Measuring Economic Policy Uncertainty

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Purpose

- Develop a new index of economic policy uncertainty (EPU) based on newspaper coverage frequency since 1985
- Extend the newspaper-based approach to measuring policy uncertainty along three dimensions:
  - Back in time
  - Across countries
  - Specific policy categories

Measuring Economic Policy Uncertainty (EPU)

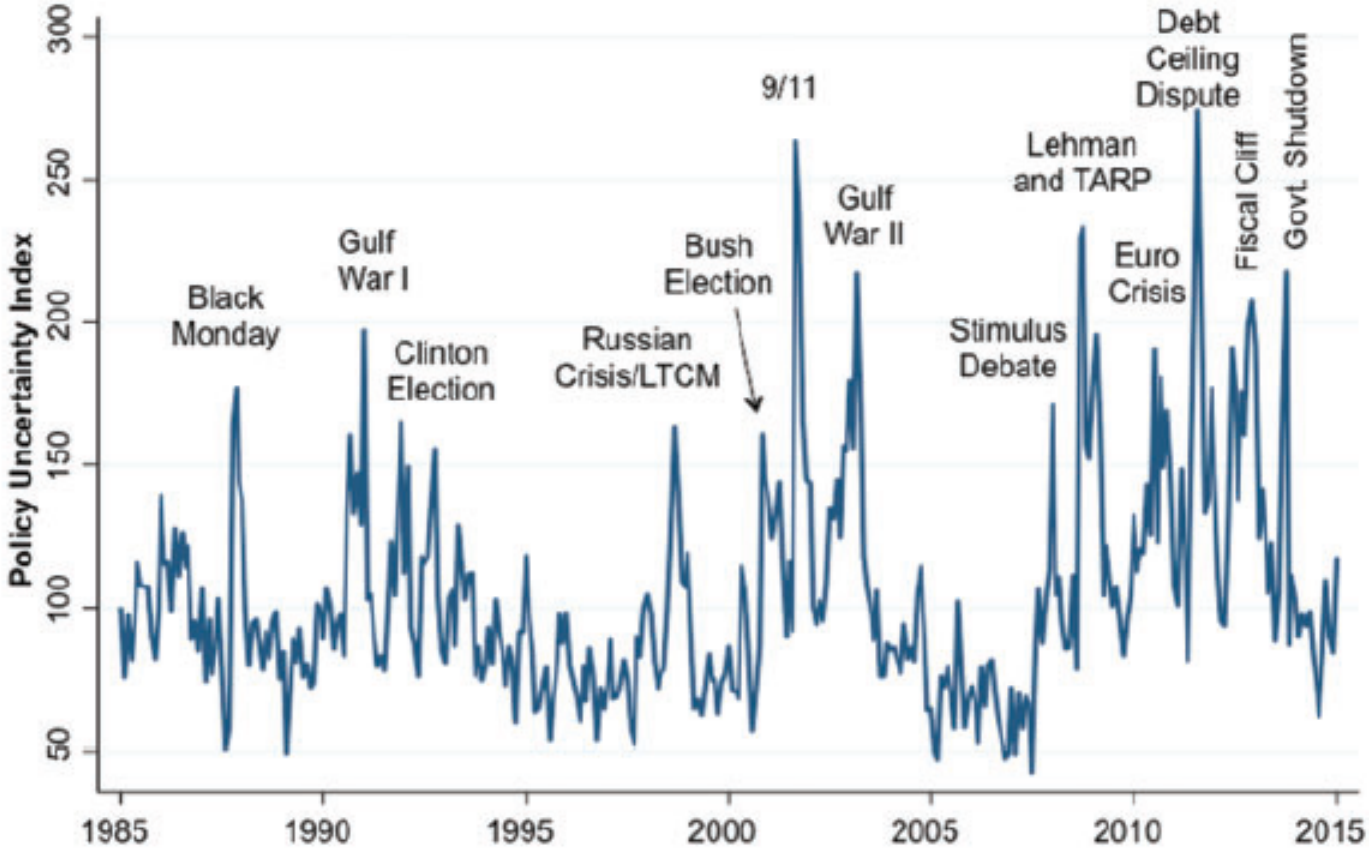
- Capture uncertainty regarding *who*, *what*, *when*, and the *effects* of policy action and inaction
- Capture near-term and long-term concerns

Measuring Economic Policy Uncertainty (EPU)

U.S. Economic Policy Uncertainty Indexes from 1985

- Relies on 10 leading newspapers
- Search digital archives from 1985 and obtain monthly count of articles that contain terms related to uncertainty (U), policy (P), and the economy (E)
  - "uncertainty" or "uncertain"; "economic" or "economy"; and one of the following policy terms: "Congress," "deficit," "Federal Reserve," "legislation," "regulation," or "White House"
  - Audit study to determine policy (P) terms
  - An article must contain terms in all three categories
- Scale by the total number of articles in the same newspaper and month, standardize newspaper-level series to unit standard deviation and average across the 10 papers and by month, and normalize to a mean of 100

Measuring Economic Policy Uncertainty (EPU)



Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'regulation', 'federal reserve', 'deficit', 'congress', 'legislation', or 'white house'. The series is normalized to mean 100 from 1985-2009 and based on queries run on 2 February, 2015 for the USA Today, Miami Herald, Chicago Tribune, Washington Post, LA Times, Boston Globe, SF Chronicle, Dallas Morning News, NY Times, and the Wall Street Journal.

