Do Geopolitical Risks Raise or Lower Inflation?*

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Abstract

Do geopolitical risks raise or lower inflation? Using a unique dataset containing historical macroeconomic data since 1900 for 44 countries, we find that geopolitical risks foreshadow high inflation and are accompanied by lower economic activity, an increase in military spending, public debt, and money growth, as well as supply disruptions and a decline in international trade. Higher geopolitical risks are also associated with more uncertain inflation and bigger upside risks to inflation. Using a monthly VAR model estimated on global data since the 1970s, we confirm that global geopolitical risks increase inflation, with the inflationary effect of higher commodity prices and currency depreciation more than offsetting the deflationary effects of lower consumer sentiment and tighter financial conditions.

KEYWORDS: Geopolitical Risk; War; Inflation; Commodity Prices; Fiscal Policy; Dollar; Vector Autoregressions; Panel Data Estimation.

JEL CLASSIFICATION: C30. D80. E31. F44. H56.

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1 Introduction

What is the relationship between adverse geopolitical events and inflation? In this paper, we use 120 years of data across 44 countries and various empirical techniques to examine this question. Although the magnitude of the effects varies across countries and time periods, we find that geopolitical risks are inflationary, and transmit to the broader economy by restraining trade, curtailing supply, leading to looser fiscal and monetary policies, and causing higher commodity prices.

Entrepreneurs, market participants, and policy-makers view geopolitical risks as key determinants of the economic outlook. Central banks, the International Monetary Fund, and the World Bank routinely highlight and monitor economic risks posed by geopolitical tensions. As an example of these concerns, the April 2022 edition of the International Monetary Fund's World Economic Outlook contains more than 200 mentions of the word "war." However, while a large amount of empirical evidence supports the notion that elevated geopolitical risks tighten financial conditions and weigh down on economic activity, there is little systematic exploration on their effects on inflation. This is the perspective we adopt in this paper.

From a theoretical standpoint, it is unclear whether elevated geopolitical tensions should lead to higher or lower inflation because they are a convolution of adverse demand and supply shocks which could potentially move inflation in either direction. On the supply side, wars and associated risks can destroy human and physical capital, shift resources to less efficient uses, divert international trade and capital flows, and disrupt global supply chains. On the demand side, uncertainty about the range of outcomes of adverse geopolitical events may weigh on activity, delay firms' investment and hiring, erode consumer confidence, and tighten financial conditions. Additionally, adverse geopolitical events may trigger increased public spending, such as debt-financed military spending. The overall inflationary effects depend on which of these forces dominate.

Figure 1 provides suggestive evidence that the adverse geopolitical events—as measured by the Caldara and Iacoviello (2022) geopolitical risk index—are historically associated both with higher global inflation and with a higher share of countries experiencing higher-than-average inflation. The rest of the paper digs deeper into this question, using historical data on a large panel of countries, and organizing the analysis around two datasets. To provide a broad historical perspective and explore channels of transmission—most notably fiscal policy—we first use a dataset containing annual data for 44 countries—17 advanced economies and 27 emerging economies. The dataset is described in Section 2 and runs from 1900 through 2022. It features

the country-specific geopolitical risk (GPR) indexes and country-level measures of inflation, GDP, military expenditures, public debt, trade, and money growth.

Section 4 takes a deeper dive into whether the association of a higher inflationary impact of geopolitical risks is dependent on particular global or country characteristics by estimating OLS and quantile regression models across different time horizons and group of countries. Like in the VAR specifications, these regressions find that inflation rises in response to both global and country-specific adverse geopolitical events. Furthermore, the response is pervasive and not conditional on particular sets of countries or time periods. Using quantile regressions, we document that geopolitical events generate large uncertainty and upside risks to inflation. Overall, these effects are strongest in the first two years after an increase in geopolitical risk. We further document some heterogeneity in how strongly inflation responds to geopolitical risk across different countries. We show that the heterogeneity in the effects of geopolitical risk on inflation is correlated with heterogeneous effects across countries of geopolitical risk on military spending—countries that experience a larger increase in military spending tend to experience higher inflation—and on trade—countries that experience a larger decline in trade tend to experience higher inflation.

In Section 5 we organize our analysis around a monthly dataset starting in 1970 and containing variables aggregated at the global level. The advantage of using monthly data is that they allow of a more granular analysis of the timing and the dynamics of the effects, especially for high-frequency financial variables that quickly react to news. We estimate a structural vector autoregressive (VAR) model of the global economy and illustrate our VAR results through a scenario that quantifies the rise in geopolitical risks observed in 2022 following the Russian invasion of Ukraine. According to our estimated model, the ripple effects of the 2022 war shock led to a rise in global inflation of about 1.3 percentage points while reducing the level of global GDP about 1.5 percent. The adverse effects of geopolitical risks operate through a decline in aggregate demand, captured by lower consumer sentiment and a drop in stock prices, and through a contraction in aggregate supply, captured by higher commodity prices and an appreciation of the dollar. While these channels all tend to reduce global activity, they can have opposite effects on inflation. Our results indicate that the inflationary contribution of higher commodity prices and the dollar appreciation—which implies that many countries experience a currency depreciation—more than offsets the deflationary effects of reduced aggregate demand.

Our paper makes three contributions. First, our work is the first to document that, across many countries and using a long sample period, geopolitical risks not only reduce activity but

also boost inflation, thus creating stabilization trade-offs for monetary and fiscal authorities. Second, we provide a systematic exploration of the relationship between geopolitical events and inflation for a large panel of countries. Related papers in this literature typically focus on the effects of wars on economic activity (Barro, 2006) and on fiscal policy (Ohanian, 1997; Ramey, 2011). Only a handful of studies touch upon the effects of wars on inflation, and typically the analysis is centered on the United States (Hall and Sargent, 2022; Rockoff, 2015). Third, we explore transmission channels that can be active around episodes of major geopolitical tensions. In line with a vast literature on the fiscal determinants of inflation, we show that higher military spending and higher public debt are inflationary (Sims, 1994). We also contribute to the literature quantifying the effects of higher oil and commodity prices on inflation (Blanchard and Gali, 2007; Coibion and Gorodnichenko, 2015; Conflitti and Luciani, 2019; Aastveit et al., 2023).

2 The Data

In this section, we discuss construction of two datasets that underlie our empirical analysis.

2.1 Country-Level Historical Annual Data

Our first dataset comprises an annual panel that spans from 1900 to 2022 and covers 44 advanced and emerging economies.[1] This panel includes country-level measures of inflation and GDP, as well as other economic indicators: military expenditures, public debt, trade openness, government spending, and money growth. The recent data on inflation are from the IMF's International Financial Statistics and is extended back to 1900 using historical data from Jordà et al. (2017) and, for countries not in their database, Reinhart and Rogoff (2009). To minimize the impact of hyper-inflationary episodes, we winsorize the inflation data at the 1st and 97.5th percentiles.

Real GDP per capita data are from Barro and Ursúa (2012), and extended through 2022 using the World Bank's World Development Indicators (WDI) database. Military expenditures data are from Roser and Nagdy (2013). Debt to GDP ratio data are from Jordà et al. (2017); we fill in missing data from some countries using the IMF's Public Finances in Modern History

[1] Advanced economies include Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States. Emerging market economies include Argentina, Brazil, Chile, China, Colombia, Egypt, Hong Kong, Hungary, India, Indonesia, Israel, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Saudi Arabia, South Africa, South Korea, Taiwan, Thailand, Tunisia, Turkey, Ukraine, Venezuela, and Vietnam.

database and Reinhart and Rogoff (2009), with debt defined as the sum of domestic and external public debt for a given country. Recent data is added to this measure using WDI and the IMF World Economic Outlook. Trade to GDP ratio data are defined as the sum of total imports and exports over nominal GDP, and are from Jordà et al. (2017) and Barbieri et al. (2009). Money growth data are the yearly growth in broad money, with data coming from Jordà et al. (2017) and extended, where available, using the WDI database. Money growth is also winsorized at the 1 and 97.5 percentiles.

Table 1 provides summary statistics for the variables in our panel. Average annual inflation for a country in this sample is 9.2 percent, but the panel contains sizeable variability and episodes of particularly high inflation, largely coming from years surrounding world war I and II in advanced economies and from the inflationary experiences of many emerging countries. Countries in our sample display a wide range of fiscal positions, with an average debt to GDP ratio of 47.7 percent and an average share of military spending in GDP of 4.2 percent. Trade to GDP ratios are 48.6 percent and money growth 14.4 percent, on average, in our sample.

We complement this panel with the country-level measures of geopolitical risk based on Caldara and Iacoviello (2022). Geopolitical risk is defined as the threat, realization, and escalation of adverse events associated with wars, terrorism, and any tensions among states and political actors that affect the peaceful course of international relations. Country-specific geopolitical risk is constructed by using news-based mentions of adverse geopolitical events together with a country's name (or its capital city). Accordingly, country-specific indexes capture the exposure of a given country to geopolitical concerns and conflicts.

The construction of a large panel allows a deeper dive into the relationship between geopolitical risk and inflation at the country level. Figure 2 illustrates the joint behavior of GPR and inflation for a selected group of advanced and emerging countries. Historically, periods of high geopolitical risk are associated with higher inflation across countries. While major spikes in geopolitical risk and inflation have been influenced by global events like the World Wars, they are not the sole contributors. For instance, in emerging economies, we observe many large co-moving spikes in GPR and inflation throughout the latter half of the twentieth century, demonstrating the driving force of emerging markets in this correlation after 1950.

Finally, for our US-specific study in section 3.2, we add to this panel news about military spending as a share of GDP (Ramey, 2011).

