The Energy Origins of the Global Inflation Surge

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May 23, 2025

Motivation

Motivating Observations

- Global inflation surge in 2021-2022
- Large energy shocks during the same period

This Paper: What was the magnitude of energy price passthrough during 2020-2024?

- Comparison to previous episodes
- Role of structural sectoral characteristics

Ex-ante unclear passthrough implications

- Menu cost models: unchanged passthrough conditional on shock size
- Alternative: More passthrough if stronger GE feedbacks

Methodology and Findings

Empirical Strategy

- Local projections approach
- New multi-country multi-sector dataset
  - 33 countries, 11 sectors

Main Findings on Energy Price Passthrough

1. Passthrough to headline inflation comparable to past episodes
2. Nonlinearities are present in AEs but did not strengthen systematically
3. Sectoral energy dependence and price flexibility shape sectoral inflation passthrough
   - Stronger passthrough for more energy dependent and more price flexible sectors

Literature and Contribution

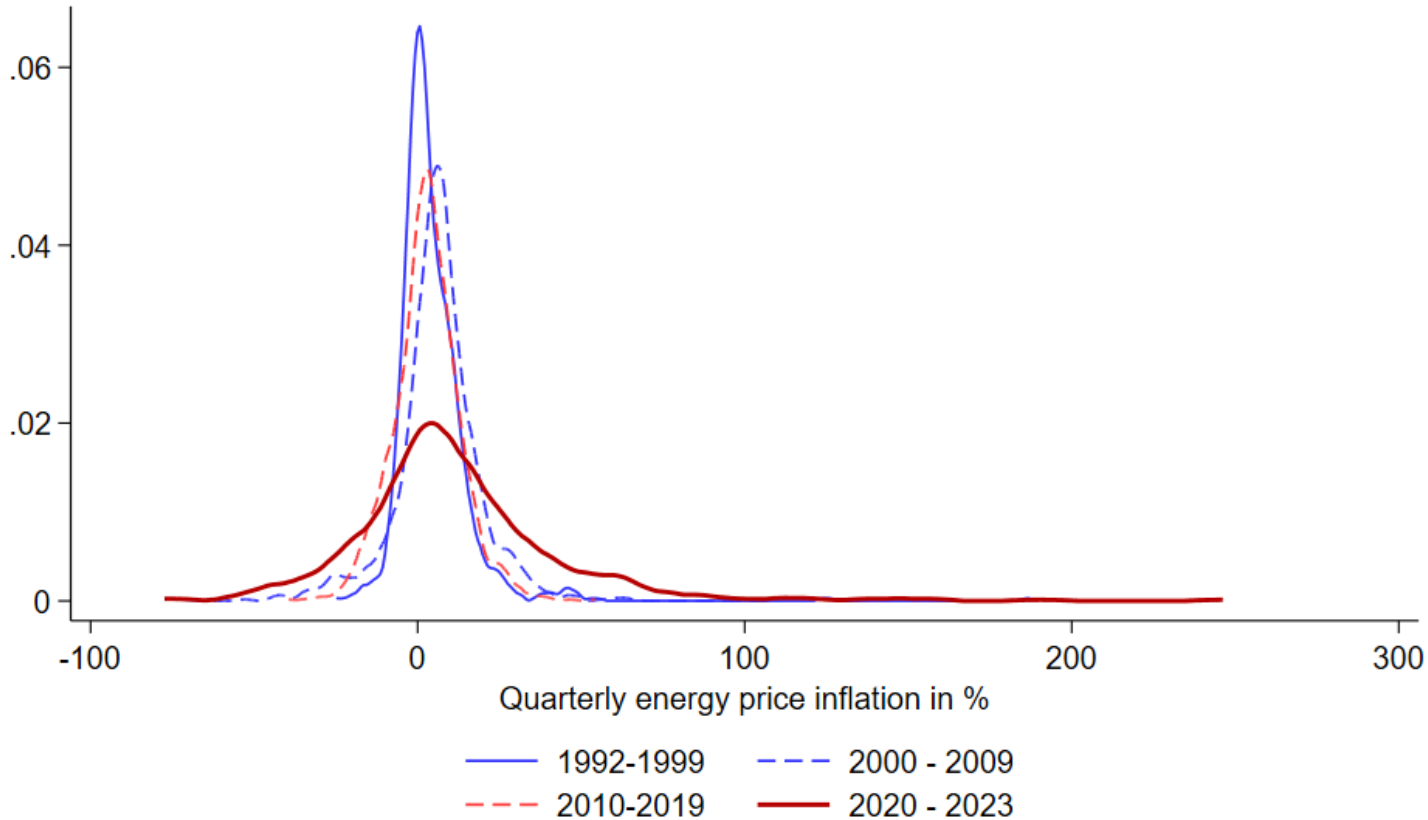
1. Inflation Dynamics during Covid
   - Baba and Lee (2022), Ball et al. (2022), Lafrogne-Joussier et al. (2023), Adolfsen et al. (2024), Bobasu et al. (2024), Casoli et al. (2024), Cavallo et al. (2024), Dao et al. (2024), Patzelt and Reis (2024), Alessandri and Gazzani (2025), Boeck et al. (2025)

2. Inflation passthrough of energy prices
   - Clark and Terry (2010), De Gregorio (2012), Choi et al. (2018), Abdallah and Kpodar (2023), Silva et al. (2024)

3. Structural modelling work
   - Afrouzi and Bhattarai (2023), Minton and Wheaton (2023), Gagliardone and Gertler (2023), Afrouzi et al. (2024)

