Challenges for Monetary Policy Transmission in a Changing World

Emerging Results from the ESCB ChaMP Network

Central Bank Research Association Annual Meetings, Boston, 8 August 2025

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Monetary policy transmission via the financial system (WS1)

Transmission of monetary policy via banks to firms (NFCs)

- Leveraging on the loan-level euro-area-wide AnaCredit dataset, investigate unexplored aspects of the bank lending channel, including country specificities and other heterogeneities, banking market competition, loan and securities portfolio composition, technology adoption, etc.

Transmission of monetary policy via banks to households (HHs)

- Analyse transmission via household lending (mortgages and consumer credit), exploring datasets available at national level ➡ collective project which draws on 9 EA Credit Registers!

Transmission of monetary policy via non-bank financial intermediaries (NBFIs)

- For example, through credit substitution between banks and NBFIs or through NBFI portfolio recomposition.

Sufficient effort should be made to go beyond credit supply outcomes and extend the research to the impact on prices and inflation

Selected initial results

Transmission of monetary policy via banks to NFCs

Transmission of monetary policy via banks to NFCs – overarching findings

Heterogeneities in the bank lending channel are many. Identifiable sources of heterogeneity should be monitored over time; those that have aggregate implications need to be accounted for in the calibration of monetary policy action. For example,

- **Banking market concentration** slows down transmission in credit and deposit markets
- **Firms' external finance composition**: while more recourse to external financing improves transmission, a more diversified funding mix allows companies to better smooth the impact of monetary policy hikes, unless firms have to refinance a large share of maturing debt
- **At the loan level,** differences in interest rate fixation period, underlying reference rate, and collateral composition alter the transmission. Loans linked to shorter-maturity risk-free rates experience a more pronounced pass-through of changes in monetary policy rates.

Monetary policy has a direct effect on prices through bank lending, as firms adjust their pricing schedule in response to variation in the cost of bank lending

Higher bank concentration slows down transmission of policy rate hikes and speeds up that of cuts

Dynamic response of deposit rates to positive and negative monetary policy shocks

Figure: Positive shock

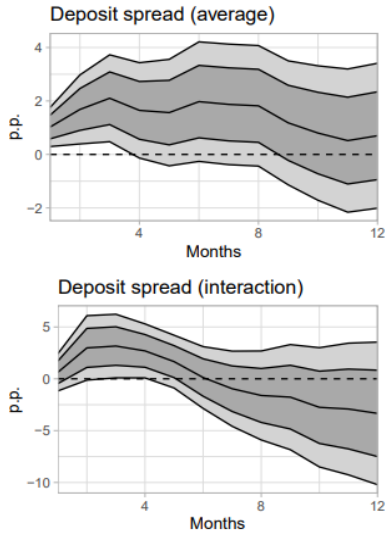
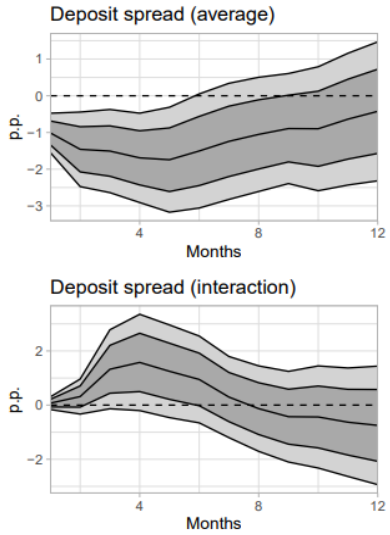


Figure: Negative shock



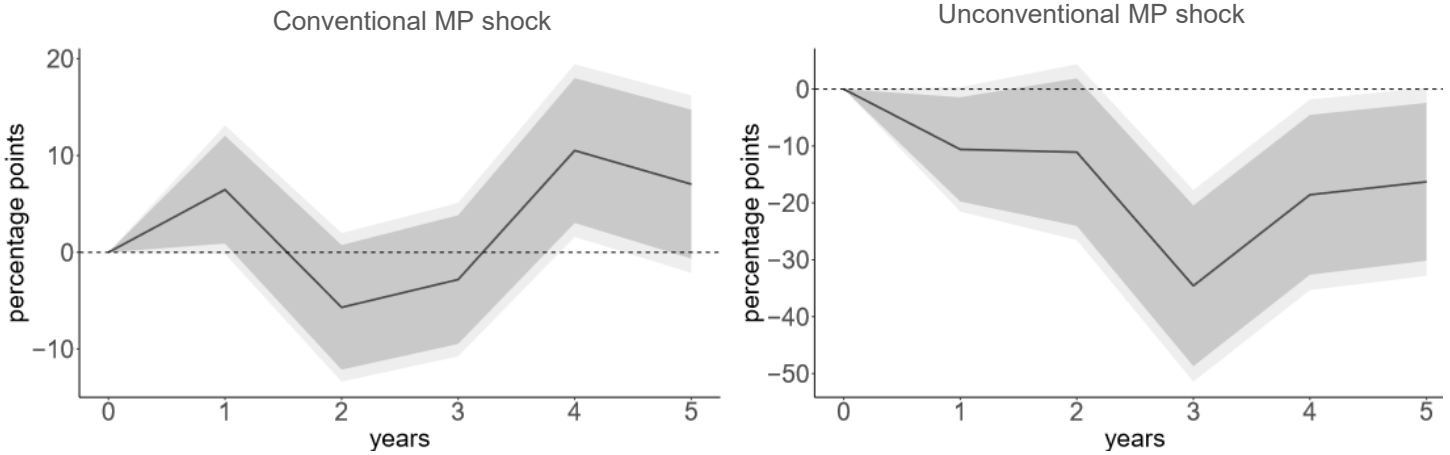
Notes: cumulative impulse responses are scaled to a positive (negative) 100 bps response of the short-term rate on impact, with 68% and 90% confidence intervals plotted. Upper panels: sector with an average degree of market concentration; bottom panels: additional impact or a market with above-average market concentration. Monthly data 2003-2022 for Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Nether-lands, Portugal, Spain, Slovenia and Slovakia.

- More concentration (less competition) implies slower increases and faster decreases: asymmetric effect
- Effects are short-lived, but economically meaningful and statistically significant

Deposit market concentration and monetary transmission: evidence from the euro area
Kho, 2025

Firms' more reliant on bond markets are more shielded from conventional MP shocks

Heterogeneous response of investment to conventional and unconventional monetary policy contractionary shocks depending on firms' bond share



Notes: Estimated coefficients to a 100 bps contractionary shock. Conventional MP shocks are surprises from Jarocinski and Karadi (2020). Unconventional MP shocks are high frequency movements in the 10-year French-German sovereign spread. Light (dark) grey bands correspond to 95% (to 90%) confidence intervals. X-axis: years after the shock. Data is a firm-level panel data for France over the period 1999-2019.

