# The Effects of Geopolitical Oil Price Shocks*

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**Abstract**

We develop a novel instrumental variable to identify geopolitical oil price shocks arising around significant geopolitical tensions and examine their transmission to the global oil market, key U.S. macroeconomic aggregates, and cross-border spillover effects on other commodity markets, output, and inflation. Geopolitical oil price shocks resemble severe oil supply shocks, leading to production declines and a much sharper increase in oil prices than conventional shocks. They are coupled with heightened uncertainty and induce a distinct inventory response: an initial short-term decline followed by long-term accumulation, reflecting market participants' concerns about future economic and oil market conditions. The cross-border spillover effects are significant for oil-intensive commodities, and are stronger for output and inflation in oil-importing economies and for countries with low energy inventories and high energy dependency on foreign supply.

*JEL Classification*: C32, E22, E31, E32, Q43.
*Keywords*: Geopolitical risk, oil price shocks, VAR model, identification, spillovers, commodity markets.

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# 1 Introduction

Recent global developments underscore the significant and immediate connection between surges in geopolitical risk and fluctuations in oil prices. For example, when Russia suddenly invaded Ukraine on February 24, 2022, Brent crude surged over 8 percent, surpassing $100 per barrel for the first time since 2014. This association is not unprecedented. Historical evidence also reveals a strong connection between episodes of heightened geopolitical tension and oil price movements. Major geopolitical events such as the 1973 Arab-Israeli War, the 1978-1979 Iranian Revolution, the 1990-1991 Gulf War, and the outbreak of civil war in Libya triggered significant oil price volatility, leading to either upward or downward oil price movements.

The response of oil prices in both directions is linked to the complex and multifaceted nature of geopolitical risk. For instance, a sudden increase in geopolitical risk in the Middle East can directly disrupt oil supply, pushing prices upward, whereas an unexpected failure of cooperation among oil-exporting countries amid geopolitical tensions may increase oil production, exerting downward pressure on oil prices. Geopolitical risk might operate even in the absence of realized disruptions, as oil prices may respond preemptively to geopolitical threats in anticipation of potential disruptions.[1]

In this paper, we disentangle the fluctuations of oil prices around periods of heightened geopolitical risk and use it to study its systematic impact on the global oil market, key U.S. macroeconomic aggregates and cross-border spillover effects on other commodity markets, output, and inflation.

We isolate the response of oil prices using high-frequency data around episodes of elevated and unexpected increases in geopolitical tensions. We construct a daily series of oil price surprises associated with significant geopolitical events and employ it as an external instrument to identify *geopolitical oil price shocks* within a Proxy VAR framework.

[1] Fernández-Villaverde et al. (2025a) show that geopolitical risk may also operate through illicit oil trade and strongly influence oil prices, with important ramifications for national outputs through the global supply chain. Komatsu (2025) shows that the interaction between geopolitical tensions and economic policies generates strong spillover effects, shaping a wide range of energy price responses across countries.

Our empirical strategy enables us to disentangle shocks that are triggered by, or closely associated with, surges in geopolitical risk. By focusing on high-frequency daily data, we capture short-run dynamics that would otherwise be conflated with other shocks in lower-frequency data. This approach allows us to study the effects of geopolitical oil price shocks on the global oil market, key macroeconomic variables in the U.S. economy, and broader spillover effects on other commodity markets, and output and inflation across countries.

We identify the heightening of geopolitical risk using the *Geopolitical Threats* (*Geo Threats*, henceforth) index developed by Caldara and Iacoviello (2022), which captures the share of international newspaper articles reporting adverse threats on geopolitical events. To construct our instrument for geopolitical oil price shocks, we focus on changes in oil price futures on days when the *GeoThreats* index increases by more than 200 percent —a threshold roughly equal to two standard deviations above the mean growth rate over the sample period— indicating a significant escalation in geopolitical risk. Our approach accounts for anticipatory effects tied to potential geopolitical risks (e.g., wars, terrorist attacks, or other disruptions or misalignments in the oil market). By focusing on threats, we capture forward-looking behavior, as markets react in anticipation of events.