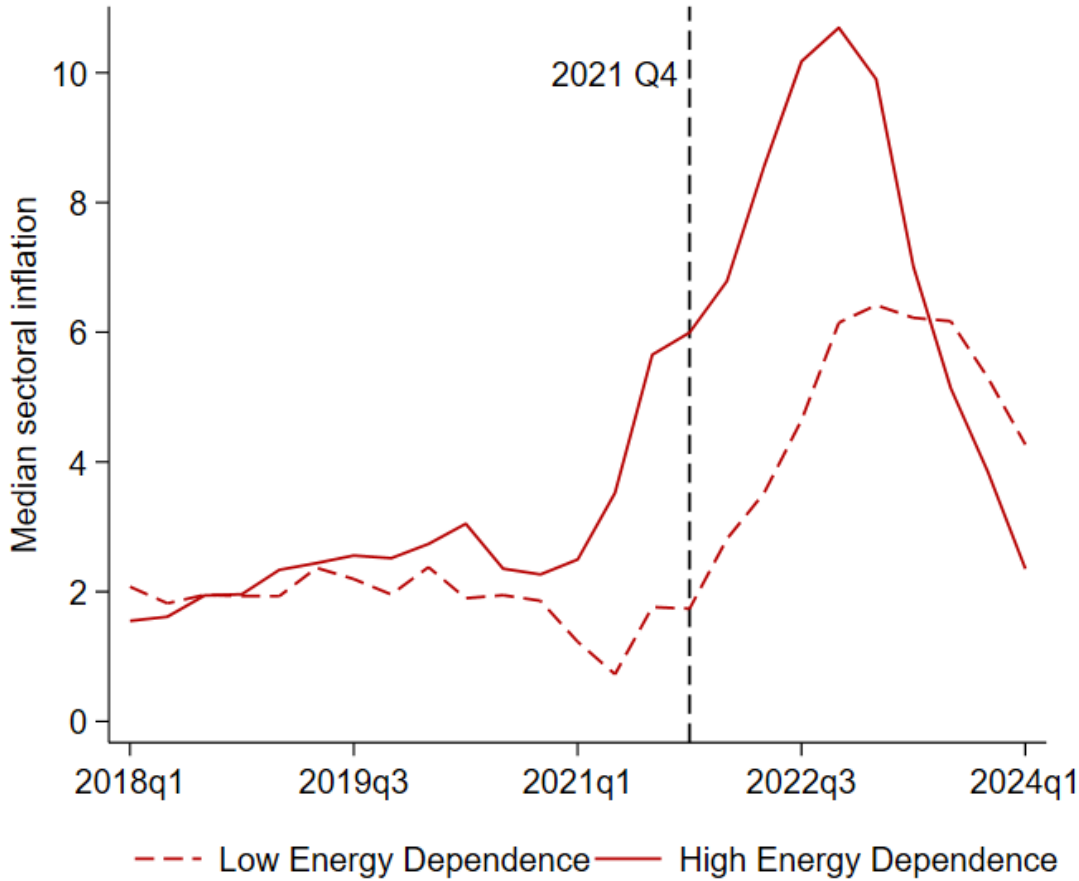
Stylized Facts

Unprecedentedly large energy price changes since 2020



By Energy Source

Aggregate Inflation Surge Driven by Energy-Dependent Sectors



Role of Price Flexibility
Event Study

Data and Empirical Strategy

Data

Aggregate Data

- IMF WEO Database
- Country-level energy inflation from Haver Analytics

Sectoral Data

- Sectoral Inflation Measures
  - OECD: Sectoral Value-Added Deflators
  - Eurostat: Sectoral PPI inflation
- OECD Inter-Country Input-Output (ICIO) Tables
  - I-O linkages for 45 sectors across 76 countries + RoW
- Sectoral Price Flexibility: Rubbo (2023)

Final Sample

- 33 countries with country and sectoral data
  - 25 AEs, 8 EMDEs with 11 sectors per country
- Quarterly sample for 2010-2024

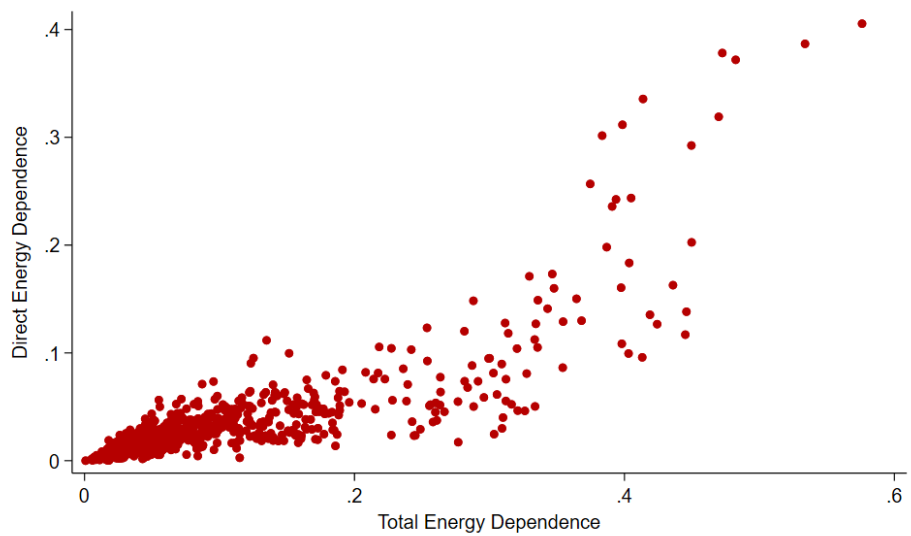
Measuring Energy Dependence

Energy Sector

- Coke & Refined Petroleum Products (C19)
- Utilities (D)

