

TURBULENT TIMES: CAPTURING SOCIAL UNREST IN THE NEWS

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LITERATURE: QUANTIFYING UNREST

- Caldara & Iacoviello 2022: Constructed a geopolitical risk (GPR) index using the coverage of major English language papers in the US, UK, and Canada.
- Barrett 2022: Constructed the Reported Social Unrest Index using the Dow Jones' Factiva news aggregator, focusing on unrest within a country and filtering out foreign policy protests.
- Redl & Hlatshwayo 2021: Constructed a social unrest risk index, where the risk of social unrest in a given year is based on the conditions of the previous year. The key drivers of risk appear to be previous unrest, food price inflation, and the popularity of cell phones.

CALDARA & IACOVIELLO 2022

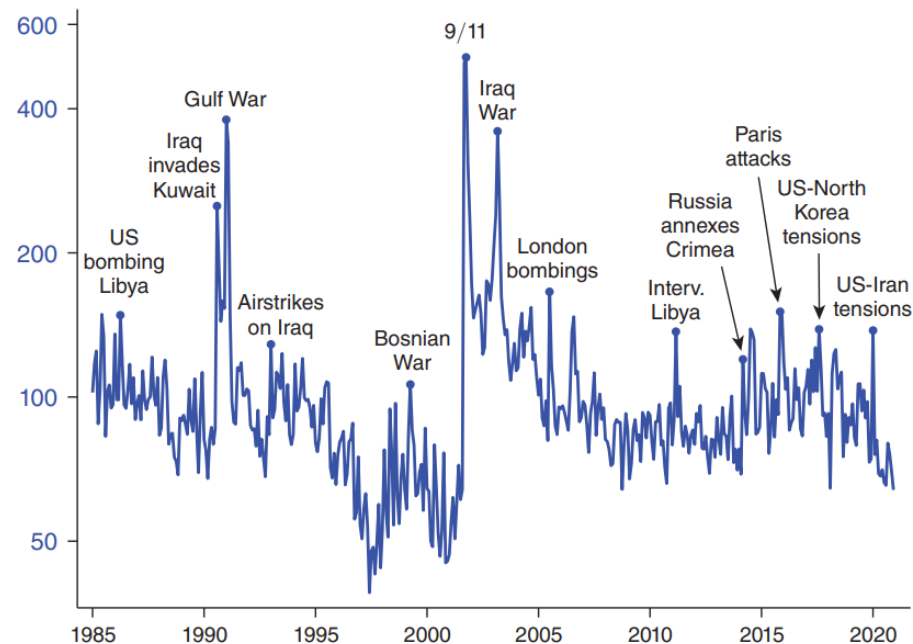


FIGURE 1. RECENT GPR INDEX FROM 1985

- Constructed a geopolitical risk (GPR) index and used that index to assess the impact of geopolitical risk on macro-economic outcomes
- The GPR is constructed by taking the share of articles that mention the threat, realization, or escalation of “adverse events” (such as war or terrorism) out of the total number of articles published in major US, Canada, and UK papers. A “mention” is defined as the presence of specific words in proximity to each other that are associated with certain event types.
 - Performed checks to verify the share of non-social unrest events (e.g. natural disasters) to ensure their index was not crowded out by other events
- They demonstrated GPR’s association with lower investment, higher unemployment, larger downside risks, and a higher probability of economic disaster.

BARRETT 2022

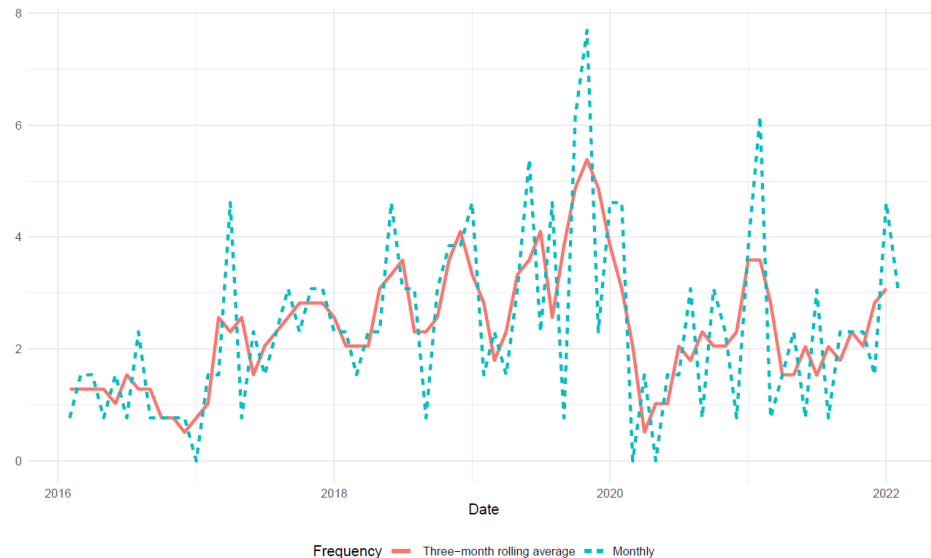


Figure 1: Fraction of countries with RSUI-identified events, 2016-2022

- Developed the Reported Social Unrest Index in order to track global unrest over time.
- The index utilizes the Dow Jones' Factiva news aggregator, focusing on 130 countries. This index is primarily focused on unrest that occurs within a given country and attempts to filter out foreign policy protests.
- To address potential bias from the news outlets selected, Barrett filters out certain articles, such as those with clear country specific bias. And to avoid retrospective rather than current data, he filters for articles that have the word "today."
- Barrett's index is primarily focused on unrest that occurs within a given country and attempts to filter out foreign policy protests.
- His index has since been used in a wide body of literature that seeks to tease out the relationship between unrest and various outcomes

LITERATURE: UNREST & ECONOMIC CONSEQUENCES

- Cerra & Saxena 2008: Civil wars and a deterioration in the quality of governance (fewer constraints on the powers of the political executive) are associated with loss of output, though only civil wars were associated with a partial rebound in output.
- Novta & Pugacheva 2020: Conflict (defined as number of deaths relative to the size of a population) is associated with drops in consumption and trade.
- Glick & Taylor 2010: International wars are associated with heavy costs including decreased volume of international trade, per capita income, and general economic welfare.
- Caldara & Iacoviello 2022: Geopolitical risk is associated with lower investment, higher unemployment, larger downside risks, and higher probability of economic disaster (used their own GPR index).
- Baker, Bloom, & Davis 2015: Economic policy uncertainty (EPU) spiked during periods of known social unrest, indicating that social unrest might be associated with negative economic outcomes (used their own EPU index).
- Hadzi-Vaskov, Pienknagura, & Ricci 2023: Unrest is associated with contractions in manufacturing and services, consumption, GDP, and trade (used Barrett's index).
- Kollias & Tzeremes 2022: Economic turmoil and unrest were often bidirectional, causing vicious cycles (used Barrett's index).

SURI: SOCIAL UNREST RISK INDEX

- SURI is a novel index for social unrest constructed using the Global Data of Events, Tone, and Language (GDELT) Project Events dataset and the Goldstein scale.
- SURI is bidirectional, meaning it captures social unrest originating in one country, conglomerate, or group and geared towards another.
 - For example, we can capture unrest triggered by civilians of a country and targeted at the military of another country or even a supranatural organization (e.g., NATO).
- The goal of this index is to provide a real-time transparent metric to visualize the risk of social unrest between two parties.

