Firm Expectations and News: Micro v Macro

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How do firm expectations adjust to news?

Survey data offers new insights into expectation-formation process

- **Forecast revision** approximates **news** as processed by survey participant
- Should not predict **forecast error** if processed correctly

Yet **forecast error** about $t+1$ responds systematically to time-t news at ...

- aggregate level: $\neg$ full information (Coibion and Gorodnichenko 2015, AER)
- individual level: $\neg$ rational expectations (Bordalo, Gennaioli, Ma, and Shleifer 2020, AER)

Evidence to date mostly from professional forecasters & macro expectations

- We study **firm expectations about firm-level outcomes**
- Necessary to distinguish **micro** and **macro news**

This paper: firm expectations respond differently to micro and macro news

Firm surveys from Italy (Banca d'Italia) and Germany (ifo Institute)

- Decompose newly incoming information into micro and macro news
- Macro news: information about aggregate economy
- Micro news: information about individual firm

Distinction between different news turns out to be essential

- Micro news predict negative forecast errors: firm expectations overreact
- Macro news predict positive forecast errors: firm expectations underreact

Reject rational expectations, explore variation of estimates at firm level

- Extent of over and underreaction varies with firm level characteristics
- Overreaction and underreaction systematically linked

This paper: firms suffer from island illusion

Stylized general equilibrium model can account for evidence

- Builds on dispersed information model of Lorenzoni (2009)
- **Island illusion**: firms systematically overweight the importance of idiosyncratic developments against aggregate developments

An instance of salience

- "Attention differentially directed to one portion of the environment rather than to others, the information contained in that portion will receive disproportionate weighing in subsequent judgments." (Taylor and Thompson 1982)
- Salient stimuli attract attention "bottom-up, automatically and involuntarily" (Bordalo, Gennaioli, and Shleifer 2022)

Related literature

Firm expectations about...

- macro economy:
  Kumar, Afrouzi, Coibion, and Gorodnichenko, (2015), Coibion, Gorodnichenko, and Kumar (2018), Enders, Hünnekes, and Müller (2019), Andrade, Coibion, Gautier, and Gorodnichenko (2022), Candia, Coibion, and Gorodnichenko (2022)
- firm-level performance:
  Bachmann, Elstner, and Sims (2013), Massenot and Pettinicchi (2018), Enders, Hünnekes, and Müller (2022), Born, Enders, Müller, and Niemann (2022)

Behavioral features in expectation formation

- Distortions in expectation formations: media reporting and narratives
  Andre, Haaland, Roth, and Wohlfart (2022), Chahrour, Nimark, and Pitschner (2021), and Shiller (2017)
- Underreaction to news: level-K thinking, cognitive discounting, sticky expectations, ...
  Bouchaud, Krüger, Landier, and Thesmar (2019), Carroll, Crawley, Slacalek, Tokuoka, and White (2020), Farhi and Werning (2019), Gabaix (2020), and García-Schmidt and Woodford (2019)
- Overreaction to news: constrained memory, diagnostic expectations Azeredo da Silveira and Woodford (2019), Bordalo et al. (2020; 2019)
- Both: bounded rationality, overconfidence (Ba, Bohren, and Imas 2023; Broer and Kohlhas 2023)

Empirical framework accounts for heterogeneous news and firms

Coibion and Gorodnichenko (2015)-type regression modified for firm-specific variables

$$x^j_{t+h,t} - F^j_t(x^j_{t+h,t}) = \beta_0 + \beta^j_1 \text{micro news}^j_t + \beta^j_2 \text{macro news}^j_t + v^j_t$$

where

- $x^j_{t+h,t} - F^j_t(x^j_{t+h,t})$: expectation error (realization - expectation)
- micro news^j_t: forecast revision on firm-specific variable
- macro news_t: forecast revision on aggregate (macro) variable

Rational expectations benchmark: $\beta^j_1 = \beta^j_2 = 0$

Coibion and Gorodnichenko (2015): $\beta^j > 0$ for underreaction, $\beta^j < 0$ for overreaction

Banca d'Italia *Survey on Inflation and Growth Expectations*

Quarterly business survey of Italian firms Survey questions

- Focus on firms that are in the survey at least 20 quarters over period 2002–2022

  $\rightarrow$ 360 firms with 35 quarters of observations on average Firm observations
- Quantitative, 4-quarter-ahead expectations for own prices $\pi^j_{t+4,t}$ + aggr. inflation $\pi_{t+4,t}$

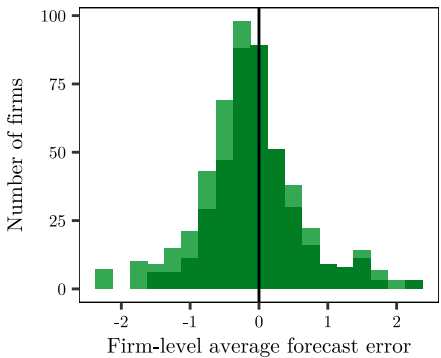
Construct

- $\pi^j_{t+4,t} - F^j_t(\pi_{t+4,t})$ = realized change in *own* prices minus exp. change in *own* prices
- micro news^j_t = forecast revision for *own*-price inflation: $F^j_t(\pi^j_{t+4,t}) - F^j_{t-1}(\pi^j_{t+3,t-1})$
- macro news^j_t = forecast revision for *aggregate* inflation: $F^j_t(\pi_{t+4,t}) - F^j_{t-1}(\pi_{t+3,t-1})$

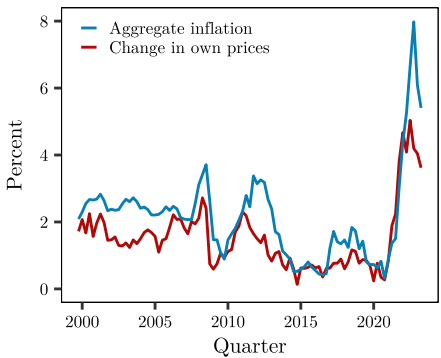
News over time

Firm expectations and forecast errors

Average forecast error about firms' own prices



Firms' average one-year-ahead expectations



- Forecast errors symmetrically distributed around zero: more than 75% of average forecast errors insignificantly different from zero (dark green)
- Expectations about own price changes and aggregate inflation highly correlated ($\rho = 0.87$)

Firms overreact to micro news, but underreact to macro news

Pooled estimation (including firm-fixed effect, data winsorized at 1%)

