Discussion of "No Firm Is an Island? How Industry Conditions Shape Firms' Aggregate Expectations"

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Sciences Po and CEPR

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Important Question in Macro

- Why does the price level (or some other aggregate of firm choices) react slowly to shocks?
  - adjustment costs (Calvo, Rotemberg, menu cost)
  - information frictions (Lucas, 1972, Mankiw-Reis, 2002, Woodford, 2003, Maćkowiak-Wiederholt, 2009)

Short Summary of Maćkowiak-Wiederholt (2009)

- The profit-maximizing price of firm i in period t:

$$p_{it}^{*} = p_{it}^{*A} + p_{it}^{*I}$$

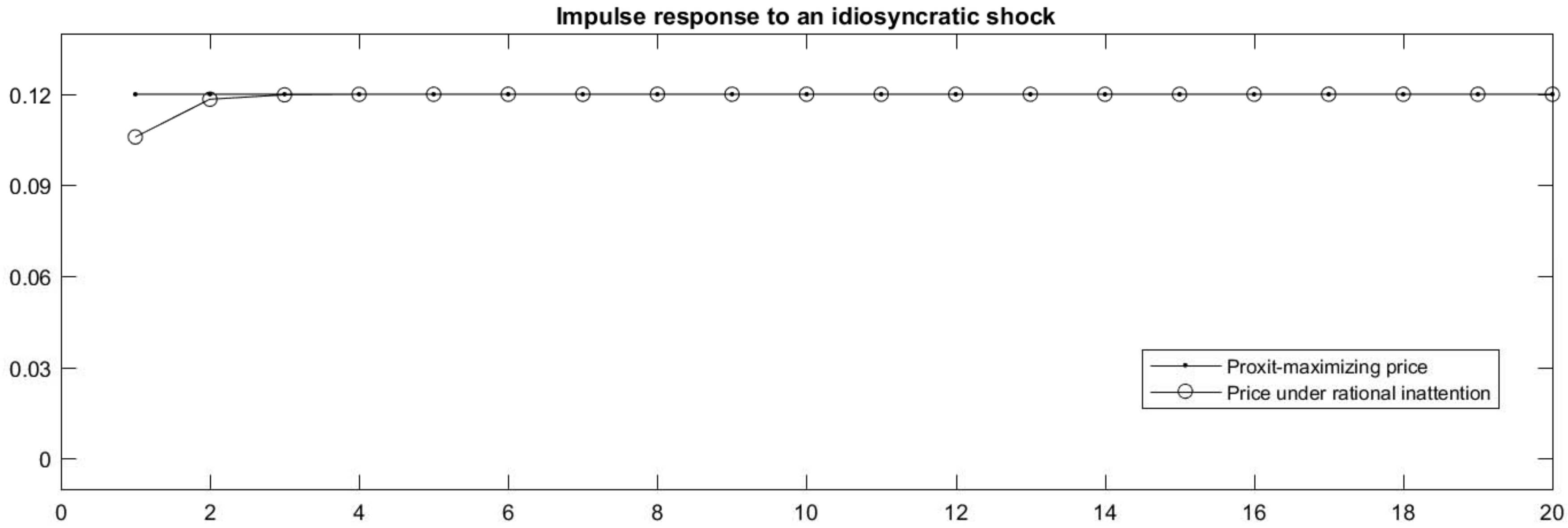
  The aggregate component, p_{it}^{*A}, and the firm-specific component, p_{it}^{*I}, follow independent, Gaussian AR(1) processes.
- The actual price set by firm i in period t:

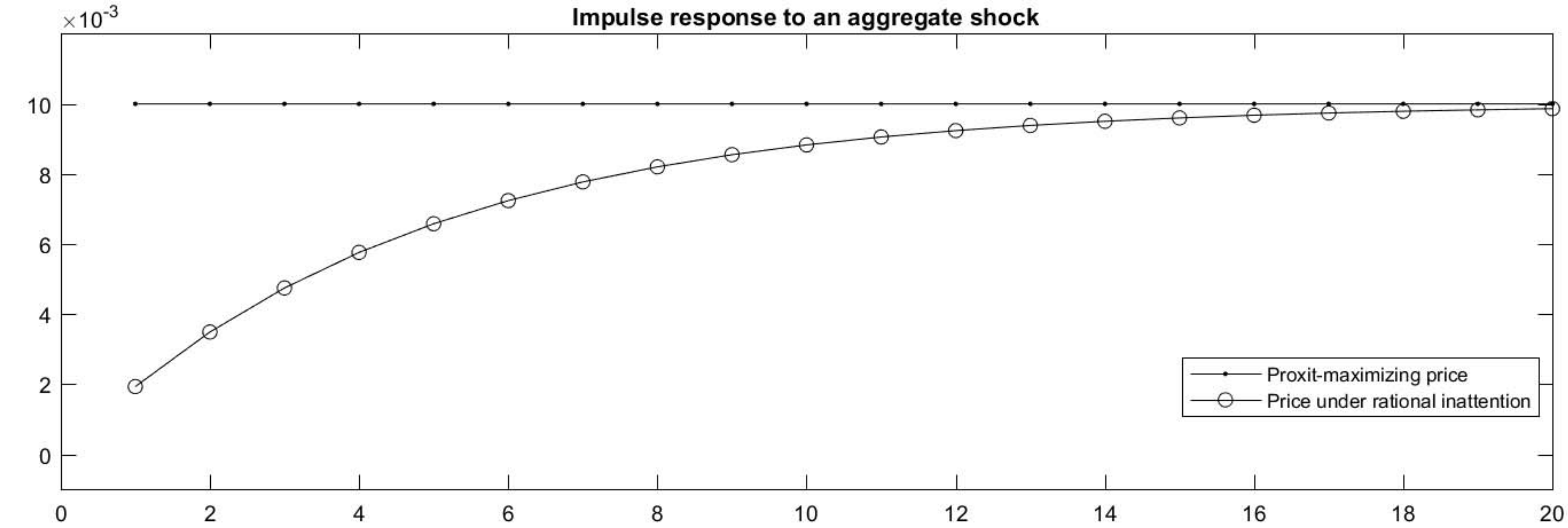
$$p_{it} = E\left[p_{it}^{*} | \mathcal{I}_{it}\right]$$

- Optimal signal under rational inattention with the independence assumption:

$$s_{it} = \begin{pmatrix} p_{it}^{*A} + \psi_{it}^{A} \\ p_{it}^{*I} + \psi_{it}^{I} \end{pmatrix}$$

- The gaps $\left(p_{it}^{*A} - p_{it}^{A}\right)$ and $\left(p_{it}^{*I} - p_{it}^{I}\right)$ follow AR(1) processes. Size and persistence of each gap is decreasing in attention. Attention is increasing in importance and volatility.


Impulse response to an idiosyncratic shock
0.12
0.09
0.06
0.03
0
0
2
4
6
8
10
12
14
16
18
20
Proxit-maximizing price
Price under rational inattention


Impulse response to an aggregate shock
×10^-3
10
8
6
4
2
0
0
2
4
6
8
10
12
14
16
18
20
Proxit-maximizing price
Price under rational inattention

Short Summary of Maćkowiak-Moench-Wiederholt (2009)

