

Measuring Geopolitical Risk

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Geopolitical Risks Receive a Lot of Attention...

Geopolitical Risks (GPR) often cited by policy-makers, investors, and media as key determinants of economic decisions.

- 2017 Gallup Survey: 75 % of investors worried about GPR for business environment.
- GPR part of 'uncertainty trinity' that could have significant adverse economic effects. [Carney \(2016\)](#)
- GPR salient noneconomic risk to economic outlook.
[IMF \(2017\)](#), [ECB \(2017\)](#)

Newmont Mining Corp. (NEM) Cut to Hold:

Posted by James Conley on Aug 22nd, 2016 // No Comments

company's production may also be affected by lower grades across specific mines and geopolitical issues."

Remarks by Chairman Alan Greenspan Before the Economic Club of New York, New York City December 19, 2002

argued by some as having been spawned by the bubble, became more intense. This, in turn, dampened capital investment and trimmed inventory plans. More recently, of course, geopolitical risk has risen markedly, further weighing on demand. Though unrelated to the bubble burst of 2000, it has muddled the evaluation of the post-bubble economy.

Europe ends sharply down on geopolitics; oil prices slide

Alexandra Gibbs | Arjun Kharpal | Holly Ellyatt
Wednesday, 6 Jan 2016 | 11:54 AM ET



Carney's chart showing doubling of geopolitical risk in wake of 9/11

Chart 1: Geopolitical risk doubled, on average, after 9/11

...but their Consequences are Unclear

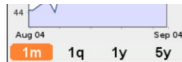
Little research devoted to quantify the macroeconomic and financial impact of geopolitical risks.

Why are the usual effects of geopolitical risk not occurring?

Monday, 11 August 2014

Written by [Patrick Artus](#)

We are currently in a period with high levels of geopolitical risk on a global scale, particularly in areas such as Syria, Libya, Iraq, Nigeria and Venezuela or from the tensions between Ukraine and Russia, China and Japan or Israel and Palestine. Increased risk usually brings several predictable consequences – consequences that have been notably



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Bloomberg



01:14 / 01:46

What Is Real Economic Impact of Geopolitical Risks?

What We Do

1. **Construct an indicator of GPR** measuring frequency of articles in leading newspapers discussing rising geopolitical tensions.
 - ▶ Focus on risks associated with wars, terrorist attacks;
 - ▶ GPR perceived by global investors and policy-makers.
2. **High GPR induces:**
 - ▶ adverse effects on US employment, IP, and trade;
 - ▶ drop in US stock market: heterogeneous response across industries;
 - ▶ decline in real activity and stock prices in advanced economies;
 - ▶ capital outflows from emerging economies to safe havens.
3. **Economic impact** of GPR mostly driven by **threat** of adverse geopolitical events rather than their realization.

Why We Do It

- Existing GPR indicators not amenable to empirical analysis:
 - ▶ No definition or broad definition of GPR;
 - ▶ Constructed judgmentally with unknown criteria;
 - ▶ Little variation or short sample availability; Examples
 - ▶ Constructed as combinations of outcome variables (gold, VIX, dollar, oil prices).
- Complement research on effects of wars and terrorist attacks.
Blomberg & al (2004); Tavares (2004); Glick & Taylor (2010)
- Relationship to proxies for macroeconomic uncertainty:
 - ▶ Exogeneity of GPR index;
Ludvigson & al (2015); Caldara & al (2016)
 - ▶ Control for effects of realization of events.

Plan of the Talk

- Introduction
- Construction of the GPR Index:
 - ▶ Definition
 - ▶ Measurement
 - ▶ Audit
- Effects of GPR on US economy
- International effects of GPR on:
 - ▶ real activity;
 - ▶ stock returns;
 - ▶ capital flows.
- Robustness
- Conclusions

Definition: Geopolitics and Geopolitical Risk

- Geopolitics is a word that encompasses multiple definitions.
- Define GPR as the risk associated with wars, terrorist acts, and tensions between states that affect the normal and peaceful course of international relations.
- GPR captures both risk that these events materialize and new risks associated with escalation of existing events.
- Definition excludes some “geopolitical” phenomena:
 - ▶ Major economic crisis (e.g. GFC, Eurozone debt crisis)
 - ▶ Major democratic political events (e.g. Brexit)
 - ▶ Climate change, civil right movements, domestic terrorist acts...
- Our definition is not exhaustive and some judgement is required (e.g. 2016 attempted coup in Turkey).

Measurement

Newspaper Searches

- Our methodology follows Baker, Bloom, Davis (2016).
- The geopolitical risk (GPR) index reflects the frequency of articles in 11 **newspapers** discussing geopolitical tensions.
- **Benchmark index (from 1985):**
 - ▶ **United States:** Boston Globe; Chicago Tribune; Los Angeles Times; NYT; WSJ; WaPo.
 - ▶ **United Kingdom:** Daily Telegraph; FT; Guardian; Times.
 - ▶ **Canada:** The Globe and Mail.
- **Historical index (from 1899):** NYT, Chicago Tribune, and FT
- GPR as covered by the English-speaking press.
- More weight to events with U.S. involvement.

Measurement

Not as Simple as Searching for 'Geopolitical' AND 'Risks'

- **Language** has changed:
 - ▶ Term "Geopolitical risk" popular after 9/11
 - ▶ "War risks" used to be "War perils"
 - ▶ "Terror Threats" used to be "Terrorist Menaces"
- **News articles content** has changed:
 - ▶ Focus shifted from 'chronicles' to 'opinions'.
- **Nature of risks** has changed:
 - ▶ From wars to nuclear threats to terrorism.