DATA GDELT

- The GDELT Events database is a large (terabyte-scale) database of global events, each categorized using the CAMEO system. The database is an output of sophisticated NLP models on news data that factors global events into fields such as
 - **who** was involved (each event contains exactly 2 actors),
 - **what** type of event happened (protest, aggression, etc.),
 - **when** the event occurred,
 - **how many** news articles reported it,
 - and much more.
- A row in the dataset could tell us “In **February 2022**, the **United States** placed **economic sanctions** on **Russia**, reported by **250 articles**.”
- In the above case **United States -> Russia** the United States is Actor1 and Russia is Actor2.
- **Actor1 perpetrates a given action against Actor2**. If the Russian government were to retaliate against the United States, Russia would be Actor1, as the perpetrator of the action. This allows us to filter and construct subsets of the data that focus on government/government unrest (e.g., economic sanctions), domestic government/civilian unrest (e.g., insurrections), and international government/civilian unrest (e.g., foreign policy protests).
- We specifically examine events related to **protests**, **demands**, and **threats**. We look at events containing both **non-government** actors (civilian groups, educational organizations, etc.) and **government** actors, defined as social unrest. We associate actors with their **country of origin**. Using these fields, we construct the bi-directional Social Unrest Risk Index (SURI) between countries.

GOLDSTEIN SCALE

- First published by Goldstein in 1992, the Goldstein scale assigns a numeric value between –10 to 8.3 to various events, scaling them from conflict (negatives), to neutral (0), to cooperation (positives)
- In order to construct the scale, Goldstein used McClelland's (1971) World Events Interaction Survey (WEIS)
 - For each WEIS event there were two actors and an action: Country A toward Country B.
 - For example, Country A gives warning to Country B
- A panel of international affairs researchers were asked to rate each WEIS event along two scales (one for conflict, one for cooperation) from 0 to 10. The Goldstein scale is an average of their responses.

TABLE 1
New Weights for WEIS Events

<i>Event Type</i>	<i>Weight</i>	<i>SD</i>
223 Military attack; clash; assault	–10.0	0.0
211 Seize position or possessions	–9.2	0.7
222 Nonmilitary destruction/injury	–8.7	0.5
221 Noninjury destructive action	–8.3	0.6
182 Armed force mobilization, exercise, display; military buildup	–7.6	1.2
195 Break diplomatic relations	–7.0	1.3
173 Threat with force specified	–7.0	1.1
174 Ultimatum; threat with negative sanction and time limit	–6.9	1.4
172 Threat with specific negative nonmilitary sanction	–5.8	1.9
193 Reduce or cut off aid or assistance; act to punish/deprive	–5.6	1.4
181 Nonmilitary demonstration, walk out on	–5.2	2.1
201 Order person or personnel out of country	–5.0	1.7
202 Expel organization or group	–4.9	1.4
150 Issue order or command, insist, demand compliance	–4.9	1.7
171 Threat without specific negative sanction stated	–4.4	1.5
212 Detain or arrest person(s)	–4.4	2.3
192 Reduce routine international activity; recall officials	–4.1	1.2
112 Refuse; oppose; refuse to allow	–4.0	1.5
111 Turn down proposal; reject protest, demand, threat	–4.0	1.5
194 Halt negotiation	–3.8	0.9
122 Denounce; denigrate; abuse	–3.4	1.1
160 Give warning	–3.0	1.3
132 Issue formal complaint or protest	–2.4	0.9
121 Charge; criticize; blame; disapprove	–2.2	1.3
191 Cancel or postpone planned event	–2.2	1.5
131 Make complaint (not formal)	–1.9	0.6
063 Grant asylum	–1.1	2.5
142 Deny an attributed policy, action, role or position	–1.1	1.0

CONSTRUCTING SURI: METHODOLOGY I

$$SURI_{i,j} = \text{Geopolitical Unrest Score}_{i,j} * \text{Political Involvement Score}_{i,j}$$

$$\text{Geopolitical Unrest Score}_{i,j} = \sum \text{Demand, Threaten, Protest Events}_{i,j}$$

$$\text{Political Involvement Score}_{i,j} = \left(\frac{\sum \text{Gov, Gov}_{i,j}}{\sum \text{Events}_{i,j}} + \frac{\sum \text{NonGov, Gov}_{i,j}}{\sum \text{Events}_{i,j}} + \frac{\sum \text{Gov, NonGov}_{i,j}}{\sum \text{Events}_{i,j}} \right)$$

$$i = \text{date}$$

$$j = \text{actor1countrycode, actor2countrycode}$$

CONSTRUCTING SURI: METHODOLOGY II

$$SURI_{i,j} = ImportanceScore_{i,j} * IntensityScore_{i,j}$$

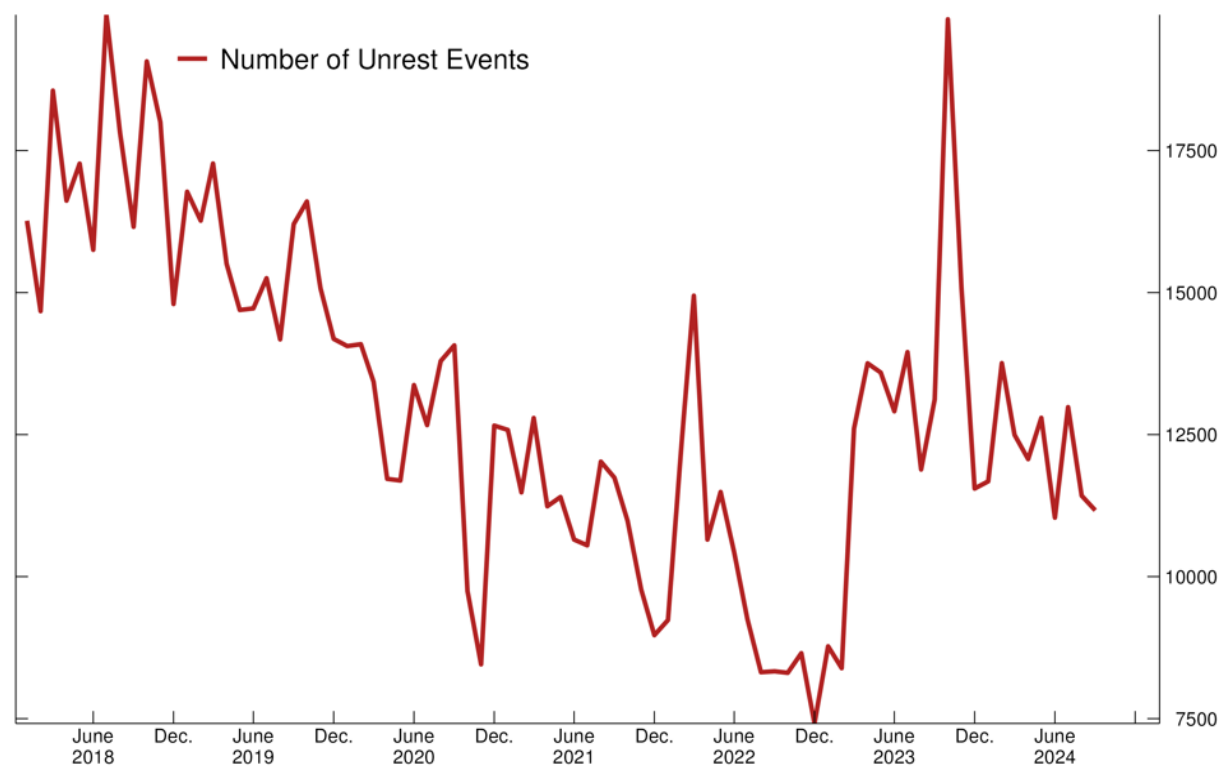
$$ImportanceScore_{i,j} = \sum NewsArticles_{i,j}$$

$$IntensityScore_{i,j} = \frac{\sum Goldstein\ Scores_{i,j}}{\sum Events_{i,j}}$$

$$j = actor1countrycode, actor2countrycode$$

SURI EVENT COUNTS

SURI-Relevant Event Counts



Count of all global protest, demand, and threaten events matching one government and one non-government actor.

