The propagation of shocks across the production network and implications for monetary policy

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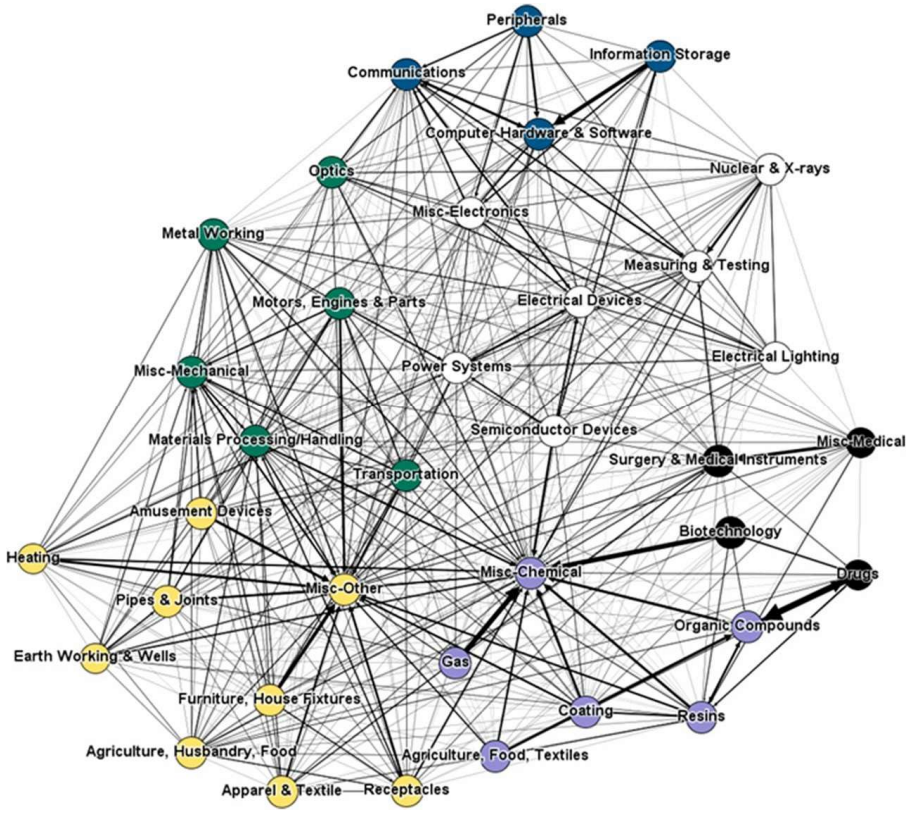
Outline

1. Why production networks?
2. Heterogeneous Monetary Policy Transmission and Networks
3. Models for policy analysis
4. Insights from firm-level data
5. Implications for the Phillips curve and monetary policy
6. Policy implications and future research

1. Why production networks?

Production networks better capture economic linkages

- Firms and sectors are linked through buyer–supplier relationships, creating an interconnected production network.
- Shocks affecting one firm or sector can propagate throughout the production chain and influence aggregate economic outcomes.
- Economies should therefore be analysed as networks of interdependent agents rather than as collections of isolated entities.
- The macroeconomic impact of a shock depends not only on its magnitude but also on its position within the network.



Acemoglu, Akcigit and Kerr (2016)

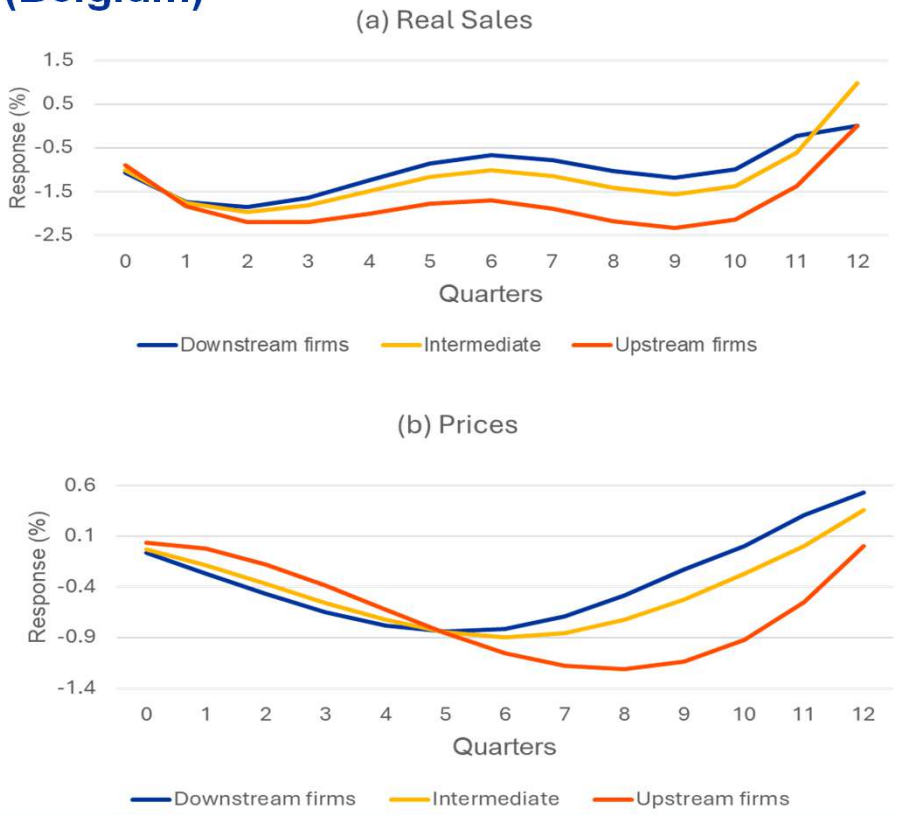
Notes: Innovation network 1975–1984. Network mapping of patent system using technology subcategories.

