(Ir)rationale Firmenerwartungen und ihre Auswirkungen

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The topic

Many economic decisions involve intertemporal aspect, e.g.,

- Consumption vs. saving
- Investment
- Hiring vs. firing

Expectations hence seen to be crucial for macroeconomic outcomes

Importance of expectations unquestioned *premise* in macro

- Pigou (1927), Keynes (1936)
- Lucas (1972), Kydland Prescott (1983), Woodford (2003)

Central for how we think economic policy works

- Lucas (1976), Barro Gordon (1983), Eggertsson Woodford (2003)

Questions

In this talk, focus on three questions:

1.) How are firm expectations formed?
   - What influences firm expectations?
   - Are firms rational when forecasting the future?

2.) Do expectations really matter for economic outcomes?
   - Maybe firms' foresight too limited, required planning horizons short...

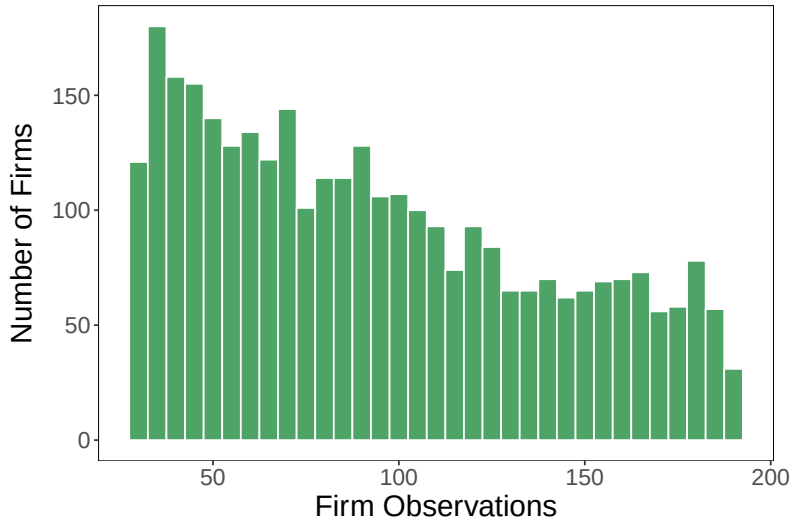
3.) If yes, which part of aggregate fluctuations is driven by changing expectations?
   - Are they an autonomous source of BC fluctuations?

How do firms form expectations?

ifo Business Climate Survey

Why firm expectations? Because firms decide!

- monthly, mostly qualitative firm survey
- final sample includes roughly 1,600 firm-observations per month



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].

Six facts about firm expectations and expectation errors

1. **Unbiasedness**: Unconditionally, firms' expectation errors are small and almost always insignificant.
2. **Informational content**: Firm expectations outperform static and adaptive expectations.
3. **Experience**: Larger and older firms are better at forecasting their own variables.
4. **Predictability**: Firms make predictable expectation errors.
5. **Countercyclical second moments**: The dispersion and volatility of expectations and expectation errors are countercyclical.
6. **Stickiness**: Firm expectations are updated infrequently; updates for production and prices often happen at the same time and in the same direction.

What drives expectations?

	Production		Prices	
Variables	Observations	Pseudo R^2	Observations	Pseudo R^2
Survey	181329	0.2523	181276	0.32
Fundamentals	271498	0.00012	277890	0.00008
Macro	337028	0.005	345828	0.007
Survey+Fundamentals	180686	0.252	180633	0.32
Survey+Macro	172428	0.252	172374	0.324
Fundamentals+Macro	254624	0.006	260988	0.007
Survey+Fund.+Macro	172327	0.252	171731	0.324

→ Variables and additional evidence

A closer look at monetary policy

$$\Delta f(y)_{i,t} = \alpha + \sum_m \beta_m D_{i,m} + \delta_1 f(y)_{i,t-1} + \delta_2 Z_{i,t-1} + u_{i,t}$$

- $f(y)_{i,t}$: expectation of firm i regarding y in next 3 months, reported in month t
- $\Delta f(y)_{i,t}$: change of expectations relative to previous month
- $Z_{i,t-1}$: lagged controls (prices, production, demand, (foreign) orders, capacity utilization, and average state of business)
- $D_{i,m} = 1$ if response within two working days after unconventional monetary policy announcement m
- $D_{i,m} = 0$ if response within two working days before announcement m, or if no announcement in month

Effects of non-conventional announcements

	Dependent variable: change in the expectations for prices			production		
12-month LTROs	-0.156***	-0.101***	-0.005	-0.140***	-0.066	-0.056
	(0.032)	(0.031)	(0.038)	(0.041)	(0.041)	(0.051)
6-month LTROs	-0.036	-0.034	-0.043	-0.046	-0.015	-0.025
	(0.027)	(0.026)	(0.031)	(0.036)	(0.035)	(0.041)
12/13-month LTROs	-0.029	-0.064**	-0.041	-0.136***	-0.153***	-0.080*
	(0.026)	(0.025)	(0.028)	(0.038)	(0.040)	(0.044)
36-month LTROs	0.070**	0.086**	0.056	-0.003	0.027	0.070
	(0.035)	(0.035)	(0.046)	(0.042)	(0.040)	(0.056)
OMT details	-0.054**	-0.038	-0.034	-0.192***	-0.135***	-0.123***
	(0.026)	(0.026)	(0.029)	(0.039)	(0.040)	(0.044)
Forward Guidance	-0.030**	-0.019		-0.005	0.001	
	(0.013)	(0.012)		(0.019)	(0.018)	
TLTROs	-0.070	-0.055	-0.023	-0.042	0.010	0.048
	(0.052)	(0.052)	(0.056)	(0.067)	(0.069)	(0.074)
ABSPP+CBPP3	-0.011	-0.006		-0.036*	0.008	
	(0.013)	(0.013)		(0.021)	(0.021)	
APP details	0.006	-0.003		0.028	0.030	
	(0.020)	(0.020)		(0.026)	(0.027)	
PSPP share limit	-0.027	-0.019		0.064**	0.101***	
	(0.017)	(0.017)		(0.031)	(0.033)	
APP end	0.034	0.028	-0.006	-0.013	-0.011	-0.055
	(0.028)	(0.033)	(0.048)	(0.043)	(0.045)	(0.067)
Expectation, t-1	X	X	X	X	X	X
Further Controls		X	X		X	X
Monthly time fixed effects			X			X
Observations	236635	201212	201212	230028	197239	197239
Adjusted R^2	0.22	0.29	0.29	0.25	0.32	0.33