Measurement

Selection of Search Terms

- We define 6 search groups based on pilot audit of articles likely mentioning geopolitical risks.
- Audit set of articles (\mathcal{E}) containing **Geopolitics** or **War** or **Military** or **Terrorism/t** – most RECURRING WORDS in geopolitics books.
- In 2,500 articles in \mathcal{E} , about 50% discuss **high** geopolitical risk (\mathcal{E}^1).
- Most articles in \mathcal{E}^1 contain additional words related to risks or threats, tensions between states, beginning of wars.
- Construct search categories based on content of articles in \mathcal{E}^1 .
- Exclude from searches phrases overwhelmingly associated with false positives (\mathcal{E}^0):
 - ▶ E.g. movies, anniversaries, obituaries, end of the war.

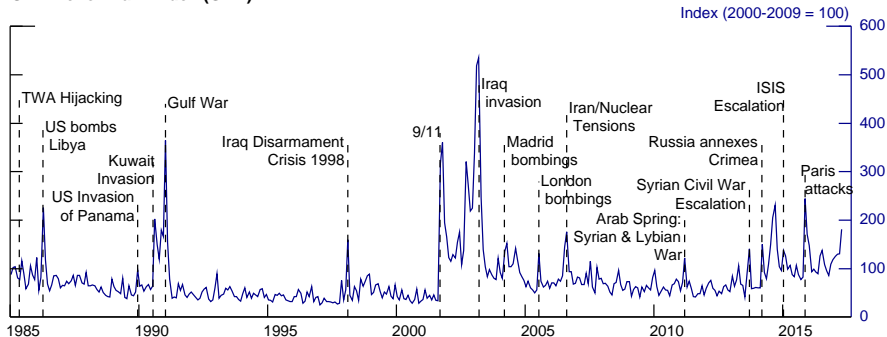
Measurement

The Search Terms

Search Category	Words
1. Geopolitical Threats	Geopolitical AND (risk* OR concern* OR tension* OR uncertain*) "United States" AND tensions AND (military OR war OR geopolitical OR coup OR guerrilla OR warfare) AND ("Latin America" OR "Central America" OR "South America" OR Europe OR Africa OR "Middle East" OR "Far East" OR Asia)
2. Nuclear Threats	("nuclear war" OR "atomic war" OR "nuclear conflict" OR "atomic conflict" OR "nuclear missile*") AND (fear* OR threat* OR risk* OR peril* OR menace*)
3. War Threats	"war risk*" OR "risk* of war" OR "fear of war" OR "war fear*" OR "military threat*" OR "war threat*" OR "threat of war" ("military action" OR "military operation" OR "military force") AND (risk* OR threat*)
4. Terrorist Threats	"terrorist threat" OR "terrorist threats" OR "menace of terrorism" OR "terrorism menace" OR "threat of terrorism" OR "terrorist risk" OR "terror risk" OR "risk of terrorism" OR "terror threat" OR "terror threats"
5. War Acts	(beginning OR outbreak OR onset OR escalation OR start) "of the war" (war OR military) AND ("air strike" OR "heavy casualties")
6. Terrorist Acts	"terrorist act" OR "terrorist acts"

The Benchmark Geopolitical Risk Index

GPR Benchmark Index (GPR)



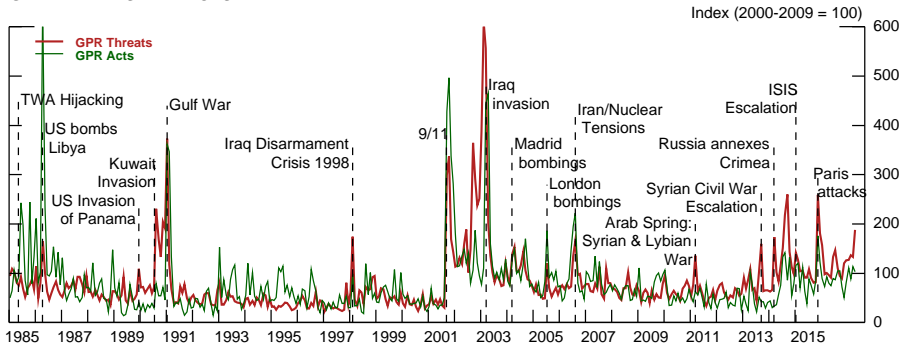
Geopolitical Threats vs. Geopolitical Acts

- 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 organize searches to separate **threats** that do not immediately materialize from **acts** that reveal an underlying threat.
 - ▶ **Geopolitical Threats (GPT):** Search categories 1 to 4;
 - ▶ **Geopolitical Acts (GPA):** Search categories 5 to 6.

