Implications of Climate Change for Monetary Policy

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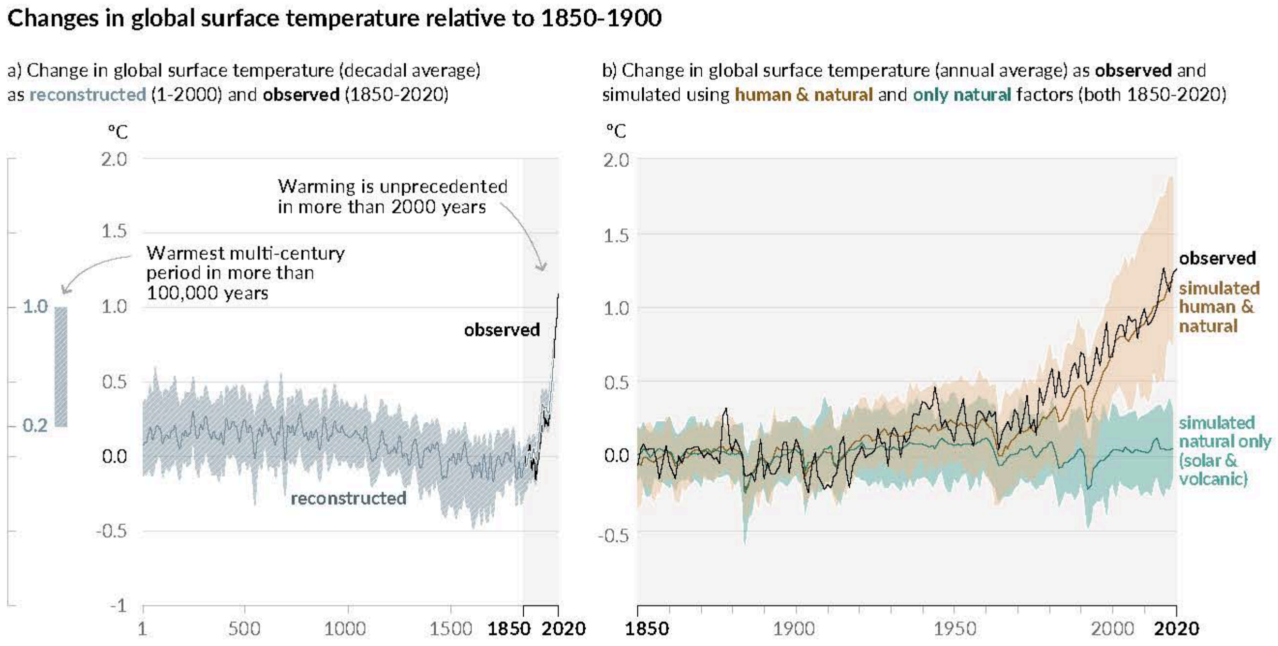
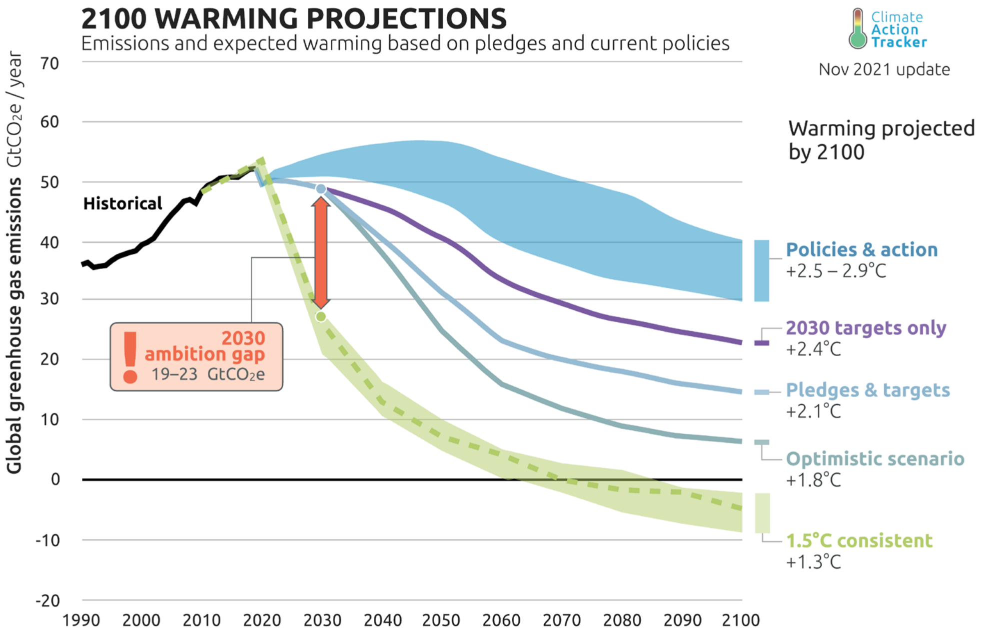
Exogenous climate change shocks, endogenous responses, and monetary policy