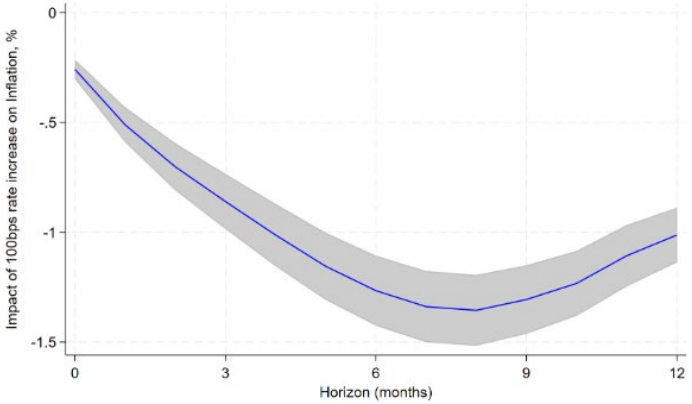
- Firms more reliant on bank credit are relatively more affected by conventional monetary policy shocks. Firms more reliant on bond debt are more sensitive to shocks that affect bond liquidity.
- On aggregate there is important, but imperfect, substitution between the two types of funding sources, with firms turning to new bond debt issuance after a conventional shock, but returning to loans after a shock to bond liquidity

Corporate debt structure and heterogeneous monetary policy transmission
Alder, Coimbra, Szczerbowicz, 2024

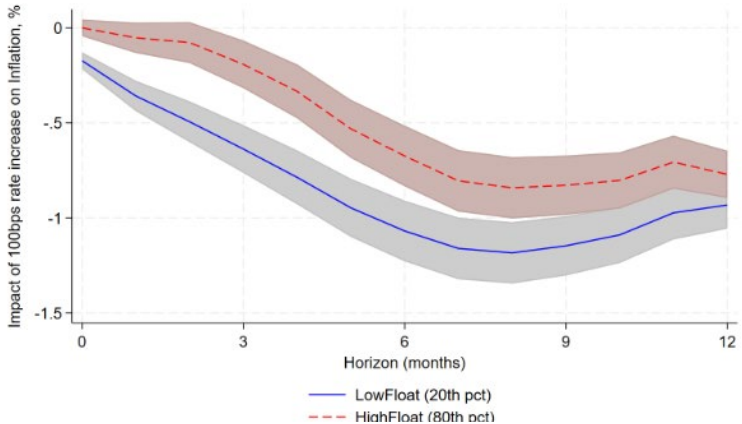
Conventional policy rate hikes' effects on prices vary with the actual increase triggered in borrowing costs

The Impact of Monetary Policy on Inflation: Floating and Fixed-rate Markets

Baseline



Floating (blue) vs. Fixed-rate (red) Markets



Notes: impulse response functions by local projection for a 100bps increase in the deposit rate facility on inflation (CPI growth) using a 12-month horizon and controlling for lagged inflation. Impulse response function are plotted for the average market (Baseline) and for markets with a low (20th pct.) vs. high (80th pct) share of floating-rate loans (Floating vs Fixed-rate Markets). The sample consists of monthly observations at for euro area firms the industry*country level from July 2021 until July 2023. Shaded areas represent 95% confidence bands.

- After a rate hike, firms with floating-rate loans (which experience a faster increase in borrowing costs compared to those borrowing at fixed-rates) keep prices elevated to offset higher borrowing costs, thereby reducing the effectiveness of monetary policy.
- The effect on inflation is stronger in markets that are more concentrated, where firms have higher leverage and where firms have lower cash buffers

Inflation and floating-rate loans:
evidence from the euro area
Core, De Marco, Eisert, Schepens (2024)

Selected initial results

Transmission of monetary policy via banks to HHs

Transmission of monetary policy via banks to HHs – overarching findings

Transmission of MP to HHs' borrowing and consumption appears to be as nuanced and heterogenous as that to NFCs, calling for further research. Current results help to micro-found macro modelling choices, encouraging a departure from single (representative) agent models. For example,

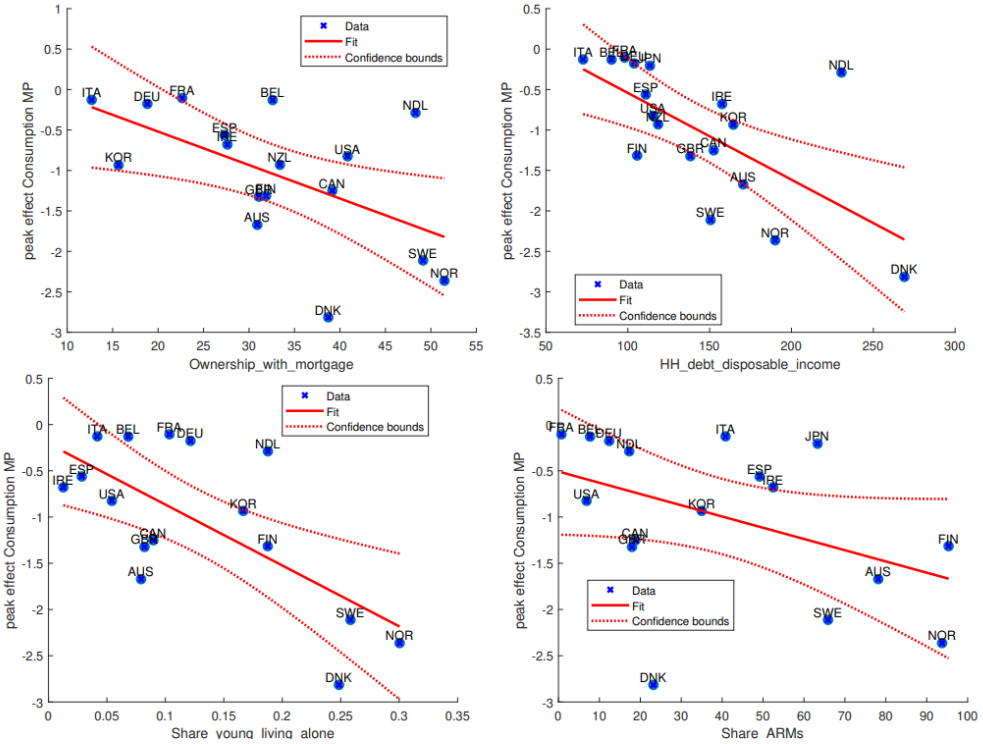
- Transmission is weaker in low-growth, low-rate, high-inflation environments
- Consumption responses are large, fast, and dependent on the household's balance sheet positions.
- Household consumption is more responsive to monetary policy than many macro models assume. Representative-agent models fail to capture important aspects of transmission.

Effect of MP on consumption varies along many dimensions

- Strong monetary policy (both conventional and unconventional) effects to consumption via housing markets
- The strength of the effect on consumption ranges from around 2% in France to around 68% in Norway
- Effect higher in countries with a higher share of:
  - homeowners with mortgage,
  - household debt to disposable income
  - young households living alone
  - adjustable-rate mortgages

consistently with cash-flow channel

Maximum effect of monetary policy shock on consumption and characteristics of housing markets across countries



Notes: results from a structural BVARs for 20 advanced economies (Australia, Belgium, Canada, Germany, Denmark, Spain, Finland, France, Ireland, Israel, Italy, Japan, Korea, Netherlands, Norway, New Zealand, Portugal, Sweden, UK, US.), for the period 1995-2023q4.