2. Heterogeneous Monetary Policy Transmission and Networks

Demand shocks are dampened…

- Production networks dampen demand shocks, including monetary policy shocks.
- After a negative demand shock, downstream firms **adjust quantities more than prices**, reducing the overall inflation response.
- Belgian firm-level transaction data show quantities react more strongly than prices after a monetary policy shock.
- Downstream prices adjust faster, while upstream input-price effects are more persistent.

Firm response to a monetary policy shock (Belgium)

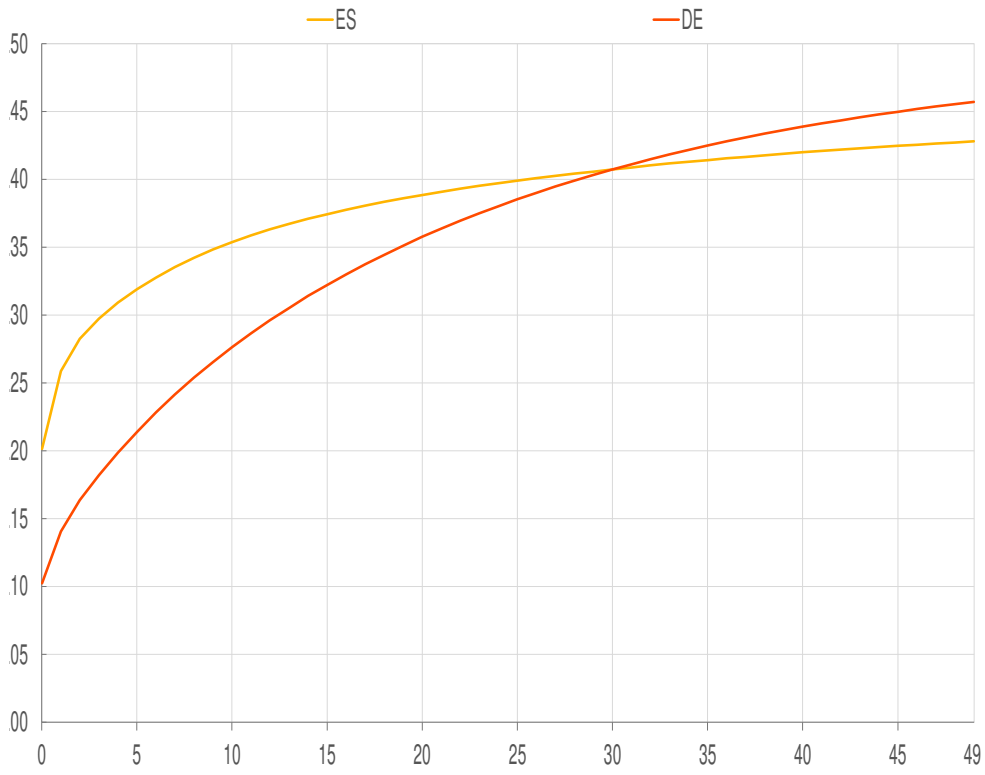


Dhyne et al. (2026)

Notes: Impulse response functions for a 1 standard deviation (5 bp) monetary tightening shock. Estimated with quarterly data from 2002 to 2023.

…and supply shocks are amplified

- Production networks amplify inflationary supply shocks (e.g., energy shocks) when higher costs are passed from firm to firm.
- Models without production networks capture only about 60% of the inflation seen after an energy shock and underestimate its persistence.
- Differences in production-chain length explain varying inflation dynamics across sectors and Euro Area countries: longer chains (e.g., Germany) lead to slower but more persistent inflation; shorter/downstream structures (e.g., Spain) produce faster pass-through.