Events in each country

United States: 772

Israel: 277

United Kingdom: 217

Nigeria: 154

Russia: 149

China: 131

Iran: 105

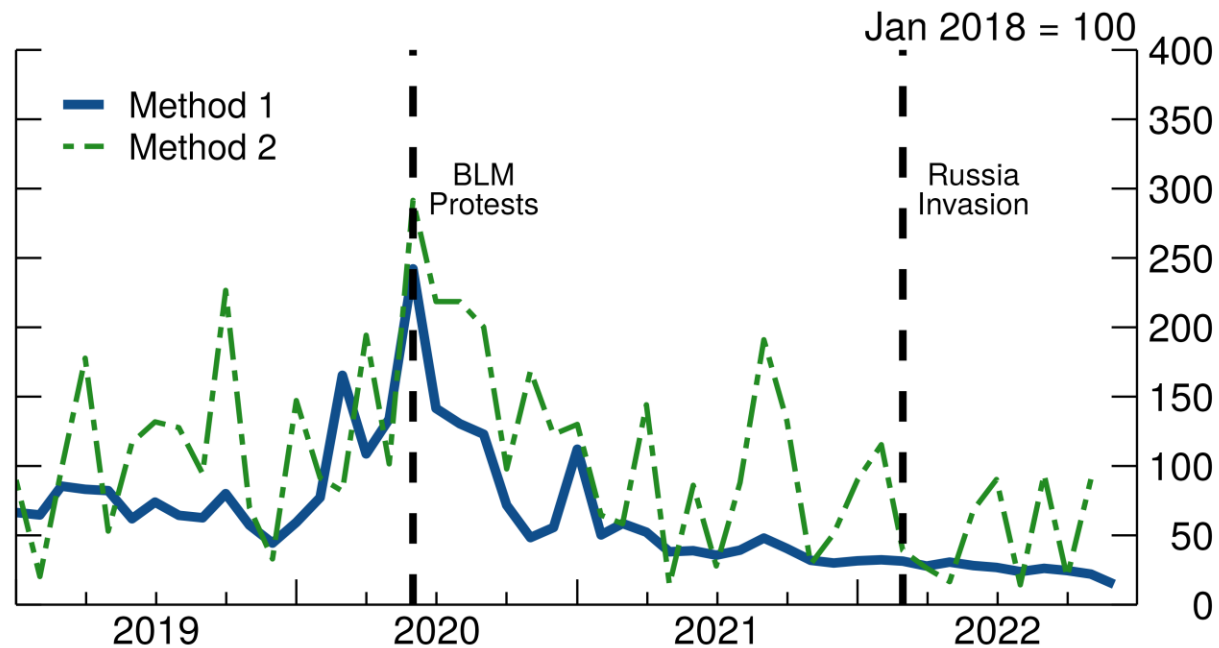
Sudan: 93

India: 91

Kenya: 76

CASE STUDY: BLACK LIVES MATTER PROTESTS IN THE US

USA Public -> USA Gov: SURI Scores



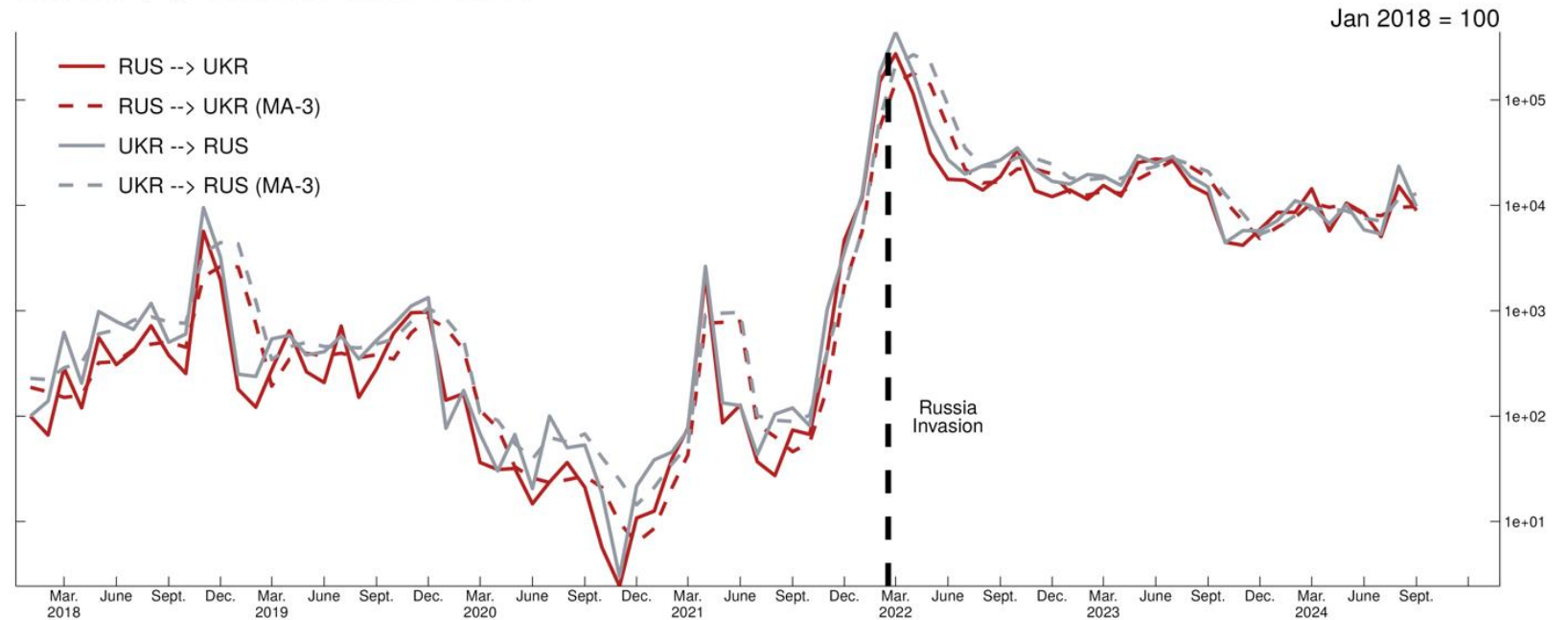
Source: GDELT, Staff Calculations

CASE STUDY: RUSSIAN INVASION OF UKRAINE

SURI scores between Russia and Ukraine peaked starting at Russia's invasion and have remained elevated since.

This chart is created using Methodology 1.

Russia <--> Ukraine: SURI Scores



Source: GDELT, Staff Calculations

CASE STUDY: RUSSIAN INVASION OF UKRAINE

In this chart, the SURI is plotted for multiple groups of countries including the EU, NATO, and select NATO members

This chart is created using Methodology 1.

NATO -> Russia



Select NATO members include Canada, Italy, France, Germany, United Kingdom, and the United States.
 NATO members include Albania, Belgium, Bulgaria, Canada, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, United Kingdom, and the United States.
 EU members include Austria, Belgium, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain.
 Source: GDELT; Staff Calculations

CASE STUDY: RUSSIAN INVASION OF UKRAINE

Indexed at the onset of the Russian invasion of Ukraine, we see around the 9-month mark, unrest risk starts to decrease.

This chart is created using Methodology 1.

