The Macroeconomic Effects of Climate Policy Uncertainty

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Motivation

Uncertain times for climate policy


Paris climate accord to take effect; Obama hails 'historic day'

By Alister Doyle and Roberta Rampton

October 5, 2016 5:03 PM PDT · Updated October 5, 2016

U.S. President Barack Obama delivers a statement on the Paris Agreement in the Rose Garden of the White House in Washington, U.S., October 5, 2016. REUTERS/Yuri Gripas Purchase Licensing Rights

- U.S. **climate policy** marked by reversals and uncertainty
  - Inconsistent stance on Paris agreement

Uncertain times for climate policy


Paris climate accord to take effect;
Obama hails 'historic day'

News | Published: 08 June 2017

Trump pulls United States out of Paris climate agreement

Jeff Tollefson

Nature 546, 198 (2017) | Cite this article

6129 Accesses | 33 Citations | 166 Altmetric | Metrics

This article has been updated

Withdrawal from global pact may take almost four years – which could give the winner of the 2020 presidential race the final word.

- U.S. **climate policy** marked by reversals and uncertainty
    - Inconsistent stance on Paris agreement

Uncertain times for climate policy

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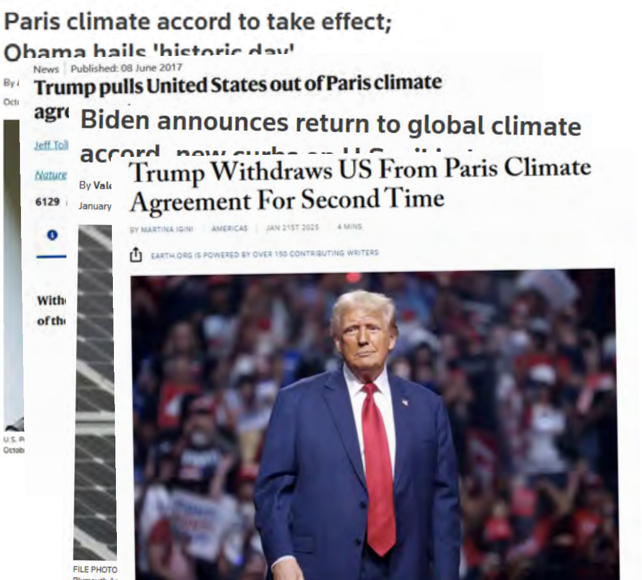
Uncertain times for climate policy



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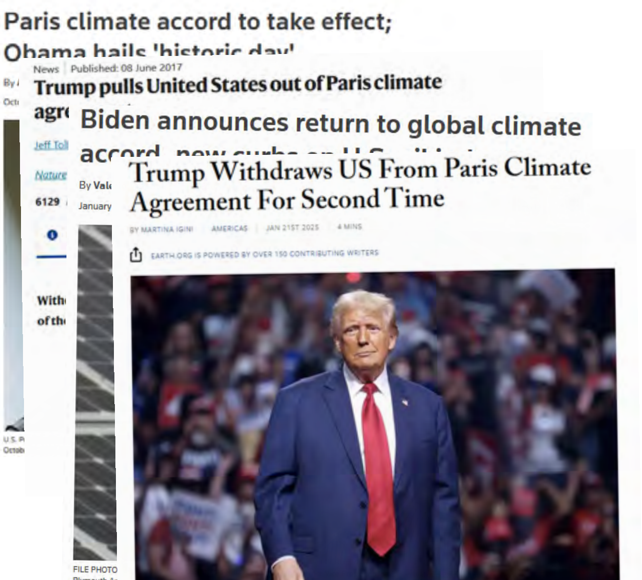
Uncertain times for climate policy



- U.S. **climate policy** marked by reversals and uncertainty
  - Inconsistent stance on Paris agreement
  - Many other examples . . .

- U.S. **climate policy** marked by reversals and uncertainty
  - Inconsistent stance on Paris agreement
  - Many other examples . . .
- **Salient** dimension of policy uncertainty
  - Makes it difficult for households & firms to plan
- How does **climate policy uncertainty** affect the economy?

This paper

- We construct a new measure of **climate policy uncertainty** (CPU) based on newspaper coverage in the United States
  - Building on approach by Baker, Bloom, and Davis (2016)
  - Index spikes near important events related to climate policy:
    Presidential announcements on international climate agreements, congressional debates on climate bills, or disputes about the right of the EPA & states to regulate emissions ...

This paper

- Identification challenge: climate policy uncertainty may increase in response to economic downturns
    - Propose new IV approach: Isolate plausibly exogenous increases in climate policy uncertainty, quantified using newspaper coverage in tight window around events

- Provide new estimates on the **dynamic causal effects** of climate policy uncertainty

Main results: aggregate impacts

- **Climate policy uncertainty** has significant macroeconomic effects
  - Higher uncertainty causes fall in **output**, private **investment** & **employment**
  - But also **increases** **commodity** and **consumer prices**
  - Emissions fall following economic contraction, **no green paradox** at aggregate level
- Climate policy uncertainty transmits to the economy as **supply shocks**
  - Differs from **economic policy uncertainty** moving output & prices in same direction
  - Important implications for monetary policy
- **No increase** in other measures of uncertainty
  - Climate policy uncertainty is a distinct source of policy uncertainty
- **No effect** on government spending & emissions intensity unchanged
  - We successfully capture uncertainty and not news

