

Rising Heterogeneity and Policy Effectiveness

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CompNet Conference

Plan

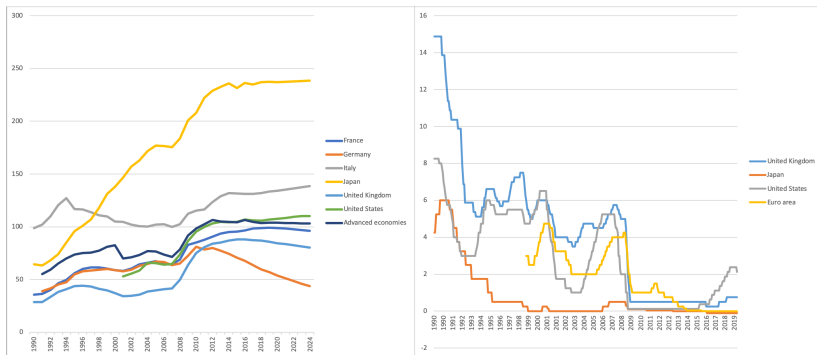
- 1 Motivation
- 2 Key findings
- 3 Data
- 4 Empirical identification
 - Average response to policy shock
 - Additional response to the interaction with rising heterogeneity
- 5 Concluding remarks

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Observation 1: constraints on policy instruments

Public debt at the maximum and policy rate at the minimum level:



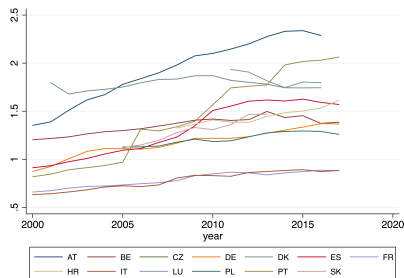
(a) Public debt

(b) Monetary policy rate

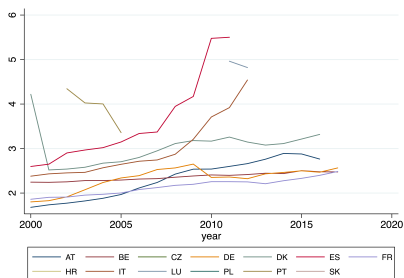
Sources: IMF Fiscal Monitor and BIS.

Observation 2: rising heterogeneity

Distributional data exhibits rising heterogeneity in various dimensions:



(c) Current debt/total assets

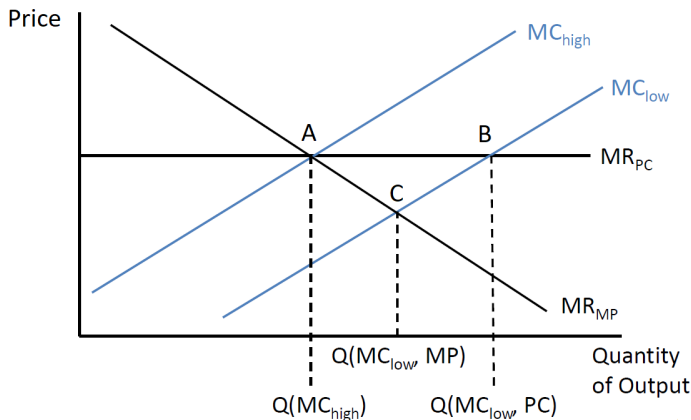


(d) Interest on debt

Sources: BACH.

Simple framework: example of rising markup

An expansionary MP shock lowers marginal cost (shift from MC_{high} to MC_{low}).



- Under perfect competition, output increases (from A to B).
- Under imperfect competition, output increases (from A to C), less than in perfect competition case.

Sources: Syverson (2018).

Research question and contribution to literature

How effective are public policies in a context of rising heterogeneity?

- 1 Rising heterogeneity in firm-level variables.
 - ▶ IMF WEO 04/2019 Ch. 2; Calligaris, Criscuolo and Marcolin (OECD, 2018); De Loecker and Eeckhout (2017, 2018).
- 2 Macroeconomic implications of rising heterogeneity.
 - ▶ Jackson Hole 2018 (Haldane, Syverson,...), Jones and Philippon (2016).
- 3 Debate on policy effectiveness.

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Key findings

On average,

- MP tightening shock lowers output and investment, as expected.
- Fiscal adjustment (tax increase) shock lowers output and investment, as expected

When interacted with rising heterogeneity,

- Response is amplified when MP tightening shock is interacted with rising markup and TFP.
- Response is weakened when MP tightening shock is interacted with rising heterogeneity in price-to-cost margin and marginal product of capital.
- Response is amplified when fiscal tightening shock is interacted with rising heterogeneity.

