# More Than Words

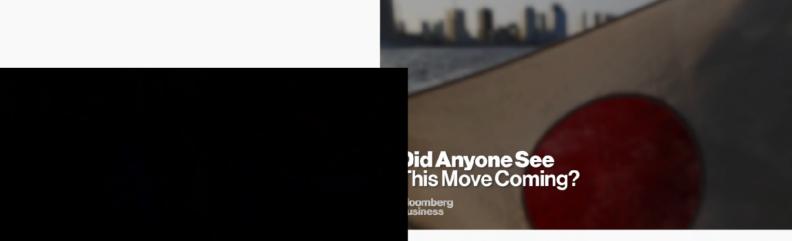
A Textual Analysis of Central Bank Communication



Communication is really a big deal ...

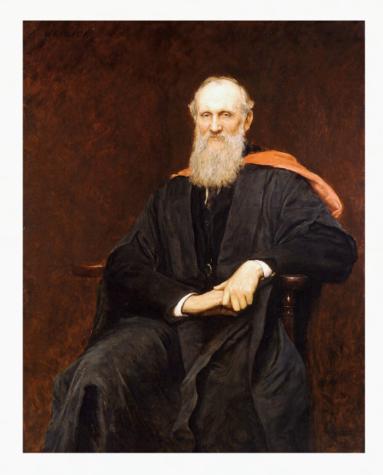
Bloomberg





Bloomberg

... but examining the language of central banks is not easy.



'I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it'

Baron William Thomson Kelvin May 1883

# What did we study?

- Policy statements of 22 central banks, including major and IT, during 2000-2015
- Computational linguistic tools that measure:
  - (1) Readability
  - (2) Topics
  - (3) Tones
- Key findings:
  - Complicated nature of communication
  - Complex decision making process
  - Significant variation across central banks and points in time





# Analytical Framework

Readability - the ease of reading

'Overall consumer prices, as measured by

# Readability - the ease of reading

'Overall consumer prices, as measured by the price index for personal consumption expenditures, increased just 1 percent over the 12 months ending in April, up noticeably from its pace through much of last year but still well short of the Committee's 2 percent objective. Much of this shortfall continues to reflect earlier declines in energy prices and lower prices for imports.'

# Topics - the key themes

'Overall consumer prices, as measured by the price index for personal consumption expenditures, increased just 1 percent over the 12 months ending in April, up noticeably from its pace through much of last year but still well short of the Committee's 2 percent objective. Much of this shortfall continues to reflect earlier declines in energy prices and lower prices for imports.'

# Tones - how positive/negative things are

'Overall consumer prices, as measured by the price index for personal consumption expenditures, increased just 1 percent over the 12 months ending in April, up noticeably from its pace through much of last year but still well short of the Committee's 2 percent objective. Much of this shortfall continues to reflect earlier declines in energy prices and lower prices for imports.'



