

(Almost) 200 Years of News-Based Economic Sentiment

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Sentiment and Business Cycle

What drives the business cycle?

- Shocks to fundamentals (Lucas), or
- Sentiment (Keynes)

Expectations and sentiment are crucial over the business cycle: Greenwood and Hanson (2013), Lopez-Salido et al. (2017), Mian et al. (2017), Bordalo et al. (2018a,b), Bordalo et al. (2020, 2022).

Identifying shocks to sentiment:

- using structural models: Lorenzoni (2009), Angeletos and la O' (2013)
- using survey-based measures, e.g. of consumer confidence: Souleles (2004), Barsky and Sims (2012)

Existing surveys are very short-lived, and target very few economic objects.

Sentiment and Local Newspapers

Can we measure sentiment for a longer period and at a more granular level?

- Unstructured text, such as newspapers, are available for much longer periods
- Local newspapers are available at a much granular level
- They may contain information about the national and/or local economy

Challenges:

- How to synthesise relevant information from a diverse pool of topics covered by local newspapers?
- What does this information capture?
 - Expectations (are these rational), discount rates, something else?
 - Content and structure of economic news: Gentzkow and Shapiro (2006, 2008, 2010), Bybee, Kelly, Manela (2021, 2022).

This Paper

Data:

- Use one of the biggest corpus of local newspaper articles in the world
- 193 million pages, approximately 2 billion articles

Method:

- State-of-art and versatile methodology to extract views and attitudes about a particular topic: Singla and Mukhopadhyay (2022).
- Word vectors based on neural networks.

Measure: News-Based Economic Sentiment

- State and country-level measure of economic sentiment for about 170 years
- Separate overall sentiment from the economic sentiment

What is News-Based Economic Sentiment?

Irrational Exuberance



Facts



Caveat: We broadly define sentiment as the positivity/negativity of economic news coverage."

Cash Flows



Discount Rate

Types of news

How does our measure relate to the economy (local and global), and what does it capture?

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Cash Flows



Discount Rate

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How does our measure relate to the economy (local and global), and what does it capture?

Findings

Country level (US):

- sentiment has a clear business cycle pattern;
- it co-moves with existing measures (Michigan survey);
- it leads the Survey of Professional Forecasters (SPF);
- it predicts GDP growth, employment, consumption and services controlling for past fundamentals;
- it predicts changes in Fed Funds Rate (monetary policy), particularly during recessions.

State level:

- economic sentiment predicts local GDP growth, controlling for both state and country-wide fundamentals and national level of sentiment;
- common trend drives only about 35% of the state-level sentiment;
- higher dispersion across states predicts lower GDP growth.

Outline

1. Measuring sentiment from text
2. (National) News-Based Economic Sentiment (NBES) and its properties
3. Economic predictability and potential channels
4. Local variation in economic sentiment and predictability

Measuring Sentiment from Text

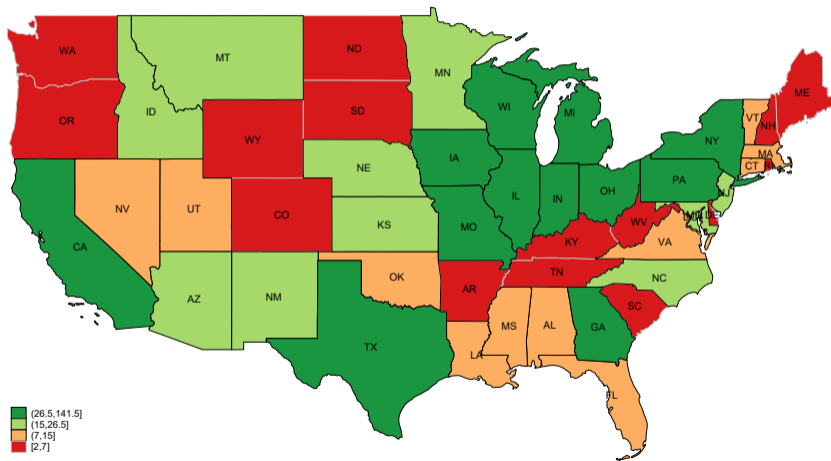
Dataset

Historical collection of digitized newspapers from 1736-2020 in the USA

- 13,000 local newspapers across thousands of communities
- 193 million newspaper pages
- Around 2 billion newspaper articles (compared to 800,000 for the standard WSJ corpus)
- The corpus is 95 times larger than all of English Language Wikipedia.

Madison Project database for long-term gdp data

Newspaper Coverage Across States



Dataset covers 47 states for at least 100 years out of 170.

A Roadmap to Measuring Sentiment

Sentiment analysis in economics/finance typically follows 3 broad steps:

- **Step 1:** Create a dictionary of relevant words for the topic
- **Step 2:** Identify the words that are positive or negative
- **Step 3:** Apply this dictionary to measure the intensity of positive and negative sentiment in a particular document.

Step I: Automated Dictionary

Semantic information about every word is captured by its vector representation, based on the context in which the word/phrase is used.

- Word2vec, based on neural networks
- Applies to phrases as well as words
- Outperforms existing alternatives: Mikolov et al. (2013)

Create a dictionary of the most similar words

- Use distances between the vector representations of words to measure their similarities

Example: **KING + WOMAN - MAN \approx QUEEN**

Step II: Automated Measure of Word Sentiment

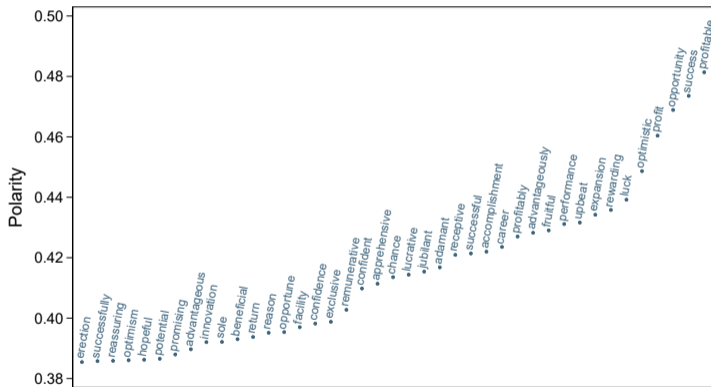
Isolate **positive** or **negative** words to measure economic sentiment

