#### Attention to the Macroeconomy

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  - Attention to the economy is central for business cycles, and policy transmission. (Maćkowiak and Wiederholt, 2009; Paciello and Wiederholt, 2014; Reis, 2006a)

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     (Bordalo et al., 2025; Hartzmark et al., 2021; Sicherman et al., 2016)
- Empirical properties of attention to the economy and link to beliefs not well understood due to a lack of direct data on attention allocation.

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- Empirical facts about attention, beliefs and link to actions.
  - Purely descriptive, but naturally occurring variation in attention, large samples, period with a changing economic environment.
  - We link attention and beliefs to decisions (firms' price setting behavior).

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  - We link attention and beliefs to decisions (firms' price setting behavior).
- Develop model of selective memory recall to reconcile theory and empirics.
  - Test additional predictions in the data.

## Preview of results

- Consistent with theories of goal-optimal attention:
  - Persistent cross-sectional heterogeneity in attention, related to exposure & info costs.
  - Attention higher when environment is more volatile.
  - Attention associated with more frequent expectation adjustment, higher confidence, smaller misperceptions of realized inflation.
  - Firms attentive to inflation are more likely to plan or to have implemented price increases.

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#### • Extended model with similarity-based memory recall:

- Reconciles theory and empirics.
- Model predicts important role for experiences in agents' attention allocation and belief formation: confirmed in our data.
- Predictions on attention to energy prices and inflation expectations confirmed in the data.

#### Related literature

#### • Determinants of information acquisition and attention allocation to the economy.

(Adam, 2007; Bracha and Tang, 2024; Capozza et al., 2022; Coibion and Gorodnichenko, 2015; Coibion et al., 2018; Flynn and Sastry, 2024; Goldstein, 2023; Korenok et al., 2023; Mikosch et al., 2024; Pfäuti, 2024a,b; Roth et al., 2022; Song and Stern, 2024; Weber et al., 2025)

 $\hookrightarrow$  We provide direct field evidence on the dynamics, consequences, and drivers of attention to the macroeconomy.

#### • Role of memory and experiences in belief formation.

(Afrouzi et al., 2023; Andre et al., 2022; Bordalo et al., 2024, 2023a,b, 2020; Conlon and Patel, 2025; D'Acunto and Weber, 2022; Enke et al., 2024; Gennaioli et al., 2024; Gödker et al., 2021; Goldfayn-Frank and Wohlfart, 2020; Graeber et al., 2024; Kahana, 2012; Laudenbach et al., 2024; Malmendier and Nagel, 2016; Salle et al., 2023)

→ Our results point to a role for experiences – through similarity-based recall – in shaping the link from attention to beliefs.

## Outline

- 1 Setting and Data
- 2 A Model of Goal-Optimal Attention
- **3** Testing Theories of Goal-Optimal Attention
- 4 Selective Memory and Non-Goal-Optimal Attention

# Setting and Data

#### Context and timeline

- We conduct **quarterly surveys** with German households and firms b/w December 2020 and March 2023 (10 waves).
  - Firms: ifo Business Survey ( $N \approx 3,000$  per wave).
  - Households: Dynata, broadly representative of German population ( $N \approx 5,000$  per wave).



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▶ Responses/Attrition

- Turbulent economic times:
  - Recovery from the pandemic recession.
  - Surge in inflation (largely unexpected) starting mid-2021 to close to 10% end-2022, amplified by Ukraine war and energy crisis.
  - Interest rate at the ZLB until mid-2022, then sharp rate hikes up until 3.5% in March 2023.
  - Unemployment rate relatively stable between 5% and 6%.