S2: Sta

S. Korea Indonesia

Canada Turkey

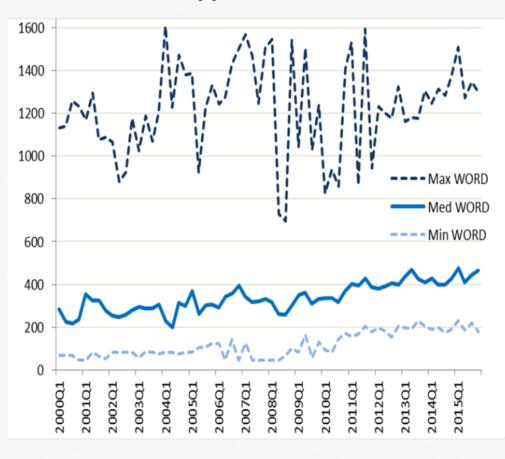
Hungary Colombia Australia New Zealand

Iceland

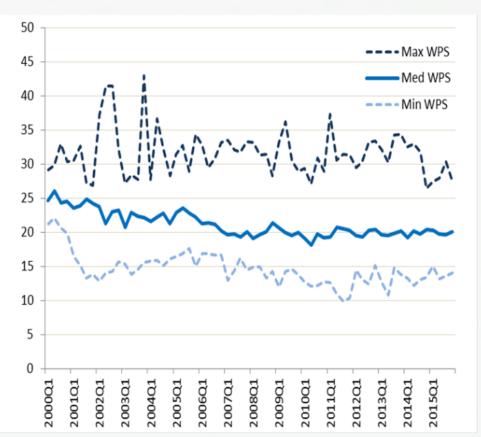
The numbers are 2008

# S1: Central banks talk more over time

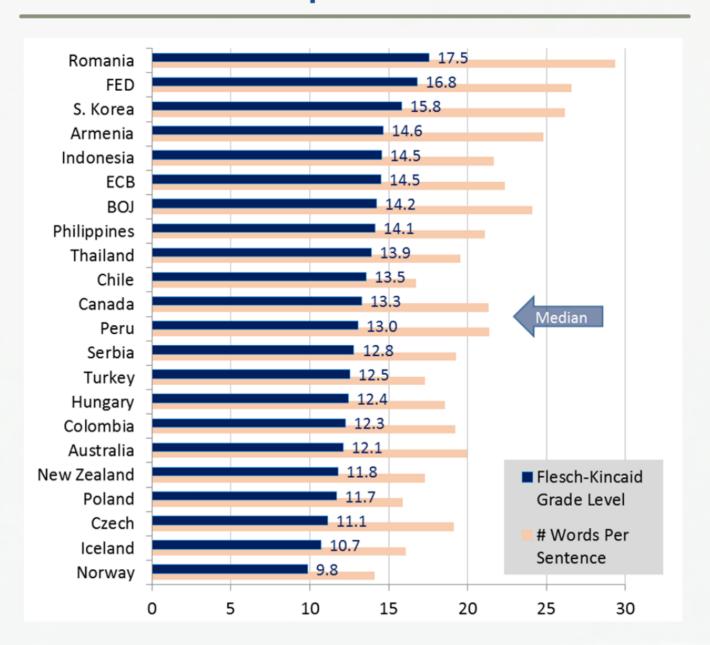




## (ii) Words per sentence



#### S2: Statements require an advanced reader



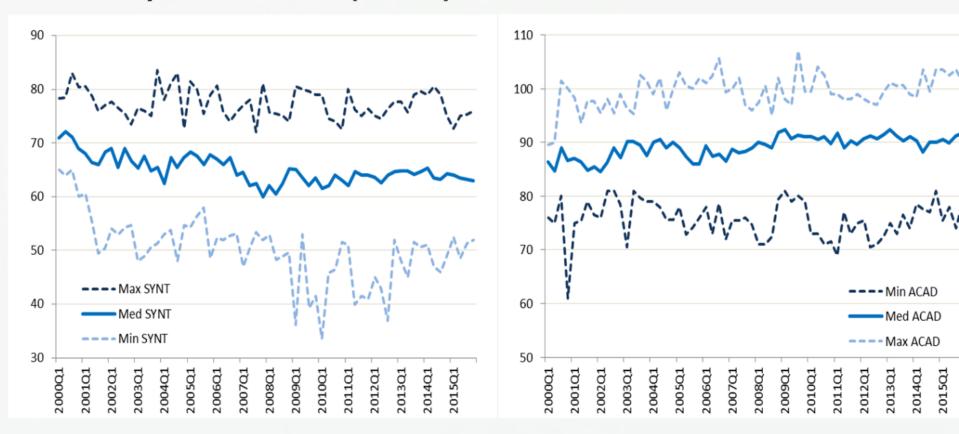
The numbers are 2008-2015 averages. FK rates text on a US school grade level.

We use

# Central banks tend to use 'big words'

# (i) Syntactic complexity

#### (ii) Academic words score



We used TextEvaluator, provided by Educational Testing Service (ETS), to calculate complexity scores.