	Forecast error about firms' own prices			
	(1)	(2)	(3)	(4)
Micro News				
Forecast revision for $\pi^j_{t+4,t}$	-0.457^{***}		-0.478^{***}	
	(0.020)		(0.022)	
Forecast revision for $\pi^j_{t+4,t}$ net of $\gamma_j \Delta\pi_t$		-0.474^{***}		-0.502^{***}
		(0.020)		(0.020)
Macro News				
Forecast revision for $\pi_{t+4,t}$	0.242^{***}	0.248^{***}		
	(0.058)	(0.072)		
Inflation surprise			4.113^{***}	3.758^{***}
			(0.356)	(0.470)
Observations	29,471	22,596	21,707	14,030
R^2	0.094	0.097	0.103	0.116
Within R^2	0.110	0.104	0.127	0.127

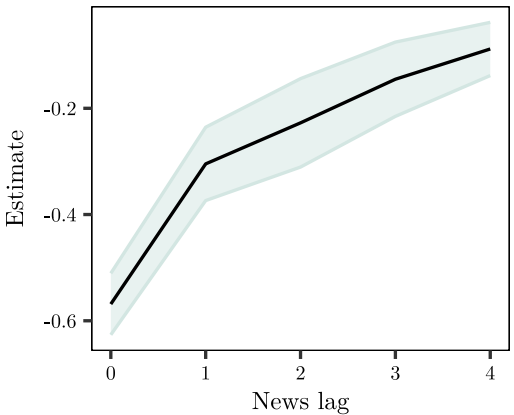
Micro news coefficient < 0, macro news coefficient > 0 Robustness Univariate results

$\rightarrow$ robust across news specifications

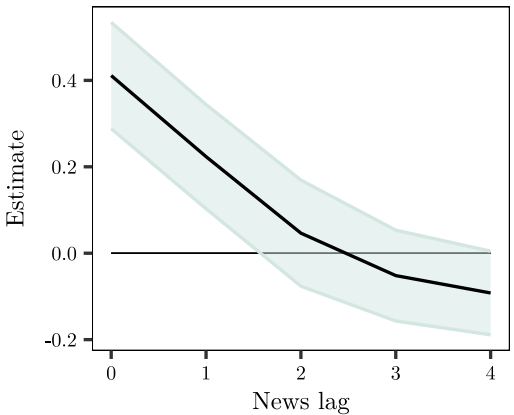
Over-/underreaction persistent over time

Pooled estimation including lags of news

(a) Micro news



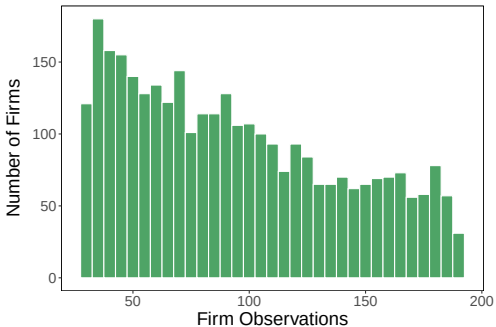
(b) Macro news



→ speaks against results being mechanically driven by measurement error Details

ifo Business Climate Survey of German firms

- Monthly, mostly qualitative survey of German firms
  $\rightarrow$ focus here: manufacturing sector
- Restrict our sample: firms that are in the survey for at least 30 months
  $\rightarrow$ median firm: in survey for 90 months
  $\rightarrow$ top 25% of firms: $>$ 130 months
- Final sample includes roughly 1,600 firm-observations per month



Large T: can estimate model robustly at firm level/explore firm-level heterogeneity

Firm expectations and expectation errors

ifo survey asks for qualitative answers

- Production expectations for next three months: *Our production is expected to be [1] increasing, [0] not changing or [-1] decreasing.*
- Production realization in last month: *Compared to (month before previous month) our production increased [1], stayed about the same [0] or decreased [-1].*

Define

- Forecast error for production: Sign of difference between sum of realized changes (as reported in $t+3$) and three-month ahead expectations reported in t (Bachmann, Elstner, and Sims 2013)
- Forecast revision

$$FR_t^j = \text{sign}\left\{F_t^j(x_{t+3,t}^j) - F_{t-1}^j(x_{t+2|t-1}^j)\right\}$$

Details

Macro news

Timing and construction

No expectation questions about aggregate economy in ifo survey

$\rightarrow$ cannot use forecast revisions for macro news

Instead, use the surprise component of a business cycle indicator (ifo index)

In month $t-1$

- during the first two weeks: firms complete ifo survey
- until release of ifo index: professional forecasters submit forecasts to Bloomberg
- during the last week: ifo index is published

In month t define macro news as

$$\text{macro news}_t = \text{ifo index}_{t-1} - \textit{median}\,(\text{professional forecasts for ifo index}_{t-1})$$

ifo survey: over/under reaction to micro/macro

Pooled estimation - baseline

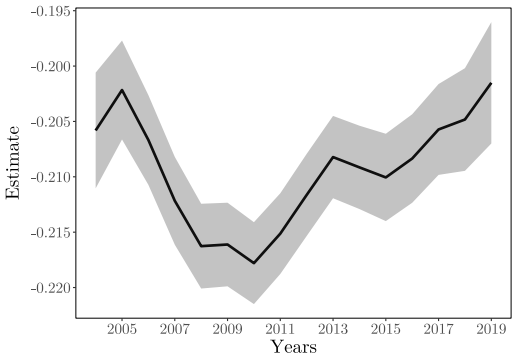
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for x_{t+3}	-0.191***			
	(0.001)			
Forecast Revision for x_{t+3} net of $\beta_j \Gamma_t$		-0.209***	-0.208***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.022***	0.022***		0.021***
	(0.0007)	(0.0007)		(0.0007)
Observations	302,737	302,737	302,737	302,737
R^2	0.16260	0.15806	0.15313	0.08967
Within R^2	0.08471	0.07974	0.07435	0.00498

Notes: Full, pooled sample. Standard errors clustered on firm level. *** p<0.01, ** p<0.05, * p<0.1.

