Measuring Geopolitical Risk

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Geopolitical Risks Receive a Lot of Attention

Geopolitical risks are often cited by policy-makers, investors, and media as key determinants of economic decisions.

- 75% of investors worry about geopolitical risk (Gallup Survey 2017).
- Geopolitical risk salient risk to outlook for BoE, ECB, IMF, WB.

Higher geopolitical risks can:

1. Heighten perception of disastrous outcomes (destruction of human and physical capital, disruption of supply chains, expropriation risk)
2. Make investment in risky projects less attractive.
3. Lower consumer confidence
But Should They?

To many, concerns about adverse geopolitical events seem overstated as many events should have little direct economic impact for the United States (e.g. 9/11; Russia-Ukraine tensions; US-North Korea tensions).

Do geopolitical risks have economic consequences for the United States?

Answering this question requires definition & measurement of geopolitical risk, and empirical analysis.
What We Do: Definition and Measurement

1. Construct an indicator of geopolitical risk—GPR Index—measuring frequency of articles in leading newspapers discussing rising geopolitical tensions.
   - Focus on risks associated with wars, terrorism, tensions between states;

2. Separate threats of adverse geopolitical events from their realization.

GPR highly correlated with firms’ own assessment of geopolitical risks.

GPR index available at daily & monthly frequencies.

GPR index better than many existing indicators that are not amenable to empirical analysis.
What We Do: Empirical Evidence on GPR

- **Aggregate analysis:**
  
  GPR exogenous to U.S. macroeconomic conditions.

  Higher GPR reduces investment, employment, and stock returns.

  Effects mostly driven by threat of adverse geopolitical events rather than their realization.

- **Firm-level analysis:**

  Reduction in firm-level investment stronger for firms highly exposed to aggregate GPR.

  Idiosyncratic GPR reduces firm-level investment.
Plan of the Talk

1. Introduction

2. Construction of the GPR Index:
   ▶ Definition.
   ▶ Measurement.
   ▶ Audit.

3. Aggregate analysis:
   ▶ Exogeneity
   ▶ Predictive regressions on US investment.
   ▶ VAR models.


5. Conclusions.
**Definition: Geopolitics and Geopolitical Risk**

- We define Geopolitical Risk as the “risk associated with wars, terrorist acts, and tensions between states that affect the normal and peaceful course of international relations.”

- Geopolitical risk captures both risk that these events materialize and new risks associated with escalation of existing events.
Measurement: Newspaper Searches

- The geopolitical risk (GPR) index is the **frequency** of articles in 11 newspapers mentioning high or rising geopolitical tensions.

  \[ GPR \propto \frac{\mathcal{G}}{\mathcal{U}} \]

  where \( \mathcal{G} \): articles mentioning geopolitical tensions;
  \( \mathcal{U} \): total number of articles

- **Benchmark index (from 1985):** Boston Globe; Chicago Tribune; Los Angeles Times; NYT; WSJ; WaPo; Daily Telegraph; FT; Guardian; Times; The Globe and Mail.

- **Historical index (from 1899):** NYT, Chicago Tribune, and WaPo

- Risks as covered/perceived by the English-speaking press.
Measurement: Selecting Terms in set $G$

- Start with a pilot audit of articles likely mentioning geopolitical risks, by reading and coding $\mathcal{E}^0$ or $\mathcal{E}^1$ a set of articles $\mathcal{E}$ containing Geopolitics or War or Military or Terrorism —the most recurring words in geopolitics books.

- Most articles in $\mathcal{E}^1$ contain additional words related to risks or threats, tensions between states, beginning of wars.

- Based on the content in $\mathcal{E}^1$, we construct the terms in set $G$.

