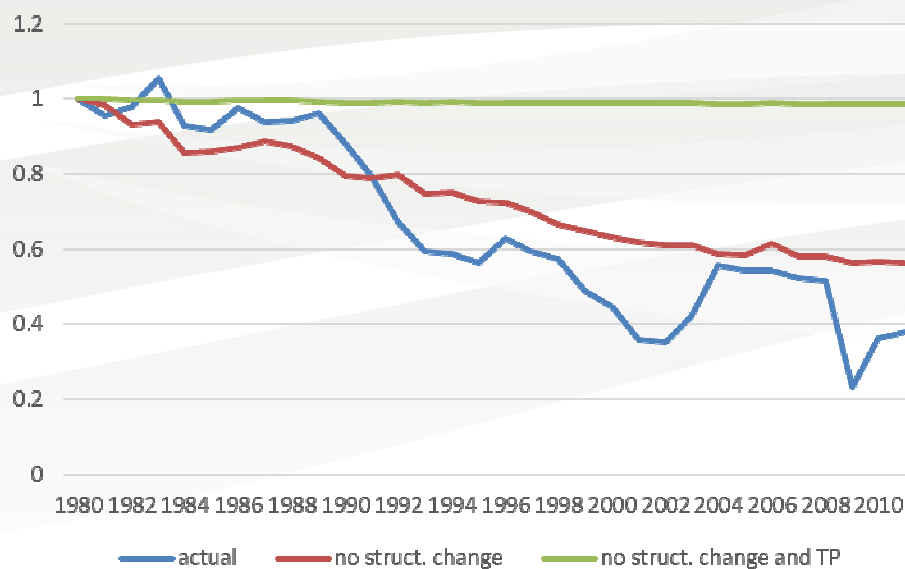
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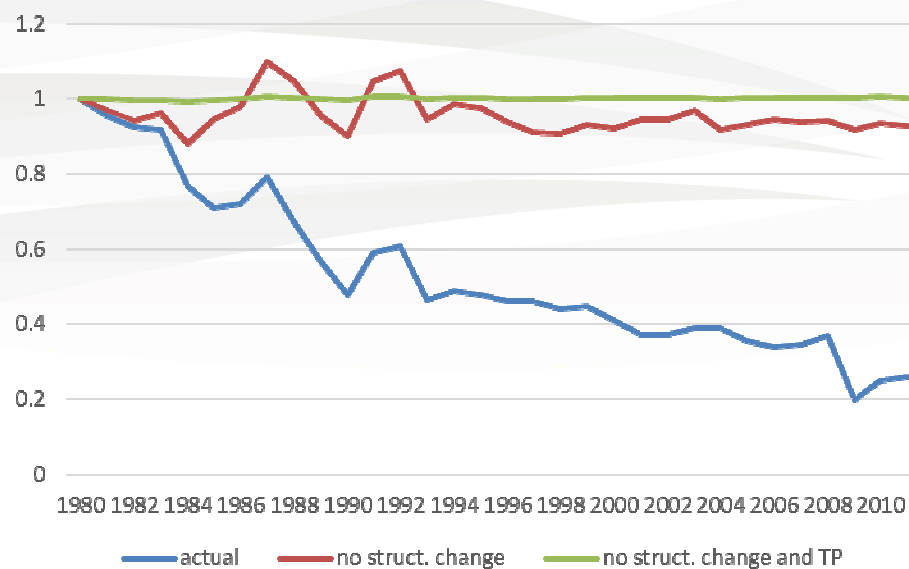
Denmark

