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# Sentiment and Uncertainty about Regulation

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## Motivation

"Owners ... saw the drive-through window as an opportunity for disabled patients and frequent customers. They invested \$100,000 last summer on an intercom system, high-resolution cameras and secure garage doors. But without <u>a change in statewide</u> <u>regulations</u>, the drive-through couldn't legally open." (The Washington Post, Apr. 30, 2020)

"U.S. stocks surged Thursday, on track to extend their sharpest weekly rally since April, as investors cheered the prospect of <u>curbs on new regulations</u> and diminished chances of higher taxes under a split Congress." (Wall Street Journal, Nov. 5, 2020)



## Preview

- We construct news-based measures of sentiment and uncertainty about regulation in the U.S. from 1985 to 2021, both in aggregate and for 14 regulatory policy areas.
- We examine the responses of macroeconomic indicators to regulatory sentiment and uncertainty shocks.

### **Key Findings:**

- A negative shock to sentiment about regulation is associated with large, persistent drops in future output and employment.
- Increased regulatory uncertainty overall has a nonsignificant or transitory impact on output and employment.
- Economic outcomes are particularly sensitive to sentiment and uncertainty around certain regulatory policy areas.

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### Literature

- Economic sentiment
  - Survey-based measures (Carroll et al., 1994; Benhabib and Spiegel, 2019)
  - News-based measures (Shapiro et al., 2020; Kalamara et al. 2020)
- Policy uncertainty
  - Economic policy uncertainty (EPU) index (Baker et al., 2016)
  - Policy uncertainty for other countries and policy areas (Caldara et al., 2020; Husted et al., 2019)
- Economic effects of regulation
  - Cumulative volume or restriction of regulation (Coffey et al., 2020; Dawson and Seater, 2013)



# Newspaper Data

Initial corpus: over one million news articles that contain the keyword "regulat\*" or "deregulat\*"

(Seven U.S. newspapers, Jan 1985 – Dec 2021, from ProQuest TDM Studio)

	All articles	Unique articles	Regulatory articles	First regulatory article	Last regulatory article
Wall Street Journal	259,714	253,862	168,874	1985-01-02	2021-12-31
New York Times	283,773	273,223	164,626	1985-01-01	2021-12-31
Los Angeles Times	130,697	129,998	78,438	1985-01-01	2021-12-31
The Washington Post	120,506	117,519	72,705	1987-01-01	2021-12-31
Chicago Tribune	100,049	99,327	56,154	1985-01-01	2021-12-31
Boston Globe	77,358	75,946	44,862	1985-01-01	2021-12-31
USA Today	40,951	40,387	22,513	1987-04-01	2021-12-31
Total	1,013,048	990,262	608,172	-	-

# **Regulation-Related News**

True"Maryland regulationsPositive"Maryland regulationsPositiverestraints."

(The Washington Post, 2004-3-25)

False Positive "Western led 35-33 at halftime, but the Warriors fought back to take a 57-49 lead on two David Boone free throws with 8:11 left in **regulation**."

(Chicago Tribune,1987-1-13)



# **Regulation-Related News**

"But in the meantime, a provision was put into the Health and <u>Human Services</u> bill (under which <u>Head</u>

i-1 Start is funded) that allows local <u>Head Start</u> programs to apply for a waiver from the seat restraint rule if they meet local <u>transportation regulations</u>."

#### True Positive

- "Maryland regulations permit school buses to operate without seat belts or other restraints."
- <sup>i+1</sup> "Montgomery County's argument is, and has been for a long time, that children are safer in <u>school buses</u> without seat restraints because of the way the buses and seats are designed, with high, firm cushions."

#### False Positive

i-1 Marquette 78, Western Michigan 76 (OT)--Michael Sims sank two free throws with 3 seconds left in overtime to win it in Kalamazoo.

### *i* "Western led 35-33 at halftime, but the Warriors fought back to take a 57-49 lead on two David Boone free throws with 8:11 left in <u>regulation</u>."

play."

free throws with 8:11 left in <u>regulation</u>." The Broncos scratched back over the next 3:07 to tie the score, 61-61, and led 69-66 with 25 seconds to

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### Regulatory Noun Chunks & Regulatory Sections

"But in the meantime, a provision was put into the Health and <u>Human Services</u> bill (under which <u>Head</u> i - 1 <u>Start</u> is funded) that allows local <u>Head Start</u> programs to apply for a waiver from the seat restraint rule if they meet local <u>transportation regulations</u>."

#### Regulatory Section

- "Maryland **regulations** permit school buses to operate without seat belts or other restraints."
- i+1 "Montgomery County's argument is, and has been for a long time, that children are safer in <u>school buses</u> without seat restraints because of the way the buses and seats are designed, with high, firm cushions."