**Notes:**

- We exclude from searches phrases overwhelmingly associated with false positives ($\mathcal{E}^0$) (e.g. movies, anniversaries, obituaries, end of the war)

- We try to account for the evolution of language and content over time.
## Measurement: The Search Terms

<table>
<thead>
<tr>
<th>Search Category</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Geopolitical Threats</td>
<td>Geopolitical AND (risk* OR concern* OR tension* OR uncertaint*)</td>
</tr>
<tr>
<td></td>
<td>&quot;United States&quot; AND tensions AND (military OR war OR geopolitical OR coup OR guerrilla OR warfare) AND (&quot;Latin America&quot; OR &quot;Central America&quot; OR &quot;South America&quot; OR Europe OR Africa OR &quot;Middle East&quot; OR &quot;Far East&quot; OR Asia)</td>
</tr>
<tr>
<td>2. Nuclear Threats</td>
<td>(&quot;nuclear war&quot; OR &quot;atomic war&quot; OR &quot;nuclear conflict&quot; OR &quot;atomic conflict&quot; OR &quot;nuclear missile&quot;) AND (fear* OR threat* OR risk* OR peril* OR menace*)</td>
</tr>
<tr>
<td>3. War Threats</td>
<td>&quot;war risk&quot; OR &quot;risk of war&quot; OR &quot;fear of war&quot; OR &quot;war fear&quot; OR &quot;military threat&quot; OR &quot;war threat&quot; OR &quot;threat of war&quot;</td>
</tr>
<tr>
<td></td>
<td>(&quot;military action&quot; OR &quot;military operation&quot; OR &quot;military force&quot;) AND (risk* OR threat*)</td>
</tr>
<tr>
<td>4. Terrorist Threats</td>
<td>&quot;terrorist threat&quot; OR &quot;terrorist threats&quot; OR &quot;menace of terrorism&quot; OR &quot;terrorism menace&quot; OR &quot;threat of terrorism&quot; OR &quot;terrorist risk&quot; OR &quot;terror risk&quot; OR &quot;risk of terrorism&quot; OR &quot;terror threat&quot; OR &quot;terror threats&quot;</td>
</tr>
<tr>
<td>5. War Acts</td>
<td>(beginning OR outbreak OR onset OR escalation OR start) &quot;of the war&quot;</td>
</tr>
<tr>
<td></td>
<td>(war OR military) AND (&quot;air strike&quot; OR &quot;heavy casualties&quot;)</td>
</tr>
<tr>
<td>6. Terrorist Acts</td>
<td>&quot;terrorist act&quot; OR &quot;terrorist acts&quot;</td>
</tr>
</tbody>
</table>
The Benchmark Geopolitical Risk Index

GPR Benchmark Index (GPR)

GPR Index updated monthly and available at https://www2.bc.edu/matteo-iacoviello/gpr.htm
Audit: Reading and Manually Coding Articles

- **Full Scale Audit:** Sample 6,125 articles from $\mathcal{E}$, code them as 0/1.
- **Goal:** comparison of GPR index with “human GPR”:
  \[
  GPR = \frac{\mathcal{G}}{\mathcal{U}}
  \]
  \[
  \text{human}_\text{GPR} = \frac{\mathcal{E}^1 \mathcal{E}}{\mathcal{E} \mathcal{U}}
  \]
- **Correlation between GPR and “Human GPR”:** 84%.

- **Ex post Audit:** Sample 2,500 articles from set $\mathcal{G}$:
  - 87% mention high or rising geopolitical tensions.
  - 4% mention low or decreasing geopolitical tensions.
  - Correlation between GPR and audited-GPR is 0.98
GPR Index shows little correlation with EPU Index, except around 9/11 and the Iraq War.
GPR Index displays more high-frequency variation relative to other proxies of war risk, allowing to establish the importance of GPR for stock returns over relatively short samples.
GPR Index highly correlated with firms’ own assessment of geopolitical risk, constructed using same search terms in transcripts of listed firms’ quarterly earnings calls with analysts.
The Historical Geopolitical Risk Index

Decomposition by topic
Geopolitical Threats vs. Geopolitical Acts

- GPR index captures a convolution of shocks to first and higher order moments of the distribution of geopolitical events.
  - Spikes in risk often coincide with realization of big events.

- We break the index down into:
  - Geopolitical Threats (GPT): Search categories 1 to 4;

- Main idea: Many spikes in GPT and GPA associated with realization of geopolitical acts...