Main results: firm-level effects

- Climate policy uncertainty has substantial firm-level impacts
  - Firms view climate policy uncertainty as material financial risk
- Firms respond **more strongly** when their climate change exposure is high
  - Holds even when controlling for sector by time fixed effects
- We document rich **sectoral heterogeneity**
  - Most sectors lower investment and R&D
  - Mining, oil & utilities increase investment
- **But**: R&D decreases particularly strongly in these sectors
  - **Green paradox** at micro level
  - Exacerbate transition costs through misallocative forces

▸ Literature

Measuring climate policy uncertainty

Defining climate policy uncertainty

- **Definition**: Lack of clarity/predictability of government actions on climate change
  - Focus on climate policy with national significance
  - Includes uncertainty about new climate policies as well as political/legal challenges to existing policies
- Measurement is challenging
  - We follow approach by Baker, Bloom, and Davis (2016) leveraging informational content in newspaper articles

Measuring climate policy uncertainty

- **Idea**: use dictionary of words whose occurrence in newspaper articles is associated with coverage of topics related to climate policy uncertainty
  - `Climate`: *climate change, carbon dioxide, greenhouse gas, green energy, ...*
  - `Policy`: *regulation, legislation, white house, congress, ...*
  - `Climate policy`: *carbon tax, emissions trading, energy policy, EPA, ...*
  - `Uncertainty`: *uncertain**
- We specify these dictionaries based on corpus of news articles from specialized climate policy reporting agencies:

  Inside Climate News, Carbon Control News, Washington Week (Energy)
- Identify article as CPU if it contains at least one term in: (`Climate` AND `Policy` AND `Uncertainty`) OR (`Climate policy` AND `Uncertainty`)

(a) Climate change **(b)** Policy **(c)** Climate policy

Figure 1: Climate policy dictionary by category

Measuring climate policy uncertainty

- Our sample contains ~7.87 million news articles published in leading American newspapers from mid-1980
  - *New York Times, Wall Street Journal, Washington Post, LA Times*
  - These outlets provide comprehensive & systematic coverage of national climate policy developments
- Index counts, each month, the number of articles discussing uncertainty about climate policy, divided by the total number of published articles
  - Manual & LLM-augmented audit of sample of articles revealed that only few articles are false-positives
  - Results robust to varying dictionary terms

▸ Validation

Climate policy uncertainty since the 80s

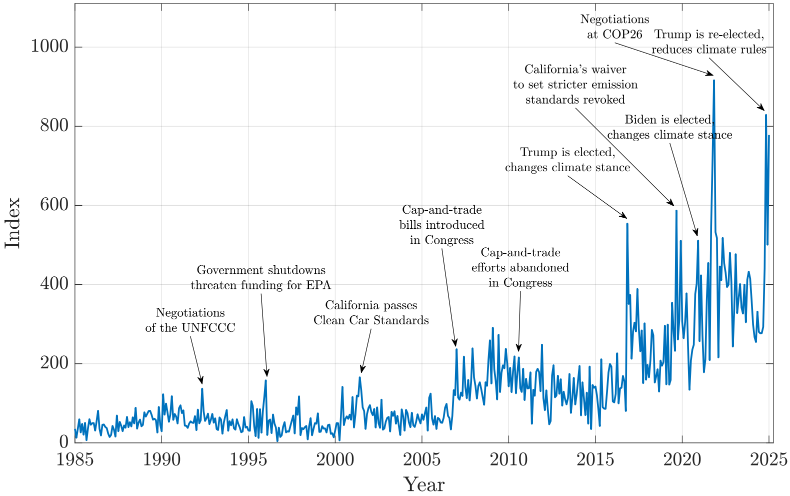


Figure 2: Climate policy uncertainty index

Climate policy uncertainty since the 80s

- Climate policy uncertainty **increased** substantially, especially in recent years
  - Some notable spikes in first part of the sample, marked increase in late 2000s amid emissions trading proposals
  - Stark increase in uncertainty following Paris agreement and election of Trump
- Index uncorrelated with VIX & geopolitical risk
- Weakly correlated with EPU and trade policy uncertainty
  - Results robust to controlling for other uncertainty measures
  - CPU captures distinct variation from other dimensions of policy uncertainty

Identification

Identification

- Uncertainty about climate policy may increase in times of economic distress
- Isolate plausibly exogenous increases in climate policy uncertainty
  - Driven by climate-related, political or ideological considerations
- Based on **narrative account** of U.S. climate policy history, identify 146 events
  - Legislative, regulatory, & judicial actions leading to climate policy uncertainty ▸ More
- **Examples**:
  - Inconsistent stance on international agreements like Kyoto or Paris agreement
  - Debates over proposed legislation such as cap-and-trade policies
  - Disputes about the right of the EPA and states to regulate emissions

A new climate policy uncertainty IV

- Events may contain both policy news and uncertainty. **But:**
  - Changes in policy stringency & uncertainty often move in opposite directions
  - Direction of stringency is readily observed
- Our approach thus consists of **two steps**:
  1. Measure change in climate policy reporting intensity around events d:

$$\Delta \text{cp}_{i,d}^{\text{intensity}} = n_{i,d}^{\text{cp}} - n_{i,d-1}^{\text{cp}}$$

  2. Purge reporting intensity from changes in climate policy stringency

$$\Delta \text{cp}_{i,d}^{\text{intensity}} = \alpha_i + \beta_i \times \Delta \text{cp}_{i,d}^{\text{stringency}} + \Delta \text{cp}_{i,d}^{\text{uncertainty}}$$

- Aggregate over newspaper and time to **monthly** IV series, $\Delta \text{cp}_t^{\text{uncertainty}}$