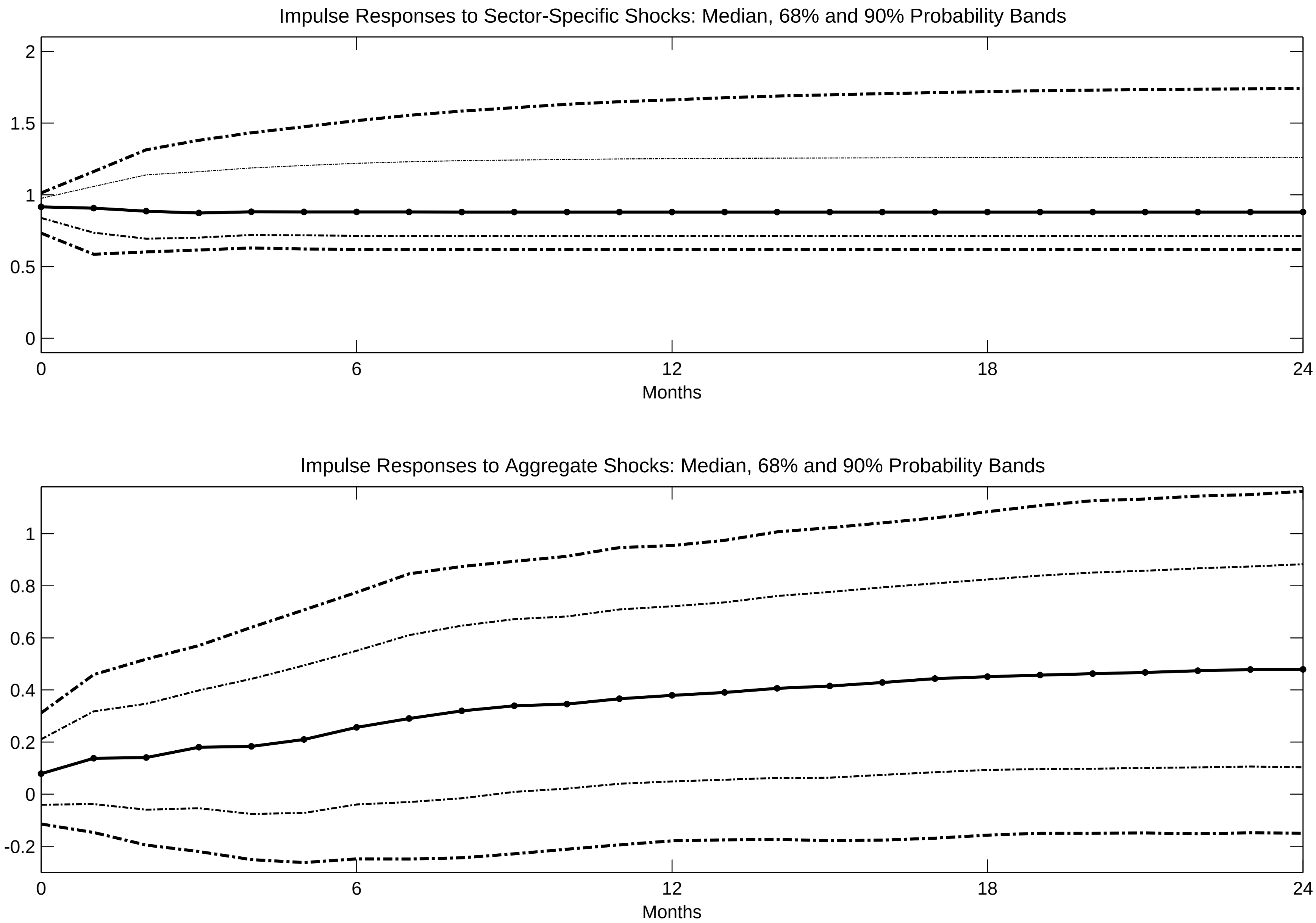
- The empirical model:

$$\pi_{jt} = \mu_j + A_j(L)\,\varepsilon_t + B_j(L)\,\varepsilon_{jt}$$

  π_{jt} is inflation in sector j in period t. $A_j(L)$ is the lag-polynomial of an MA(q) process. $B_j(L)$ is the lag-polynomial of an AR(p) process.