# Open-ended measurement of attention allocation

- Attention as the allocation of cognitive resources across (economic) domains.
- We want to be agnostic about the exact margins through which attention matters:
  - Information acquisition.
    - (Mankiw and Reis, 2002; Reis, 2006a,b)
  - Information processing.
     (Maćkowiak and Wiederholt, 2009; Sims, 2003; Woodford, 2003)
- We rely on an open-ended elicitation:
  - Increasingly common in economics.
     (Andre et al., 2022, 2025, 2024; Haaland et al., 2024; Stantcheva, 2021, 2023)
  - Core advantage compared to more structured question formats: no priming through displayed response options.

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<u>**Q**</u>: What topics come to mind when you think about the economic situation of your company/household?

# Coding of open-ended responses

Coding scheme for responses to the open-ended question to quantitatively analyze the unstructured text data:

- Codes for a range of topics:
  - Macroeconomic: pandemic, inflation, growth, monetary policy, ...
  - Household-level: income, spending, saving, housing costs, ...
  - Firm-level: supply chain, input factors, product demand, costs, ...
- Each response can be assigned multiple codes.
- Instruct research assistants to apply the coding scheme to the open-text responses.

# Reliability of coding scheme & validity of open-ended data

- 85.5% of HH responses and 97.3% of firm responses can be assigned at least one code.
- Double-coding of subset: High inter-rater reliability ( $\approx$  90%).
- Large overlap with automated word counts.
- Large overlaps with AI-based classification. More
- $\rightarrow$  Coding scheme reliably captures content of open-ended data.

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- Large overlap with automated word counts.
- Large overlaps with AI-based classification.
- $\rightarrow$  Coding scheme reliably captures content of open-ended data.
- Strongly correlated w/ attention measure based on structured survey question.
- Attentive agents consume more economic news.
- Time variation closely aligned with Google searches.
- $\rightarrow$  Supports validity of open-ended measurement.





# A Model of Goal-Optimal Attention

#### Model setup

Standard model of rational inattention (Maćkowiak et al., 2023):

- deviating from the full-information forecast leads to losses ....
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Setup:

- (demeaned) Inflation follows an AR(1)-process with persistence  $\rho_{\pi}$ .
- Loss is given by:

$$\frac{B}{2} \left( \underbrace{\rho_{\pi}\pi}_{\text{full info}} - \pi^e \right)^2$$

- Cost of information is linear in mutual information:  $C = \kappa I(\pi; s)$ .
- Gaussian prior:  $\pi \sim N(\hat{\pi}, \sigma_{\pi}^2)$ , we set prior mean  $\hat{\pi} = 0$  for simplicity.

#### Model solution

• Optimal attention choice:

$$\gamma_{\pi} = max \left\{ 0, 1 - rac{\kappa}{B 
ho_{\pi}^2 \sigma_{\pi}^2} 
ight\},$$

where *B* is the agent's exposure to inflation and  $\kappa$  is the cost of information.

- Inflation nowcast:  $\tilde{\pi} = \gamma_{\pi} s$ .
- Inflation forecast:  $\pi^e = \rho_{\pi} \gamma_{\pi} s$ .

## Model predictions

- Variation in attention: agents pay more attention if ...
  - they are more exposed to inflation.
  - they face lower information costs.
  - the variable to be forecast is more volatile (higher prior uncertainty).

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- Variation in attention: agents pay more attention if ...
  - they are more exposed to inflation.
  - they face lower information costs.
  - the variable to be forecast is more volatile (higher prior uncertainty).
- Attention and beliefs: attentive agents ...
  - are more likely to adjust their expectations when obtaining a new signal.
  - are more confident in their beliefs.
  - make more accurate nowcasts and forecasts:
    - expected nowcast error  $|\pi \gamma_{\pi}\pi|$  is lower with  $\gamma_{\pi}$  closer to 1.
    - expected forecast error  $|\rho_{\pi}| \cdot |\pi \gamma_{\pi}\pi|$  is lower with  $\gamma_{\pi}$  closer to 1.
    - $\rightarrow$  Attention is goal-optimal
  - disagreement about nowcasts  $|\gamma_{\pi,1}s_1 \gamma_{\pi,2}s_2|$  is (weakly) larger than about forecasts  $|\rho_{\pi}||\gamma_{\pi,1}s_1 \gamma_{\pi,2}s_2|$ .