Major climate policy uncertainty events

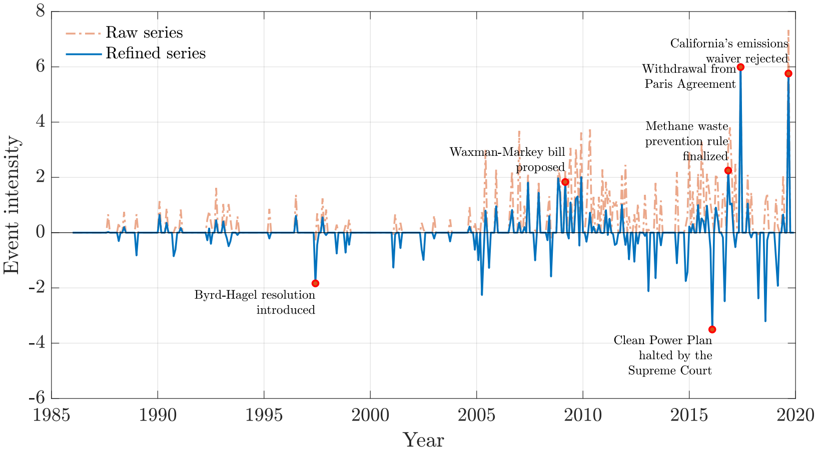


Figure 3: Climate policy uncertainty event series

▸ Diagnostics

Econometric framework

- Use $z_t = \Delta \text{cp}_t^{\text{uncertainty}}$ as IV to identify a climate policy uncertainty **shock**
- **Identifying assumptions**: ▸ Details

$$\mathbb{E}[z_t \varepsilon_{1,t}] = \alpha \neq 0 \qquad \text{(Relevance)}$$

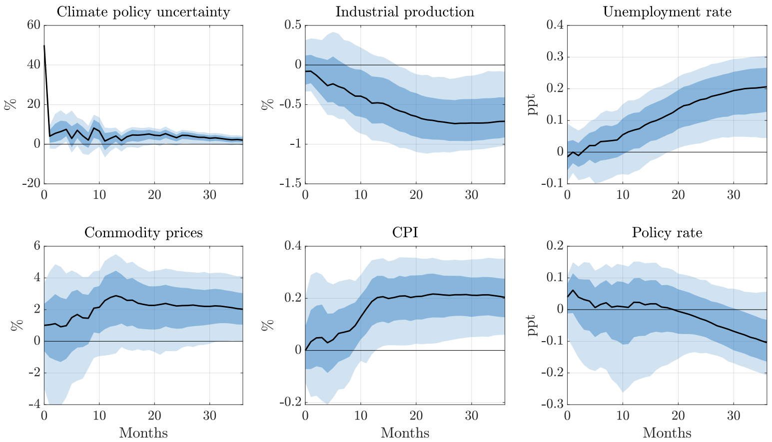
$$\mathbb{E}[z_t \boldsymbol{\varepsilon}_{2:n,t}] = \mathbf{0}, \qquad \text{(Exogeneity)}$$

- For estimation, we rely on VAR techniques given the short sample
  - Sample: 1985 – 2019
  - Specification: 12 lags, 6 variables

    CPU index, industrial production, unemployment rate, commodity prices, consumer prices, policy rate ▸ Data
- Use local projections as robustness and to map out wider effects ▸ More

Aggregate Effects

The macro effects of climate policy uncertainty



First-stage regression: F-statistic: 23.54, R^2: 2.81%

Figure 4: Baseline VAR

The macro effects of climate policy uncertainty

- Climate policy uncertainty has **meaningful** economic effects
  - Leads to significant fall in industrial production and an increase in unemployment
  - Importantly, commodity and consumer prices increase
  - Monetary response is ambiguous
- Thus, transmit more like **supply shocks**

▸ LP-IV

The macro effects of climate policy uncertainty

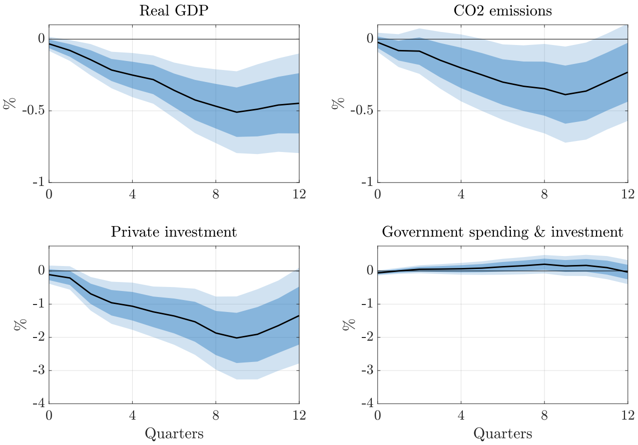


Figure 5: Impacts on GDP, emissions and investment

- Significant fall in GDP and **investment**
- No response of government spending & investment
- Emissions fall but emissions intensity **unchanged**
- No evidence for **green paradox**

Sensitivity

- CPU has **no** significant effect on other uncertainty measures ▸ Detail
  - Economic policy uncertainty, trade policy uncertainty, geopolitical risk, financial uncertainty, . . .

- Results **robust** to
  - Controlling for other uncertainty measures (other policy uncertainty, financial uncertainty, oil price uncertainty)
  - Controlling for first moment shocks using climate news index ▸ Detail
  - Relaxing VAR assumptions (invertibility, dynamic VAR structure) ▸ Detail

Is climate policy uncertainty special?