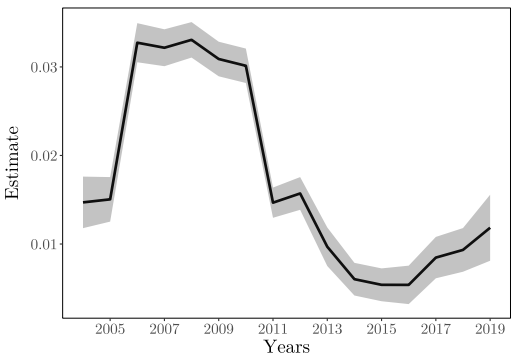
Interpretation of size

Over- and underreaction co-move systematically over time

Overreaction to micro news



Underreaction to macro news

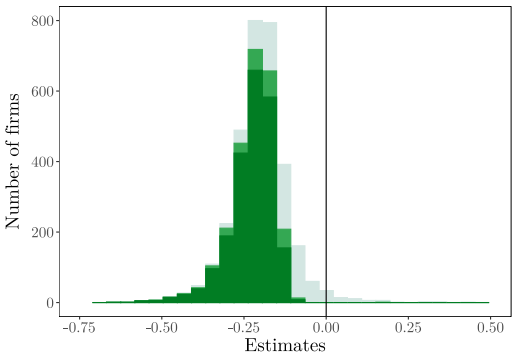


Note: Regressions over Rolling Window (5 Periods)

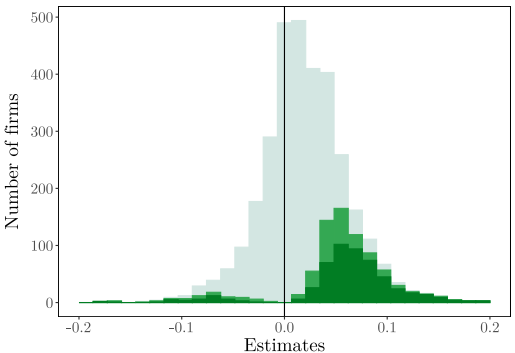
Pattern pervasive at firm level

Individual firm-level regressions

Overreaction to micro news (forecast revision)



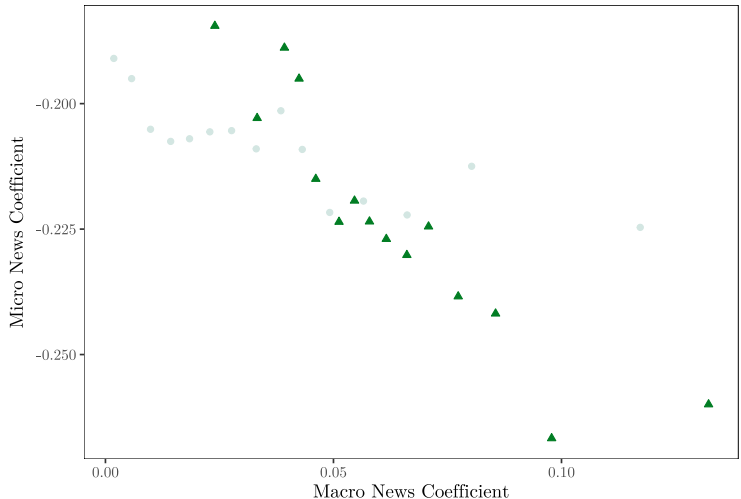
Underreaction to macro news (ifo index shock)



Note: grey=not significant, bright green=10%, dark green=5%

Firm-level heterogenetiy

Over- and underreaction co-move systematically at the firm level



Robust along a number of dimensions . . .

Estimation	OLS pooled across firms	ordered logit pooled across firms	Results
Forecast error	Bachmann et al. (2013)	set small errors ($\pm 1/3$) to zero	Results
Micro news	forecast revisions (FR)	only FR towards zero (variations)	Results
		use one month lagged micro news	Results
Macro news	surprise in ifo index	fixed effect by time (and sector)	Results
		surprise in manuf. orders	Results
		first difference of ifo index	Results
		average forecast revision (by sector)	Results
		first difference of stock market index	Results
Data	qualitative questions	quant. question about bus. situation	Results

Theory

Different theoretical approaches to model over-/underreaction (of *prof. forecasters*) with respect to *macro variables* in the literature:

- **underreaction** of consensus forecast:
  sticky/noisy information (e.g., Coibion and Gorodnichenko 2012)
- **overreaction:** diagnostic expectations (Bordalo, Gennaioli, Ma, and Shleifer 2020)
- **both:** absolute + relative overconfidence (Broer and Kohlhas 2023)

Our model: expectations about *firm-specific* developments respond differently to different types of news

- joint effect of firm-specific and aggregate variables on firm output requires GE model
- combines noisy information (Lorenzoni 2009) + island illusion

Model setup: key features

An island is a specific productivity level: $a_t^r = x_{t-1} + \sqrt{w_a}\hat{a}_t + \sqrt{1-w_a}\hat{a}_t^r$

- Common innovation $\hat{a}_t$ and island-specific innovation $\hat{a}_t^r$, normalize variance
- Firms observe only both innovations jointly: private signal
- Common component x_t follows random walk: $x_t = x_{t-1} + \sqrt{w_a}\hat{a}_t$

Household lives on one island but buy goods from all islands

- Isomorphic structure of demand shock: $q_t^r = \sqrt{w_q}\hat{q}_t + \sqrt{1-w_q}\hat{q}_t^r$

Timing & rest of the model

- Full information about time $t-1$ variables, monetary policy sets interest rates
- Firms receive signals, set prices
- Households buy, firms produce to satisfy demand at posted prices
- Firm's production expectations depend on expected relative prices

Island illusion: micro news

Firms forecast aggregate productivity conditional on own productivity...

$$a_t^r - x_{t-1} = \sqrt{w_a}\hat{a}_t + \sqrt{1-w_a}\hat{a}_t^r \rightarrow \textit{private signal} \text{ for each island}$$

...but underestimate importance of aggregate shocks: belief $\widehat{w}_a$ of w_a too small

$$\widehat{w}_a = \Upsilon w_a < w_a \quad \text{with} \quad \Upsilon < 1$$

Firms consider technological innovations to be mostly idiosyncratic, hence

$\rightarrow$ expect, on average, other prices to fall little after observing positive private signal

$\rightarrow$ overestimate own output, since competitors' prices turn out to be lower.

Result 1: expectations overreact to private signal.

Island illusion: macro news

Firms forecast own and aggregate demand based on public signal...

$$s_t = \sqrt{w_q}\hat{q}_t + e_t \rightarrow \textit{public signal}$$

...but underestimate importance of aggregate shocks: belief $\widehat{w}_q$ of w_q too small

$$\widehat{w}_q = \Upsilon w_q < w_q \quad \text{with} \quad \Upsilon < 1$$

Firms consider demand changes to be mostly idiosyncratic, hence

$\rightarrow$ underestimate own and aggregate demand after observing positive public signal

$\rightarrow$ underestimate own output

Result 2: expectations underreact to public signal.