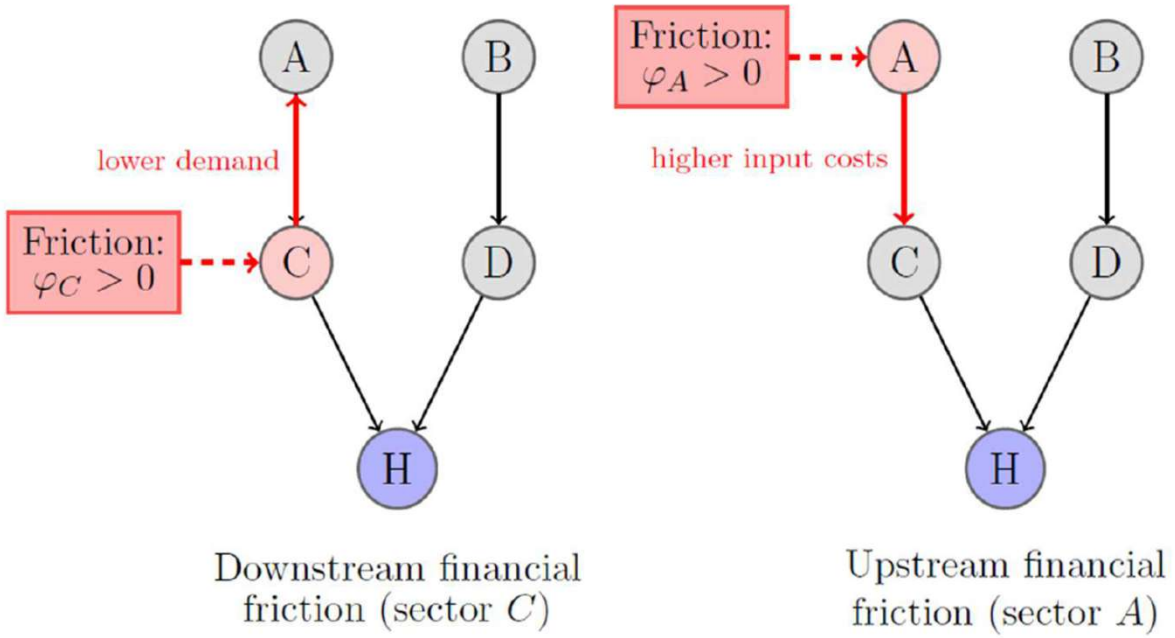


Aguilar et al. (2026)

Notes Cumulative impusle response fnction of headline inflation for Germany (DE) and Spain (ES) with heterogenous production networks.

The interaction of financial and network structure also contribute to heterogenous responses

- Financial conditions affect price-setting through firms' financing costs and liquidity constraints.
- Network leverage exposure can amplify or dampen disinflation following monetary tightening.
- Downstream constraints strengthen disinflation by reducing demand and propagating shocks upstream.
- Upstream constraints weaken disinflation when firms pass higher financing costs into prices.



De Sanctis et al. (2025)

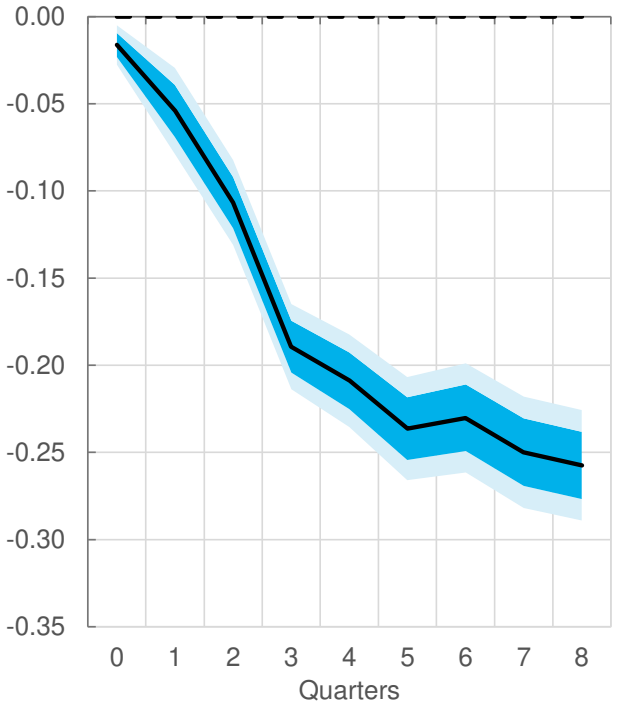
Notes: The figure shows the upstream (LHS panel) and downstream (RHS panel) propagation of a tightening shock. Sectors A and B: strict upstream suppliers of intermediate goods; sectors C and D: downstream final-goods producers. Households H only buy from downstream final-goods producers in sectors C and D.

3. Models for policy analysis

Monetary policy shocks reduce employment, with heterogeneous effects across sectors and countries

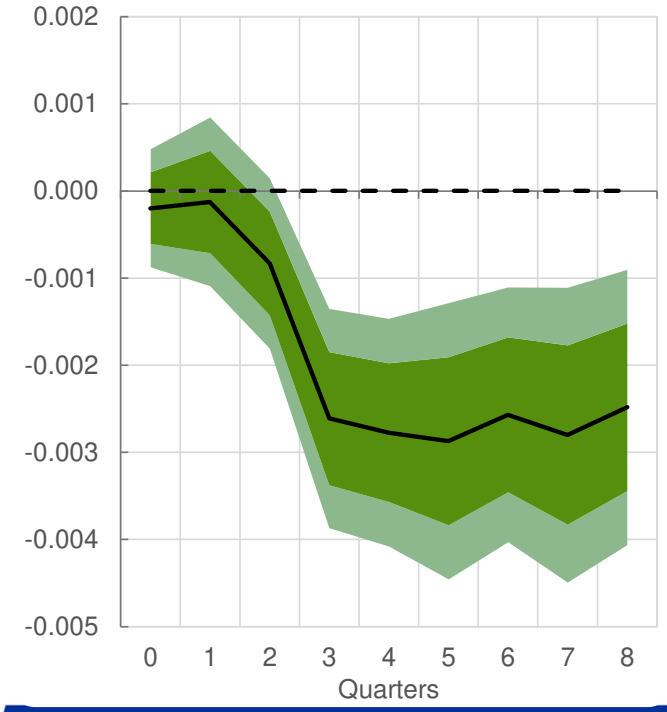
Average Effect - Hours

(percent)