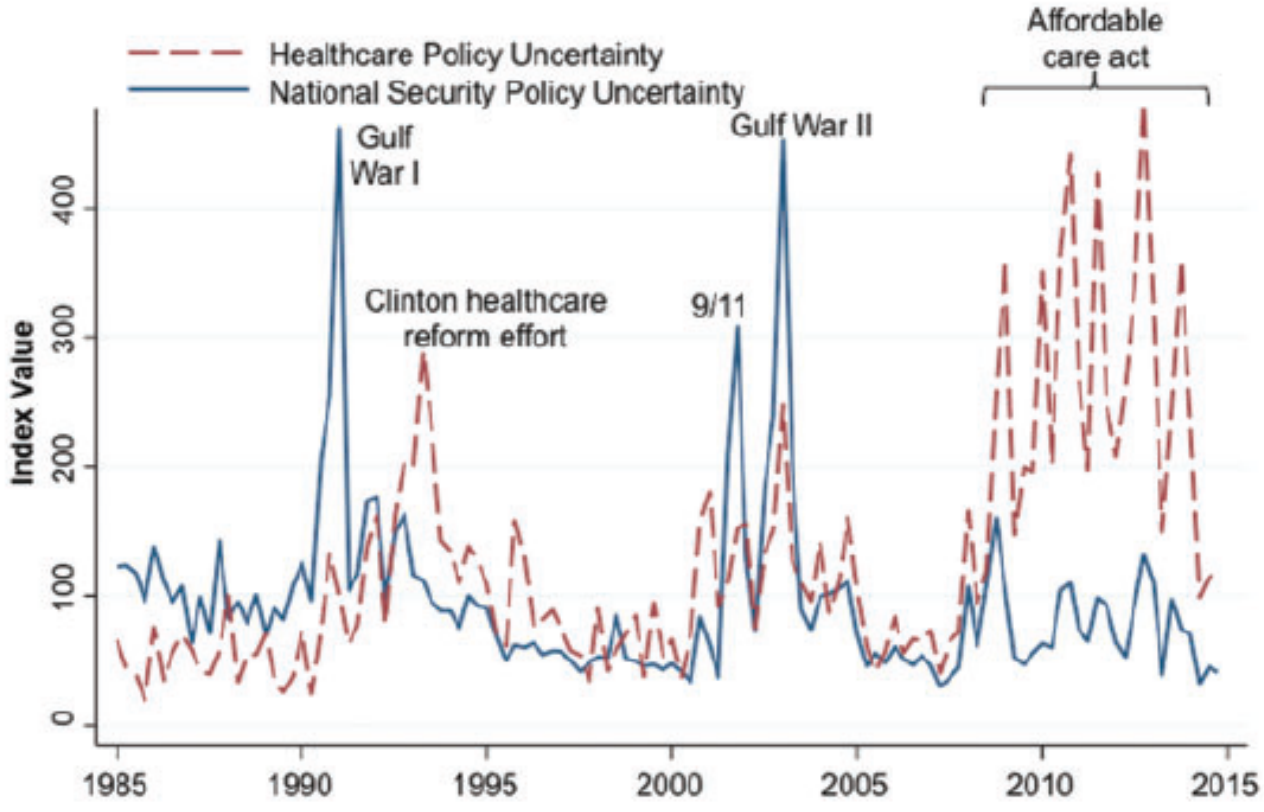
Figure: EPU Index for the United States

Measuring Economic Policy Uncertainty (EPU)

EPU Indexes for Policy Categories

- Apply additional criteria to articles
  - Ex.) "the Fed", "central bank", "inflation" for monetary policy index
- Newsbank for the category indexes
- Newsbank news aggregator covers 1,500 U.S. newspapers
- Can be expressed as a percentage of the overall EPU frequency

EPU Indexes for Policy Categories



Indices reflect scaled monthly counts of articles containing the same triple as in Figure 1 ***and*** one or more terms pertaining to national security (e.g., "war", "terrorism", or "department of defense") and healthcare (e.g., "healthcare", "hospital", or "health insurance"), respectively, for the National Security and Healthcare indices. Each series is normalized to mean 100 from 1985-2009 and based on queries run Jan 18, 2015 on Access World News Newsbank newspaper archive, which covers about 1,500 US papers.