Potash fertilizers per unit of output



Sweden

Potash fertilizers per unit of output



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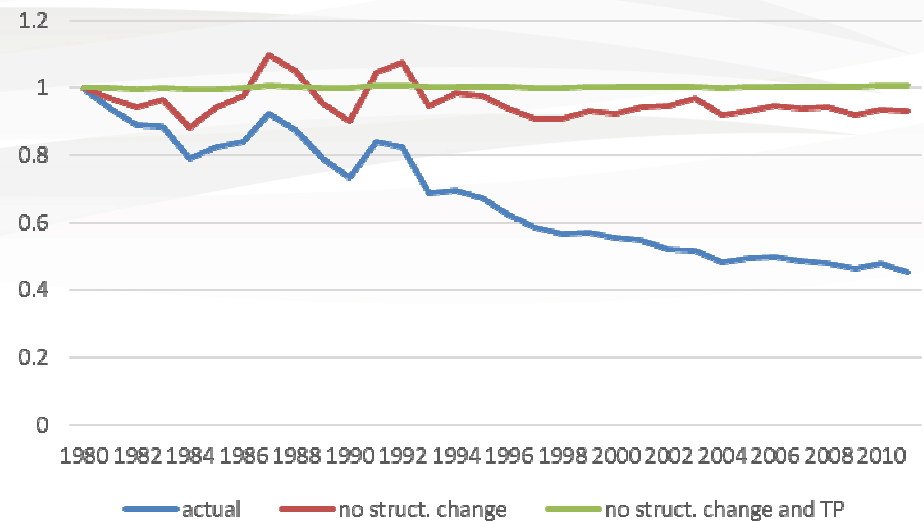
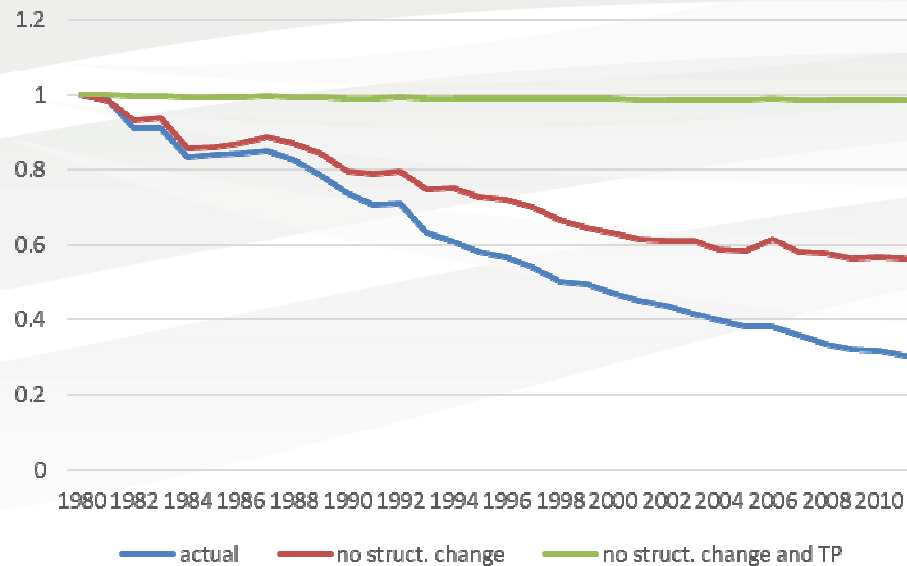
fertilizers in Denmark – results

Denmark

Sweden

Labour supply per unit of output

Labour supply per unit of output



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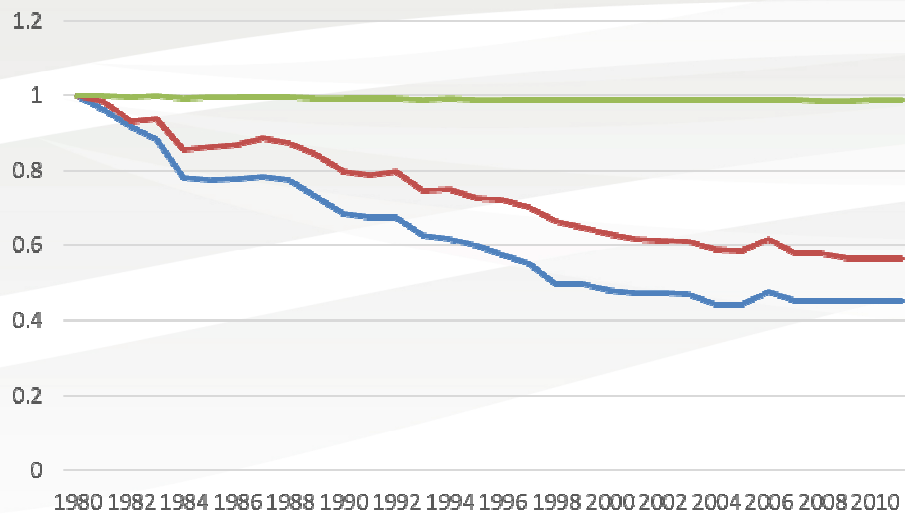
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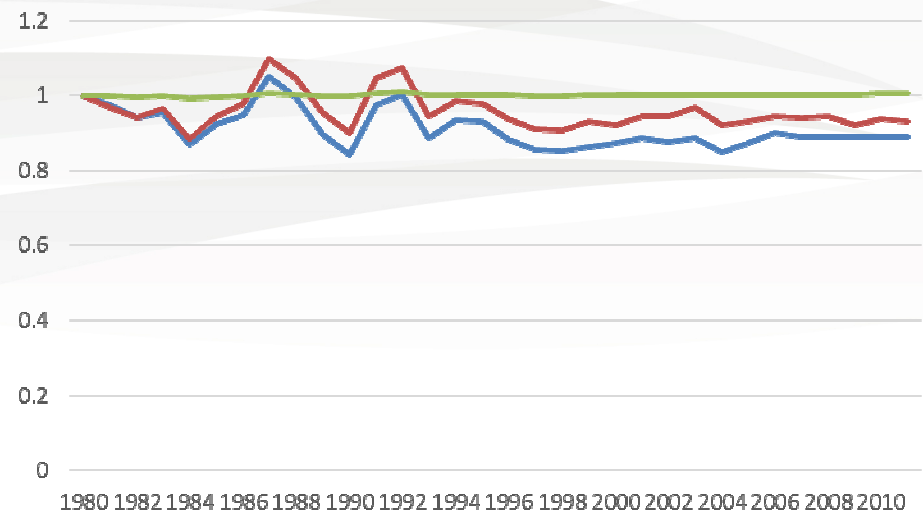
Machinery capital stock per unit of output