Start with a few seed words related to sentiment:

- **Positive:** expansion, boom, growth, profit, optimistic, optimism, opportunity, success, successful, profitable, prosperity, profitability, bullish
- **Negative:** recession, bankrupt, shrinking, unemployment, loss, bankruptcy, cutback, layoff, redundancy, pessimism, contraction, unsuccessful, failure, insolvent, insolvency, bearish

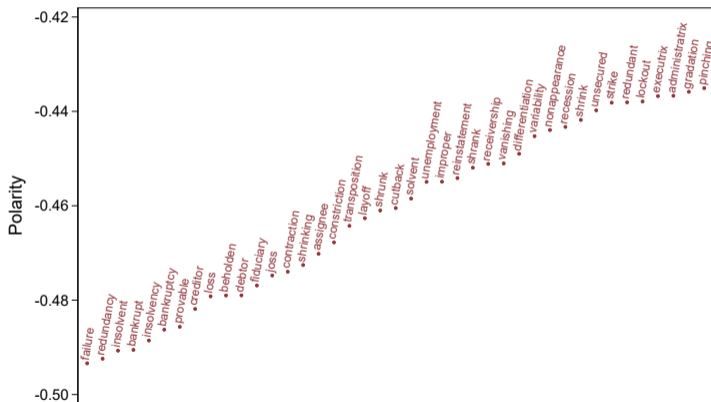
Following Hamilton et al. (2016) – the gold standard to generate sentiment scores for economics and finance – we produce a continuous measure of sentiment for each word/phrase in the dictionary.

Sentiment Polarity: Positive



Most positive words/phrases: “successful”, “success”, “profit”, “opportunity”, “profitable”, “success”, “proven”, “expansion”, “interview”, “rewarding”.

Sentiment Polarity: Negative



Most negative words/phrases: “failure”, “unsuccessful”, “insolvent”, “earnest”, “redundancy”, “bankrupt”, “bankruptcy”, “insolvent debtor”, “contraction”.

Step III: Aggregating Sentiment Score of a Document

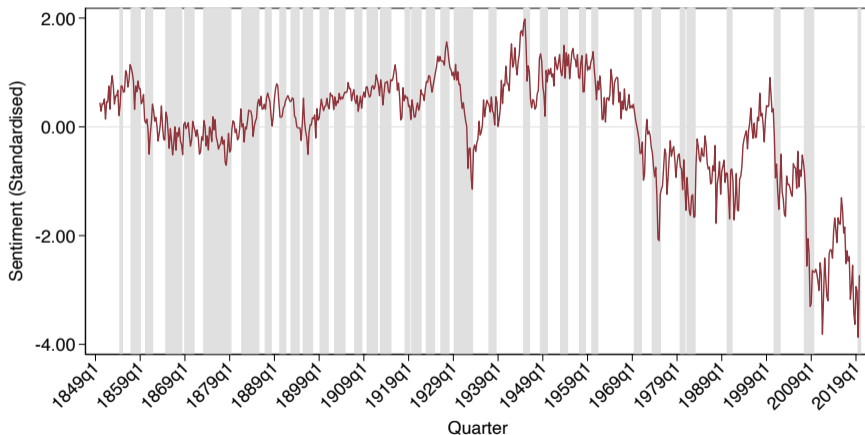
- Produce a vector representation of the document: Arora et al. (2017)
- Focus on the pages with economy-related words
- Measure the similarity between the vector representation of each newspaper page and our economic dictionary (weighted by the word sentiment score)
- Aggregate to the city/county/state/country level
- Seasonally adjust the final measure

Key Advantages

- Almost fully automated construction of topic-specific dictionaries
 - can be easily applied to almost any other context/topic
 - no need to manually create the whole dictionary
- Reflects the context in which words/phrases are used
- Automatically deals with negation, a common challenge for word counts
 - good vs not good
- Automatic generation of a continuous measure of word sentiment score
 - good vs excellent
- Captures not just key words, but their synonyms and related language

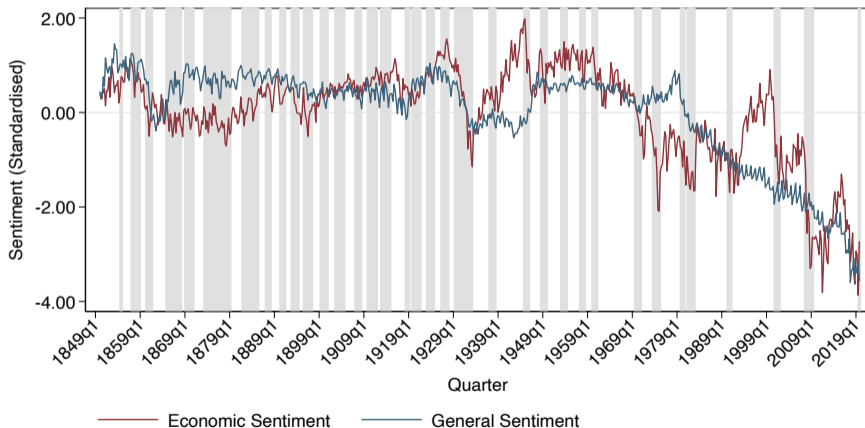
News-Based Economic Sentiment

Quarterly Measure of Raw Economic Sentiment (1850-2020)