The identified geopolitical oil price shock behaves, on average, akin to a severe supply disruption, resulting in a decline in oil production and a rise in prices. Consistent with a *conventional* oil supply shock, oil inventories decline in the initial months following the shock, as they decrease to offset the reduction in production in response to the geopolitical oil shock.[2] However, unlike in a standard supply shock, this initial fall in oil inventories is later reversed, and oil inventories increase and remain persistently elevated due to the precautionary behavior arising from heightened uncertainty that stimulates the accumulation of oil inventories. The precautionary behavior reflects the forward-looking characterization of economic agents, who, after an initial depletion of oil inventories to buffer against the geopolitical shock, build up inventories in anticipation of potentially

[2] Baumeister and Hamilton (2019) and Kilian (2014) among several other studies show that negative oil supply shocks increase the price and decrease the quantity of oil production and global inventories.

worsening oil market and economic conditions.[3] Following the shock, world industrial production declines over the medium term, highlighting its adverse real effects in the macroeconomy.

Geopolitical oil price shocks also have significant links with macroeconomic and financial uncertainty, both of which rise in the initial months following the shock. The U.S. economy exhibits a marked response to geopolitical oil shocks: economic output exhibits a lagged decline, inflation rises in the short run, and interest rates initially increase in response to higher inflation before falling in the longer term —reflecting the subsequent weakening of economic activity. These effects are persistent, with implications extending beyond the immediate aftermath of the shock.

The magnitudes of the responses of oil production and oil prices to the geopolitical oil price shock are substantial. A 1 percent initial decline in oil production in the aftermath of our identified geopolitical supply shock is associated with an 11.5 percent increase in oil price. This estimate is consistent with the observed comovement between oil production and prices during episodes of heightened geopolitical risk. However, our estimated price response is significantly larger than that reported in previous work, like Caldara et al. (2019) and Baumeister and Hamilton (2019), nearly doubling the impulse response coefficients found in those studies. This difference is explained by the specific focus of our identification strategy. While previous studies capture oil supply shocks arising from a broad set of supply-side disturbances —and therefore conflate the contributions of multiple forces, including not only geopolitical events but also natural disasters, labor strikes, and OPEC announcements— we isolate oil price surprises that occur during episodes of exceptionally high geopolitical risk. In this way, our approach captures the dynamics of the oil market under substantially heightened forward-looking geopolitical tensions amid uncertainty, resulting in pronounced fluctuations in oil prices.

The geopolitical oil price shock significantly propagates to several commodity markets and across countries. Oil-intensive commodities (such as natural gas and fertilizers) are the

[3]This finding aligns with Känzig (2021), who identifies an oil supply news shock that causes an immediate rise in oil prices, a moderate production decline, and an increase in inventories due to oil supply news coming from OPEC.

most responsive to geopolitical shocks. The geopolitical oil price shock has also significant spillover effects across countries, it is contractionary for national output (industrial production) and raises consumer price indices. The magnitude of the impact significantly differs across countries. On average across OECD countries, industrial production declines by roughly -0.5 percent, and consumer prices increase by 0.3 percent in response to a 10 percent initial increase in oil prices caused by the geopolitical oil price shock. The large and significant differences in national responses are determined by the size of energy inventories that reflect the self-resilience of countries from shortages in oil supply, and the energy purchases from abroad that reflect the dependency on external supply of oil. We find that countries with higher energy inventory levels exhibit smaller responses in industrial production and consumer price indices following a geopolitical oil price shock. Similarly, lower reliance on foreign energy purchases is associated with a more muted reaction of these macroeconomic indicators to the shock.