- What do we learn from looking at **climate policy uncertainty**?
- Contrast with effects of broader **economic policy uncertainty**
  - Use index from Baker, Bloom, and Davis (2016)
  - Estimate responses based on recursive VAR

The effects of economic policy uncertainty

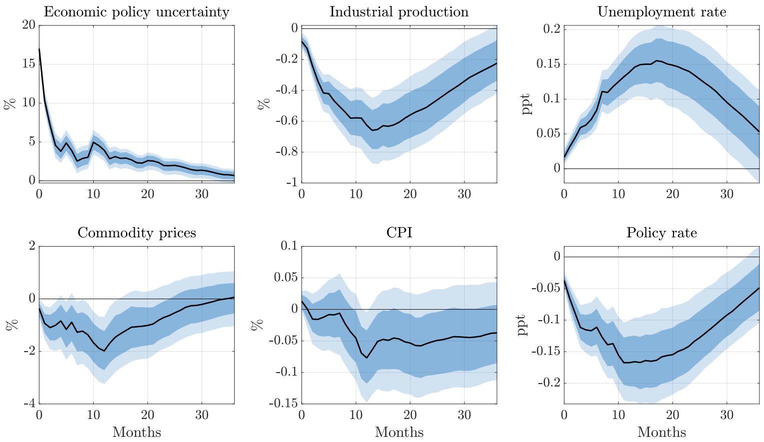


Figure 6: VAR with EPU

Climate versus economic policy uncertainty

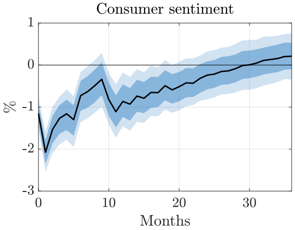
- Economic policy uncertainty transmits differently from climate policy uncertainty
  - Economic policy uncertainty leads to fall in production
  - But commodity and consumer prices also tend to **decrease**
  - Monetary response **accommodates** the shock
- They thus transmit more like **demand shocks**
  - This is true for most uncertainty measures, e.g. an innovation to the VIX has very similar effects
- Response of prices to uncertainty shocks theoretically ambiguous
  - Different channels: precautionary demand, real options, precautionary pricing, . . .
  - Price response depends on relative strength of supply- and demand-side effects

▸ More

Why is climate policy uncertainty inflationary?

- For CPU supply-side effects dominate, for EPU demand-side effects dominate
  - Consistently, consumer sentiment falls significantly for EPU but **not** for CPU shock

(a) Economic policy uncertainty shock



(b) Climate policy uncertainty shock

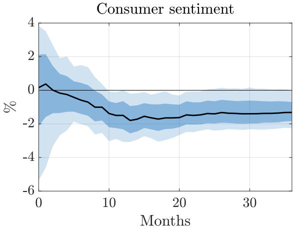


Figure 7: Impacts on sentiment

▸ Role of monetary policy

Firm-level effects

Firm-level impacts

- We revisit effects of climate policy uncertainty shocks in panel of firms
  - Construct quarterly panel of U.S. listed firms
  - Unbalanced panel from 1986 to 2019 (136 quarters) with 11,872 firms
- Average effects on sales, employees consistent with aggregate data ▸ Details
- **But**: average effect may mask substantial **heterogeneity**

Heterogeneity by climate exposure

- How does effect vary with firm-level **climate change exposure**?
  - use exposure measures by Sautner et al. (2023) based on earnings conference calls
- Estimate local projection on shock **interacted** with exposure

$$y_{i,t+h} = \mu_{i,h} + \delta_t + \theta_h(\text{Exp}_{i,t-1} - \overline{\text{Exp}_i}) \times \varepsilon_{1,t} + \boldsymbol{\gamma}_h' \mathbf{x}_{i,t-1} + \nu_{i,t+h},$$

  - Focus on **within-firm** variation to net out permanent differences: how does time-t exposure compare to average exposure of firm i
  - Allows to control for **time fixed effects**

Heterogeneity by climate exposure

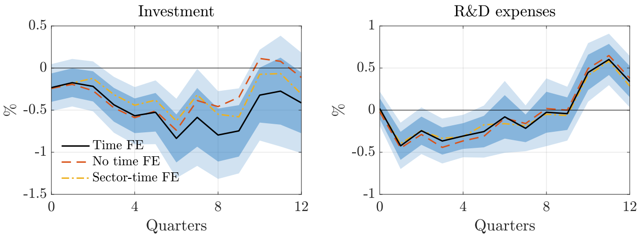


Figure 8: Heterogeneous effects based on prior climate exposure

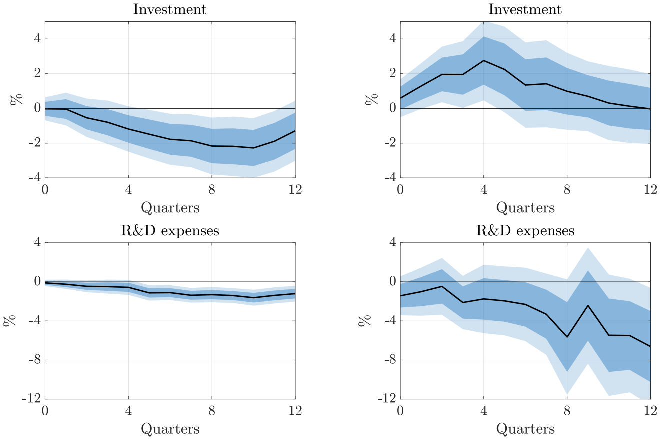
- Firms display **stronger fall** in investment and R&D when climate exposure is high
- Statistically and economically significant
- Robust to time or sector by time fixed effects

