

Understanding the pathways to a zero-carbon economy using micro data and macro models

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The Vice-Chancellor's Research Day

Research agenda

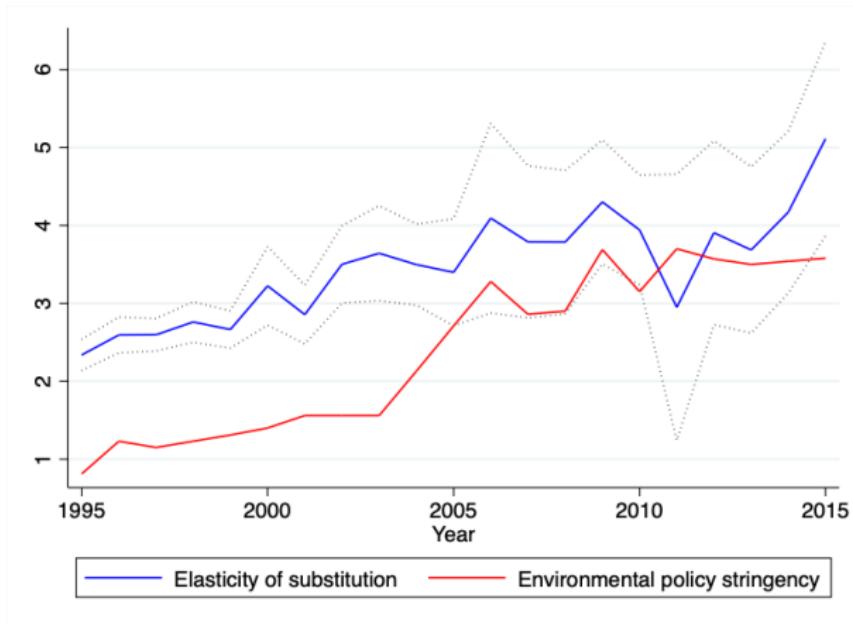
- **Goal**
 - Leverage economic research to tackle climate change through creative use and innovation of methodologies
 - Enrich our understanding of **macroeconomic processes and impacts** of climate change mitigation with **micro-level mechanisms**
- **Approach**
 - Combine **micro** data with **macro** models
 - Firm level administrative data from the UK and France

Research example

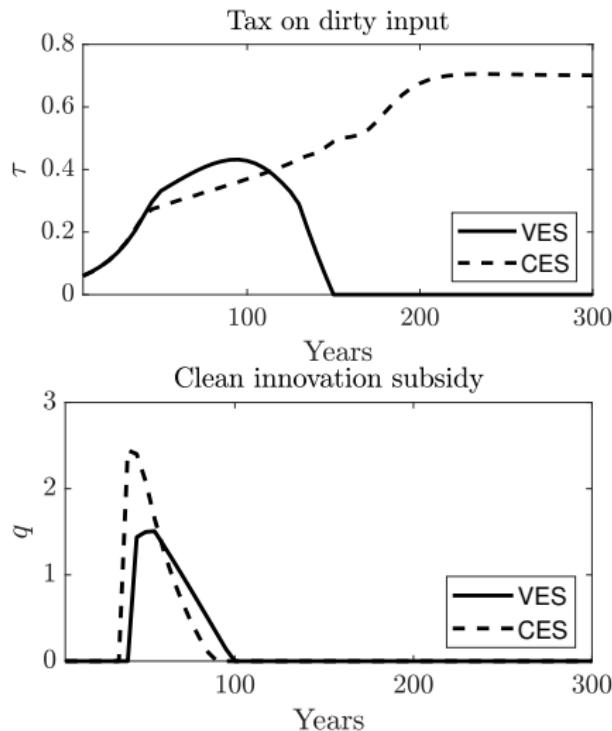
- The optimal carbon tax heavily depends on how easy it is to substitute fossil fuels with low-carbon resources
- As a result, **the elasticity of substitution between clean and dirty energy** features significantly in leading macroeconomic analyses of climate policy
- However, the standard approach is to keep this key parameter constant over time

