

An Important Problem

- Climate change is the defining problem of our time; broad consensus that carbon pricing is the way to address it
- Still little known about the effects of carbon pricing on emissions and economic activity in practice
- Distributional effects of particular interest, as a sustainable transition to a low-carbon economy has to be just and equitable
- -Discussion about energy poverty and inequality around European Commission's proposal to expand the European carbon market
- -Particularly relevant given recent surge in carbon prices
- Research question: How successful is carbon pricing in reducing emissions, and how does it affect economic activity and inequality?

Approach

- Novel identification strategy, exploiting institutional features of the EU ETS and high-frequency data
- EU ETS is the largest carbon market in the world
- Cap-and-trade system: Market price for carbon, liquid futures markets



- Regulations in the market have changed considerably over time
- Isolate exogenous variation in carbon price by measuring price change in tight window around policy events concerning supply of emission allowances



- Use as **instrument** to estimate dynamic causal effects of a carbon policy shock
- -External instrument approach (Stock and Watson, 2012; Mertens and Ravn, 2013), robust to using as internal instrument (Ramey, 2011; Plagborg-Møller and Wolf, 2019)
- -VAR model with carbon and macro block, 6 lags, spanning 1999M1-2018M12

The economic consequences of putting a price on carbon

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Aggregate effects

• First stage: F-statistic of 21, no evidence for weak instrument problems

• Carbon pricing has significant effects on emissions and the economy



- A shock *tightening* the carbon pricing regime leads to - a significant increase in energy prices and a persistent fall in emissions
- measured by lower industrial production and higher unemployment
- pass through the cost of emissions
- Higher energy prices in turn can have significant effects on the economy via -direct effect through energy share - indirect effects through income and employment
- Estimate effects on GDP and component using local projections



• Large effects on consumption and investment suggest that indirect effects are important





-an increase in consumer prices and a temporary fall in economic activity, as

• Energy prices play a *crucial role* in the transmission, as power producers



- Denmark and Spain)



- economic costs of carbon pricing
- reductions



- the most vulnerable



Heterogeneous effects

Study heterogeneous effects on carbon pricing using detailed household micro data for the United Kingdom (confirm external validity using data for

• Split households by normal disposable income into low-income (bottom 25%), middle-income (middle 50%) and high-income (top 25%)

• Low-income households reduce their consumption significantly and persistently, response of higher-income barely significant

-Not only are low-income households more exposed because of higher energy expenditure share, they also experience a stronger fall in their income

• Low-income households account for $\sim 40\%$ of the aggregate effect on consumption even though they only represent 25% of the population

Policy implications

• Fiscal policies targeted at the most affected households can reduce the

-To the extent that energy demand is inelastic, this should not compromise emission

-Intuition confirmed in a climate DSGE model with heterogeneity in energy expenditure shares, income incidence and marginal propensities to consume

• Crucial for a *sustainable* transition, which should not come at the cost of

 Suggestive evidence that making policy more equitable helps to increase public support for climate change mitigation