2.2 Global Monthly Time-Series Data

Our second dataset consists of monthly data on the global economy from 1974 through 2022. We include the following macroeconomic and financial variables: world GDP, world inflation, consumer confidence, oil prices, stock prices, commodity prices, and the dollar exchange rate. Our measure of world GDP is taken from Cuba-Borda et al. (2018). World inflation is a world aggregate of countries' twelve-month change in the consumer price index from Global Financial Data. The consumer confidence index is from the Organization for Economic Cooperation and Development, and oil prices from the West Texas Intermediate Index. For financial data, we measure global monthly stock prices using the FTSE World Dollar index, commodity prices using the S&P Goldman Sachs Commodity Index, and the dollar exchange rate using the Federal Reserve Board broad dollar index. When using the monthly data, we utilize the monthly global measure of geopolitical risk from Caldara and Iacoviello (2022). In addition, the headline global GPR is broken down into two separate components, the geopolitical threat (GPT) and the geopolitical acts (GPA) indexes. The GPT index is based on articles that include phrases related to threats and concerns about scope, duration, and ramifications of geopolitical tensions, while the GPA index concerns phrases referring to the outbreak and actual unfolding of wars.

3 The Inflationary Effects of Geopolitical Risk: Country-Level Evidence

In this section, we assess the effects of geopolitical risk on inflation by estimating VAR models on country-level data. In all VAR models estimated in the paper, we identify a GPR shock by using a Cholesky decomposition of the covariance matrix of the VAR reduced-form residuals, ordering the GPR index first. The ordering implies that any contemporaneous correlation between economic variables and the GPR indexes reflect the effect of the GPR index on the economic variables. The characteristics of the GPR indexes discussed in Caldara and Iacoviello (2022) support this assumption, as the indexes capture events that are typically not caused by economic conditions within the same year. We estimate the models using two lags and we bootstrap the standard errors.

3.1 International Evidence

We start our analysis by estimating a bivariate panel VAR on country-specific GPR indexes and inflation. This specification has the benefit of exploiting the largest possible sample of observations on inflation at our disposal, as the analysis is constrained only by lack of reliable data on inflation, mostly at the beginning of the sample or during hyper-inflationary episodes. Of note, this bivariate panel VAR (which leaves out the United States) covers 43 countries for a total of 4,670 observations.

A rise in country-specific geopolitical risks produces inflationary effects. We illustrate this result in Figure 3, which displays the impulse responses to a country-specific one-standard-deviation GPR shock. The median response to the shock is marked by the solid blue line, while the dashed lines show the 90% confidence interval bands. In response to an increase in geopolitical risk within a country, domestic inflation rises nearly 3 percentage points within the first three years, slowly declining thereafter.

To gather insight into the transmission of GPR shocks to inflation, we add seven more variables to the panel VAR: real GDP per capita, military spending to GDP, debt to GDP ratios, trade to GDP ratios, government spending to GDP, a news-based global index of shortages, and money growth.[2]. As before, we exclude the United States from the baseline specification, and focus on the U.S. in the next subsection. In total, this specification contains 3,034 observations in total.

As shown in Figure 4, in response to a one-standard deviation shock to GPR, inflation raises by about 2 percentage points. While this response is slightly more muted than in the bivariate specification, it is remarkably robust given the different model specifications and in spite of the smaller number of observations. While inflation goes up, GDP drops by 1 percent after the first year, and keeps declining relative to baseline up to five years after the shock.

It is illustrative to decompose the transmission into two blocs, the supply and the demand one. For ease of exposition, we group the response of trade and shortages as illustrative of supply-side developments, while the response of military spending, money growth and fiscal variables is taken as illustrative of demand-side developments. Such decomposition is motivated by the observation that in a simple Choleski identification of all the residual form shocks

[2] Figure A.1 illustrates the data coverage for each country-year. The news-based index of shortages measures the share of articles in six newspapers mentioning the words shortage* OR bottleneck OR scarcity OR rationing and is described in detail in Caldara et al. (2024). The index is plotted in Appendix Figure A.2. The resulting specification includes a total of 42 countries (it excludes Hong Kong due to lack of data on military spending data). For the purposes of the panel VAR, we use country-specific cubic trends to detrend GDP and trade-to-GDP.

from the panel VAR, trade and shortages shocks move inflation up and GDP down, whereas innovations to the other variables generate positive comovement between inflation and GDP, thus suggesting demand-side forces.

On the supply side, adverse geopolitical events result in lower trade and higher incidence of shortages. On the demand side, military spending increases, as adverse geopolitical events are associated with wars or higher risk of wars. Government spending as a share of GDP goes up substantially, and so do public debt and money supply. These responses are in line with studies observing increased public expenditure, debt, and money supply in response to conflicts, as for instance documented by Hall and Sargent (2022) for the United States.

How do demand and supply forces lead to higher inflation in the aftermath of adverse geopolitical events? To answer this question, we conduct two simple counterfactuals that illustrate how both forces contribute to the positive response of inflation to adverse geopolitical events. Figure 5 shows the results of this exercise.

In the first counterfactual scenario, we hold trade openness and supply disruptions at baseline in response to the GPR shock, using the methodology of Leeper and Zha (2003), Sims and Zha (2006), and Kilian and Lewis (2011), among others. In particular, we create a hypothetical sequence of trade shocks and shortages shocks that zero out the response of trade and shortages to the GPR shock at every horizon.[3] Were trade and shortages to remain at baseline, the rise in inflation would be materially lower, and the decline in GDP would be attenuated.

In the second counterfactual, we hold military spending, public debt, and money growth constant at baseline in response to a one-standard deviation GPR shock. After shutting down the expansionary fiscal and monetary responses that follow a GPR shock, the rise in inflation is nearly half as in the baseline scenario. However, the counterfactual GDP decline is much larger, due to the lack of economic stabilization provided by such policies.

3.2 U.S. Evidence

Among the major superpowers, the United States holds a distinct position in history, as it stands alone in having never experienced a foreign conflict on its soil. Consequently, due to this unique circumstance, the economic ramifications on the U.S. resulting from conflicts in which it is involved are likely to be different.

[3] The shocks in the VAR for the counterfactual are identified using a recursive identification scheme with variables ordered as follows: GPR, Inflation, GDP, Trade, Shortages, Military Spending, Debt, Money Growth and Government Spending.

To delve into the historical U.S. experience following geopolitical risk shocks, we run a similar specification of the VAR in the previous subsection, with one modification. Specifically, we replace trade with the military spending news variable, as described by Ramey (2011). Figure 6 outlines the results. A one-standard deviation increase in geopolitical risk raises inflation by slightly over 2 percentage points, in line to what we find in the full panel. By contrast, the level of GDP rises, peaking at 2 percent above trend before starting to decline.

We conjecture that higher GDP and inflation are attributable to a demand channel stemming from a strong public demand—due to very a large increase in military spending—that more than offsets weak private demand and confidence as well as the typical disruptions associated with the negative supply shock that are found outside of the United States. In the VAR model of the global economy previously described, military and government spending as a share of GDP increase by 1 percentage point. By contrast, in the U.S.-specific model, this increase is about three times larger. Absent major supply disruptions, GDP overall rises. Such observation is consistent with the U.S. experience during major geopolitical events, most notably World War II, when American industry supplied almost two-thirds of all Allied military equipment. In addition, high geopolitical risk triggers immediate news about prospective increases in military spending, which come to fruition in the years that follow.

This analysis underscores the unique resilience of the U.S. economy in weathering adverse geopolitical events during the full sample from 1900 through 2022.

That said, it also underscores that responses may vary by sample period and by country. We address these issues in the next section.

4 Country-Level Evidence Across Time and Space

In this section, we study how the relationship between geopolitical risk and inflation varies across time and depends on country characteristics.

4.1 Illustrative Evidence

It is tempting to be skeptical of the relationship between geopolitical risk and inflation on two grounds. First, the relationship could be heavily influenced by outliers such as the two World Wars. Second, the relationship could be limited to a few hyper-inflationary episodes in a few countries or groups of countries. Figure 7 illustrates that the relationship is not just driven by a few outliers, by showing binned scatter plots. When the entire sample is broken in six distinct subperiods, the positive relationship between year on year changes in GPR and

two-year changes in inflation is common across all sub-periods, and is not driven only by the period around the two world wars. Of note, the relationship is somewhat relatively weaker in the 1981-2009 sample, and stronger in the 1920-1938 sample. In the bottom row, the positive relationship holds both for advanced and for emerging economies, and at both low and high levels of inflation.

4.2 Effects by Subsample and along the Distribution

The suggestive evidence coming from the scatter plots of Figure 7 is confirmed by formal regression that explore the relationship across time and space. First, we estimate the average effects of geopolitical risk on inflation in country i at horizon h with the following panel regression:

$$\Delta\pi_{i,t+n} = \alpha_i + \beta\Delta GPRC_{i,t} + u_{i,t}, \tag{1}$$

where $\Delta\pi_{i,t+n}$ is inflation n horizons ahead relative to inflation in year $t-1$, α_i are country-fixed effects, and $\Delta GPRC_{i,t}$ is one-year change in country-specific GPR index. We use the one-year change in GPR rather than the actual level to capture the spirit of the panel VAR of the previous section, where the driving force of inflation are surprise changes (shocks) in the GPR index. In addition to this baseline, we run different specification of this equation, controlling for the global GPR index (GPR_t), splitting the sample by advanced and emerging economies, and limiting the sample to the post-1950 period, respectively.

Second, we use quantile regressions to measure the effects of GPR over the conditional distribution of contemporaneous and future inflation. While average effects are important, geopolitical risks can have a substantial impact on uncertainty and the risk of particularly elevated future inflation. Both can arise as major geopolitical events are relatively infrequent but can have extremely large effects, in line with the rare-disasters literature (Barro and Ursúa, 2012). The regressions are of the following form:

$$\mathcal{Q}_\tau(\Delta\pi_{i,t+n}|x_{i,t}) = \alpha_\tau + \beta_\tau GPRC_{i,t}. \tag{2}$$

The regression in equation (2) estimates the best linear predictor of the quantile τ of the change in inflation from period $t-1$ to $t+n$, conditional on changes in country-specific geopolitical risk, denoted by $\Delta GPRC_{i,t}$. We include country fixed effects so that the coefficients on GPR variables can be interpreted as capturing the effects of geopolitical risk for the distribution of a country's future inflation. We estimate equation (2) at the median, at the 10th quantile—

measuring the left tail of the inflation distribution—and at the 90th quantile—measuring the right tail of the inflation distribution associated with high inflation readings.