# ATA DEPENDEN

S3: Complexity coincides with rate cuts

# tend to use 'big words'



# Top vocabulary in policy statements

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# Topic classification by LDA algorithm

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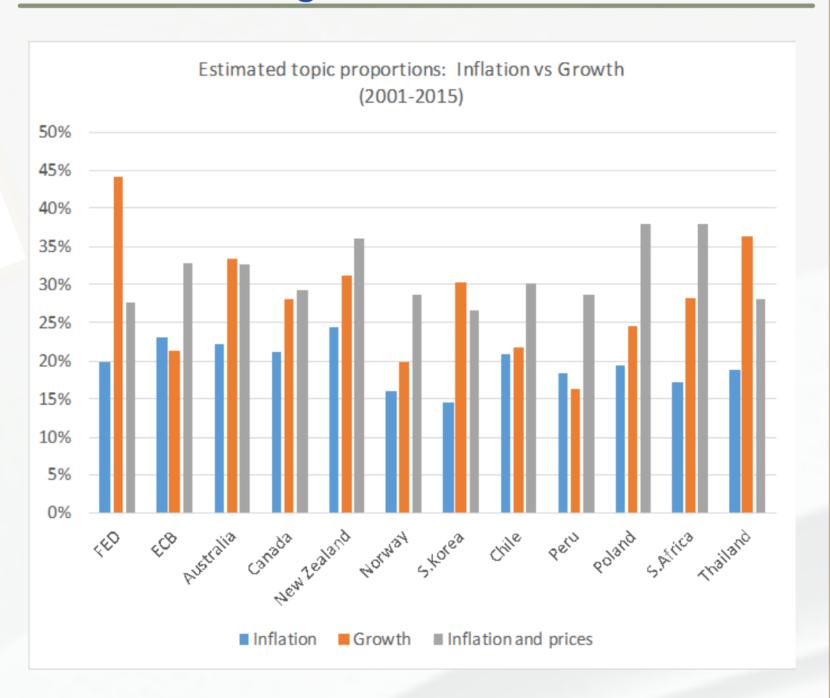
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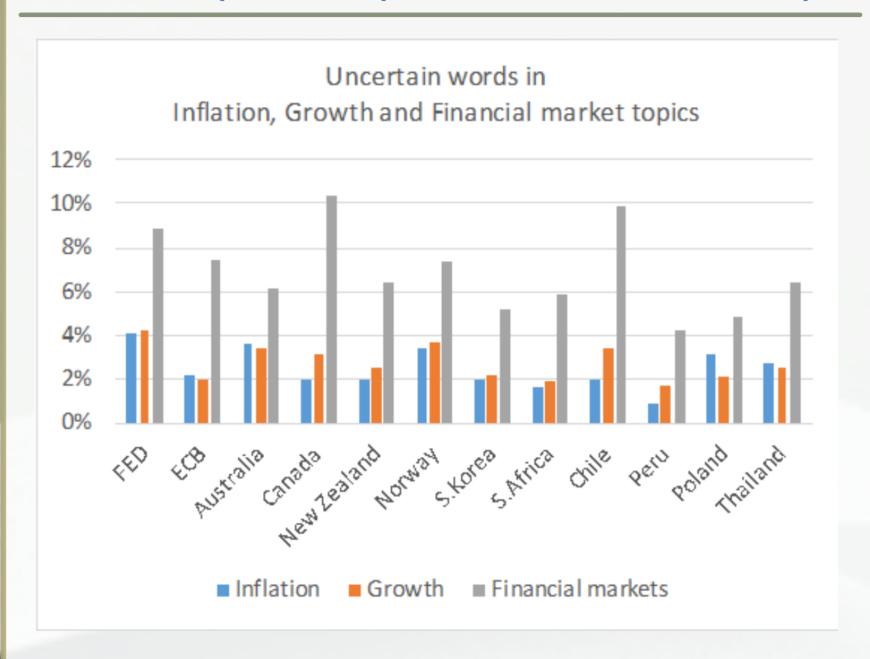
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#### S4: Inflation targeters discussed inflation more