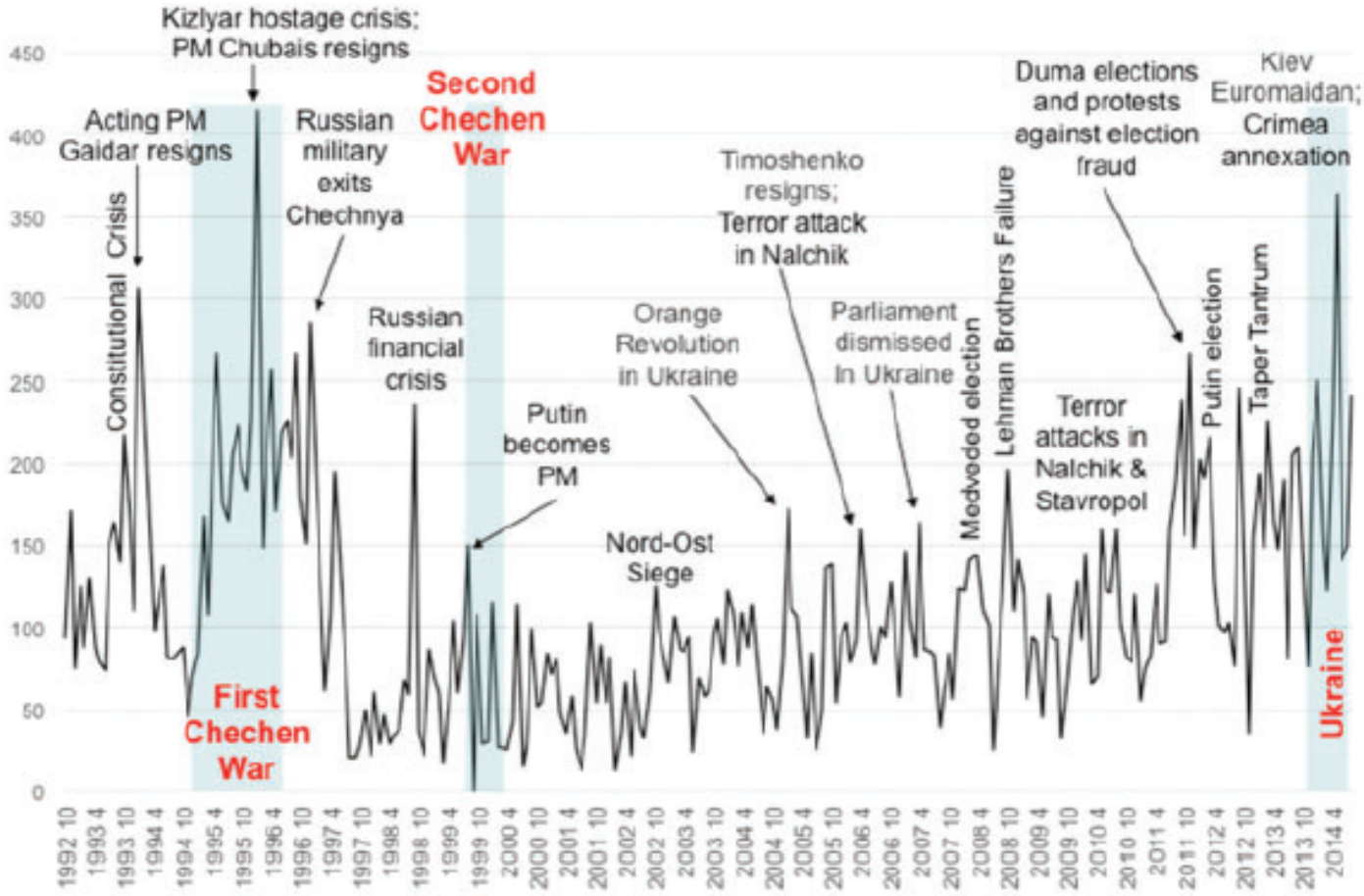
Figure: National Security and Health Care EPU Indexes

Measuring Economic Policy Uncertainty (EPU)

EPU Indexes for Other Countries

- Construct EPU Indexes for 11 other major countries
  - Obtain monthly count of articles that contain a trio of terms about the economy, policy, and uncertainty
  - Scale, standardize, normalize
  - Consult persons with native-level fluency and economic expertise in each country
- Yields important information even for countries with restrictions on press freedoms

EPU Indexes for Other Countries



Index reflects scaled monthly counts of articles in Kommersant with Russian terms for 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more selected policy terms. The series is normalized to 100 and runs from October 1992 to August 2014.