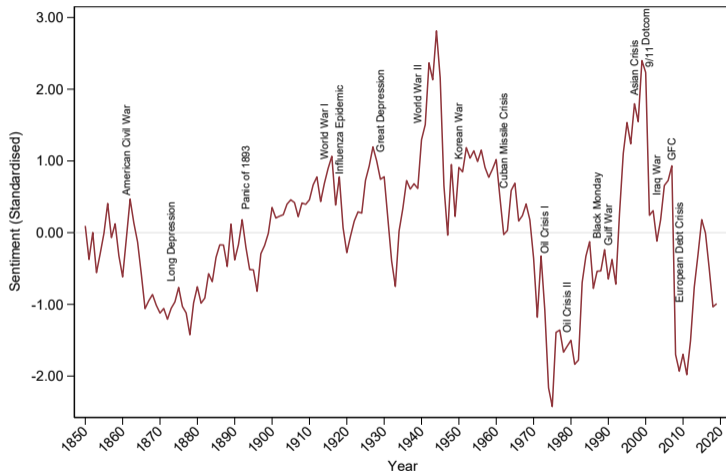
Sentiment varies a lot and exhibits business cycle variation as well as time trend.

Quarterly Measure of Raw Economic and Non-Economic Sentiment (1850-2020)



Non-econ sentiment is different and is trending downwards from 1980: increased negativity.

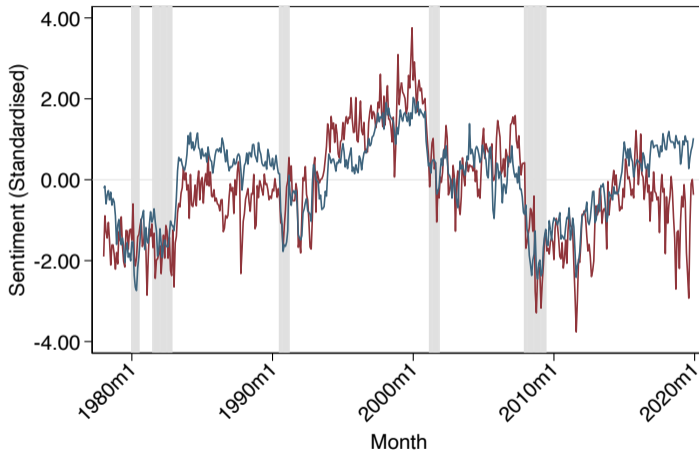
Orthogonalized News-Based National Economic Sentiment (1850-2020)



Orthogonalising economic w.r.t non-econ sentiment produces a stationary time series.

It declines after key events that triggered economic and financial crises.

National Economic Sentiment vs Michigan Consumer Survey



— News Sentiment — Consumer Sentiment

71% correlation with Michigan Consumer Sentiment Survey (68% during recessions).

Sentiment and the Economy

News-Based Economic Sentiment (NBES) Leads GDP Growth

	$\Delta \ln(GDP_t)$								
	I	II	III	IV	V	VI	VII	VIII	IX
$\Delta \ln(GDP_{t-1})$	0.355*** (5.91)	0.356*** (5.79)		0.333*** (5.57)	0.335*** (5.48)			0.327*** (5.17)	0.330*** (5.15)
<i>Term Spread</i> _{t-1}		0.072* (1.97)			0.063* (1.69)			0.060 (1.59)	0.060 (1.58)
$\Delta Sent_{t-1}$			0.333*** (3.88)	0.255*** (2.78)	0.242*** (2.60)	0.421*** (4.05)	0.390*** (3.53)	0.288*** (2.73)	0.250** (2.23)
$\Delta Sent_{t-2}$						0.167* (1.67)	0.176* (1.73)	-0.015 (-0.16)	-0.006 (-0.06)
$\Delta Sent_{t-3}$						0.317*** (2.60)	0.316** (2.58)	0.225** (2.04)	0.223** (2.01)
$\Delta Sent_{t-4}$						0.267** (2.23)	0.267** (2.20)	0.152 (1.37)	0.151 (1.35)
$\Delta Sent_{t-5}$						0.074 (0.74)	0.055 (0.54)	0.007 (0.08)	-0.017 (-0.18)
Q4 Dummy							-0.107 (-0.90)		-0.131 (-1.05)
$\Delta Sent_{t-1} \times Q4Dummy$							0.051 (0.25)		0.057 (0.30)
F statistic ($\Delta Sent$ (t-2 to t-n))						2.235	2.242	2.499	2.435
P-value (all $\Delta Sent$ (t-2 to t-n))						0.065	0.065	0.043	0.048
Observations	290	290	290	290	290	290	290	290	290
Adjusted R-squared	0.12	0.13	0.04	0.14	0.15	0.06	0.06	0.16	0.16

The table reports a linear predictive model for GDP per capita. Newey-West t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1947Q1-2019Q4.

News-Based Economic Sentiment (NBES) Leads GDP Growth

	$\Delta \ln(GDP_t)$								
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The table reports a linear predictive model for GDP per capita. Newey-West t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1947Q1-2019Q4.

NBES Leads GDP Growth over 167 years

	$\Delta \ln(GDP_t)$					
	I	II	III	IV	V	VI
$\Delta \ln(GDP_{t-1})$	0.147 (1.29)		0.072 (0.65)	-0.223* (-1.79)	0.203 (1.42)	0.148 (1.17)
$\Delta Sent_{t-1}$		2.129*** (3.58)	1.929*** (3.73)	2.262 (1.51)	2.334** (2.01)	1.105** (2.65)
Period	Full	Full	Full	1850-1914	1915-1980	1981-2017
Observations	167	167	167	63	66	38
Adjusted R-squared	0.02	0.06	0.06	0.02	0.02	0.25

The table reports a linear predictive model for GDP growth per capita. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and ***(1%). Sample: 1850-2017.