# **Testing Theories of Goal-Optimal Attention**

# Variation of attention across topics



- Attention to macro topics higher among firms than among households.
- Attention to the macroeconomy concentrated in inflation.

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- Attention to macro topics higher among firms than among households.
- Attention to the macroeconomy concentrated in inflation.
- Individual fixed effects are an important source of variation.
- Time fixed effects explain a meaningful but smaller part of the variation. More
- Dynamics: attention shifts from Covid-19 to inflation, consistent with increasing inflation volatility and changes in news coverage. • More

## Cross-sectional variation in attention: Measures of attention drivers

#### • Direct measure of perceived exposure to different variables:

- Self-reported on a 5-point categorical scale.
- Information acquisition costs (only available for households):
  - Perceived difficulty of finding macroeconomic information.
  - Self-reported on a 5-point categorical scale.
- $\Rightarrow$  regress individual fixed effects in attention on these measures (+ demographics)

## Cross-sectional variation in attention: Households

	Attention				
	(1)	(2) Monetary	(3)	(4) Any macro	
	Inflation	policy	Growth	topic	
Low information acquisition costs	0.030***	$0.003^{*}$	-0.001	$0.046^{***}$	
	(0.007)	(0.002)	(0.002)	(0.009)	
High perceived exposure to variable	$0.097^{***}$	$0.005^{***}$	$0.007^{***}$	$0.126^{***}$	
	(0.005)	(0.001)	(0.001)	(0.007)	
Demographic controls	Yes	Yes	Yes	Yes	
Observations	10,755	10,755	10,755	10,755	

• Consistent with the model predictions, attention ...

- decreases with information costs.
- increases with proxies for exposure to the variable to be forecast.

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Next: how is attention to inflation related to beliefs about inflation?
	Absolute change in ex- pectation ≥ 0.5 p.p.	Confi- dence (z)	Expected inflation	Absolute deviation from expert forecast	Perceived current inflation	Absolute deviation from current level
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Households						
Attention to inflation	0.021*** (0.007)	0.167*** (0.016)	0.171** (0.087)	0.104 (0.085)	-0.111 (0.072)	-0.502*** (0.061)
Distinct respondents	6,716	10,755	10,755	10,755	8,328	8,328
Observations	20,983	34,976	34,976	34,976	24,404	24,404
R-squared	0.02	0.12	0.16	0.10	0.14	0.07
Mean dep. var.	0.79	0.04	7.08	4.88	6.32	2.67
SD dep. var.	0.41	0.99	6.50	6.17	5.26	4.26
Panel B: Firms						
Attention to inflation	0.013** (0.006)	0.044** (0.017)	0.212*** (0.046)	0.200*** (0.046)		
Distinct respondents	4,402	6,193	6,235	6,235		
Observations	18,423	27,121	28,107	28,107		
R-squared	0.02	0.02	0.49	0.23		
Mean dep. var.	0.80	0.04	5.47	3.00		
SD dep. var.	0.40	1.02	3.44	2.72		
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

• Attentive agents update inflation expectations more frequently in our environment of changing signals, consistent with the model.

	Absolute change in ex- pectation $\geq 0.5 \text{ p.p.}$	Confidence (z)	Expected inflation	Absolute deviation from expert forecast	Perceived current inflation	Absolute deviation from current level
	(1)	(2)	(3)	(4)	(5)	(6)
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• Attentive agents more confident in their expectations, consistent with the model.

	$\frac{Absolute}{change}$ in ex- pectation $\frac{\geq 0.5 \text{ p.p.}}{(1)}$	Confidence (z) (2)	$\frac{\text{Expected}}{\text{inflation}}$ (3)	Absolute deviation from expert forecast (4)	Perceived current inflation (5)	Absolute deviation from current level (6)
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Time FE	Yes	Yes	Yes	Yes	Yes	Yes

• Smaller misperceptions about current inflation, consistent with the model.

