Getting through:
Communicating complex central bank messages

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Disclaimer: Preliminary. The views expressed in this paper are those of the authors and not necessarily of the Bank of England or of the Irish Fiscal Council.

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(Hernandez-Murillo & Shell 2014) ▸ FOMC

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- BUT narrow focus on Flesch-Kincaid (simple avg of word and sentence length).

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- Propose a simple theoretical argument for simplicity
- Construct novel measures of complexity that capture *broader* dimensions
- Test causal impact of complexity on **informedness** and **trust**, in an RCT

What we find

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4. This result holds among people who have studied economics at university.

Related Literature

CB Comms

1st Revolution (1990s): Financial markets

- CBs have largely been successful in shaping exps Coibion et al., 2019; Swanson 2018

2nd Revolution (2010s): General public

- "*It may be time to pay attention to communication with the public*" Blinder (2008)
  - HHs and firms form exps in similar ways Coibion & Gorodnichenko, 2015; Nalewaik, 2016
  - HH exps matter for activity and financial choices Reis 2023; Bachmann, Berg & Sims, 2015; Armantier et al., 2015; Malmendier & Nagel, 2016
- "*CBs will keep trying but, for the most part, they will fail*" Blinder (2018), Binder (2017)
  - Exciting open area of research D'Acunto et al., 2022

Linguistic Complexity

- Simplified communication can help achieve this Haldane & McMahon, 2018; Coibion et al., 2020
- But focus to date on Flesch-Kincaid score Mumtaz et al., 2023; Ferrara & Angino 2022; Hernandez-Murillo & Shell 2014; Bulir et al., 2012

A theoretical argument for simplicity

Simple Rational Inattention Model

Summary

Two agents

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Setup

CB transmits a message revealing the true state of the economy.

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h chooses how much attention to pay to it based on $u_h(informed)$ and $c_h(complexity)$.

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Setup
CB transmits a message revealing the true state of the economy.
h chooses how much attention to pay to it based on $u_h(informed)$ and $c_h(complexity)$.

Result
Optimal attention: $\frac{\partial(attention)}{\partial(complexity)} < 0$, and inaccuracy of updated belief: $\frac{\partial(accuracy)}{\partial complexity} < 0$.

Linguistic Complexity of CB Communications

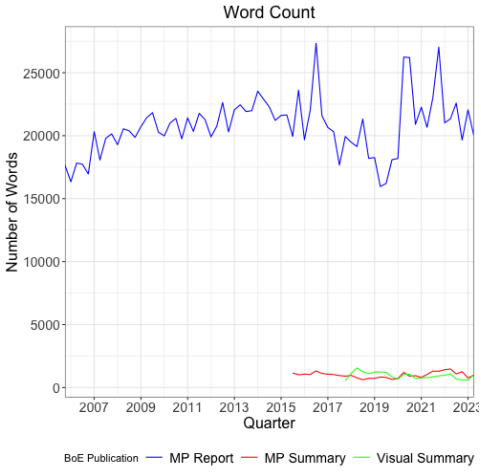
Traditional measures: Semantic Complexity

- Word Count
- Flesch-Kincaid

$$\text{Flesch Kincaid Score} = 0.39\frac{n(Words)}{n(Sentences)} + 11.8\frac{n(Syllables)}{n(Words)} - 15.59$$

Traditional measures: Semantic Complexity

BoE efforts to simplify language have focused on 'semantic' dimensions of complexity...



