

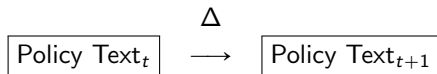
# Measuring Change and Influence in Budgeting

Devin Judge-Lord

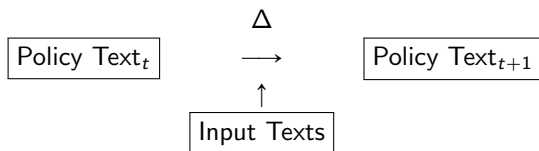
University of Wisconsin

December 4, 2019

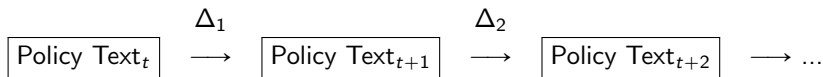
# Policy Change



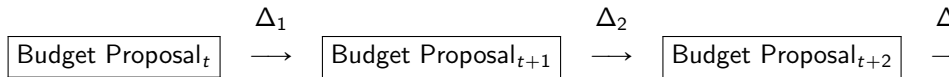
# Policy Change: Influence



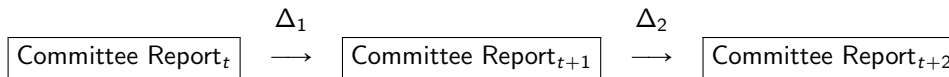
# Policy Change: Attention Over Time



# Data: President's Annual Budget

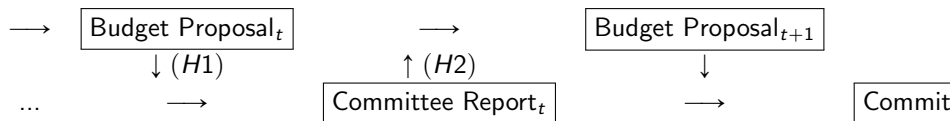


# Data: Appropriations Bills





# Issue Attention ( $\rightarrow$ ) and Agenda Setting ( $\uparrow\downarrow$ )





# Motivation

Attention is limited and varies over time.

Congress scholars:

- Attention is desired (e.g. Jones and Baumgartner 2005)

Bureaucracy scholars:

- Attention is often bad (e.g. “fire-alarm” oversight (McCubbins and Schwartz 1984))

How much do parties, committee chairs, president, or agencies affect the appropriations agenda? (Berry, Burden, and Howell 2010, Carpenter 2001, Lee 2000)

# Term Frequency

Figure: "Climate Change" in the Environmental Protection Agency Budget Justification

# Term Frequency

Figure: "Climate Change" in House Appropriations Subcommittee Reports

# Text Reuse

FY 2017 → FY 2018:

“This funding change eliminates climate change research FTE  
This funding change reduces air quality research This eliminates  
funding for the Science to Achieve Results STAR program for FY  
Statutory Authority: Clean Air Act Title II of Energy Independence  
and Security Act of Environmental Research Development and  
Demonstration Authorization Act ERDDAA Intergovernmental  
Cooperation Act National Environmental Policy Act NEPA Pollution  
Prevention Act PPA Global Change Research Act”

# Text Reuse

FY 2017:

"FDA is implementing the Food Safety Modernization Act FSMA the  
XXXXXXXXXX motivation XXXXXX for XXXXX the generic drug labeling  
rule and regulation of tobacco products"

FY 2018:

"FDA is implementing the Food Safety Modernization Act FSMA XXX  
addressing XXXXXXXXXXX opioid XXX abuse XXX XXXXXXXX XXXX XXXXXXXX  
XXXX and regulation of tobacco products"

# Thinking About Relationships Among Texts

## Question

How much discussion of  $K$  topics?

How similar is overall word-use?

Documents' relative positions?

What is copied from where?

## Approach

Topic Models

↳ Mixed Member

↳ Single Member

Cosine Similarity

Scaling (e.g. *Wordfish*)

Text Reuse

↳ Sentences

↳ 10-grams

↳ Smith-Waterman

## Metric

Proportions of  $K$  topics per document

Topic proportions

Number of paragraphs per topic

Similarity score for each pair

Location on 1-Dimensional scale

Tokens in document  $d$  copied from  $d'$

Matching sentences

Matching sequences  $\geq 10$  words

Approximately aligned sequences

# Term Frequency

Figure: Estimated Impact of Preprocessing Steps using preText()

# Term Frequency: LDA

Difference in  $\theta$  proportions of K topics

Text:	<div style="border: 1px solid black; padding: 2px 10px;">Year <math>t</math></div>		<div style="border: 1px solid black; padding: 2px 10px;">Year <math>t + 1</math></div>		<u>Change</u>
	$\theta_{k,t}$	$\longrightarrow$	$\theta_{k,t+1}$		$ \theta_{k,t+1} - \theta_{k,t} $



# Term Frequency: LDA

**Figure:** Year-to-year Change in Environmental Protection Agency Budget Justification for 45 LDA Topic Models ( $K = 5:50$ ), Fiscal Years 1967-2018

# Term Frequency: Scaling and Cosine Similarity

	<u>Difference</u>	<u>Similarity</u>
<i>Wordfish:</i>	$ \omega_{t+1} - \omega_t $	1-Difference
Cosine:	1-Similarity	$\frac{\mathbf{A} \cdot \mathbf{B}}{\ \mathbf{A}\ _2 \ \mathbf{B}\ _2}$

# Text Reuse: 10-gram Window

Agriculture, Rural Development, Food and Drug Administration, and Related Agencies

Interior, Environment, and Related Agencies

\*Solid lines indicate change in Senate majority, dotted lines a change in House majority.  
0 = No report published.

# Comparison

**Figure:** Year-to-year Change in Environmental Protection Agency Budget Justification

# Agenda Setting / Influence

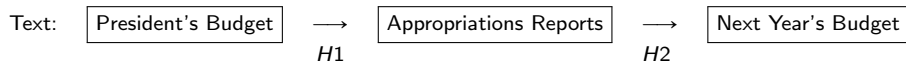


Figure: Assessing the Relationship Between Congress and the EPA Over Time