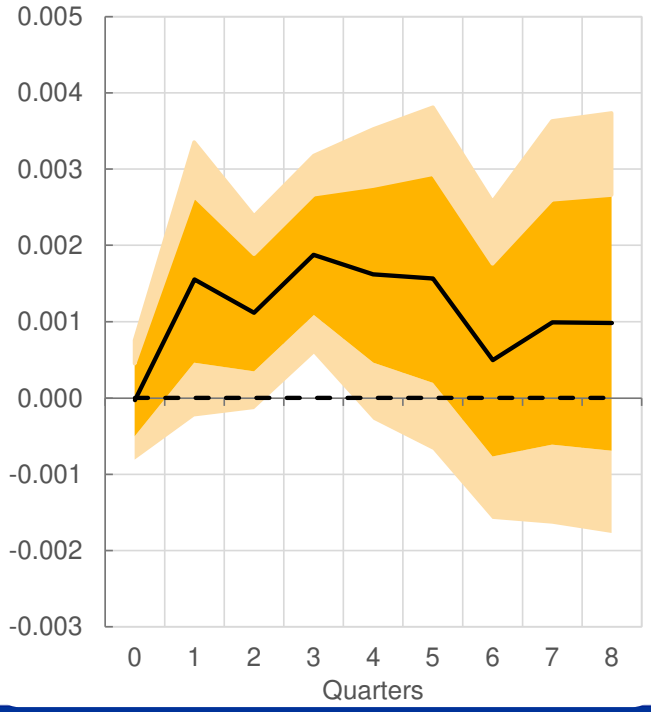
Additional Effect of Labor Share

(percentage points)



Additional Effect of PPI Flexibility

(percentage points)

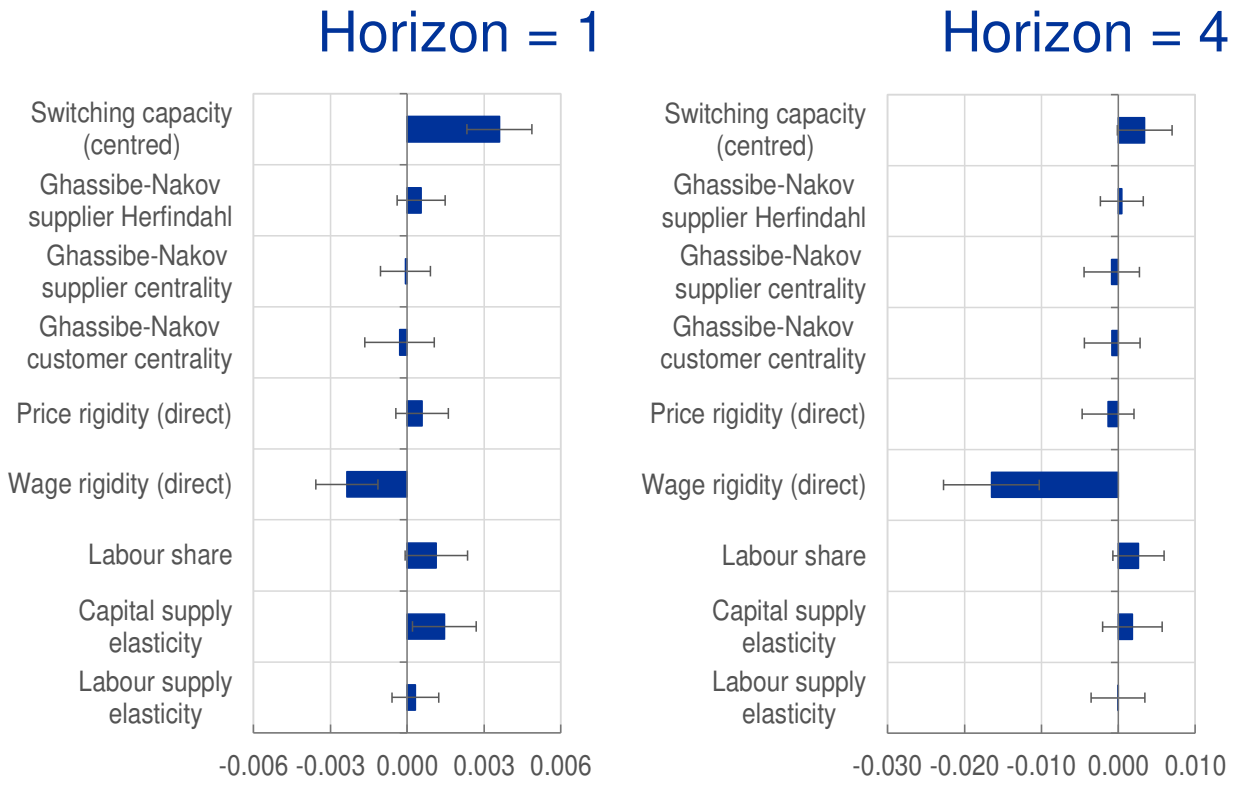


Sources: Eurostat and ECB staff calculations.

…and the model quantifies the contribution of the characteristics driving these effects

1. Switching capacity cushions the impact response (pos.value)
2. Wage rigidity amplifies the employment response (neg. value)
3. Labour share, capital supply elasticity and network position matter

Contribution:
The model allows to make a structural decomposition of the empirical heterogeneous monetary transmission based on observable country-sector characteristics.