Mapping the model to the empirics

Model implications for empirical setup

$$\boldsymbol{y_3^j - E_2^j(y^j) = \beta_1 FR_2^j + \beta_2 s_2 + \omega^j}.$$

$y_3^j - E_2^j(y^j)$: production forecast error of firm j on island r
FR^j: micro news/production forecast revision of firm j on island r
s: macro news/public signal about aggregate demand

$\rightarrow$ Island illusion ($\Upsilon < 1$) implies $\beta_1 < 0$ **and** $\beta_2 > 0$

External validation: higher degree of island illusion (a lower Υ) implies

- lower expected profits
- a larger variance of the firm-specific forecast error

External validation

	$\text{mean}_j(\text{profits}_{jt})$		$\text{sd}_j(\text{production}_{jt})$		$\text{sd}_j(\text{error}_{jt})$	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.224		0.383***		0.226***	
	(0.177)		(0.011)		(0.007)	
Reaction micro news	1.70**	1.79**	-0.371***	-0.360***	-0.318***	-0.312***
($\beta_1 < 0$)	(0.782)	(0.756)	(0.046)	(0.046)	(0.028)	(0.028)
Reaction macro news	-0.673	-1.10	1.63***	1.61***	1.31***	1.30***
($\beta_2 > 0$)	(1.79)	(1.78)	(0.097)	(0.097)	(0.062)	(0.062)
Observations	1,691	1,691	2,227	2,227	2,227	2,227
R^2	0.003	0.051	0.146	0.162	0.230	0.252
Within R^2		0.004		0.143		0.228
Sector FE		✓		✓		✓
Size FE		✓		✓		✓

Profits: biannual, quantitative survey question on expected surplus less tax in percent of net sales. Sample restricted to firms that overreact to micro news and underreact to macro news.

Conclusion

Use rich firm-firm level data to shed light on expectation-formation process

- Consistent with earlier work on professional forecasters

Expectations about firm-level outcomes respond differently to micro and macro news

- Firms overreact to micro news, but underreact to macro news
- Systematic co-movement over time and at firm level

Stylized model of island illusion can account for these patterns

- Future work: explore macroeconomic & policy implications
- For instance: explain high firm-level volatility without resorting to large firm-level shocks

Appendix

Survey on Inflation and Growth Expectations: Questionaire

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Label	Name	Introduced	Wording
Q1	expected change in own price	1999q4	For the next 12 months, what do you expect will be the average change in your firm's prices?
Q2	expected inflation (12 months ahead)	1999q4	In July consumer price inflation, measured by the 12-month change in the harmonized index of consumer prices was 8.4 percent in Italy and 8.9 percent in the euro area. What do you think it will be in Italy in September 2023?
Q3	realized change in own prices	2002q4	In the last 12 months, what has been the average change in your firm's prices?
Q4	expected inflation (24 months ahead)	2009q2	In July consumer price inflation, measured by the 12-month change in the harmonized index of consumer prices was 8.4 percent in Italy and 8.9 percent in the euro area. What do you think it will be in Italy in September 2024?
Q5	expected inflation (6 months ahead)	2010q4	In July consumer price inflation, measured by the 12-month change in the harmonized index of consumer prices was 8.4 percent in Italy and 8.9 percent in the euro area. What do you think it will be in Italy in March 2023?
Q6	expected inflation (12 months ahead, no update)	2012q3	What do you think consumer price inflation in Italy, measured by the 12-month change in the harmonized index of consumer prices, will be in September 2023?

SIGE: Firm observations

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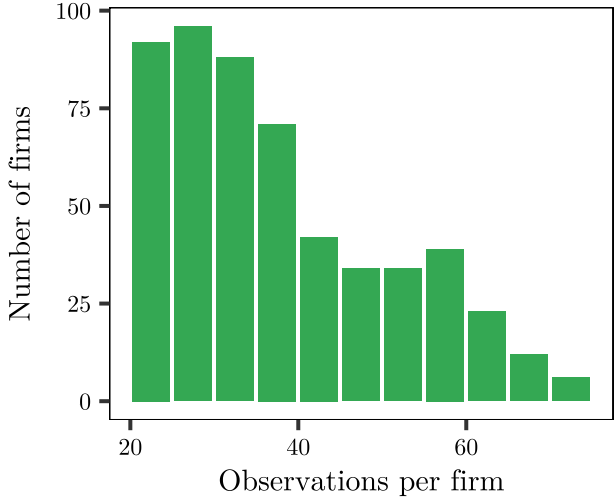

Macro and micro news

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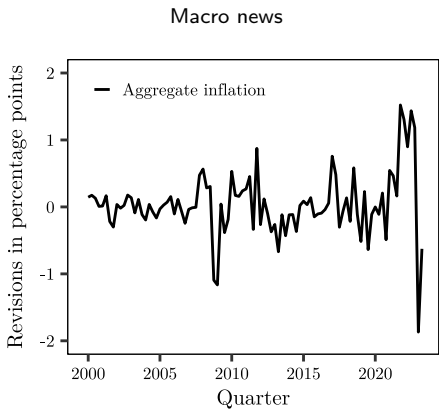

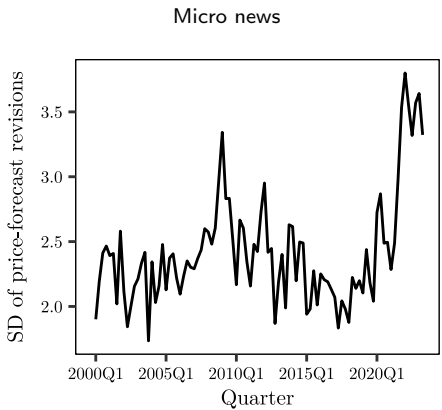

Robustness SIGE

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	(1)	(2)	(3)
Micro News			
Forecast revision for $\pi^j_{t+4,t}$	-0.462^{***}	-0.475^{***}	
	(0.021)	(0.030)	
Forecast revision for $\pi^j_{t+4,t}$ net of $\gamma_j \Delta\pi_t$			-0.475^{***}
			(0.029)
Macro News			
Forecast revision for $\pi_{t+4,t}$	0.098^{**}		
	(0.044)		
Forecast revision for $\pi_{t+2,t}$ (6m-L6.12m)		0.260^{***}	0.228^{***}
		(0.052)	(0.054)
Observations	13,687	8,867	8,867
R^2	0.101	0.084	0.089
Within R^2	0.110	0.097	0.100

(1) $<$ 2020; (2)–(3) different macro news spec.