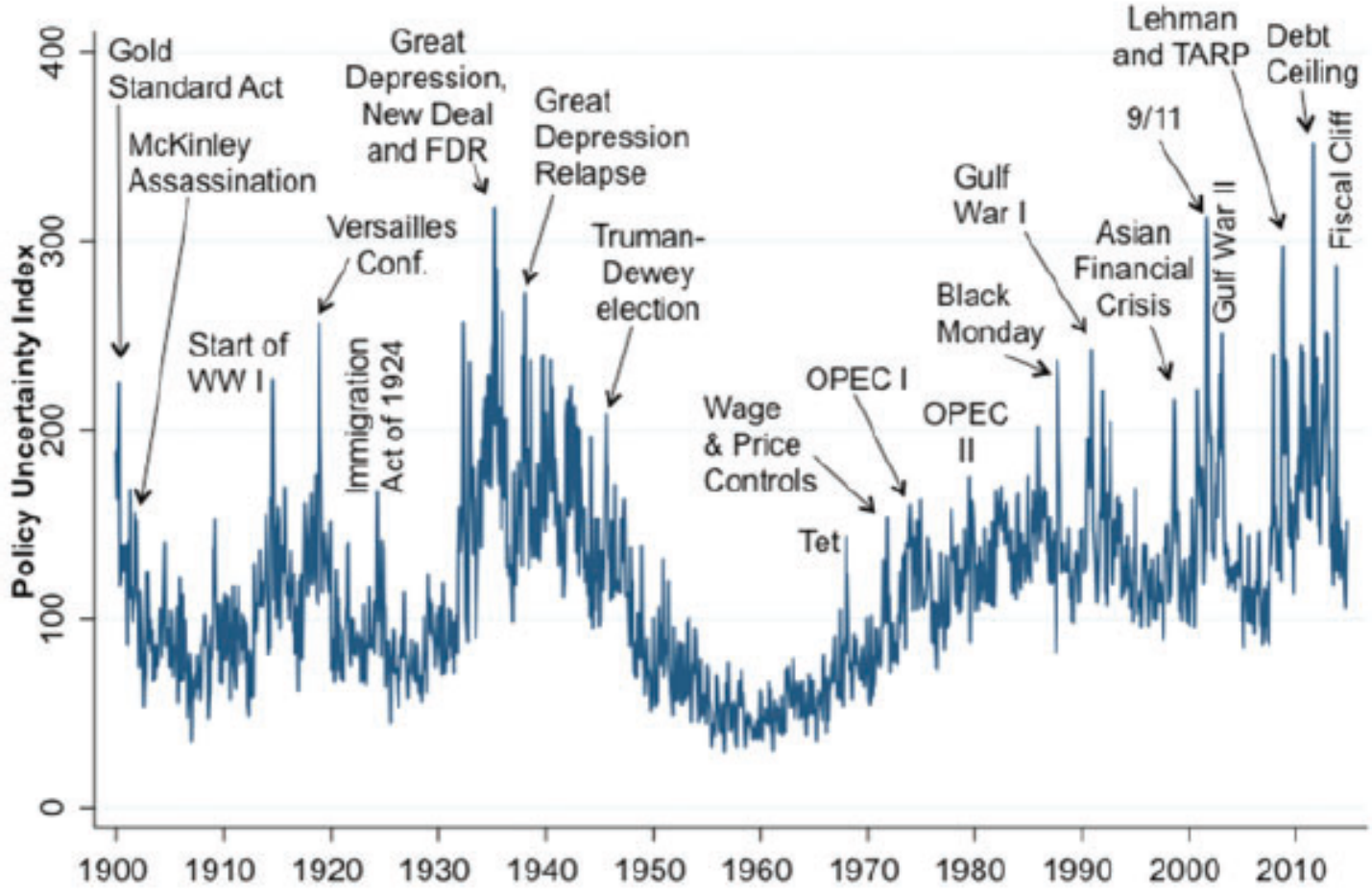
Figure: Index of EPU for Russia

Measuring Economic Policy Uncertainty (EPU)

Long-Span EPU Indexes for the United States and United Kingdom

- Construct EPU Indexes for the U.S. and the United Kingdom dating back to 1900
- Drawing on digital archives from 6 major newspapers for the U.S. and 2 from the UK
- Expanded word search for the "E" based on informal audits and review of word usage patterns in newspapers
- E terms added: "business," "industry," "commerce," and, "commercial"
- Expanded "P" term set based on audits
- P terms added: "tariff" and "war"

Long-Span EPU Indexes for the US and UK



Index reflects scaled monthly counts of articles in 6 major newspapers (Washington Post, Boston Globe, LA Times, NY Times, Wall Street Journal, and Chicago Tribune) that contain the same triple as in Figure I, except the economy term set includes "business", "commerce" and "industry" and the policy term set includes "tariffs" and "war". Data normalized to 100 from 1900-2011.