Geopolitical Threats vs Geopolitical Acts

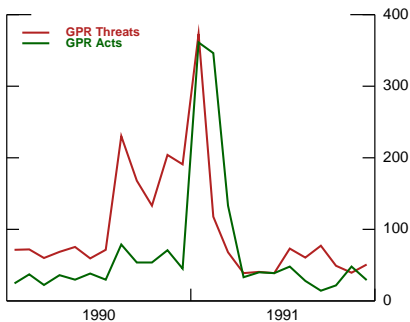
Correlation coefficient: 0.55

GPR THREATS AND ACTS

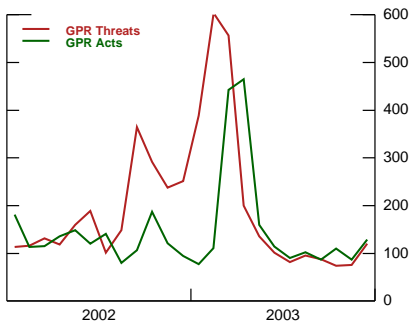


Geopolitical Threats vs Acts in 1991 and 2003

Gulf War

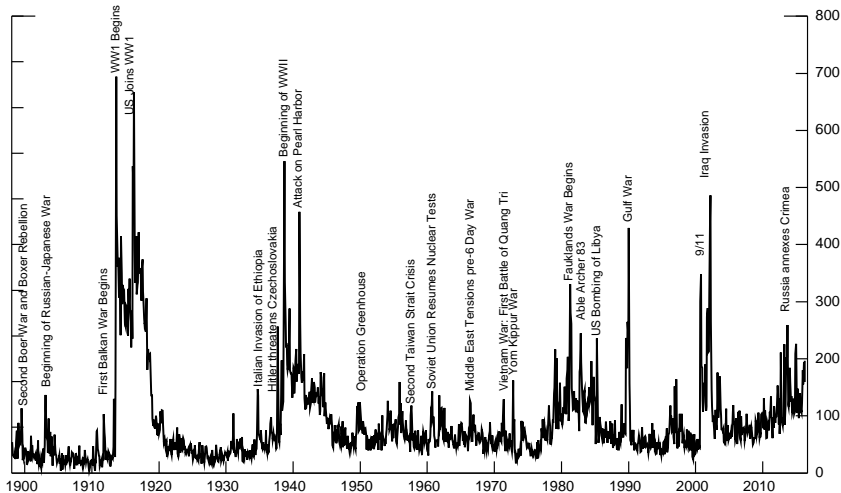


Iraq Invasion



The Historical Geopolitical Risk Index

GPR Historical



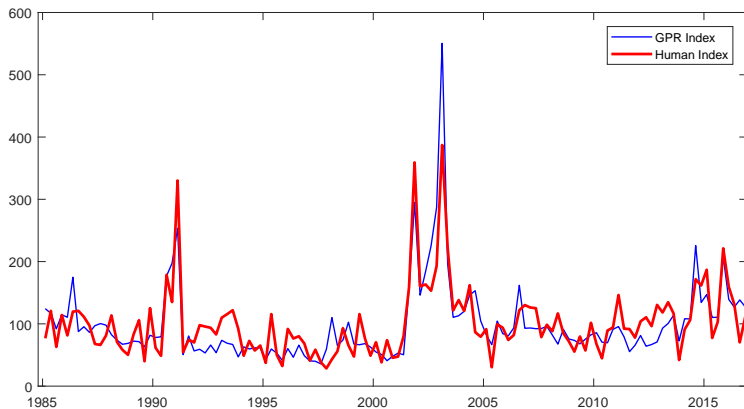
Audit

Reading and Manually Coding Articles

- **Pilot Audit:** Sample of 2,500 articles from set \mathcal{E} .
 - ▶ Goals: inform and refine exact search terms; build audit guide
- **Full scale audit 1:** Sample of 6,125 articles (50 per quarter) from \mathcal{E} .
 - ▶ Goal: construction of human GPR;
 - ▶ Correlation between GPR index and human index: 84%.
- **Full scale audit (2):** Sample of 2,500 articles from set selected by automated searches.
 - ▶ 87% mention high or rising geopolitical tensions.
 - ▶ 4% mention low or decreasing geopolitical tensions.
 - ▶ Correlation between GPR and audited-GPR is 0.98
- Test that GPR Index does not reflect changes in media attention to geopolitical events and risks.

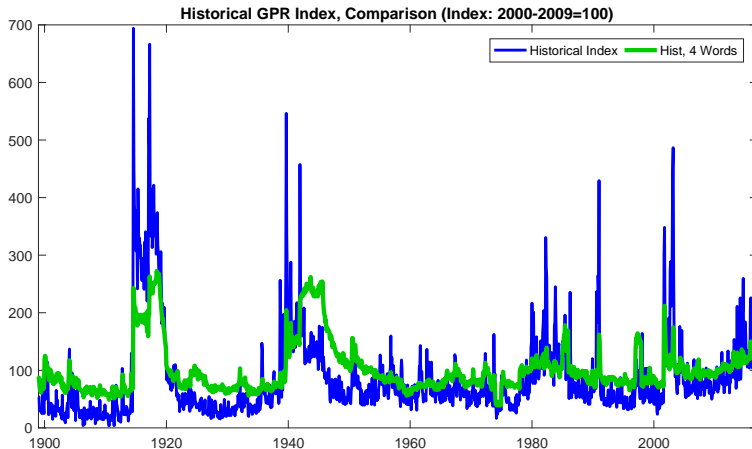
Audit

Comparison between GPR and Human Index



Audit

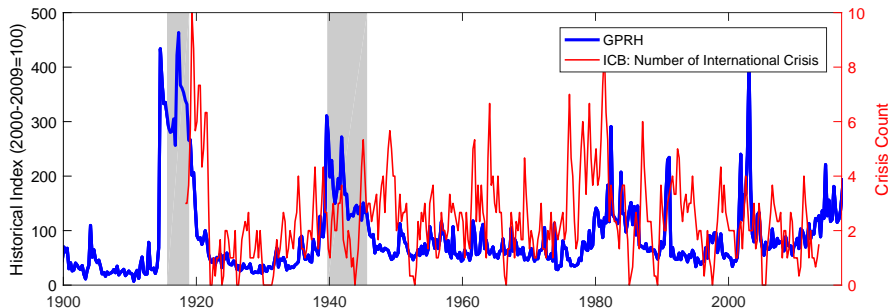
Comparison between GPRH and Naive Index



Naive index uses only: "war" OR "terrorism" /t OR "military" OR "geopolitics"