We also examine cross-country heterogeneity by oil export and import status. The results show that the contraction in industrial production following geopolitical oil price shocks is more pronounced in oil-importing economies, while oil-exporting countries do not appear to benefit from the associated increase in oil prices. In contrast, both groups face similar inflationary pressures in response to these shocks. These findings suggest that there are no clear beneficiaries of oil price shocks during periods of heightened geopolitical risk. Although exporters may mechanically gain from higher oil prices, such gains are likely offset by elevated uncertainty and disruptions to trade and financial conditions. At the same time, importers are adversely affected through higher production costs and declining real incomes, further dampening economic activity. Overall, the evidence indicates that geopolitical oil supply shocks impose broad-based macroeconomic costs and amplify global economic fragility.

We perform several robustness exercises to ensure that our results are not driven by forces unrelated to the oil market. In particular, although our identification strategy relies on high-frequency movements in oil prices around periods of heightened geopolitical risk, such events may also affect global demand conditions through channels such as confidence, trade, or investment. To address this concern, we construct an alternative high-frequency instrument using the recent oil-market-specific geopolitical risk index developed by Iacoviello and Tong (2026). This index employs a layered classification architecture to identify news articles specifically related to geopolitical oil supply disruptions, allowing us to restrict the set of events used in our identification strategy to those directly associated with oil supply threats. Using this alternative instrument yields impulse responses that are robust to our benchmark results and consistent with the dynamics of severe oil supply disruptions.

In additional robustness exercises, we further purge the instrument of potential demand and financial influences by controlling for global macroeconomic conditions prior to estimation. Specifically, we regress the benchmark instrument on an indicator for the 2008-09 global financial crisis and on the growth rate of world industrial production, and then use the resulting residuals as the instrument in the Proxy SVAR. We also show that the results remain robust across alternative samples and specifications, including excluding the Covid-19 period, estimating the model over a shorter sample that excludes the turbulent years of the 1970s, and augmenting the model with financial variables such as the S&P 500 index and the U.S. dollar index.

Our study relates to several strands of the literature. First, it connects to the recent literature on the effects of geopolitical risk. Clayton et al. (2025) provides a comprehensive overview of the state and challenges of the literature, and Clayton et al. (2024) and Clayton et al. (2026) provide conceptual frameworks to study the influence of geopolitical risk on macroeconomic outcomes. We complement this literature by empirically studying the propagation of geopolitical oil price shocks within the U.S. economy and the spillovers across countries and commodity markets.

Second, we relate to studies examining the relationship between geopolitical risks and changes in the oil price. Pinchetti (2025) uses high-frequency data to study oil price dynamics during periods of heightened geopolitical risk, distinguishing between shocks linked to the energy market and broader macroeconomic developments, and examining how these distinct shocks differ in their effects on inflation, output, and sectoral propagation in the U.S. We are also related to Baumeister (2023), which studies how the Russian invasion of Ukraine catalyzed structural changes in the global oil market, focusing on major producers and how the invasion reshaped their roles and influence in supply dynamics. Bondarenko et al. (2024) and Kilian et al. (2024) find that geopolitical risks to oil production can significantly increase oil price uncertainty and affect the global economy. Baumeister et al. (2024) shows that accounting for tail events such as exceptional oil price changes improves the forecast of macroeconomic variables —such as during the period of the Russian invasion of Ukraine.

Third, we connect to the extensive literature identifying the impact of oil shocks using structural VAR models and other econometric methods.[4] Most similar to us, in focus and use of a high-frequency identification approach, is Känzig (2021) who shows that the impact of oil supply news shocks operates by generating an immediate increase in oil prices, a gradual decline in oil production, and a rise in inventories that is different from our geopolitical oil price shocks.[5] Other studies include the following econometric approaches: SVAR (Cunado et al., 2020, Zhou et al., 2020), GARCH-MIDAS (Liu et al., 2019, Mei et al., 2020), MA models (Plakandaras et al., 2019), textual analysis (Brandt and Gao, 2019), Markov-Switching models (Bouoiyour et al., 2019), and quantile regressions (Qin et al., 2020). While the primary focus of these studies is on the forecasting of oil prices conditional on geopolitical developments and the study of the effects of different types of shocks related to the oil market (i.e., demand, supply, global, oil specific and inventories), we focus on the identification of a structural shock to the oil prices that is produced around high geopolitical risk periods.