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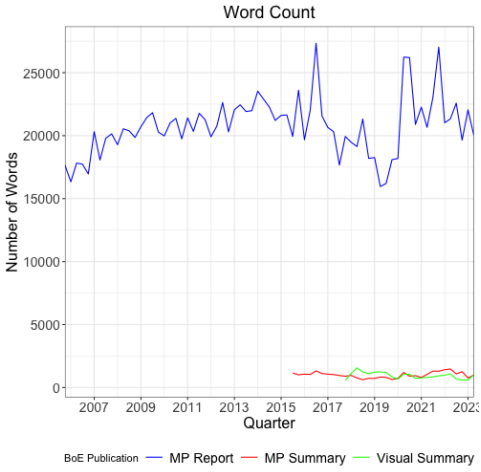
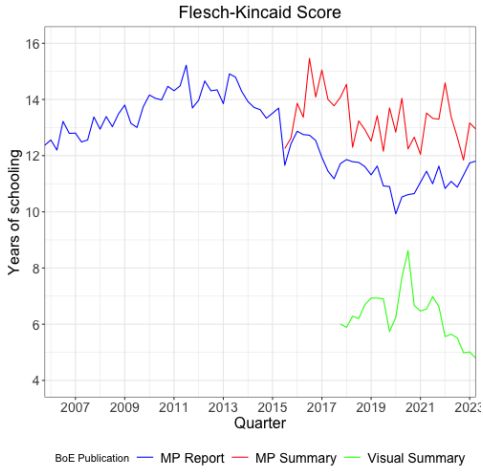




Novel measures: Conceptual Complexity

- Proportion of Jargon

$$\text{PoJ} = \frac{\sum_{j=1}^{J} w_j}{\sum_{i=1}^{N} w_i} \equiv \frac{W_j}{W_i}$$

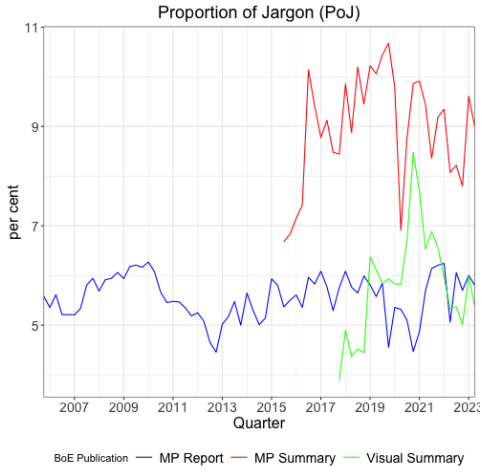
w_j: number of instances *jargon* term $j \in \{1, ..., J\}$ is mentioned.
w_i: number of instances *any* word $i \in \{1, ..., N\}$ is mentioned.

Novel measures: Conceptual Complexity

Wordcloud: Monetary Policy Report

Novel measures: Conceptual Complexity

... but we do not observe the same trend-decline along dimensions of 'conceptual' complexity.



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We categorise jargon into 10 topics (MP, inflation, output, etc.) and make two adjustments:

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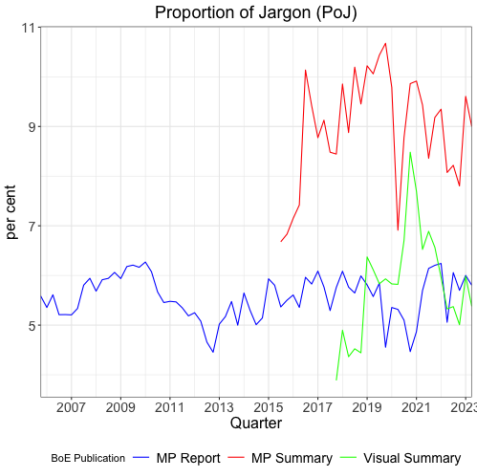
ii Φ: adjusts for the range of topics, T, discussed.

Novel measures: Conceptual Complexity

The MP Summary uses a broader range of technical terms and concepts.



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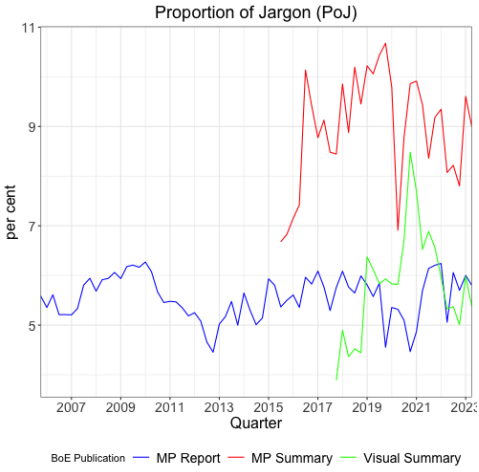