Table 2 tabulates the results from estimating equations (**??**) and (2), which each column showing the effects on inflation at different years. In the first row of the table, a one standard deviation increase in country-specific geopolitical risk raises a country's inflation relative between two and three percentage points after two years, in line with the panel VAR estimates.

The next rows confirm the robustness of these results across different time periods and country groups. In the second row of the table, even after controlling for global GPR, a domestic increase in geopolitical risk still raises a country's inflation by nearly three percentage points between two to four years the shock. This inflationary response is not limited to any particular stage of a country's development. The response across advanced economies is slightly larger than the response across emerging economies. Finally, this pattern in inflationary response is not solely attributable to events like the two world wars or other early 20th-century occurrences. When we run the same regression starting in 1950, the inflationary response is only one percentage point smaller, only marginally muted compared to the entire sample period.

The last three rows show the results for different quantiles τ. We find consistently positive coefficients across quantiles, suggesting that higher geopolitical risk is associated with increases in inflation across the entire distribution of inflation, not just on average. If anything, geopolitical risk appears to have slightly stronger effects on inflation at low levels of inflation, since the $q10$ coefficients are somewhat larger than the $q90$ ones.

4.3 Cross-Country Heterogeneity

The relationship between geopolitical risk and inflation may differ across countries. We document this finding by estimating panel regressions that allow for different country-specific elasticities to GPR. Specifically, we estimate the effect of geopolitical risk on variable X in country i in year $t+n$ with the following regression:

$$X_{i,t+n} = \alpha_i + \beta_i GPRC_{i,t} + X_{i,t-1} + u_{i,t}, \tag{3}$$

where $X_{i,t+n}$ is the dependent variable n horizons ahead, $X_{i,t-1}$ is the level of the variable in year $t-1$, $GPRC_{i,t}$ is the standardized country-specific GPR index, and the α_i denote country fixed effects. We consider five variables in this analysis, so that X_i denotes inflation, GDP, military spending, money supply, and trade. We set $n = 3$, in line with the VAR evidence that

inflation peaks about three years after a GPR shock. Accordingly, β_i denotes the response of variable X three years after a 1-standard deviation increase in a country GPR index.

Figure 8 visualizes the results using four scatter plots, each depicting point estimates of the β_i coefficients as follows. Each y-axis plots the response of inflation to geopolitical risk by country. Inflation responses are mostly positive, with only a handful of countries experiencing a decline in inflation, and by bulk of the positive response ranging between 0 and 5 percentage points. Most of the countries responses range between 0 and 5 percentage point. Some countries experience more outsize inflationary effects, with the largest effects taking place in China and Japan.

The x-axis depicts the responses across countries of GDP, military spending, money supply, and trade. Larger inflationary responses are associated with larger GDP declines, suggesting that geopolitical shocks are more likely to manifest themselves as "supply" than "demand" shocks. The demand component is important as well, as highlighted by the panel VAR analysis. Larger increases in inflation go hand in hand with higher military spending and higher growth in money supply. Of note, inflation rises marginally more in countries with larger declines in trade to GDP.

5 The Global Effects of Geopolitical Risk since 1970s: An Application to the Russian Invasion of Ukraine

In this section, we assess the effects of geopolitical risk on inflation estimating a monthly VAR model of the global economy. We do this for three reasons. First, some of the effects of geopolitical risks are, broadly speaking, global in nature. For instance, some wars cause global commodity prices to spike when threatening supply. Second, annual data are not well-suited to quantify the effects of geopolitical risks on fast-moving variables, such as commodity and stock prices. These variables react immediately to news about adverse geopolitical developments. Finally, a monthly VAR model allows to easily construct scenarios to track the effects of historical and ongoing geopolitical events.

The model includes all variables in our monthly time-series database: world GDP, world inflation, global stock prices, real oil prices, the broad real dollar, commodity prices, global consumer confidence, and the geopolitical threats (GPT) and acts (GPA) indexes as measures of geopolitical risks. The VAR model uses data from January 1974 through April 2022 and includes three lags. We assume that changes in the GPT and GPA indexes drive all within-month fluctuations in the other economic variables, so that any contemporaneous

correlation between geopolitical risks and financial variables, say, is assumed to reflect the effect of geopolitical risks on financial variables, rather than the other way around. But with a lag, each variable can affect all variables. We estimate the model using Bayesian techniques. Specifically, we use an uninformative prior as in Uhlig (2005) and take 10000 draws from the posterior distribution of the model parameters.

5.1 Quantifying the Effects of the Russia Invasion of Ukraine

We illustrate the global effects of geopolitical risks through a scenario analysis of the onset of Russia's invasion of Ukraine. Specifically, we use the model to extract the historical realization of shocks to GPT and GPA. We then construct a simulation that tracks the dynamic effects of the shocks that materialized between January and April 2022. We pick April 2022 as the last period since most of the positive innovations to geopolitical risk in 2022 took place between January and April.[4]

Figure 9 shows that the global effects of GPR shocks resemble those of shocks to supply. The solid lines plot the median response of world GDP and world inflation in the simulation relative to a no-war baseline where there is no shock to geopolitical tensions. The dashed lines depict the 70 percent credible sets. The rise in geopolitical risks observed during this period is estimated to produce a drag on world GDP that builds throughout 2022, culminating to a negative impact of around 1.7 percent. Such contractionary effects of GPR are in line with previous literature documenting drops in economic activity for countries experiencing disasters, including adverse geopolitical events, as documented for instance in Barro (2006) and Glick and Taylor (2010). Meanwhile, the rise in geopolitical risks boosts prices, causing an increase in global inflation of 1.3 percentage points by the second half of 2022, after which the effects begin to subside.

5.2 Global Channels of Transmission

What are the global channels of transmission of GPR shocks? With various channels controlled for, the structural VAR estimates leave us well-positioned to answer this question. Figure 10 presents a more detailed picture of the way the global economy responds to a geopolitical risk shock. The estimates highlight how effects of elevated geopolitical risks in 2022 are associated with declining consumer confidence and stock prices, factors that weaken aggregate demand.

[4] Between January and April 2022, the average size of the GPT shocks was 2 standard deviations, while the average size of the GPT shock was 0.7 standard deviation. Hence, these impulse responses reflect a combination of GPT and GPA shocks in a three-to-one ratio.

Meanwhile, the exchange value of the dollar appreciates, in line with the evidence that spikes in global uncertainty and adverse risk sentiment can trigger flight-to-safety international capital flows Forbes and Warnock (2012). The dollar appreciation is inflationary for all countries except the U.S., as their currency depreciates raising the price of imports priced in dollar. Lastly, commodity prices and oil prices increase, putting downward pressure on global activity and upward pressure on inflation. Anayi et al. (2022) show that the Russian invasion of Ukraine has led to an increase in several measures of economic uncertainty.

Taken together, our results suggest that the coexistence of deflationary pressures—coming from lower aggregate demand—and inflationary pressures coming from supply-side disruptions, resolves in favor of the latter, with geopolitical events generating a simultaneous decline in economic activity and rise in inflation.

6 Conclusions

Global geopolitical risks soared after Russia's invasion of Ukraine, bringing at the forefront concerns of investors, market participants, and policymakers that wars and adverse geopolitical events can exert a drag on the global economy while pushing up inflation.

We used historical data for a large panel of countries to quantify the relationship between inflation and geopolitical tensions. Using annual historical panel data, we documented that global and country-specific geopolitical shocks are largely inflationary, a result that appears remarkably consistent across countries and over time. In a more recent monthly sample from 1970 onward, geopolitical risks increase global inflation, with the inflationary effects of fiscal policy, higher commodity prices and supply disruptions more than offsetting the deflationary effects of lower consumer sentiment and tighter financial conditions.

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Table 1: Summary Statistics

	Average	St.Dev.	p5	p50	p95	N
Inflation (%)	9.3	18.7	-5.0	3.8	45.3	4,793
Advanced Economies	4.4	6.9	-3.4	2.5	18.3	2,091
Emerging Economies	15.6	35.3	-6.3	5.4	77.8	2,702
GDP (%)	2.3	6.3	-6.9	2.4	10.1	4,920
Govt Spending to GDP (%)	19.4	10.2	5.6	18.2	39.0	4,242
Military Spending to GDP (%)	4.2	7.5	0.7	2.3	14.4	4,164
Public Debt to GDP (%)	47.3	37.1	6.9	39.0	116.0	4,168
Trade to GDP (%)	35.5	37.8	3.8	27.9	86.8	4,343
Money Growth (%)	14.4	16.0	-0.5	10.0	49.2	3,507
Country GPR	0.0	1.0	-0.8	-0.3	2.0	5,412

The table presents the mean, standard deviation, 5th percentile, 95th percentile, and count for key variables on the sample of 44 countries from 1900 to 2022. GDP growth indicates growth in real GDP per capita. Inflation and money growth are winsorized at the 1 and 97.5 percentiles. The GPR index is standardized at the country level. Trade to GDP ratio is the sum of imports plus exports, expressed as a percent of GDP. GDP, government spending, military spending, public debt, trade, and money growth data are all in percent terms.