Evidence from micro data

Figure: Evolution in energy substitutability



Optimal policy under constant and variable elasticity



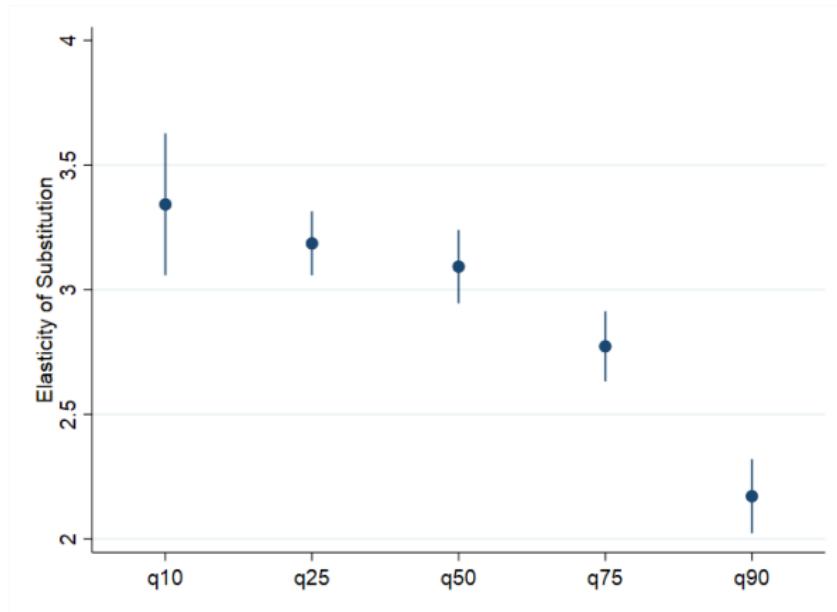
Jo and Miftakhova (2024). Forthcoming at the *Journal of Environmental Economics and Management*

Research example

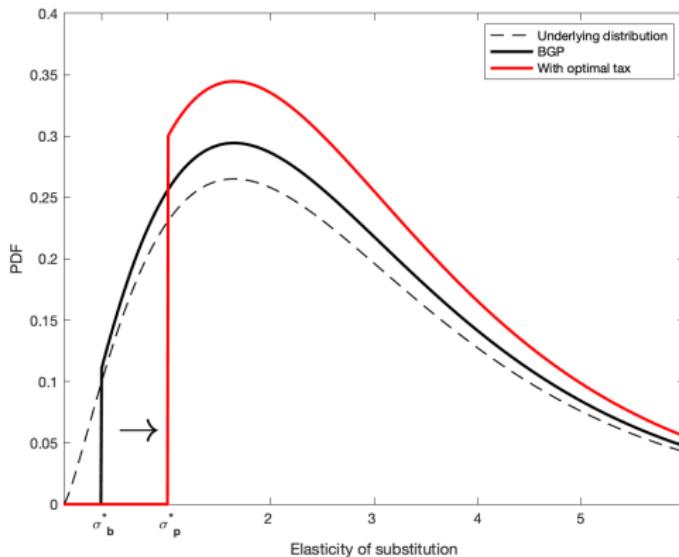
- Another typical assumption in the literature is that all firms and sectors face the same elasticity
- What does micro data tell us about this?
- How does heterogeneity at the micro level affect the optimal policy?

Evidence from micro data

Figure: Heterogeneity in energy substitutability across firms



Interaction between policy and elasticity



- The channel of industry dynamics and the change in the aggregate elasticity **reduces the required carbon tax by half**

Going forward

- Continue to focus on uncovering micro-level mechanisms to better understand the economic process of decarbonization
- Publish the findings in high-impact journals (3 working papers invited to revise for 4 star journals)
- Prepare grant applications leveraging the success of the previous work

Q&A

Thank you!