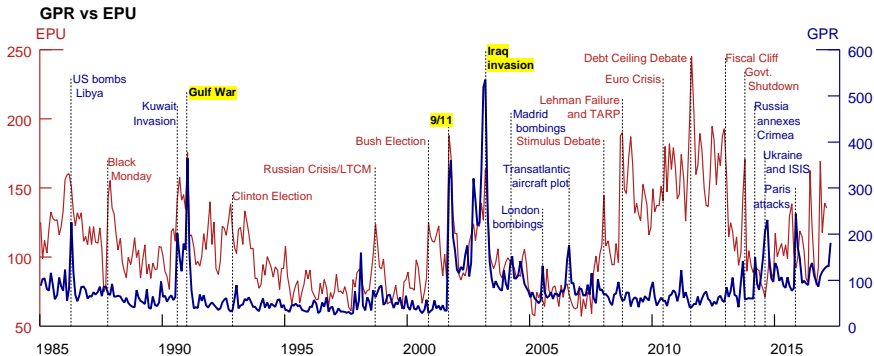
Audit

Comparison between GPR and International Crisis Database



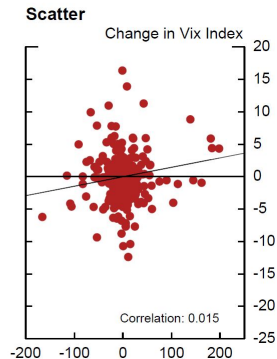
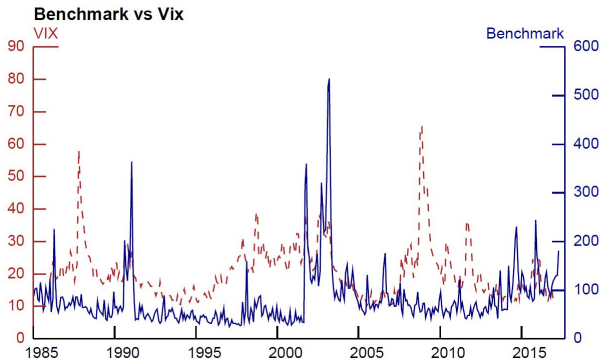
Audit

Comparison between GPR and EPU



Audit

Comparison between GPR and VIX



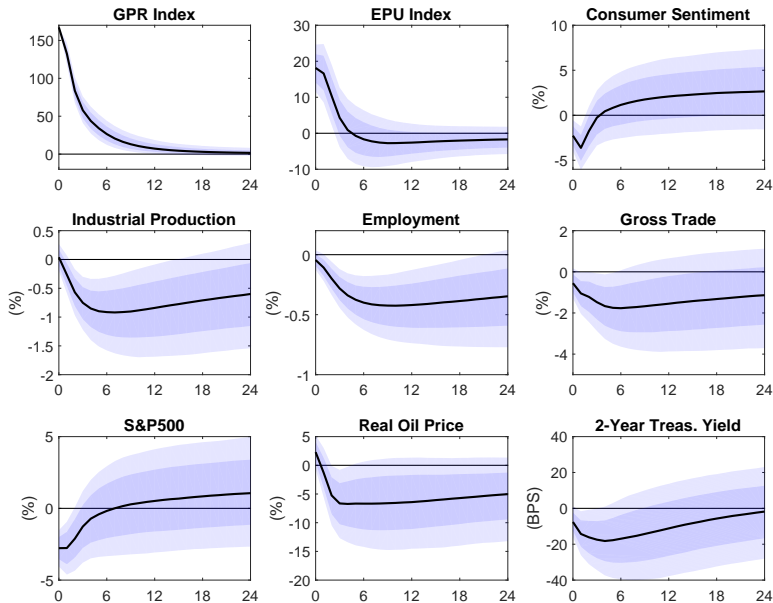
Economic Effects of GPR

- How could GPR matter?
 1. Standard Uncertainty/Macro Channels.
 2. Effects on Stock Returns.
 3. Effects on Capital Flows. Uncertainty could reshuffle portfolios towards safe havens.

Effects of Higher GPR: A VAR Analysis

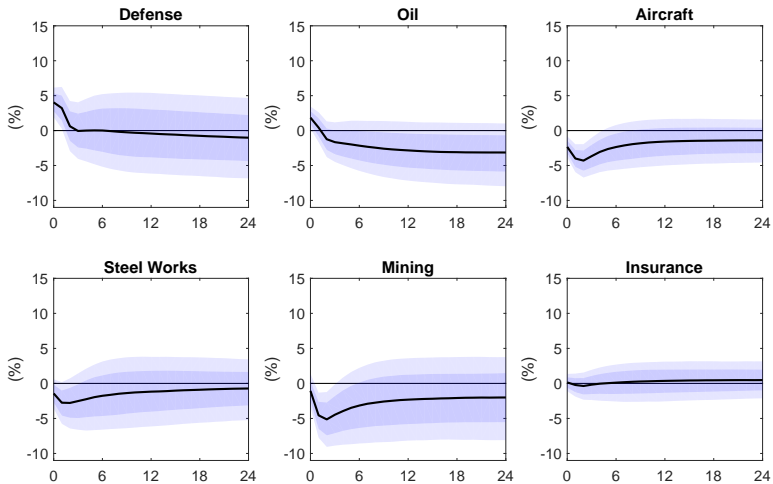
- Sample: 1985M1 to 2016M12.
- US benchmark VAR:
 1. **GPR Index**;
 2. Economic Policy Uncertainty (EPU);
 3. Consumer sentiment;
 4. US industrial production;
 5. Private payroll employment;
 6. US Imports + Exports;
 7. Value-weighted S&P 500 Index;
 8. Oil price;
 9. Yield on 2-Year Treasury.
- Extra variable: Industries Excess Return over S&P 500.
- **Identification**: GPR Index ordered 1st in Cholesky ordering.
- Shock sized to match rise in GPR after major events

