Stanford Big-Data Initiative in International Macro-Finance

Text-Based Methods

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Measuring Uncertainty with Text

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Practical motivation view that uncertainty matters
But for some people the best evidence that uncertainty is important that....
Paul Krugman thinks it is not important

Phony Fear Factor

We live in a golden age of economic debunkery: fallacious doctrines have been dropping like flies. No, monetary expansion needn’t cause hyperinflation. No, budget deficits in a depressed economy don’t cause soaring interest rates. No, slashing spending doesn’t create jobs. No, economic growth doesn’t collapse when debt exceeds 90 percent of G.D.P.

And now the latest myth bites the dust: No, “economic policy uncertainty” — created, it goes without saying, by That Man in the White House — isn’t holding back the recovery.

I’ll get to the doctrine and its refutation in a minute. First, however, I want to recommend a very old essay that explains a great deal about the times we live in.

The Polish economist Michal Kalecki published “Political Aspects of Full
Measuring Uncertainty

- Stock Market Volatility
- Newspapers
- Surveys
VIX (1 month ahead implied S&500 volatility) – the classic stock market uncertainty measure

Stockmarket volatility to measure uncertainty:
Pros: Daily (available real-time) back to 1990
Cons: Mainly recessions and financials crisis, few LDCs
Measuring Uncertainty

- Stock Market Volatility
- Newspapers
- Surveys
Part of a group working on using Newspapers (and other text) as another measure of uncertainty
This proxy for Economic Policy Uncertainty (EPU) comes from computer searches of newspapers

- US index: 10 major papers get monthly counts of articles with:
  - E {economic or economy}, and
  - P {regulation or deficit or federal reserve or congress or legislation or white house}, and
  - U {uncertain or uncertainty}

- Divide the count for each month by the count of all articles

- Normalize and sum 10 papers to get the U.S monthly index
Constructing the US News-Based EPU Index

Newspapers:
• Boston Globe
• Chicago Tribune
• Dallas Morning News
• Los Angeles Times
• Miami Herald

• New York Times
• SF Chronicle
• USA Today
• Wall Street Journal
• Washington Post

Note: We use Access World News Newsbank Service when constructing a daily EPU Index, because the daily index requires a higher density of news (3,000+ papers).
US News-based economic policy uncertainty index

Downloaded from https:// fred.stlouisfed.org/series/USEPUINDEXD#0
Validation: Running Detailed Human Audits

10 undergraduates read ≈ 10,000 newspaper articles to date using a 63-page audit guide to code articles if they discuss “economic uncertainty” and “economic policy uncertainty”
Find humans and computers give similar results in large samples (in fact both make mistakes)
Flexible: Can focus on narrower areas of uncertainty, e.g. Health

Notes: Weekly values for Economic Policy Uncertainty (EPU) index categories from www.policyuncertainty.com. See Baker, Bloom and Davis (2016) for details of EPU index construction. We plot data from 1 January 2015 to 30 July, with categories showing large rises in 2020 or 2019 plotted. Note that the average of the four plotted categories from 1985-2019 is as follows: Fiscal Policy=45.7, Health=17.7, Monetary Policy=27.1, and Trade Policy=5.7. This highlights how the rise in health policy in 2020 and trade policy in 2019 are particularly striking given their otherwise relatively low level.
Can also use time series of newspaper to create a Historical EPU

Notes: 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 1, 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.
UK Policy Uncertainty Index

Source: www.policyuncertainty.com, Data from 10 newspapers (the FT, Telegraph, Daily Mail, Daily Express, Times, Guardian, Mirror, Northern Echo, Standard, and Sun).
India Economic Policy Uncertainty Index (free press)

Source: [www.policyuncertainty.com](http://www.policyuncertainty.com). Data from 7 Indian newspapers (Economic Times, Times of India, Hindustan Times, Hindu, Statesman, Indian Express, and Financial Express).
North Korean Economic Policy Uncertainty Index

Source: [www.policyuncertainty.com](http://www.policyuncertainty.com), Data from 0 North Korean newspapers
EPU index used by Central Banks, Government Agencies and firms (e.g. on Bloomberg, FRED etc)
Newspapers:

Pros:

Cons:
Second approach - generated a Twitter text uncertainty measures

Third Approach – working with the IMF to generate a “world uncertainty index” covering 143 countries from Economist Intelligence Unit text

The World Uncertainty Index

Hithe Ahir, Nicholas Bloom, and Davide Furceri

May 30, 2019

(Preliminary)

We construct a new index of uncertainty—the World Uncertainty Index (WUI)—for 143 individual countries on a quarterly basis from 1996 onwards, and for 34 large advanced and emerging market economies from 1955. This is defined using the frequency of the word “uncertainty” in the quarterly Economist Intelligence Unit country reports.

Globally, the index spikes near the 9/11 attack, the SARS outbreak, the Gulf War II, the failure of Lehman Brothers, the Euro debt crisis, El Niño, the European border crisis, the Brexit vote, the 2016 US election and the recent US-China trade tensions. Uncertainty spikes tend to be more synchronized within advanced economies and between economies with tighter trade and financial linkages. The level of uncertainty is significantly higher in developing countries and is positively associated with economic policy uncertainty and stock market volatility, and negatively with GDP growth. In addition, there is an inverted U-shaped relationship between uncertainty and democracy.

In a panel vector autoregressive setting, we find that innovations in the WUI foreshadow significant declines in output. This effect varies across countries and across sectors within the same country: across countries, the effect is larger and more persistent in those with lower institutional quality; across sectors, the effect is stronger in those more financially constrained.