#### S5: Uncertainty words are prevalent in financial market topics

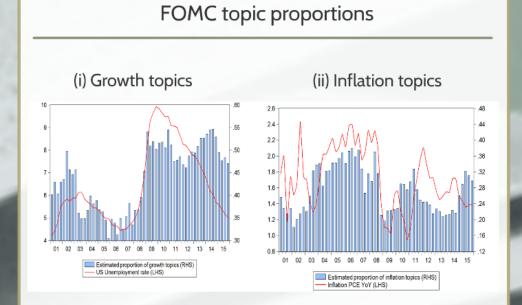


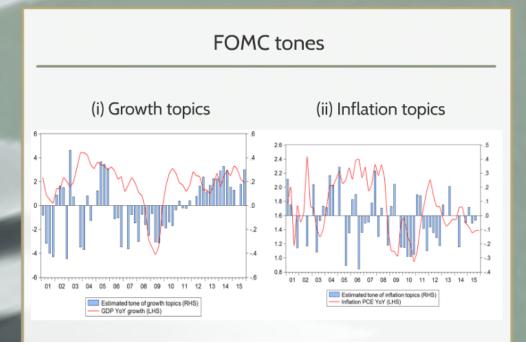
# S6: Global developments become more important after GFC

	Domestic economy		External environment			
	2001-2007	2008-2015	Difference	2001-2007	2008-2015	Difference
Australia	57%	55%	-2%	31%	33%	2%
Canada	53%	52%	0%	26%	32%	7%
New Zealand	60%	58%	-2%	31%	34%	3%
Norway	58%	45%	-13%	24%	25%	1%
S. Korea	67%	52%	-15%	17%	35%	19%
Chile	53%	48%	-5%	20%	27%	7%
Peru	52%	49%	-2%	14%	15%	1%
Poland	67%	59%	-7%	20%	25%	4%
S. Africa	69%	65%	-4%	23%	29%	6%
Thailand	57%	51%	-7%	31%	37%	6%

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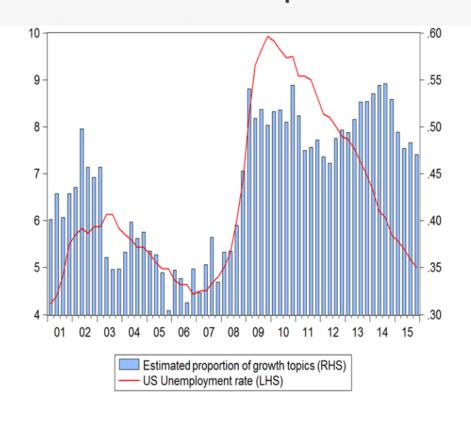
# **Topic evolution & Tone analysis**