Figure: U.S. Historical Index of EPU

Evaluating Policy Uncertainty Measures

Audit Study Based on Human Readings

- 18-month human audit study to read and code articles from 1900 to 2012
  - Reviewed 12,009 articles using a two-stage approach:

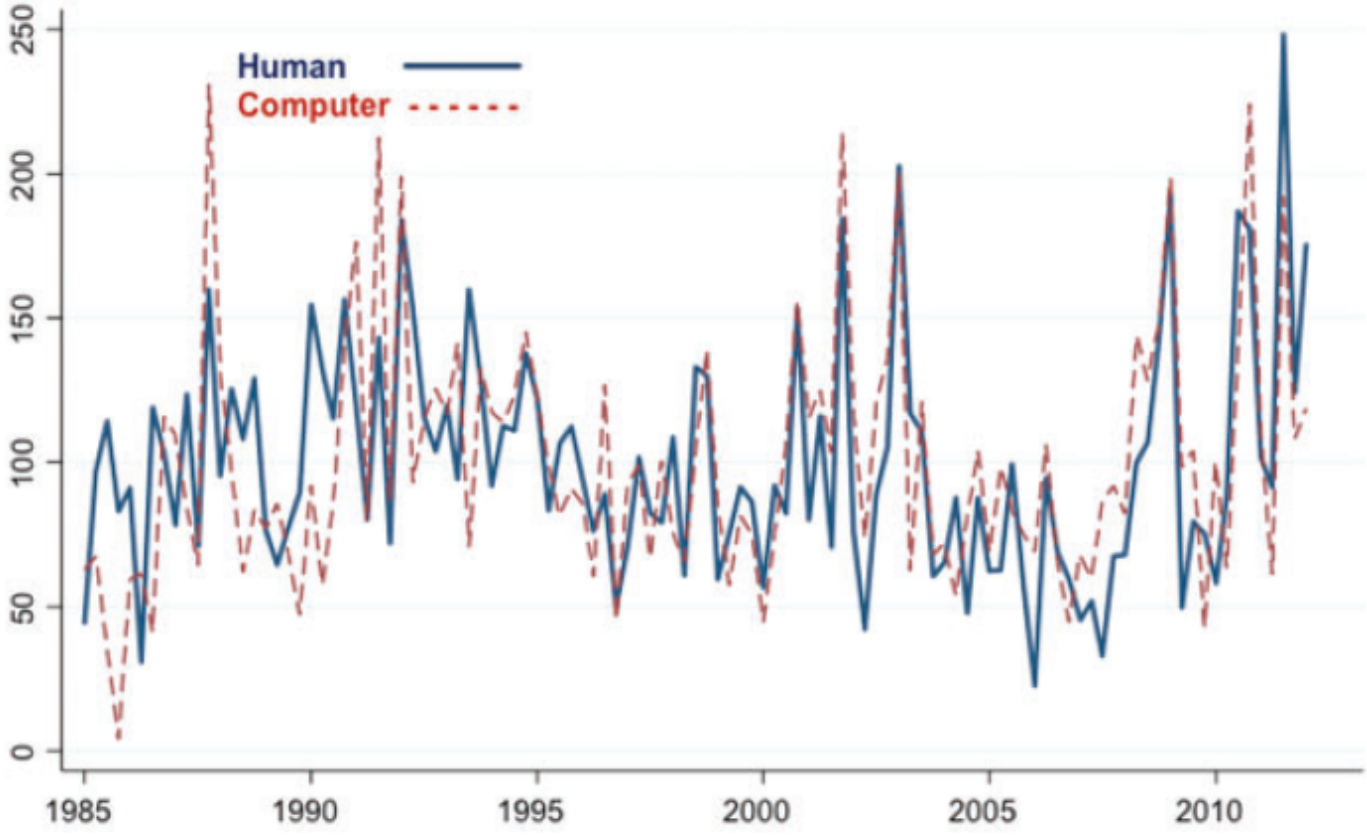
1. Specified target sample size per year
2. Randomly sampled a number of articles for each newspaper and month
3. Randomly assigned one quarter of the articles to multiple auditors

Evaluating Policy Uncertainty Measures

Selecting a P Term

- When an auditor codes an article as EPU = 1, he or she also records the policy terms contained in the passages about EPU
- Identify 15 most common policy terms
- Consider 32,000 term set permutations with four or more of these policy terms
- Generate computer assignments for each permutation of EPU^C = 0 or 1 for each article in the sample
- Compare computer assignments to human codings
- Choose P terms that minimize the gross error rates (sum of false positive ($EPU^C = 1$, $EPU^H = 0$) and false negatives ($EPU^C = 0$, $EPU^H = 1$))
- Compare movements over time in human and computer-generated EPU indexes

Evaluating Policy Uncertainty Measures



Index comparison from 1985 Q1 to 2012 Q1 based on 3,723 articles (4,388 audits) in the Chicago Tribune, Dallas Morning News, LA Times, Miami Herald, NY Times, San Francisco Chronicle, Washington Post and Wall Street Journal. Series are plotted quarterly to reduce sampling variability, with an average of 33 articles per quarter. Each series is normalized to 100 from 1985-2009. See text for additional discussion of the audit process and this comparison.