A. Role of monetary policy in climate arena

- Climate => monetary policy
- Monetary policy => climate policy (not Fed)

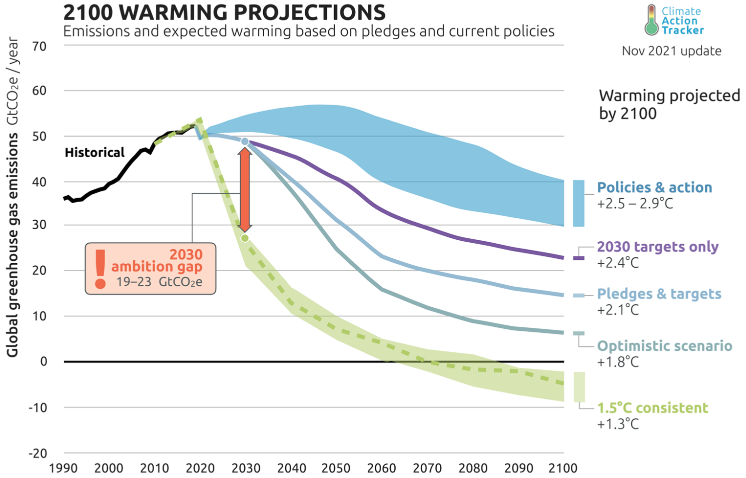
B. Three risks (Carney 2015) (exogenous disturbances)

1. **Physical risks**
   - Extreme weather (storms, floods, etc.)
   - Crop failures
   - Productivity, health, & mortality impacts
   - Sea level rise
   - Climate migration
   - …
2. **Transition risks**
   - Asset revaluation
   - Energy price volatility
   - Sectoral reallocation/dislocation
   - Food price volatility
   - Policy risks
   - Political risks
   - …
3. **Liability risks** (will not discuss)

C. Macro consequences (endogenous response)

1. **Low frequency**
2. **Business cycle frequency**

Timeline of physical and transition risks



Physical

- Heat waves
- Storms
- Regional crop failures
- Sea level rise
- Climate migration

Transition

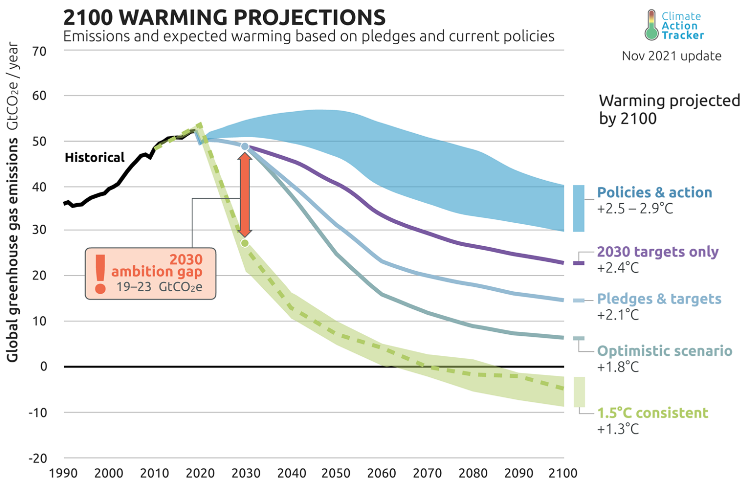
- Asset revaluation
- Energy price volatility
- Sectoral reallocation
- Food price volatility
- Policy effects

Macro impacts

Macro consequences (endogenous response)

1. **Low frequency**
   - Long run productivity growth
   - Patterns & location of innovation
   - R^*, u^*, π^*
2. **Business cycle frequency**
   - Physical disruptions (heat waves, storms, etc.)
   - Direct effects of transition policy on real activity & inflation
     - Carbon price
       - Carbon tax
       - Cap & trade
       - Implicit carbon price (regulatory)
       - Border carbon adjustment
     - Technology policy
     - Weeds (e.g., grid reliability)

Timeline of physical and transition risks



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     - Technology policy
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3. **The transition will not be easy or neat**
   - Inefficient transition policy risks (policy uncertainty,…)
   - Transitional fossil fuel price volatility (“non-transition” risk)
   - Political risk (impacted communities & populism in US; climate migrations; political economy of O&G companies…)
   - Geopolitical risk (China & metals? Petro-states (Russia) in decline? Governance of solar geo?)
   - Wild stuff: unknown unknowns
   - ***Think 1970, 1973-4, 1990, & 2020, not 2001 or 2008***

Transition policy case study #1: carbon tax*

Data set:

- EU + Iceland + Norway + Switzerland (n = 31)
  - all countries in the European ETS
  - Of which, 15 also have a carbon tax, almost entirely on emissions not covered by the ETS (surface transport)
- Annual, 1985 – 2018; World Bank, Eurostat, IEA, Norway, Ireland
  - EU ETS started in 2005