Effects of non-conventional announcements vary

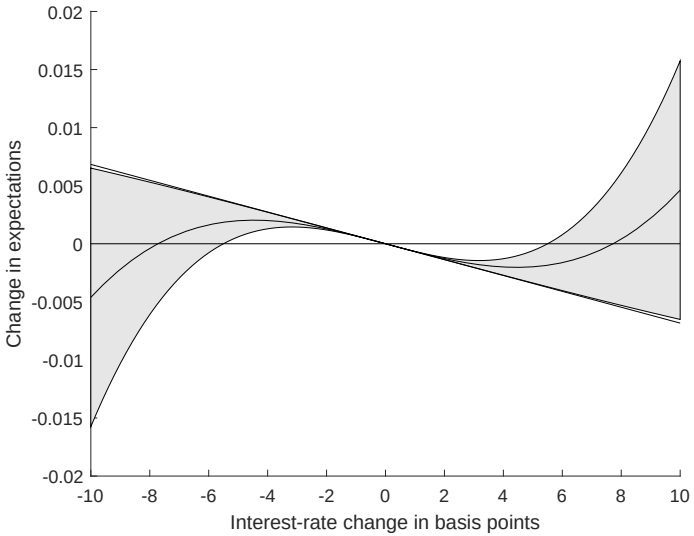
Not many announcements had a significant effect on firms expectations

Despite announcements being easing, expectations fell
→ in line with other studies of non-conventional announcements

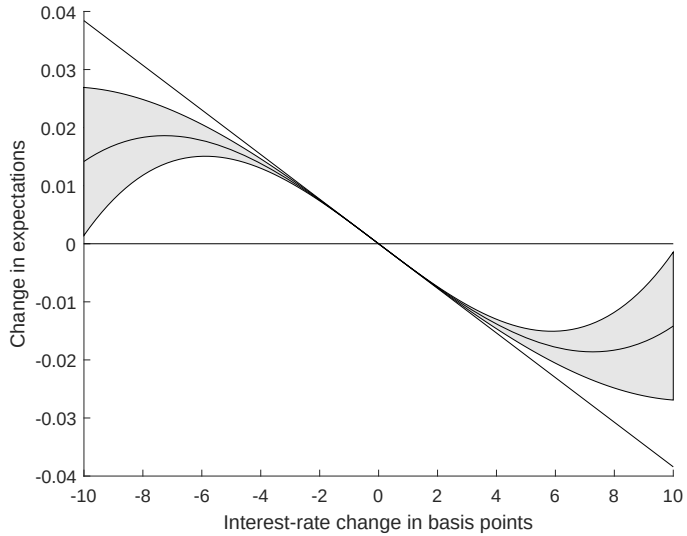
To understand results, turn to more systematic analysis using broader measure of monetary policy shocks

⇒ Use the change in the 1-month overnight index spread during monetary announcements as shock measure

Cubic term



(a) Price expectations



(b) Production expectations

Straight line: estimate of linear term. Shaded area: 90% confidence interval around cubic component.
Horizontal axis: interest rate surprise (bp); vertical axis: change in expectations.

Significant evidence for smaller effects of large announcements

→ In line with 'information effect': large expansionary policy surprises carry bad news (or trigger reassessment of expectations)

Are firm expectations rational?

Empirical test

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

$$\text{Error}_{i,t} = \beta_0 + \beta_1^i \text{Micro news}_{i,t} + \beta_2^i \text{Macro news}_t + \nu_t^i$$

where

- $\text{Error}_{i,t}$: production-expectation error (realization - expectation)
- $\text{Micro news}_{i,t}$: production-expectation revisions net of time-fixed effect
- $\text{Macro news}_{i,t}$: surprise components in ifo index

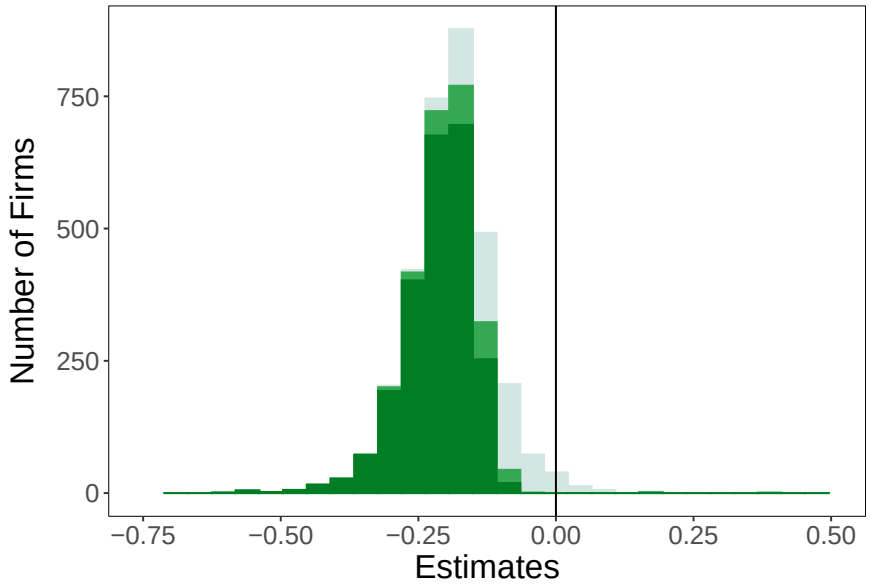
Rational-expectations benchmark: $\beta_1^i = \beta_2^i = 0$