Fourth, we connect to the literature studying the effect of oil price changes on global inflation and output. An et al. (2023), Giannone and Primiceri (2024), Aastveit et al. (2023), Miranda-Pinto et al. (2023), and Degasperi et al. (2026) use alternative

[4]Prominent studies are those that use sign restrictions like Kilian and Murphy (2012), Lippi and Nobili (2012), Baumeister and Peersman (2013), Baumeister and Hamilton (2019), and narrative information like Antolín-Díaz and Rubio-Ramírez (2018); Caldara et al. (2019), and Zhou (2020).

[5]Other prominent studies using a VAR approach are those that use sign restrictions like Kilian and Murphy (2012), Lippi and Nobili (2012), Baumeister and Peersman (2013), Baumeister and Hamilton (2019), and narrative information like Antolín-Díaz and Rubio-Ramírez (2018); Caldara et al. (2019), and Zhou (2020).

identification strategies in SVAR models showing the significant role of changes in oil and commodity prices for global macroeconomic variables. We contribute to this literature by focusing on the global propagation of geopolitical oil price shocks across countries and commodity markets.

The remainder of the paper is organized as follows. Section 2 outlines our identification strategy, constructs the geopolitical oil price shock, and performs diagnostic analysis of the instrument. Section 3 develops our VAR model describing the identification, the data, and the validation of our instrument. Section 4 presents the results by analyzing the response of macroeconomic variables to geopolitical oil price shocks. Specifically, we estimate the impact effects, the forecast error variance decomposition, and the contribution of geopolitical oil price shocks to historical changes in oil prices. We also examine the spillovers of these shocks to national outputs, prices, and commodity markets. Section 5 concludes.

## 2 Identification strategy

Our identification strategy is based on the conventional view that links the heightening of geopolitical risks with changes in oil prices.[6] The general idea is that episodes of exceptionally high geopolitical risk are associated with unexpected (and thus exogenous) movements in oil prices that provide critical information for identifying the macroeconomic effects of oil price fluctuations occurring during periods of heightened geopolitical tensions. We exploit this basic insight by constructing a series of oil futures price changes on days of substantial increases in geopolitical risk, which allows us to identify structural oil price shocks driven by such risk. Before building our index and developing the Proxy VAR model, we first document the tight link between elevated geopolitical risk and oil price movements from raw data.

[6]Popular press and policy articles customarily link sharp movements in oil prices with the intensification of geopolitical risks. For instance, the policy notes and articles in World Bank (2023), McCartney (2024), Reuters (2024), and Mufarech and Longley (2024) suggest a powerful connection between geopolitical tensions and significant changes in the price of oil.

## 2.1 Geopolitical risk threats and oil prices

We measure geopolitical risk using the *GeoThreats* index constructed by Caldara and Iacoviello (2022), who quantify the share of articles in leading international newspapers mentioning adverse geopolitical threats and associated risks.[7] We employ the category of *threats* since it reflects a broad set of events that encapsulate uncertainty around oil prices. Important for our identification, oil prices are reactive to geopolitical threats, even without the actual realization of those tensions. News about the potential onset, escalation, or execution of extreme events may generate significant movements in oil prices. Instead, the actual realization of those threats may result in no movement in oil prices, especially if the news on the potential threats was previously internalized by markets.[8]

Following the ideas in Känzig (2021) and similar to the strategy employed by Pinchetti (2025), we employ high-frequency daily data to isolate the behavior of oil futures prices around days marked by sharp increases in geopolitical threats. High-frequency data enable us to identify the immediate co-movement of elevated geopolitical risk and oil price reactions, which lower-frequency data may obscure. Figure 1 shows representative historical episodes (listed in the caption) where the *GeoThreats* index rose sharply, alongside the corresponding oil futures price response in absolute terms within days of the shock.