Method: LP, identified by tax rate being predetermined administratively

Key points:

- Negligible effect on GDP or employment
  - Some evidence of benefits higher if CT is accompanied by revenue recycling
- Small effect on emissions
  - Consistent with other studies (Green [2021])
  - In line with elasticity of demand for petroleum
  - But emissions effect would be much larger in US power sector
- Monetary policy implication:
  - *Boring (but effective) climate policy lets monetary policy be boring too.*

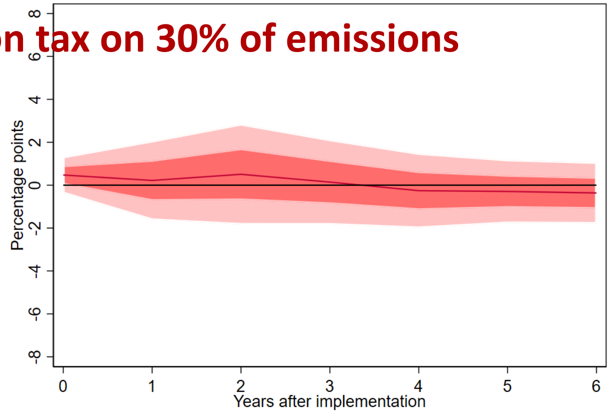
Caveats:

- Aggregate effect masks sectoral & regional reallocation & job loss/gain
- Possibly greater macro costs from cap & trade system (EU ETS – Känzig 2021), perhaps b/c of price volatility, perhaps sectoral coverage

IRF from $40 carbon tax on 30% of emissions

GDP (log level)

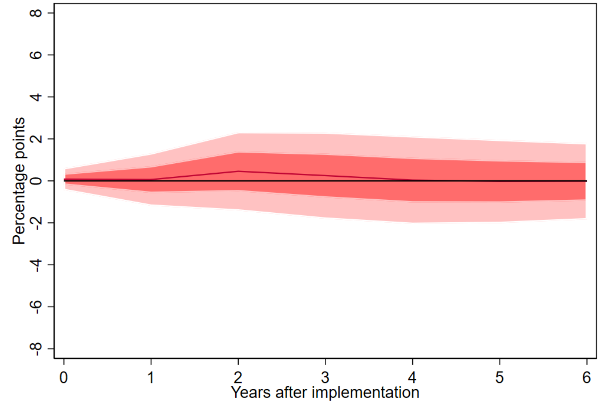
No effect



67% and 95% confidence bands. Includes 4 lags of all regressors.

Employment (log level)

No effect



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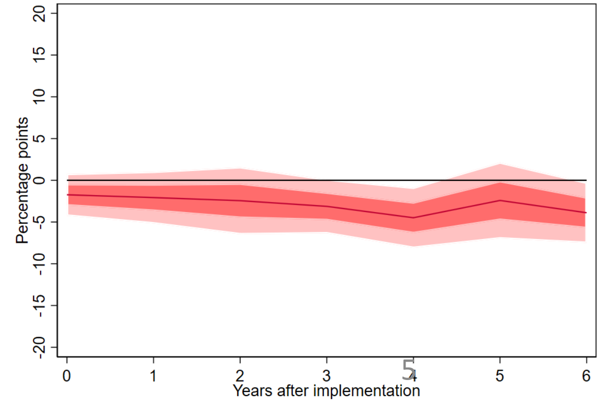
Emissions in covered sectors (log level)