- ... Yet, some movements in GPT may happen when no underlying act materializes.
Geopolitical Threats vs Acts in 1991 and 2003

Gulf War

- GPR Threats
- GPR Acts

1990 1991

Iraq Invasion

- GPR Threats
- GPR Acts

2002 2003

Full sample
Geopolitical Risk and Economic Activity

- GPR is Exogenous.
- GPR predicts economic activity (forecasting regressions and VAR).
- Threats matter more than acts (VAR).
- Effects of GPR stronger in industries more exposed to GPR.
Granger Tests: Specification

- **Granger-causality** tests based on:

\[ LGPR_t = \alpha + \sum_{i=1}^{p} \beta_i LGPR_{t-i} + \sum_{i=1}^{p} \Gamma'_{M,i} M_{t-i} + \sum_{i=1}^{p} \Gamma'_{F,i} F_{t-i} + \sum_{i=1}^{p} \Gamma'_{U,i} U_{t-i} + \varepsilon_{t}^{GPR} \]

- A test that \( x_t \) does not Granger-cause \( LGPR_t \) is an F-test of \( H_0 : \Gamma_{x,i} = 0, \forall i \).

- **Macro variables** \( (M_t) \): \( \Delta IP \), \( \Delta employment \), real oil price.

- **Financial variables** \( (F_t) \): Return on S&P500, 2-year Treasury yield.

- **Uncertainty variables** \( (U_t) \): LEPU, LVXO.

- **Sample**: 1985M1-2017M12; \( p = 3 \).
## Granger Tests: Results

### Table 1: Exogeneity of Geopolitical Risk

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>LGPR</td>
<td>LGPRA</td>
<td>LGPRT</td>
</tr>
<tr>
<td>Macro</td>
<td>1.18</td>
<td>0.94</td>
<td>1.38</td>
</tr>
<tr>
<td></td>
<td>[0.31]</td>
<td>[0.49]</td>
<td>[0.20]</td>
</tr>
<tr>
<td>Financial</td>
<td>1.33</td>
<td>0.82</td>
<td>1.26</td>
</tr>
<tr>
<td></td>
<td>[0.24]</td>
<td>[0.55]</td>
<td>[0.28]</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>1.08</td>
<td>0.72</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>[0.38]</td>
<td>[0.63]</td>
<td>[0.19]</td>
</tr>
<tr>
<td>LGPR</td>
<td>139.67***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.00]</td>
<td></td>
<td></td>
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<tr>
<td>LGPRA</td>
<td></td>
<td>27.67***</td>
<td>1.22</td>
</tr>
<tr>
<td></td>
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<td>[0.00]</td>
<td>[0.30]</td>
</tr>
<tr>
<td>LGPRT</td>
<td></td>
<td>3.21**</td>
<td>121.46***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[0.02]</td>
<td>[0.00]</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.66</td>
<td>0.39</td>
<td>0.67</td>
</tr>
</tbody>
</table>

- Macro, financial and uncertainty variables do not predict GPR.
Forecasting Regressions: Specification

- Do shocks to GPR predict future changes in investment?

- Estimate univariate forecasting specification:

\[
\Delta BFI_{t+h} = \alpha + \beta_h^{GPR} \varepsilon_t^{GPR} + \sum_{i=1}^{p} \Gamma_{t-i} X_{t-i} + \nu_{t+h}
\]

\(\Delta BFI_{t+h}\): Change in log quarterly business fixed investment between \(t - 1\) and \(t + h\).

\(X_t = EPU_t, \Delta BFI_t, \Delta EMP_t; p = 2\).