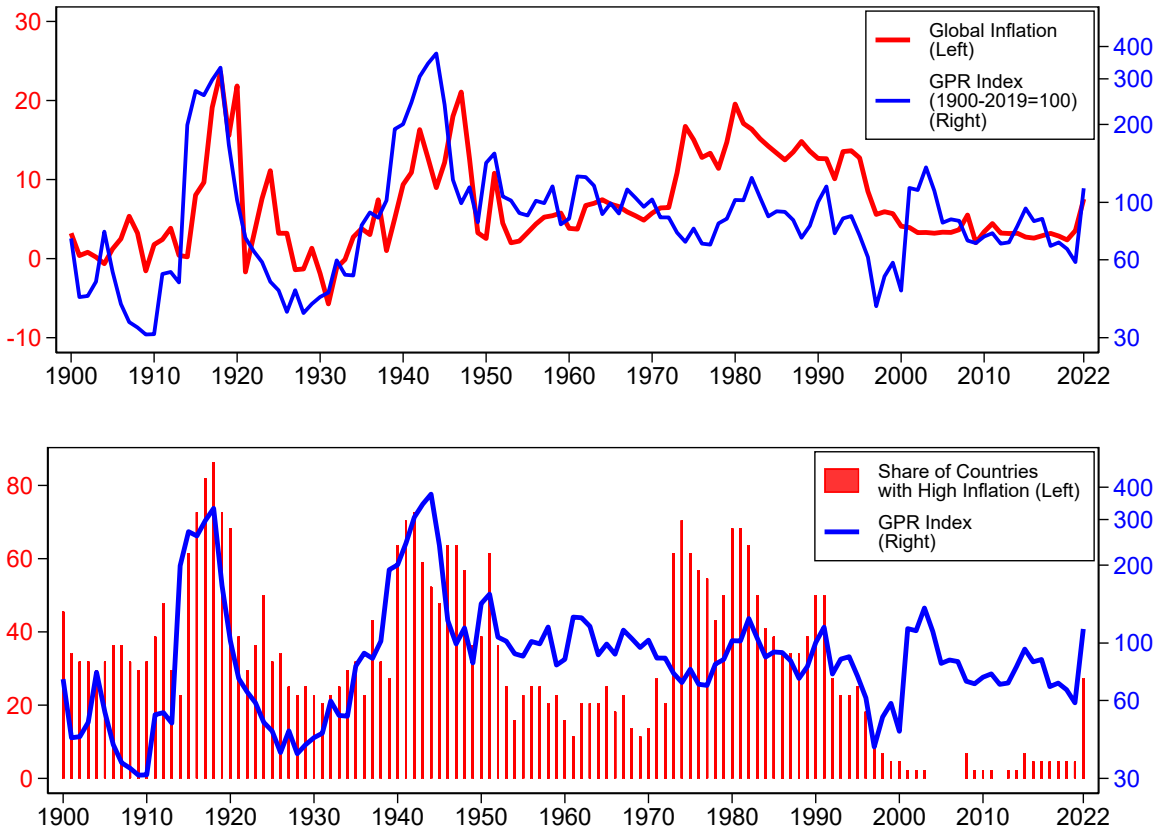
Table 2: Effects of an Increase in Country-specific Geopolitical Risk

	Horizon				
Inflation	t	$t+1$	$t+2$	$t+3$	$t+4$
Baseline	1.06	2.20	2.84	2.74	2.79
	(0.43)	(0.50)	(0.63)	(0.72)	(0.76)
Robustness					
Controlling for global GPR	0.98	2.10	2.74	2.68	2.79
	(0.44)	(0.46)	(0.62)	(0.72)	(0.74)
Advanced Economies	1.28	2.43	3.75	4.12	3.68
	(0.83)	(0.74)	(1.09)	(1.37)	(1.39)
Emerging Economies	0.95	2.08	2.33	1.95	2.27
	(0.44)	(0.61)	(0.62)	(0.53)	(0.67)
Post-1950s	1.04	1.67	1.86	1.64	1.81
	(0.37)	(0.61)	(0.56)	(0.55)	(0.69)
Quantiles					
q10	1.51	2.59	2.90	3.22	2.84
	(0.42)	(0.56)	(0.69)	(0.66)	(0.95)
q50	1.06	2.20	2.84	2.73	2.79
	(0.24)	(0.42)	(0.43)	(0.47)	(0.53)
q90	0.58	1.79	2.78	2.24	2.73
	(0.60)	(0.77)	(0.75)	(0.77)	(0.76)
Observations(Baseline)	4,746	4,691	4,637	4,584	4,532
Number of Countries (Baseline)	44	44	44	44	44

Standard errors in parenthesis clustered by country and year.

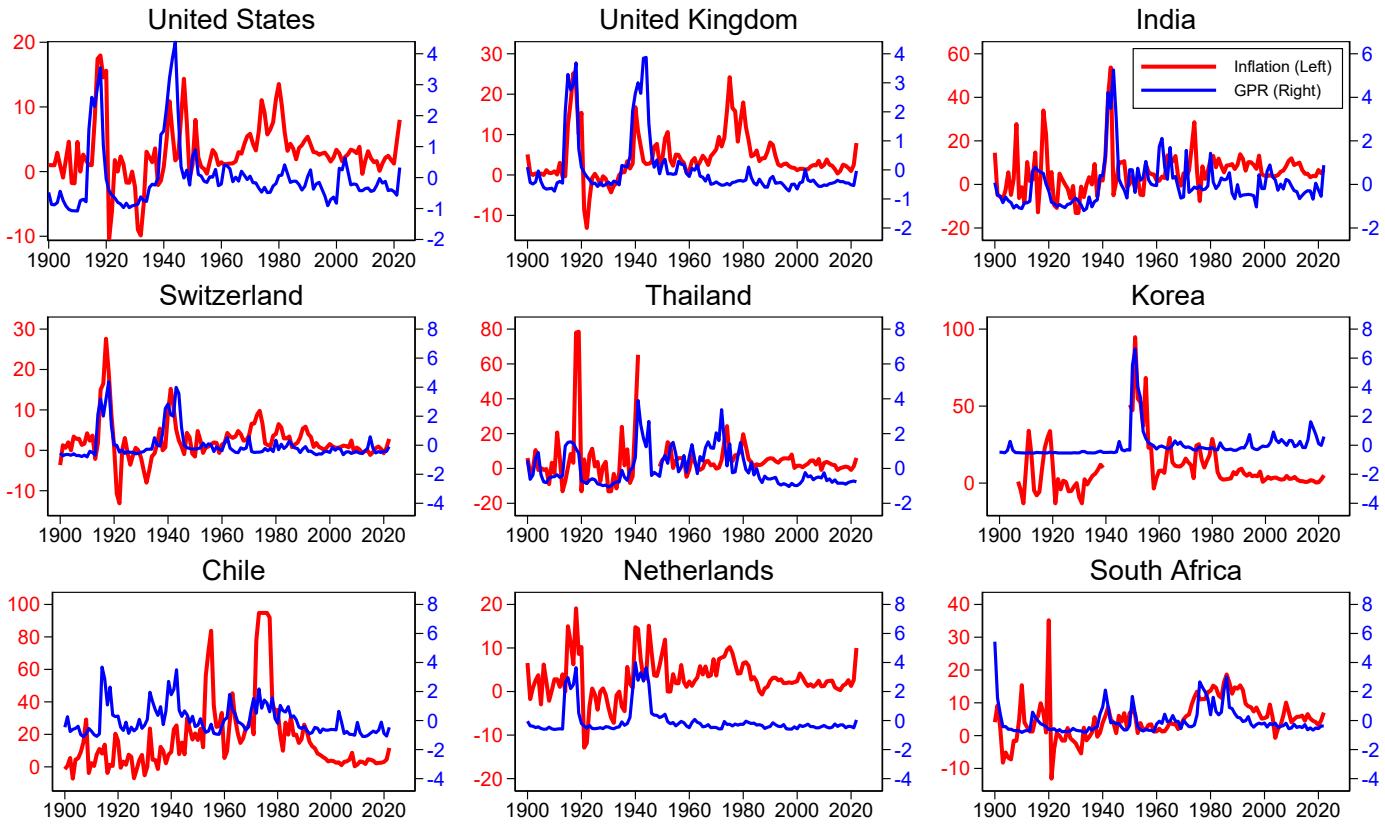
Effects of inflation on geopolitical risk in a panel of countries from 1900 to 2022. Inflation is annual inflation in year $t+n$ minus its value in year $t-1$, with results shown at five different horizons n. Each row displays the effect of country-specific geopolitical risk in different specifications. "Global GPR" is the effect when controlling for standardized global geopolitical risk. "Advanced Economies", "Emerging Economies", and "Post-1950s" are the effects when limiting the sample to only those sets of countries or years. Quantile coefficients report the effects at the 10th, 50th, and 90th percentile of the distribution of inflation. Inflation is winsorized at the 1 and 97.5 percentiles. Country-specific geopolitical risk is standardized to have a mean of 0 and standard deviation of 1 for each country. All specifications include country fixed effects.

Figure 1: Global Inflation and Global Geopolitical Risk since 1900



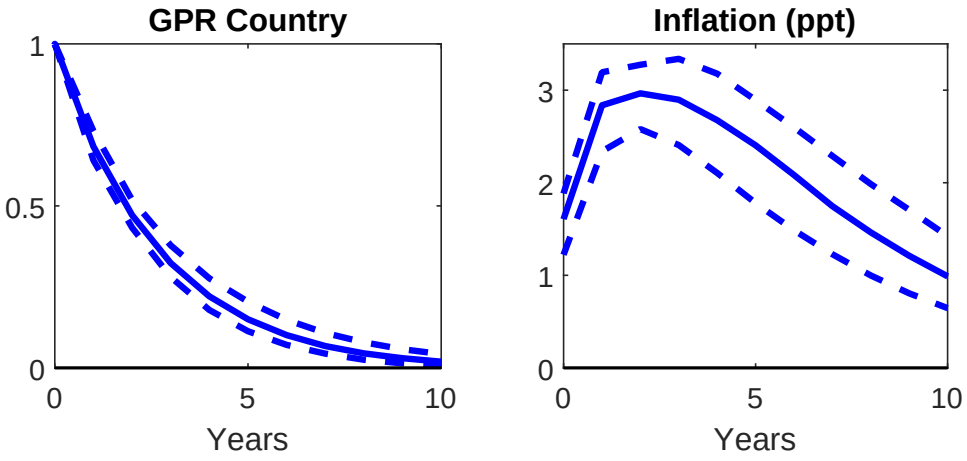
Top panel: Global Inflation and Global Geopolitical Risk from 1900 through 2022. Global inflation is calculated by averaging inflation for countries in our sample using real GDP weights. Bottom panel: Share of countries with "high" inflation and Global Geopolitical Risk from 1900 through 2022. We regress inflation on country fixed effects, and dummies for 1900-1945, 1946-1972, 1973-2022, each interacted with an advanced economy dummy. A country has "high" inflation when the residual is greater than 5 percent, corresponding to about 10 percent of the observations. Global Geopolitical Risk is plotted on a logarithmic scale and is expressed as annual average of monthly readings.