Energy Dependence

$$\gamma_i^{direct} = e'_{energy} \tilde{\Omega} e_i$$
$$\gamma_i^{total} = e'_{energy} (I - \tilde{\Omega})^{-1} e_i$$



Alternative Definition | Residualized

Empirical Strategy

Country-level Regressions

$$\pi_{i,t+h} = \alpha_i^h + \beta^h \pi_{energy,i,t} + \gamma^h \pi_{energy,i,t} Post_t + \nu^h Post_t + \theta^h X_{i,t-1} + \epsilon_{i,t+h}$$

- Projections for $h = 0, 1, 2, 3, ..., 12$
- $X_{i,t-1}$: two lags of inflation, output gap, Δ NEER, policy rate
- $Post_t$: Dummy for period since 2020
- $\pi_{energy,i,t}$: quarterly country-level energy inflation
  - Robustness check with Kaenzig (2021) oil supply news IV

Sector-level Regressions

$$\pi_{i,j,t+h} = \alpha_{i,j}^h + \alpha_{i,t}^h + \beta^h \pi_{\text{energy},i,t} \times Z_{i,j} + \epsilon_{i,j,t+h} \quad \forall h = 0, 1, 2, \ldots, 12$$

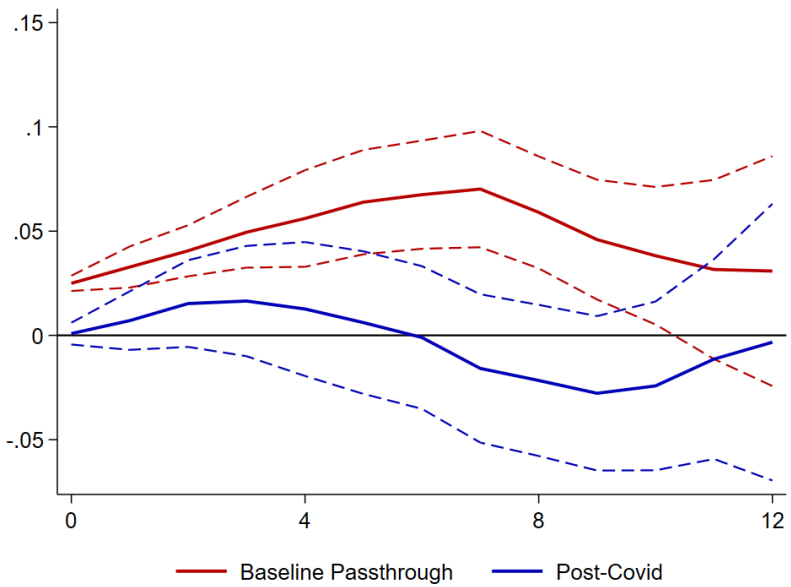
- $Z_{i,j}$: sectoral energy dependence or price flexibility

Main Results

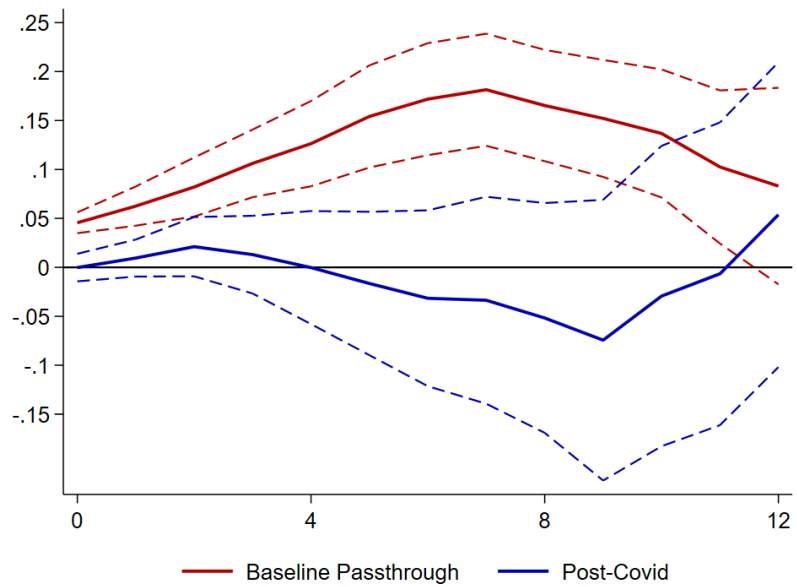
Finding I: Comparable Passthrough to previous episodes

$$\pi_{i,t+h} = \alpha_i^h + \beta^h \pi_{energy,i,t} + \gamma^h \pi_{energy,i,t} Post_t + ...$$
$$\nu^h Post_t + \theta^h X_{i,t-1} + \epsilon_{i,t+h} \quad \forall h = 0, 1, 2, 3, ..., 12$$