House prices, consumption and monetary policy: a cross-country analysis
Di Casola, Groethe (2024)

Beyond the aggregate statistics: results from 9 EA Credit Registers

ChaMP collective project: 9 credit registers!

- In the mortgage market, reasonable homogeneity in the transmission
- More heterogeneity in the consumer market (wider variety of underlying products)
- Age appears to be an important source of heterogeneity; pass-through is stronger for younger borrowers in the mortgage mkt, and vice-versa for cons credit mkt (however: tightening cycle only!)

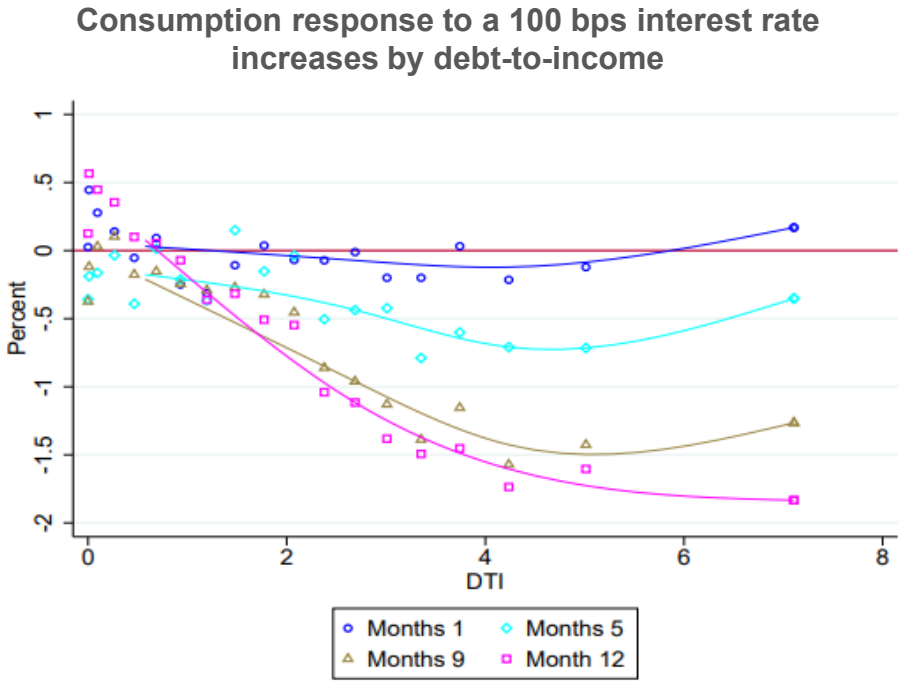
Estimated pass-through of changes in the relevant reference rate **by country** and **by age**

Notes: coefficient for changes in the risk-free reference rate on the average interest rate on new contract, percentage points. Reference category is Spain and 35-44 age group. Biannual data on interest rate on new contracts for the period 2022H1 – 2024H2 for Belgium (BE), Spain (ES), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Latvia (LV), Portugal (PT) and Slovakia (SK).

Household Borrowing and Monetary Policy Transmission: Post-Pandemic Insights from Nine European Credit Registers, De Jonghe et al, 2025

Measuring the impact on consumption

- Following a 100 bps interest rate increase, the consumption response of households who hold no debt is close to zero, while households at the 90th percentile of debt-to-income experience a consumption fall corresponding to around 2 percent of income after 1 year.



Notes: the figure shows the coefficient beta_hg, which identifies the average effect within group g of a one percentage point increase in the interest rate on consumption after h months, by time horizon and quantiles of households based on debt-to-income. Month 0 is the month of the instrumented interest rate change. The median value of the grouping variable for each of the quantile is shown on the horizontal axis. The vertical axis shows the estimated response of consumption, relative to its level in the three months before the change in the interest rate, in percent of income. Data are weekly individual level electronic payments in Norway provided by the Norwegian retail clearing institution over the period 2006-2018.

The cash flow channel of monetary policy – evidence from billions of transactions
Ahn, Galaasen, Maehlum (2024)

Selected initial results

Transmission of monetary policy via non-bank financial intermediaries (NBFIs)

Transmission of monetary policy via non-bank financial intermediaries (NBFIs) – overarching findings

NBFIs respond to changes in conventional monetary policy but in a way that is not homogenous across institutional types

Insurers amplify monetary policy transmission

- Monetary loosening (contractions) expands (tighten) insurers' balance sheets. Portfolio rebalancing toward higher-risk assets and increase in insurances' price to bolster their balance sheets.

Investment funds exhibit procyclical behavior and create risks to financial stability

- Monetary tightening triggers outflows from fragile open-end funds, leading to fire sales and reduced bank deposits. Tight monetary policy contracts fund assets in conservative markets but expands them in hubs like Luxembourg, due to regulatory arbitrage.
- Investment funds rebalance under stress. Central bank interventions matter.

Monetary transmission hinges on how collateral moves through repo markets

- Effective transmission requires understanding how central bank decisions shape collateral flows and repo market functioning.

NBFIs reduce their credit supply more following a monetary policy tightening

- Nonbanks reduce their credit supply more following a monetary policy tightening: results in column (1) suggest that a 1% increase in the Euribor leads to a 15-percentage points reduction in credit by nonbanks relative to banks.

- This higher sensitivity of nonbank lending is explained by:

  - Balance sheet strength: capital ratios and reliance on short-term financing;

  - Ownership structure (Asset Finance Specialists)

Monetary policy transmission: banks versus nonbank

Dependent variable: $\Delta \ln L_{b,l,t}$	(1)	(2)	(3)	(4)
Nonbank x 3M Euribor YoY	-14.945***	-13.976***	-12.514**	-10.488**
	(4.177)	(4.112)	(4.961)	(4.610)
3M Euribor YoY	-4.023*	-4.932**		
	(2.318)	(2.099)		
Nonbank	0.082			
	(0.058)			
Observations	6,420,304	6,420,303	3,473,506	2,117,801
R-squared	0.021	0.035	0.181	0.533
Lender FE	No	Yes	Yes	Yes
Industry-Location-Time FE	No	No	Yes	No
Firm-Time FE	No	No	No	Yes

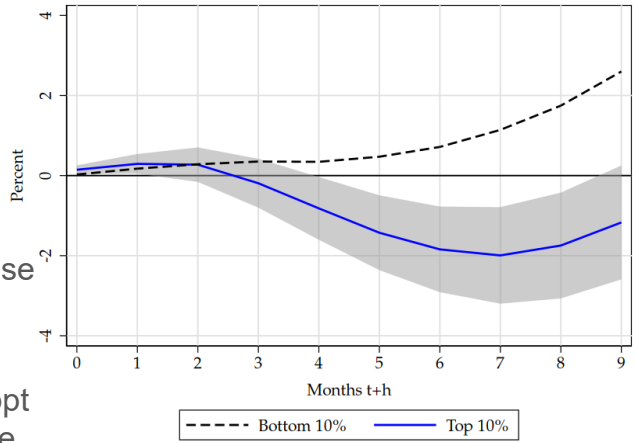
Notes: The dependent variable is the year-on-year change in outstanding loan volumes of borrower b with lender ℓ at time t. 3M Euribor YoY is the year-on-year change in the Euribor, while Nonbank is a dummy equal to one for nonbank lenders, and zero otherwise. Standard errors clustered at the lender level are in parentheses. ***,**,* represent significance at 1, 5 and 10% levels, respectively. Monthly loan-level data for the universe of banks and non-banks active in Ireland for the period 2018-2023.