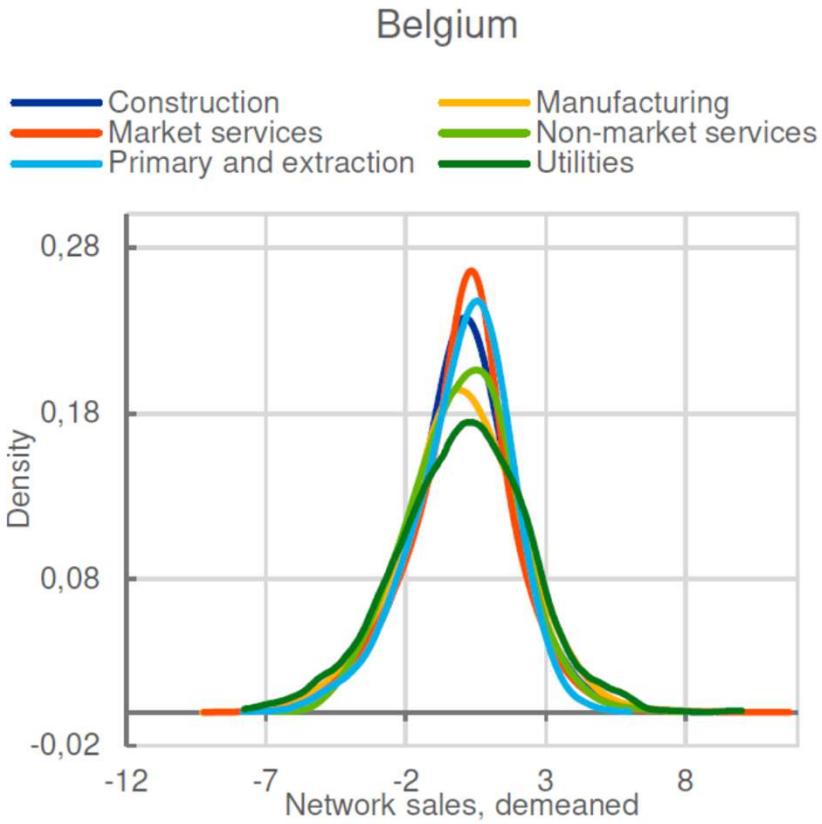
Rubbo et al. (2025)

Note: Results of Ridge Regression on a set of model features. Regularisation parameter chosen using Leave-one-out cross-validation; One s.d. bootstrap confidence intervals; Red indicates significance at 68% level.

4. Insights from firm-level data

Granular data reveals properties of production networks that are masked by sectoral aggregation

- Firm-level data reveal extreme concentration and heterogeneity hidden by sectoral averages.
- Production networks are sparse, while sectoral aggregation creates artificially dense connections.
- Firms within the same sector differ greatly in size, input use, and network exposure.
- Network centrality and upstreamness are distinct dimensions of influence beyond firm size.
- Granular networks better explain and predict shock propagation and aggregate outcomes.



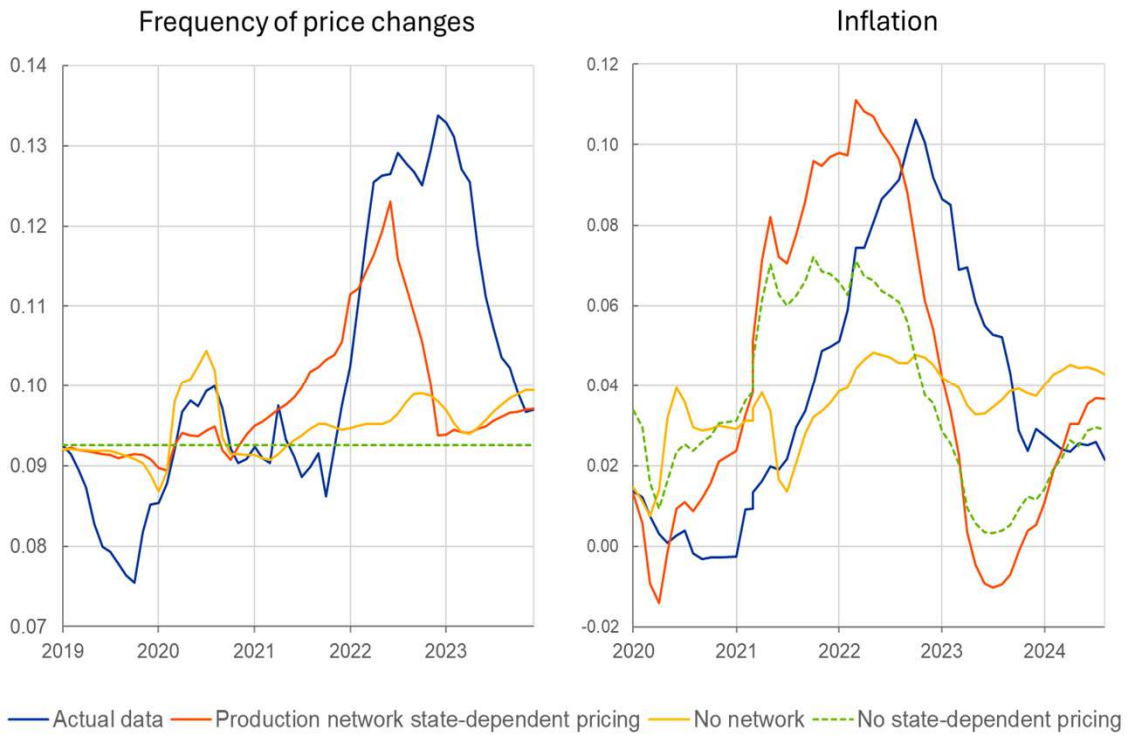
Magermann et al. (2026)

Notes: The figure reports kernel density estimates of firm.level network sales, demeaned at the NACE 4-digit level, grouped again by high.level industry. The horizontal axis is shown on a logarithmic scale.