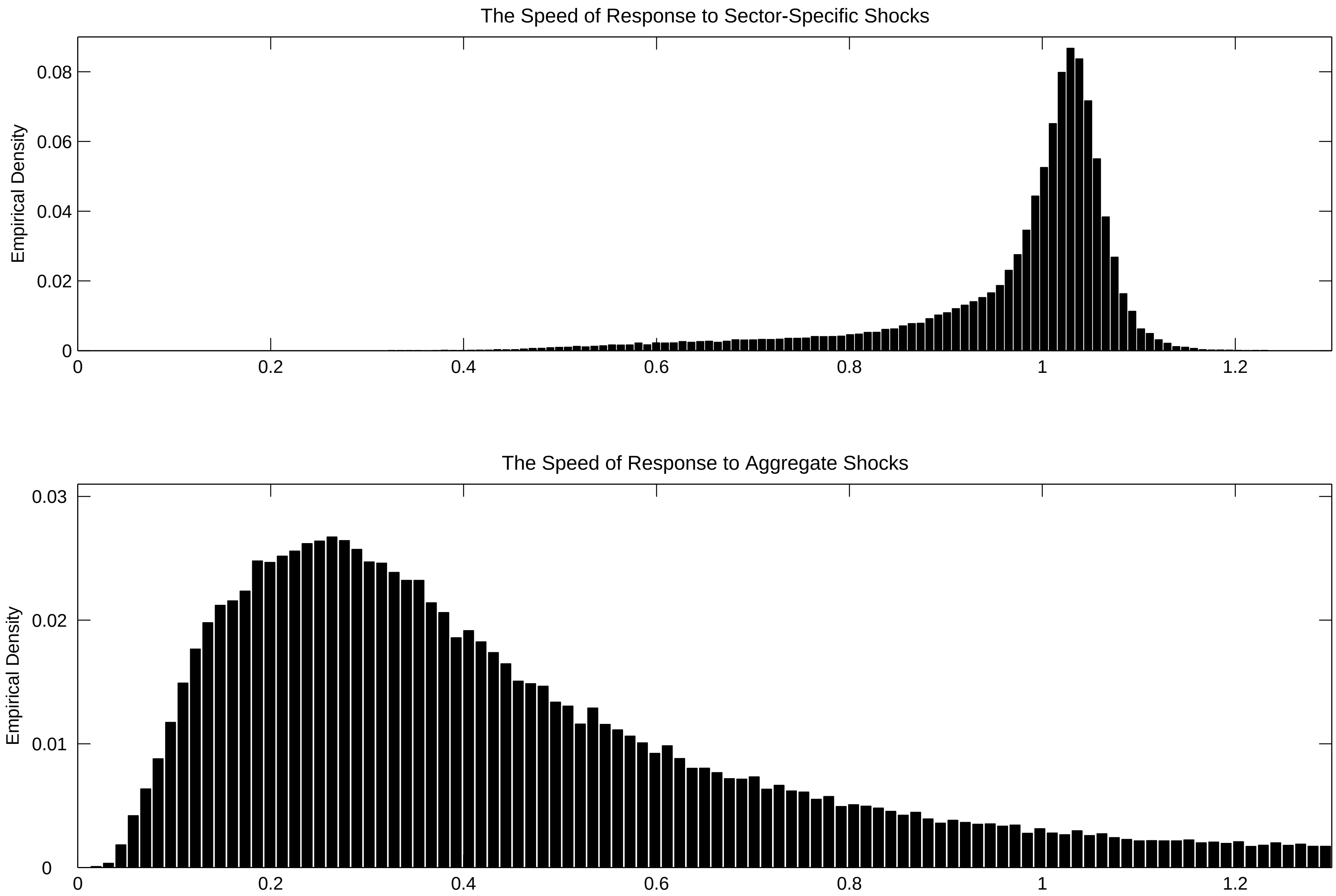
- This dynamic factor model of sectoral inflation is estimated on US data using Bayesian methods.

Figure 1: The Cross-Section of the Normalized Impulse Responses of Sectoral Price Indexes



Note: Figure 1 shows the posterior density of the normalized impulse responses of sectoral price indexes to sector-specific shocks (top panel) and to aggregate shocks (bottom panel). The posterior density takes into account variation across sectors and parameter uncertainty. The results reported in Figure 1 are discussed in Section 4.

Figure 2: The Cross-Section of the Speed of Response of Sectoral Price Indexes to Shocks



Note: Figure 2 shows the posterior density of the speed of response of sectoral price indexes to sector-specific shocks (top panel) and to aggregate shocks (bottom panel). The posterior density takes into account variation across sectors and parameter uncertainty. The speed of response is defined in Section 4.