Figure 2: Country-Specific Inflation and Geopolitical Risk since 1900



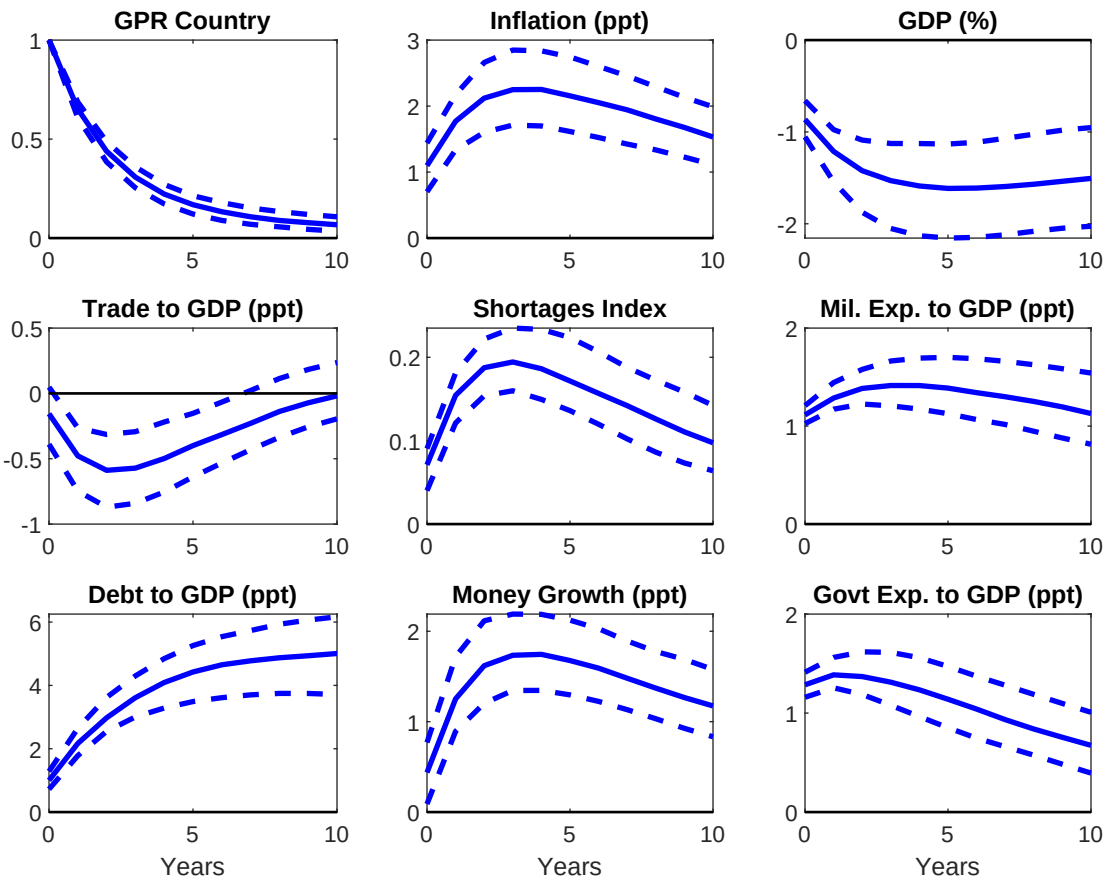
Each panel displays inflation and geopolitical risk from 1900 through 2022 for a selection of advanced and emerging economies. Inflation is winsorized at the 97.5 percentile, with winsorized values are represented by a dotted line. Country-specific geopolitical risk is standardized so as to have 0 mean and unit standard deviation in each country.

Figure 3: Effects of Geopolitical Risk on Inflation: Bivariate Panel VAR from 1900 to 2022



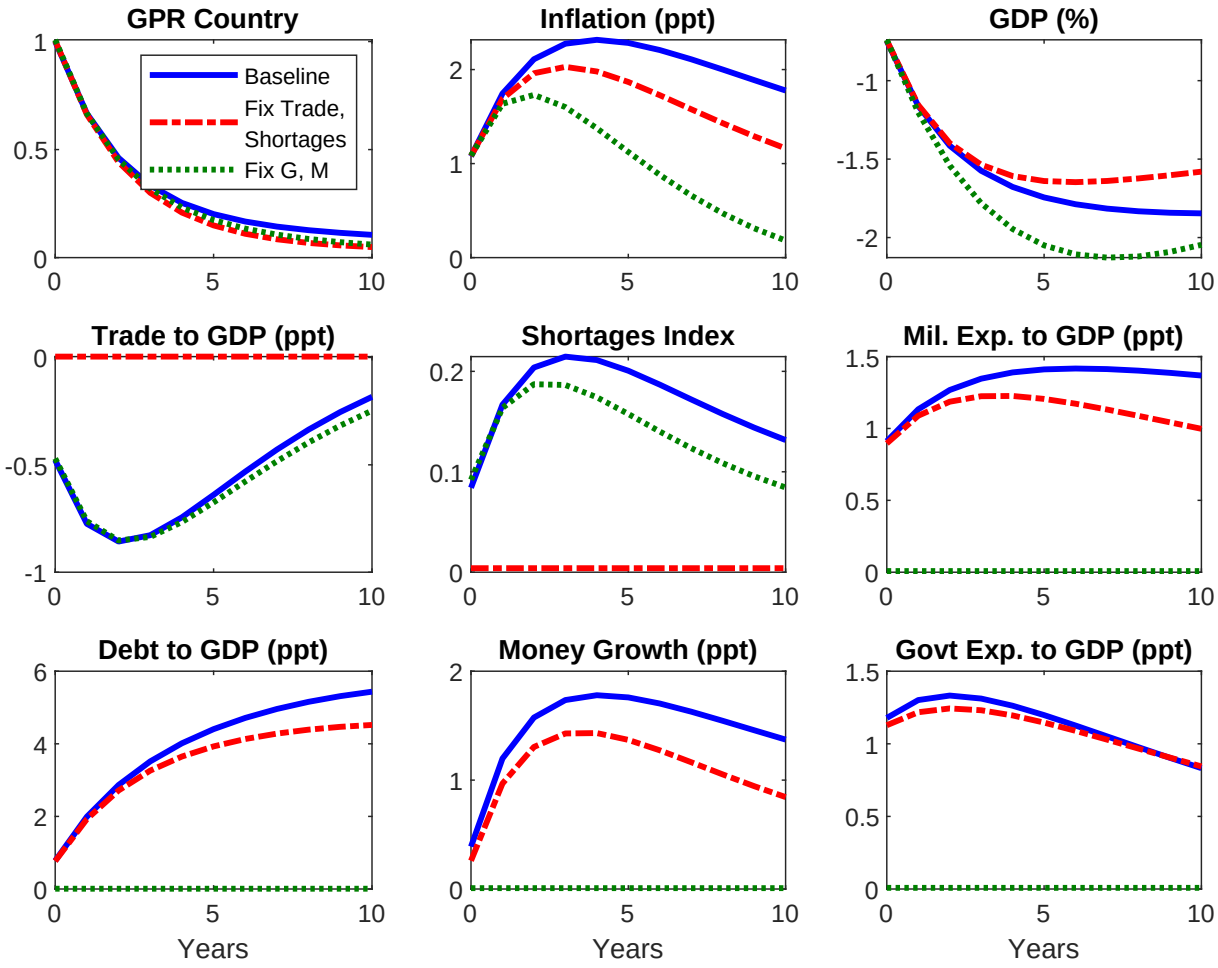
Note: The figure plots the response over time of geopolitical risk and inflation to a one standard-deviation shock to country-specific geopolitical-risk. The impulse responses were estimated using a panel vector autoregression model. Data is annual from 1900 to 2022. The solid blue lines in the figure plot the central estimates. The dashed blue lines denote bootstrapped 90 percent confidence intervals (using 500 replications). Variables are plotted in deviation from baseline.