$\beta^i > 0$ for irrational underreaction, $\beta^i < 0$ for overreaction

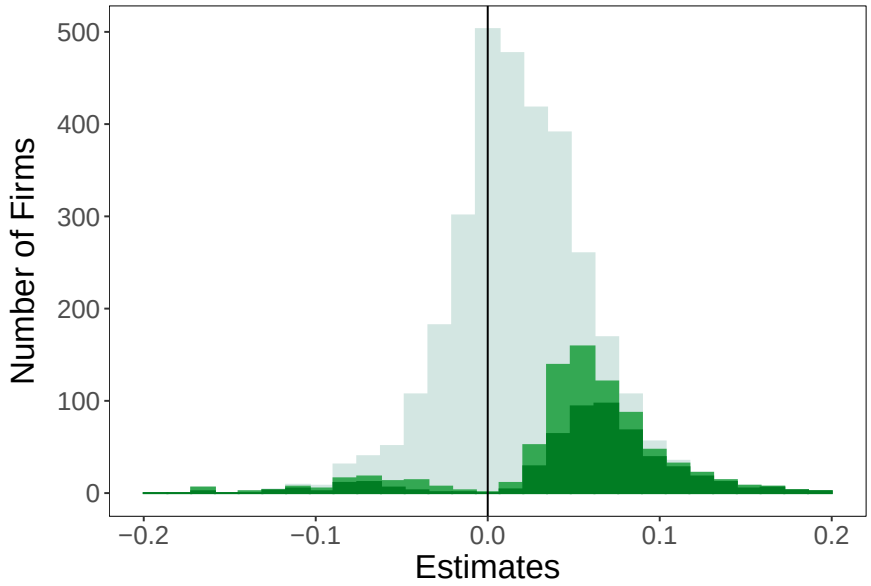
Over- and underreaction to news

Individual firm-level regressions

Overreaction to micro news
(forecast revision)



Underreaction to macro news
(ifo index shock)

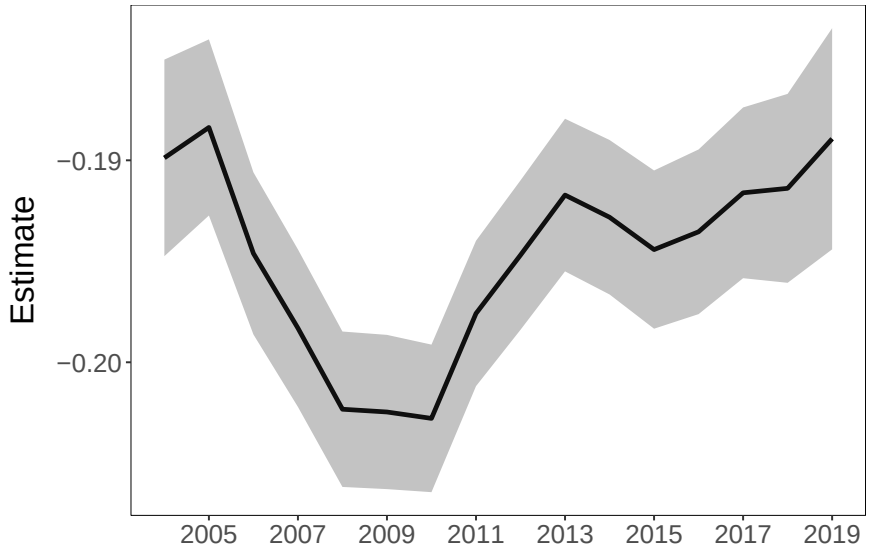


Note: grey=not significant, bright green=10%, dark green=5%

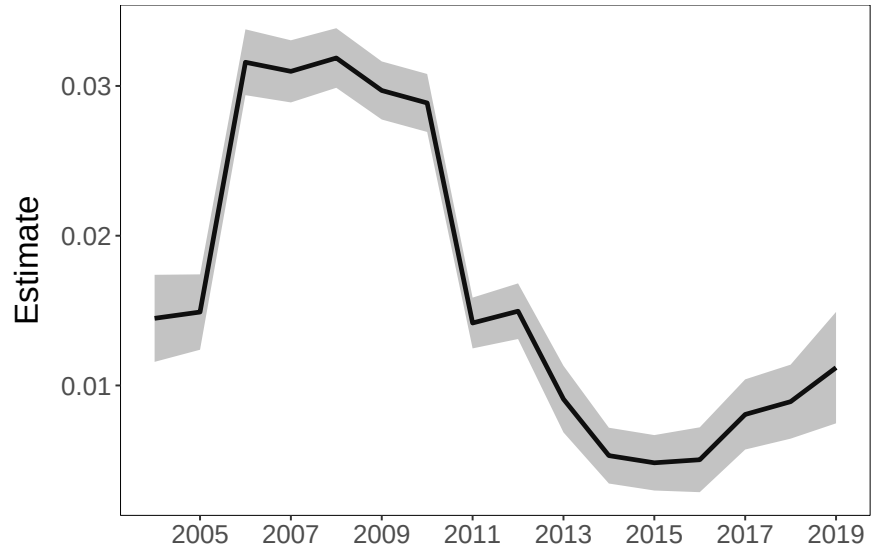
Over- and underreaction to news over time

Stronger biases during financial crisis

Micro Bias



Macro Bias



Note: Regressions over Rolling Window (5 Periods)

Firm-level profitability

	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	0.197	-0.121	0.199			
	(0.178)	(0.090)	(0.182)			
Micro News Bias	1.76**		1.76**	2.39***		2.36***
	(0.856)		(0.876)	(0.824)		(0.842)
Macro News Bias		-0.778	-0.069		-1.29	-0.363
		(1.81)	(1.85)		(1.80)	(1.83)
Observations	1,665	1,665	1,665	1,665	1,665	1,665
R^2	0.003	0.000	0.003	0.053	0.049	0.053
Within R^2				0.005	0.000	0.005
Sector FE				✓	✓	✓
Size FE				✓	✓	✓

→ Micro bias is associated with lower profits

Firm-level importance of business cycle

	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	0.245***	0.198***	0.209***			
	(0.058)	(0.026)	(0.057)			
Micro News Bias	-0.041		0.062	-0.001		0.081
	(0.286)		(0.276)	(0.293)		(0.283)
Macro News Bias		1.59**	1.61**		1.35**	1.37**
		(0.641)	(0.649)		(0.640)	(0.646)
Observations	720	720	720	720	720	720
R^2	0.000	0.010	0.010	0.038	0.045	0.045
Within R^2				0.000	0.007	0.007
Sector FE				✓	✓	✓
Size FE				✓	✓	✓

→ Macro bias is associated with attachment to the business cycle

Effects of Expectations

Concepts

Several possibilities how expectations may (not) affect actions

- **They don't**
  - **Agents wait until observing future**

- News
  - Expectations as transmission channel
  - Beaudry Portier (2006), Barsky and Sims (2012), Schmitt-Grohé Uribe (2012)