2-6% reduction



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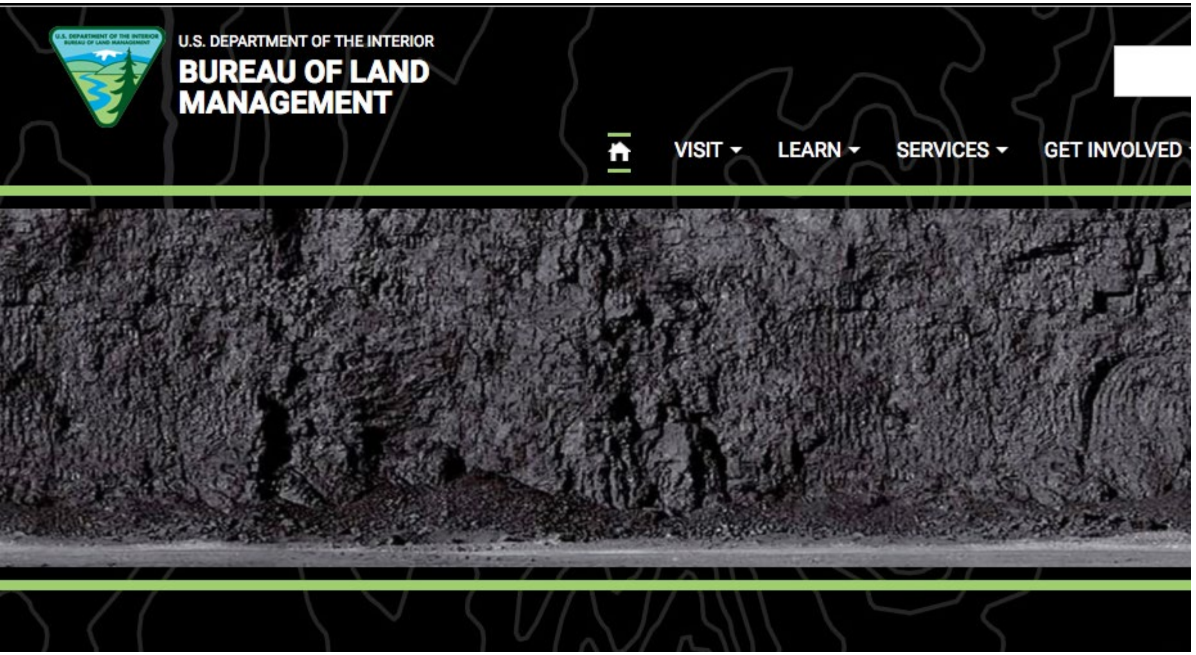
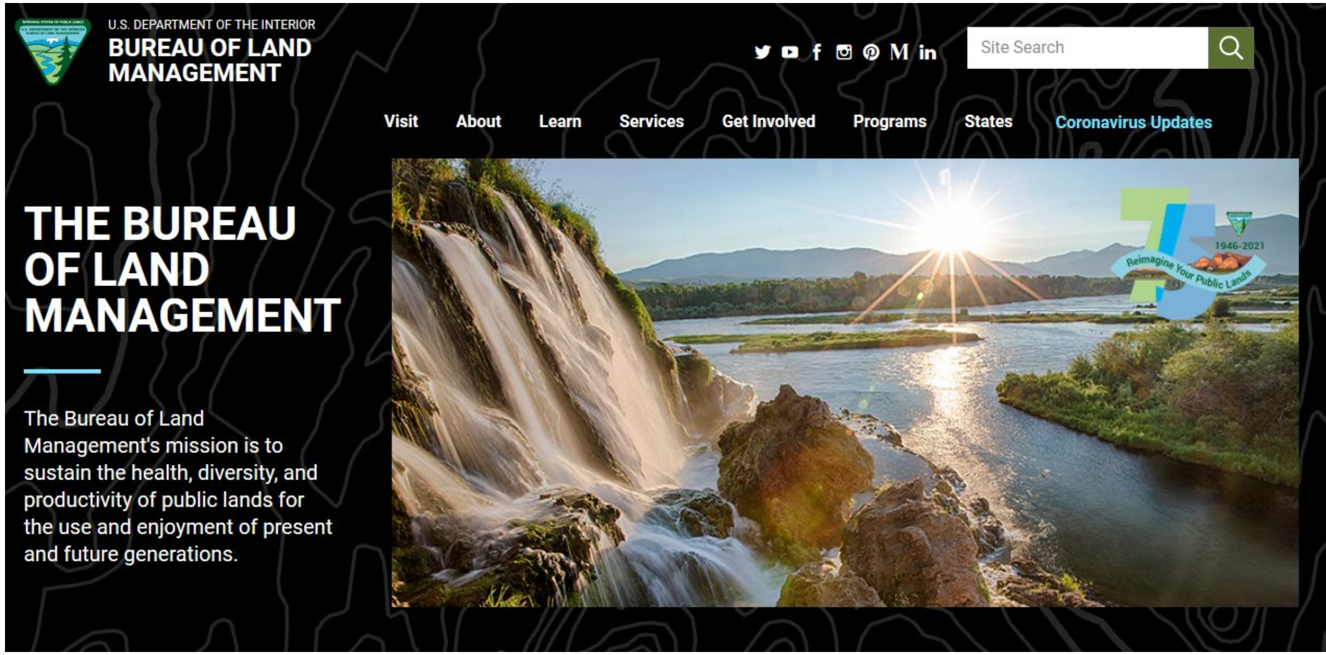
*G. Metcalf & JH Stock, "The Macroeconomic Impact of Europe's Carbon Taxes," AEJ-Macro (forthcoming)