Non-banks and monetary policy transmission
McCann, Hoffmann, Peia, Schepens (2024)

Homeowners insurance market amplifies monetary policy transmission to the real estate sector

- Contractionary MP surprises have a dampening effect of on insurance supply on average
  - US NAIC data on insurer balance sheets and insurance prices
- This effect is more pronounced for insurers that hold larger amounts of interest-rate-sensitive assets and a larger share of their assets mark-to-market.
- When local insurers are more sensitive to monetary policy, home prices and mortgage applications decrease significantly more in response to contractionary MP surprises
- The differential effect is economically significant: a 1 ppt monetary policy surprise reduces home prices over the following six months by about 0.7% in counties with a low insurer sensitivity and by approximately twice as much in counties with a high insurer sensitivity.

Home prices and monetary policy transmission



Notes: coefficients from a regression of the growth in home prices on a 1 percentage point monetary policy surprises interacted with local insurers' sensitivity to monetary policy. The black dashed (blue solid) line represents the effect at the 10th (90th) percentile of the pooled distribution of insurers' sensitivity. The grey area plots the corresponding 90% confidence intervals. Insurer sensitivity is estimated based on financial constraints and mark-to-market share in panel. Data on "rate filings", which track changes in homeowners insurance prices, submitted between 2010 and 2019 from S&P's Rate Watch database in the US.

Homeowners Insurance
and the Transmission of Monetary Policy
Damast, Kubitza, Sørensen (2025)

Monetary policy transmission via the real economy (WS2)

Transmission of monetary policy via production networks

- Better understanding of how (monetary policy) shocks propagate through or are amplified by production networks (using sectoral data or B2B data)

Monetary policy transmission and structural changes (*not part of today's presentation*)

- Do structural changes such as affect the transmission of monetary policy?
- How does monetary policy affect the structural transformation of the euro area economy?

Corollary: Implications for shape and slope of the Philips Curve

Transmission via production networks

Production networks bring further dimensions of heterogeneity important to understand the transmission of monetary policy

- in labor skills, consumption and income distribution;
- In the nature of price setting
- in input shares

Why are they useful?

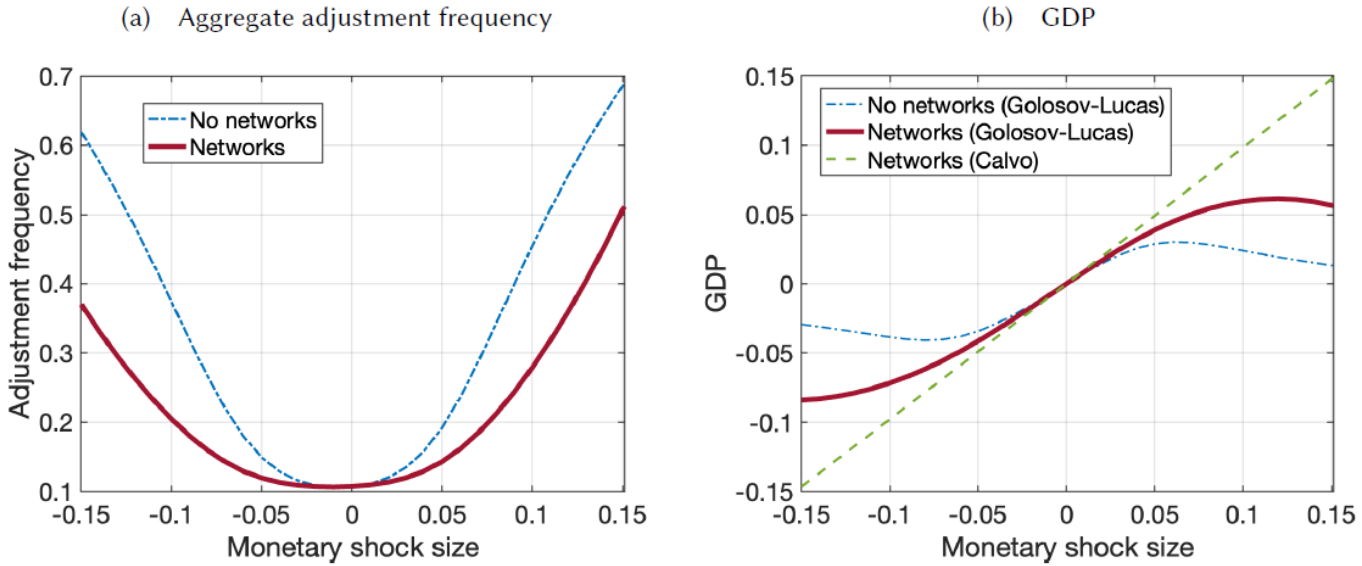
Models with production networks and sectoral heterogeneity can capture:

- nonlinearities in the transmission of monetary policy shocks,
- the dampening or amplification effects of shocks to inflation arising from the network structure
- the distributional effects of monetary policy.

Selected initial results

Production Networks

The type of shock matters for its propagation



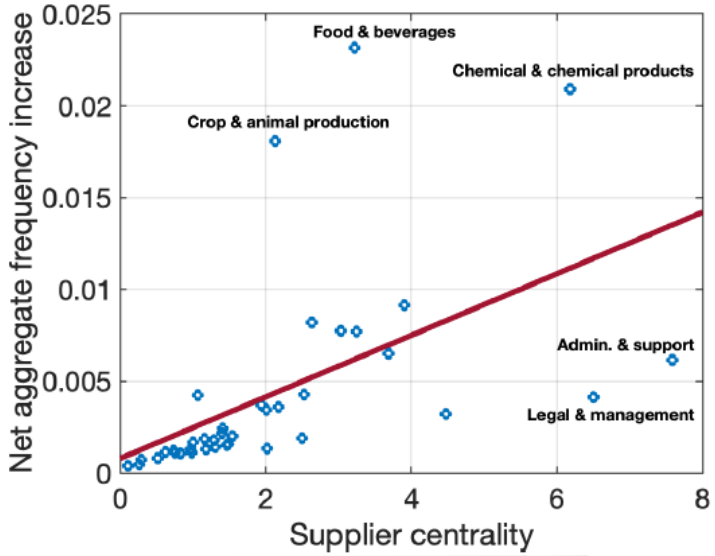
Model features sectors interconnected by networks with state-dependent pricing that is solved fully non-linearly

- Networks slow down the extensive margin pricing response to demand shocks: cascades dampening (chart)
- Networks speed up the extensive margin response to supply shocks: cascades amplification
- Interaction of networks and pricing cascades crucial for matching the observed surges in inflation and repricing frequency in EA