Figure 4: Effects of Geopolitical Risk on Inflation: Multivariate Panel VAR, 1900-2022



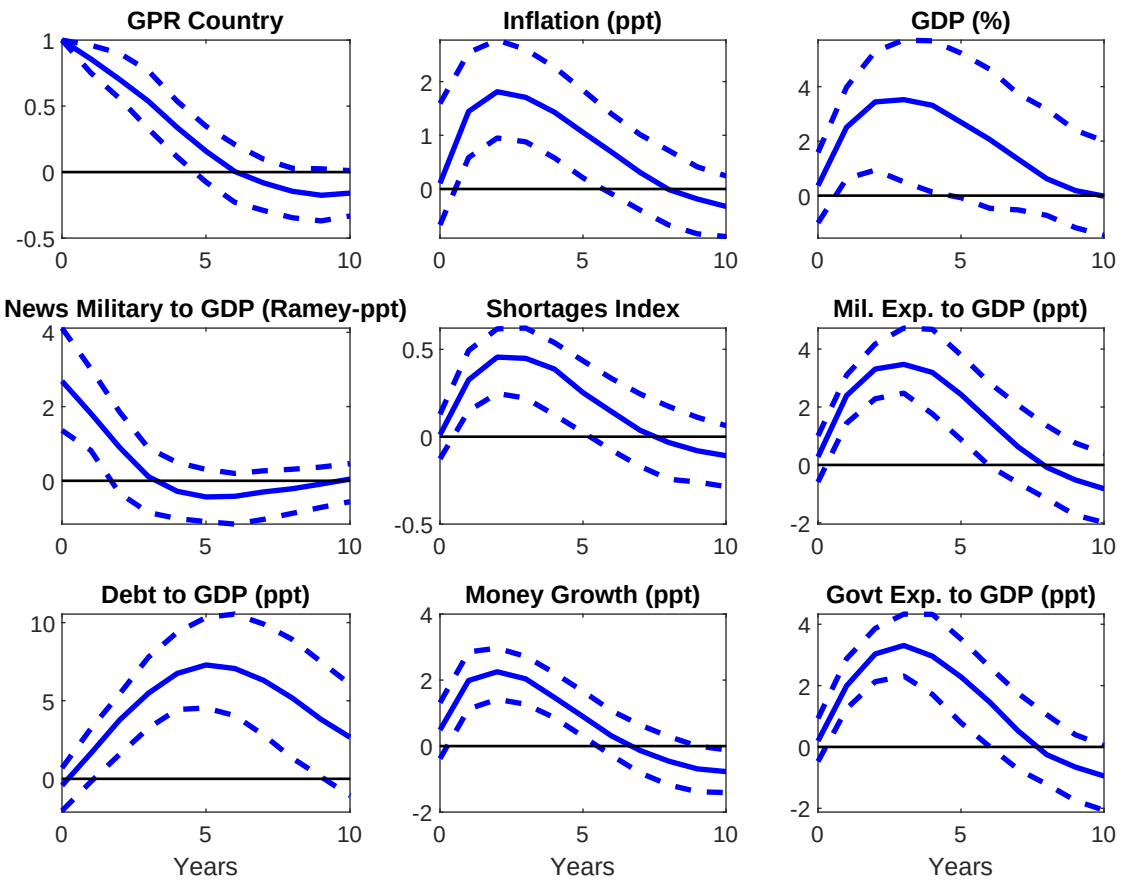
Note: The figure plots impulse responses to a one standard-deviation shock to country-specific geopolitical risk. The impulse responses were estimated using a panel vector autoregression model and includes the following variables: standardized country-specific geopolitical risk (GPR), inflation, real GDP per capita, growth in military spending as a share of GDP, trade (total imports and exports) as a share of GDP, debt as a share of GDP, and money growth. Data in the model is annual from 1900 to 2022. The solid blue lines in the figure plot the central estimates. The dashed blue lines denote bootstrapped 90 percent confidence intervals. Variables are plotted in deviation from the no-shock baseline.

Figure 5: Effects of Geopolitical Risk on Inflation: Multivariate Panel VAR, 1900-2022, Counterfactual



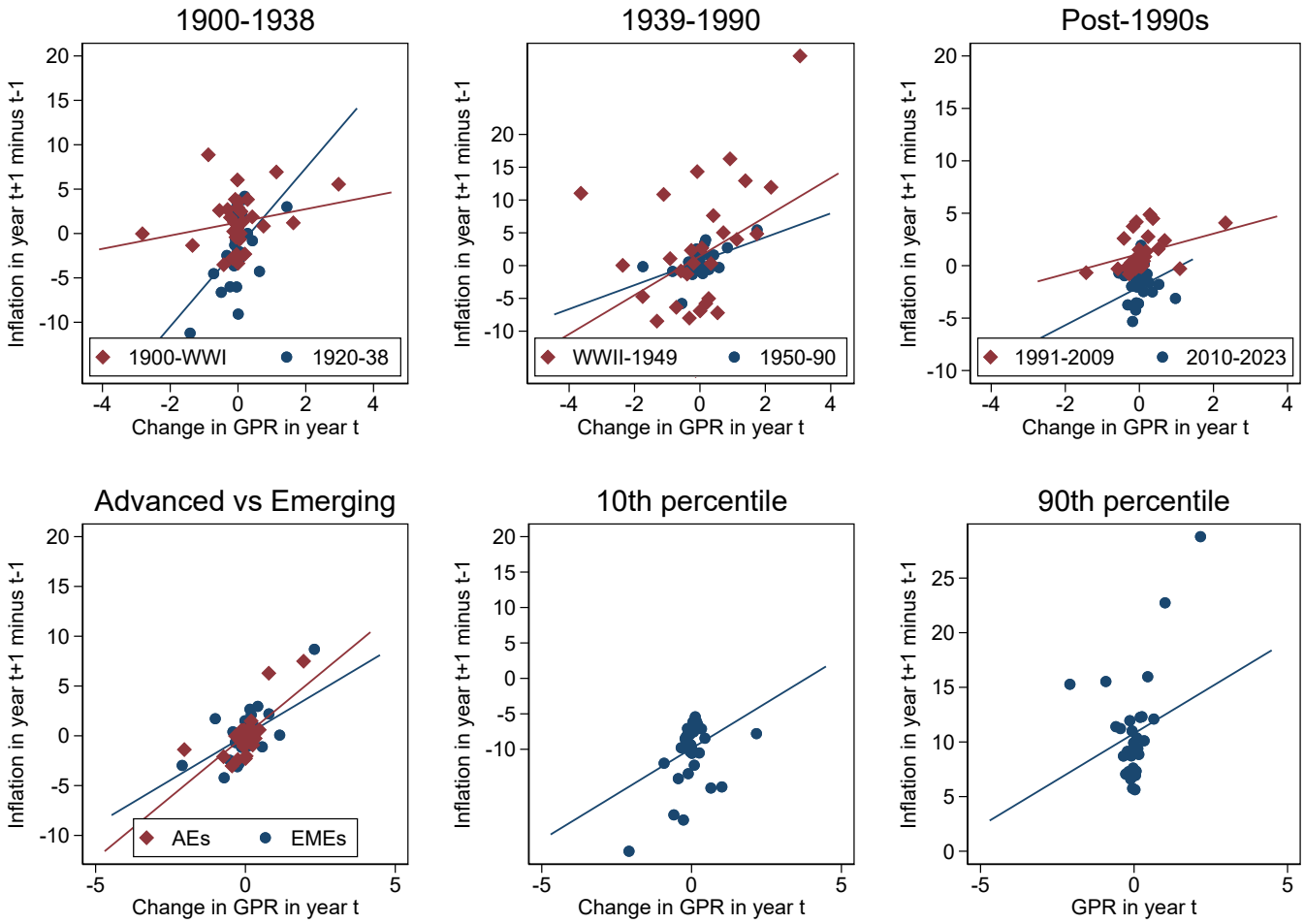
Note: The figure plots impulse responses to a one standard-deviation shock to country-specific geopolitical risk. The blue lines are the responses from the baseline vector autoregression model and includes standardized country-specific geopolitical risk (GPR), inflation, real GDP per capita, growth in military spending as a share of GDP, trade (total imports and exports) as a share of GDP, debt as a share of GDP, and money growth. The red lines are the counterfactual impulse responses that restrict to zero the response of military spending, debt to GDP and money growth following a GPR shock.

Figure 6: Effects of Geopolitical Risk on Inflation: US VAR from 1900 to 2016



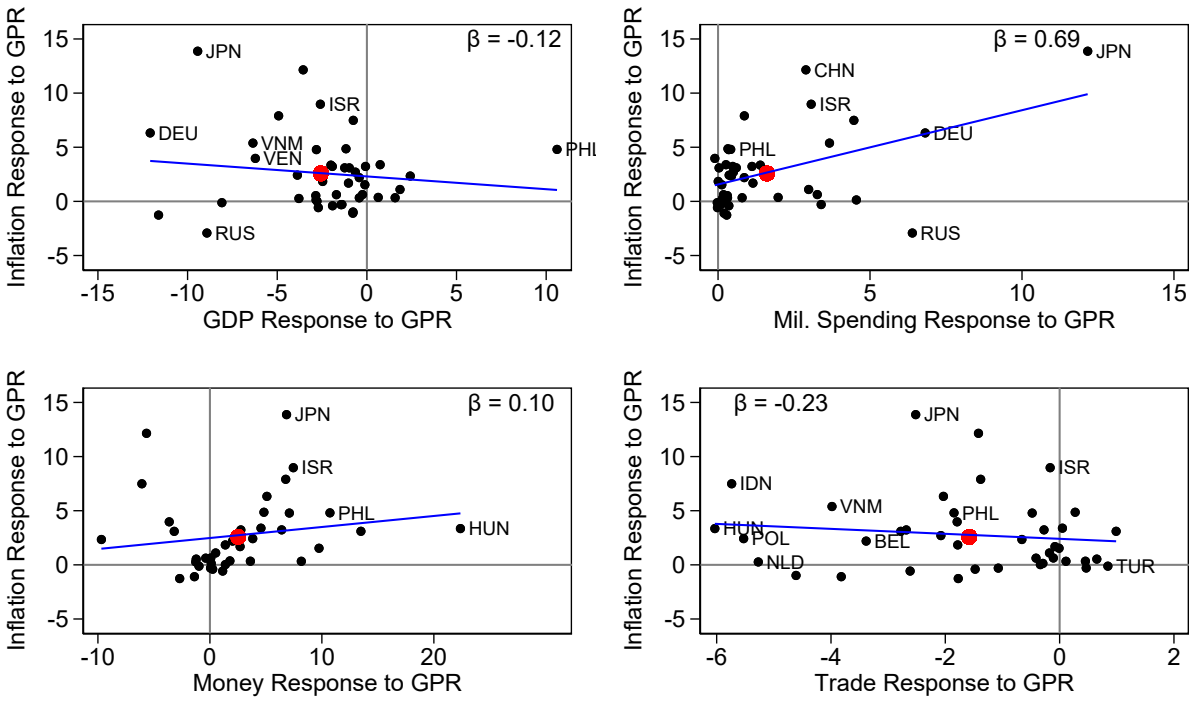
Note: The figure plots impulse responses to a one standard-deviation shock to US geopolitical risk. The impulse responses are estimated using a structural VAR model on US data only which includes the following variables: standardized country-specific geopolitical risk (GPR), inflation, real GDP, news-based present discounted value of defense expenditures, news-based index of shortages, military spending as a share of GDP, public debt as a share of GDP, money growth, and government spending as a share of GDP. Data in the model is annual from 1900 to 2016. The solid blue lines in the figure plot the central estimates. The dashed blue lines denote bootstrapped 90 percent confidence intervals. Variables are plotted in terms of the deviation from baseline.