Transition policy case study #2: Climate policy uncertainty*





*Gavrilis, D. Känzig, & JH Stock, work in progress

Transition policy case study #2: Climate policy uncertainty

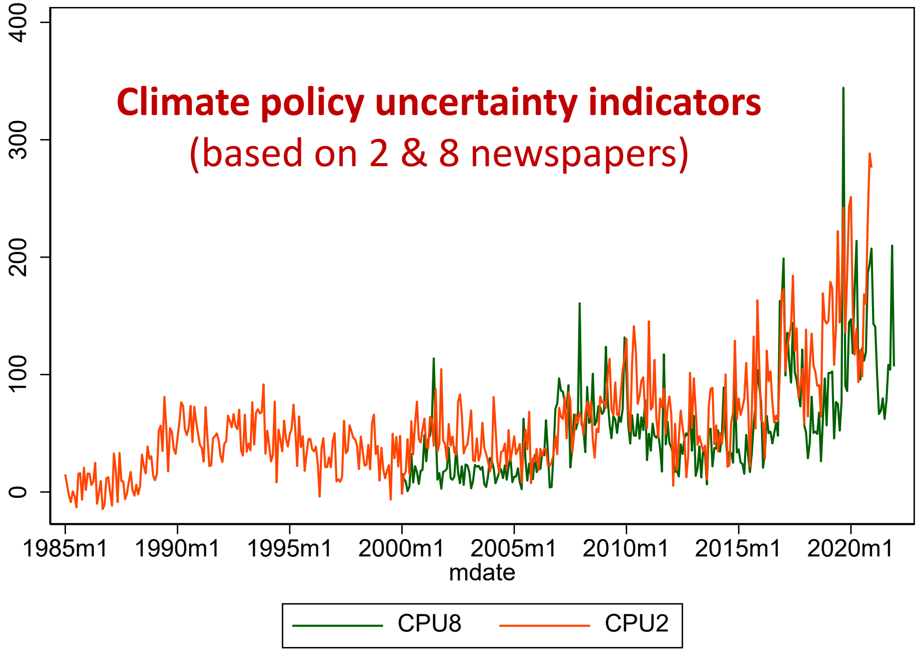
Data set:

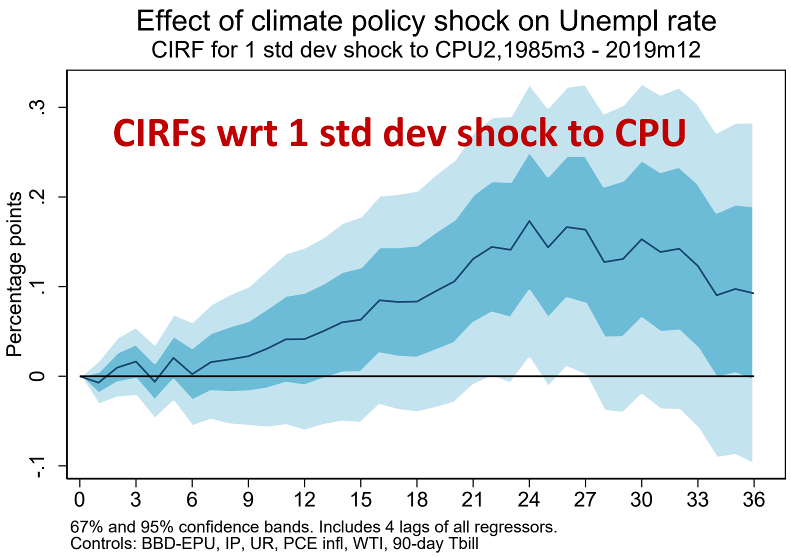
- Climate policy uncertainty index (CPU): Gavriilidis (2021); cf Engel et al (2020)
  - Akin to Baker-Bloom-Davis Economic Policy Uncertainty construction
  - News articles including climate terms *and* policy terms *and* uncertainty
  - 8 (2) newspapers: 2000m1-2021m12 (1984m1-2020m12)
  - Policy news spikes include: Kyoto, Fuel economy rules, Clean Power Plan, Trump withdrawal from Paris, etc.
  - Correlation with BBD EPU : 0.07 (8-paper) and 0.02 (2-paper) (!)