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• Expectations deviate more strongly (upward) from experts, at odds with model.

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Time FE	Yes	Yes	Yes	Yes	Yes	Yes

• Expectations deviate more strongly (upward) from experts, at odds with model.

• Forecast disagreement *exceeds* disagreement in nowcasts, at odds with model. • More

#### Firms' price plans and attention to inflation • Definition

	Planned price change (trichotomous)		Plar pr incr (dun	nned ice ease nmy)	Planned price decrease (dummy)	
	(1)	(2)	(3)	(4)	(5)	(6)
Attention to inflation	0.101*** (0.009)	0.086*** (0.009)	0.095*** (0.008)	0.078*** (0.008)	-0.007** (0.003)	-0.008*** (0.003)
Distinct respondents	6,178	4,873	6,178	4,873	6,178	4,873
Observations	28,198	26,893	28,198	26,893	28,198	26,893
R-squared	0.10	0.44	0.12	0.45	0.03	0.37
Mean dep. var.	0.42	0.42	0.46	0.46	0.04	0.04
SD dep. var.	0.57	0.57	0.50	0.50	0.20	0.19
Controls	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

• More attentive firms are more likely to plan price increases.

#### Realized price changes and attention to inflation .

	Realized price change last month (trichotomous)		Real price ii last n (dun	lized ncrease nonth nmy)	Realized price decrease last month (dummy)	
	(1) (2)		(3)	(3) (4)		(6)
Attention to inflation	0.063*** (0.008)	0.059*** (0.008)	0.057*** (0.007)	0.055*** (0.007)	-0.006** (0.003)	-0.005 (0.003)
Distinct respondents	6,184	4,878	6,184	4,878	6,184	4,878
Observations	28,366	27,060	28,366	27,060	28,366	27,060
R-squared	0.10	0.43	0.13	0.45	0.03	0.41
Mean dep. var.	0.25	0.25	0.29	0.29	0.04	0.04
SD dep. var.	0.51	0.51	0.45	0.45	0.19	0.19
Controls	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

- More attentive firms are more likely to have implemented price increases.
- $\rightarrow$  Attention correlated with firms' decision-making.

# Selective Memory Recall and Non-Goal Optimal Attention

#### Shortcomings of the model of goal-optimal attention

Model of goal-optimal attention fails along two dimensions:

- Attentive households' forecasts deviate more strongly from expert forecasts (though their nowcasts are more accurate).
- 2 Disagreement in forecasts exceeds disagreement in nowcasts.
- $\Rightarrow$  suggesting that agents may not rationally update their expectations.
- $\Rightarrow$  propose an extension to the theory focusing on how agents go from nowcasts to forecasts while keeping the simple structure of the model.

#### Selective memory recall

# Recent literature on selective memory: current context can cue agents to retrieve memories of similar past episodes.

(Bordalo et al., 2020, 2025; Gennaioli et al., 2024; Kahana, 2012)

 $\Rightarrow$  Extend model by allowing selective memory recall to affect how agents extrapolate from nowcasts to forecasts.

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⇒ Extend model by allowing selective memory recall to affect how agents extrapolate from nowcasts to forecasts.

#### Key idea:

- Attentive agents observe currently high inflation.
- They retrieve memories of past inflationary episodes.
- ⇒ They increase their perceived persistence because inflation persistence is high when inflation is high.