NBES Leads the SPF Consensus Forecast

	GDP Forecast _{t,t+1}						
	I	II	III	IV	V	VI	VII
<i>GDP Forecast</i> _{t-1}	0.786*** (13.15)	0.727*** (12.52)		0.770*** (11.90)	0.716*** (11.82)		0.726*** (12.43)
<i>Term Spread</i> _{t-1}		0.057*** (3.85)			0.054*** (3.68)		0.054*** (3.73)
$\Delta Sent$ _{t-1}			0.154*** (3.35)	0.094*** (3.10)	0.084*** (3.05)	0.205*** (3.98)	0.082*** (2.89)
$\Delta Sent$ _{t-2}						0.151*** (3.39)	-0.038 (-1.06)
$\Delta Sent$ _{t-3}						0.163*** (3.30)	0.020 (0.47)
$\Delta Sent$ _{t-4}						0.118** (2.31)	0.004 (0.12)
$\Delta Sent$ _{t-5}						0.058 (1.28)	-0.001 (-0.04)
F statistic ($\Delta Sent$ (t-2 to t-n))						3.708	0.971
P-value ($\Delta Sent$ (t-2 to t-n))						0.006	0.425
Observations	204	204	204	204	204	204	204
Adjusted R-squared	0.62	0.65	0.05	0.63	0.67	0.11	0.67

The table shows the predictive regression of the GDP forecast by its previous quarter values, term spread, and changes in economic sentiment. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1969Q1-2019Q4.

NBES Leads GDP Growth even after Controlling for Consensus Forecast

	$\Delta \ln(GDP_t)$			
	I	II	III	IV
$\Delta \ln(GDP_{t-1})$	0.298*** (3.14)	0.054 (0.59)	0.025 (0.28)	-0.002 (-0.02)
<i>Term Spread</i> _{t-1}	0.083** (2.37)	0.024 (0.75)	0.015 (0.49)	0.018 (0.58)
<i>GDPForecast</i> _{t-1}		0.870*** (5.02)	0.875*** (5.19)	0.817*** (5.07)
$\Delta Sent_{t-1}$			0.201*** (2.93)	0.244*** (3.08)
$\Delta Sent_{t-2}$				0.050 (0.57)
$\Delta Sent_{t-3}$				0.180* (1.71)
$\Delta Sent_{t-4}$				0.234** (2.35)
$\Delta Sent_{t-5}$				0.072 (0.83)
F statistic ($\Delta Sent$ (t-2 to t-n))				1.941
P-value ($\Delta Sent$ (t-2 to t-n))				0.105
Observations	204	204	204	204
Adjusted R-squared	0.11	0.23	0.25	0.27

The table shows the predictive regression of GDP growth, based on its previous quarter value, term spread, professional GDP forecast, and economic sentiment. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1969Q1-2019Q4.

NBES and GDP Growth: Information about Present or Future?

	$\Delta \ln(GDP_t)$				
	I	II	III	IV	V
$\Delta \ln(GDP_{t-1})$	0.355*** (5.91)	0.356*** (5.79)		0.335*** (5.51)	0.338*** (5.43)
Term Spread $_{t-1}$		0.072* (1.97)			0.065* (1.73)
Δ Current News Sent (gross) $_{t-1}$			-0.232 (-0.45)	-0.091 (-0.20)	-0.111 (-0.25)
Δ Future News Sent (gross) $_{t-1}$			0.416*** (3.41)	0.295** (2.45)	0.278** (2.28)
Δ Non – Econ Sent $_{t-1}$			0.031 (0.12)	-0.080 (-0.31)	-0.104 (-0.40)
Observations	290	290	290	290	290
Adjusted R-squared	0.12	0.13	0.02	0.13	0.14

Table reports a linear predictive model for national GDP growth and economic sentiment measured from text about current and future events. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample:

Sources of Predictability

Capital or labor?

- Recent (as well as old) literature emphasizes the role of investment:
- Greenwood et al (1998), Justiniano et al (2011), Ramey (2018)
- Shocks to (marginal efficiency of) investment explain 60-85% of changes in business cycle
- Typical idea: investment boom increases gdp growth, employment, consumption, then subsides

Capital Channel: NBES, Investment, and Industrial Production

	$\Delta \ln(Investment_t)$					$\Delta \ln(IndustrialProduction_t)$				
	I	II	III	IV	V	VI	VII	VIII	IX	X
$\Delta \ln(Investment_{t-1})$	0.738*** (13.70)			0.738*** (13.79)	0.743*** (13.83)					
$Term\ Spread_{t-1}$	-0.046** (-2.08)			-0.044** (-1.99)	-0.045** (-2.08)	0.225* (1.88)			0.226* (1.89)	0.215* (1.78)
$\Delta Sent_{t-1}$		-0.073 (-0.90)	-0.073 (-0.66)	-0.038 (-0.72)	-0.019 (-0.34)	0.472 (0.99)	0.826* (1.74)	-0.039 (-0.09)	0.133 (0.33)	
$\Delta Sent_{t-2}$			0.016 (0.12)		0.108 (1.54)		0.739* (1.97)		0.213 (0.58)	
$\Delta Sent_{t-3}$			-0.043 (-0.32)		-0.024 (-0.38)		1.152*** (3.27)		0.702* (1.81)	
$\Delta Sent_{t-4}$			-0.018 (-0.14)		0.032 (0.44)		0.450 (1.03)		-0.060 (-0.15)	
$\Delta Sent_{t-5}$			-0.030 (-0.24)		-0.006 (-0.10)		0.092 (0.25)		0.061 (0.20)	
$\Delta \ln(IndustrialProduction_{t-1})$						0.409*** (3.92)		0.410*** (4.13)	0.402*** (4.04)	
F statistic ($\Delta Sent$ (t-2 to t-n))			0.175		1.062			3.144		0.873
P-value ($\Delta Sent$ (t-2 to t-n))			0.951		0.376			0.015		0.480
Observations	290	290	290	290	290	399	399	399	399	399
Adjusted R-squared	0.61	-0.00	-0.01	0.61	0.61	0.17	0.00	0.01	0.17	0.17

The table shows the linear regression of investment and industrial production growth on the term spread and economic sentiment. Newey-West corrected t-statistics are reported in parentheses. Significance: * (10%), ** (5%), and *** (1%). Sample: 1939Q1-2019Q4.