The figure prominently shows that episodes of heightened geopolitical tensions may coincide with either increasing or falling oil prices. For instance, oil prices increased in anticipation of the Gulf War in 1990 (by 14 percent), the September 11 terrorist attacks in 2001 (by 6 percent), and Russia's invasion of Ukraine in 2022 (by 8 percent). In contrast, they fell at the onset of the 2014 OPEC cooperation failure in the middle of the

[7]Specifically, for the Threats component of the index, Caldara and Iacoviello (2022) focus on articles that mention geopolitical threats, which include references to diplomatic tensions, threats of military action, war warnings, and other language signaling the potential for geopolitical conflict. Using a set of 11 leading international newspapers, the authors employ a keyword-based approach to identify relevant articles and calculate the monthly share of such articles relative to the total number of articles published. This measure captures the anticipatory dimension of geopolitical risk—where uncertainty arises not only from conflict itself but from the credible threat of its emergence.

[8]The category of threats also captures periods in which violent events materialize. For example, around Iraq's invasion of Kuwait, the terrorist attacks on the United States, and the drone attacks on Saudi Aramco's Abqaiq and Khurais facilities, we observe sharp increases in the *GeoThreats* index, reflecting agents' concerns about a potential deterioration in future conditions following these events.

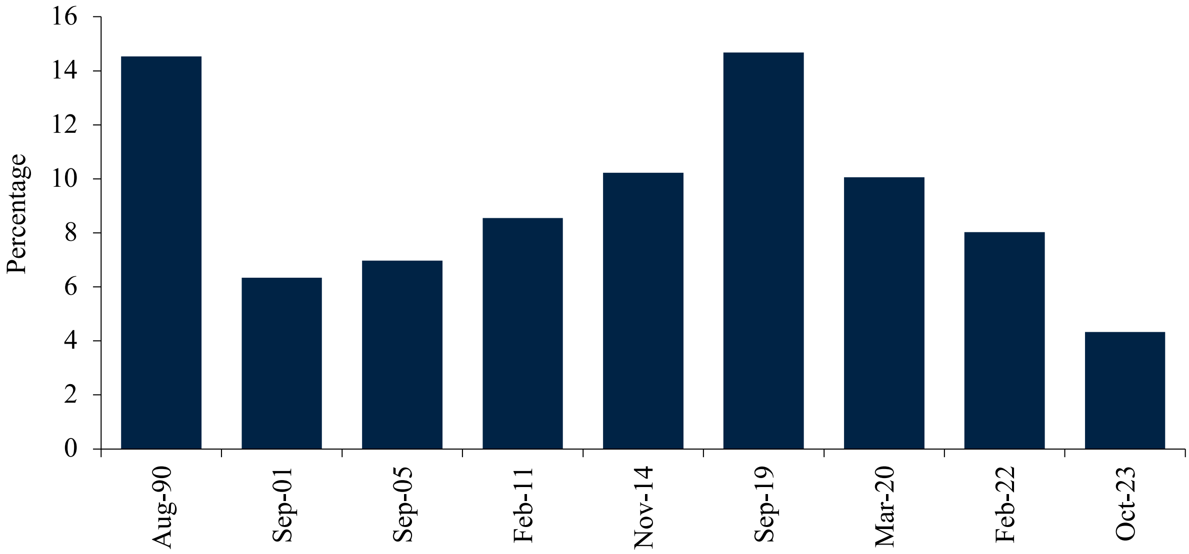


Figure 1: **Absolute percentage change of oil future prices around periods of heightened geopolitical tensions.** The episodes include (1) August 1990: Iraqi Invasion of Kuwait; (2) September 2001: Terrorist attacks U.S.; (3) September 2005: U.S. diplomat and three American security guards were killed in a suicide car bomb attack in Mosul; (4) February 2011: Libyan Civil War; (5) November 2014: OPEC cooperation failure in the middle of the escalation of conflicts in Ukraine and Syria; (6) September 2019: Drone attacks on Saudi facilities; (7) March 2020: Collapse of cooperation between Russia and OPEC; (8) February 2022: Russian invasion of Ukraine; (9) October 2023: Hamas–Israel conflict.

escalation of conflicts in Ukraine and Syria (a 10 percent decline), and at the breakdown of cooperation between Russia and OPEC in 2020 (a 10 percent decline).[9] We exploit this systematic relationship in oil price changes, in both directions, to construct an instrument for geopolitical oil supply shocks. We then use this instrument to identify their effects on the oil market and the broader economy, and to study spillovers across commodity markets and across countries' industrial production and inflation.