\(\varepsilon_t^{GPR}\) is the residual from exogeneity regression under \(\Gamma_{M,i} = \Gamma_{F,i} = \Gamma_{U,i} = 0 \forall i\).
### Table 2: Geopolitical Risk and Business Fixed Investment

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<tbody>
<tr>
<td><strong>Business Fixed Investment</strong> ($\Delta BFI_{t+h}$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$h=1$</td>
<td>-0.97***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[2.84]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$h=2$</td>
<td>-1.27***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>[2.86]</td>
<td></td>
<td></td>
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<tr>
<td>$h=4$</td>
<td>-1.81***</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>[2.89]</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>GPR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPRA</td>
<td>-0.48</td>
<td>-0.46</td>
<td>-0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[1.34]</td>
<td>[0.72]</td>
<td>[0.02]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPRT</td>
<td>-0.79**</td>
<td>-0.99**</td>
<td>-1.64**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[2.28]</td>
<td>[2.27]</td>
<td>[2.49]</td>
<td></td>
<td></td>
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<tr>
<td>Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>$N$</td>
<td>128</td>
<td>128</td>
<td>127</td>
<td>127</td>
<td>125</td>
<td>125</td>
</tr>
</tbody>
</table>

Coefficients in the table report the impact of a 2-SD rise in $\varepsilon_{GPR}^t$. 
Quarterly VARs: Specification and Identification

- To get a broader perspective on the transmission of changes in GPR, we estimate quarterly VAR models.

- **GPR Specification**: LGPR, LEPU, BFI, EMP, S&P500, T02YR.

- **Acts vs. Threats**: Replace LGPR with LGPRA & LGPRT

- Identification (I): Cholesky with GPR indexes ordered before economic variables ⇒ **Contemporaneous exogeneity**.

- Identification (II): LGPRA ordered 1st and LGPRT 2nd in Cholesky
  - **GPRA shocks** can be a convolution of shocks to first and higher moments of geopolitical events distribution.
  - **GPRT shocks** capture primarily shocks to uncertainty and risk.

- **Sample**: 1985Q1-2017Q4
Quarterly VAR: 2-SD GPR Shock
Quarterly VAR: 2-SD GPRA Shock

A. GPR Acts & Threats

B. EPU

C. S&P 500

D. Consumer Sentiment

E. Business Fixed Investment

F. Employment

G. Two-Year Yield

H. Oil Price
Quarterly VAR: 2-SD GPRT Shock

A. GPR Acts & Threats

B. EPU

C. S&P 500

D. Consumer Sentiment

E. Business Fixed Investment

F. Employment

G. Two-Year Yield

H. Oil Price
Firm-Level Effects on Investment

Two questions:

- Do firms in industries more exposed to aggregate geopolitical risks experience a larger decline in investment?
- Are there idiosyncratic geopolitical risk events that drive variation in investment at the firm level?

Conceptual framework:

\[ GPR_{i,t} = GPR_t + GPR_t \Lambda_{k,t} + Z_{i,t}. \]

- \( \Lambda_{k,t} \) is industry-exposure to aggregate GPR
- \( Z_{i,t} \) is pure idiosyncratic risk.

We want to measure the cross-industry and within-industry effects of \( GPR_t \Lambda_{k,t} \) and \( Z_{i,t} \) on firm investment.
Industry Effects of Geopolitical Risk

Construction of Industry Exposure

- Construct stock-market based measure of industry exposure to geopolitical risk using daily regressions:

\[ R_{k,s} = \alpha_k + \beta_k \Delta GPRT_s + \gamma_k RM_s + \varepsilon_{k,s}, \]

- 10-year window rolled one quarter at time.

- Use Fama-French 48 industry groups.

- \( \Lambda_{k,t} \): Minus beta lagged by one quarter.
  
  ▶ Most exposed (negative beta): Entertain, Transportation, Textiles.
  
  ▶ Least exposed (positive beta): Gold, Oil, Defense.
Industry Effects of Geopolitical Risk

Industry Regressions

- Let $ik$ denote firm CapEx divided by property, plant and equipment. We estimate, for $h = 0, \ldots, 6$:

$$
\log ik_{i,t+h} - \log ik_{i,t-1} = \alpha_i + \alpha_t + \beta_h (GPR_t \Lambda_{k,t}) + X_{i,t} + \epsilon_{i,t}
$$

$\beta_h$: differential response of $\log ik$ in $t + h$ to GPR in quarter $t$

- $\alpha_i$ and $\alpha_t$: firm and time fixed effects

- $X_{i,t}$: firm cash flows and Tobin’s Q.