NATO -> Russia



Select NATO members include Canada, Italy, France, Germany, United Kingdom, and the United States.
 NATO members include Albania, Belgium, Bulgaria, Canada, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, United Kingdom, and the United States.
 EU members include Austria, Belgium, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain.
 Source: GDELT; Staff Calculations

NEXT STEPS

Moving forward, we are refining and executing a series of regression analyses. These will tease out potential applications of SURI and hopefully provide meaningful information about the relationship between unrest and various elements of the economy.

We are excited about the richness and nuance within SURI, and we believe some of its most fruitful applications will be in targeted analyses of specific international relationships over time. Due to its bidirectionality, diverse country representation, and ability to capture both threatened and realized events, its applications are nearly infinite.

PROPOSED ANALYSIS

The basic structure of our analysis would follow the below equation:

$$Y_{i,j,t} = \alpha + \beta \text{SURI}_{i,j,t} + \gamma_t + C_{i,j,t} + \varepsilon_{i,j,t}$$

$$Y_{i,j,t} = \alpha + \beta \text{SURI}_{i,j,t-1} + \gamma_{t-1} + C_{i,j,t-1} + \varepsilon_{i,j,t-1}$$

$$Y_{i,j,t} = \alpha + \beta \text{SURI}_{i,j,t+1} + \gamma_{t+1} + C_{i,j,t+1} + \varepsilon_{i,j,t+1}$$

Where $Y_{i,j,t}$ is a macroeconomic variable value at time t

i is the country of origin for Actor1 and j is the country of origin for Actor2

SURI is our unrest index, γ are the time fixed effects, C are the other control variables, and ε is the error term

We plan to evaluate these relationships contemporaneously and with leads and lags by one period

PROPOSED ANALYSIS

$$Y_{i,j,t} = \alpha + \beta \text{SURI}_{i,j,t} + \gamma_t + C_{i,j,t} + \varepsilon_{i,j,t}$$

For any of these permutations, the countries of origin for Actor 1 and Actor 2 may be the same **or** two different countries.

If the same, one can examine directly the economic state of the country at hand.

If different, one can exploit or construct a number of bilateral variables in order to understand the international economic dynamics at play. For example:

- $Y_{i,j,t} = (\text{GDP}_{i,t} - \text{GDP}_{j,t})$
- $Y_{i,j,t} = (\text{Portfolio Flows } i \rightarrow j)_t$
- $Y_{i,j,t} = (\text{Trade Flows } i \rightarrow j)_t + (\text{Trade Flows } j \rightarrow i)_t$
- $Y_{i,j,t} = (\text{Unemployment}_{i,t} - \text{Unemployment}_{j,t})$

There are many subsets for which the above equation could be used.

To list a few:

- Actor 1: Government Organization, Actor 2: Civilian Organization
- Actor 1: Civilian Organization, Actor 2: Government Organization
- Actor 1: Government Organization, Actor 2: Government Organization
- Actor 1: Civilian Organization, Actor 2: Civilian Organization
- Actor 1: Any actor type, Actor 2: Government Organization
- Actor 1: Government Organization, Actor 2: Any actor type
- Actor 1: Any actor type, Actor 2: Any actor type

BEYOND SURI

- The methodologies for SURI have the potential to be expanded beyond GDELT as a source. Richer but messier data from social media could also be used to identify unrest events and intensity.
 - TikTok (captions, audio, textual content, hashtags)
 - Instagram (captions, hashtags)
 - Instagram Reels (captions, audio, textual content, hashtags)
 - Twitter / X (text, hashtags)

THANK YOU

APPENDIX

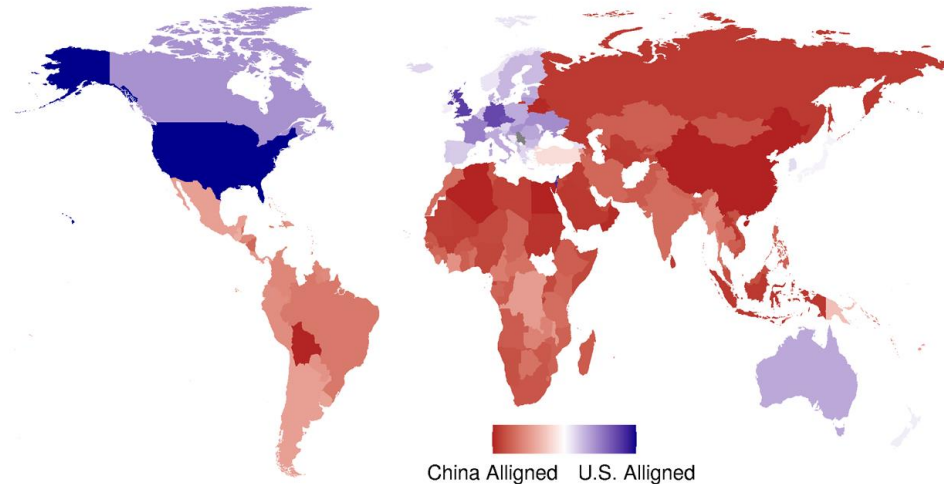


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CONTEXT: INCREASED POLARIZATION, TENSION, AND UNREST

Geopolitical Alignment 2023



2024, Airudo & Richards

- Increased polarization is a global phenomenon, shedding light on dissatisfaction with the status quo and discontent across national borders.
- From trade fragmentation and diversion to geopolitical aggression, unrest is not only costly but is increasingly relevant to our understanding of international dynamics.
- The ability to examine the actions between citizens, governments, and non-governmental organizations has never been more relevant.

REFLECTIONS ON EACH METHODOLOGY

Methodology 2 appears to be more sensitive (and noisy) than Methodology 1. However, both appear effective in terms of having large swings around large domestic unrest events. While it's unlikely that these indices would lead to someone discovering a "new" or "overlooked" unrest event, a weighted aggregation of these scores across many countries could serve as a quantitative estimate of the level of global unrest. This measure could then be used in lower-frequency (e.g., monthly) fore/nowcasting models to succinctly capture media information on social unrest. It is worth noting that we heavily restrict the data in this study; relaxing these restrictions could allow higher-frequency analysis. Similar measures could be used to capture labor strikes, hostility levels, and other forms of geopolitical risk.

SURI AND MACROECONOMIC INDICATORS

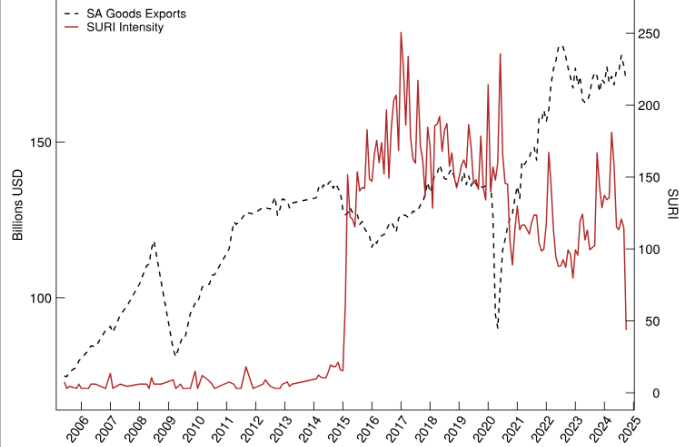
Previous literature has shown compelling evidence of a relationship between of unrest and macroeconomic indicators. In order to assess, at a preliminary level, the potential applications of SURI in macroeconomic research, we have begun to examine its associations with the following:

- Foreign Direct Investment
- Portfolio Flows
- Unemployment
- GDP & GDP Growth
- Trade Dynamics (Imports, Exports, Trade Openness)
- Inflation