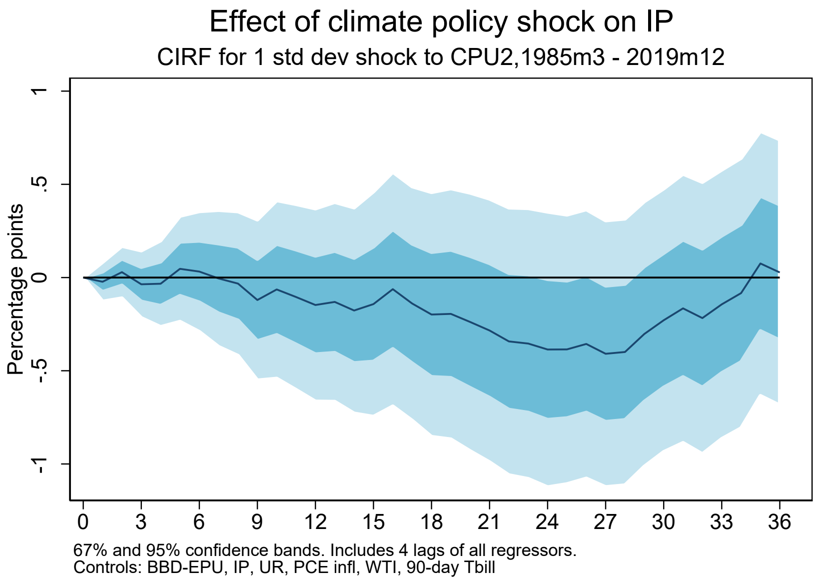
Method: LP & SVAR

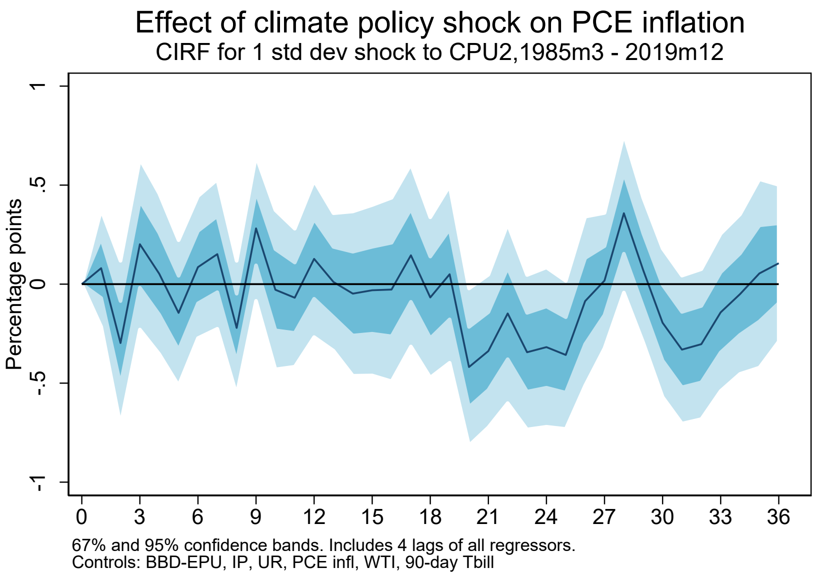
- Identification: CPU is CMI given contemporaneous control variables: BBD-EPU, IP, unemployment rate, PCE inflation, WTI price, 90-day T-bill rate

Caveats: Usual BBD EPU caveats









Transition policy case study #3: “Non-transition” policy & FF price volatility

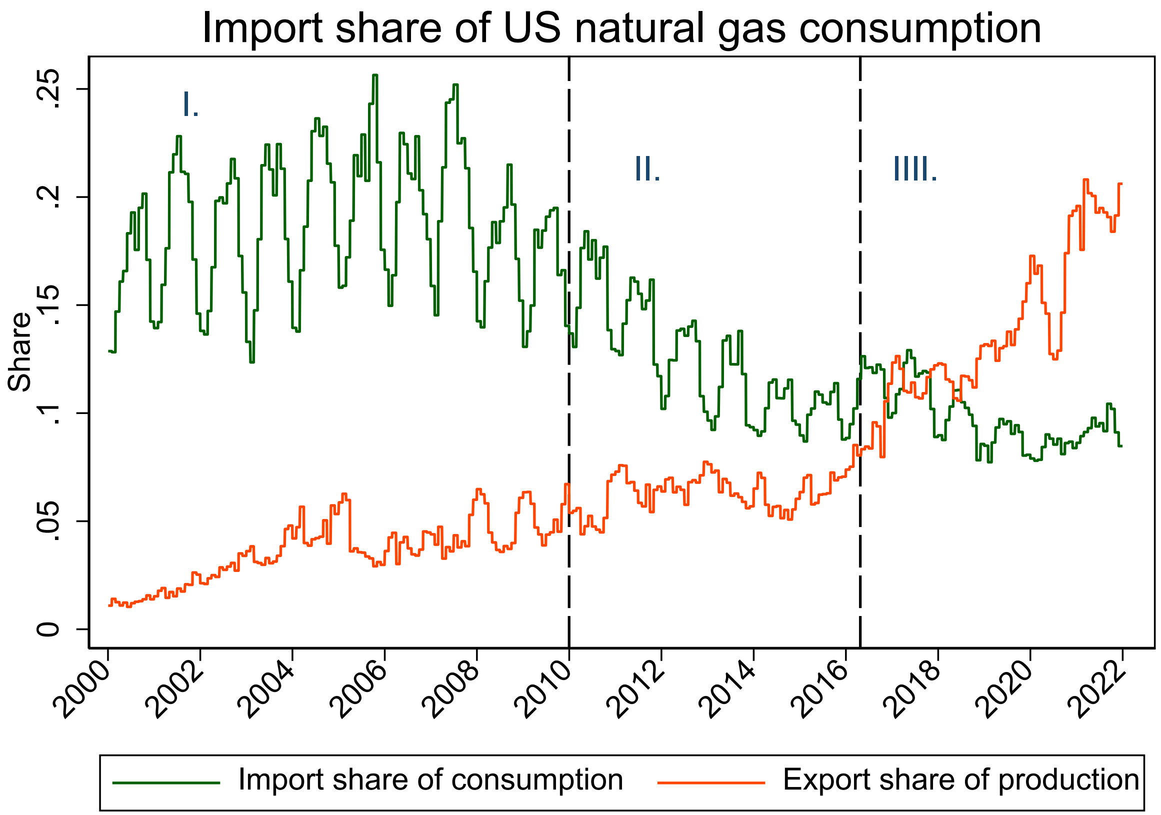
Ukraine, natural gas prices, & cyclical implications of fossil fuel price shocks for US