AE



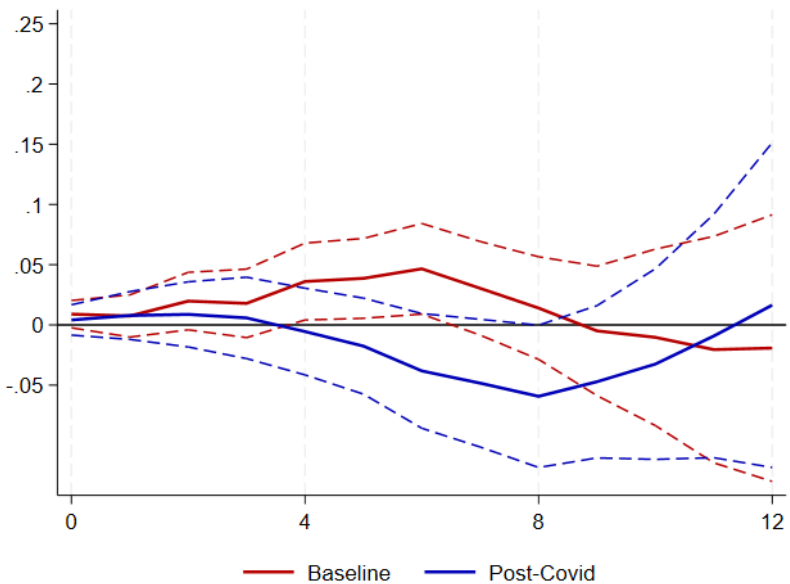
EMDE



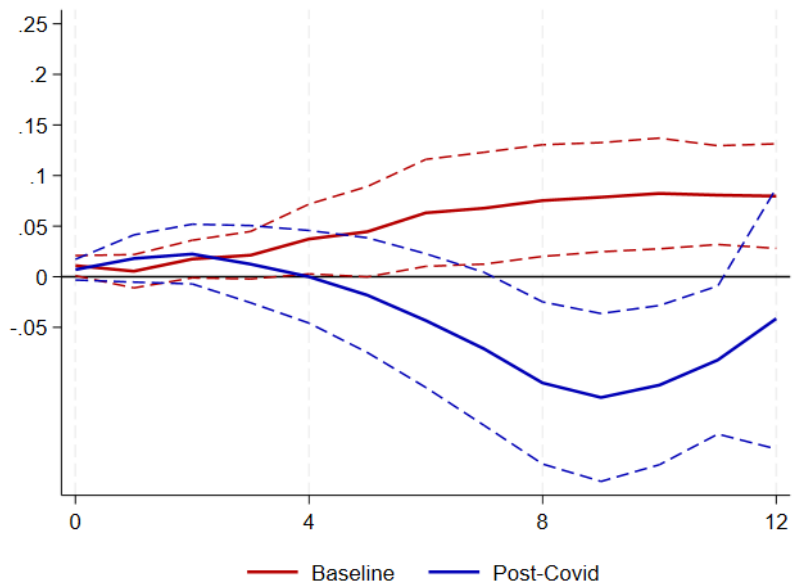
Finding II: Nonlinearities are present in AEs but did not change systematically over time

$$\pi^{CPI}_{i,t+h} = \alpha^h_i + \beta^h_1 \pi_{e,i,t-1} + \beta^h_2 \pi^2_{e,i,t-1} + \beta^h_3 \pi^3_{e,i,t-1} + \gamma^h_1 \pi_{e,i,t-1} \times Post_t + \gamma^h_2 \pi^2_{e,i,t-1} \times Post_t + \gamma^h_3 \pi^3_{e,i,t-1} \times Post_t + \phi^h Post_t + \theta^h X_{i,t-1} + \epsilon_{i,t+h}$$