### • Identify noun chunks from all federal rule titles (Unified Agenda data)

Test Procedures for the Analysis of Trace Metals Under the Clean Water Act

["test procedure", "analysis", "trace metal", "clean water act"]

### ❷ Match noun chunks in the news corpus → Regulatory Sections

### Conduct human checking and correction

- ➡ 10,645 Regulatory Noun Chunks
- → 493,418 news articles with Regulatory Sections

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### Increasing News Attention to Regulation



*Notes:* The index is constructed by standardizing the monthly counts of regulation-related news articles scaled by the monthly counts of all news articles in each newspaper and normalizing the time series to a mean of 100 from January 1985 to December 2009.

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### Lexicon-based "Sentiment Analysis"

### • Assessing sentiment

- Benchmark: Loughran and McDonald (LM) dictionary (with negation)
- Robustness checks:

Harvard General Inquirer (GI) dictionary
Lexicoder Sentiment Dictionary (LSD)

 $SentimentScore = \frac{PositiveWordCount - NegativeWordCount}{TotalWordCount} * 100$ 

- Assessing uncertainty
  - Loughran and McDonald (LM) dictionary

 $UncertaintyScore = \frac{UncertaintyWordCount}{TotalWordCount} * 100$ 



# **Compute Indexes**

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Following Shapiro et al. (2020):
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$$s_j = u_{t(j)} + v_{i(j)} + \epsilon_j,$$

where:

- *s<sub>j</sub>* is the estimated sentiment or uncertainty score for article *j*
- $u_{t(j)}$  is a year-month fixed effect
- $v_{i(j)}$  is a newspaper fixed effect



### **Regulatory Sentiment Index**



*Notes:* The figure plots three sentiment indexes estimated using the Loughran and McDonald (LM) dictionary, the General Inquirer (GI) dictionary, and the Lexicoder Sentiment Dictionary (LSD), respectively, and the first principal component of the three indexes. All indexes are normalized to have mean equal to zero and standard deviation equal to one.

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### Regulatory Uncertainty Index



Notes: The figure plots the regulatory uncertainty index estimated using the uncertainty category of the Loughran and McDonald (LM) dictionary.

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# Impulse Responses

Local projections of Jordà (2005):

$$y_{i,t+h} = \alpha_i^h + \beta_i^h reg_t + \sum_{\tau=1}^3 \gamma_{i,\tau}^h reg_{t-\tau} + A_i^h \sum_{\tau=0}^3 Y_{t-\tau} + \varepsilon_{i,t+h}$$

where:

- $y_i$  is log industrial production or log employment
- *reg* is the regulatory sentiment or regulatory uncertainty index
- matrix *Y* includes contemporaneous and lagged values of economic variables including log S&P 500, federal funds rate, log employment, and log industrial production

 $\beta_i^h$ : impulse responses from a shock to regulatory sentiment or uncertainty on economic variable  $y_i$ 

- a one-standard-deviation negative sentiment shock or a one-standard-deviation upward uncertainty shock
- horizons up to 12 months after the shock  $(h = \{0, 1, ..., 12\})$

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#### (a) Impulse Responses to a Regulatory Sentiment Shock



*Notes:* The figures plot impulse response functions for industrial production and employment to a one-standard-deviation negative regulatory sentiment shock or to a one-standard-deviation upward regulatory uncertainty shock. Shaded areas show 90 percent (light gray) and 95 percent (dark gray) confidence bands.

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# Categorizing News Content

#### Article Frequency by Regulatory Area



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#### Regulatory Sentiment Index (Selected Areas)



*Notes:* The figure plots the regulatory sentiment and regulatory uncertainty indexes for selected policy areas estimated using the Loughran and McDonald (LM) dictionary. Shaded areas represent NBER recessions.

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### Impulse Responses to Regulatory Sentiment Shocks (Selected Areas)



*Notes:* The figures plot impulse responses of industrial production and employment to a one-standard-deviation negative sentiment shock for each regulatory policy area. Shaded areas show 90 percent (light gray) and 95 percent (dark gray) confidence bands.

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### Impulse Responses to Regulatory Uncertainty Shocks (Selected Areas)



*Notes:* The figures plot VAR-estimated impulse responses of industrial production and employment to a one-standard-deviation upward uncertainty shock for each regulatory policy area. The gray areas are 90% confidence bands.

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## Conclusion

- We constructed news-based measures of sentiment and uncertainty about regulation.
- Negative news about regulation may lead to persistent drops in future output and employment, while increased regulatory uncertainty overall has little impact.
- Economic outcomes are particularly sensitive to sentiment and uncertainty around certain regulatory policy areas:
  - Sentiment around transportation, communication, and finance and banking regulations
  - Uncertainty around energy regulations



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# Thank you!

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