- Noise/irrational animal spirits
  - (Ir-)rational expectations cause 'wrong' actions
  - Lorenzoni (2009), Blanchard et al. (2013), Angeletos La'O (2013)

- Self-fulfilling expectations
  - Expectations change future fundamentals
  - Azariadis (1981), Cass Shell (1983), Farmer (2012/13), Benhabib et al. (2016)

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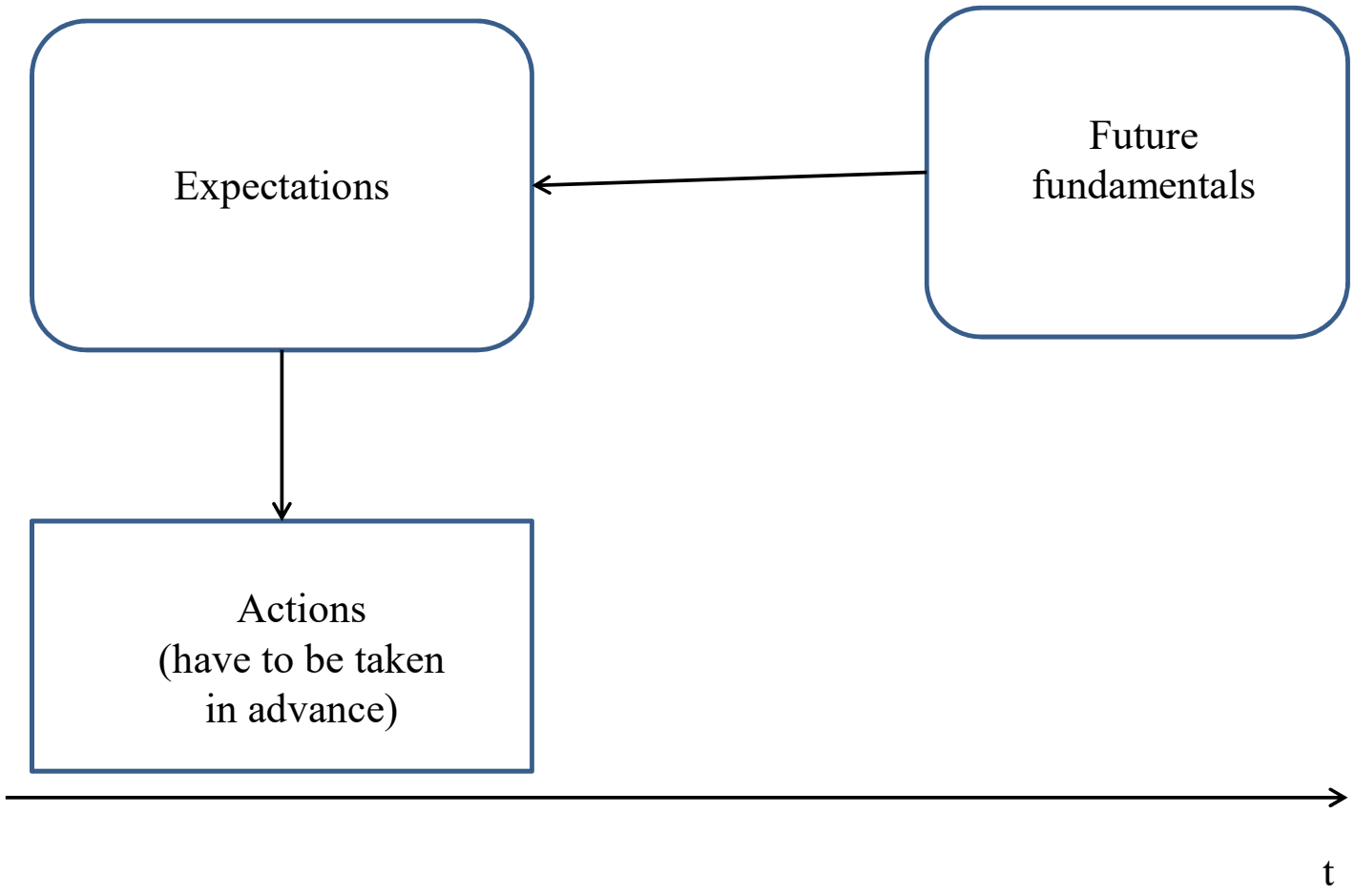
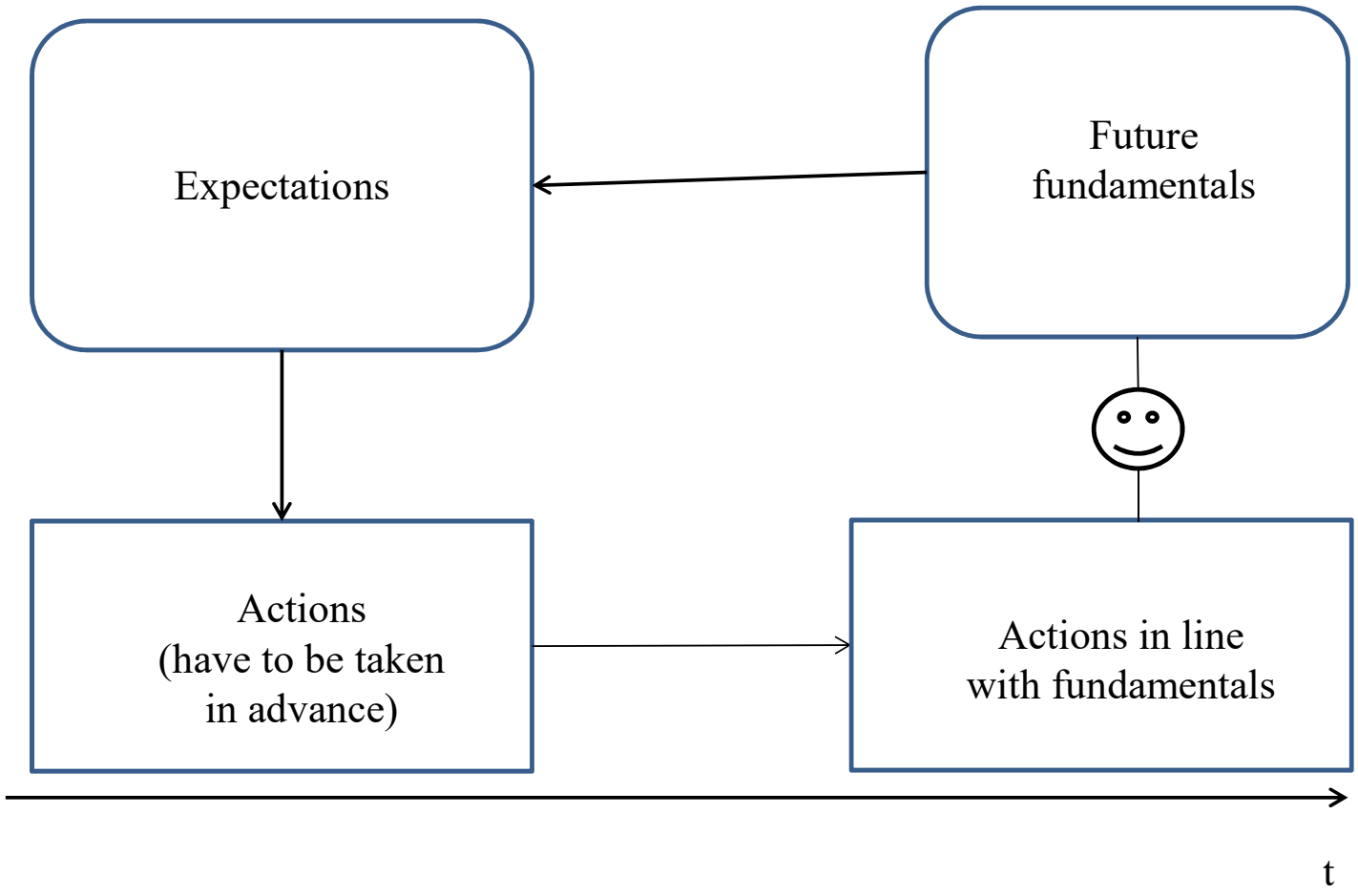
News