5. Implications for the Phillips curve and monetary policy

Non-linear inflation dynamics in production networks

- **Periods of high inflation** are best explained by combining production networks with **state-dependent pricing**, where cost shocks propagate and trigger more frequent price changes once thresholds are reached
- **Unanchored** expectations make inflation more belief-driven
- Only the full model matches the data
- This implies a **non-linear, state-dependent policy transmission**



Notes: Actual versus model-generated dynamics under different assumptions about firm price setting behaviour and existence of production networks.

Ascari et al (2025)
Gautier et al (2026)
Ghassibe and Nakov (2025)

6. Policy implications and future research

Policy implications and future research

- Monetary policy transmission is state-dependent and varies with the type (supply vs. demand) and origin of shocks.
- Analyzing production networks improves our understanding of the factors shaping the speed and strength of monetary policy transmission.
- Conversely, ignoring firm-to-firm and sectoral linkages can lead to underestimating inflation risks and misjudging the appropriate policy stance.
- Production networks shed light on potential non-linearities and state dependence, helping identify how monetary policy should respond and which indicators should be monitored.
- Future research should further integrate production network structures into macroeconomic models.
- Greater availability and use of granular microdata from firms, households, and financial institutions are essential.

Thank you for your attention

Monetary policy transmission and structural changes

Guido Ascari, Volha Audzei, Gert Bijnens, Alina Bobasu, Andrea Colciago, Emmanuel Dhyne, Michaela Elfsbacka-Schmöller, Alex Grimaud, Maria Teresa Valderrama, Andrejs Zlobins

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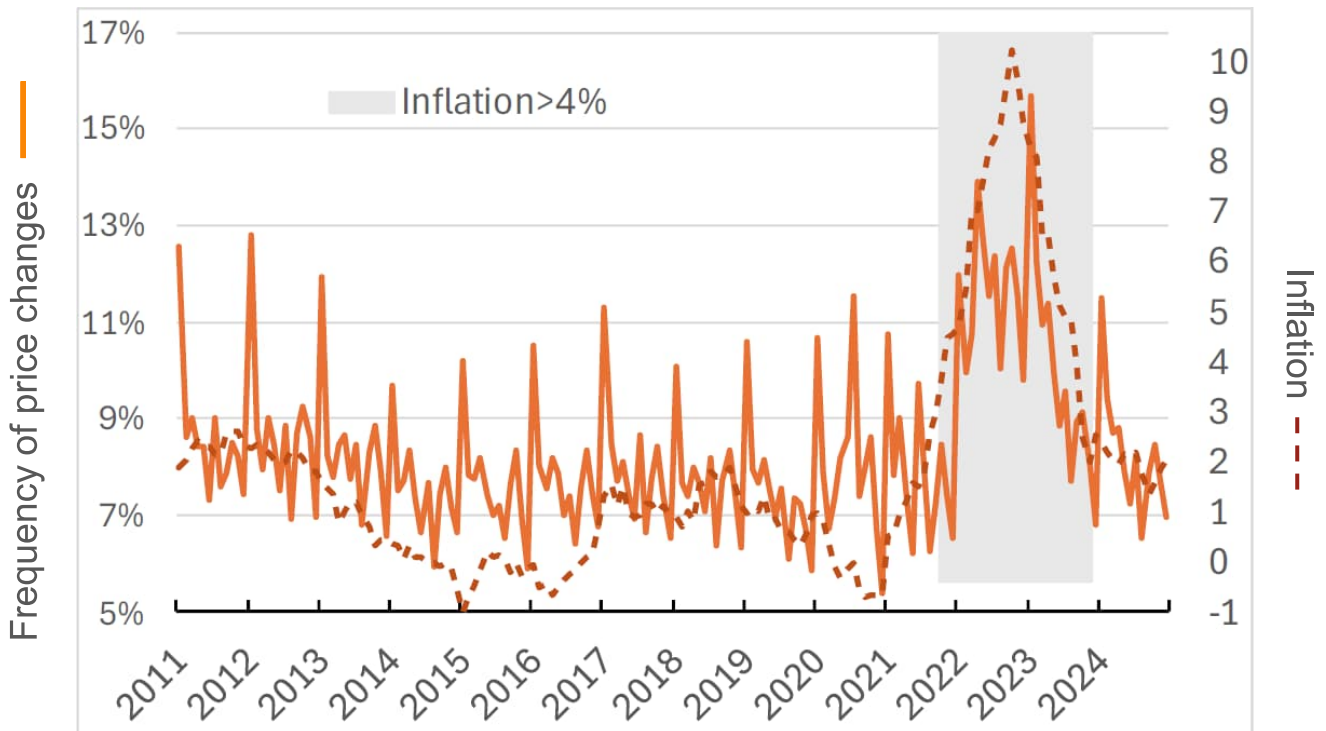
Outline