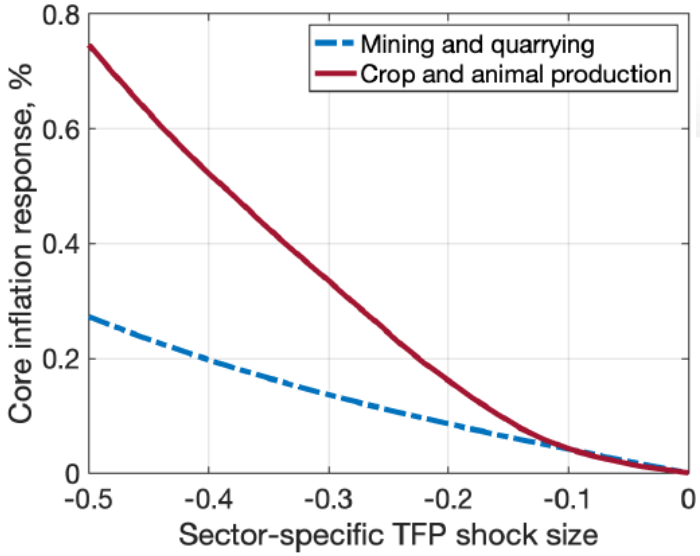
Business cycles with pricing cascades,
Ghassibe and Nakov, forthcoming

Sectoral centrality drives inflation dynamics

(a) (Net) aggregate adjustment frequency



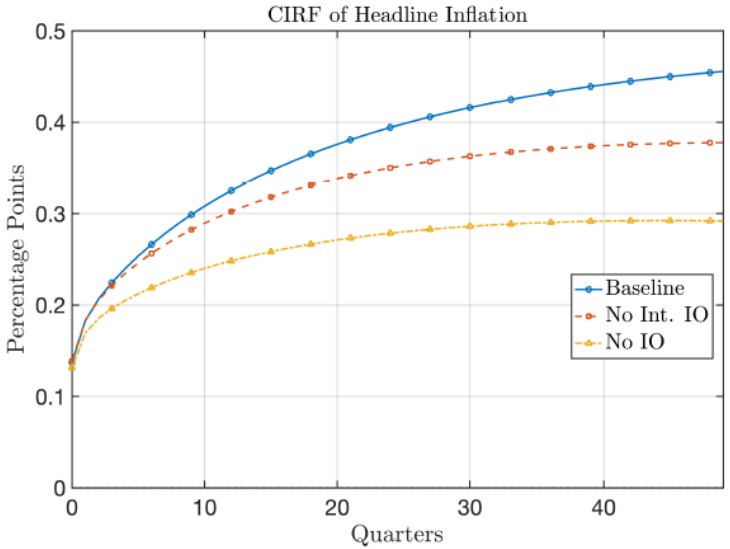
(b) Core inflation response

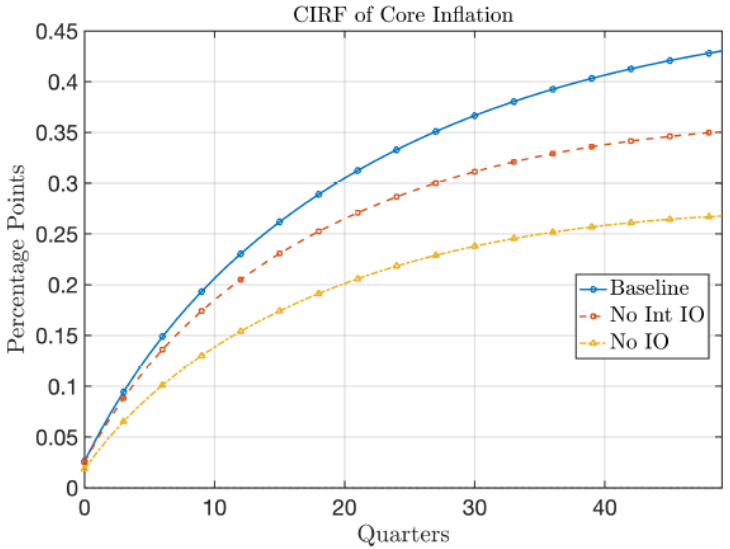


- Shocks originating in upstream or highly connected sectors can trigger widespread pricing cascades and aggregate inflationary surges, regardless of the sector's relative size in GDP.
- Calls for the integration of input-output linkages into policy analysis.
- Importantly, the model explains post-Covid inflation dynamics without resorting to implausibly large shocks.

Business cycles with pricing cascades,
Ghassibe and Nakov, forthcoming

Production networks explain amplification of shock and inflation persistence

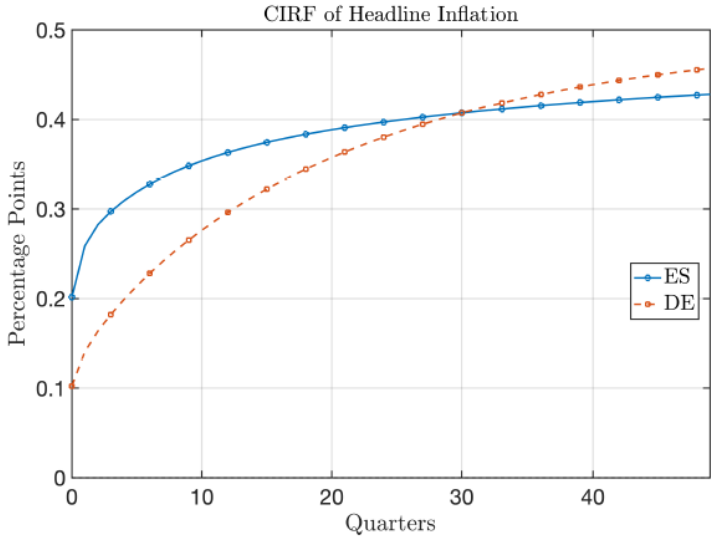


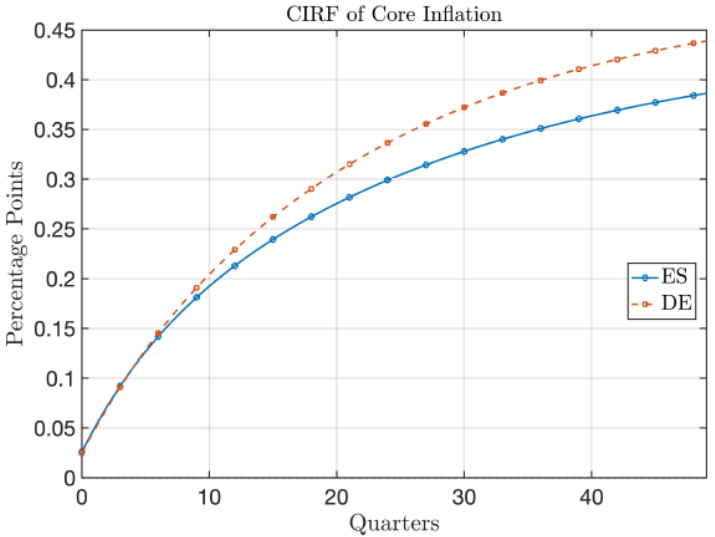


- The paper shows analytically that shocks to international import prices (for example, energy prices) generate a meaningful trade-off for monetary policy in the presence of production networks.
- Additionally, the network structure helps to understand the amplification of the inflationary impact and the persistence caused by a hike in energy prices

The Transmission of Foreign Shocks in a Networked Economy, Aguilar, Domínguez-Díaz, Gallegos, Quintana, forthcoming