Expectations
Future fundamentals
Actions (have to be taken in advance)
t

News


Expectations
Future fundamentals
Actions (have to be taken in advance)
Actions in line with fundamentals
t

News

Conclusion in this case:

- Expectations only indirectly important,
  do not change economic outcomes by themselves

Concepts

Several possibilities how expectations may (not) affect actions

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- **Noise/irrational animal spirits**
  - **(Ir-)rational expectations cause 'wrong' actions**
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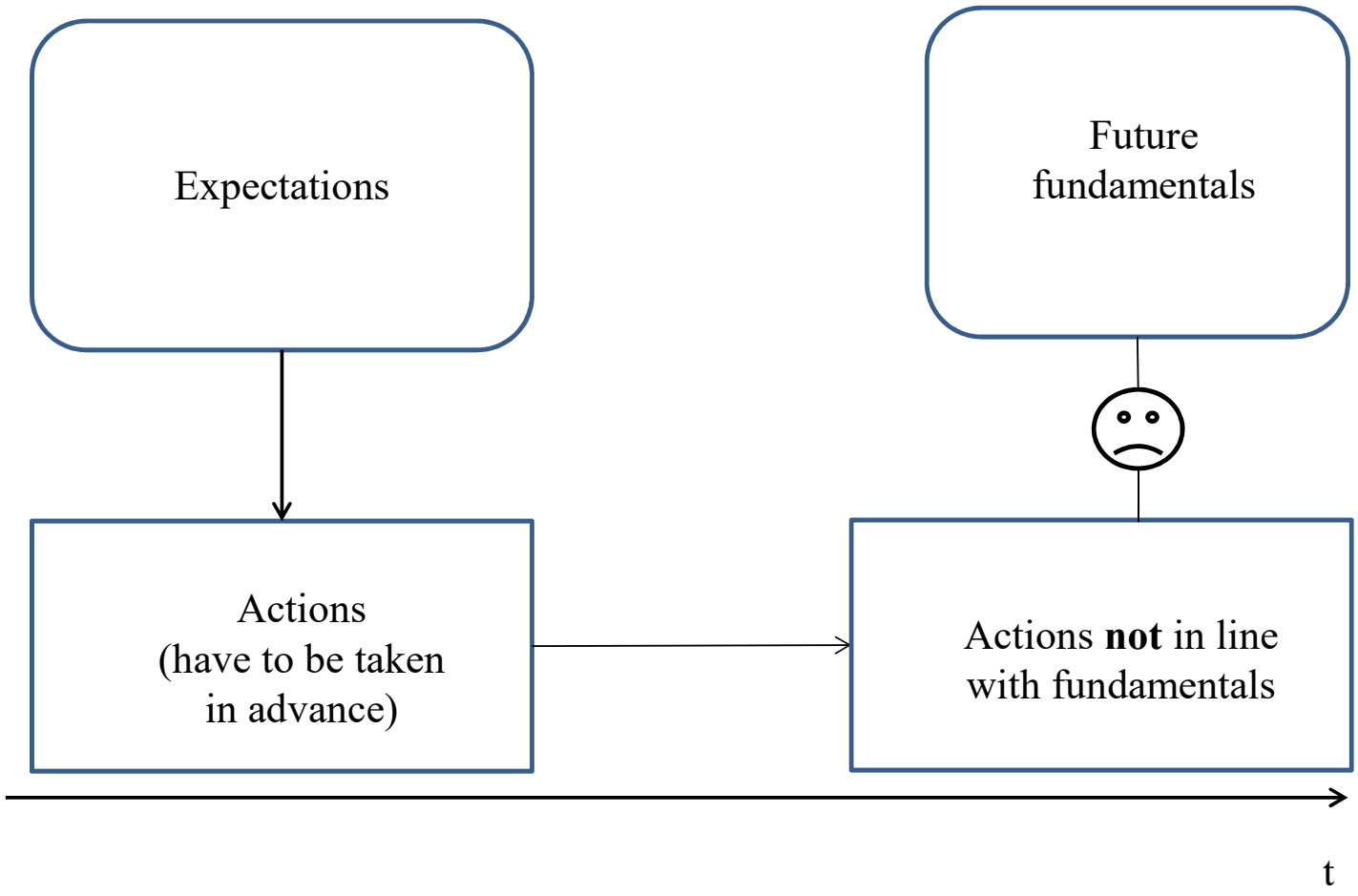
Noise/irrational animal spirits