(Benati, 2008; Gallegos, 2023)

• Selective memory recall affects agent's perceived persistence:

 $\hat{\rho}_{\pi} = \rho_{\pi}(1+\theta),$ 

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- The agent recalls past experiences based on their similarity to  $\mathcal{I}_t$ :

 $\theta \propto S(\rho_{\pi_{t-s}}, \mathcal{I}_t, D_t)$ 

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- $S(\cdot)$ : similarity function that overweights  $\rho_{\pi_{t-s}}$  when current context  $\mathcal{I}_t$  is similar to episodes *s* periods ago.
- $\Rightarrow$  as  $\rho_{\pi_{t-s}}$  is higher in periods of high inflation, agents with experiences of high inflation will have  $\hat{\rho}_{\pi} > \rho_{\pi}$  when they **are attentive and observe current inflation to be high.**

The model overcomes the shortcomings of the goal-optimal attention model:

- Attention becomes non-goal-optimal: attentive agents increase expectations more than under rational expectations when inflation is high.
- Forecast disagreement increases relative to nowcast disagreement due to heterogeneity in memory databases.

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We cannot test the functional form of  $\theta$  or  $S(\cdot)$ , but we can test the role of experiences:

- Agents that experienced inflation in the past have higher inflation expectations.
- Agents that experienced inflation in the past deviate more from expert forecasts.
- Attention feedback: increase attention due to selective memory recall.

#### Empirical evidence on experiences, attention and beliefs

We consider two types of experiences:

- experienced income or wealth loss due to inflation (elicited before inflation surge).
- 2 have lived through the 1970s oil crises.
- $\Rightarrow$  interact experience measures with shock period to estimate dynamic relationship.

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Experiences and attention:

Attention to inflation<sub>*it*</sub> =  $\alpha$ Prior inflation experience<sub>*i*</sub> × **Shock periods**<sub>*t*</sub> +  $X'_{it}\Pi + \phi_t + \phi_i + \epsilon_{it}$ 

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## Differential belief responses: Households

	Attention	Attention to inflation		Expected inflation next 12 months		e deviation ert forecast
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation experience						
$\times 1(t \in \{21m9, 21m12\})$	0.036*** (0.009)	0.026*** (0.009)	0.565*** (0.130)	0.185 (0.136)	0.556*** (0.127)	0.200 (0.133)
$\times \; 1 (t \in \{22m3, 22m6, 22m9\})$	0.030**	0.054***	1.029***	0.591***	0.946***	0.563***
$\times \; 1 (t \in \{22m12, 23m3\})$	(0.013) 0.004 (0.016)	(0.014) $0.051^{***}$ (0.018)	(0.162) 1.042*** (0.188)	(0.175) 0.565*** (0.207)	(0.157) 0.934*** (0.181)	(0.171) 0.491** (0.200)
Experience measure	Oil crises	Past losses	Oil crises	Past losses	Oil crises	Past losses
Distinct respondents	7,126	4,913	7,925	5,404	7,925	5,404
Observations	31,347	23,820	36,451	27,913	36,451	27,913
R-squared	0.45	0.43	0.67	0.65	0.65	0.63
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes

- Prior experiences associated with ...
  - stronger increases in attention to inflation in response to the shock.
  - stronger updating of inflation expectations.
  - stronger (upward) deviations from expert benchmarks.

## Summary

- New panel data on HHs' and firms' attention allocation using open-ended questions.
- Consistent with theories of goal-optimal attention:
  - Attention varies systematically with exposure, information costs, volatility.
  - Attention associated with more frequent expectation adjustment, higher confidence, smaller misperceptions of realized inflation.

#### • At odds with goal-optimal attention:

 Attentive agents deviate more strongly upward from expert forecasts and disagree more in forecasts than in nowcasts.

#### • Extended model with selective memory recall:

- Reconciles theory and empirics, important role of experiences: confirmed in the data.
- Interference of other variables: paying attention to energy prices also increases inflation expectations, consistent with the model.

#### • Implications:

- Macro modeling: Examine aggregate implications of selective memory recall.
- Use of open-ended data to measure economic attention in other contexts.