Sectoral impacts

- How do effects vary by **sectors**?
- Estimate panel local projections, conditioning on different industries
  - Of particular interest: Mining, oil & gas and utilities

Sectoral impacts

(a) All ex. oil, gas, utilities **(b)** Oil, gas, and utilities



- Most sectors show significant fall in investment and R&D
  - Consistent with **average** response
- **Oil, gas and utilities** stand out
  - Investment increases!
  - R&D falls substantially

Sales

Longer-term impacts

- Results are consistent with **green paradox** at micro level
- Climate policy uncertainty strengthens incentives to extract fossil fuels
- **But**: reduces R&D expenses that spur the green transition
- Climate policy uncertainty can exacerbate transition costs via misallocative forces
- Confirmed by significant and persistent fall in TFP Longer-term impacts

Conclusion

Conclusion

- Climate policy uncertainty has **pervasive economic** effects at macro & firm-level
  - Broad-based effects beyond brown sectors
  - Effects more pronounced when exposure to climate is high
- Contrary to other uncertainty shocks, climate policy uncertainty transmits more like **supply shocks**
  - Very persistent impacts dragging on investment and innovation
  - Monetary policy can make matters worse by leaning against inflationary pressures
- Illustrates importance of **clear and predictable** climate policies & coordination between fiscal and monetary policy

Thank you!

Related literature

Climate policy actions: Anderson, Marinescu, and Shor 2019; Martin, De Preux, and Wagner 2014; Metcalf 2019; Metcalf and Stock 2023; Bernard and Kichian 2021; Känzig 2023

Measuring policy uncertainty: Saiz and Simonsohn 2013; Baker, Bloom, and Davis 2016; Caldara and Iacoviello 2022; Caldara et al. 2020; Gambetti et al. 2023

Climate news and uncertainty: Engle et al. 2020; Sautner et al. 2023; Gavriilidis 2021; Basaglia et al. 2025; Noailly, Nowzohour, and Van Den Heuvel 2022; Fried, Novan, and Peterman 2021

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Index validation

- **Validation exercise**:
  - To validate the index, we use OpenAI's `gpt-4o-mini model`
  - We sample a set of articles from our `Climate` AND `Policy` corpus
  - Next, we ask the LLM to classify articles into CPU and non-CPU articles
  - This yields a false-positive rate **below 10%**
  - Human audit of subset of articles confirms the accuracy of the classification
- **Robustness**:
  - Results are robust to using less restrictive set of dictionary terms
  - Expanding the set of newspapers

Back

Methodology for event selection

1. **International agreements**
   - Agreement, signature, or ratification of key treaties and protocols
2. **Judicial actions**
   - Court rulings or stay orders influencing climate policy
3. **Legislative actions**
   - Proposal, introduction, passage, signing, or blocking of climate-related bills
   - Pioneering California bills that influence federal policy included
4. **Presidential actions**
   - Statements of intent, policy positions, policy proposals, or executive measures
5. **Regulatory actions**
   - Proposal, final rule, revision, or withdrawal of Federal agency regulations

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Diagnostics

- **Narrative account**: ✓ Accords well with accounts on key historical episodes
- **Forecastability**: ✓ Not forecastable by macroeconomic or financial variables
- **Orthogonality**: ✓ Uncorrelated with measures of other structural shocks

  (e.g. other uncertainty, oil, or fiscal shocks)

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Forecastability

Table 1: Granger causality tests

Variable	p-value
Instrument	0.9993
Climate policy uncertainty	0.6533
Industrial production	0.4910
Unemployment rate	0.8193
Commodity prices	0.0712
CPI	0.3890
Policy rate	0.9641
Economic policy uncertainty	0.9426
Trade policy uncertainty	0.7150
Geopolitical risk	0.3252
VXO	0.7332
Climate policy news	0.8981
Joint	0.9525

Orthogonality

Shock	Source	ρ	p-value	n	Sample
Panel A: Uncertainty shocks					
Uncertainty	Bloom (2009)	-0.04	0.48	384	1986M01-2017M12
	Baker, Bloom, and Davis (2016)	0.03	0.54	384	1986M01-2017M12
	Piffer and Podstawski (2017)	-0.02	0.68	355	1986M01-2015M07
Panel B: Oil shocks					
Oil price	Hamilton (2003)	-0.06	0.23	384	1986M01-2017M12
Oil supply	Kilian (2008)	0.04	0.58	225	1986M01-2004M09
	Caldara, Cavallo, and Iacoviello (2019)	0.04	0.48	360	1986M01-2015M12
	Baumeister and Hamilton (2019)	-0.02	0.74	408	1986M01-2019M12
	Kilian (2009)	0.04	0.49	264	1986M01-2007M12
Global demand	Kilian (2009)	-0.07	0.25	264	1986M01-2007M12
Oil-specific demand	Kilian (2009)	0.03	0.63	264	1986M01-2007M12
Oil supply news	Känzig (2021)	0.03	0.53	408	1986M01-2019M12
Panel C: Productivity and news shocks					
Productivity	Basu, Fernald, and Kimball (2006)	-0.03	0.77	104	1986Q1-2011Q4
	Smets and Wouters (2007)	0.10	0.40	76	1986Q1-2004Q4
News	Barsky and Sims (2011)	0.16	0.13	87	1986Q1-2007Q3
	Kurmann and Otrok (2013)	0.14	0.21	78	1986Q1-2005Q2
	Beaudry and Portier (2014)	-0.08	0.42	107	1986Q1-2012Q3
Panel D: Monetary policy					
Monetary policy	Romer and Romer (2004)	0.04	0.66	132	1986M01-1996M12
	Gertler and Karadi (2015)	-0.04	0.50	324	1990M01-2016M12
	Miranda-Agrippino and Ricco (2021)	0.08	0.23	228	1991M01-2009M12
	Bauer and Swanson (2023)	0.04	0.48	383	1988M02-2019M12
	Aruoba and Drechsel (2024)	-0.01	0.81	274	1986M01-2008M10
Panel F: Fiscal policy shocks					
Fiscal policy	Romer and Romer (2010)	-0.04	0.68	88	1986Q1-2007Q4
	Fisher and Peters (2010)	0.00	0.98	92	1986Q1-2008Q4
	Ramey (2011)	-0.07	0.48	100	1986Q1-2010Q4
Panel F: Financial shocks					
EBP	Gilchrist and Zakrajšek (2012)	-0.04	0.46	360	1986M01-2015M12
Loan supply	Bassett et al. (2014)	0.03	0.78	76	1992Q1-2010Q4