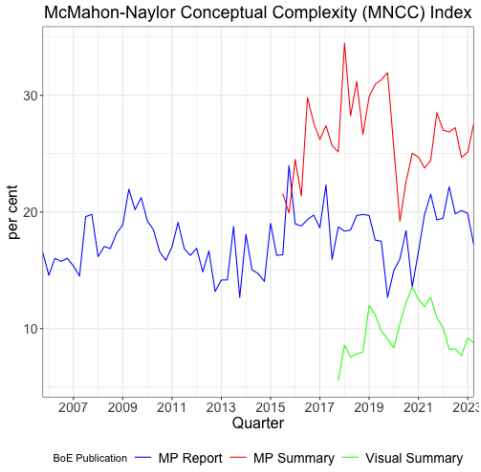

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MP Summary 2015-2023

Visual Summary 2017-2023

Empirical Strategy: RCT

Survey Design

- **Respondents**: 2000 representative members of the public
- **Pre-treatment questions**: Demographics, interests, state of UK economy
- **Treatment**: Read a CB report. Texts vary in complexity across dimensions
- **Post-treatment questions**: Capture levels of **informedness** and **trust**

Treatment

Texts vary across different dimensions of complexity

		Semantic		
		Low	Medium	High
Conceptual	Low	Text 1	Text 2	
	Medium	Text 3	Text 4	
	High		Text 5	Text 6

- Text 1 = 2018 Q1 VS
- Text 3 = 2019 Q4 VS
- Text 6 = 2018 Q1 MPS

▸ Complexity scores

Post-Treatment Questions

i **Understanding**
   - Perceived
   - Actual

ii Attitude towards CB (such as **trust**)

iii What matters most?

Results

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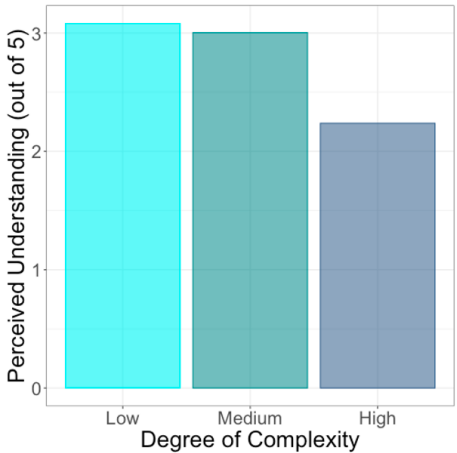
Results: Perceived Understanding

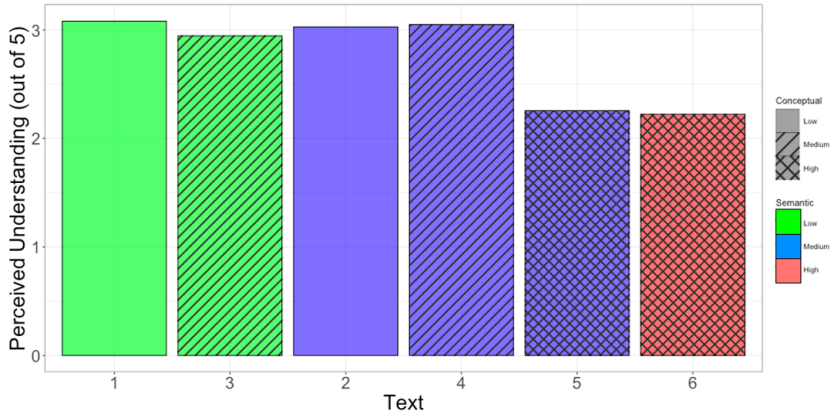
Complexity reduces perceived understanding



Q: To what extent are you able to understand the content and messages of the material you just read?

Results: Perceived Understanding

High *conceptual* complexity drives this



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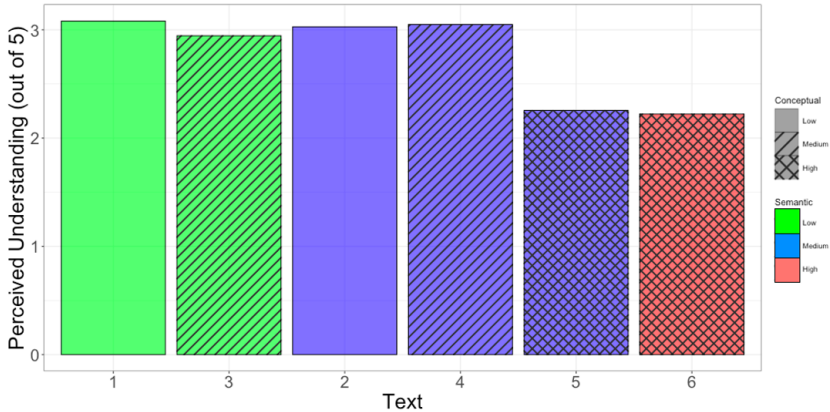
Results: Perceived Understanding