Turning to Andrade-Coibion-Gautier-Gorodnichenko (2019)

- The first regression:

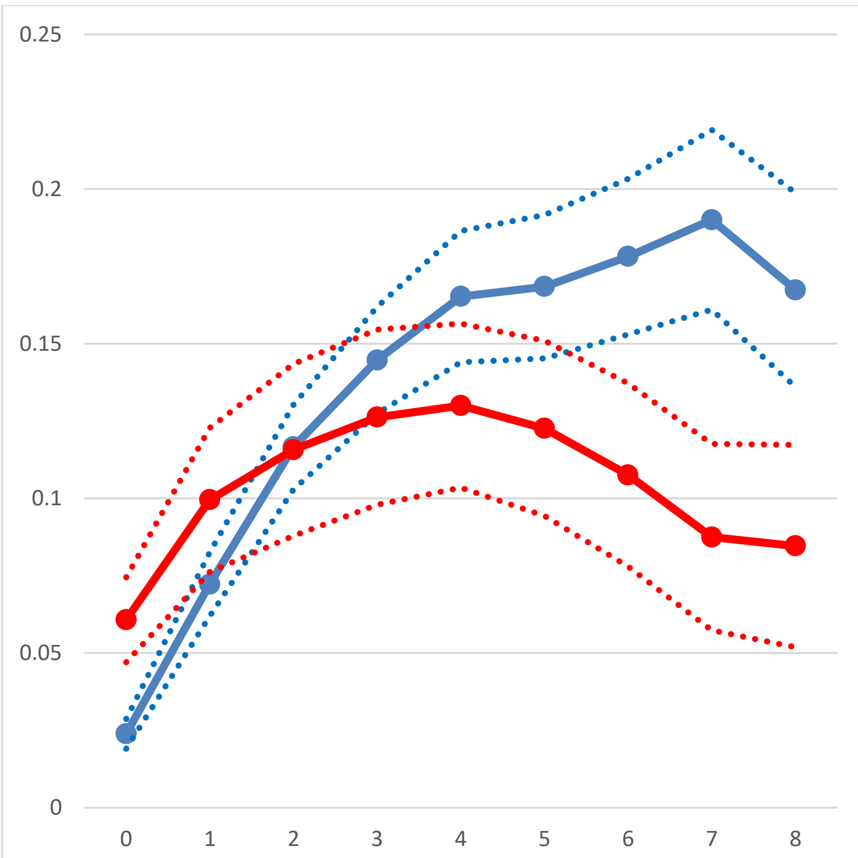
$$\sum_{k=0}^{h} E_{t+k}^{i}\left[\pi_{t+k+1}^{i}\right] = \alpha_i + \beta_h \pi_t + \gamma_h \pi_t^j + \varepsilon_t^i$$