Figure 7: Heterogeneous Effects of Geopolitical Risk on Inflation



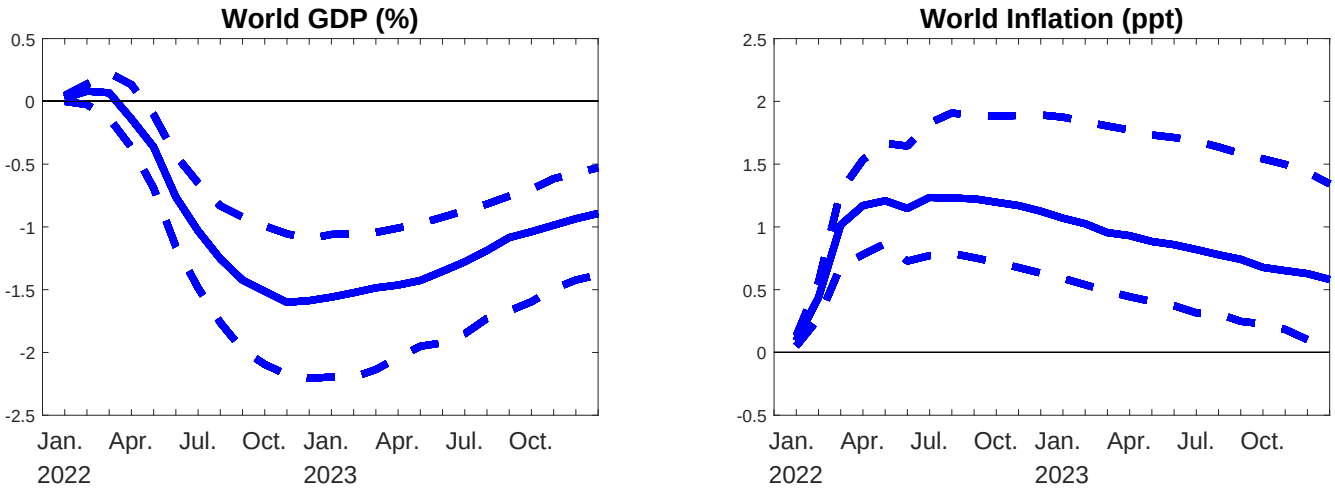
Note: The figure plots the relationship between changes in geopolitical risk and changes in inflation, by sample period, by stages of development, and by quantile.

Figure 8: Cross-Country Dispersion in the Effects of Higher Geopolitical Risk



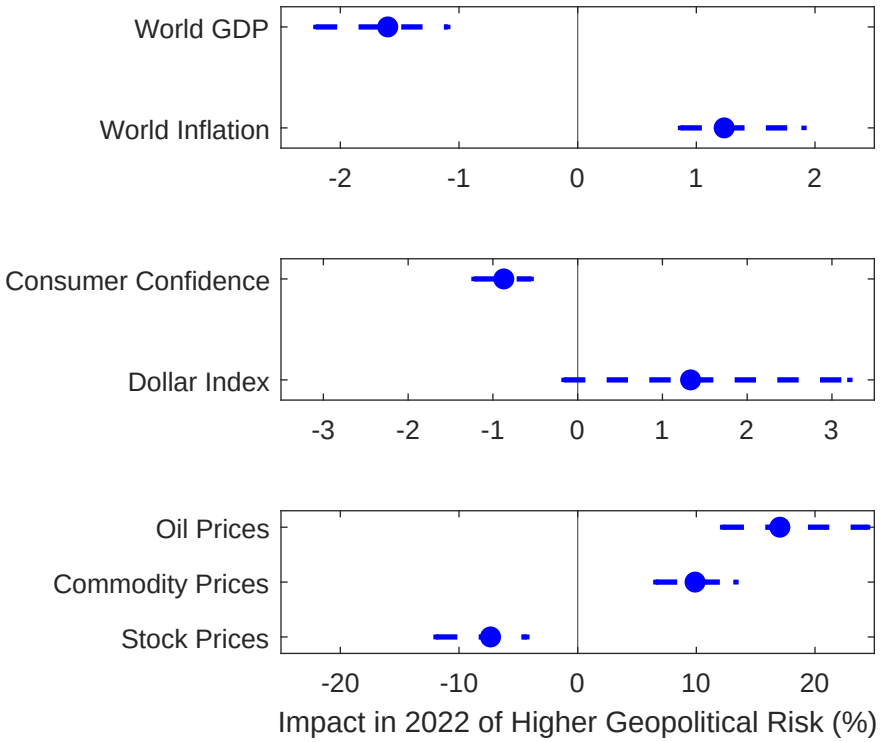
Note: The x-axis in each panel plots point estimates of the coefficients β_i measuring the effect of geopolitical risk on variable X in country i in year $t+3$, obtained using the panel regression $X_{i,t+n} = \alpha_i + \beta_i GPRC_{i,t} + X_{i,t-1} + u_{i,t}$. The y-axis plots the country-specific response of inflation to geopolitical risk. The inset in each panel reports the slope of the fitted line.

Figure 9: Global Effects of Geopolitical Risks on World GDP and Inflation: Simulated Effects of Higher Geopolitical Risk in 2022 based on monthly VAR from 1974 to 2022



Note: The figure plots impulse responses over time of world GDP and world inflation to a rise in geopolitical risks sized to mimic the increase occurred between January and April 2022, estimated using a structural vector autoregression (VAR) model. The model includes monthly measures of world GDP, world inflation, global stock prices, real oil prices, the broad real dollar, commodity prices, global consumer confidence, and the Geopolitical Threats (GPT) and Geopolitical Act indexes. Data in the model is from January 1974 to April 2022 and uses three lags.
The solid blue lines in the figure plot the central estimates. The dashed blue lines denote the 70 percent confidence intervals. The variables are plotted from January 2022 to December 2023 in deviation from a no-war baseline.

Figure 10: Effects of Geopolitical Risk on Selected Variables: monthly VAR from 1974 to 2022



Note: The figure plots the maximum impact in the first year of a rise in geopolitical risks sized to mimic the increase occurred between January and April 2022, estimated using a structural vector autoregression (VAR) model. The model includes monthly measures of world GDP, world inflation, global stock prices, real oil prices, the broad real dollar, commodity prices, global consumer confidence, and the Geopolitical Threats (GPT) and Geopolitical Act indexes. Data in the model is from January 1974 to April 2022 and uses three lags.
For each variable, the blue dots plot the central estimates of the maximum impact in the first year. The blue dashed error bars denote 70 percent confidence intervals. The effect is measured in percent deviation from a no-war baseline for all variables except inflation, for which it is measured in percentage points.

Appendix

A Appendix on: Data Sources

A.1 Data Sources for Cross-Country Analysis

The countries included in the panel are Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Egypt, Finland, France, Germany, Hong Kong, Hungary, India, Indonesia, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, Norway, Peru, Portugal, Philippines, Poland, Russia, Saudi Arabia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Tunisia, Turkey, Ukraine, United Kingdom, United States, Venezuela, and Vietnam.

Initial data for some countries on country-specific geopolitical risk are from Caldara and Iacoviello (2022). To their sample we add data for the following countries: Colombia, Egypt, Hong Kong, Hungary, India, Indonesia, Israel, Malaysia, Philippines, Poland, Saudi Arabia, South Africa, Thailand, Tunisia, Turkey, Ukraine, Venezuela, and Vietnam. This is done using the same methodology as in Caldara and Iacoviello (2022), counting the joint occurrence of articles mentioning geopolitical risks alongside the name, capital city, or major city of a given country. The indexes are constructed using articles from the Chicago Tribune, the New York Times, and the Washington Post starting in year 1900.

Below we describe coverage for each variable.

Inflation

Country-specific inflation are initially from the IMF International Financial Statistics. Data coverage differs across countries and mostly starts in the 1950s (with the exception of Canada, for which data begin in 1920). The dataset is extended back to 1900 with historical data from Jordà, Schularick, and Taylor (2017) and Reinhart and Rogoff (2009). Additional gaps in data are filled using information from the World Bank's World Development Indicators (series mnemonics A***CPIA@WDI, where *** indicates the country code) and the IMF World Economic Outlook (series mnemonics A***PCPE, where *** indicates the country code). To approximate inflation in Vietnam during the Vietnam War, we use exchange rates from Reedy (2008) and subtract US inflation from depreciation of the Vietnamese against the US dollar. This adds Vietnamese inflation data from 1955 to 1975. Data for inflation in the Philippines during World War II are constructed using information from `https://factsanddetails.com/southeast-asia/Philippines/sub5_6b/entry-3842.html`, from newspaper articles from New York Times and the Wall Street Journal, and from Sicat (2003).

GDP

The real per capita GDP data are from Barro and Ursúa (2012), extended through 2022 using the World Bank World Development Indicators (WDI) for all countries except Taiwan, for which real per capita GDP is taken from Haver Analytics based on underlying data from national statistical offices (series mnemonics A528GCPC@EMERGE). Growth is calculated using Barro and Ursúa's data until 2005, and WDI data from 2006 through 2022.

Military Expenditures

Data on military expenditures as a share of GDP are taken from Roser and Nagdy (2013)

and extend through 2022. The data were retrieved from https://ourworldindata.org/military-spending. Coverage for each of the 44 countries in our panel differs; data for 18 countries is available as early as 1900.

Public Debt

Debt to GDP ratio data are taken from several sources. For advanced economies, data are from Jordà, Schularick, and Taylor (2017). Additional data coverage is gained using data the IMF World Economic Outlook (series mnemonics A***GDSS), from the IMF's Public Finances in Modern History database, and from Reinhart and Rogoff (2009), adjusting the series for possible breaks in the mean when coverage changes from one dataset to another.