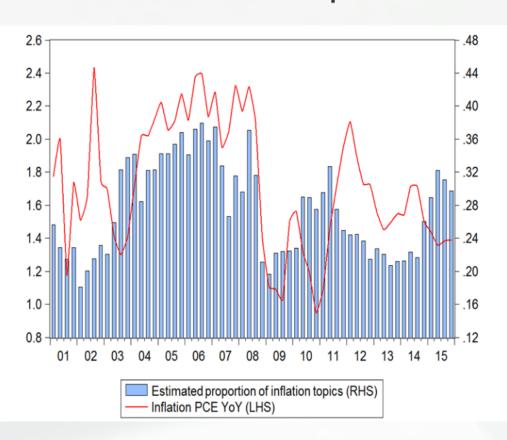




# FOMC topic proportions

#### (i) Growth topics

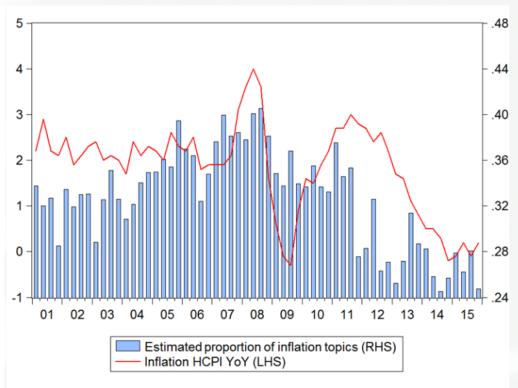




# ECB topic proportions

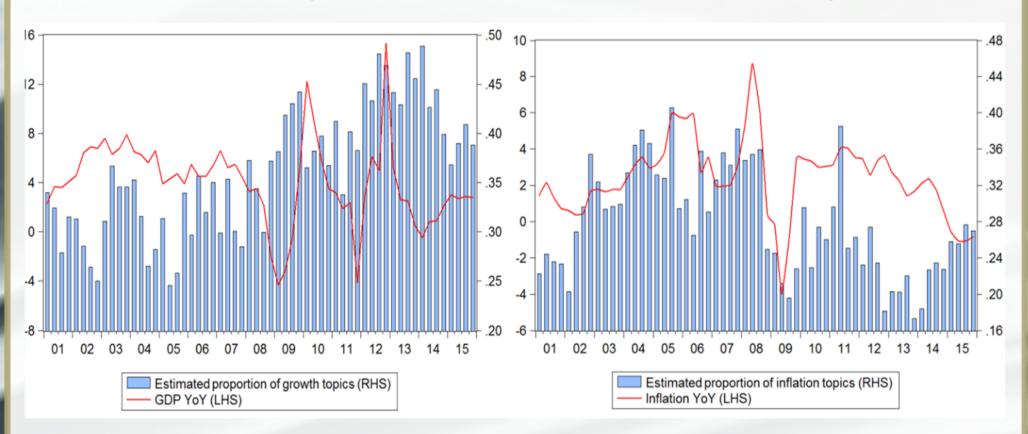
## (i) Growth topics

# 30 4 2 26 24 22 4 6 18 8 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 Estimated proportion of growth topics (RHS) GDP YoY growth (LHS)