- Summarises the very heterogeneous / numerous ChaMP research on monetary policy and structural changes
- What I will cover:
  - State dependence of monetary policy transmission
  - Impact of monetary policy on the structure of the economy and on long-term growth
  - Main policy implications
- What I will not cover but is covered in the OP:
  - Monetary policy and energy shocks, climate transition

Transmission is no longer a constant macroeconomic mapping

High-inflation regimes trigger faster and broader price adjustments



Gautier et al. (2025)

Rising service intensity dampens aggregate monetary policy transmission

- Service sector output responds less than manufacturing output to monetary policy.
- Why? Services rely less on physical capital, lowering interest rate sensitivity
- As the EA becomes more service-oriented, the sacrifice ratio declines
- EA regions with higher service shares exhibit weaker output effects
  - Regions at the 75th percentile of service share distribution experience output changes that are 40% weaker than regions at the 25th percentile following an MP shock

Hauptmeier, Holm-Hadulla and Saporito (2025)

Monetary policy primarily impacts discretionary consumption

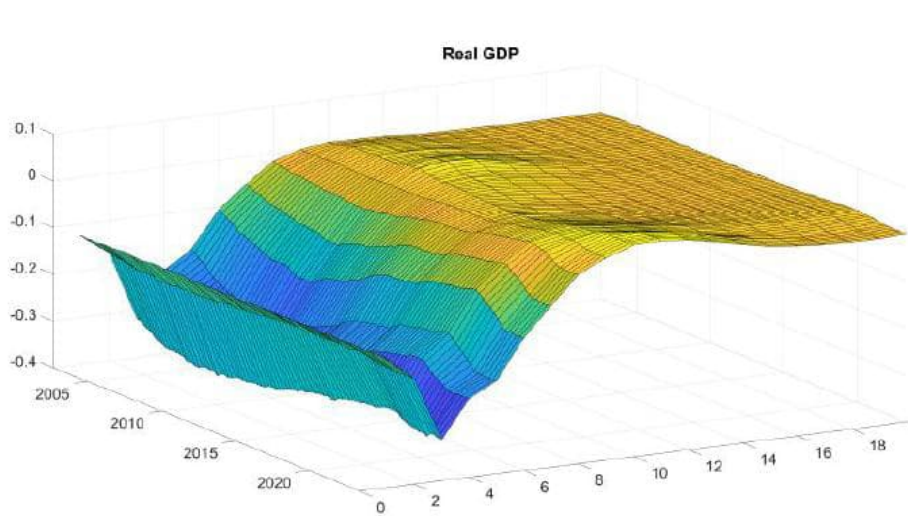
Core HICP Basket

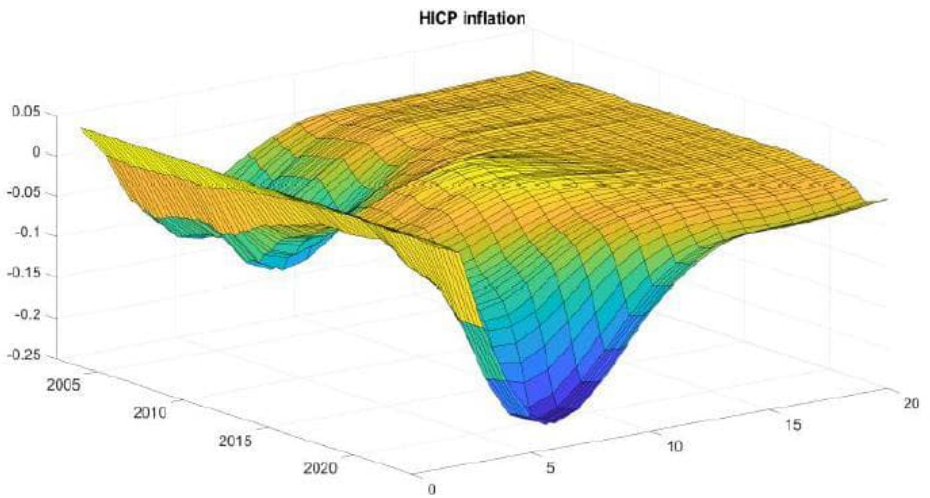
Policy sensitive (45%)	Less sensitive / Sticky (55%)
Durables / Recreation / Transport...	Rents / Medical services / Utilities...
Response is 3x larger and faster.	Dominated by non-discretionary or regulated pricing,
Linked to high-income households	

Granularity: Core inflation persistence is structural, due to large non-sensitive share
Propagation speed: Discretionary consumption adjusts within weeks
Sensitive items make up a larger share of **high-income** baskets, but a large share of the income of hand-to-mouth workers.