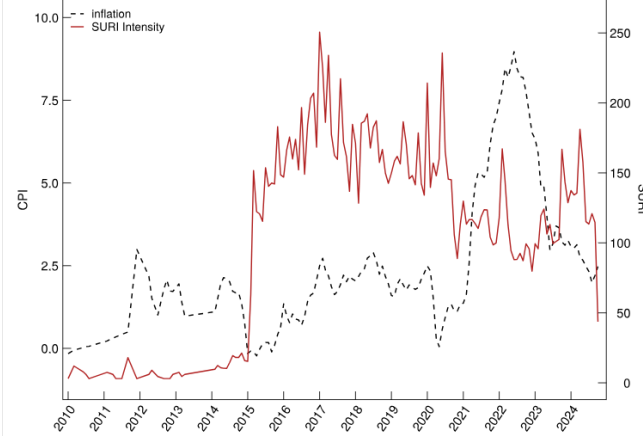
PRELIMINARY ASSOCIATIONS METHOD I

DOMESTIC ISSUES: COUNTRY OF ORIGIN FOR
ACTOR1 AND ACTOR2 ARE THE SAME

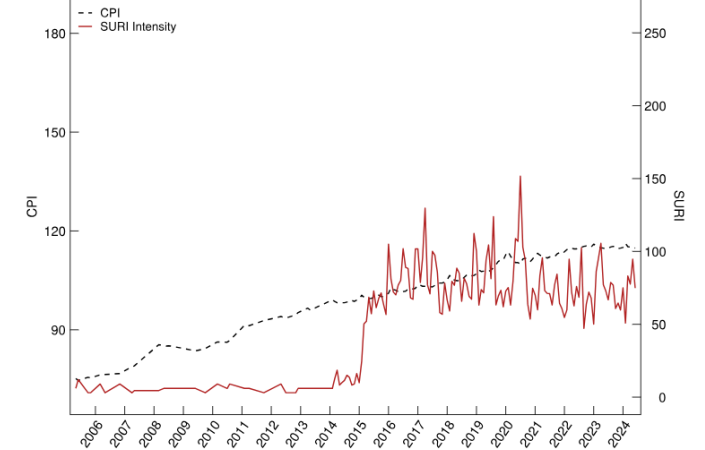
SURI and Goods Exports in USA



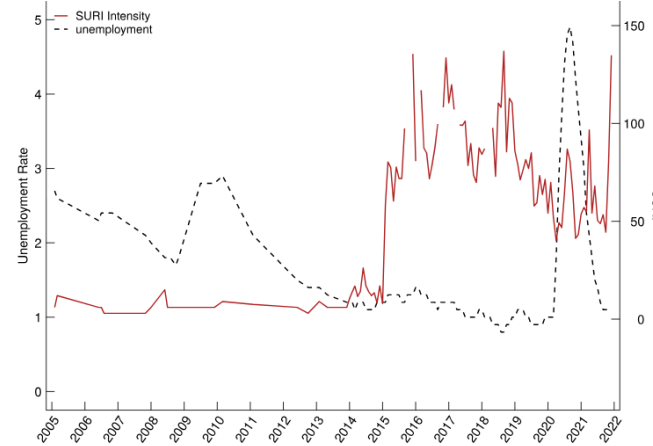
SURI and Inflation in USA



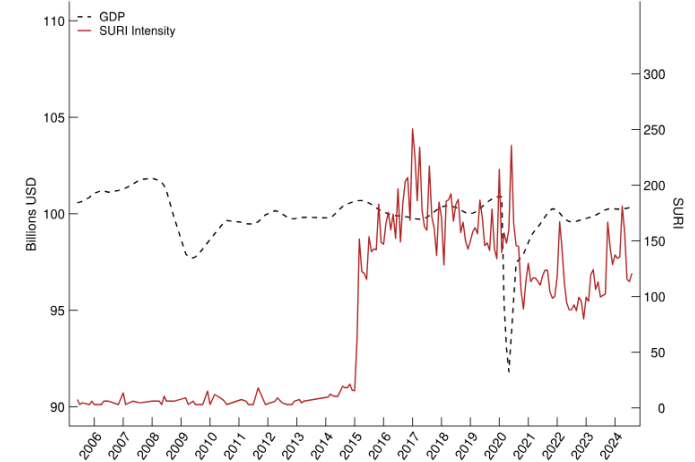
SURI and Inflation in China



SURI and Unemployment in Russia



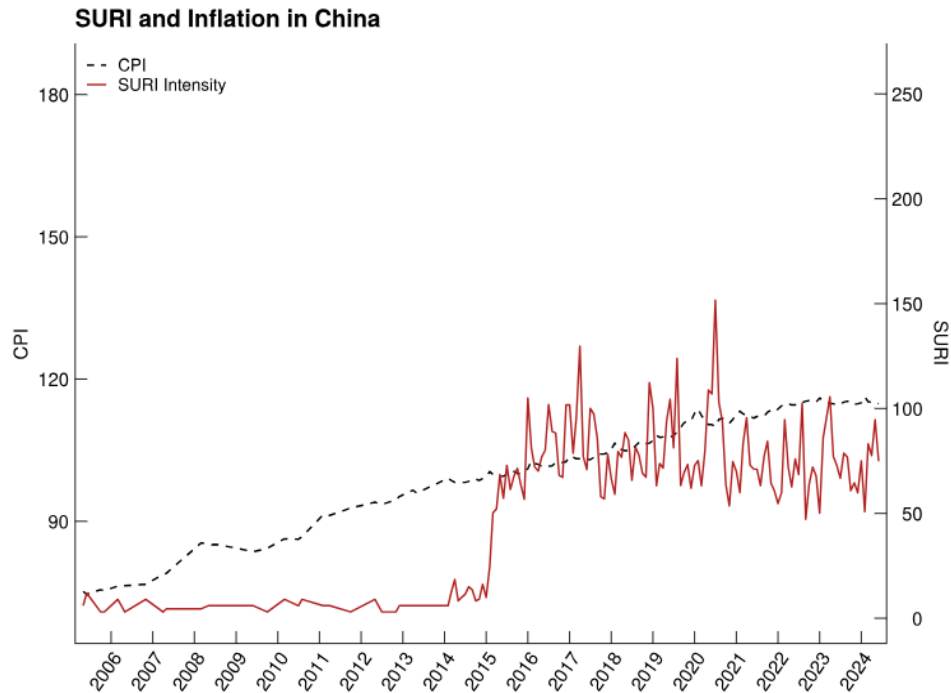
SURI and GDP in USA



PRELIMINARY ASSOCIATIONS: INFLATION IN CHINA

Method I

Country of Origin for
Actor1 and Actor2 are the same