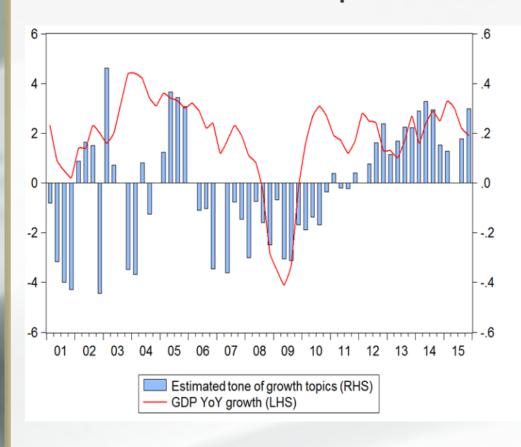
# **BOT** topic proportions

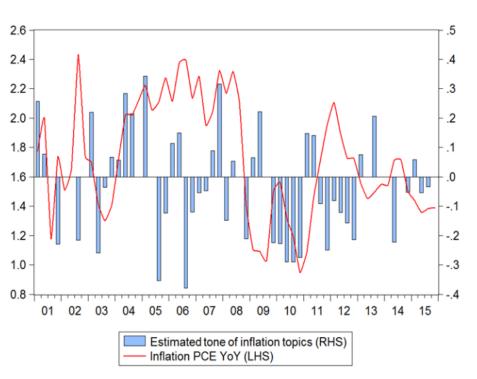




#### **FOMC** tones

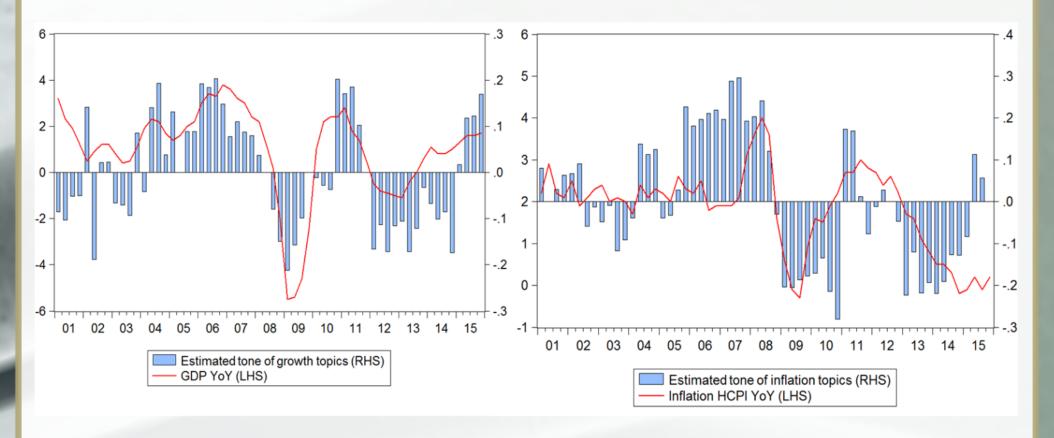
## (i) Growth topics





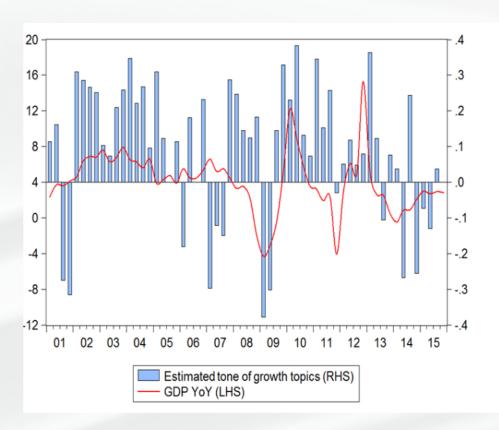
#### **ECB** tones

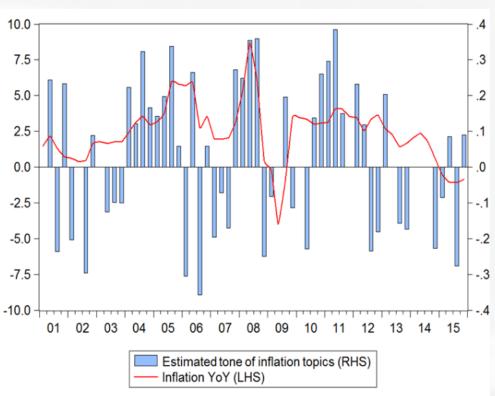




# **BOT** tones

## (i) Growth topics





#### **S7: Tone matters**

- FED: Fed funds rate significantly related to net tone in economic growth topics but not inflation tone.
- BOT: Thai policy rate decision related more to inflation tone.
- ECB: The policy rate correlated significantly both to growth and inflation tones.

D communication & rate decisions

# Concluding remarks

#### On communication policy design

Key requirements for effective communication:

- Clear: Readability of overall message
- Informative: Topics & Tones of central bank's assessment

#### On computational linguistic tools

- By using various tools, the paper demonstrated fruitful use of textual information for economic research.
- Other application includes: measuring 'Uncertainty'.
  - Economic policy uncertainty (Baker et al., 2015)

Otmar Issing (2005): "The central bank is not only obliged to fulfill its mandate, it must also provide society with *convincing reasons* for its actions... there must be no doubt that all communications are made to the best of its knowledge and belief."

Jeremy C. Stein (2014): "As we evaluate our own performance in the communications department, it is probably better for us to focus on how legitimately transparent we have succeeded in being, as opposed to how much or how little our various announcements have moved markets."

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