Univariate results

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	(1)	(2)	(3)	(4)
Micro News				
Forecast revision for $\pi^j_{t+4,t}$	-0.436^{***}			
	(0.021)			
Forecast revision for $\pi^j_{t+4,t}$ net of $\gamma_j \Delta\pi_t$		-0.431^{***}		
		(0.020)		
Macro News				
Forecast revision for $\pi_{t+4,t}$			0.177^{***}	
			(0.054)	
Inflation surprise				2.424^{***}
				(0.375)
Observations	15,656	15,656	15,656	7,878
R^2	0.078	0.080	0.002	0.011
Within R^2	0.085	0.085	0.001	0.009

Can measurement error mechanically lead to overreaction? Back

Assume (for sake of argument) reported forecast is subject to error

$$F_t^{j,rep}(x_{t+h,t}^j) = F_t^j(x_{t+h,t}^j) + \varepsilon_t^{rep}$$

Then, the observed forecast error

$$x_{t+h,t}^j - F_t^{j,rep}(x_{t+h,t}^j) = x_{t+h,t}^j - F_t^j(x_{t+h,t}^j) - \varepsilon_t^{j,rep}$$

correlates negatively with reported FR

$$F_{j,t}^{rep} - F_{j,t-1}^{rep} = (F_{j,t} - F_{j,t-1}) + \varepsilon_t^{j,rep.} - \varepsilon_{t-1}^{j,rep}$$

- Could induce account for overreaction to micro news (Juodis and Kucinskas 2022)
- But not for underreaction to macro news

Firm expectations and expectation errors

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Production forecast error (Bachmann, Elstner, and Sims 2013):

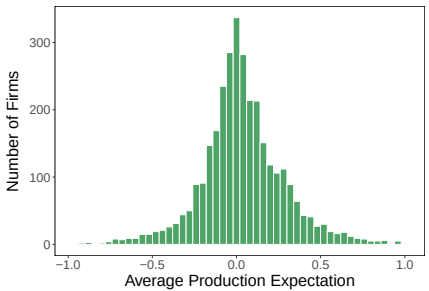
$$x^j_{t+3,t} - F^j_t(x^j_{t+3,t}) = \begin{cases} 0 & \text{if sign}\left\{x^j_{t+3,t}\right\} = \text{sign}\left\{F^j_t(x^j_{t+3,t})\right\} \\ \frac{1}{3}\left[x^j_{t+3,t} - F^j_t(x^j_{t+3,t})\right] & \text{else,} \end{cases}$$

where

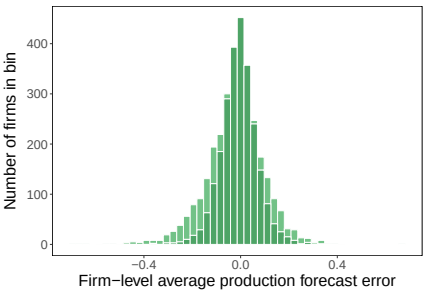
- $F^j_t(x^j_{t+3,t}) \in \{-1, 0, +1\}$ is the 3-months-ahead expectation at t
- $x^j_{t+3,t} \in [-3, +3]$ is the sum of subsequent 3 (monthly) realizations

Firm expectations and expectation errors

Average production expectation by firm



Average production forecast error by firm



- Production expectations vary strongly, but positive on average: 0.032
- Forecast errors symmetrically distributed around zero: more than 75% of average forecast errors insignificantly different from zero (dark green)

Info content in forecast revision

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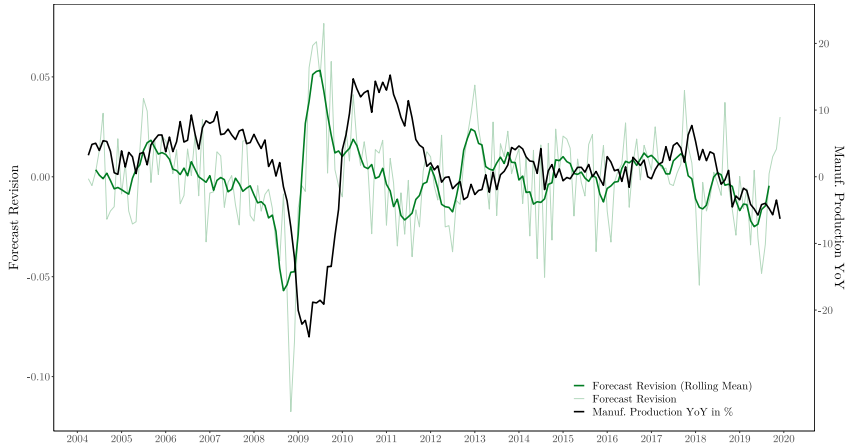
Average forecast revisions and changes in manufacturing production



Notes: S.a. 6-months rolling mean of avg. forecast revisions (green) and yoy prod. growth in manuf. (black).

Macro news

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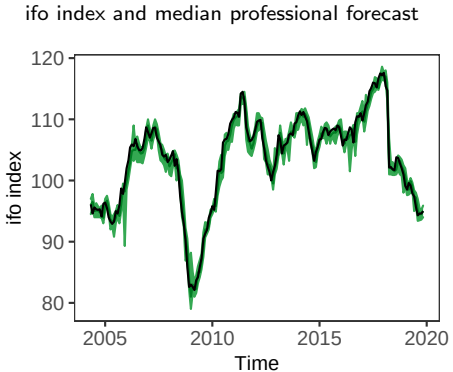
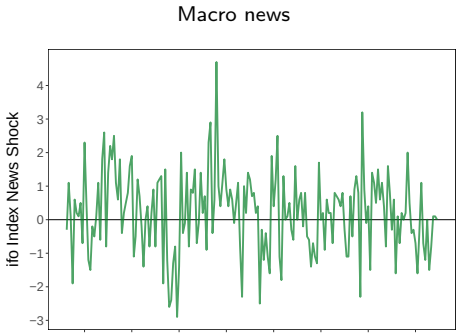
Time series





Media coverage of ifo index and professional forecasts

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Date	Outlet	Quote
24 April 2022	Der Spiegel	[ifo index] stieg [...] auf 91,8 Zähler. Analysten hatten mit [...] 89,0 Punkten gerechnet.
22 February 2022	Handelsblatt	[ifo index] stieg im Februar [...] auf 98.9 Punkte. Ökonomen hatten mit [...] 96,5 Punkten gerechnet.
24 November 2021	Der Spiegel	Geschäftsklimaindex sank auf 96,5 Punkte. Experten hatten [...] 96,6 Punkte erwartet
27 July 2020	Süddeutsche Zeitung	[ifo index] für Juli legte auf 90,5 Zähler [...] zu. Ökonomen hatten mit 89,3 Punkten gerechnet.