- Drop financial firms and utilities, HQ outside US, small firms (PPENTQ less than $5$ million).
Experiment: 2sd aggregate GPR shock hitting a firm in an industry with 1sd exposure above average.

In the four quarters after the shock, firm experiences a differential decline in investment about 2 p.p. larger than the average decline.
Industry Effects of Geopolitical Risk

- From VAR: A 2sd GPR shock reduces aggregate investment by 1.8%.

- From firm-level regressions calculate differential effects across industries:
  - Entertainment industry: 3.8% decline in investment (-1.8% -2%)
  - Defense industry: 0.2% increase in investment (-1.8% +2%)

- Effects of GPR can be twice as large as the VAR for industries 1sd more exposed, and close to zero for industries 1sd less exposed.
What Drives Industry Exposure $\Lambda_{k,t}$?

1. Macro Exposure. Firms in cyclical sectors may be more vulnerable if geopolitical risks weigh on aggregate demand. (Cyclicality = industry sensitivity of investment to aggregate demand)

2. Openness. Geopolitical risks may lead to embargoes, expropriation, trade wars, reducing demand for foreign-oriented firms.

3. Leverage. If geopolitical risks increase disaster probability, levered industries could be more impacted (Gourio, 2013).

Regressing Industry Exposure on these three variables gives:

$$\Lambda_{k,t} = 0.203 \, \text{MacroExp}_k + 0.177 \, \text{Openness}_{k,t-4} + 0.234 \, \text{Leverage}_{k,t-4}$$

(0.096)

(0.091)

(0.074)
Two steps:

1. Search the earnings call transcripts for geopolitical (GP) terms
   - E.g., war*, militar*, terror*, conflict*
   - Frequency of GP matches indicates the intensity of trade policy discussions in a conference call

2. Search for risk (R) terms in close proximity to GP terms
   - E.g., risk*, threat*, tension*, uncertain*
   - Must appear within 10 words

\[ GPR_i = \text{Number of joint instances of GP and R (normalized by number of words in the call)} \]
Firms’ Earnings Calls

Terrorist Attacks in 2005 (2005Q3):
- Terrorism including the London bombings have impacted our consumer travel businesses. Whether it is declining consumer confidence or an actual slowdown in the travel economy, it is too soon to tell. But the impact is slower growth across our segments of the markets. Cendant Corporation

Russia - Ukraine tensions (2014 Q3):
- As a global company, we continuously monitor the changing geopolitical environments in areas in which Capstone is doing or plans to do business. The largest potential impact is definitely Russia and the ongoing tensions in the Ukraine. Capstone Turbine Corp

North Korea - US tensions (2017 Q2):
- And there’s still tremendous geopolitical uncertainty around the world that we’re keeping our eye on and want to make sure I think before we would take another step that we’re comfortable about sustainability of the order rates versus what we saw in the first quarter. Caterpillar
Quantifying the Effects of Firm-Level GPR on Investment

- We estimate, for $h = 0, ..., 6$:
  \[
  \log ik_{i,t+h} - \log ik_{i,t-1} = \alpha_i + \alpha_{k,t} + \gamma_h Z_{i,t} + X_{i,t} + \varepsilon_{i,t}
  \]

- $\alpha_i$ and $\alpha_{k,t}$: firm and industry-time fixed effects
- $\gamma_h$: response of $\log ik$ in $t + h$ to change in TPU in quarter $t$
- $X_{i,t}$ are firm-level controls: cash flows and Tobin’s Q.
Firm-Level Response to Idiosyncratic GPR

Percent response vs. Quarters
Conclusions

- We construct a quantitative measure of geopolitical risk.

- Geopolitical risk is largely exogenous to the US economy.

- Geopolitical risk has adverse negative effects on real activity in the United States, including investment.
  - The effect on investment varies across firms and industries.