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External instrument approach

- Structural VAR

$$\mathbf{y}_t = \mathbf{b} + \mathbf{B}_1 \mathbf{y}_{t-1} + \cdots + \mathbf{B}_p \mathbf{y}_{t-p} + \mathbf{S}\varepsilon_t, \qquad \varepsilon_t \sim N(0, \mathbf{\Omega})$$

- **External instrument:** variable z_t *correlated* with the **shock of interest** but *not* with the **other shocks**

- **Identifying assumptions**:

$$\mathbb{E}[z_t \varepsilon_{1,t}] = \alpha \neq 0 \qquad \text{(Relevance)}$$

$$\mathbb{E}[z_t \varepsilon_{2:n,t}] = \mathbf{0}, \qquad \text{(Exogeneity)}$$

$$\mathbf{u}_t = \mathbf{S}\varepsilon_t \qquad \text{(Invertibility)}$$

- Use **climate policy uncertainty event series** as *external instrument* for **climate policy uncertainty index**

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Data

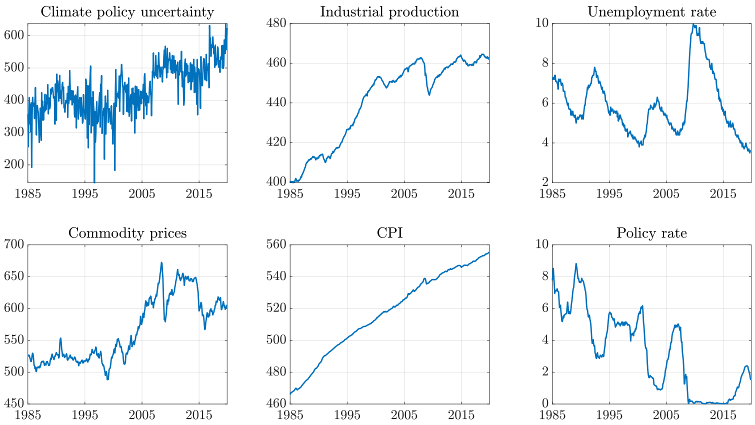

Figure 10: Transformed data series

◂ Back

Econometric framework

- Use identified climate policy uncertainty shock, $\varepsilon_{1,t}$ in local projection

$$y_{i,t+h} = \beta^i_{h,0} + \psi^i_h \varepsilon_{1,t} + \beta^i_{h,1} y_{i,t-1} + \ldots + \beta^i_{h,p} y_{i,t-p} + \xi_{i,t,h}$$

  - Assess possible truncation bias by relaxing dynamic VAR structure
  - Can also estimate effects on variables only available at lower frequencies

- To relax invertibility requirement, also present results from local projections-instrumental variable specification

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The macro effects of climate policy uncertainty

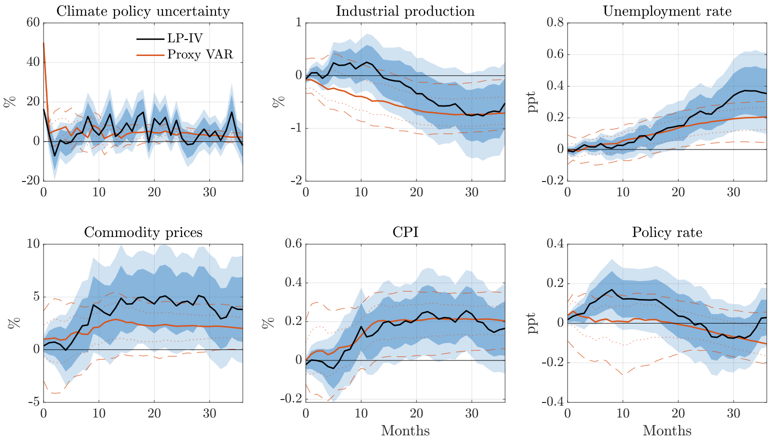

Figure 11: Local projections

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Impacts on other uncertainty measures

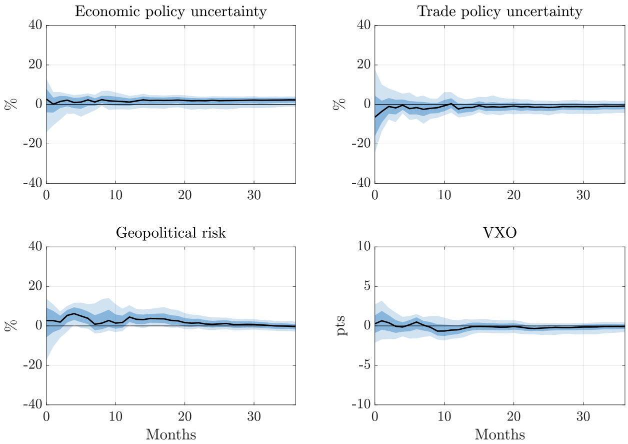

Figure 12: Impacts on other uncertainty measures

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Controlling for news and other uncertainty measures