Over/underreaction quantitatively meaningful

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Some back-of-the-envelope comparisons

Difficulty: Qualitative nature of the forecast revisions

– economic importance over/underreaction not straightforward to quantify

– however, their relative size can be compared

- Average absolute size of micro news: 0.318

  → Overreaction leads to increase in |forecast error| by 0.066 (0.18 std. of forecast error)

- Average absolute size of macro news: 0.971

  → Underreaction leads to increase in |forecast| error by 0.02 (0.05 std. of forecast error)

Over- and underreaction to news – Robustness

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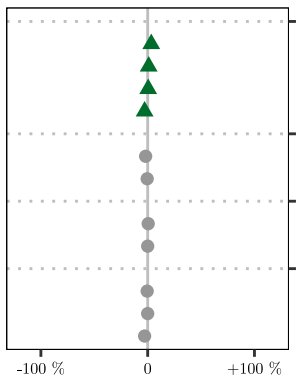
Ordered logit

Term	Estimate	Standard Error	t-value	Coeficient type	exp(estimate)
Micro News	-1.24	0.01	-158.19	coefficient	0.29
Macro News	0.11	0.00	37.16	coefficient	1.12
-4/3|-1	-6.04	0.03	-173.89	scale	0.00
-1|-2/3	-3.56	0.01	-337.00	scale	0.03
-2/3|-1/3	-2.45	0.01	-370.14	scale	0.09
-1/3|0	-1.27	0.00	-280.89	scale	0.28
0|1/3	1.52	0.00	314.78	scale	4.57
1/3|2/3	2.71	0.01	373.96	scale	15.10
2/3|1	3.91	0.01	321.66	scale	49.88
1|4/3	6.66	0.05	144.17	scale	782.37

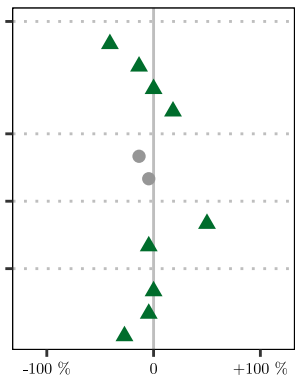
Firm heterogeneity matters only for response to macro news

Positive (negative) values imply stronger (weaker) under/overreaction; triangles indicate significance



Conditioning on

Number of employees
1. Quartile
2. Quartile
3. Quartile
4. Quartile
Firm age in years
19 or younger
20 or older
Months in survey
six or less
seven or more
Importance of business cycle
very important
important
less important



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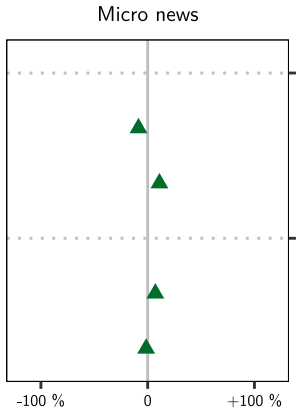
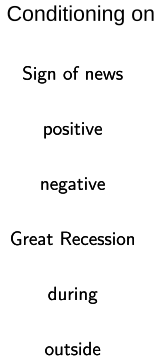
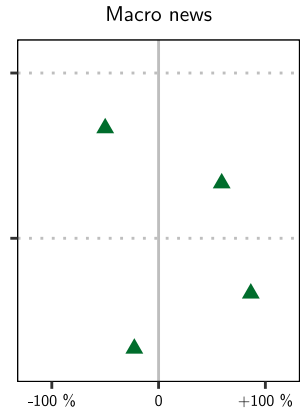
Similar pattern for other sources of heterogeneity

How different is the reaction to news across kinds of news?







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Over- and underreaction to news – Robustness

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Set small forecast errors to zero

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for $q^j_{t+3,t}$	-0.115***			
	(0.001)			
Forecast Revision for $q^j_{t+3,t}$ net of $\gamma_j \Gamma_t$		-0.128***	-0.128***	
		(0.002)	(0.002)	
Macro News				
Surprise component of the ifo index	0.018***	0.018***		0.018***
	(0.0006)	(0.0006)		(0.0006)
Observations	302,737	302,737	302,737	302,737
R^2	0.11352	0.11278	0.10838	0.07974
Within R^2	0.04103	0.04022	0.03547	0.00449
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Set small forecast errors to zero when zero expectations

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for x_{t+3}	-0.176***			
	(0.001)			
Forecast Revision for x_{t+3} net of $\gamma_j \Gamma_t$		-0.192***	-0.191***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.018***	0.018***		0.017***
	(0.0006)	(0.0006)		(0.0006)
Observations	302,737	302,737	302,737	302,737
R^2	0.14684	0.14143	0.13768	0.07495
Within R^2	0.08113	0.07529	0.07125	0.00369
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Micro news: only zero expectations

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for $q^j_{t+3,t}$	-0.091***			
	(0.003)			
Forecast Revision for $q^j_{t+3,t}$ net of $\gamma_j \Gamma_t$		-0.110***	-0.112***	
		(0.003)	(0.003)	
Macro News				
Surprise component of the ifo index	0.030***	0.030***		0.030***
	(0.0008)	(0.0008)		(0.0009)
Observations	205,962	205,962	205,962	205,962
R^2	0.17355	0.17605	0.16728	0.16331
Within R^2	0.02310	0.02605	0.01569	0.01100
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Micro news: only zero expectations and small forecast errors to zero

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for x_{t+3}	-0.072***			
	(0.002)			
Forecast Revision for x_{t+3} net of $\gamma_j \Gamma_t$		-0.086***	-0.088***	
		(0.002)	(0.002)	
Macro News				
Surprise component of the ifo index	0.024***	0.023***		0.024***
	(0.0008)	(0.0008)		(0.0008)
Observations	205,962	205,962	205,962	205,962
R^2	0.14081	0.14270	0.13592	0.13288
Within R^2	0.01729	0.01945	0.01170	0.00823
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Micro news: use lagged micro news

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for x_{t+3}	-0.191***			
	(0.001)			
Forecast Revision for x_{t+3} net of $\gamma_j \Gamma_t$		-0.021***	-0.020***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.022***	0.021***		0.021***
	(0.0007)	(0.0007)		(0.0007)
Observations	302,737	280,583	280,583	302,737
R^2	0.16260	0.09452	0.08988	0.08967
Within R^2	0.08471	0.00580	0.00071	0.00498
Firm FE	✓	✓	✓	✓

Over/underreaction very persistent over time

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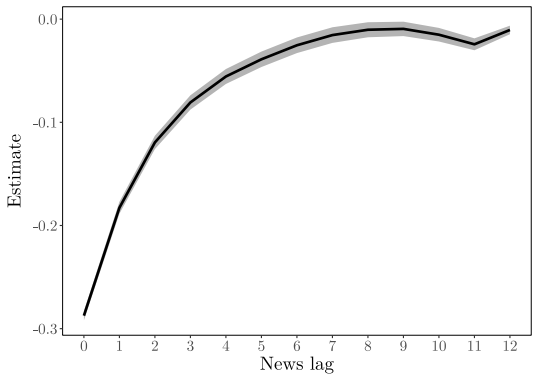
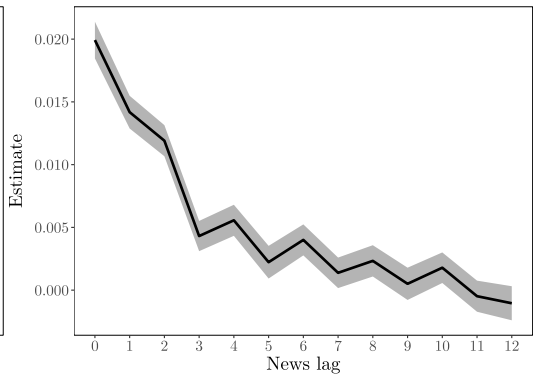
Pooled estimation including lags of news