Allayioti et al. (2024), Andreolli et al. (2026), Buda et al. (2025)

Transmission lags and sacrifice ratios shrink under high inflation



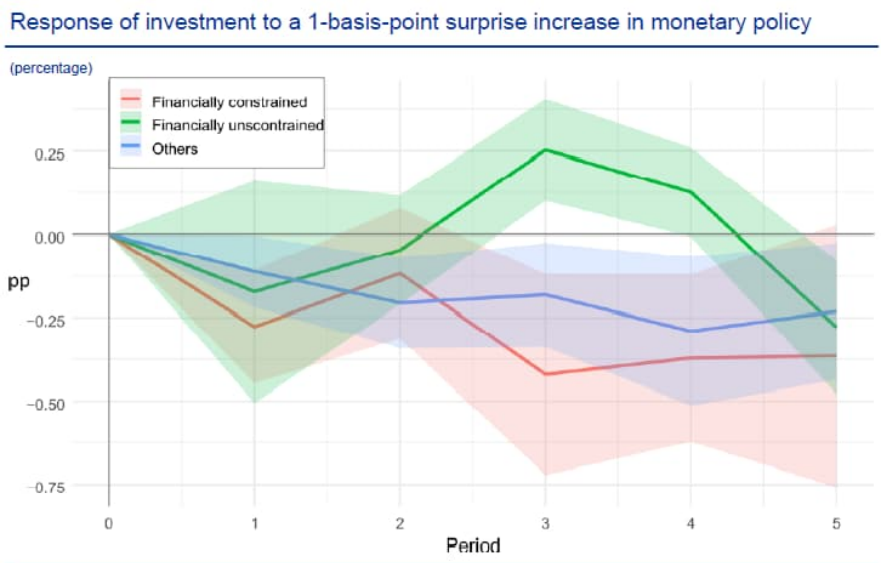


Traditional lags: conventional BVARs suggest 12–18 months for full transmission
The 2022–2023 tightening episode: stronger, more persistent inflation response with standard GDP reaction
Low sacrifice ratio due to a steepened PC in a high-inflation state

Zlobins (2025)

Monetary policy affects competition and TFP growth

Credit conditions shape market competition and firms' responses



- Accommodative monetary policy lowers barriers for small, financially constrained firms
  - Tight policy: constrains small firms => increases concentration and incumbent dominance
  - Easy policy: reduces constraints on small firms and entrants => increases business creation and competition
- The reaction of firms facing multiple financial constraints to monetary policy is asymmetric:
  - Relatively muted response to monetary easing as some constraints still bite
  - Strong response to monetary tightening as constraints are more and more binding

Ferrando, Lamboglia and Offner (2025)

Monetary policy also symmetrically affects TFP growth through innovation

Effect of policy rate changes on planned innovation

Monetary policy response	Scen 1.: hike 1 pp.	Scen 2.: hike 0.5 pp.	Scen 3: cut 0.5 pp.	Scen 4: cut 1 pp.	Scen. 5: cut 1 pp. (long)	N
Baseline	-0.094*** [0.007]	-0.060*** [0.006]	0.043*** [0.006]	0.109*** [0.007]	0.164*** [0.009]	14,485

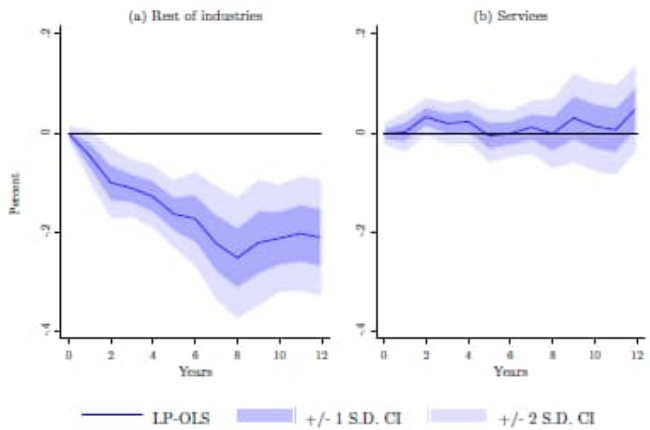
- Firms' R&D expenditures are symmetrically adjusted in response to monetary policy shocks
- Forward guidance increases the transmission of monetary policy easing to R&D expenditures by reducing the uncertainty
- Monetary policy may therefore affect long-term growth but remains neutral over the business cycle

Elfsbacka-Schmöller, Goldfayn-Frank and Schmidt (2025)

Monetary policy reallocates activity across sectors and weighs on TFP

- In response to a monetary policy tightening, resources shift away from high-productivity sectors but the opposite is observed during easing episodes
- Firms with the highest returns on capita react more strongly to monetary easing, improving capital allocation and aggregate productivity growth

Figure 4: IRF estimates of industry-level Domar weight to monetary policy shock



Notes: The figure shows cumulative impulse response estimates of a contractionary monetary shock based on Equation (5). The dependent variables is the Domar weights $\lambda_{i,s,t}$. The shaded areas show one and two Newey-West standard-error confidence bands. The monetary shock series can be found in Table 2 of Romer and Romer (2023). See text for details.

Amador, Elfsbacka-Schmöller (2024), Gonzàlez et al. (2024)

Policy implications

Central banks are right to adopt a state-contingent analytical framework

	Traditional assumptions	ChaMP findings
Response and transmission lags	**Uniform response:** long lags (12 to 18 months)	**State-contingent:** shorter and faster in high-inflation regimes, “Strike while the iron is hot”
Supply-side impact	**Monetary neutrality**	**Some medium-run effects**: supply side is not totally immune to monetary policy but effects are symmetric.

Thank you for your attention