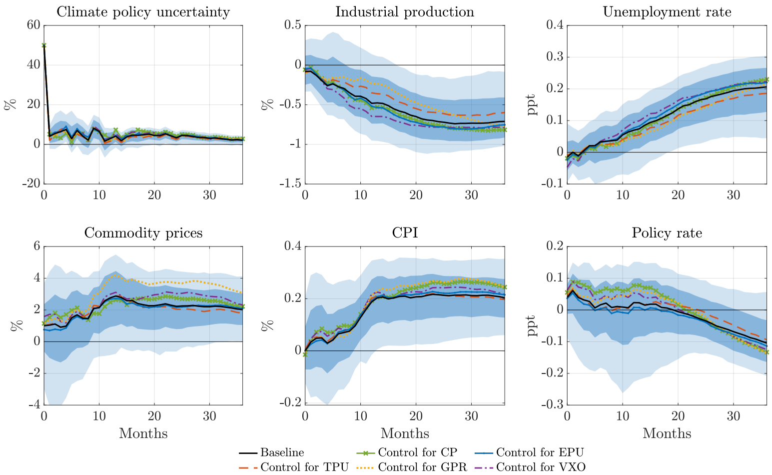

Figure 13: Additional controls

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Relaxing VAR assumptions

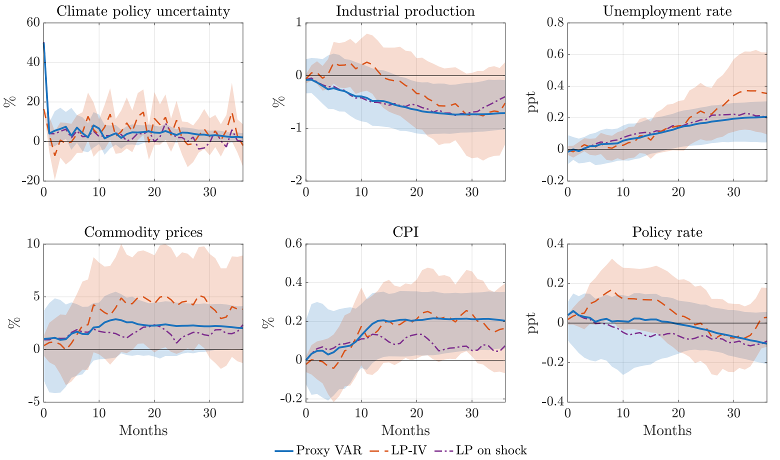

Figure 14: Relaxing VAR assumptions

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Why is climate policy uncertainty inflationary?

- Response of prices to uncertainty shocks theoretically ambiguous
- Key channels
  - **Precautionary demand**: Higher uncertainty leads agents to cut spending, **reducing prices** via lower demand
  - **Real options channel**: After a rise in uncertainty, firms delay investment and hiring. Price response depends on strength of demand- and supply-side effects
  - **Precautionary pricing**: Increased uncertainty raises the potential for higher future costs, leading firms to **raise prices** preemptively
- Price response depends on relative strength of supply- and demand-side effects

▸ Simple model

◂ Back

A simple two-sector NK model

- Why are CPU shocks inflationary?
- Study propagation of different uncertainty shocks in NK model with two sectors:
  - **Energy sector** producing energy/emissions using labor
  - **Non-energy sector** producing consumption good using energy and labor
- Standard household sector and fiscal/monetary authority

Non-energy sector

- Technology

$$y_t = Z_{x,t} e_t^{\alpha} n_{x,t}^{1-\alpha}$$

- Cost-minimization

$$p_{e,t} = \alpha mc_t \frac{y_t}{e_t}$$
$$w_t = (1-\alpha) mc_t \frac{y_t}{n_{x,t}}$$

- Price setting

$$\pi_t (\pi_t - \bar{\pi}) = \beta \mathbb{E}_t \left[\frac{\lambda_{t+1}}{\lambda_t} \pi_{t+1} (\pi_{t+1} - \bar{\pi}) \frac{y_{t+1}}{y_t} \right] + \frac{\varepsilon}{\Omega_p} \left(mc_t - \frac{\varepsilon - 1}{\varepsilon} \right)$$

- Consider uncertainty shock about productivity, $\sigma_{Z_{x,t},t}$

Energy sector

- Technology

$$e_t = Z_{e,t} n_{e,t}$$

- Cost-minimization

$$(1-\tau_t) p_{e,t} = \frac{\eta}{\eta - 1} \frac{w_t}{Z_{e,t}}$$

- Price setting

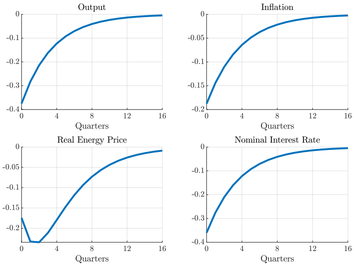
$$\pi_t^e \left(\pi_t^e - \bar{\pi}^e\right) = \beta \, \mathbb{E}_t \left[\frac{\lambda_{t+1}}{\lambda_t} \pi_{t+1}^e \left(\pi_{t+1}^e - \bar{\pi}^e\right) \frac{e_{t+1}}{e_t} \frac{p_{e,t+1}}{p_{e,t}} \right] + \frac{\eta}{\Omega_p^e} \left(\frac{w_t}{Z_{e,t} p_{e,t}} - \frac{(1-\tau_t)(\eta-1)}{\eta} \right)$$

