

# The Real Effects of China's Carbon Dioxide Emissions Trading Program

Wang and Liu

Discussion by Diego Känzig  
Northwestern University, CEPR & NBER

*NBER-SAIF Climate Finance and the Sustainable Energy Transition*

# The climate challenge

- Climate change is the **defining challenge** of our time
    - Potentially large economic costs according to recent estimates ...
    - ...and substantial downside risk
  - We have to decarbonize **but** decarbonization also **costly**
- ⇒ Crucial to understand how decarbonization policies affect the economy

## A quick summary

- How does **carbon pricing** affect **firms** behavior and performance?
  - How does investment, R&D and employment change?
  - How is output and profits affected?
- Analyze empirically in **Chinese context** exploiting
  1. **rich** balance sheet data for listed firms
  2. staggered implementation of the policy
- Look into heterogeneity by sector and region

## Main takeaways

- Compliance firms invested significantly more & hired more workers
- Output and profits not significantly affected by ETS coverage
- Vast **heterogeneity**
  - Effects driven by power and manufacturing sectors
  - Strong effects in South and East China, weaker in Central and West China

# Overview of my comments

1. Econometric odds and ends
2. General-equilibrium effects
3. Carbon leakage

## Selection of control group

- The final sample consists of 3,796 firms but only 510 are compliance firms
- Are treatment and control firms similar?
  - Do they operate in the same sectors?
  - How do they compare in terms of age, size, leverage and other firm characteristics?
- Would be useful to have more info
  - Show some descriptive statistics
  - If different, perhaps the authors could construct a **synthetic control** group?

# Staggered DiD

- The regional ETS were implemented in a **staggered** fashion
  - Important to chose the control group right
    - de Chaisemartin-D'Haultfoeuille 2020; Callaway-Sant'Anna 2021; Borusyak-Jaravel-Spiess 2024
- Authors should probably use one of these estimators as the baseline
- **Challenge:** event-study charts from these new methods may be misleading (Roth 2024)
  - May show a kink or jump at the time of treatment even when there is no treatment effect and the violation of parallel trends is the same in all periods
  - Have to adjust heuristics accordingly

# General equilibrium effects

- **Power sector** crucial
  - seems to do quite a bit of lifting in the estimates
- If **energy prices increases**, this also affects the non-treated firms
  - Netted out by time-fixed effects
  - Potentially important given adverse economic consequences of energy price shocks
  - See for instance Känzig (2023)



# Carbon leakage

- How should we think about **carbon leakage** effects?
  - Big concern especially for regional initiatives
  - Cui et al 2023 document substantial carbon leakage in Chinese setting
- How to reconcile leakage with the finding of significant capital investment?
- Authors also find that share of low-skilled workers increases
  - My prior would have been that greener capital requires more skilled workers to operate
  - Would be useful to shed more light on this

## Minor comments

- Authors include stock prices as control variable
  - Also affected by ETS coverage. Bad control?
- Dynamic panel subject to Nickell bias
  - Potentially binding given the relatively short time dimension of panel
- Some more information about regional ETS would be helpful
  - How high were prices historically?

## To sum up

- Great paper on a very timely and important topic!
- Very cool setting and data
- New evidence on the effects of carbon pricing in emerging markets