Bottom line: Responsiveness to policy varies across dimensions of rising heterogeneity and the latter needs to be taken into account.

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Data for macro analysis

- 1 CompNet database: semi-aggregated firm-level data.
 - ▶ Country coverage: 18 European countries.
 - ▶ Sector coverage: variable across datasets (2-digit, 1-digit classification).
 - ▶ Period coverage: 1999 - 2016 (unbalanced).
- 2 BACH database: semi- and aggregated financial statements.
 - ▶ Country coverage: 11 European countries.
 - ▶ Sector coverage: 19 industries.
 - ▶ Period coverage: 2000 - 2016.
- 3 EU Klems Database (after merger with the previous dataset)
 - ▶ Country coverage: 11 European countries.
 - ▶ Sector coverage: variable across datasets.
 - ▶ Period coverage: 1999 - 2015.

Monetary policy shock identification

Shock identification is based on Furceri, Loungani and Zdzienicka (2018).

- 1 Compute forecast errors for macroeconomic variable j in country c :

$$FE_{c,t}^j = \underbrace{A_{c,t}^j}_{\text{Actual value}} - \underbrace{F_{c,t}^j}_{\text{Forecast value}}$$

- 2 For each country separately, regress forecast error in policy rate (tb) on that of GDP (y) and inflation (p):

$$FE_{c,t}^{tb} = \alpha_c + \beta_c FE_{c,t}^y + \gamma_c FE_{c,t}^p + \varepsilon_{c,t}^m$$

- 3 $\varepsilon_{c,t}^m$ corresponds to unexpected change in policy rate (orthogonal to unexpected change in GDP and inflation).

Fiscal policy shock identification

Fiscal policy shock stems from IGIER Database following (Gujardo, Leigh and Pescatori, 2011)

- 1 Report measures from archives of budget speeches and documents
 - ▶ Focus on fiscal measures that aim to reduce budget deficits
 - ▶ Measures that do not respond to current and/or prospective economic conditions)
- 2 Measures are grouped in year they are introduced (rather than time they are implemented).

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Average response to policy shock

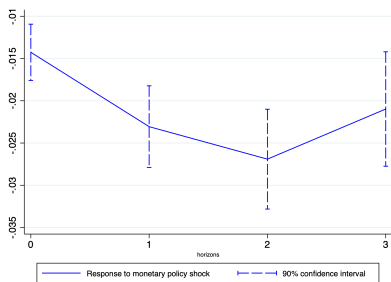
Local projection (Jorda, 2005) of dependent variable (output, investment and value added) at horizon h :

$$\begin{aligned}\tilde{y}_{c,s,t+h} &= \ln(y_{c,s,t+h}) - \ln(y_{c,s,t-1}) \\ &= \alpha_c^h + \alpha_s^h + \alpha_t^h + \beta_{policy}^h \varepsilon_{c,t}^{policy} + \Gamma^{h'} X_{c,s,t} + \varepsilon_{c,s,t+h}\end{aligned}$$

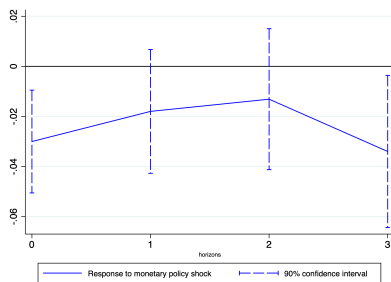
- c , s , and t denote respectively country, industry and time.
- $y_{c,s,t}$: output, investment and value added.
- $\varepsilon_{c,t}^m$: policy shock (MP tightening - increase of 100 bps or fiscal tightening).
- $X_{c,s,t}$: control variables and lags.

β_m^h denotes the response of \tilde{y} at $t+h$ to policy shock occurred at t .