  - In line with the data assume that energy prices much more flexible than goods prices

- Consider uncertainty shock about carbon tax, $\sigma_{\tau_t,t}$

The differential impact of uncertainty shocks

(a) Uncertainty about productivity



(b) Uncertainty about carbon tax

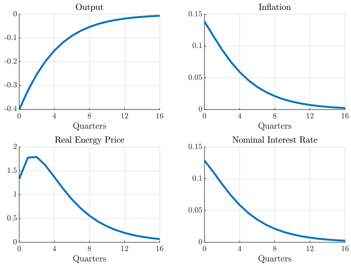


Figure 15: Uncertainty shocks in model

The differential impact of uncertainty shocks

- Uncertainty about productivity in non-energy sector has very different implications
- Consistent with data, uncertainty about productivity is disinflationary while climate policy uncertainty is inflationary
- Precautionary pricing channel dominates precautionary demand channel for climate policy uncertainty

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The role of monetary policy

- How important is **monetary policy** for transmission of climate policy uncertainty?
- Perform a **counterfactual exercise** using McKay and Wolf (2023) approach
  - Use monetary shocks from Bauer and Swanson (2023)
  - Robust to Lucas critique
- Use MP shocks to impose same monetary reaction after CPU shock as for EPU shock

The role of monetary policy

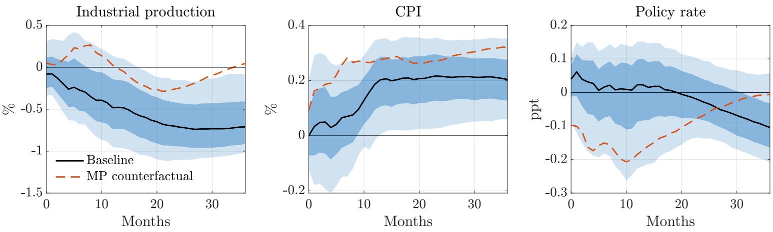

Figure 16: Monetary policy counterfactual

- Monetary policy response **matters** for the transmission of CPU shocks
  - Mitigates industrial production response substantially
  - Comes at cost of tolerating slightly higher inflation
- Should monetary policy respond **differently** to different sources of uncertainty?

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Firm-level impacts

- Estimate effects on firm-level outcomes using panel local projections:

$$y_{i,t+h} = \mu_{i,h} + \beta_h \varepsilon_{1,t} + \boldsymbol{\gamma}_h' \mathbf{x}_{i,t-1} + \nu_{i,t+h}$$

  where $\varepsilon_{1,t}$ is the identified climate policy uncertainty shock

- **Outcomes**: sales, employees, investment, R&D

Average effect

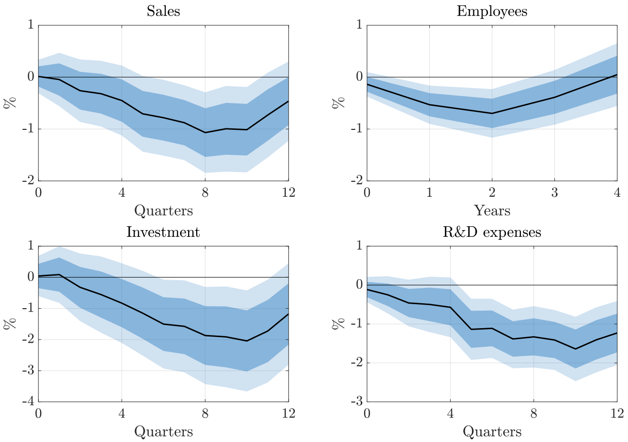

Figure 17: Average effect on firm outcomes

- Sales and employees fall significantly
- Substantial fall in firm-level **investment** and **R&D**
- Evidence consistent with macro results

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Sectoral impacts

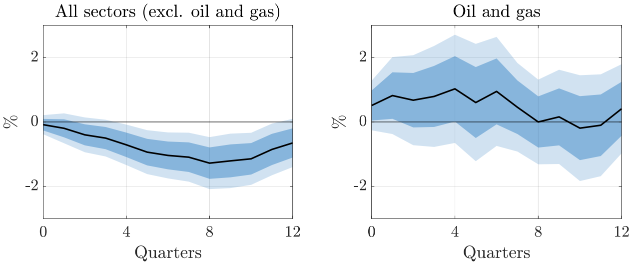

Figure 18: Sectoral impacts

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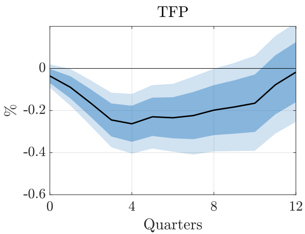
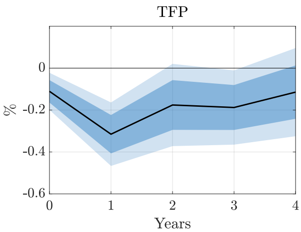
Longer-term impacts

(a) Aggregate TFP



(b) Average firm-level TFP



- Climate policy uncertainty is a drag on investment and innovation
- Distorts allocation leading to overinvestment in firms with uncertain long-term viability
- Confirmed by significant and persistent fall in TFP

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