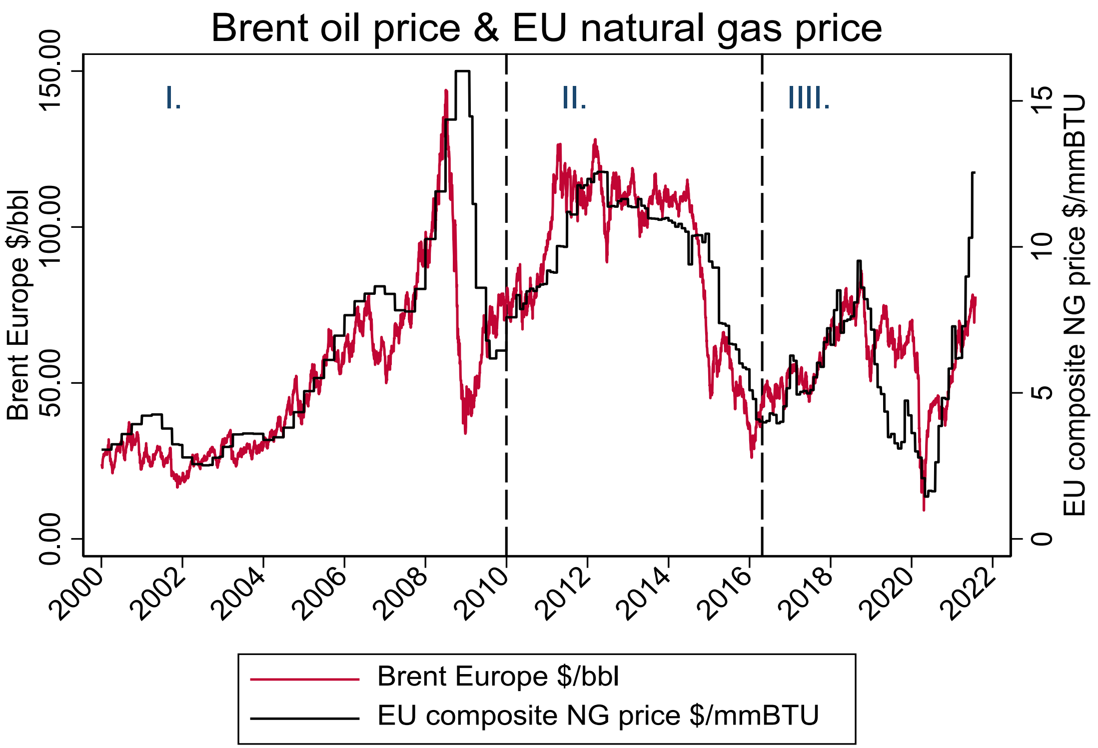
Three regimes in US gas markets:

I. <= ~2009: growing & large imports
II. 2010 – 2016: Fracking & “locked in”
III. 2016 – present: LNG exports

Cheniere Sabine Pass Train 1 was placed into service May 2016.