Noise/irrational animal spirits

Conclusion in this case:

- Expectations matter for economic outcomes
- Can drive aggregate fluctuations

→ Expectations exogenous source of business-cycle fluctuations

Alternative labels: misperceptions or sentiment shocks

Concepts

Several possibilities how expectations may (not) affect actions

- They don't
  - Agents wait until observing future

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Empirical strategy: propensity score matching

Compare firms that are very similar in all observable variables, *except* in optimism/pessimism regarding production

Propensity score matching:

- Calculate probability of being optimistic/pessimistic
- Match firms with same probability but different answers
- Compare actual behavior today

Firms are very similar: potentially different actions today should be triggered by different expectations about future

Variables in probit model

Variable	Description	Frequency	Reference period
debt share[1]	total debt over assets	annual	$t-11$ to t
financing coefficient[1]	liabilities minus provisions divided by equity plus provisions	annual	$t-11$ to t
employees	no. of employees	annual[2]	Oct./Nov.
state of business	answer to question on state of business (values: 1, 0, −1)	monthly	t
orders	answer to question on state of orders (values: 1, 0, −1)	monthly	t
foreign orders	answer to question on state of foreign orders (values: 1, 0, −1)	monthly	t
production	answer to question on change in production (values: 1, 0, −1)	monthly	$t-1$
prices	answer to question on change in prices (values: 1, 0, −1)	monthly	$t-1$
capacity utilization	utilization of existing capacity in %	quarterly[2]	$t-1$
demand	answer to question on demand in previous month (values: 1, 0, −1)	monthly	$t-1$

Notes: For all variables with monthly frequency also three lags are included as well as various interaction terms are included.

[1] Exclude 99.99 percentile of debt share and 0.02/99.98 percentiles of financing coefficient (outliers/mismeasurement).

[2] In months with no reporting we use data from the most recent balance sheet/most recent quarter the question was asked.

Average treatment effect on the treated

	(1) Baseline	(2) Radius 0.01	(3) Sample 2002-2016	(4) Sample excl. fin. crisis[1]	(5) Match in sector	(6) Response in first 10 days[2]
Panel (a): Expected production increase – Effect on production						
ATT	0.172***	0.170***	0.181***	0.170***	0.165***	0.200***
	(30.43)	(29.34)	(30.22)	(28.52)	(23.30)	(19.20)
Observ.	129812	120335	108660	113690	52961	31722
Panel (b): Expected production increase – Effect on prices						
ATT	0.025***	0.025***	0.024***	0.025***	0.026***	0.032***
	(5.97)	(5.80)	(5.30)	(5.52)	(5.00)	(3.98)
Observ.	129858	120367	108691	113734	52962	31732
Panel (c): Expected production decrease – Effect on production						
ATT	-0.173***	-0.170***	-0.169***	-0.172***	-0.164***	-0.174***
	(-27.77)	(-26.47)	(-25.00)	(-25.37)	(-20.48)	(-13.81)
Observ.	125458	113992	104275	106764	47320	28855
Panel (d): Expected production decrease – Effect on prices						
ATT	-0.031***	-0.033***	-0.026***	-0.035***	-0.028***	-0.025**
	(-6.13)	(-6.41)	(-4.76)	(-6.53)	(-4.52)	(-2.46)
Observ.	125530	114050	104337	106821	47341	28877

Expectations matter

We find optimism to be expansionary/pessimism contractionary

- Expectations matter!

But why? Two possibilities

- Firms correctly anticipate fundamental developments ("news")—expectations matter as transmission channel
- "Noise" or animal spirits: "drive economic decisions beyond considerations based on nothing but a mathematical expectation" (Keynes)—purely exogenous variation

Correct vs. incorrect optimism/pessimism

Assess forecast error of firms ex post, define

- Correct optimists: expected *increase* and *no* error
- Incorrect optimists: expected *increase* and *negative* error
- Comparison group: expected *no change* and *no* error

Perform matching procedure again

- Separately for correct and incorrect optimists
- Control group: neutral firms without error
- Analogously for correct and incorrect pessimists

(In)correctly expected production increases

	(1) Baseline	(2) Radius 0.01	(3) Sample 2002-2016	(4) Sample excl. fin. crisis[1]	(5) Match in sector	(6) Response in first 10 days[2]
Panel (a): Correctly expected production increase – Effect on production						
ATT	0.302***	0.298***	0.313***	0.297***	0.290***	0.331***
	(36.89)	(34.85)	(35.95)	(34.26)	(25.37)	(22.75)
Observ.	81254	68946	68597	71391	20644	18040
Panel (b): Correctly expected production increase – Effect on prices						
ATT	0.035***	0.034***	0.037***	0.033***	0.034***	0.033***
	(5.40)	(5.18)	(5.24)	(4.90)	(4.03)	(2.83)
Observ.	81254	68945	68587	71392	20635	18044
Panel (c): Incorrectly expected production increase – Effect on production						
ATT	0.063***	0.060***	0.075***	0.063***	0.082***	0.081***
	(8.58)	(7.94)	(9.55)	(8.13)	(8.42)	(5.90)
Observ.	84029	74232	69659	73973	26203	18716
Panel (d): Incorrectly expected production increase – Effect on prices						
ATT	0.016***	0.015***	0.014**	0.011*	0.012	0.006
	(2.92)	(2.58)	(2.26)	(1.89)	(1.61)	(0.58)
Observ.	84032	74232	69656	73978	26205	18723