High *conceptual* complexity drives this, explained exclusively by the MNCC index



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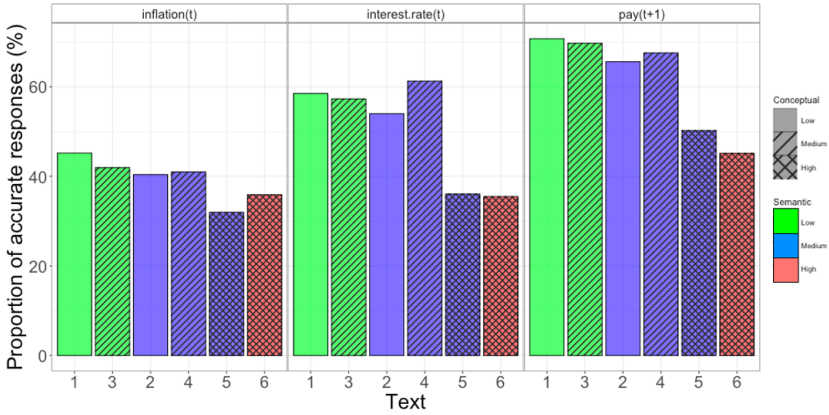
Results: Actual Understanding

Conceptual complexity reduces accuracy of beliefs formed



- What is the current inflation rate in the economy described?
- What is the interest rate in the economy described?
- What do you expect to happen to pay (adjusting for price changes) in the coming years?

Results: Empirical Specification

We test these observations conditioning on demographic factors

$$\begin{aligned} \text{Y}_i = &\beta_1 \text{Conceptual Medium}_i + \beta_2 \text{Conceptual High}_i \\ &+ \gamma_1 \text{Semantic Medium}_i + \gamma_2 \text{Semantic High}_i \\ &+ \delta X_i + \epsilon_i \end{aligned}$$

Results: Understanding

And these results hold when we condition on demographic factors

	Perceived	Actual Understanding		
	Understanding	Inflation(t)	Interest Rate(t)	Pay
	(1)	(2)	(3)	(4)
Conceptual				
Medium	−0.039	−0.011	0.048	0.015
	(0.060)	(0.031)	(0.031)	(0.030)
High	**−0.791*****	**−0.079***	**−0.186*****	**−0.130*****
	(0.084)	**(0.043)**	**(0.043)**	**(0.042)**
Semantic				
Medium	0.029	−0.041	0.016	−0.040
	(0.061)	(0.031)	(0.031)	(0.031)
High	0.005	−0.001	0.019	**−0.115****
	(0.108)	(0.056)	(0.056)	**(0.055)**
Studied Econ at Uni	0.450***	−0.032	0.022	−0.048*
	(0.051)	(0.026)	(0.026)	(0.026)
Demographic Controls	Yes	Yes	Yes	Yes
Observations	1,745	1,745	1,745	1,745
R^2	0.267	0.063	0.090	0.050

Note: *p<0.1; **p<0.05; ***p<0.01

Results

i **Understanding**
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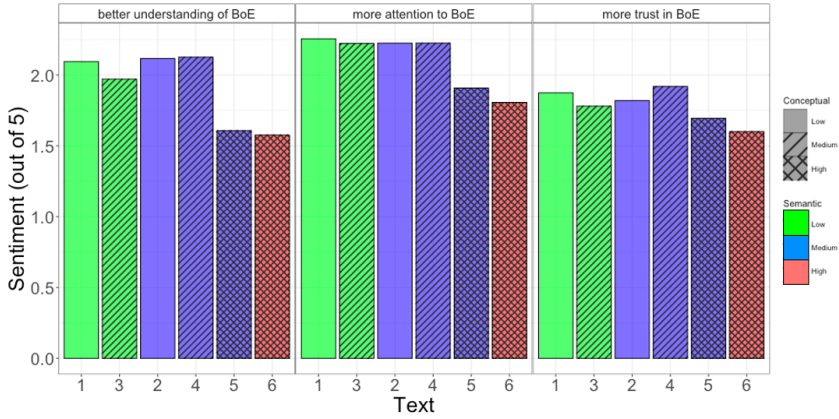
Results: Attitudes towards CB