Figure: Human and Computer Generated EPU Indexes

Evaluating Policy Uncertainty Measures

Political Slant in Newspaper Coverage of EPU

- Audit study does not address potential for political slant to skew newspaper coverage of EPU
- To address this:
  - Split 10 newspapers into 5(R) and 5(D) using media slant index from Gentzkow and Shapiro (2010)
  - Correlation of 0.92 between the "left" and "right" EPU indexes implies that political slant does not distort variation over time

Evaluating Policy Uncertainty Measures

Comparisons to Other Measures of Uncertainty and Policy Uncertainty

- Comparison to VIX- an index of 30-day option-implied volatility in the S&P 500 index
  - VIX measures equity returns while EPU reflects policy uncertainty- correlation of 0.58
  - Create a newspaper-based index of equity market uncertainty by replacing P term set with "stock price," "equity price," or "stock market"- correlation of 0.73
- Other text sources (Beige Book and 10-K flings)
  - Count frequency of "uncertain" in Beige Book and normalize for variation in word count- correlation of 0.54
  - Count sentences in the Risk Factors section that contain 1+ policy terms, divide by the total number of sentences, and average over firms by year

Evaluating Policy Uncertainty Measures

Comparisons to Other Measures of Uncertainty and Policy Uncertainty

- Daily Stock Market Jumps
  - Identify greater than 2.5 percent daily moves in the S&P 500 stock index
  - Read NYT, WSJ and classify policy-related explanations of stock move
  - Record the explanation(s) according to the article, and classify it as policy-related or not
  - Hypothesis: higher policy uncertainty leads to a greater frequency of large equity market moves triggered by policy-related news
  - Correlation of annual frequency count of daily stock and EPU is 0.78

Summary: newspaper-based EPU indexes contain useful information about the extent and nature of economic policy uncertainty