Small Energy Price Increase



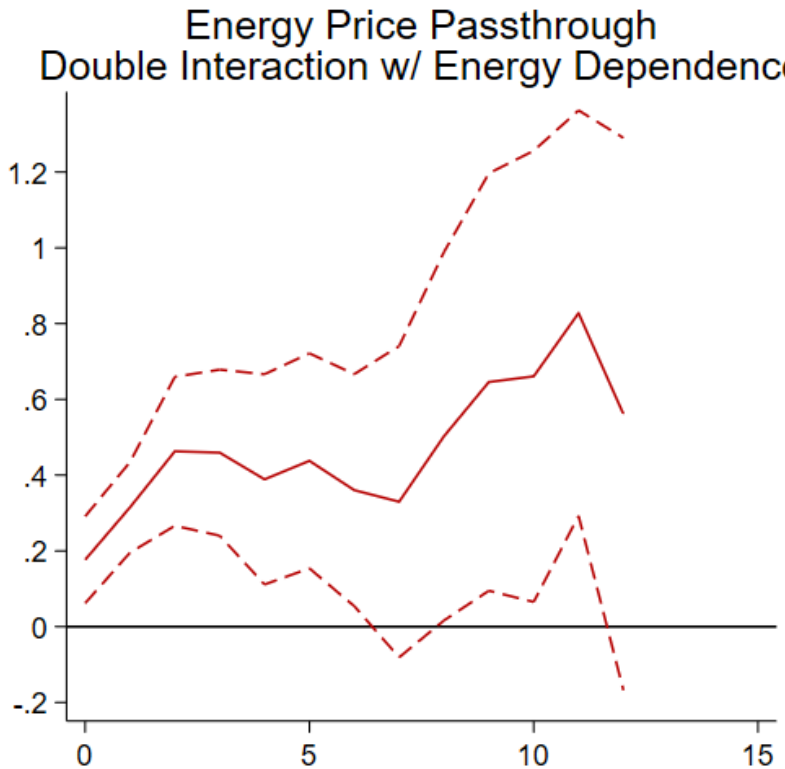
Large Energy Price Increase

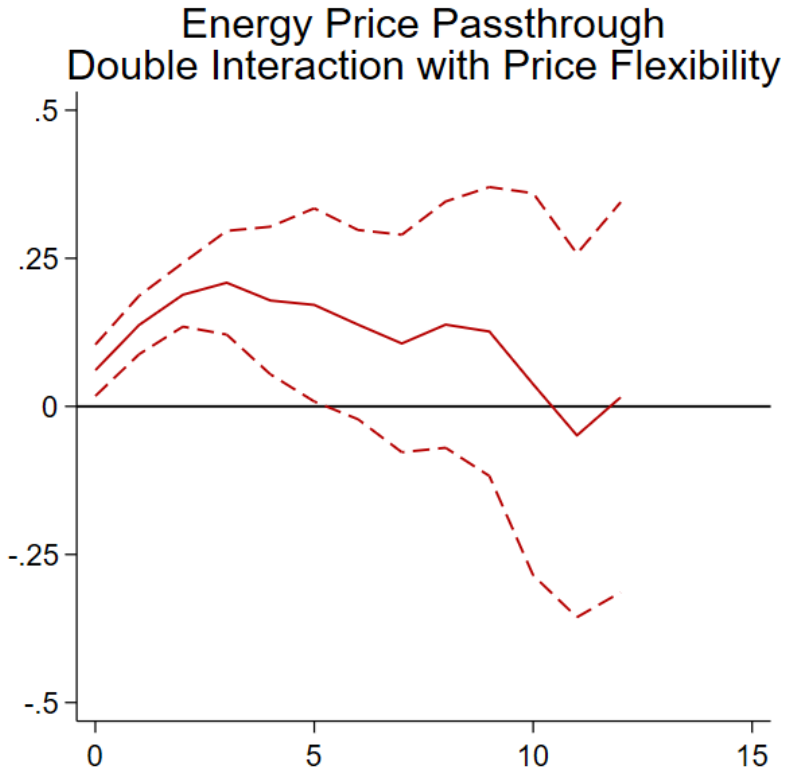


EMDEs

Finding III: Sectoral characteristics shape energy price passthrough

$$\pi_{i,j,t+h} = \alpha^h_{i,j} + \alpha^h_{i,t} + \beta^h \pi_{\text{energy},i,t} \times Z_{i,j} + \epsilon_{i,j,t+h} \quad \forall h = 0, 1, 2, \ldots, 12$$





SD of Energy Dependence: .072

SD of price flexibility: .156

Conclusion

Conclusion

This paper analyzes the inflation passthrough from energy prices to overall inflation during 2020-2024.

Main Findings

1. Passthrough to headline inflation comparable to past episodes
2. Nonlinearities are present in AEs but did not strengthen systematically
3. Sectoral energy dependence and price flexibility shape sectoral inflation passthrough

Outlook

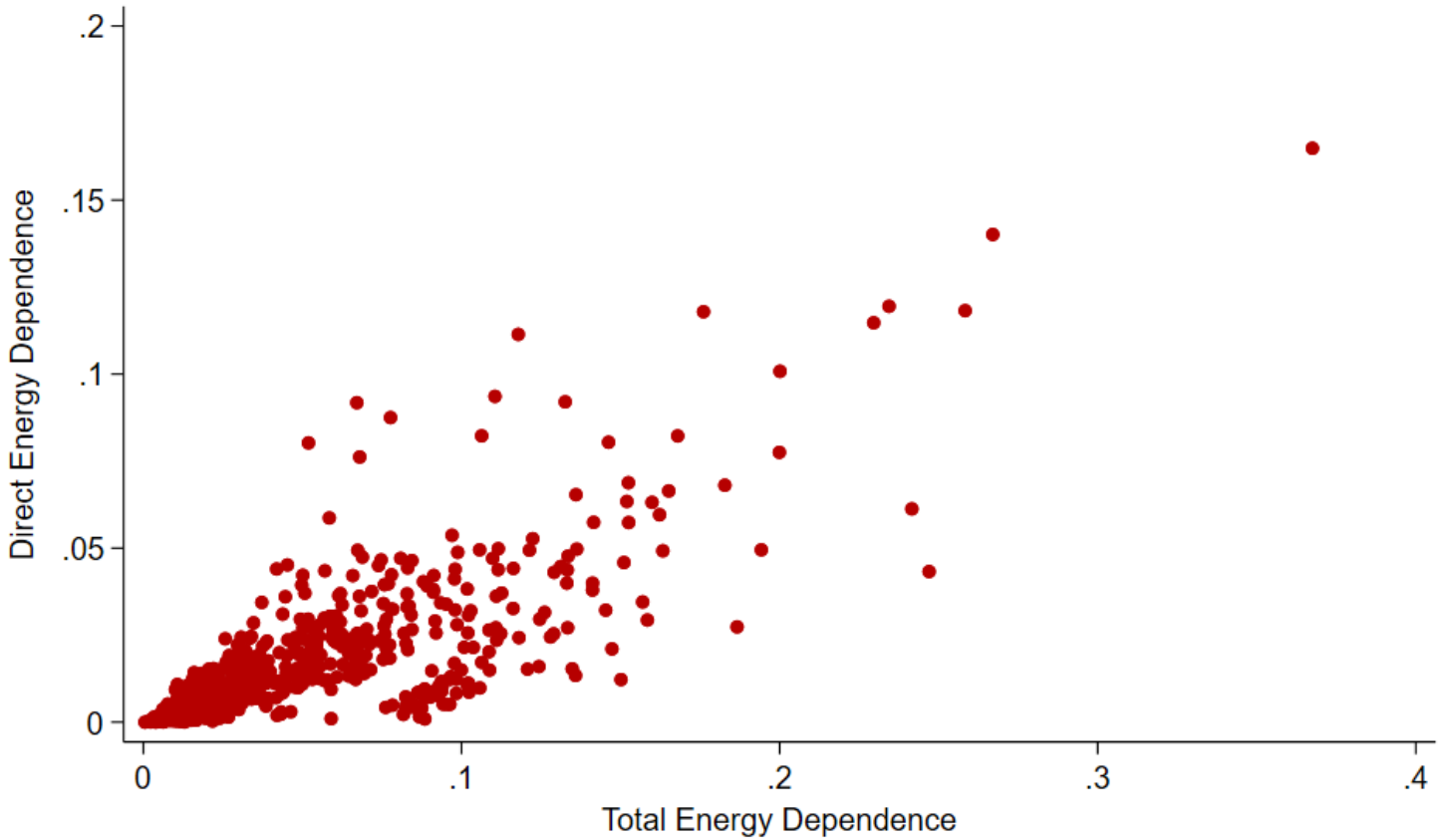
- Understanding of sectoral characteristics and linkages is key