The Macroeconomic Impact of Increased GPR



Increased Geopolitical Risk and Stock Returns

Cumulative Excess Return Over S&P 500 - Selected Industries

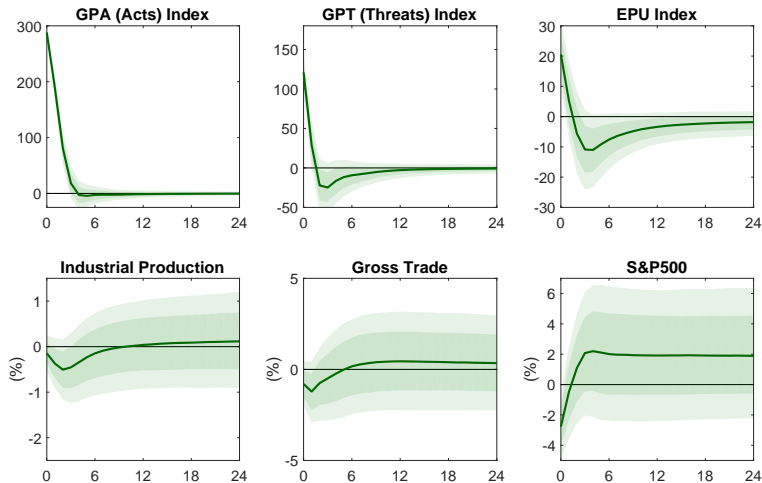


Effects of Higher GPR: Acts vs Threats

- Modify VAR used to study effects of GPR on US economy.
- Replace GPR with GPA and GPT.
- **Identification:** GPA ordered 1st and GPT 2nd in Cholesky ordering.
 - ▶ GPA shocks move GPT on impact.
 - ▶ GPT shocks do not move GPA on impact.
- GPA shocks convolution of shocks to first and higher moments of geopolitical events distribution.
- GPT shocks primarily shocks to uncertainty and risk.

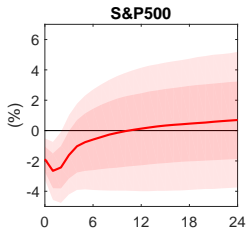
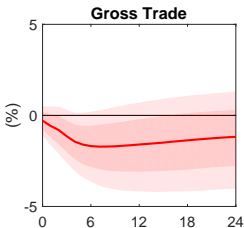
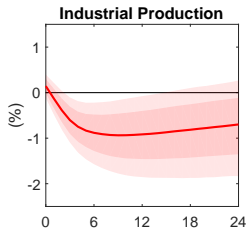
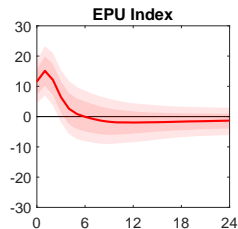
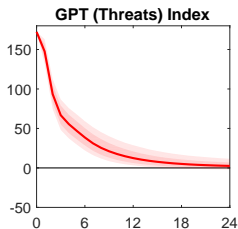
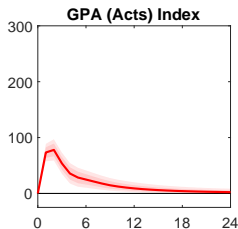
The Impact of Increased GPR: Acts