— actual — no struct. change — no struct. change and TP

Sweden

Machinery capital stock per unit of output



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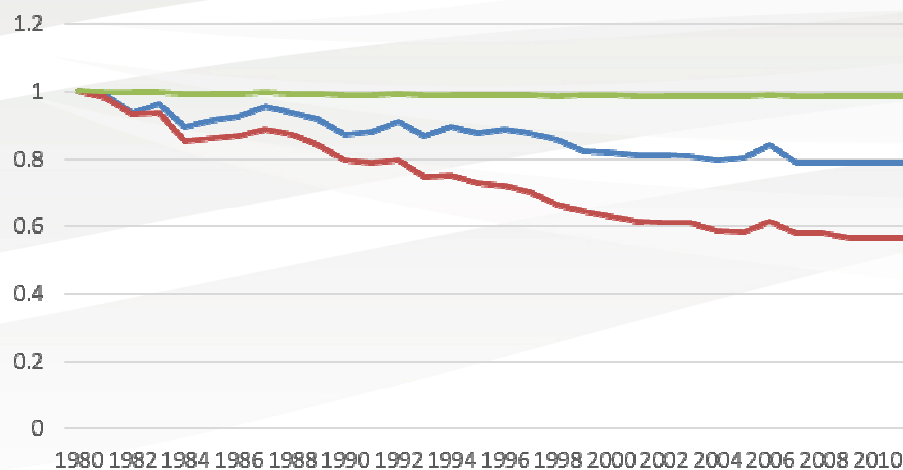
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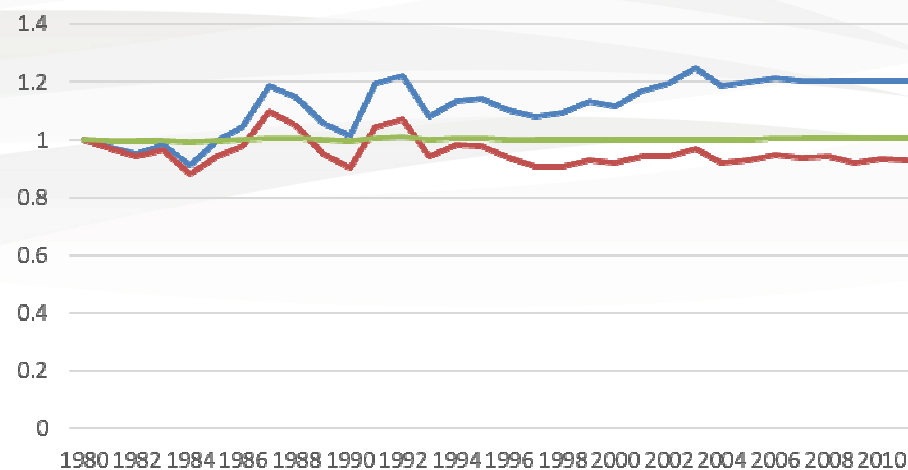
Land development capital stock per unit of
output



— actual — no struct. change — no struct. change and TP

Sweden

Land development capital stock per unit of
output



— actual — no struct. change — no struct. change and TP



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quantitative assessment – conclusions

- Policies increasing cost of aggregates proved to be successful in increasing productivity of this resource in construction sector
- In Denmark, we observed significant impact of structural change on fertilizer use. Moreover, broad technological progress increased productivity of all production factors.
- In contrast, in Sweden, fertilizers (especially potash) were substituted by land development



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Thank you.

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