Quantities





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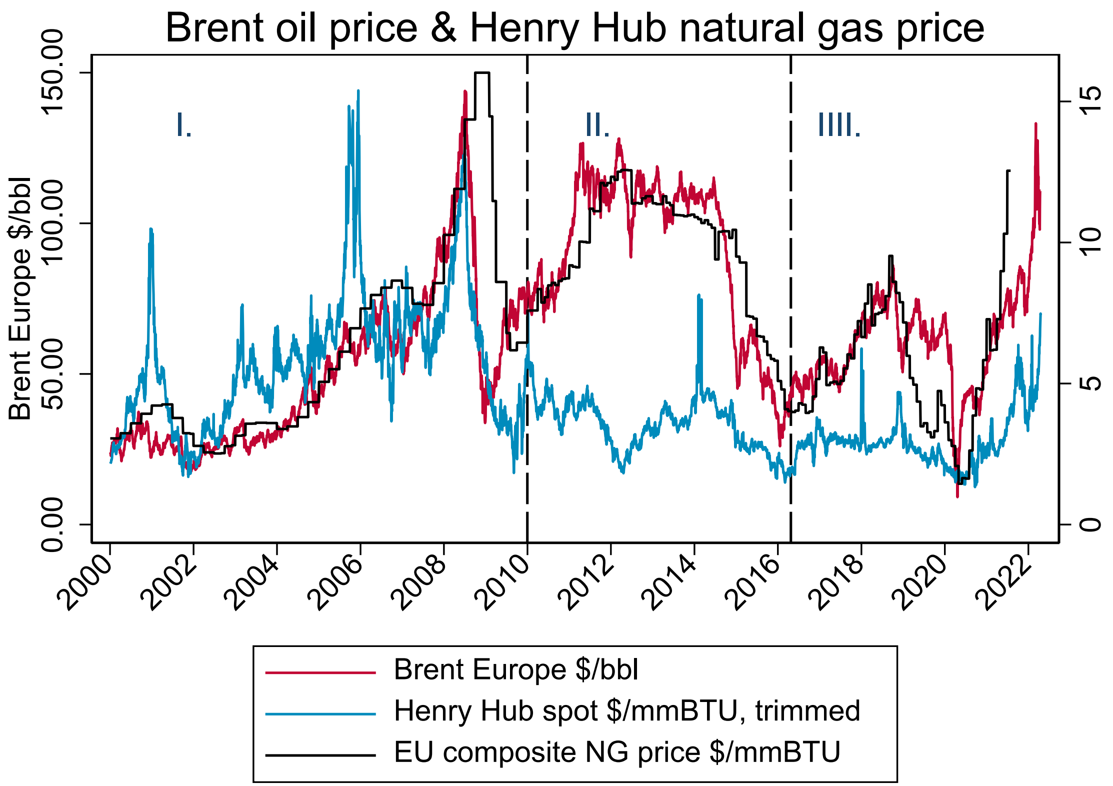
Discussion

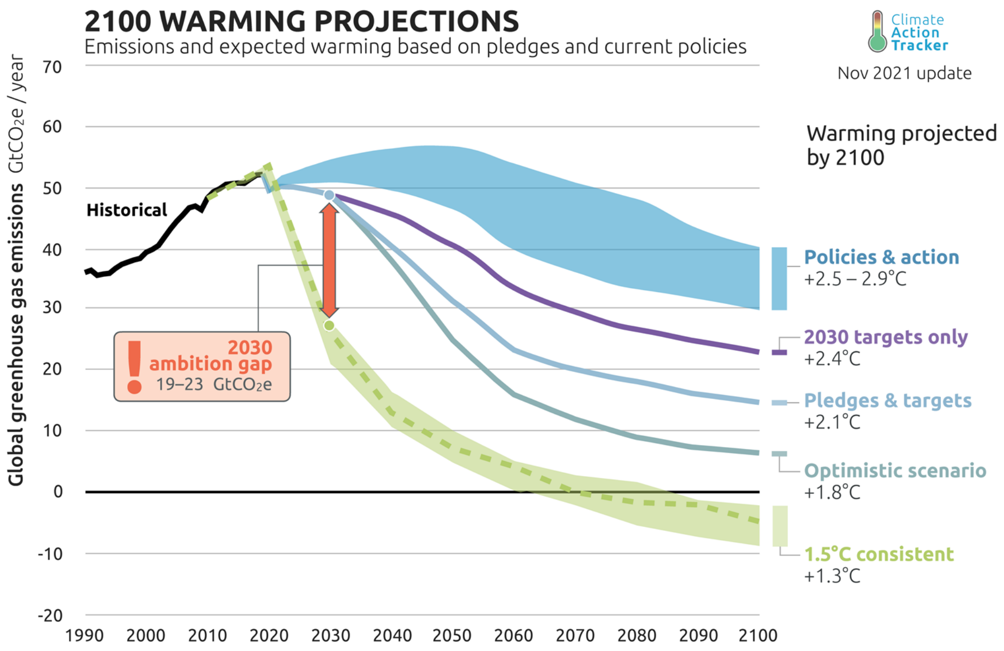
- Henry Hub & EU gas prices are currently *not* linked
  - Liquifaction + transport + regasification ≈ \$4-7/mmBTU
- But suppose:
  - Russian gas partially shut in over 5-year horizon
  - Expansion of US LNG export capacity & EU liquefaction capacity
- \$5-6 US gas?
- Volatile oil prices for the foreseeable future?
- Volatile US gas prices for the foreseeable future?
- Oil price shocks will impact power & industrial sectors?
- Greater macro (business cycle) exposure to oil price shocks?

Correlation between *n*-week pct change of Brent crude & Henry Hub gas

	2-week	4-week
I. 2000-2009	0.28	0.21
II. 2010-April 2016	0.08	0.03
III. May 2016-present (x 2020)	0.18	0.22



Concluding remarks: Macro climate risks



Summary

1. The transition is likely to be neither efficient nor smooth
   - Policy choices/non-choices
   - Political/geopolitical stresses

2. These difficult-to-predict transition risks could pose significant challenges for macro management & monetary policy.