Trade

Trade to GDP ratio data are constructed as follows. For advanced economies, trade and GDP data are taken from Jordà, Schularick, and Taylor (2017) and the measure is constructed by taking the ratio of total imports and exports over GDP. Data for these countries spans from 1900 to 2019, with some gaps around the two world wars. Additional data are taken from Fouquin and Hugot (2016) (available through https://ourworldindata.org/trade-and-globalization). We merge these two datasets with additional national accounts data from Haver and from the World Bank's World Development Indicators (series mnemonics N***GPCD@WDI), adjusting the series for possible breaks in the mean when coverage changes from one dataset to another (in particular, the Fouquin and Hugot (2016) dataset only covers merchandise trade rather than total trade). Additionally, we interpolate missing year/observations for...

Money Supply

Money growth data are constructed in a similar manner. For advanced economies, broad money data are taken from Jordà, Schularick, and Taylor (2017) and yearly growth is calculated. Additional data on broad money growth for advanced economies, as well as all data for emerging markets, are taken from the World Bank's World Development Indicators (series mnemonics F***BMG@WDI). Data for money growth in Belgium during World War I and World War II only are taken respectively from the International Encyclopedia of the First World War (https://encyclopedia.1914-1918-online.net/article/war_finance_belgium) and from Chapter 8 in Van der Wee (2009).

Governnment Spending

Government spending to GDP data are taken from several sources. For advanced economies, data are from Jordà, Schularick, and Taylor (2017). For other economies, we use data either from the IMF's Public Finances in Modern History database or from the Penn World Tables, whichever has a larger coverage.

Defense Expenditure News

Data on defense expenditure news, used only for the US-specific VAR from Section 3.2, are taken from Ramey (2011) and its extended historical data used in Ramey and Zubairy (2018). The indicator is available quarterly from 1900q1 to 2016q4; the sum is taken for each year to aggregate the measure to an annual basis. The measure is defined as the present discounted value of expected changes in defense expenditures, as reported by selected news sources.

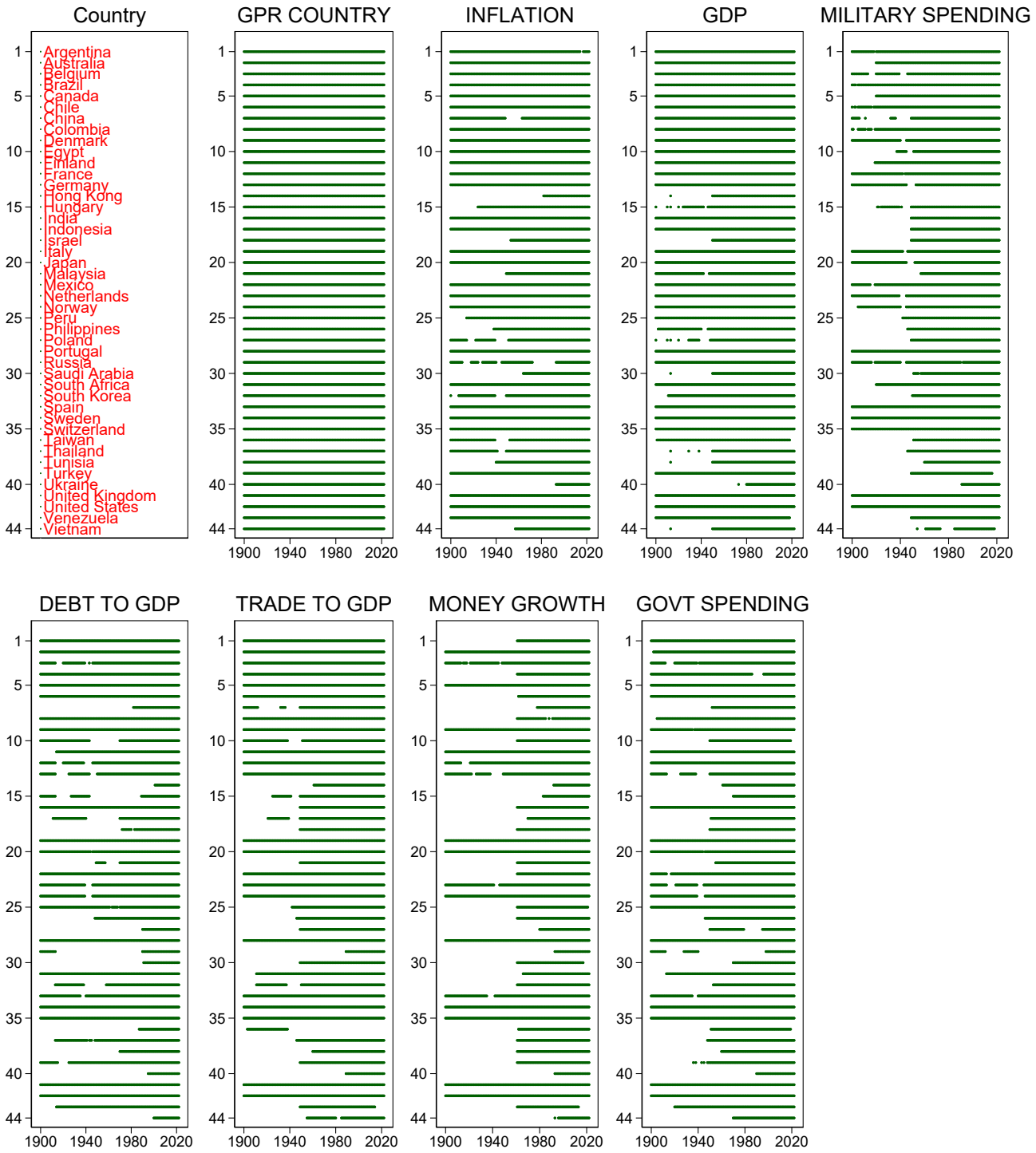
A.2 Data Sources for Monthly Global VAR

The global indicators used in the VAR are described below:

- Global geopolitical risk (GPR), as well as the geopolitical threats (GPT) and acts (GPA) indexes (Caldara and Iacoviello (2022))
- World GDP in purchasing power parity (Cuba-Borda, Mechanick, and Raffo (2018))
- World inflation, defined as the aggregate of countries' twelve-month change in consumer price index (Global Financial data)
- Stock prices from the FTSE World Dollar index (Global Financial data)
- The OECD Consumer Confidence Index for Europe (Haver mnemonics: C023CCE@OECDMEI)
- The spot oil prices from West Texas Intermediate (Haver mnemonics: PXTEXP@USECON)
- commodity prices (GSCI@USECON - from the S&P Goldman Sachs Commodity Index)
- The dollar exchange rate (FXTWBDI@USECON - Federal Reserve Board Nominal Trade-Weighted broad dollar index)

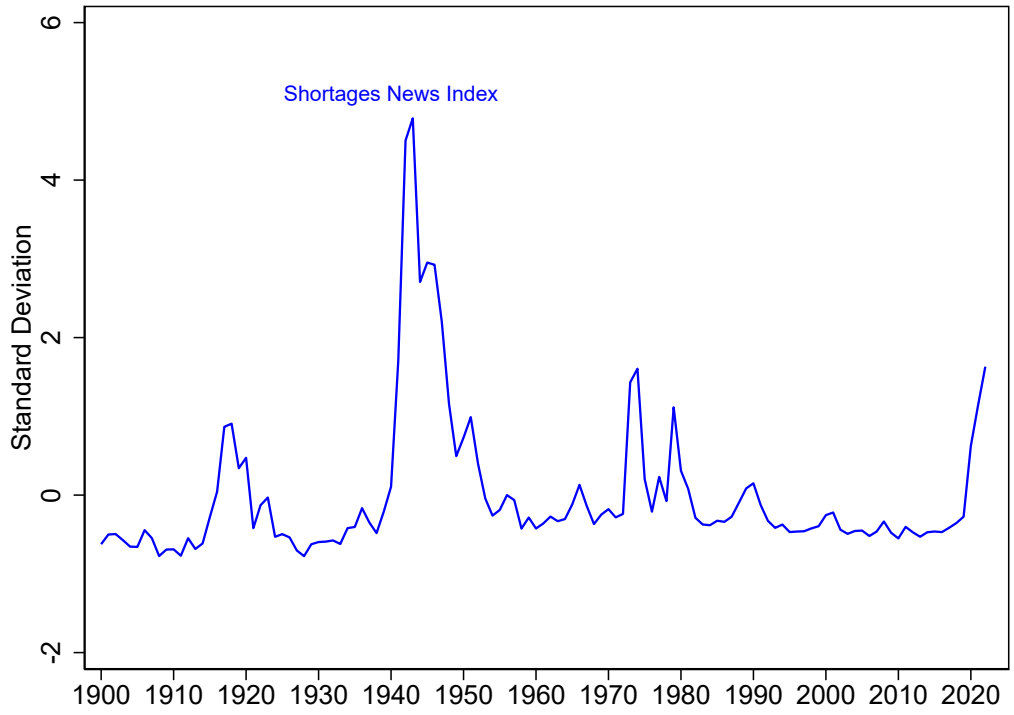
Data spans from 1974 to 2022 for all indicators and is at the monthly level.

Figure A.1: Data Coverage for the Cross-Country Panel



Note: The figure illustrates coverage between 1900 and 2022 of country-specific variables over the sample: country-specific geopolitical risk, inflation, log real GDP per capita, military spending as a share of GDP, public debt to GDP, trade to GDP, money growth, and government spending to GDP.

Figure A.2: News Indexes of Shortages



Note: The Shortages News Index is a newspaper-based indexes capturing coverage of news about shortages and bottleneck, measuring the share of articles mentioning the words {shortage* OR bottleneck OR scarcity OR rationing}. The index is constructed from the historical archives of six leading U.S. newspapers from 1900 to 2022.