(a) Micro news



(b) Macro news



Over- and underreaction to news – Robustness

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Micro news: absorb macro comp. of forecast revision with time-fixed effect

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for $q^j_{t+3,t}$	-0.191***			
	(0.001)			
Forecast Revision for $q^j_{t+3,t}$ net of $\gamma_j \Gamma_t$		-0.194***	-0.194***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.022***	0.021***		0.021***
	(0.0007)	(0.0007)		(0.0007)
Observations	302,737	302,737	302,737	302,737
R^2	0.16260	0.16471	0.16015	0.08967
Within R^2	0.08471	0.08701	0.08202	0.00498
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Micro news: absorb macro comp. of forecast revision with time-sector-fixed effect

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for $q^j_{t+3,t}$	-0.191***			
	(0.001)			
Forecast Revision for $q^j_{t+3,t}$ net of $\gamma_j \Gamma_t$		-0.196***	-0.196***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.022***	0.021***		0.021***
	(0.0007)	(0.0007)		(0.0007)
Observations	302,737	302,737	302,737	302,737
R^2	0.16260	0.16555	0.16100	0.08967
Within R^2	0.08471	0.08793	0.08295	0.00498
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Macro news from manufacturing orders

	Forecast Error			
	(1)	(2)	(3)	(4)
Micro News	-0.208***	-0.208***		
	(0.001)	(0.001)		
Macro News	0.005***		0.005***	0.005***
	(0.0003)		(0.0003)	(0.0003)
Forecast Revision				-0.190***
				(0.001)
Observations	298,586	298,586	298,586	298,586
R^2	0.15383	0.15286	0.08580	0.15828
Within R^2	0.07536	0.07431	0.00103	0.08023

Over- and underreaction to news – Robustness

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Macro news: first difference of ifo index rather than ifo index surprise

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for $q^j_{t+3,t}$	-0.190***			
	(0.001)			
Forecast Revision for $q^j_{t+3,t}$ net of $\gamma_j \Gamma_t$		-0.208***	-0.208***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.002***	0.002***		0.001***
	(0.0002)	(0.0003)		(0.0003)
Observations	301,185	301,185	302,737	301,185
R^2	0.15737	0.15318	0.15313	0.08505
Within R^2	0.07908	0.07450	0.07435	0.00004
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Macro news: average forecast revisions rather than ifo index

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for $q^j_{t+3,t}$	-0.194***			
	(0.001)			
Forecast Revision for $q^j_{t+3,t}$ net of $\gamma_j \Gamma_t$		-0.209***	-0.208***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.502***	0.345***		0.308***
	(0.019)	(0.018)		(0.018)
Observations	302,737	302,737	302,737	302,737
R^2	0.16186	0.15526	0.15313	0.08681
Within R^2	0.08389	0.07668	0.07435	0.00187
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Macro news: average forecast revisions for each sector rather than ifo index

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for $q^j_{t+3,t}$	-0.196***			
	(0.001)			
Forecast Revision for $q^j_{t+3,t}$ net of $\gamma_j \Gamma_t$		-0.211***	-0.208***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.326***	0.216***		0.129***
	(0.013)	(0.011)		(0.012)
Observations	302,737	302,737	302,737	302,737
R^2	0.16169	0.15506	0.15313	0.08580
Within R^2	0.08371	0.07646	0.07435	0.00076
Firm FE	✓	✓	✓	✓

Over- and underreaction to news – Robustness

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Macro news: first difference of stock market index rather than ifo index surprise

	Firms' forecast errors about their production			
	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for $q^j_{t+3,t}$	-0.190***			
	(0.001)			
Forecast Revision for $q^j_{t+3,t}$ net of $\gamma_j \Gamma_t$		-0.208***	-0.208***	
		(0.001)	(0.001)	
Macro News				
Surprise component of the ifo index	0.371***	0.328***		0.328***
	(0.014)	(0.014)		(0.014)
Observations	302,737	302,737	302,737	302,737
R^2	0.15999	0.15518	0.15313	0.08716
Within R^2	0.08185	0.07659	0.07435	0.00224
Firm FE	✓	✓	✓	✓

Robustness: Quantitative data for business expectations

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Wording of questions

Expectations for the next six months:

- In cyclical regards, our state of business will be
  0 [rather less favorable] to 100 [rather favorable]

Current situation:

- We consider our state of business to be
  0 [bad] to 100 [good]

Results robust to removing outliers

A priori not clear if expectations measure levels or changes

- Link (2020) concludes that responses measure expected levels of revenue

  → forecast errors symmetrically centered around zero in both interpretations

  → our results hold for both interpretations

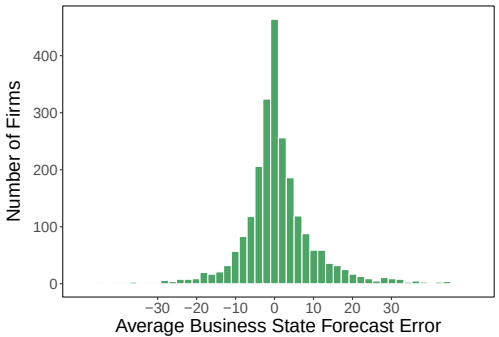
Figures

Robustness: Quantitative data for business expectations

Forecast errors again centered around zero

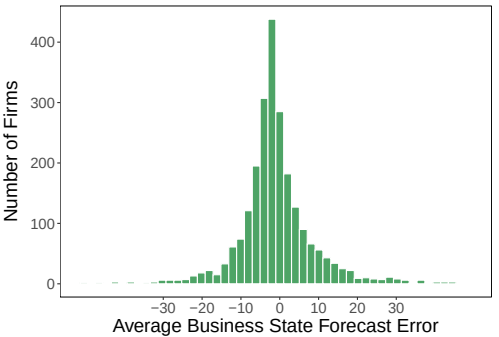
Interpret expectations as levels

$\text{Error}_{it} = \text{Busi}_{i,t+6} - \text{Busi}_{i,t+6|t}$



Interpret expectations as changes

$\text{Error}_{it} = (\text{Busi}_{i,t+6} - \text{Busi}_{i,t}) - \text{Busi}_{i,t+6|t}$