Different production structures result in different inflation dynamics

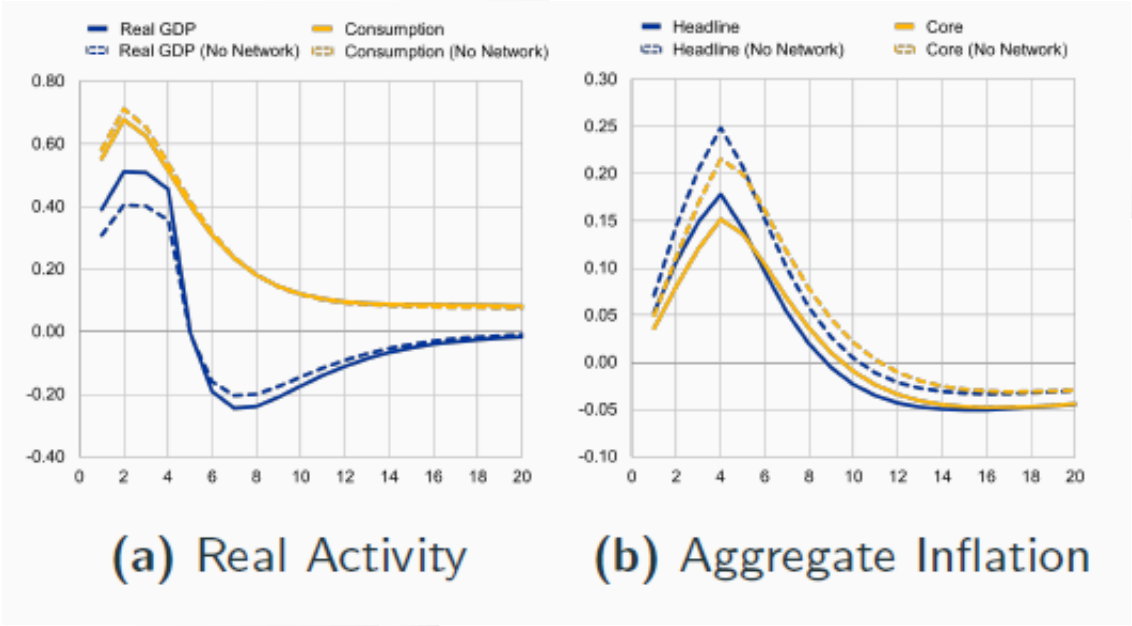




- Countries with longer production chains like Germany exhibit higher inflation persistence than countries characterized by more downstream production structures like Spain.
- Accounting for the different production structures in the Euro Area lead common global shocks to deliver country-specific inflation dynamics.

The Transmission of Foreign Shocks in a Networked Economy, Aguilar, Domínguez-Díaz, Gallegos, Quintana, forthcoming

Sectoral transmission of monetary policy



- Dynamic New Keynesian multi-sector model of the euro area with heterogeneous price and wage rigidities, sector specific factor shares, and frictions in labour and capital reallocation used to analyse the transmission of sectoral and aggregate shocks and how monetary policy affects both aggregate and sectoral dynamics.
- The model shows that these features of the model affect significantly the sensitivity of inflation to interest rate changes on the nominal side.

A Multi-Sector Production Network Model for the Euro Area, Christoffel, Dobrew, Gebauer, Höynck, Lisack, Mazelis, Müller, forthcoming

Collective projects

1. Shock transmission in a monetary union

An alternative (to HANK) way to model heterogeneity based on Rubbo (2024)

- New, supply-side, way to study distributional effects of monetary policy
- Unlike HANK: not via consumption-savings decisions, but exposure to income shocks
- Heterogeneity comes from occupation/sector, degree of wage rigidity, price rigidity of the consumption basket and ownership of capital and firms

Policy contributions:

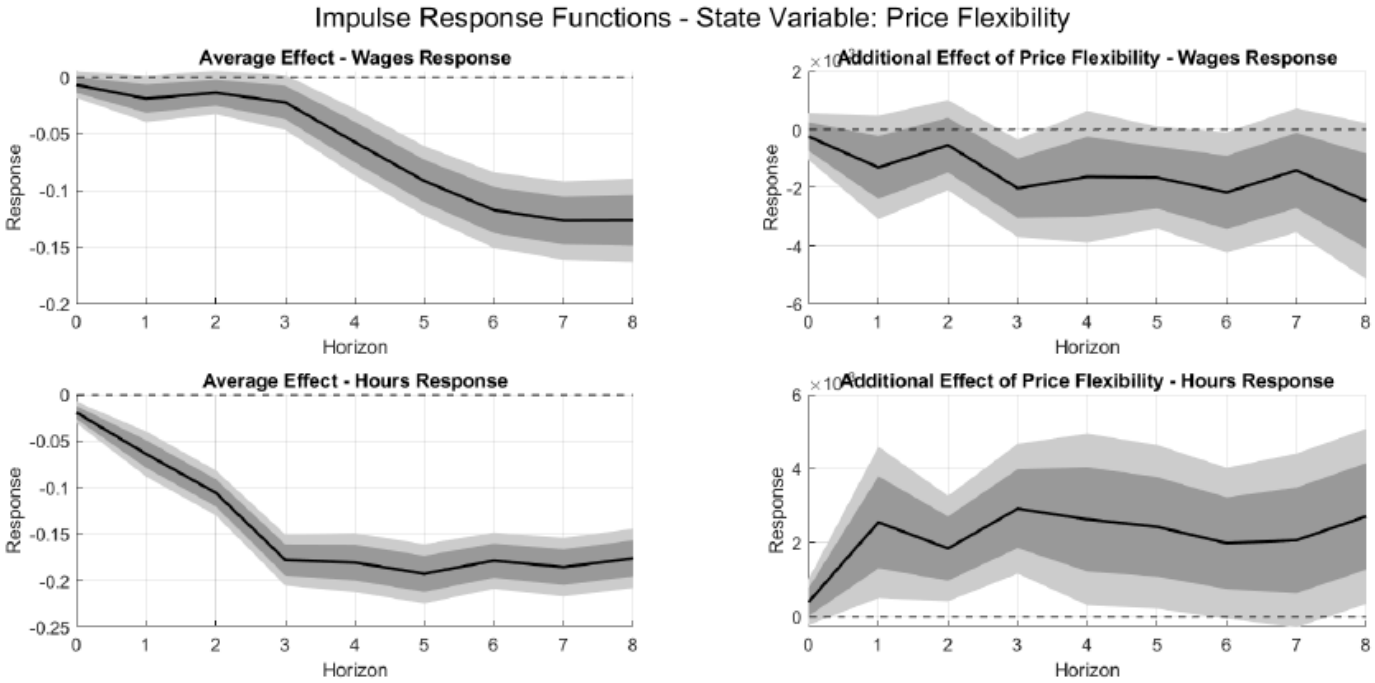
- Document heterogeneous sectoral structures and rigidities in euro area countries
- Quantify which regions/occupations gain/lose from policy (or other) shocks

Initial results:

- Households working in sectors with stickier prices and more labor intensive are more strongly affected
- Aggregate effects are larger if markets are more segmented (as is the case in the euro area)