- Adverse effects of geopolitical risk are mostly driven by the threat of adverse geopolitical events.

- On our GPR webpage—together with all data for the US—you can also find a beta version of the GPR index for many other countries.
Available Indices 1: Doomsday Clock
Available Indices 2: Geopolitical Heat Maps
Frequent Unigrams in Flint’s Geopolitics Textbook
The Historical Geopolitical Risk Index: Components

Words in the Historical Index

- Geopolitical Threats
- Nuclear Threats
- War Threats
- War Acts
- Terrorist Threats
- Terrorist Acts

Historical Index (2000-2009=100)
GPR and VIX

GPR vs VIX

- Black Monday
- Kuwait Invasion
- Asian Financial Crisis
- LTCM
- 9/11
- Iraq invasion
- Lehman
- Euro crisis
- Stimulus Debate
- Lehman Failure and TARP
- Euro Crisis
- Debt Ceiling Debate
- Fiscal Cliff
- Govt. Shutdown
- Back
GPR and Sports Event Index

Sorry, I could not refrain from throwing in some coverage of the World Cup at some point...

GPR index uncorrelated with other newsworthy predictable (World Cup, Olympics, SuperBowl) and unpredictable events.
GPR and Newspaper Slant

GPR Index does not reflect newspaper political slant.
Geopolitical Threats vs Geopolitical Acts

Correlation coefficient: 0.60
Monthly VAR: Shocks and Persistence

A. GPR

- GPR Shock

B. GPR Acts

- GPR Acts Shock
- GPR Threats Shock

C. GPR Threats

- GPR Threats Shock
Monthly VAR: Macro and Financial Effects

A. Employment
Percent

B. Industrial Production
Percent

C. Trade
Percent

D. EPU
Percent

E. S&P 500
Percent

F. Oil Price
Percent
Monthly VAR Robustness: VXO

- **A. GPR**
  - Percent
  - 0 6 12 18 24
  - 0 20 40 60 80

- **B. VXO**
  - Percent
  - 0 6 12 18 24
  - 0 20 40 60 80

- **C. Employment**
  - Percent
  - 0 6 12 18 24
  - 0 0.2 0.4

- **D. Industrial Production**
  - Percent
  - 0 6 12 18 24
  - -1.0 0.0 0.5

- **E. Trade**
  - Percent
  - 0 6 12 18 24
  - -3.0 -2.0 -1.0

- **F. S&P 500**
  - Percent
  - 0 6 12 18 24
  - -8.0 -4.0 0.0

- **G. Oil Price**
  - Percent
  - 0 6 12 18 24
  - -0.2 0.2 0.4

- **H. 2-Year Yield**
  - Percent
  - 0 6 12 18 24
  - 0.0 0.2 0.4
Monthly VAR Robustness: GPR Ordered Last

A. GPR Percent

B. EPU Percent

C. Employment Percent

D. Industrial Production Percent

E. Trade Percent

F. S&P 500 Percent

G. Oil Price Percent

H. 2-Year Yield Percent
Monthly VAR Robustness: Exclude 9/11

A. GPR
B. EPU
C. Employment
D. Industrial Production
E. Trade
F. S&P 500
G. Oil Price
H. 2-Year Yield
Average 1995-2017, standardized. Higher values indicate larger decline in industry daily stock returns after increase in daily GPR.
Joy for Germans, W
By ERIC PACE
New York Times (1923-C pg. 20

Academics Ask, What's N

For All, East and West, A Day Like No Other
By SERGE SCHMEMANNSpecial to The New York Times New York Times (1923-Current file); Nov 12, 1989 pg. 18

Family Says Of the West, ‘It’s a Dream’
By FERDINAND PROTZMAN
Special to The New York Times

Clamor in the East: How the Other Hal

Reunification in West Berlin

For All, East and West, A Day Like No Other
By SERGE SCHMEMANNSpecial to The New York Times
Annualized Historical GPR and Annualized Time-Varying Disaster Probability constructed by Wachter (2013) using the price-dividend ratio.