FIRMS' EXPECTATIONS OF OWN PRICES AND OUTPUT

- Reaction to **aggregate** and **industry** specific variables

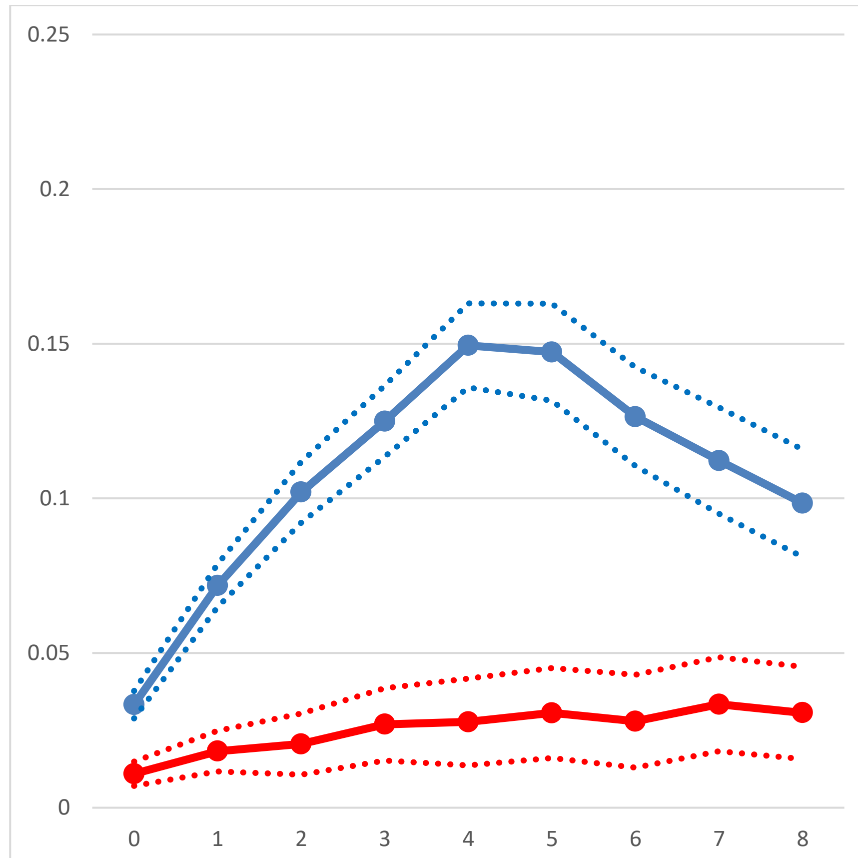
Own price expectation

$$\Delta E_t^i \pi_{t+h}^i = \alpha_i + \beta_h \pi_t + \gamma_h \pi_t^j + \varepsilon_t^i$$



Own output expectation

$$\Delta E_t^i x_{t+h}^i = \alpha_i + \beta_h x_t + \gamma_h x_t^j + \varepsilon_t^i$$



Prices react more rapidly to industry shocks (Boivin et al, 2009, Mackowiak et al. 2008)

Suggestion I

- Fascinating result.
- For comparison, it would be great to estimate the full-information rational expectations (FIRE) response of the LHS variable, as in Coibion and Gorodnichenko (2012).
- Alternatively, one could report the outcome of a reverse engineering exercise. What would the process for π_t^i have to be for the estimated responses of $\sum_{k=0}^{h} E_{t+k}^i \left[\pi_{t+k+1}^i\right]$ to equal the FIRE responses?

Andrade-Coibion-Gautier-Gorodnichenko (2019)

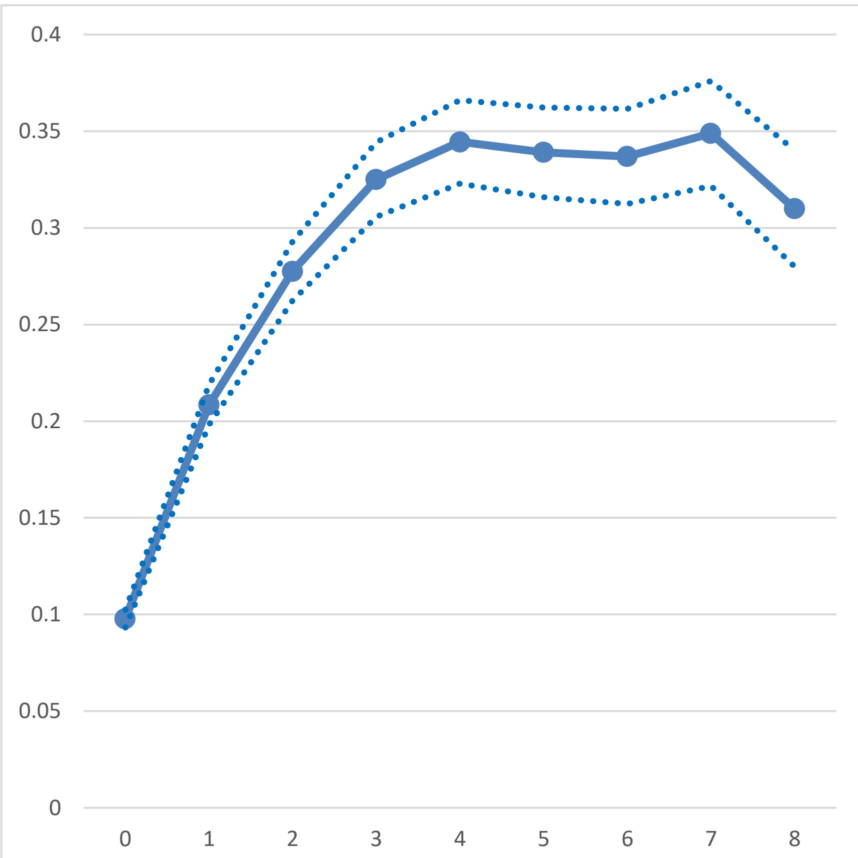
- The second regression for inflation expectations:

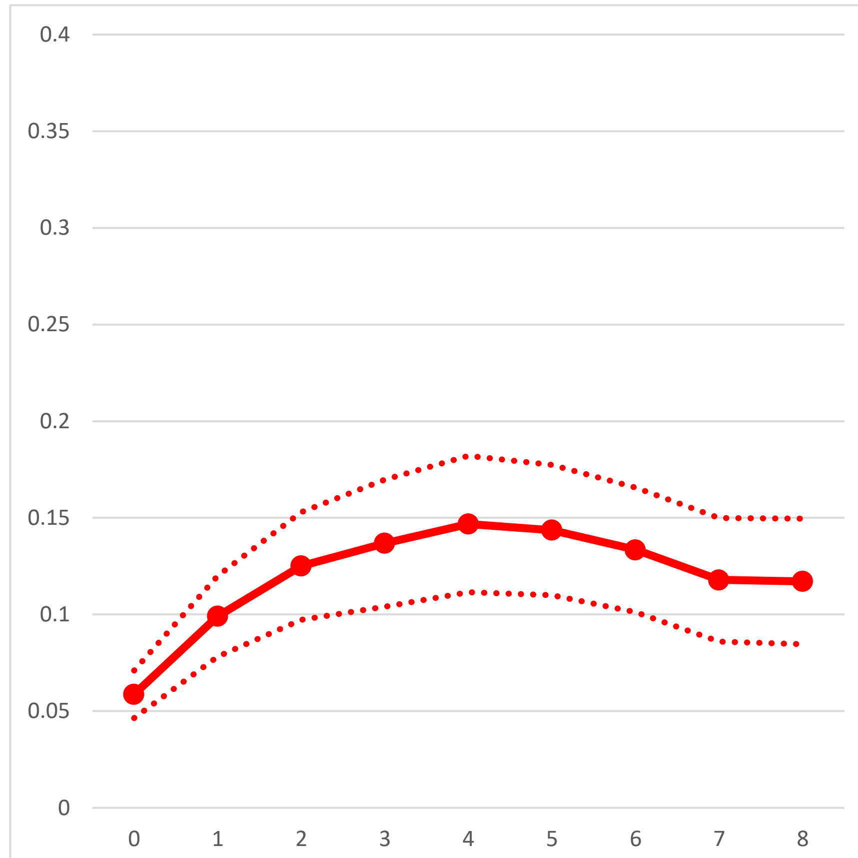
$$\sum_{k=0}^{h} E_{t+k}^{i}\left[\pi_{t+k+1}\right]=\alpha_i+\beta_h \pi_t+\gamma_h \pi_t^j+\varepsilon_t^i$$

FIRMS' EXPECTATIONS OF AGGREGATE INFLATION

- Reaction to **aggregate** and **industry** (4 digits) specific inflation

$$\sum_{k=0}^{h} E_{t+k}^{i}\pi_{t+k+1} = \alpha_i + \beta_h \pi_t + \gamma_h \pi_t^j + \varepsilon_t^i$$





Suggestion II

- Interesting result because it is telling us something about which variables firms are looking at.
- Seems consistent with theoretical models in Lucas (1972), Angeletos-La'O (2009), Lorenzoni (2009), Maćkowiak-Wiederholt (2009) Section 8.2.
- In all these papers, agents learn about macro from observations of micro, but details differ across papers. It would be interesting to have a detailed discussion.

Suggestion III

- Let us return to the first regression:

$$\sum_{k=0}^{h} E_{t+k}^{i}\left[\pi_{t+k+1}^{i}\right] = \alpha_i + \beta_h \pi_t + \gamma_h \pi_t^j + \varepsilon_t^i$$

- From studying how estimated coefficients vary across sectors with $\sigma\left(\pi_t^j\right)$, one could potentially learn something about the shape of the attention cost function.

Great paper!