Selected Variables from US VAR



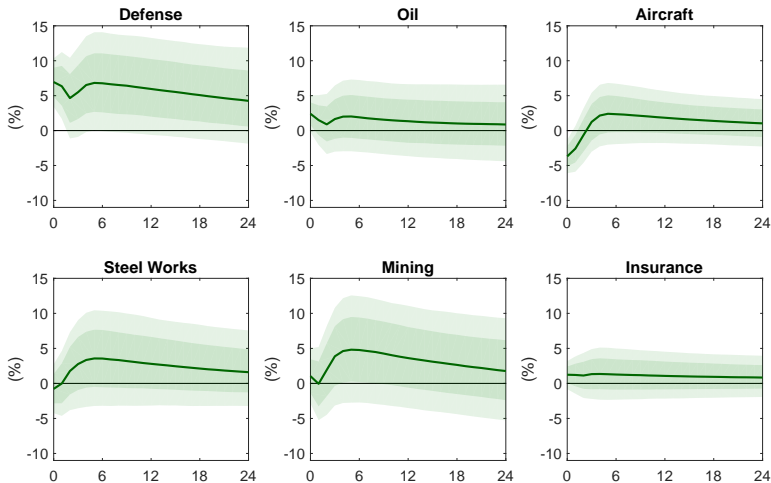
The Impact of Increased GPR: Threats

Selected Variables from US VAR



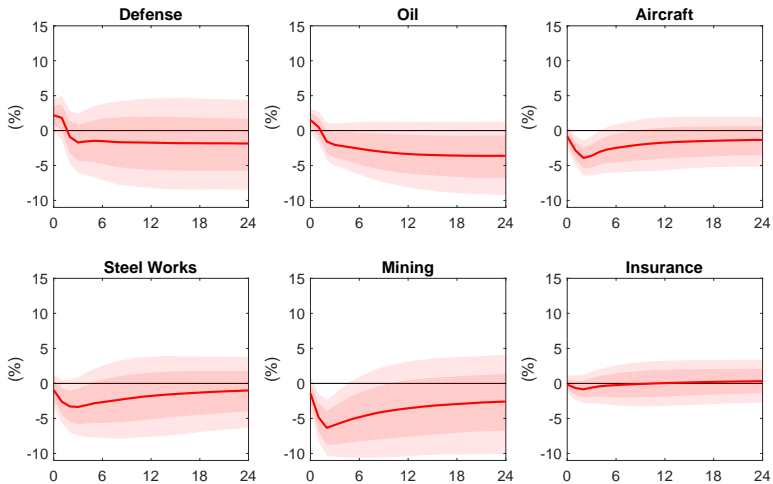
The Impact of Increased GPR: Acts

Cumulative Excess Return Over S&P 500



The Impact of Increased GPR: Threats

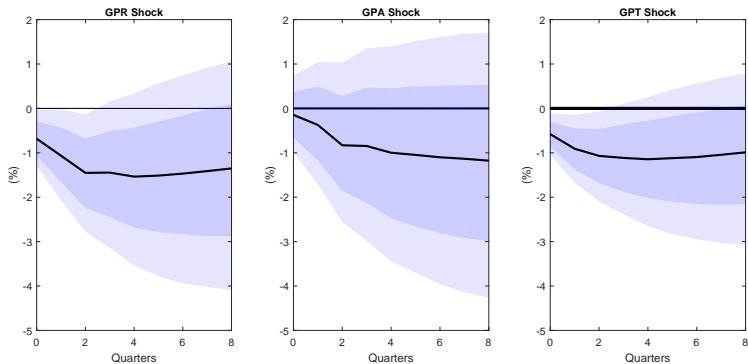
Cumulative Excess Return Over S&P 500



Increased Geopolitical Risk and Investment

Nonresidential Investment and Consumer Durables

Estimation of quarterly VAR from 1985 to 2016.



International Effects of Higher GPR

Three different econometric models chosen depending on data availability and timing of effects.

- VARs to study real activity (dynamic effects):

1. **GPR Index**;
2. EPU;
3. Country/Region 'X' industrial production.

- Univariate regressions to study stock returns:

$$r_{i,t} = \mu_i + \alpha_i GPRSHOCK_t + \varepsilon_{i,t},$$

(monthly data from pre-WWII but gaps for many countries)

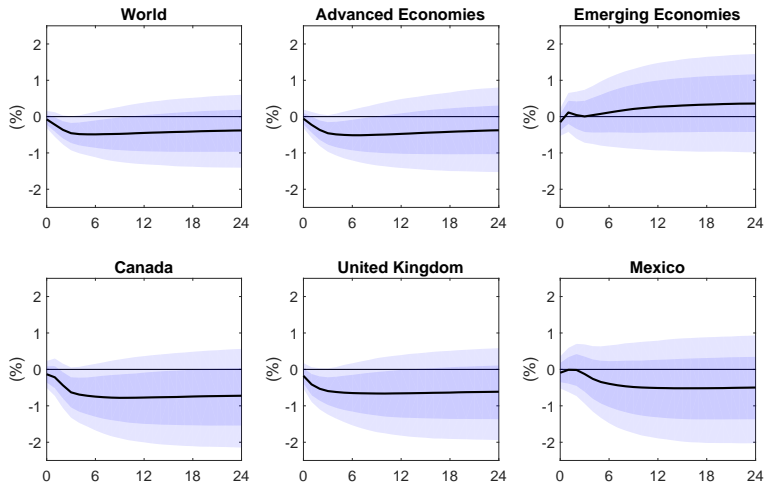
- Panel regression to study capital flows:

$$y_{i,t} = \alpha_i + \rho_1 y_{i,t-1} + \beta GPR_t + \Gamma X_t + u_{i,t},$$

(short sample for many countries)

The International Impact of Increased GPR

Industrial Production for Selected Countries and Regions



Geopolitical Risk and Capital Flows

VARIABLES	(1) Inflows/GDP Emerging Economies	(2) Inflows/GDP Advanced Economies	(3) Inflows/GDP United States
Lagged Inflows	0.290 (0.0597)	0.141 (0.0530)	0.497 (0.0866)
GPR Index, standardized	-0.339 (0.146)	0.901 (0.323)	0.407 (0.382)
VIX, standardized	-1.116 (0.207)	-1.387 (0.666)	-0.995 (0.441)
Lagged GDP Growth	0.260 (0.0956)	1.975 (0.475)	-0.209 (0.726)
Constant	7.280 (0.836)	10.96 (1.551)	5.449 (1.808)
Observations	1,796	2,065	103
R-squared	0.157	0.047	0.332
Number of country	23	22	1
Country FE	YES	YES	—
Clustered SEs	YES	YES	—