Method II

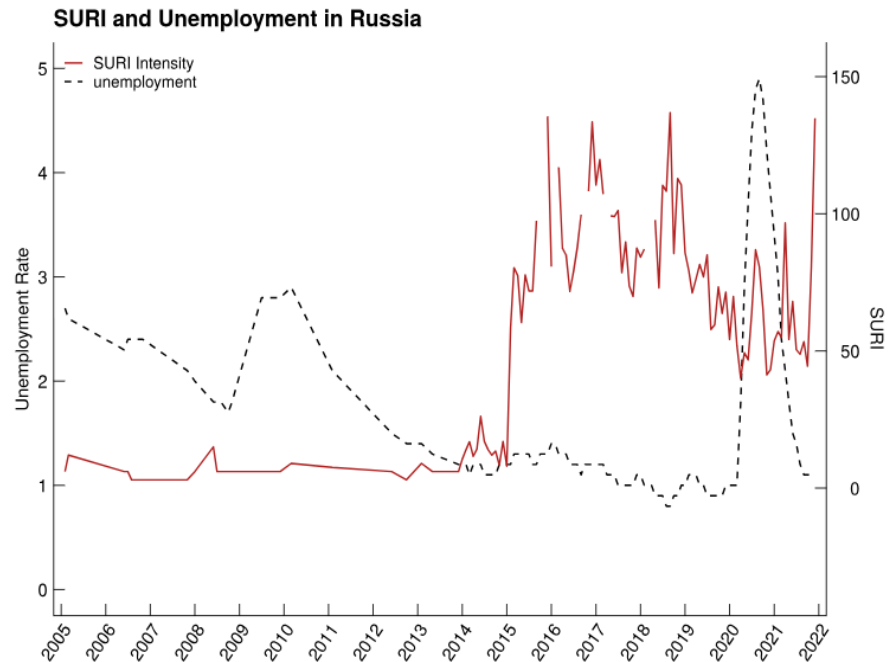
Either Actor1 or Actor2 is China



PRELIMINARY ASSOCIATIONS: UNEMPLOYMENT IN RUSSIA

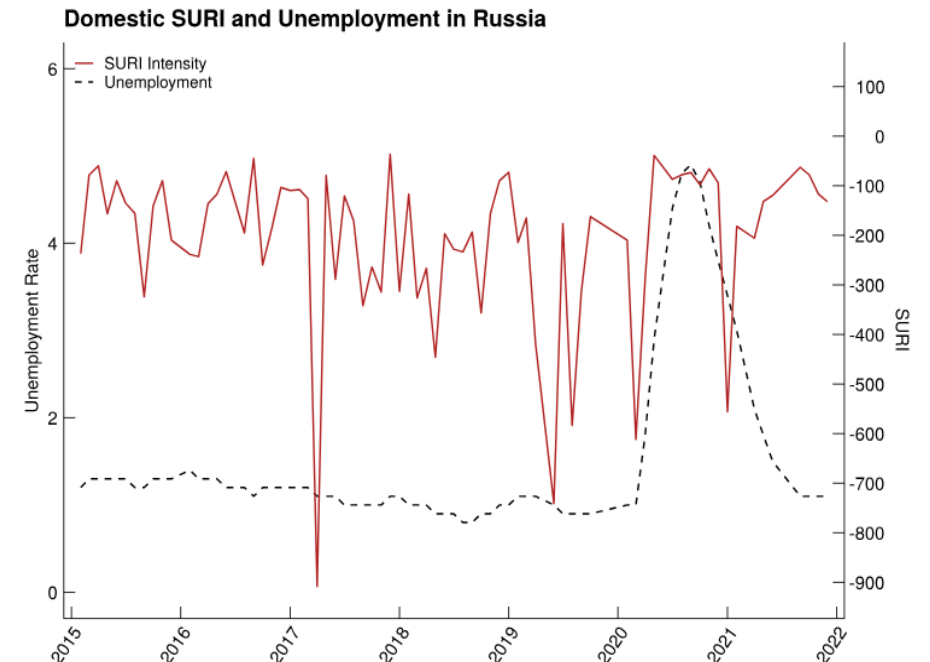
Method I

Country of Origin for
Actor1 and Actor2 are the same



Method II

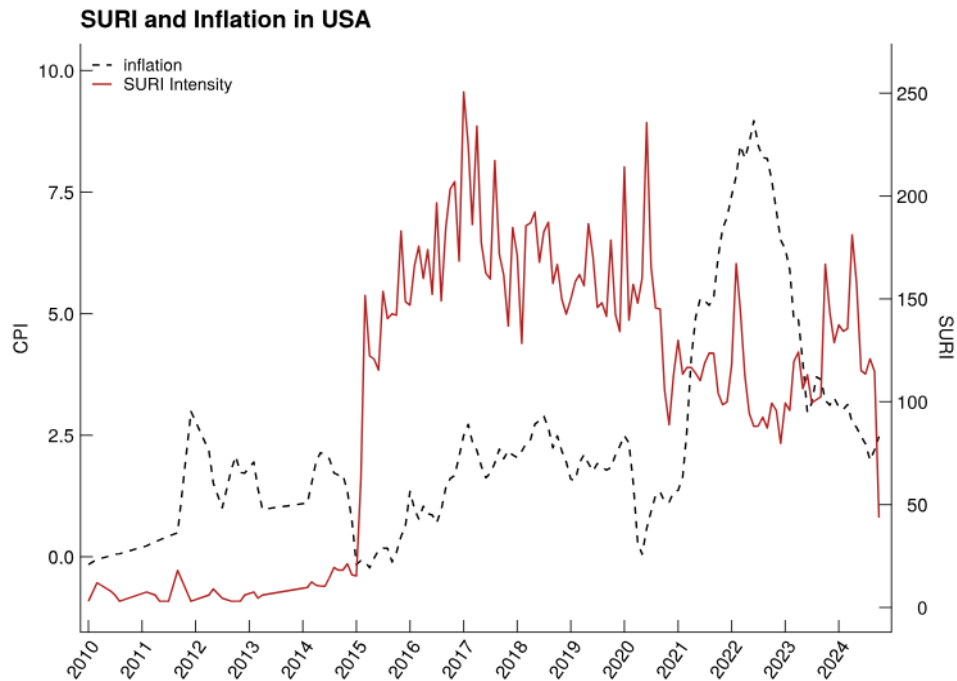
Both Actor1 and Actor2 are Russia



PRELIMINARY ASSOCIATIONS: INFLATION IN THE USA

Method I

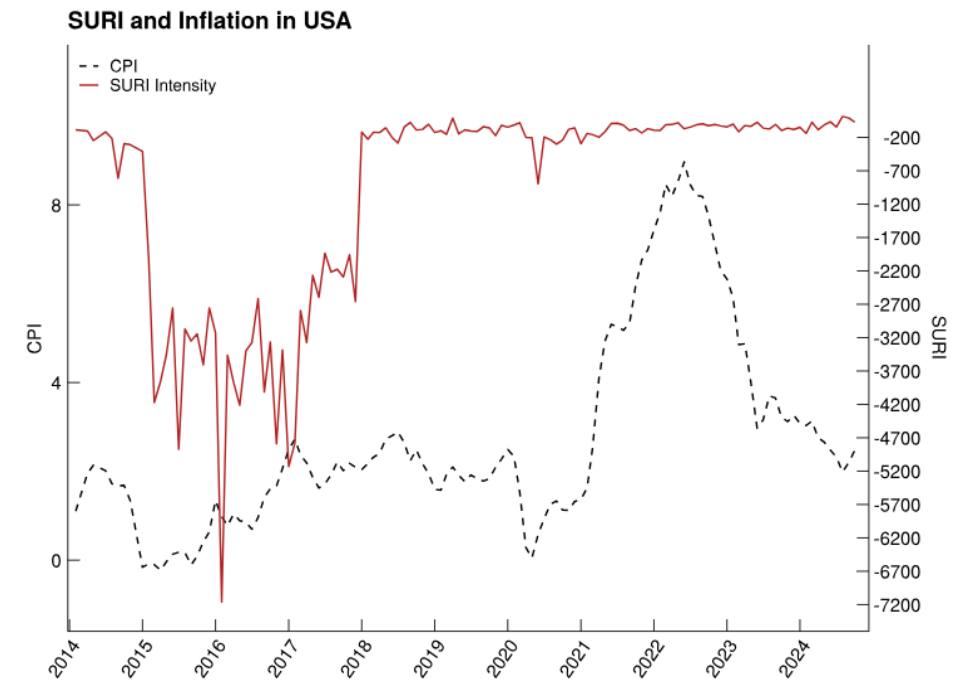
Country of Origin for
Actor1 and Actor2 are the same



Source: GDELT, OECD, and Federal Reserve Staff Calculations.