Capital Channel: NBES, Investment, and Industrial Production

	$\Delta \ln(\text{Investment}_t)$					$\Delta \ln(\text{IndustrialProduction}_t)$				
	I	II	III	IV	V	VI	VII	VIII	IX	X
$\Delta \ln(\text{Investment}_{t-1})$	0.738*** (13.70)			0.738*** (13.79)	0.743*** (13.83)					
Term Spread_{t-1}	-0.046** (-2.08)			-0.044** (-1.99)	-0.045** (-2.08)	0.225* (1.88)			0.226* (1.89)	0.215* (1.78)
ΔSent_{t-1}		-0.073 (-0.90)	-0.073 (-0.66)	-0.038 (-0.72)	-0.019 (-0.34)	0.472 (0.99)	0.826* (1.74)	-0.039 (-0.09)	0.133 (0.33)	
ΔSent_{t-2}			0.016 (0.12)		0.108 (1.54)		0.739* (1.97)		0.213 (0.58)	
ΔSent_{t-3}			-0.043 (-0.32)		-0.024 (-0.38)		1.152*** (3.27)		0.702* (1.81)	
ΔSent_{t-4}			-0.018 (-0.14)		0.032 (0.44)		0.450 (1.03)		-0.060 (-0.15)	
ΔSent_{t-5}			-0.030 (-0.24)		-0.006 (-0.10)		0.092 (0.25)		0.061 (0.20)	
$\Delta \ln(\text{IndustrialProduction}_{t-1})$						0.409*** (3.92)		0.410*** (4.13)	0.402*** (4.04)	
F statistic (ΔSent (t-2 to t-n))			0.175		1.062		3.144		0.873	
P-value (ΔSent (t-2 to t-n))			0.951		0.376		0.015		0.480	
Observations	290	290	290	290	290	399	399	399	399	399
Adjusted R-squared	0.61	-0.00	-0.01	0.61	0.61	0.17	0.00	0.01	0.17	0.17



The table shows the linear regression of investment and industrial production growth on the term spread and economic sentiment. Newey-West corrected t-statistics are reported in parentheses. Significance: * (10%), ** (5%), and *** (1%). Sample: 1939Q1-2019Q4.

Labor Channel: NBES, Employment, and Consumption

	$\Delta \ln(\text{Employment}_t)$					$\Delta \ln(\text{Consumption}_t)$				
	I	II	III	IV	V	VI	VII	VIII	IX	X
$\Delta \ln(\text{Employment}_{t-1})$	0.757*** (14.73)			0.748*** (14.65)	0.748*** (16.61)					
Term Spread_{t-1}	0.042** (2.29)			0.036* (1.94)	0.036* (1.85)	0.068 (1.50)			0.064 (1.40)	0.059 (1.27)
ΔSent_{t-1}		0.249*** (3.11)	0.339*** (3.67)	0.154*** (3.06)	0.159*** (2.92)		0.135** (2.04)	0.202** (2.55)	0.106 (1.34)	0.173* (1.74)
ΔSent_{t-2}			0.315*** (2.71)		0.005 (0.06)			0.185** (2.13)		0.164* (1.76)
ΔSent_{t-3}			0.258* (1.79)		-0.014 (-0.16)			0.234** (2.21)		0.216* (1.75)
ΔSent_{t-4}			0.241* (1.76)		0.049 (0.70)			0.126 (1.11)		0.115 (1.18)
ΔSent_{t-5}			0.107 (0.97)		-0.029 (-0.52)			0.097 (1.19)		0.100 (1.14)
$\Delta \ln(\text{Consumption}_{t-1})$						0.083 (0.52)			0.071 (0.44)	0.039 (0.25)
F statistic (ΔSent (t-2 to t-n))			2.234		0.736			1.581		1.075
P-value (ΔSent (t-2 to t-n))			0.065		0.568			0.179		0.369
Observations	322	322	322	322	322	290	290	290	290	290
Adjusted R-squared	0.56	0.02	0.06	0.57	0.57	0.01	0.01	0.02	0.02	0.02

The table shows the linear predictive model for employment and total consumption growth on term spread and economic sentiment. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1939Q1-2019Q4.

Labor Channel: NBES, Employment, and Consumption

	$\Delta \ln(\text{Employment}_t)$					$\Delta \ln(\text{Consumption}_t)$				
	I	II	III	IV	V	VI	VII	VIII	IX	X
$\Delta \ln(\text{Employment}_{t-1})$	0.757*** (14.73)			0.748*** (14.65)	0.748*** (16.61)					
Term Spread_{t-1}	0.042** (2.29)			0.036* (1.94)	0.036* (1.85)	0.068 (1.50)			0.064 (1.40)	0.059 (1.27)
ΔSent_{t-1}		0.249*** (3.11)	0.339*** (3.67)	0.154*** (3.06)	0.159*** (2.92)		0.135** (2.04)	0.202** (2.55)	0.106 (1.34)	0.173* (1.74)
ΔSent_{t-2}			0.315*** (2.71)		0.005 (0.06)			0.185** (2.13)		0.164* (1.76)
ΔSent_{t-3}			0.258* (1.79)		-0.014 (-0.16)			0.234** (2.21)		0.216* (1.75)
ΔSent_{t-4}			0.241* (1.76)		0.049 (0.70)			0.126 (1.11)		0.115 (1.18)
ΔSent_{t-5}			0.107 (0.97)		-0.029 (-0.52)			0.097 (1.19)		0.100 (1.14)
$\Delta \ln(\text{Consumption}_{t-1})$						0.083 (0.52)			0.071 (0.44)	0.039 (0.25)
F statistic (ΔSent (t-2 to t-n))			2.234		0.736			1.581		1.075
P-value (ΔSent (t-2 to t-n))			0.065		0.568			0.179		0.369
Observations	322	322	322	322	322	290	290	290	290	290
Adjusted R-squared	0.56	0.02	0.06	0.57	0.57	0.01	0.01	0.02	0.02	0.02



The table shows the linear predictive model for employment and total consumption growth on term spread and economic sentiment. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1939Q1-2019Q4.