Conceptual complexity also drives the degrading of attitudes towards the CB



Q: To what extent do you agree with each of the following statements:

- I now have a better understanding of the role of the Bank of England
- I am now more likely to pay attention to future documents published by the Bank of England
- I now have more trust in the Bank of England as an institution

Results: Attitudes towards CB

And these results also hold when we condition on demographic factors

	Trust	Attention	Role of BoE
	(1)	(2)	(3)
Conceptual			
Medium Conceptual	−0.009	−0.025	−0.099
	(0.058)	(0.071)	(0.067)
High Conceptual	**−0.185****	**−0.313*****	**−0.546*****
	(0.081)	**(0.098)**	**(0.093)**
Semantic			
Medium Semantic	0.057	0.004	0.053
	(0.058)	(0.071)	(0.067)
High Semantic	0.009	−0.115	0.043
	(0.104)	(0.127)	(0.120)
Studied Econ at Uni	0.118**	0.224***	0.252***
	(0.049)	(0.059)	(0.056)
Demographic Controls	Yes	Yes	Yes
Observations	1,742	1,743	1,745
R^2	0.047	0.051	0.090
Note:			*p<0.1; **p<0.05; ***p<0.01

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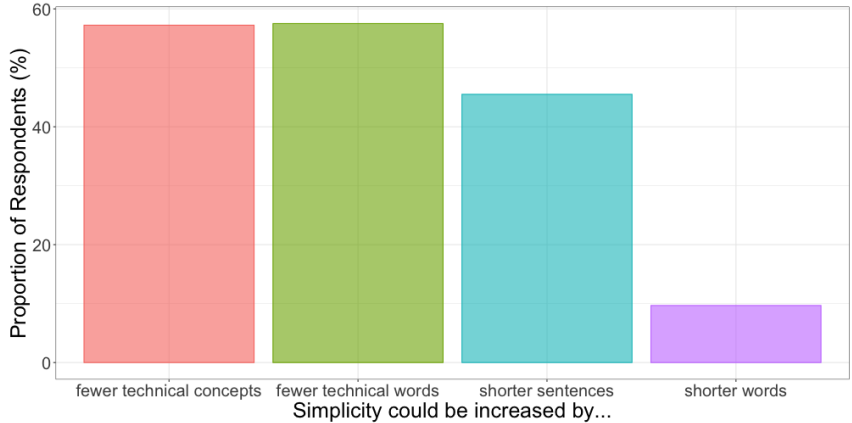
Results: What would make the text easier?

Respondents identified *conceptual* complexity as the greatest barrier



Which of the following do you think would have made the text easier to understand?

Results: Sub-Sample of Economics graduates

Our results hold when we focus on a sub-sample of respondents who studied Economics at university

	Perceived	Actual Understanding			Sentiments towards CB		
	Understanding	Inf(t)	i(t)	Exp Pay	Trust	Attention	BoE Role
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
High Conceptual	**−0.784*****	−0.053	**−0.195****	**−0.206****	**−0.339****	**−0.406****	**−0.462*****
	(0.189)	(0.092)	**(0.089)**	**(0.089)**	**(0.150)**	**(0.179)**	**(0.170)**
High Semantic	0.225	0.006	−0.052	0.004	0.248	−0.009	0.207
	(0.246)	(0.119)	(0.115)	(0.116)	(0.195)	(0.233)	(0.221)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Econ	Econ	Econ	Econ	Econ	Econ	Econ
Observations	288	288	288	288	288	288	288
R^2	0.129	0.018	0.093	0.051	0.044	0.036	0.038

Note: *p<0.1; **p<0.05; ***p<0.01

▸ Full table

Conclusions

Conclusions

1. If agents are rationally inattentive, complexity reduces the accuracy of beliefs formed
2. Efforts by the BoE to reduce complexity have focused on *semantic* dimensions, while evidence across *conceptual* dimensions is more mixed
3. Conceptual complexity matters more than semantic complexity. It reduces:
   - *perceived* understanding
   - *actual* understanding
   - attitudes towards the central bank
4. This remains the case among people who have studied economics at university.