# Appendix

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#### Survey responses across waves: Households • Back





#### Survey responses across waves: Firms Pack Households





#### Summary Statistics **Pack**

	GSOEP	Survey samples					
	(1) Mean	(2) Mean	(3) p25	(4) Median	(5) p75	(6) SD	(7) N
Panel A: Households							
Female	0.51	0.45	0.00	0.00	1.00	0.50	40,552
Age	51.19	52.53	40.00	50.00	60.00	13.85	40,552
East	0.17	0.17	0.00	0.00	0.00	0.38	40,552
Log(HH net income)	7.96	7.78	7.60	8.01	8.36	0.69	40,552
At least highschool	0.39	0.50	0.00	1.00	1.00	0.50	40,552
Employed	0.64	0.59	0.00	1.00	1.00	0.49	38,421
Homeowner	0.49	0.48	0.00	0.00	1.00	0.50	40,552
Stockowner	0.26	0.42	0.00	0.00	1.00	0.49	40,552
Panel B: Firms							
Employees		326.00	14.00	40.00	125.00	2336.81	32,539
Export share		0.15	0.00	0.01	0.24	0.24	17,101
Manufacturing firm		0.29	0.00	0.00	1.00	0.45	32,612
Services firm		0.41	0.00	0.00	1.00	0.49	32,612
Construction firm		0.08	0.00	0.00	0.00	0.27	32,612
Retail/wholesale firm		0.22	0.00	0.00	0.00	0.41	32,612
High influence on decisions in firm		0.78	1.00	1.00	1.00	0.42	20,417

#### Unexpected shock to inflation ••••


## Hand-coding vs. word count for topic "inflation" • Back

	Hand- coded		Automated word count					
	(1)	(2) Inflation	(3) Price	(4) Cost	(5) Expen- sive	(6) Joint word count	(7) hand-coded vs. joint word count	
Panel A: Households								
Wave 1: 2020m12	0.03	0.01	0.02	0.01	0.03	0.05	0.60	
Waye 2: 2021m3	0.00	0.01	0.02	0.01	0.03	0.06	0.75	
Wave 3: 2021m6	0.07	0.02	0.02	0.01	0.03	0.00	0.81	
Wave 4: 2021m0	0.07	0.02	0.04	0.02	0.04	0.10	0.78	
Wave 5: 2021m12	0.16	0.07	0.07	0.02	0.04	0.17	0.88	
Wave 6: 2022m3	0.28	0.09	0.14	0.04	0.04	0.27	0.88	
Wave 7: 2022m6	0.32	0.21	0.17	0.05	0.06	0.39	0.82	
Wave 8: 2022m9	0.38	0.20	0.20	0.08	0.06	0.43	0.86	
Wave 9: 2022m12	0.33	0.23	0.19	0.06	0.07	0.42	0.80	
Wave 10: 2023m3	0.35	0.23	0.18	0.06	0.08	0.44	0.82	
Total (Waves 1-10)	0.19	0.09	0.09	0.03	0.05	0.22	0.84	
Panel B: Firms								
Wave 1: 2020m12	0.05	0.01	0.04	0.01	0.03	0.09	0.69	
Wave 2: 2021m3	0.10	0.01	0.07	0.01	0.04	0.14	0.79	
Wave 3: 2021m6	0.19	0.02	0.15	0.03	0.03	0.23	0.87	
Wave 4: 2021m9	0.19	0.03	0.14	0.04	0.06	0.28	0.78	
Wave 5: 2021m12	0.25	0.07	0.16	0.04	0.02	0.28	0.89	
Wave 6: 2022m3	0.33	0.09	0.24	0.07	0.02	0.39	0.76	
Wave 7: 2022m6	0.43	0.19	0.24	0.07	0.03	0.48	0.82	
Wave 8: 2022m9	0.42	0.19	0.28	0.10	0.02	0.52	0.75	
Wave 9: 2022m12	0.40	0.20	0.22	0.09	0.02	0.46	0.76	
Wave 10: 2023m3	0.35	0.20	0.16	0.06	0.02	0.41	0.79	
Total (Waves 1-10)	0.28	0.11	0.16	0.06	0.03	0.34	0.81	