Method II

Either Actor1 or Actor2 is the USA

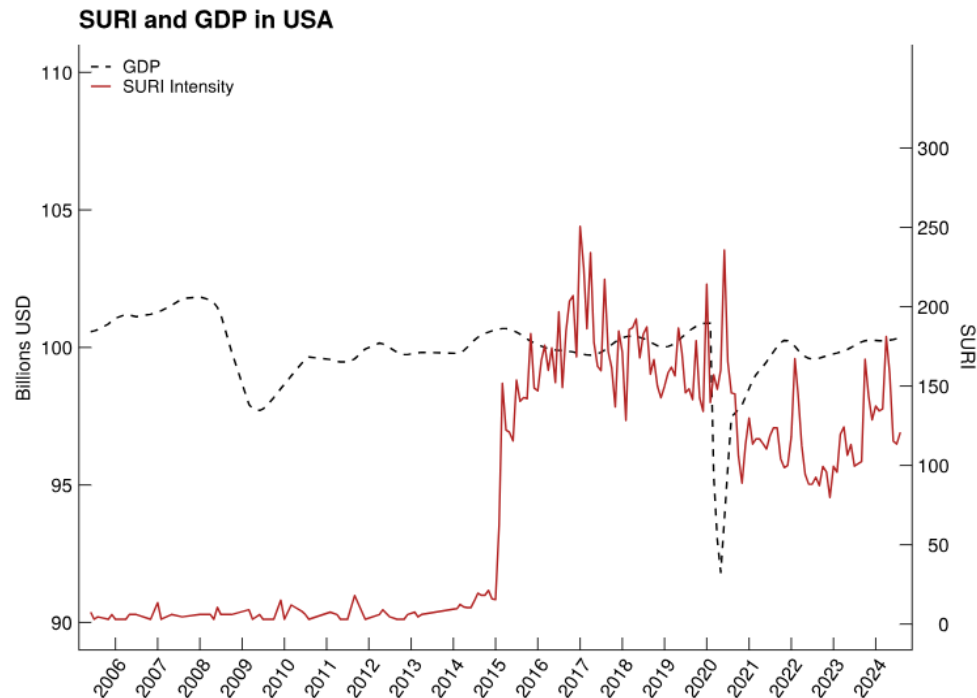


Source: GDELT, OECD, and Federal Reserve Staff Calculations.

PRELIMINARY ASSOCIATIONS: GDP IN THE USA

Method I

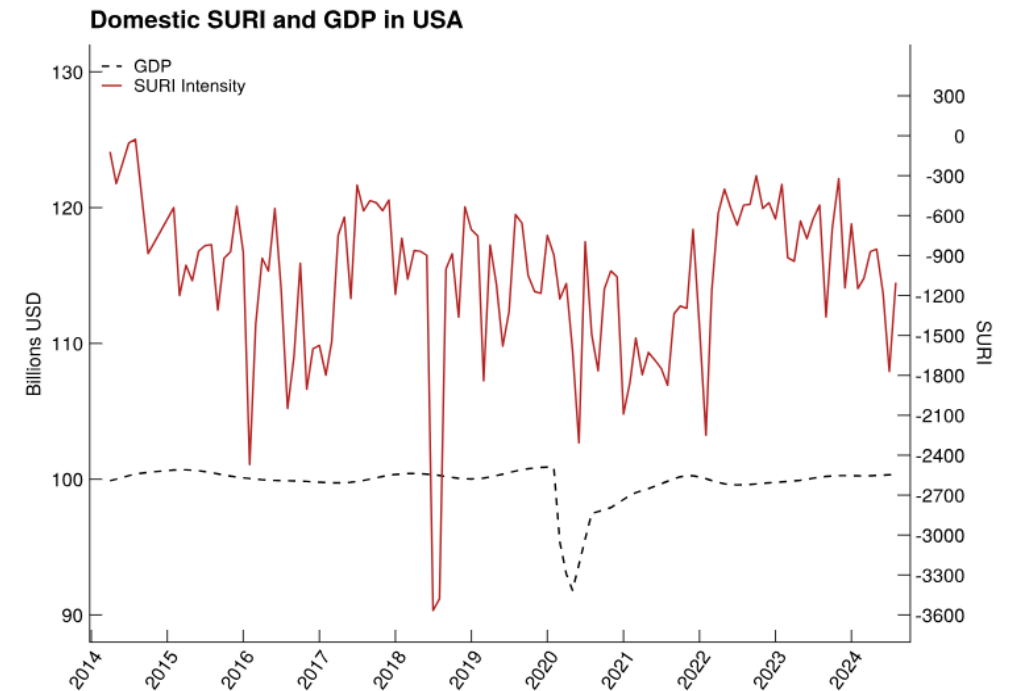
Country of Origin for
Actor1 and Actor2 are the same



Source: GDELT, OECD, and Federal Reserve Staff Calculations.

Method II

Both Actor1 and Actor2 are the USA

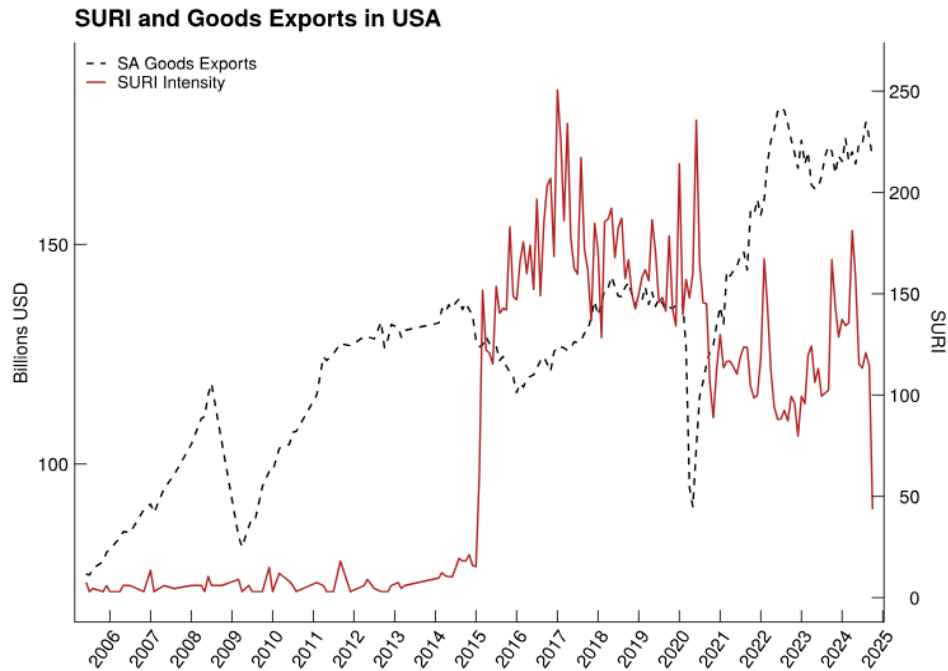


Source: GDELT, OECD, and Federal Reserve Staff Calculations.