ChaMP cross-country project, Rubbo, Aguilar, Buss, Cantelmo, Covarrubias, Dhyne, Dobrew, Domínguez-Díaz, Elfsbacka Schmöller, Gallegos, Lisack, Osbat, Paz Pardo, Pisani, Quintana, Valderrama, Verdini, forthcoming

Preliminary results: price flexibility



ChaMP cross-country project, Rubbo, Aguilar, Buss, Cantelmo, Covarrubias, Dhyne, Dobrew, Domínguez-Díaz, Elfsbacka Schmöller, Gallegos, Lisack, Osbat, Paz Pardo, Pisani, Quintana, Valderrama, Verdini, forthcoming

2. The transmission of monetary policy through firm linkages (a B2B production network)

Within ChaMP, important data collection initiative to characterize the organisation of domestic production networks

- B2B data transaction data available in six EU countries: Belgium, Estonia, Hungary, Italy, Netherlands, Portugal
- Common set of network statistics : Number of suppliers, customers, upstreamness, centrality (systemic importance)
- Commonalities emerge in the organisation of local production network despite cross-country difference in the reporting of B2B transactions

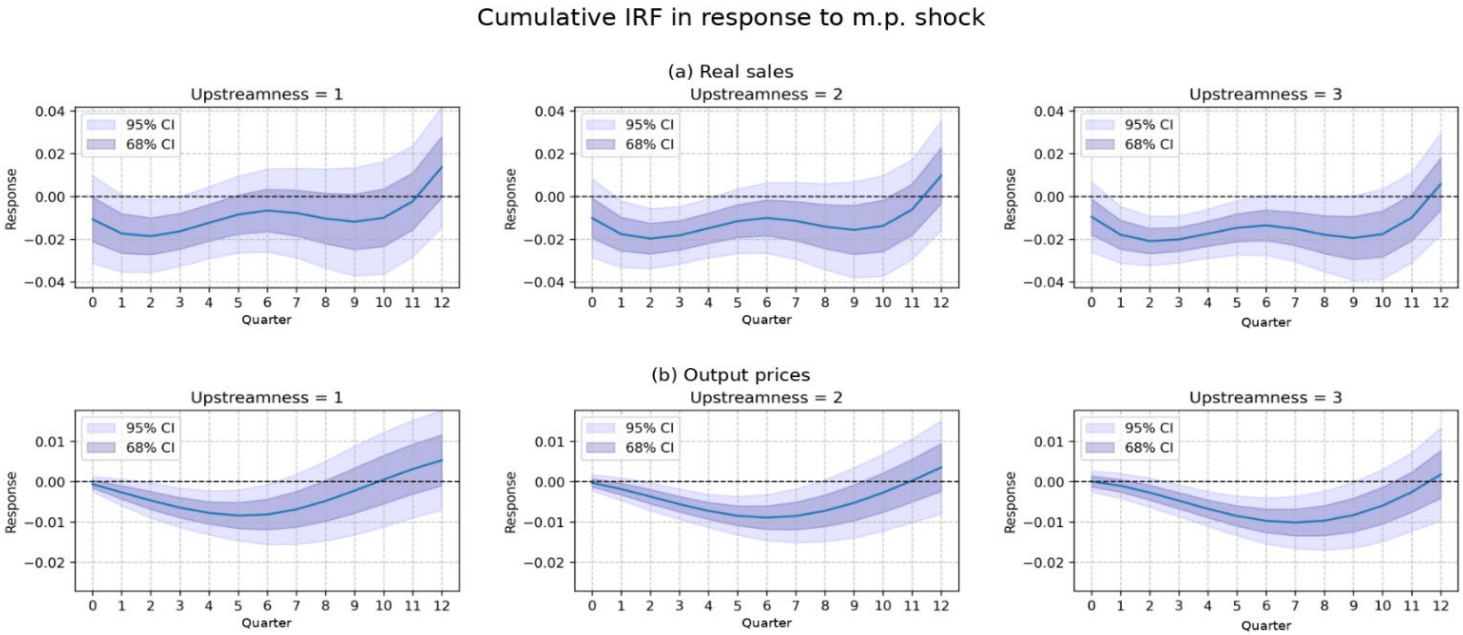
How does this influence the transmission of monetary policy at the firm level?

- Local projection exercise, using quarterly producer prices (manufacturing) and real sales at the firm level (preliminary evidence from Belgium)

Main Takeaways

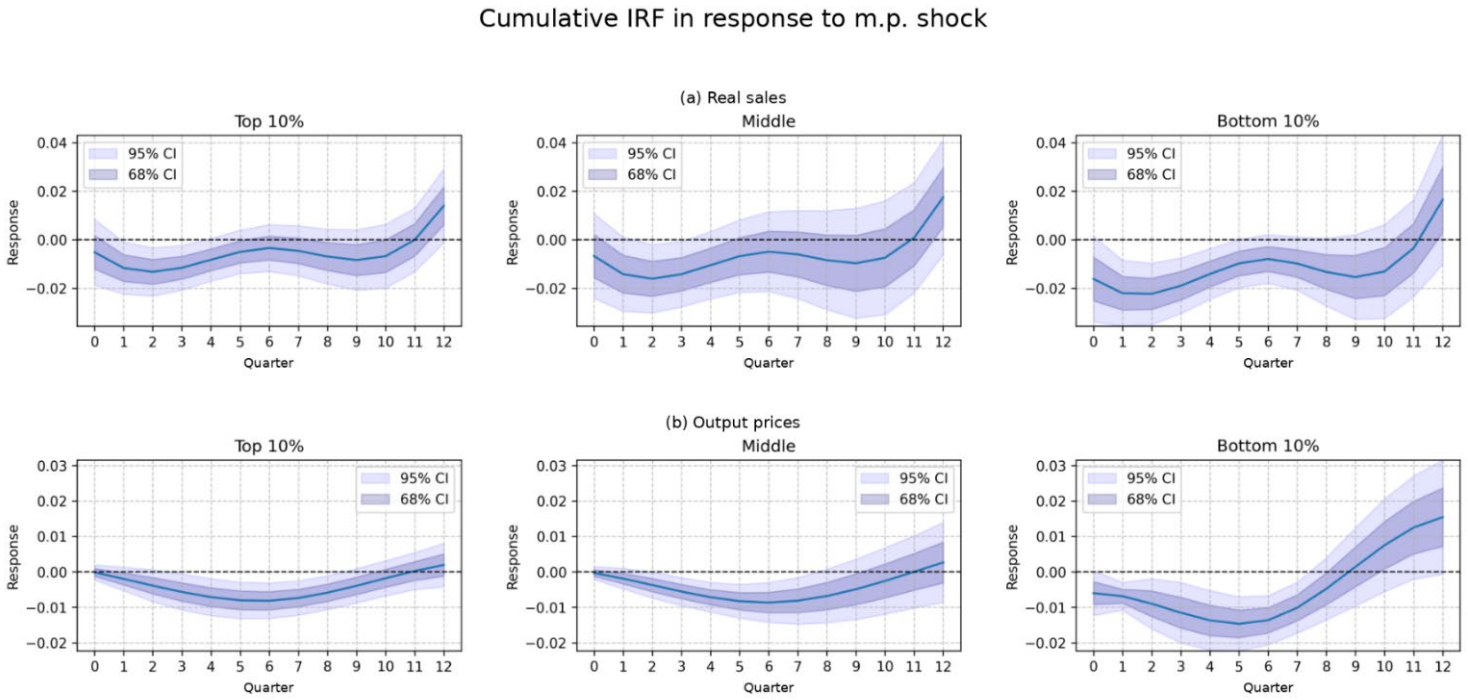
- We see a more delayed price response for more upstream firms and a somewhat more persistent response on sales.
- The effect of a monetary policy shock on prices and quantities is stronger for less central firms.