Comparisons to Other Measures of Uncertainty and Policy Uncertainty

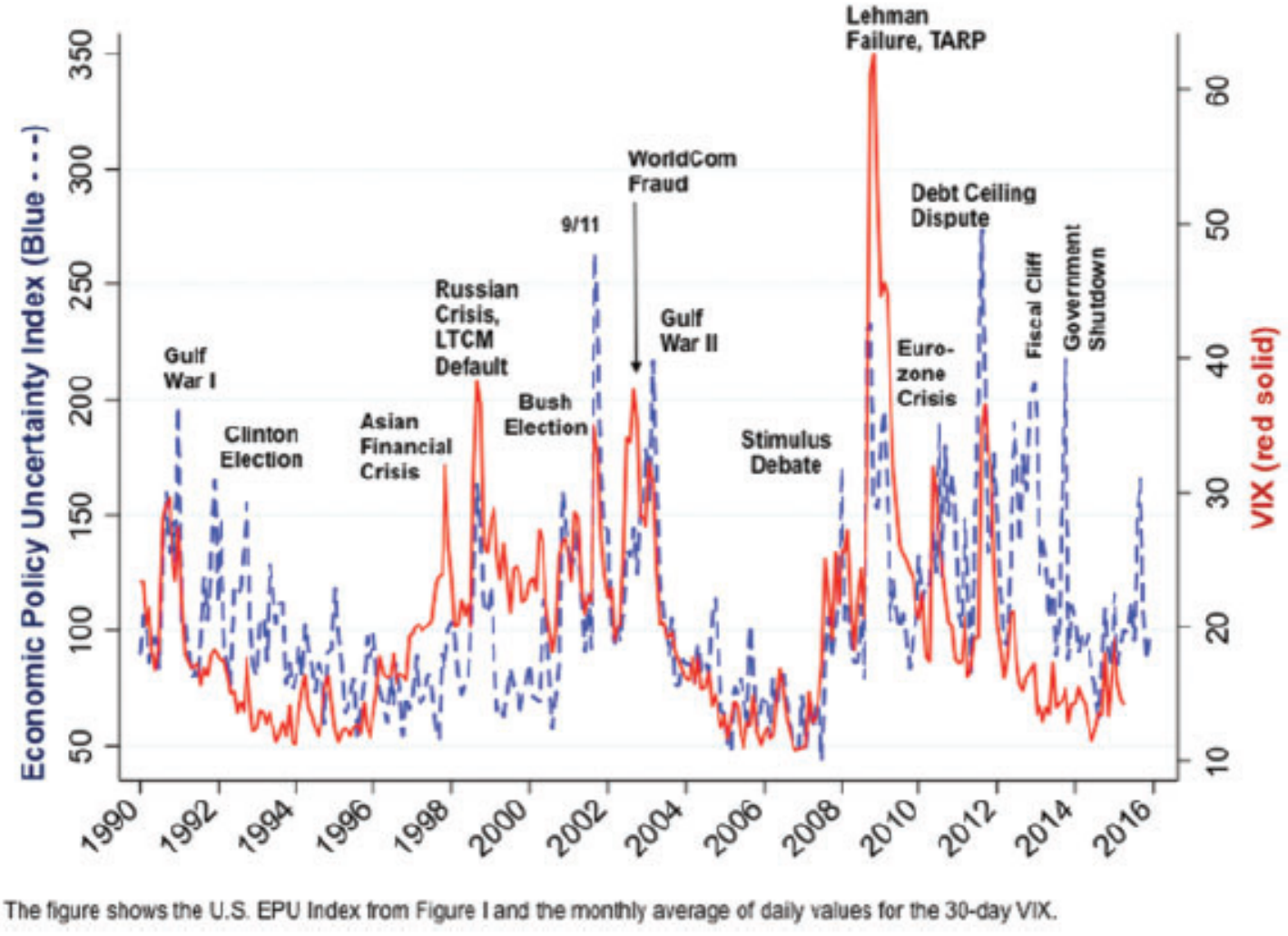


Figure: U.S. EPU Compared to 20-Day VIX

Policy Uncertainty and Economic Activity

Firm-Level Outcomes and Policy Uncertainty

- Option-implied stock price volatility as a proxy for firm-level uncertainty and investment rates and employment growth as real activity measures
- Calculate the share of firm and industry revenues derived from sales to government
- Data sources: Gov't share of U.S. health care expenditures in 2010 for firms in Health Services and Micro data in the Federal Registry of Contract, Compustat
  - Aggregate revenues and contract awards to obtain the ratio of federal purchases to revenues in each industry by year
  - Measure each firm's exposure to government purchases as its revenue-weighted mean of the industry-level exposure

Policy Uncertainty and Economic Activity

Firm-Level Outcomes and Policy Uncertainty

- Run regressions on a sample (1996-2012) and weight by firm sales
  - Regresses logged 30-day implied volatility on EPU index and ratio of federal government purchases to GDP
  - Add firm and time fixed effects and interact log(EPU) and purchases/GDP with firm-level measures of exposure to gov't purchases (intensity)
- Finding: firms with greater exposure to government purchases experience greater stock price volatility when policy uncertainty is high
- Finding: Firms in the defense, health care, and financial sectors are especially responsive to their own category-specific EPU measures

Policy Uncertainty and Economic Activity

TABLE II

OPTION-IMPLIED STOCK PRICE VOLATILITY AND POLICY UNCERTAINTY

Dep var: log(30-day implied vol)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(EPU)	0.432***		−0.044***		−0.752***		
	(0.010)		(0.013)		(0.027)		
Log(EPU) × intensity		0.215**		0.228**		0.545***	0.082
		(0.069)		(0.100)		(0.202)	(0.117)
Log(VIX)			0.734***				
			(0.016)				
Log(VIX) × intensity				−0.020			
				(0.117)			
Log(EU)					1.080***		
					(0.027)		
Log(EU) × intensity						−0.301**	
						(0.177)	
$\frac{\text{Federal purchases}}{\text{GDP}}$	−19.30***		−7.75***		−17.40***		
	(1.50)		(1.49)		(1.49)		
$\frac{\text{Federal purchases}}{\text{GDP}}$ × intensity		−29.45*		−29.70**		−29.93*	−31.08
		(12.72)		(12.36)		(12.66)	(13.24)
National security EPU × defense							0.048***
							(0.012)
Health care EPU × health							0.071*
							(0.043)
Financial regulation EPU × finance							0.144***
							(0.030)
Firm and time effects	No	Yes	No	Yes	No	Yes	Yes

Notes. The sample contains 136,578 observations on 5,460 firms from 1996 to 2012. The dependent variable is the natural log of the 30-day implied volatility for the firm, averaged over all days in the quarter. Intensity is the firm's exposure to federal purchases of goods and services computed by the two-step method described in Section IV. $\frac{\text{Federal purchases}}{\text{GDP}}$ is from NIPA tables. Log(EU) is the log of the newspaper-based economic uncertainty index. National security EPU × defense is the national security EPU index from Table I multiplied by 1 for firms in defense industries (SICs 348, 372, 376, 379, 381, 871) and 0 otherwise, and analogously for health care EPU × health (SICs 800 to 809) and financial regulation EPU × finance (SICs 600–699). All regressions weighted by the firm's average sales in the sample period. Standard errors based on clustering at the firm level. ***p <0.01, **p <0.05, *p <0.1