Robust standard errors in parentheses

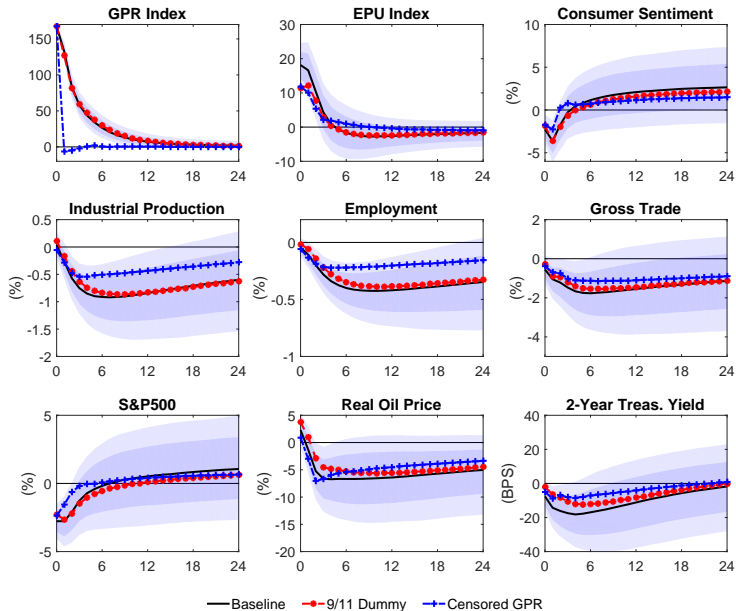
Geopolitical Risk and Stock Returns

Country	GPR Benchmark		GPR Historical		
	(1) Coefficient	(2) Std. Errors	(3) Coefficient	(4) Std. Errors	(5) First Obs.
Australia	-0.43	0.51	-0.45	0.31	1900
Belgium	-2.24	0.71	-1.02	0.45	1900
Canada	-1.09	0.43	-0.91	0.34	1914
Finland	-0.75	0.98	-0.30	0.52	1923
France	-2.00	0.9	-0.86	0.48	1900
Germany	-2.45	0.94	-0.14	0.91	1918
India	-1.13	0.98	-0.71	0.74	1922
Italy	-2.54	0.94	-1.33	0.55	1905
Japan	-0.58	0.59	0.10	0.46	1914
Netherlands	-2.17	.85	-0.44	0.55	1919
Peru	-1.78	1.62	-0.87	1.04	1933
Portugal	-1.62	0.73	-0.39	0.77	1934
Spain	-1.41	.83	-0.39	0.47	1915
South Africa	-2.25	0.53	-1.23	0.34	1910
Sweden	-1.40	0.89	-0.58	0.41	1906
United Kingdom	-1.62	0.62	-0.81	0.33	1900
United States	-1.32	0.59	-0.62	0.42	1900
World	-1.21	0.58	-0.84	0.48	1919

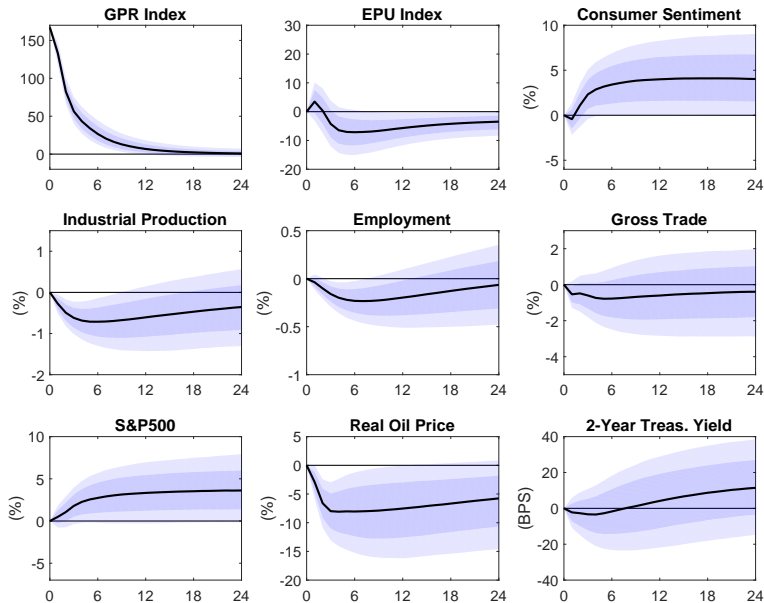
Robustness Analysis

- Investigate the following modifications to the baseline VAR specification:
 1. Censored GPR index: Keep only 9 largest peaks.
 2. Dummy for 9/11.
 3. Alternative Cholesky ordering
 4. Replace EPU with the VIX.
- Alternative specifications of GPR index:
 1. Broader and narrower list of search terms;
 2. Exclude articles mentioning economic consequences of GPR.