JEL No. D80, E22, E56, G18, I50.

Keywords: uncertainty; political uncertainty; economic uncertainty; volatility.

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Uses Economist Intelligence Unit quarterly reports

EUI quarterly reports standard format, mean (and median) of 29 pages.
Global average of all 143 countries – rising recently

Source: https://worlduncertaintyindex.com/
Some example countries – including LDCs

Uncertainty in Democratic Republic of Congo, Gabon, Ireland, and South Africa (World Uncertainty Index, 1996Q1 to 2020Q2)
Can Also Examine the Share of Uncertainty Globally that comes from the United States
Can Also Examine the Share of Uncertainty Globally that comes from the United Kingdom

Ratio of uncertainty related to the UK to overall uncertainty (excluding the UK), GDP weighted average

Brexit deadline and parliamentary votes
EU rejects Brexit Chequers plan
Brexit vote
Can also look at uncertainty in different types of countries – here we see developing countries have higher overall uncertainty

**Figure 3. Average WUI by income group**

Note: The World Uncertainty Index (WUI) is computed by counting the frequency of uncertain (or the variant) in EIU country reports. The WUI is then normalized by total number of words and rescaled by multiplying by 1,000. A higher number means higher uncertainty and vice versa. For the list of countries in each income group, see Table 1.
Recently examined how words matter – for example, for uncertainty

*WUI counts the word uncertainty

**Neutral synonyms count the following keywords: ambiguous ambivalent dubious erratic hazy hesitant unclear undecided undetermined unpredictable unreliable unsettled unsure vague questionable insecure

***Negative synonyms count the following keywords: risk risks risky precarious unresolved
Measuring Uncertainty

- Stock Market Volatility
- Newspapers
- Surveys
Running Monthly SBU survey with the Atlanta Fed and Chicago

### Survey of Business Uncertainty

Looking ahead, from now to four quarters from now, what approximate percentage sales revenue growth rate would you assign to each of the following scenarios?

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The LOWEST percentage sales revenue growth rate would be about:</td>
<td>-2 %</td>
</tr>
<tr>
<td>A LOW percentage sales revenue growth rate would be about:</td>
<td>-1 %</td>
</tr>
<tr>
<td>A MIDDLE percentage sales revenue growth rate would be about:</td>
<td>0 %</td>
</tr>
<tr>
<td>A HIGH percentage sales revenue growth rate would be about:</td>
<td>1 %</td>
</tr>
<tr>
<td>The HIGHEST percentage sales revenue growth rate would be about:</td>
<td>2 %</td>
</tr>
</tbody>
</table>

Please assign a percentage likelihood to the sales revenue growth rates you entered. (Values should sum to 100%)

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOWEST: The likelihood of realizing a -2% sales revenue growth rate would be:</td>
<td>15 %</td>
</tr>
<tr>
<td>LOW: The likelihood of realizing a -1% sales revenue growth rate would be:</td>
<td>25 %</td>
</tr>
<tr>
<td>MIDDLE: The likelihood of realizing a 0% sales revenue growth rate would be:</td>
<td>30 %</td>
</tr>
<tr>
<td>HIGH: The likelihood of realizing a 1% sales revenue growth rate would be:</td>
<td>25 %</td>
</tr>
<tr>
<td>HIGHEST: The likelihood of realizing a 2% sales revenue growth rate would be:</td>
<td>5 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>
The SBU is Spread Across the US Geographically
The SBU is Spread Across the US by Firm Size and Industry

By Number of Employees:
- 1-4 employees: 488
- 5-9 employees: 352
- 10-19 employees: 281
- 20-49 employees: 216
- 50-99 employees: 144
- 100-249 employees: 34
- 250-499 employees: 144
- 500-999 employees: 34
- 1000 or more employees: 34

By Sector:
- Construction: 342
- Durable goods manufacturing: 242
- Educational services: 128
- Finance and insurance: 128
- Health care and social assistance: 128
- Information: 77
- Leisure and hospitality: 77
- Mining and utilities: 55
- Nondurable goods manufacturing: 55
- Other services except government: 55
- Other services excluding government: 55
- Professional and business services: 55
- Real estate and rental and leasing: 55
- Retail and wholesale trade: 55
- Transportation and warehousing: 55

Number of panel members
US Firm subjective sales uncertainty doubled due to COVID

Source: Survey of Business Uncertainty conducted by the Federal Reserve Bank of Atlanta, Stanford University, and the University of Chicago Booth School of Business. For more information, see “Surveying Business Uncertainty” by David Altig, Jose Maria Barrero, Nick Bloom, Steven J. Davis, Brent Meyer and Nick Parker, NBER Working Paper No. 25956, February 2020.
The pandemic generated extensive downside tail-risk for firms

Notes: Data through August 2021. This is a plot of the subjective distribution for the representative firm’s future sales growth. To calculate this distribution we gather up all the weighted individual mass points (estimates) in a given month. Every mass point is weighted by the corresponding firm’s activity weight and the probability they attach to that mass point.
Data online at the SBU website (and DMP for similar UK data)
Summary on measuring uncertainty

A) Uncertainty appears a major issue, much of this from politics

B) But measuring uncertainty is tricky

C) Text-based approaches very promising:
   1. Fast to produce (real-time)
   2. Long time series (e.g. US news back to 1900)
   3. Flexible – can drill down on topics

D) Can also use surveys – but expensive and slow to get going