## Hand-coding vs. Al-based coding **Pack**

			Hand-co	oded	
	(1) Covid-19	(2) Inflation	(3) Growth	(4) Any macro	(5) Any persona
Al-coded: Covid-19	0.997***	-0.079	-0.004		
	(0.004)	(0.070)	(0.007)		
AI-coded: Inflation	-0.006	0.808***	0.015		
	(0.006)	(0.032)	(0.013)		
Al and ad Crowsth	0.002	0.421**	0 746***		
Al-coded: Growth	-0.003	(0.421)	(0.740)		
	(0.004)	(0.205)	(0.219)		
AI-coded: Any macro topic				0.727***	0.014
				(0.051)	(0.045)
AI-coded: Any household-level topic				0.004	0.680***
in coucurring nouveriend rever topic				(0.050)	(0.058)
				(0.050)	(0.050)
Observations	200	200	200	200	200
K-squared	0.66	0.52	0.75	0.53	0.52
Mean dep. var.	0.01	0.36	0.01	0.45	0.72

## Validation: Structured question on attention • Back

	Open-ended							
	(1)	(2)	(3)	(4)	(5)	(6)		
	Covid-19	Inflation	Monetary policy	Growth	Any macro topic	Any house- hold-level topic		
Structured: Covid-19	0.098* (0.053)	-0.032 (0.086)	-0.012* (0.007)	0.012 (0.040)				
Structured: Inflation	0.008* (0.005)	0.159*** (0.041)	0.008* (0.004)	0.002 (0.014)				
Structured: Monetary policy	-0.008 (0.005)	0.040 (0.059)	0.032 (0.024)	0.039* (0.023)				
Structured: Growth	-0.018* (0.010)	0.089 (0.062)	-0.006 (0.020)	0.072** (0.029)				
Structured: Any macro topic					0.151*** (0.049)	-0.032 (0.050)		
Structured: Any household-level topic					-0.072 (0.203)	0.469** (0.192)		
Observations R-squared Mean dep. var.	468 0.10 0.01	468 0.04 0.26	468 0.02 0.01	468 0.04 0.03	468 0.01 0.29	468 0.02 0.79		

#### Validation: Attention and news consumption



#### Validation: Attention and Google searches •••••



#### Attention allocation over time: Firms • Back



• Attention shifts from Covid-19 to inflation over sample period.

# Variance decomposition of attention

	Pane R2 (%)	el A: House of panel re	holds gression		Panel B: Firms R2 (%) of panel regression				
	(1) (2)		(3) Time FE +	(4)	(5)	(6)	(7) Time FE +	(8)	
	Indiv. FE	Time FE	Indiv. FE	Obs.	Indiv. FE	Time FE	Indiv. FE	Obs.	
Any macro topic	41.1	3.2	43.3	31,348	33.0	0.7	33.7	27,554	
Inflation	38.1	10.1	44.9	31,348	31.8	8.0	38.7	27,554	
Monetary policy	27.9	0.0	28.0	31,348	34.3	0.7	35.0	27,554	
Growth	25.2	0.1	25.3	31,348	27.4	0.5	27.8	27,554	
Covid-19	37.9	2.7	39.6	31,348	32.2	10.5	41.1	27,554	
Any household-/firm-level topic	42.3	1.4	43.3	31,348	32.2	2.0	33.7	27,554	

- Theory predicts systematic variation in attention.
- Individual fixed effects are an important source of variation.
- Time fixed effects explain a meaningful but smaller part of the variation. back