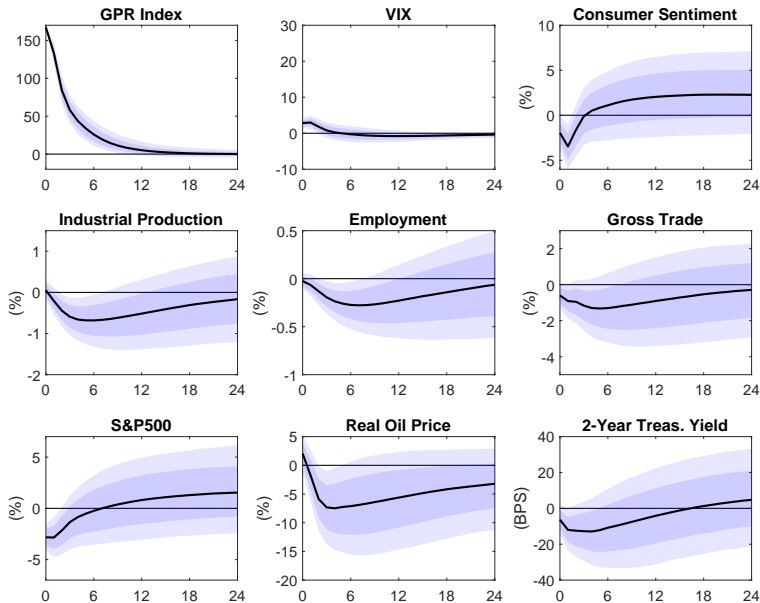
Censoring + 9/11 Dummy



Ordering GPR Last in Cholesky



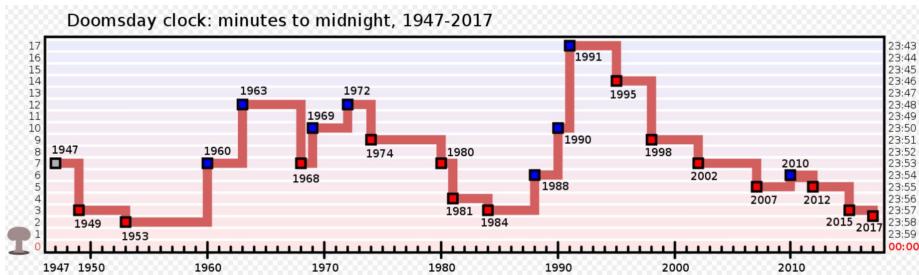
Replacing EPU with the VIX



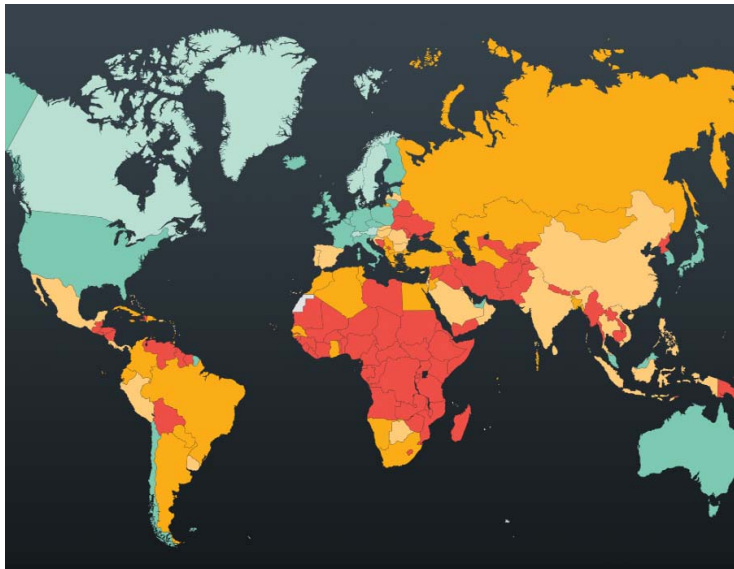
Conclusions

- We construct a quantitative measure of geopolitical risk.
- For many countries, the GPR index is perhaps more "exogenous" to economic conditions than other uncertainty measures.
- Geopolitical risk has adverse effects on real activity and stock returns in advanced economies.
- The effect on US stock returns varies across industries.
- Adverse effects of geopolitical risk are mostly driven by the threat of adverse geopolitical events.
- We are currently working on constructing country-specific GPR indexes.

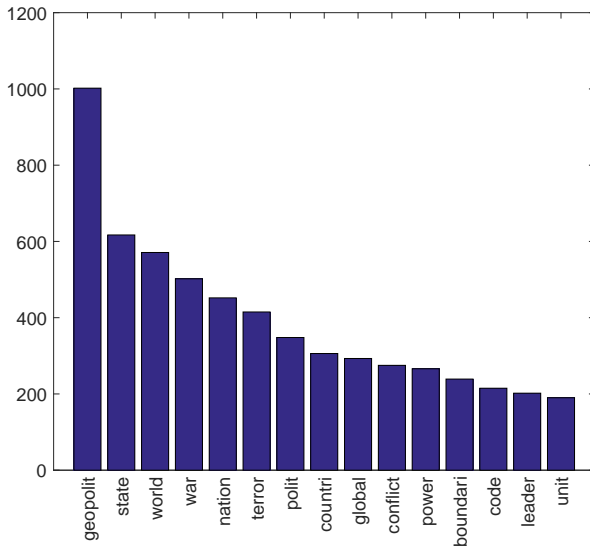
Available Indices 1: Doomsday Clock



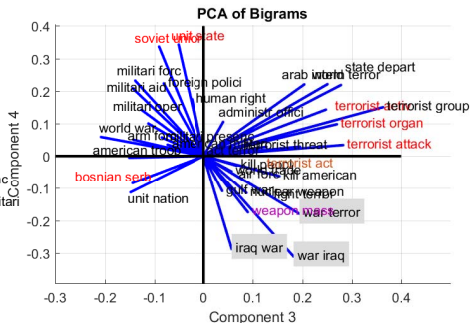
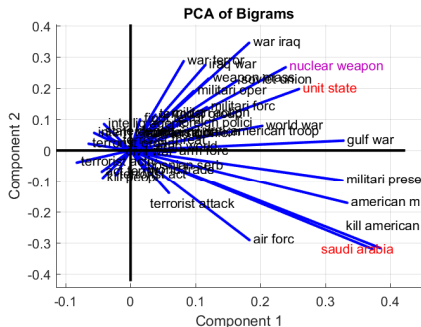
Available Indices 2: Geopolitical Heat Maps



Most Frequent Words in Geopolitics Textbook



Content of Articles in Pilot Auditing



Scatter plot of the 4 principal components from analysis of the top 50 bigrams from 2,500 newspaper abstracts classified as \mathcal{E}^1 .

GPR Index and Media Attention to GPR

Natural Disasters as Instrument for Media Attention