Labor Channel: NBES, Nondurable Consumption, and Services

	$\Delta \ln(\text{Cons}_{t-1}^{\text{nondur}})$					$\Delta \ln(\text{Cons}_{t-1}^{\text{serv}})$				
	I	II	III	IV	V	VI	VII	VIII	IX	X
$\Delta \ln(\text{Cons}_{t-1}^{\text{nondur}})$	0.096 (1.06)			0.086 (0.95)	0.057 (0.67)					
Term Spread_{t-1}	0.049 (1.41)			0.047 (1.35)	0.043 (1.25)	0.026 (0.88)			0.025 (0.85)	0.020 (0.62)
ΔSent_{t-1}		0.097 (1.40)	0.153* (1.94)	0.061 (0.91)	0.118 (1.52)		0.037 (0.87)	0.104** (2.13)	0.008 (0.17)	0.061 (1.20)
ΔSent_{t-2}			0.183* (1.81)		0.161 (1.54)			0.201*** (3.26)		0.155*** (2.64)
ΔSent_{t-3}			0.198** (2.08)		0.177* (1.84)			0.169*** (2.71)		0.094 (1.60)
ΔSent_{t-4}			0.103 (1.04)		0.090 (0.95)			0.153** (2.54)		0.099* (1.75)
ΔSent_{t-5}			0.114 (1.32)		0.116 (1.32)			0.046 (0.70)		0.008 (0.13)
$\Delta \ln(\text{Cons}_{t-1}^{\text{serv}})$						0.360*** (5.11)		0.359*** (5.16)	0.323*** (4.56)	
F statistic (ΔSent (t-2 to t-n))			1.383		1.101			3.460		2.269
P-value (ΔSent (t-2 to t-n))			0.240		0.356			0.009		0.062
Observations	290	290	290	290	290	290	290	290	290	290
Adjusted R-squared	0.01	0.00	0.01	0.01	0.02	0.12	-0.00	0.05	0.12	0.14

The table shows the linear predictive model for nondurable consumption and services growth on term spread and economic sentiment. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1939Q1-2019Q4.

NBES and Taylor Rule

Romer and Romer (2004) specification of the Taylor rule:

- a 1-st.dev. decrease in NBES over the past 2 quarters leads to a 25 basis point decrease in FFR.

	ΔFFR_t											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
$\Delta Sent_{t-1,t-7}$		0.077*** (3.07)	0.050** (2.57)		0.072*** (2.86)	0.044** (2.19)		0.123*** (3.38)	0.065*** (3.54)		0.070*** (3.05)	0.049*** (2.65)
$\Delta Sent_{t-1,t-7} \times Res_{t-1}$			0.197** (2.04)			0.205** (2.14)			0.337** (2.38)			0.145 (1.42)
Specification	R&R	R&R	R&R	-Unemp	-Unemp	-Unemp	-GDP	-GDP	-GDP	-Inf	-Inf	-Inf
Observations	346	346	346	346	346	346	346	346	346	346	346	346
Adjusted R-squared	0.23	0.25	0.27	0.22	0.24	0.26	0.04	0.09	0.15	0.21	0.22	0.23

The table shows the linear predictive model for changes in the Fed Funds Rate (FFR) on economic sentiment. Newey-West-corrected t-statistics are reported in parentheses. Sample: January 1969 - December 2007. Significance levels are indicated by * (10%), ** (5%), and *** (1%).

NBES and Taylor Rule

Romer and Romer (2004) specification of the Taylor rule:

- a 1-st.dev. decrease in NBES over the past 2 quarters leads to a 25 basis point decrease in FFR.

	ΔFFR_t											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
$\Delta Sent_{t-1,t-7}$		0.077*** (3.07)	0.050** (2.57)		0.072*** (2.86)	0.044** (2.19)		0.123*** (3.38)	0.065*** (3.54)		0.070*** (3.05)	0.049*** (2.65)
$\Delta Sent_{t-1,t-7} \times Res_{t-1}$			0.197** (2.04)			0.205** (2.14)			0.337** (2.38)			0.145 (1.42)
Specification	R&R	R&R	R&R	-Unemp	-Unemp	-Unemp	-GDP	-GDP	-GDP	-Inf	-Inf	-Inf
Observations	346	346	346	346	346	346	346	346	346	346	346	346
Adjusted R-squared	0.23	0.25	0.27	0.22	0.24	0.26	0.04	0.09	0.15	0.21	0.22	0.23

The table shows the linear predictive model for changes in the Fed Funds Rate (FFR) on economic sentiment. Newey-West-corrected t-statistics are reported in parentheses. Sample: January 1969 - December 2007. Significance levels are indicated by * (10%), ** (5%), and *** (1%).

NBES and Taylor Rule: Better GDP Forecast?

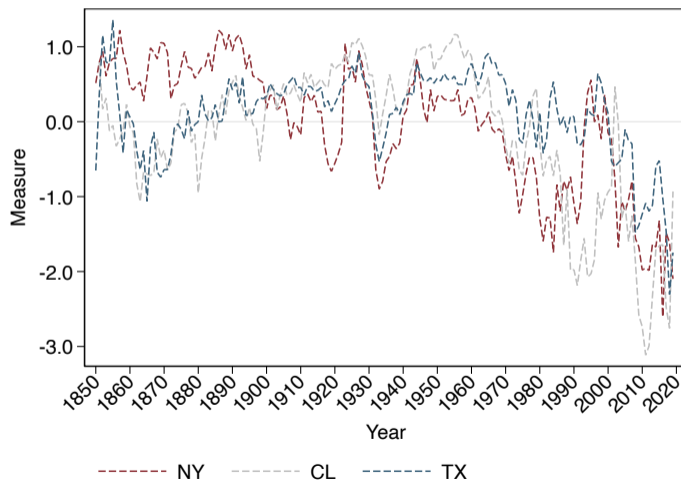
	ΔFFR_t			
	I	II	III	IV
$\Delta Sent_{t-1,t-7}$		0.063** (2.13)	0.037* (1.67)	0.032 (1.41)
$\Delta Sent_{t-1,t-7} \times Recession_{t-1}$			0.195* (1.95)	0.198** (1.98)
<i>Predicted GDP Growth</i>	0.197*** (2.68)	0.119 (1.34)	0.113 (1.29)	0.072 (0.86)
<i>Predicted GDP Growth (Two Quarters Ahead)</i>				0.073 (1.10)
Specification	R&R	R&R	R&R	R&R
Observations	346	346	346	346
Adjusted R-squared	0.24	0.25	0.27	0.27