  $\Rightarrow$ Better data on price-setting, intersectoral connectivity, and other sector-specific structural characteristics could be valuable

Backup

Energy Dependence: Alternative Definition

- Narrower energy sector definition only with coke and refined petroleum

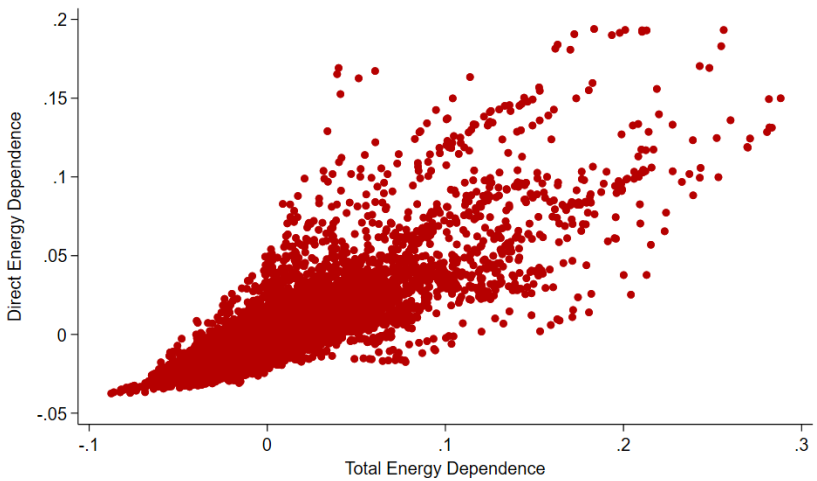


Back

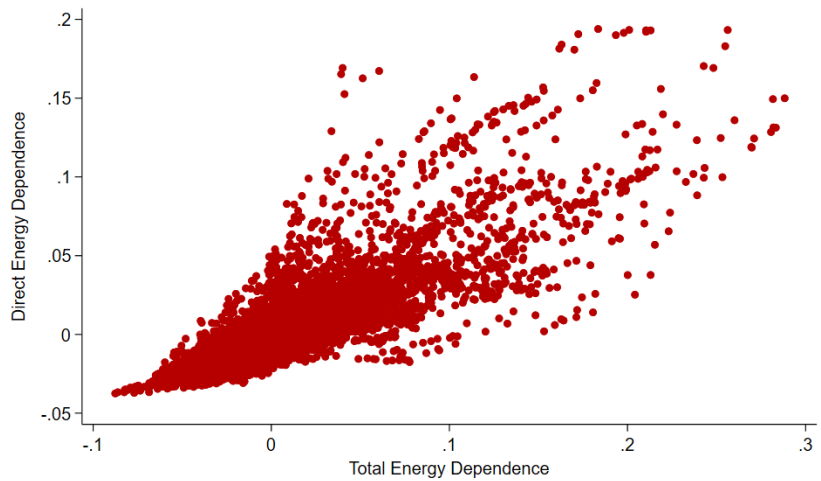
Energy Dependence: Residualized

Residuals from following regression:

$$\gamma_{i,t} = \alpha_n + \alpha_t + \epsilon_{i,t}$$



Narrow Definition



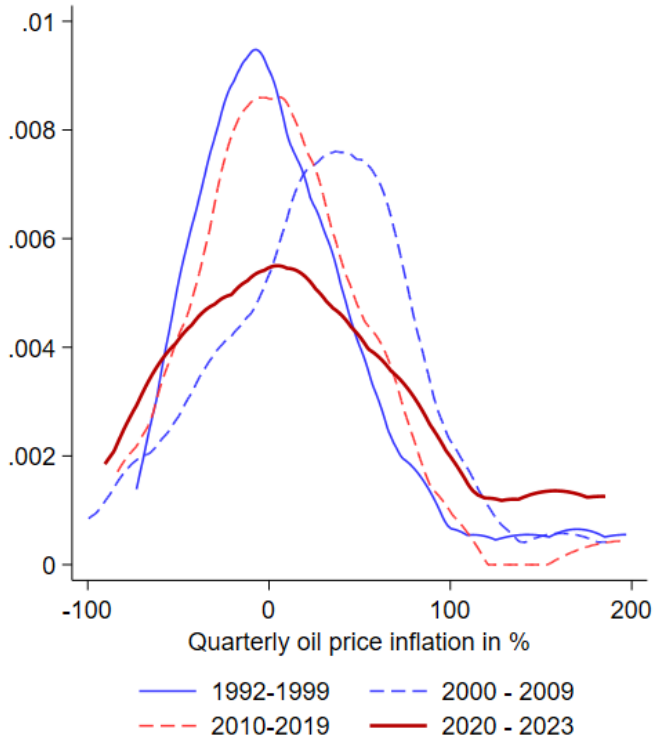
Broad Definition

Back

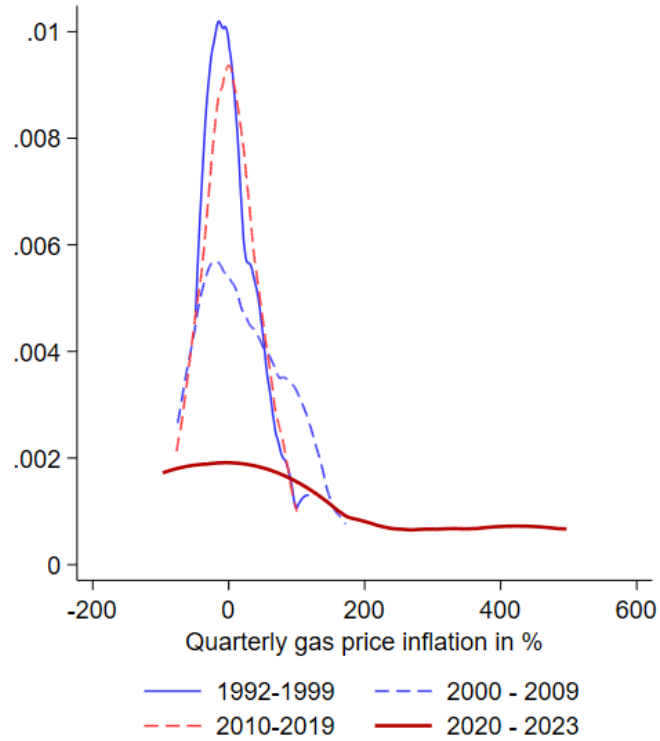
Distribution of quarterly oil and gas inflation

- Oil price distribution broadly comparable to previous decades
- Low kurtosis and thick tails of gas price distribution were unprecedented

Distribution of quarterly oil inflation



Distribution of quarterly gas inflation



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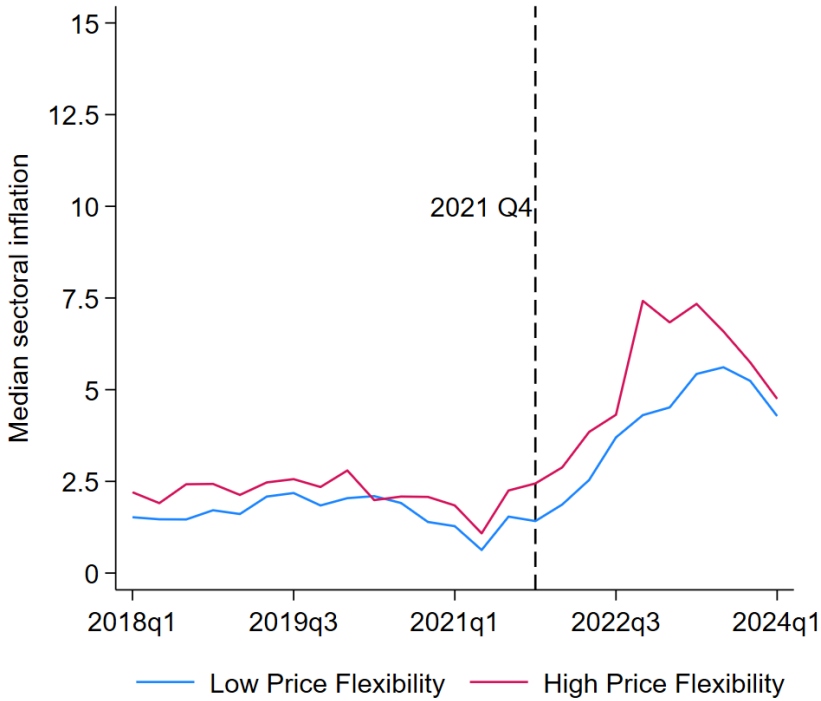
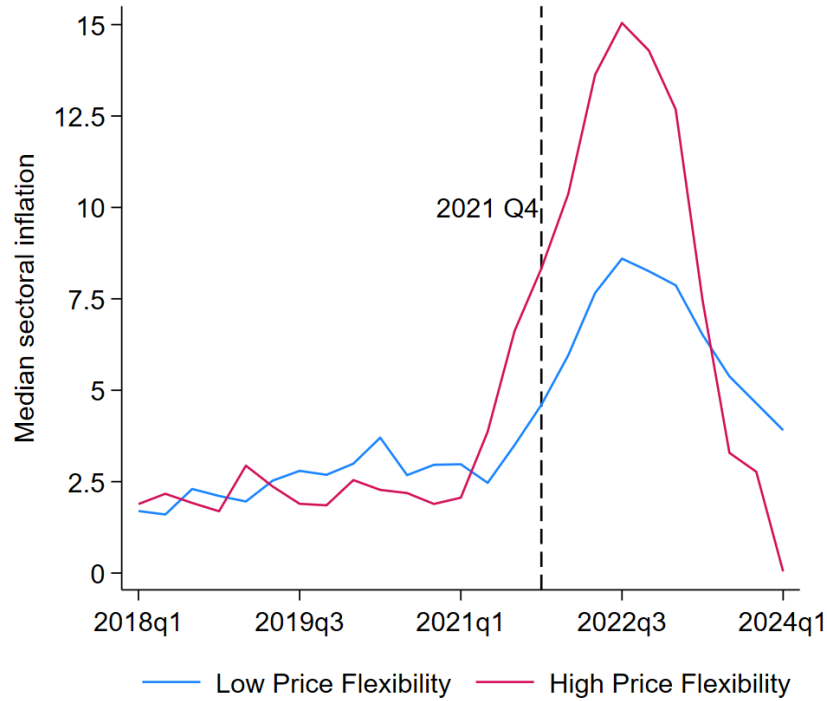
Energy Dependence remains important when accounting for price flexibility