## 2.2 Construction of the geopolitical oil price instrument

In this section, we construct our instrument to identify geopolitical oil price shocks, present the event classification, the identification strategy, and the event window, and conduct diagnostic analyses of the instrument.

[9]This behavior is consistent with the results in Caldara et al. (2025) who show that geopolitical risk may increase, decrease, or leave inflation unchanged, depending on the considered period.

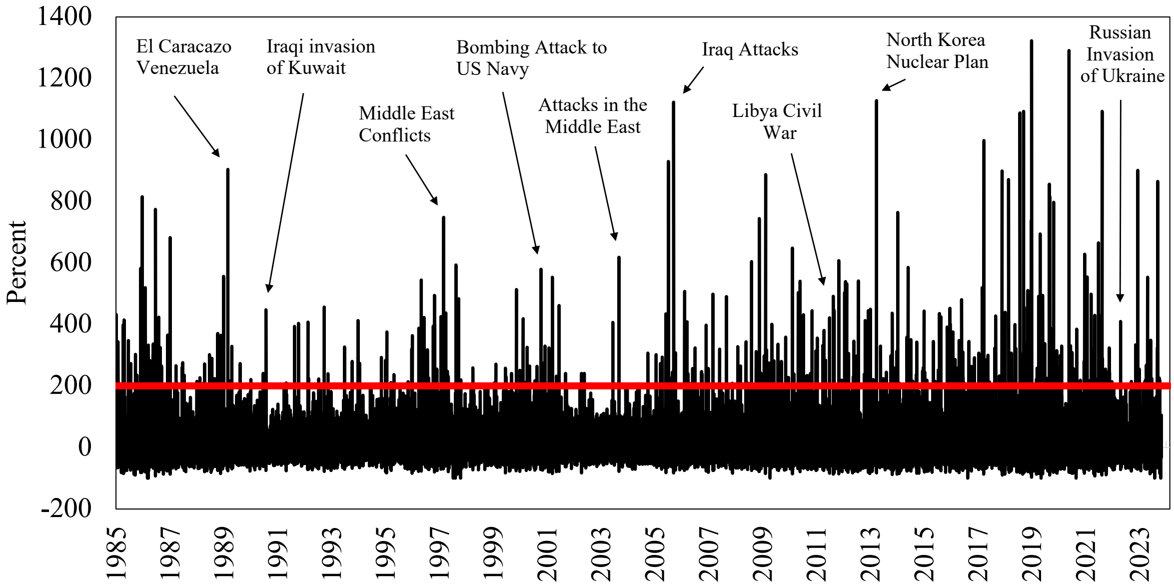


Figure 2: **Episodes of elevated geopolitical risk.** The figure shows the day-on-day growth rate of the *GeoThreats* index by Caldara and Iacoviello (2022). The 200 percent threshold (red line) indicates elevated geopolitical risk. A total of 395 days out of 14,294 days (2.8 percent) are elevated in geopolitical risk.

**Classification of elevated increases in geopolitical risk.** We define an episode of elevated geopolitical risk when the daily growth rate of the *GeoThreats* index exceeds 200 percent, which is roughly two standard deviations above the sample mean growth rate (17.3 percent).[10] Figure 2 shows the daily growth rate of the index of geopolitical risk (black line) and the threshold of 200 percent (red line) that defines elevated geopolitical risk. Out of the total sample of days (14,294), approximately 3 percent of them (395) are classified as episodes of elevated geopolitical risk.