The table shows the linear predictive model for changes in the Fed Funds Rate (FFR) on economic sentiment after controlling for sentiment-predicted GDP growth. The sentiment-predicted GDP growth is estimated using the specification of column V of Table 1. The specifications include all Romer and Romer (2004) controls. Newey-West-corrected t-statistics are reported in parentheses. Sample: January 1969 - December 2007. Significance levels are indicated by * (10%), ** (5%), and *** (1%).

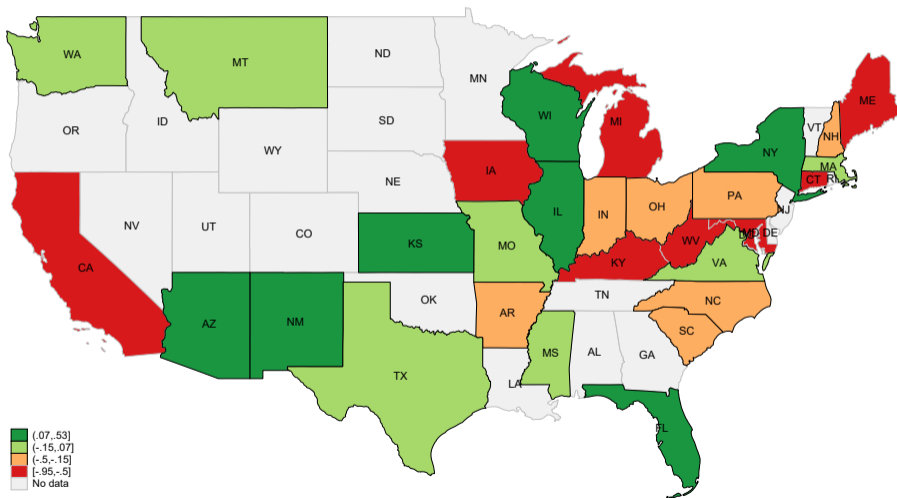
State-Level Economic Sentiment

Substantial Variation in the Local Economic Sentiment

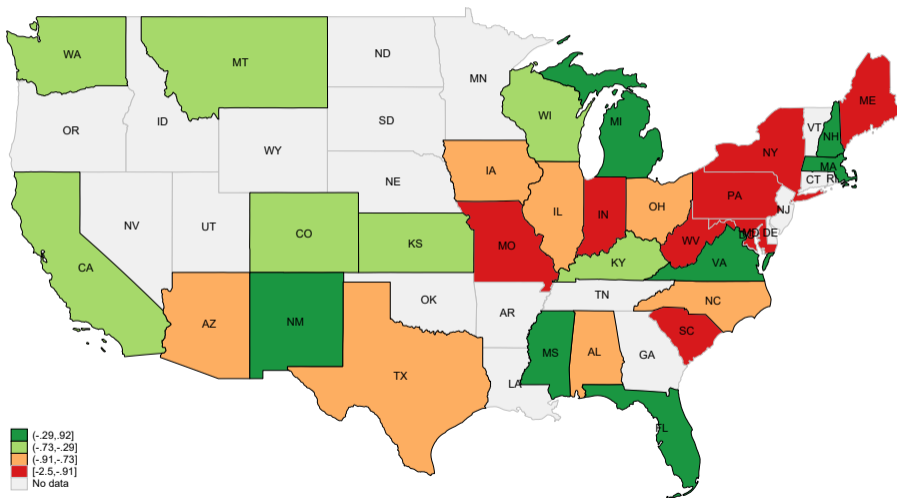
National trend explains only around 35% of the variation in state sentiment



Example: Dot-com Bubble



Example: Global Financial Crisis



Local Economic Sentiment leads Local GDP Growth

	$\Delta \ln(GSP_{s,t})$					
	I	II	III	IV	V	VI
$\Delta Sentiment_{s,t-1}$	0.263 (0.268)	0.648** (0.273)	0.723** (0.287)	-0.153 (0.320)	0.182 (0.342)	0.247 (0.357)
$\Delta Sentiment_{s,t-2}$		1.244*** (0.246)	1.362*** (0.273)		0.777*** (0.274)	0.901*** (0.302)
$\Delta Sentiment_{s,t-3}$		1.156*** (0.289)	1.321*** (0.329)		1.017*** (0.289)	1.173*** (0.330)
$\Delta Sentiment_{s,t-4}$		1.301*** (0.283)	1.455*** (0.288)		1.281*** (0.289)	1.424** (0.293)
$\Delta Sentiment_{s,t-5}$			0.334 (0.257)			0.353 (0.266)
$\Delta Sentiment_{s,t-6}$			0.740** (0.319)			0.611* (0.321)
$\Delta \ln(GSP_{s,t-1})$				0.028 (0.022)	0.013 (0.024)	0.010 (0.025)
$\Delta \ln(GDP_{t-1})$				0.488*** (0.055)	0.421*** (0.071)	0.404*** (0.075)
$\Delta NationalSentiment_{t-1}$				0.229 (0.186)	0.276 (0.192)	0.305 (0.193)
Controls	No	No	No	Yes	Yes	Yes
Observations	1,172	1,172	1,172	1,172	1,172	1,172
R-squared	0.00	0.03	0.03	0.03	0.04	0.05

Table reports a linear predictive model for state level GDP. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1979Q1-2019Q4.