Sectors with Low Energy Dependence



Sectors with High Energy Dependence

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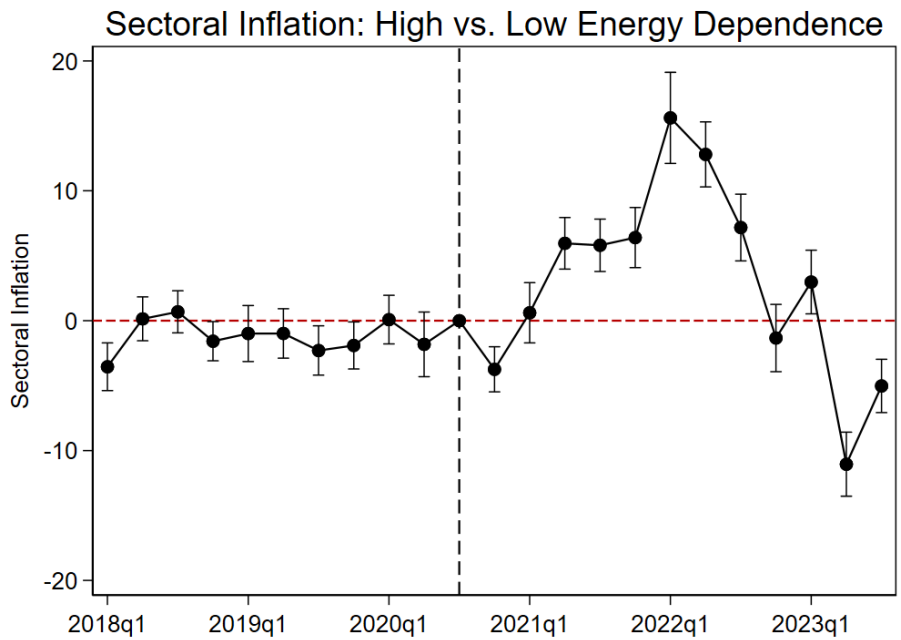
Energy Dependence Event Study

Specification

$$\pi_{i,j,t} = \alpha_{i,j} + \alpha_{i,t} + \sum_{\tau=2018Q1;\tau\neq 2020Q3}^{2023Q3} \beta_\tau s_{i,j} + \epsilon_{i,j,t}$$



Event Study for Energy Dependence

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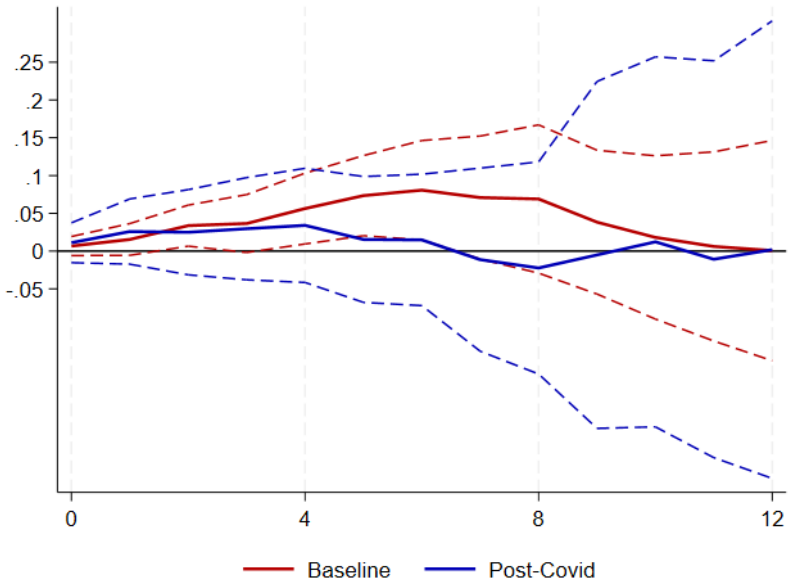
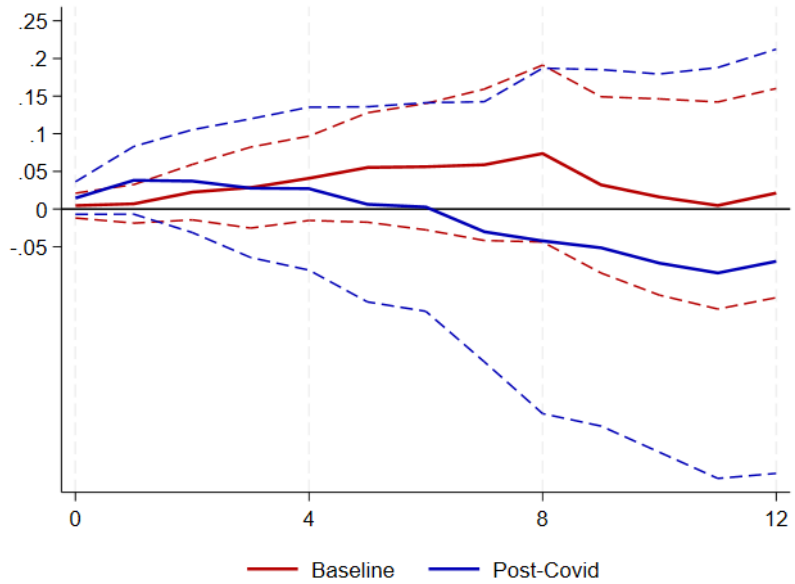
No clear evidence for non-linearities in EMs

Small Energy Price Increase



Large Energy Price Increase



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