(In)correctly expected production decreases

	(1) Baseline	(2) Radius 0.01	(3) Sample 2002-2016	(4) Sample excl. fin. crisis[1]	(5) Match in sector	(6) Response in first 10 days[2]
Panel (e): Correctly expected production decrease – Effect on production						
ATT	-0.307***	-0.300***	-0.302***	-0.303***	-0.281***	-0.304***
	(-33.71)	(-30.52)	(-30.13)	(-32.00)	(-22.03)	(-17.14)
Observ.	80282	66948	66312	68156	18875	15243
Panel (f): Correctly expected production decrease – Effect on prices						
ATT	-0.030***	-0.021**	-0.024***	-0.044***	-0.044***	-0.048***
	(-3.83)	(-2.52)	(-2.76)	(-5.66)	(-4.23)	(-3.08)
Observ.	80285	66941	66303	68158	18859	15250
Panel (g): Incorrectly expected production decrease – Effect on production						
ATT	-0.086***	-0.093***	-0.077***	-0.086***	-0.116***	-0.075***
	(-9.99)	(-10.29)	(-8.34)	(-9.15)	(-10.12)	(-4.34)
Observ.	79026	68414	65304	68835	22376	16195
Panel (h): Incorrectly expected production decrease – Effect on prices						
ATT	-0.003	-0.008	-0.003	-0.008	-0.019**	-0.004
	(-0.36)	(-1.07)	(-0.38)	(-1.08)	(-2.04)	(-0.32)
Observ.	79033	68420	65305	68842	22375	16209

Aggregate effects of undue opt-/pessimism

Generate time series of undue optimism/pessimism

- Predict opt-/pessimism of individual firm with ordered probit
- Choose firms whose answer differs from prediction (opt-/pessimists)
- Narrow down to incorrectly opt-/pessimistic firms: ex-post forecast error
- Aggregation: share of incorrect opt-/pessimists

Potential effects of macro shocks on undue opt-/pessimism filtered out by time fixed effect

Impulse-response functions

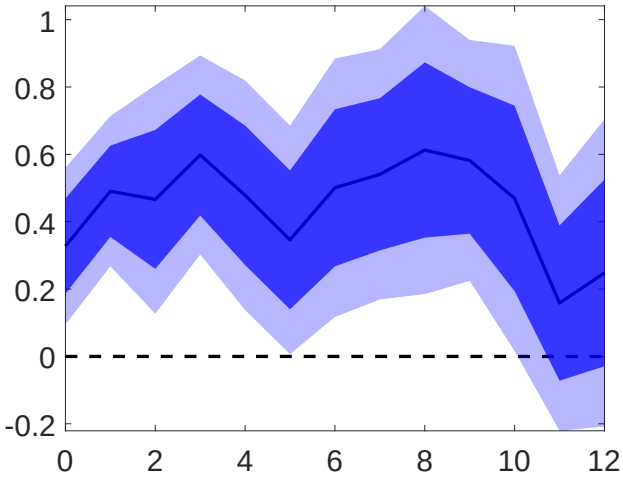
Local projections (Jordà, 2005)

- Impulse response of industrial production/prices in manufacturing to undue optimism/pessimism shocks
- Include 1 lag of dependent variable, 12 lags of shocks, linear trend, residuals of previous horizon

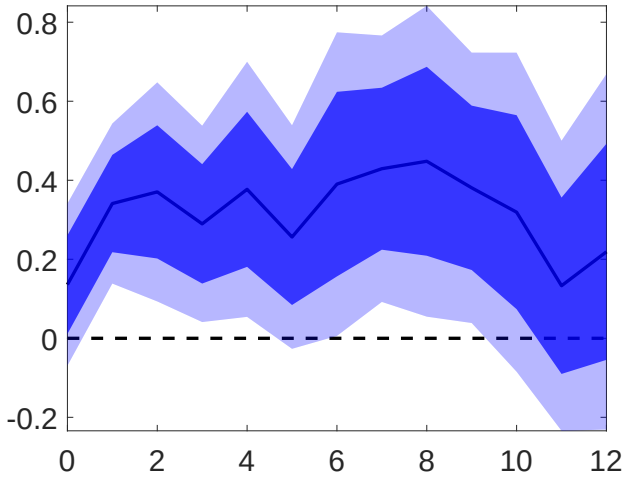
$$x_{t+h} = c^{(h)} + \sum_{j=1}^{J} \alpha_j^{(h)} x_{t-j} + \sum_{k=0}^{K-1} \beta_k^{(h)} e_{t-k}^{o} + \sum_{k=0}^{K-1} \gamma_k^{(h)} e_{t-k}^{p} + \varepsilon_{t+h}$$