MP shock: An unexpected increase in policy rate of 100 bps lowers output and investment



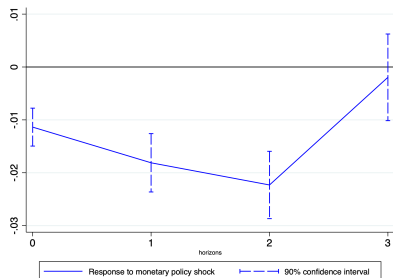
(a) Output



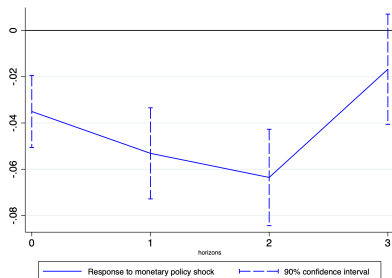
(b) Investment

Figure: Average response to MP tightening shock

Tax shock: Fiscal adjustment lowers output and investment



(a) Output



(b) Investment

Figure: Average response to fiscal adjustment shock

Additional response to the interaction with rising heterogeneity

Local projection of output on policy shock, controlling for country-year, industry-year fixed effects. Average response to MP shock is absorbed by country-year fixed effects.

$$\tilde{y}_{c,s,t+h} = \alpha_c^h + \alpha_s^h + \alpha_t^h + \beta_{policy}^h \varepsilon_{c,t}^{policy} \times \mu_{c,t} + \Gamma^{h'} X_{c,s,t} + \varepsilon_{c,s,t+h}$$

- c , s , and t denote respectively country, industry and time.
- $y_{c,s,t}$: output, investment and value added.
- $\varepsilon_{c,t}^m$: policy shock (MP tightening - increase of 100 bps or fiscal tightening).
- μ_t : measure of heterogeneity.
- $X_{c,s,t}$: control variables and lags.

β_{policy}^h denotes the response of \tilde{y} at $t+h$ to policy shock occurred at t .

Types of heterogeneity

Using CompNet and BACH databases, it is possible to compute inter-quartile measures (p75/P25) along with various dimensions.

From CompNet database:

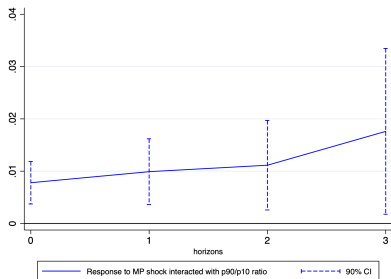
- De Loecker and Warzynski (2012) Markup using Cobb-Douglas or Translog function;
- Price-to-cost margin;
- Revenue-based TFP using Cobb-Douglas function;
- Marginal product of capital (using revenue or value added).

From BACH database:

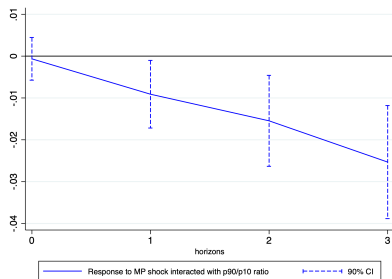
- capital ratio;
- profitability ratio;
- variables from income statement, balance sheet and cash flow statement.

MP shock: MP tightening is stronger with TFP heterogeneity and weaker with markup

Interaction effects are significant as for MP tightening shocks.



(a) Price-to-cost margin

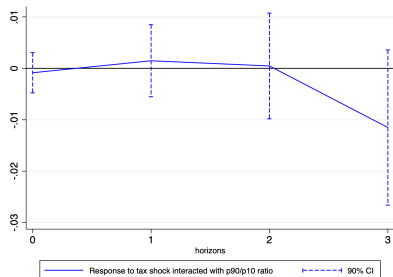


(b) Revenue-based TFP
(Cobb-Douglas at the sector level)

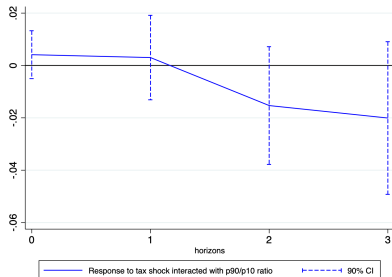
Figure: IRFs to MP tightening shock interacted with heterogeneity measure

Tax shock: Fiscal adjustment lowers output and investment

Interaction effects are not significant as for fiscal adjustment shocks.



(a) Price-to-cost margin



(b) Revenue-based TFP
(Cobb-Douglas at the sector level)

Figure: IRFs to fiscal adjustment shock interacted with heterogeneity measure

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Concluding remarks

Recap:

- Use of distributional data to tackle rising heterogeneity issues.
- Rising heterogeneity can affect policy effectiveness.

Next steps:

- Further investigation using firm-level data
 - ▶ Group estimation as in Cloyne, Ferreira, Froeml and Surico (2018), Ottonello and Winsberry (2019)
- Theoretical framework - Heterogeneous agents model.