Robustness: Quantitative data for business expectations

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Levels interpretation

	(1)	(2)	(3)	(4)
Micro News				
Forecast Revision for x_{t+6}	-0.441***			
	(0.004)			
Forecast Revision for x_{t+6} net of $\beta_j \Gamma_t$		-0.453***	-0.450***	
		(0.004)	(0.004)	
Macro News				
Surprise component of the ifo index	0.857***	0.795***		0.697***
	(0.044)	(0.044)		(0.044)
Observations	153,398	153,398	153,398	153,398
R^2	0.31864	0.30652	0.30357	0.25466
Within R^2	0.08861	0.07240	0.06845	0.00303

Over- and underreaction to news – Robustness

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Quantitative data for business expectations – interpret expectations as changes

	Firms' forecast errors about their business situation			
	(1)	(2)	(3)	(4)
Micro News	-0.448***	-0.448***		
	(0.003)	(0.003)		
Macro News	0.697***		0.693***	0.853***
	(0.043)		(0.042)	(0.043)
Forecast Revision				-0.440***
				(0.003)
Observations	161,399	161,399	164,492	161,399
R^2	0.33211	0.32989	0.26488	0.33054
Within R^2	0.09112	0.08809	0.00298	0.08898

Over- and underreaction to news: Heterogeneity

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Heterogeneity in underreaction to macro news

	Micro News		Macro News	
Interaction	$\widehat{\beta}$	SE($\widehat{\beta}$)	$\widehat{\beta}$	SE($\widehat{\beta}$)
News				
Overall	-0.194^{***}	0.001	0.021^{***}	0.001
News				
$\times$ Positive sign of news	-0.199^{***}	0.002	0.011^{***}	0.001
$\times$ Negative sign of news	-0.189^{***}	0.002	0.034^{***}	0.001
News				
$\times$ 1. Quartile by employees	-0.199^{***}	0.003	0.012^{***}	0.003
$\times$ 2. Quartile by employees	-0.193^{***}	0.003	0.019^{***}	0.002
$\times$ 3. Quartile by employees	-0.192^{***}	0.003	0.021^{***}	0.001
$\times$ 4. Quartile by employees	-0.195^{***}	0.002	0.026^{***}	0.001
News				
$\times$ Time in survey $<$ half a year	-0.195^{***}	0.008	0.032^{***}	0.006
$\times$ Time in survey $\geq$ half a year	-0.194^{***}	0.001	0.021^{***}	0.001

Macro importance and macro bias

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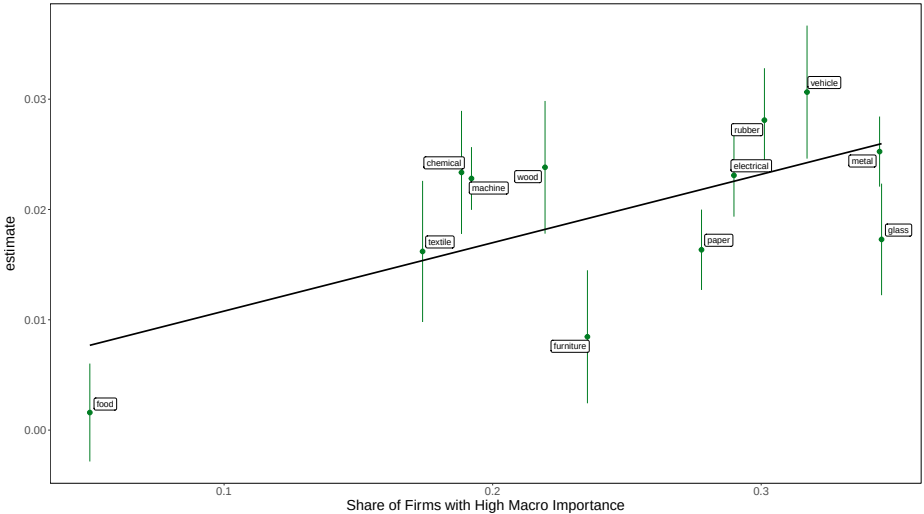
Sectors with larger attachment to business cycle display larger macro coefficients



Note: Sector shares of firms for which the business cycle is very important

Macro news and planned price changes

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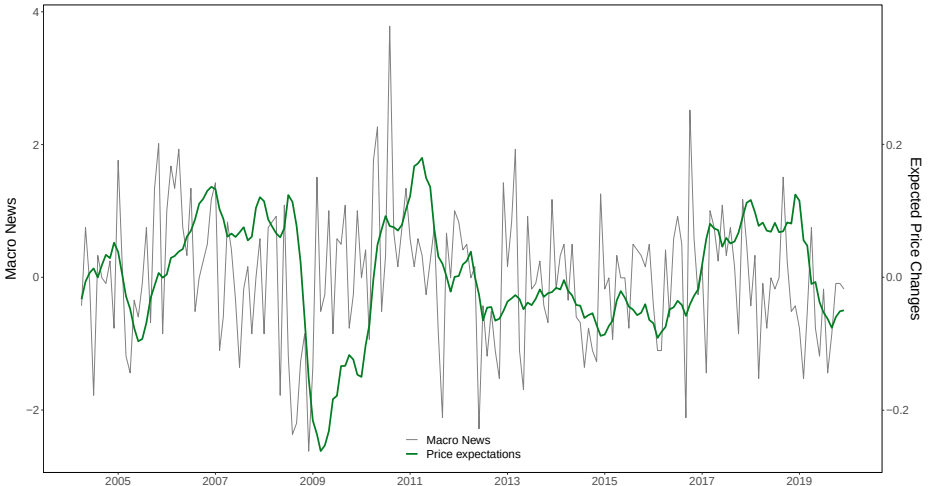

GDP Expectations and Forecast Revisions

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Correlation between Micro News and Macro Expectations is very low

	GDP 2018 (1)	GDP 2019 (2)	GDP 2020 (3)	GDP 2018 (4)	GDP 2019 (5)	GDP 2020 (6)
Constant	1.81***	1.18***	1.10***			
	(0.039)	(0.035)	(0.036)			
Forecast Revision	0.039			0.022		
	(0.069)			(0.071)		
2019-08		-0.402***	-0.403***		-0.402***	-0.402***
		(0.057)	(0.062)		(0.057)	(0.062)
Forecast Revision × 2019-03		0.133*	-0.003		0.132*	-0.007
		(0.076)	(0.073)		(0.077)	(0.072)
Forecast Revision × 2019-08		-0.057	0.007		-0.062	-0.0002
		(0.088)	(0.090)		(0.082)	(0.090)
Observations	857	1,684	1,676	857	1,684	1,676
R^2	0.00031	0.03073	0.02485	0.02860	0.05551	0.03842
Within R^2				0.00010	0.03156	0.02507
Sector FE				✓	✓	✓
Firm Size FE				✓	✓	✓