PRELIMINARY ASSOCIATIONS: EXPORTS IN THE USA

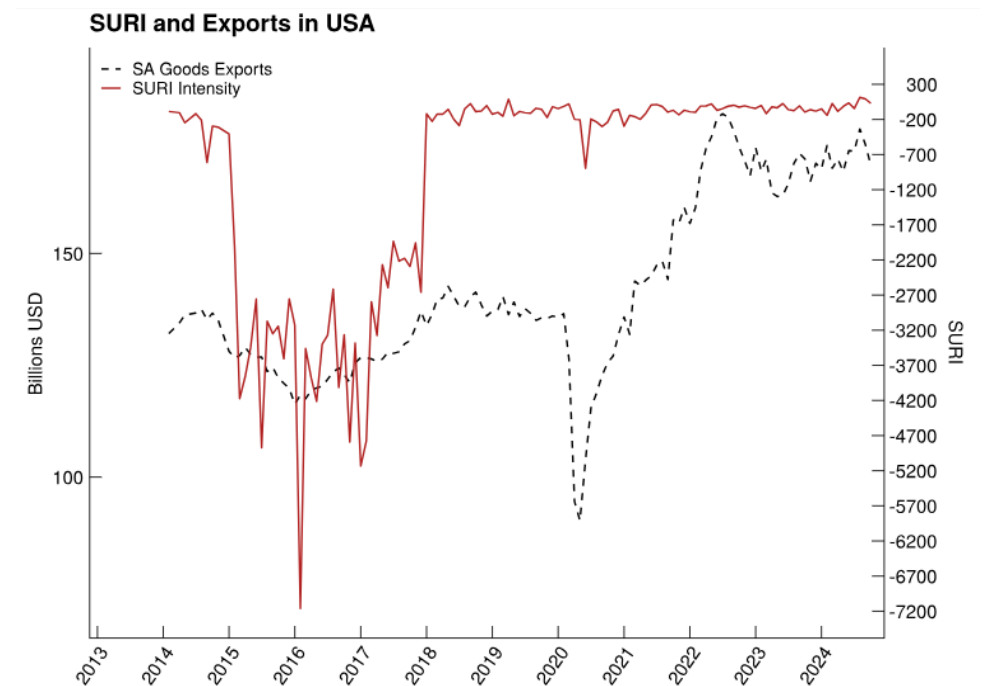
Method I

Country of Origin for
Actor1 and Actor2 are the same



Method II

Either Actor1 or Actor2 is the USA

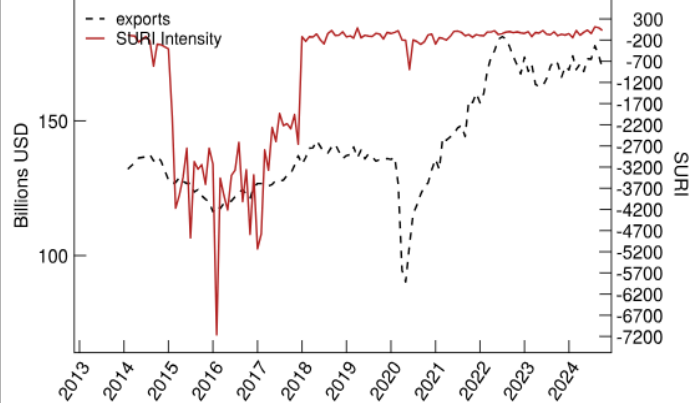


PRELIMINARY ASSOCIATIONS METHOD 2

LABELED "DOMESTIC": COUNTRY OF ORIGIN
FOR ACTOR1 AND ACTOR2 ARE THE SAME

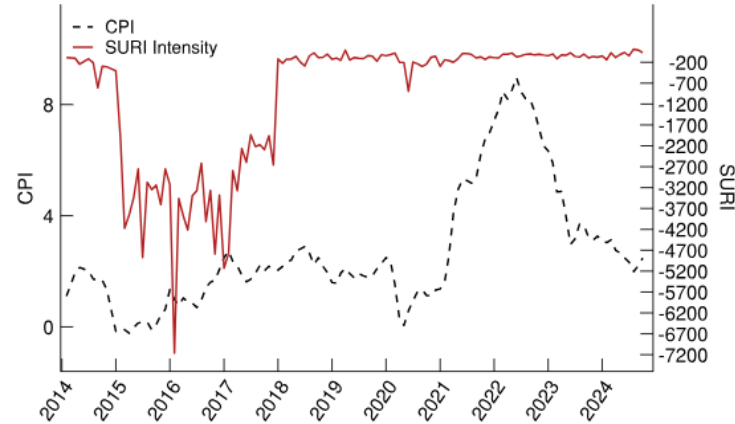
NOT LABELED "DOMESTIC": THE RELEVANT
COUNTRY IS THE COUNTRY OF ORIGIN FOR
EITHER ACTOR1 OR ACTOR2

SURI and Exports in USA



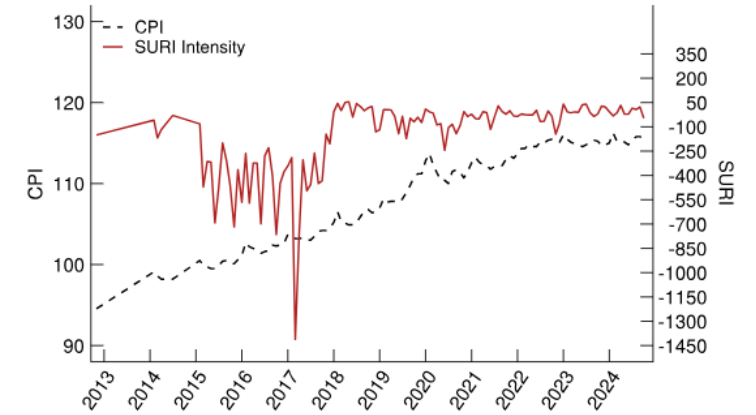
Source: GDELT, OECD, and Federal Reserve Staff Calculations.

SURI and Inflation in USA



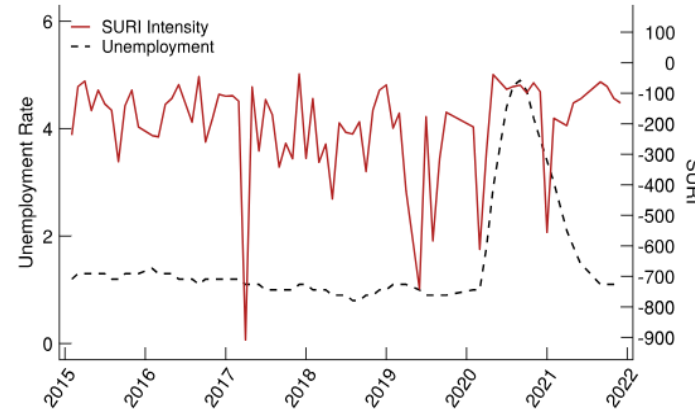
Source: GDELT, OECD, and Federal Reserve Staff Calculations.

SURI and Inflation in China



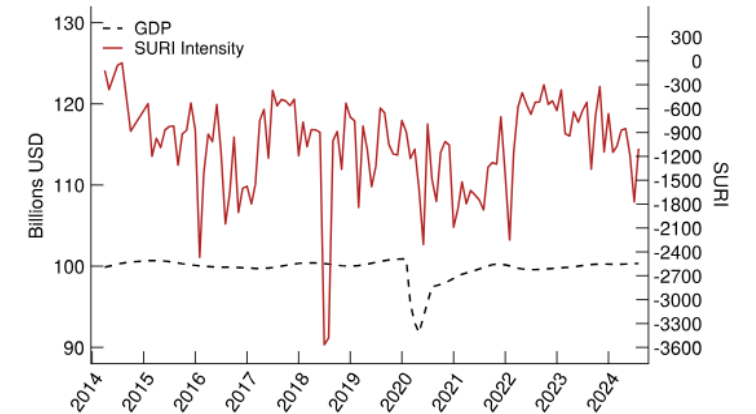
Source: GDELT, OECD, and Federal Reserve Staff Calculations.

Domestic SURI and Unemployment in Russia



Source: GDELT, OECD, and Federal Reserve Staff Calculations.

Domestic SURI and GDP in USA



Source: GDELT, OECD, and Federal Reserve Staff Calculations.