Response of IP (mfg) to undue optimism

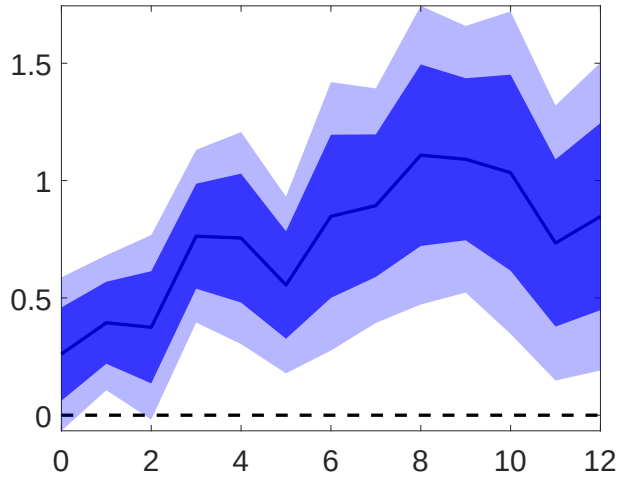
No weights



Employee weighted

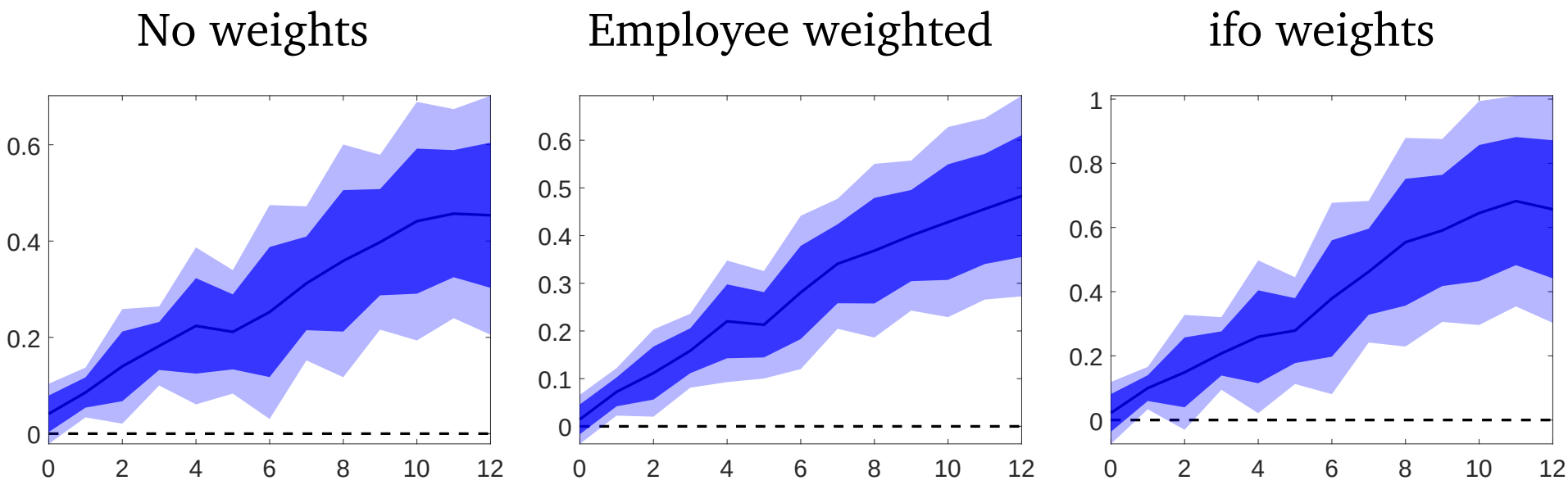


ifo weights



Notes: Response after one s.d. shock, reported in percentage points
Shaded areas represent 68% and 90% confidence intervals

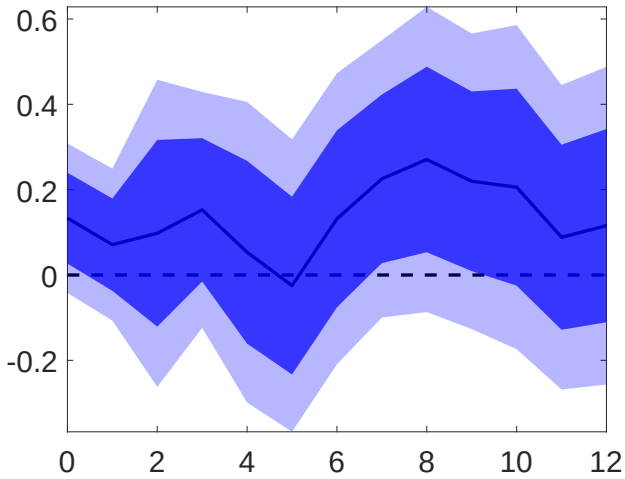
Response of PPI (mfg) to undue optimism



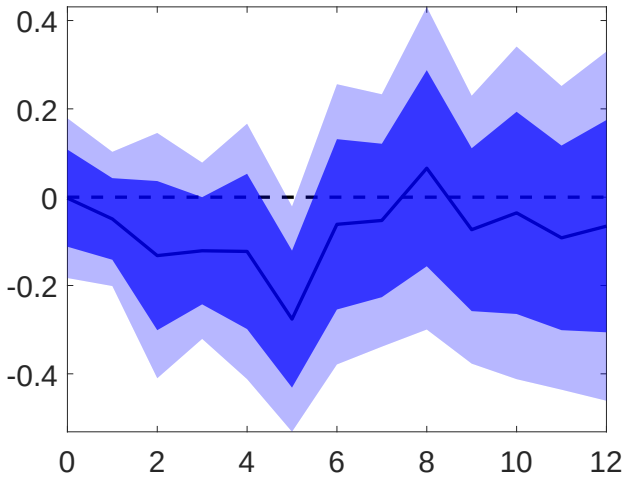
Notes: Response after one s.d. shock, reported in percentage points
Shaded areas represent 68% and 90% confidence intervals

Response of IP (mfg) to undue pessimism

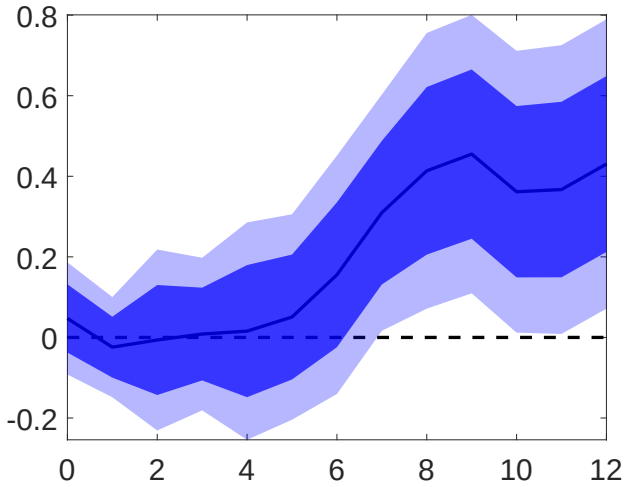
No weights



Employee weighted



ifo weights



Notes: Response after one s.d. shock, reported in percentage points
Shaded areas represent 68% and 90% confidence intervals

Response of PPI (mfg) to undue pessimism

Notes: Response after one s.d. shock, reported in percentage points
Shaded areas represent 68% and 90% confidence intervals

Forecast error variance decomposition

	Variable	Unweighted	Empl. weights	ifo weights
Optimism	IP	15%	9.5%	19%
	PPI	20%	22%	22%
Pessimism	IP	2.5%	1.3%	7.2%
	PPI	7.3%	1.2%	2.3%

Conclusion

Long-standing interest in role of expectations for economic outcomes

New empirical methods and available data allow direct investigation of expectations' effects

We use macro- (not in this talk) and micro-data to tackle this question

Results similar: incorrect expectations matter and drive around 15% of short-run fluctuations

Implications for economic policy?

- Fluctuations driven by incorrect expectations are inefficient!

- Monetary policy:
  - Large monetary policy shocks have *lower* effect on firm expectations than small shocks
  - Hints at information effect about state of the economy

- Fiscal policy: e.g., unconventional fiscal policy

  D'Acunto, Hoang & Weber (2018), Enders and Nagegast (2022)

Study (with Christian Conrad and Alex Glas) on determinants of *households'* inflation expectations

However, few studies on link consumer expectations & actions

⇒ Still much work to do...