Policy Implications

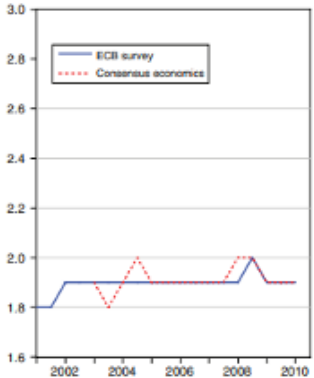
- Targeting a broader range of dimensions of complexity could enable more effective communications ...
- ... potentially with *all* economic agents, not just the general public.

Appendix

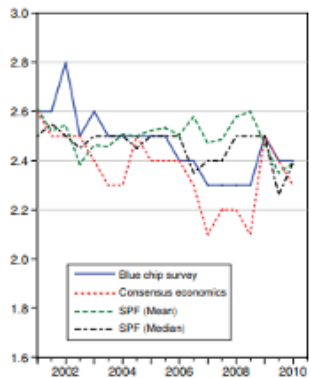
Motivation

Financial market participants have well anchored 5-year ahead inflation expectations

Euro Area



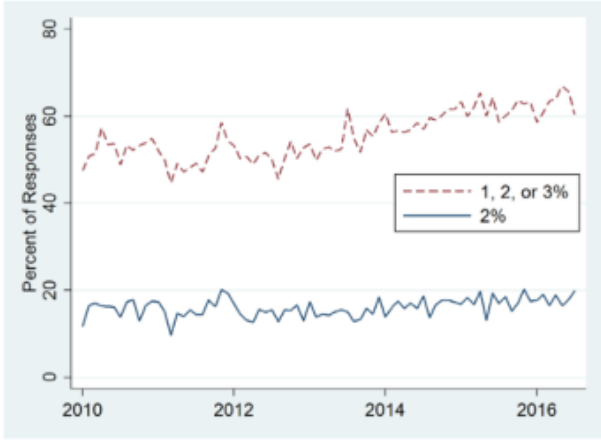
United States



Source: Beechey & Johansen 2011

Motivation

Household long-run expectations are poorly anchored



Source: Binder 2017 (US Michigan Survey of Consumers)