Statewide Dispersion in ES, National GDP Growth, and Inflation



	$\Delta \ln(GDP_t)$		$\Delta \ln(CPI_t)$	
	I	II	III	IV
$\Delta Sentiment_{t-1}$	0.339*** (3.95)	0.248*** (2.69)	0.021 (0.32)	0.067 (1.57)
$Dispersion_{t-1}$	-0.551* (-1.68)	-0.497* (-1.90)	-0.473 (-1.51)	-0.083 (-0.57)
$\Delta \ln(GDP_{t-1})$		0.334*** (5.40)		
Term Spread $_{t-1}$		0.069* (1.82)		-0.074*** (-3.06)
$\Delta \ln(CPI_{t-1})$				0.695*** (10.24)
Controls	No	Yes	No	Yes
Observations	290	290	290	290
Adjusted R-squared	0.05	0.16	0.00	0.55

The table reports a linear predictive model for national GDP and CPI. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1947Q1-2019Q4.

Statewide Dispersion in ES, National GDP Growth, and Inflation

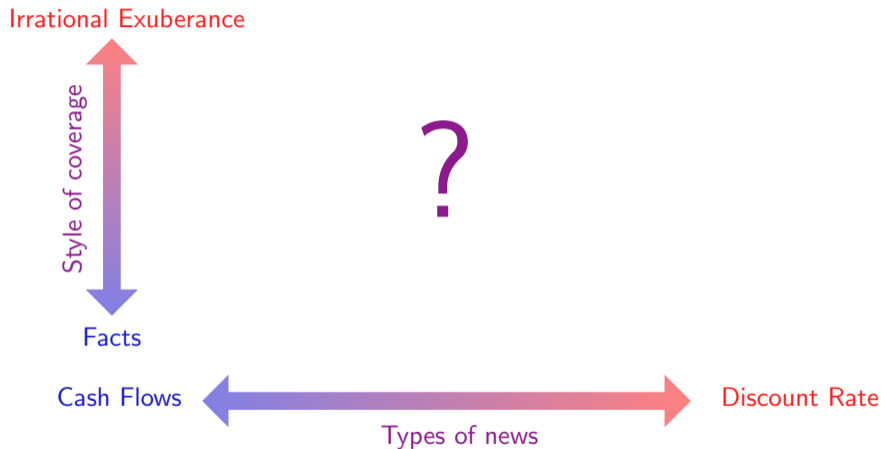
	$\Delta \ln(GDP_t)$		$\Delta \ln(CPI_t)$	
	I	II	III	IV
$\Delta Sentiment_{t-1}$	0.339*** (3.95)	0.248*** (2.69)	0.021 (0.32)	0.067 (1.57)
$Dispersion_{t-1}$	-0.551* (-1.68)	-0.497* (-1.90)	-0.473 (-1.51)	-0.083 (-0.57)
$\Delta \ln(GDP_{t-1})$		0.334*** (5.40)		
Term Spread $_{t-1}$		0.069* (1.82)		-0.074*** (-3.06)
$\Delta \ln(CPI_{t-1})$				0.695*** (10.24)
Controls	No	Yes	No	Yes
Observations	290	290	290	290
Adjusted R-squared	0.05	0.16	0.00	0.55



The table reports a linear predictive model for national GDP and CPI. Newey-West-corrected t-statistics are reported in parentheses. Significance levels are indicated by * (10%), ** (5%), and *** (1%). Sample: 1947Q1-2019Q4.

Conclusion

Sentiment Mechanics (1/2)



GDP predictability from future news, through labor and consumption, but not from investment or returns

Sentiment Mechanics (2/2)

Sentiment reflects news dispersed in the economy (Barsky and Sims (2012)): we control for SPF forecasts

News about future technological opportunities((Beaudry and Portier (2006)): investment channel

Departure from rational expectations (Angeletos et al (2020))

Could this sentiment be reflecting a **demand-driven source of business cycles?**

With no effect on investment, our findings are most consistent with short-term sentiment fluctuations spurring non-durable consumption and short-term hiring (self-fulfilling prophecy or rational sentiment)

Conclusion

The paper provides a two-fold contribution:

- First measure of country- and state-wide economic sentiment for almost 200 years
- Separation of pure sentiment from the economic one, could be used to “de-bias” existing measures
- Predicts global and local GDP and that predictability seems to operate through the consumption/labour channel rather than the investment channel
- Sentiment affects monetary policy

Potential implications/extensions:

- Sentiment disagreement and heterogeneity over time and space
- Guiding research on sentiment-augmented models in macroeconomics and finance
- Next: **housing, migration, employment, drugs, political partisanship**

Appendix

National economic sentiment and durable consumption

	$\Delta \ln(Durables_t)$				
	I	II	III	IV	V
$\Delta \ln(Durables_{t-1})$	-0.102 (-1.16)			-0.113 (-1.28)	-0.118 (-1.39)
$TermSpread_{t-1}$	0.452*** (2.80)			0.435*** (2.69)	0.429*** (2.67)
$\Delta Sent_{t-1}$		0.549* (1.67)	0.645 (1.63)	0.555 (1.58)	0.658 (1.48)
$\Delta Sent_{t-2}$			0.129 (0.39)		0.178 (0.49)
$\Delta Sent_{t-3}$			0.595 (1.25)		0.581 (1.10)
$\Delta Sent_{t-4}$			0.295 (0.65)		0.354 (0.80)
$\Delta Sent_{t-5}$			0.293 (0.93)		0.333 (0.99)
F-stat (all $\Delta Sent$)			0.605		0.495
P-value (all $\Delta Sent$)			0.659		0.739
Observations	290	290	290	290	290
Adjusted R-squared	0.03	0.00	-0.00	0.03	0.03

Sample: 1947Q1-2019Q4