## Cross-sectional variation in attention: Firms • Back

	Attention						
	(1)	(2) Monetary	(3)	(4) Any macro			
	Inflation	policy	Growth	topic			
High perceived general exposure	0.101***	0.034***	0.026***	0.081***			
	(0.007)	(0.003)	(0.005)	(0.009)			
High influence	-0.035***	-0.002	-0.007	0.001			
on decisions in firm	(0.013)	(0.005)	(0.007)	(0.014)			
Log(Employees)	0.007**	0.002*	0.003**	0.015***			
	(0.003)	(0.001)	(0.002)	(0.003)			
Export share	-0.050**	-0.009	0.027*	0.013			
	(0.024)	(0.007)	(0.015)	(0.028)			
Services firm	-0.122***	0.027***	-0.002	-0.014			
	(0.010)	(0.004)	(0.006)	(0.012)			
Construction firm	-0.005	0.059***	0.001	-0.001			
	(0.017)	(0.010)	(0.010)	(0.018)			
Retail/Wholesale firm	-0.051***	0.020***	-0.014**	0.002			
	(0.012)	(0.004)	(0.007)	(0.013)			
Observations	6,051	6,047	6,047	6,028			
R-squared	0.08	0.04	0.01	0.02			

• Consistent with model predictions, attention increases with proxies for perceived exposure to the variable to be forecast.

#### Time variation in attention: Households



 Attention shifts from Covid-19 to inflation, which, through the lens of the model, might reflect higher inflation volatility and/or lower information costs due to more media coverage.

# Disagreement

	]	Househ	olds	Firms			
	(1) SD	(2) IQR	(3) p90-p10	(4) SD	(5) IQR	(6) p90-p10	
Expected inflation							
Attentive to inflation (a)	4.86	3.08	8.00	2.71	2.42	5.12	
Inattentive to inflation (b)	5.97	2.98	8.80	2.60	2.17	4.77	
Perceived current inflation							
Attentive to inflation (c)	4.06	2.66	5.16				
Inattentive to inflation (d)	5.25	2.80	6.82				
p-value: (a)=(c)	0.00	0.00	0.00				

- Disagreement among firms lower than among households
- Attentive households disagree less than inattentive households (opposite for firms)
- Disagreement in forecasts *exceeds* disagreement in nowcasts, at odds with the model
   buck

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⇒ selective memory recall predicts important role for experiences for belief formation and attention allocation... even among agents with same  $B, \sigma_{\pi}^2$  and  $\kappa$  → back

## Interference of attention to other variables

**Extension:** Attention to other variables may interfere through selective memory recall (Bordalo et al., 2025).

- Attention to energy prices and observation of high current energy prices cues recall of past episodes of high energy prices.
- When forecasting inflation, the agent thinks of inflation in past episodes of high energy prices ⇒ higher inflation expectations.

Formally (*x*: energy prices):

$$rac{\partial heta}{\partial cov(
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Next: test this empirically.

## Interference of attention to other variables in the data

	Expected inflation next 12 months		Absolute deviation from expert forecast		Attention to energy	Expected inflation next 12 months	Absolute deviation from expert forecast
	(1)	(1) (2)		(4)	(5)	(6)	(7)
Attention to energy	0.204*** (0.048)	0.182*** (0.048)	0.203***	0.183*** (0.047)			
Attention to inflation	(,	0.152***	( ,	$0.147^{***}$			
Energy exposure $\times$ PPI energy		(0.055)		(0.052)	0.511*** (0.115)	2.389*** (0.760)	2.355*** (0.743)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distinct respondents	4,891	4,891	4,891	4,891	3,228	3,376	3,376
Observations	26,763	26,763	26,763	26,763	20,090	21,902	21,902
R-squared	0.75	0.75	0.62	0.62	0.45	0.73	0.61
Mean dep. var.	5.46	5.46	2.99	2.99	0.20	5.46	3.00
SD dep. var.	3.41	3.41	2.69	2.69	0.40	3.44	2.75

• Consistent with the extended model, attention to energy increases firms' inflation expectations and their deviations from experts (similar patterns for households).