Motivation

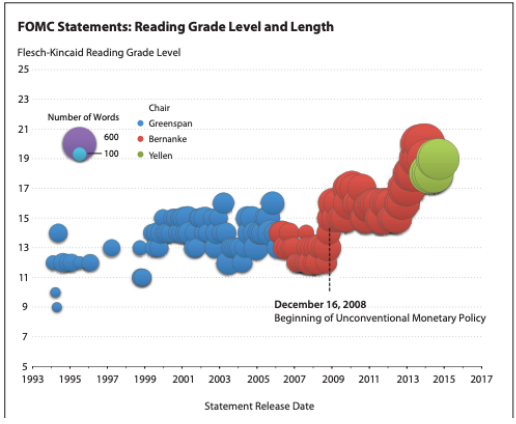
Firms' are similarly poorly anchored

	Central bank	Professional forecasters		Households		Firms	
		Mean	SD	Mean	SD	Mean	SD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. 2013:IV (wave 1, number of observations: 3,144)							
Inflation	1.3	2.0	0.2	3.6	2.4	5.3	3.2
Panel B. 2014:I (wave 2, number of observations: 712)							
Inflation	1.9	2.0	0.3	3.7	2.1	6.1	2.7
Unemployment	4.9	5.3	0.3	NA	NA	5.2	0.7
GDP growth	3.5	3.4	0.5	NA	NA	3.1	0.7
Panel C. 2014:III (wave 3, number of observations: 1,601)							
Inflation	1.6	1.9	0.2	3.5	2.4	4.1	2.5
Panel D. 2014:IV (wave 4, number of observations: 1,257)							
Inflation	1.1	1.7	0.3	3.1	2.0	4.5	2.8
Unemployment	5.2	5.2	0.3	NA	NA	5.9	1.2
GDP growth	3.5	3.0	0.3	NA	NA	3.6	1.0
Panel E. 2016:II (wave 5, number of observations: 2,040)							
Inflation	1.6	1.3	0.2	2.3	2.1	2.8	2.3
Unemployment	5.2	5.5	0.2	NA	NA	5.5	0.6
GDP growth	3.4	2.6	0.3	NA	NA	2.7	0.5
Panel F. 2016:IV (wave 6, number of observations: 1,404)							
Inflation	1.7	1.6	0.2	2.8	2.6	2.7	2.4
Unemployment	4.7	4.8	0.3	NA	NA	5.5	0.6
GDP growth	3.4	3.0	0.4	NA	NA	2.4	0.6

Source: Coibion, Gorodnichenko and Kumar 2018 (New Zealand 5-year ahead expectations)

Motivation

FK score of FOMC statements has increased significantly since 1990s



Source: Hernandez-Murillo and Shell 2014

back

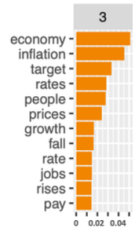
Jargon

Jargon	Relatable
inflation	prices
wages	pay
unemployment	jobs
firms	companies
agents	people
percentages	GBP values

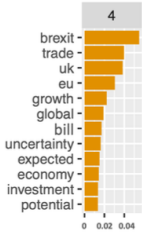
back

- Motivated by study conducted by Bholat et al., 2018 in collaboration with Behavioural Insights Team

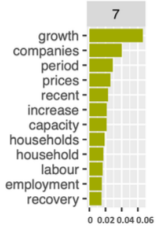
Topics discussed in BoE publications



(i) Topic 3

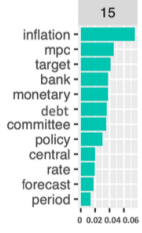


(ii) Topic 4

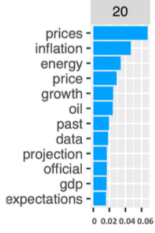


(iii) Topic 7

(iv) Topic 9



(v) Topic 15



(vi) Topic 20

Treatment

Texts vary across different dimensions of complexity

Degree of Complexity	**Semantic**	**Conceptual**	
	FK	PoJ	MNCC
Low	6.0	5	10
Medium	10.5	10	15
High	14.5	10	30

back

Results: Understanding (alternative)

And these results hold when we condition on demographic factors

	Dependent variable: Self-reported Understanding						
Baseline	SC low	SC low	SC med	CC low	CC low	CC low	CC med
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SC med	−0.050	0.084					
	(0.085)	(0.088)					
SC high			−0.028				
			(0.088)				
CC med				−0.076	0.037		
				(0.081)	(0.090)		
CC high						−0.748***	−0.787***
						(0.087)	(0.093)
Sample	CC low	CC med	CC high	SC low	SC med	SC med	SC med
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	482	470	432	505	447	439	410
R^2	0.180	0.188	0.169	0.254	0.139	0.233	0.251