Position in the production network determines the response to m.p. shocks



ChaMP collective project: Palazollo, Magerman, Dyhne, Borso, Kulikov, Linarello, Saldias, De Winter, forthcoming

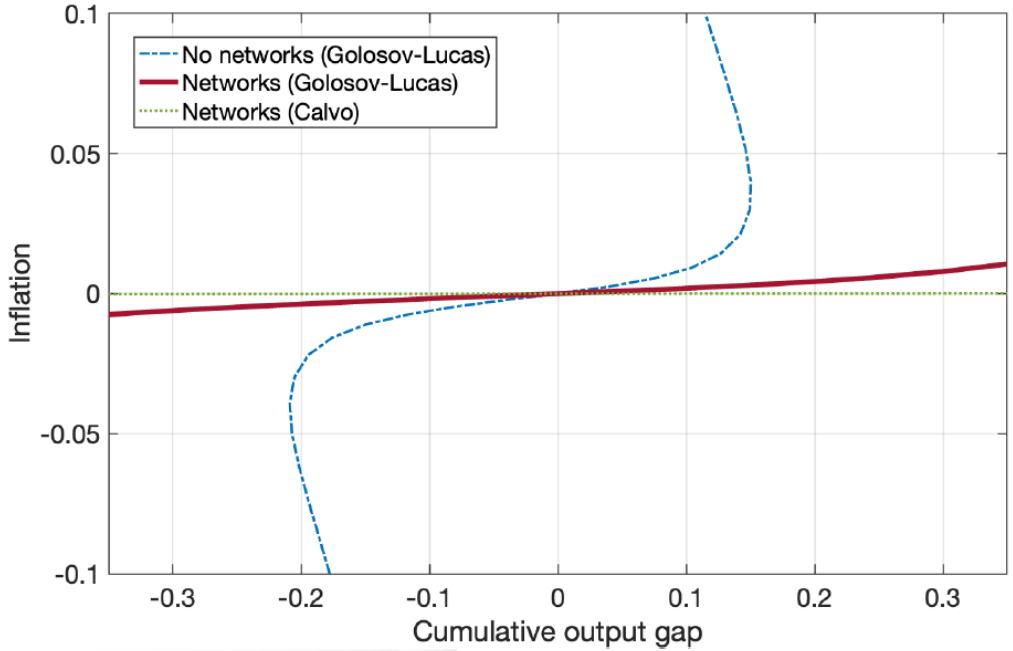
…as well as its „centrality“



ChaMP collective project: Palazollo, Magerman, Dyhne, Borso, Kulikov, Linarello, Saldias, De Winter, forthcoming

Implications for the Phillips curve

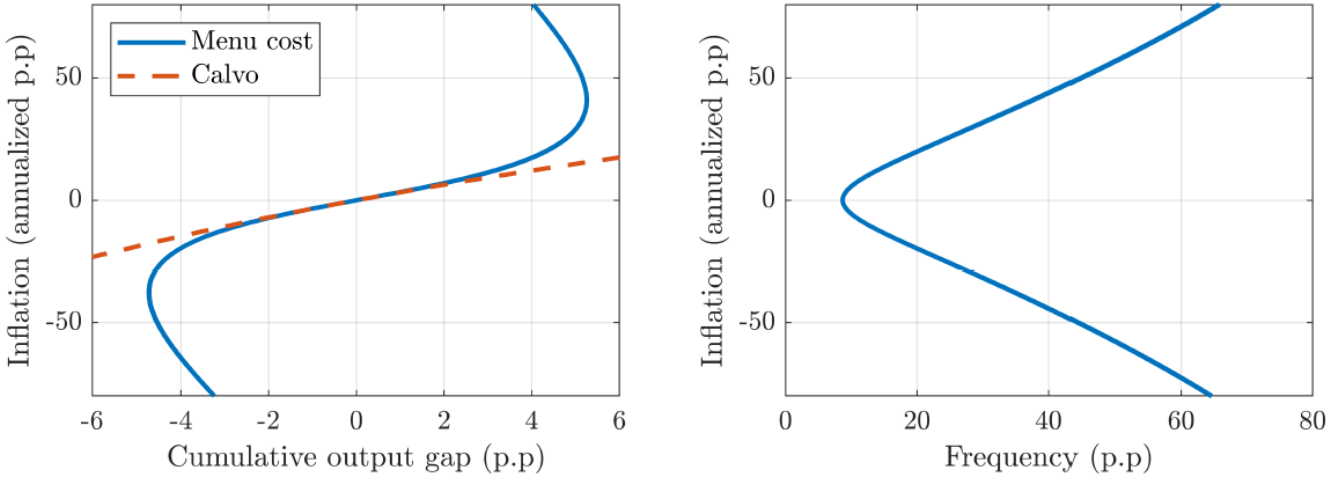
Production networks affect the Phillips curve…



- Networks slow down the extensive margin pricing response to demand shocks: cascades dampening
- Networks speed up the extensive margin response to supply shocks: cascades amplification
- As a result, we observe a flattening and steepening of the Phillips curve

Business cycles with pricing cascades,
Ghassibe and Nakov, forthcoming

….and this affects monetary policy



- The paper argues that in periods of significant economic shocks -- such as sudden increases in costs -- firms tend to change their prices more frequently.
- This behavior leads to what is known as a ``nonlinear Phillips curve," where inflation becomes more sensitive to changes in economic output.
- The central finding is that, in such scenarios, the costs of reducing inflation through tighter monetary policy are lower than previously thought because the economy adjusts more quickly when prices are already changing frequently.

Strike while the Iron is Hot -- Optimal Monetary Policy under State-Dependent Pricing, Karadi, Nakov, Nuño, Pastén and Thaler (2024)

Background slides

Other Phillips curve results

- Empirical and theoretical studies suggest that Phillips Curves might display more non-linearities than previously thought
  - In times of high inflation, firms adjust prices more frequently and/or react more strongly to shocks (Ahlander, Klein, Pappa)
  - Production networks may rationalise the nonlinearities: they slow down the transmission of demand shocks, but speed up the adjustment to (large) supply shocks (Ghassibe, Nakov)
  - Microdata on networks help to better understand the PC (Gagliardone et al.)
  - Structural changes have also impacted the PC (e.g. labor markets, Siena, Zago)

- Optimal monetary policy should take the nonlinear dynamics of the PC into account
  - Karadi, Nakov, Nuño, Pasten, Thaler: monetary policy should react more strongly against large cost-push shocks because the sacrifice ratio is lower