Figure: Option-Implied Stock Price Volatility and Policy Uncertainty

Policy Uncertainty and Economic Activity

Investment Rates and Employment Growth

- Investigate contemporaneous relationship between policy uncertainty and firm-level investment rates and employment growth
- Use firm's policy exposure intensity and a full set of time and firm effects
- Finding: Increases in policy uncertainty are associated with contemporaneous drops in investment rates and employment growth rates for firms in policy-sensitive sectors
- Finding: Near-term association with their output growth rates is more muted

Investment Rates and Employment Growth

Dependent variable	(1) I/K	(2) I/K	(3) I/K	(4) I/K	(5) ΔEmp	(6) ΔEmp	(7) ΔEmp	(8) ΔEmp	(9) ΔRev
Δ Log(EPU) × intensity	−0.032***	−0.032***	−0.024**	−0.029***	−0.213**	−0.227**	−0.220**	−0.220**	−0.128
	(0.010)	(0.010)	(0.011)	(0.010)	(0.084)	(0.089)	(0.118)	(0.094)	(0.096)
$\Delta\frac{\text{Federal purchases}}{\text{GDP}}$ × intensity	8.20***	8.04***	12.12***	8.85***	10.79	15.60***	3.19	10.99	20.39**
	(2.86)	(2.86)	(3.18)	(2.87)	(7.41)	(8.04)	(12.56)	(7.88)	(9.43)
$\Delta\frac{\text{Forecasted Federal purchases}}{\text{GDP}}$ × intensity		1.01				−4.65***			
		(0.828)				(2.89)			
Δ Log(defense EPU) × defense firm				0.002				0.018	
				(0.004)				(0.017)	
Δ Log(health care EPU) × health firm				−0.012***				−0.005	
				(0.002)				(0.025)	
Δ Log(fin. reg. EPU) × finance firm				−0.002***				0.003	
				(0.001)				(0.005)	
Periodicity	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly	Yearly
3 yrs Fed purchase leads	No	No	Yes	No	No	No	Yes	No	No
Observations	708,398	708,398	411,205	708,398	162,006	162,006	107,205	162,006	151,473
Number of firms	21,636	21,636	13,563	21,636	17,151	17,151	11,505	17,151	15,749

Notes. The sample period runs from 1985 to 2012. All columns include a full set of firm and time effects. I/K is the investment rate defined as $\frac{\text{CapEx}_t}{(\text{Net Plant, Property and Equipment})_{t-1}}$. ΔEmp is the employment growth rate measured as $\frac{\text{emp}_t - \text{emp}_{t-1}}{0.5\times\text{emp}_t + 0.5\times\text{emp}_{t-1}}$, and ΔRev is the corresponding revenue growth rate. $\Delta\frac{\text{Federal purchases}}{\text{GDP}}$ × intensity is the change in $\frac{\text{Federal purchases}}{\text{GDP}}$ from NIPA tables in the next quarter in quarterly specifications and in the next year in annual specifications, multiplied by the firm-level policy exposure intensity variable. $\Delta\frac{\text{Forecasted federal purchases}}{\text{GDP}}$ × intensity instead uses the mean forecasted change in $(\frac{\text{federal purchases}}{\text{GDP}})$ from the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters, drawing on NIPA data for the current values and forecast data for the future values. See the notes to Table II for additional variable definitions. Standard errors based on clustering at the firm level. ***p <0.01, **p<0.05, *p<0.1

Figure: Policy Uncertainty and Firm-Level Investment, Employment, and Sales

Policy Uncertainty and Economic Activity

Policy Uncertainty and Aggregate Economic Activity

- Fit vector autoregressive (VAR) models to U.S. data and to an international panel VAR for 12 countries
- Finding: The U.S. VAR results indicate that a policy uncertainty innovation equivalent to the actual EPU increase from 2005–2006 to 2011–2012 foreshadows declines of 6 percent in gross investment, 1.1 percent in industrial production, and 0.35 percent in employment
- Finding: 12-country panel VAR yields similar results
- Finding: Not necessarily causal because uncertainty can respond to current and anticipated future economic conditions

Conclusion

- Show how to tap newspaper archives to develop and evaluate new measures of interest
- Findings suggest that elevated policy uncertainty in the US and Europe have harmed macroeconomic performance
- Findings suggest that firms with greater exposure to government purchases experience greater stock price volatility when policy uncertainty is high and reduced investment rates and employment growth