Note: *p<0.1; **p<0.05; ***p<0.01

back

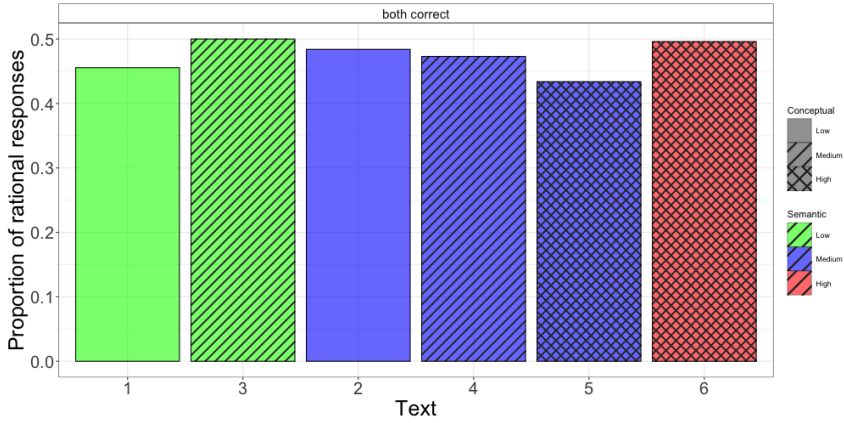
Results: Understanding

And these results hold when we condition on demographic factors

	Perceived	Actual Understanding				
	Understanding	GDP(t)	Inflation(t)	Interest Rate(t)	Pay	Interest Rate Response
	(1)	(2)	(3)	(4)	(5)	(6)
Conceptual						
High Conceptual	−0.791***	−0.0004	−0.079*	−0.186***	−0.130***	−0.030
	(0.084)	(0.028)	(0.043)	(0.043)	(0.042)	(0.039)
age	0.004*	0.0005	−0.001	0.003***	−0.001	0.003***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
UK country of birth	0.044	0.012	−0.001	−0.009	−0.013	0.024
	(0.059)	(0.020)	(0.030)	(0.030)	(0.030)	(0.027)
income	0.168***	0.010	0.012	0.026**	0.017	0.021**
	(0.022)	(0.007)	(0.011)	(0.011)	(0.011)	(0.010)
econ at uni	0.450***	−0.033*	−0.032	0.022	−0.048*	−0.039*
	(0.051)	(0.017)	(0.026)	(0.026)	(0.026)	(0.024)
pre-anchored exps	0.518***	0.077***	0.233***	0.174***	0.093***	0.093***
	(0.047)	(0.016)	(0.024)	(0.024)	(0.024)	(0.022)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,745	1,745	1,745	1,745	1,745	1,745

More results

Rational borrowing and savings preferences



How would your borrowing and savings preferences change under various interest rates?

back

Results: Attitudes towards CB

And these results also hold when we condition on demographic factors

	Dependent variable:		
	Trust	**Attention**	**Role of BoE**
	(1)	(2)	(3)
Conceptual			
High Conceptual	−0.185**	−0.313***	−0.546***
	(0.081)	(0.098)	(0.093)
age	0.007***	0.003	0.0003
	(0.002)	(0.002)	(0.002)
UK country of birth	−0.106*	−0.236***	−0.038
	(0.056)	(0.069)	(0.065)
income	0.056***	0.032	0.072***
	(0.021)	(0.026)	(0.025)
econ at uni	0.118**	0.224***	0.252***
	(0.049)	(0.059)	(0.056)
pre-anchored exps	0.146***	0.122**	0.322***
	(0.045)	(0.055)	(0.052)
Constant	1.418***	2.148***	1.750***
	(0.094)	(0.115)	(0.109)
Demographic Controls	Yes	Yes	Yes
Observations	1,742	1,743	1,745
R^2	0.047	0.051	0.090
Note:			*p<0.1; **p<0.05; ***p<0.01

Simple Rational Inattention Model

Summary

Two agents:

Simple Rational Inattention Model

Summary

Two agents:
(i) Central Bank. Perfectly informed. Minimises shocks by anchoring exps.

Simple Rational Inattention Model

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Choosing ξ_h based on utility from being informed, $u_h(x, \tilde{x}_h)$, and cost of attention, $c_h(\mu)$

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Result: Optimal attention: $\frac{\partial \xi_h^*}{\partial \mu} < 0$, and inaccuracy of updated belief: $\frac{\partial (x - \tilde{x}_h)}{\partial \mu} > 0$.

Model - Extension 2

Scenario 2: RI journalists unintentionally bias the signal when they simplify it

Journalists receive a *clean* signal from the central bank: $\tilde{x}_m^B = x$ but in seeking to simplify it, generates 'unintentional bias':

$$s_p^B = (1 - \mu\sigma_x^2)x + \epsilon_p \tag{1}$$

The public optimally allocates attention to this simplified, but now biased signal, generating posterior belief:

$$x - \tilde{x}_p^B = \mu\sigma_x^2 x + \frac{\tau x}{2b_p\sigma_x^2}(1 - \mu\sigma_x^2) - \eta_p \tag{2}$$