**Series of geopolitical oil price surprises.** Our series of geopolitical oil price surprises is constructed to capture oil price fluctuations around episodes of elevated increases in geopolitical risk and is constructed by taking the (log) difference between the price of oil futures on the business day after and the business day before the index of geopolitical risk

[10]Using the growth rate of the index rather than its level allows us to capture sharp, sudden, and unexpected changes in geopolitical risk.

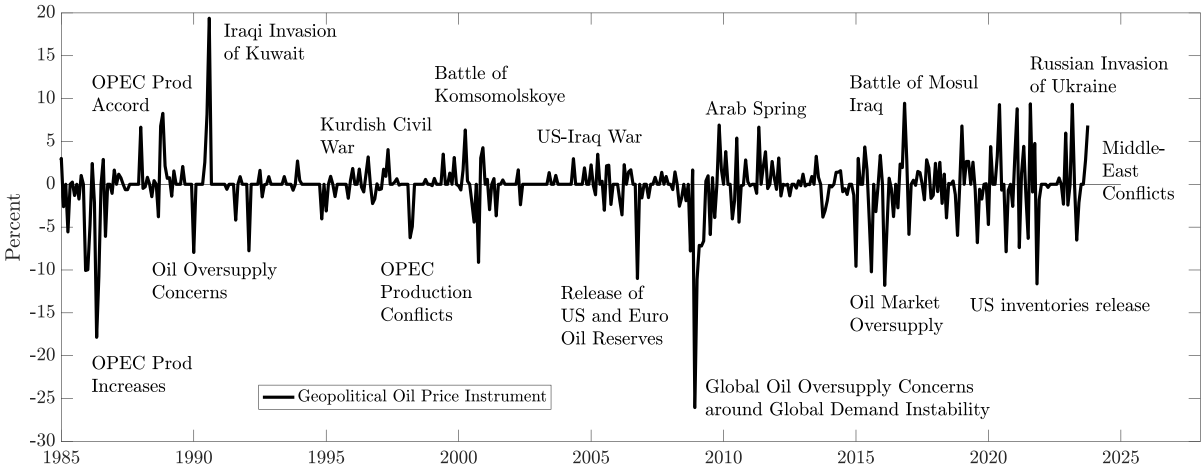


Figure 3: **Geopolitical oil price surprises.** Instrument constructed from episodes of extremely elevated geopolitical threats.

rises above the 200 percent threshold.[11] More formally, our series of geopolitical oil price surprises is defined as follows:

$$Surprise_{d+1} \quad = \quad F_{d+1} - F_{d-1}, \tag{1}$$

where the subscript $d$ indicates the day of the high geopolitical risk event, and $F_{d+1}$ ($F_{d-1}$) is the one-month-ahead oil futures contract on the next (previous) business day around the geopolitical event. We adopt a one-day window around the heightening of geopolitical risk, as oil prices typically take only a few hours to react while markets internalize the information on rising geopolitical threats,[12] and we use the one-month-maturity oil futures contract since it accurately reflects short-run changes in oil prices.[13]

Figure 3 shows our monthly series of geopolitical oil price shocks, including references to major historical geopolitical events. We convert our index from daily to monthly

[11]We use future oil prices instead of spot prices to incorporate market expectations about future supply and demand, the cost of storage, interests, and risk premiums for future events.

[12]For instance, following an Iranian missile attack on Israel on October 5, 2024, oil prices reacted almost immediately, with an increase of more than 3 percent. See ABC News report.

[13]The one-month contract encompasses information for a longer time span than other futures contract series (for example, the twelve-month contract starts in 1989). Since oil futures prices across maturities are highly correlated, we expect our results to be robust when using contracts with different maturities.

frequency following Känzig (2021). Specifically, we set the monthly geopolitical surprise equal to the daily surprise when only one episode with a *GeoThreats* index increase of more than 200 percent occurs in a given month. We set it equal to the sum of daily surprises when multiple episodes occur, and to zero when no episode occurs in that month. Figure 3 shows that our series of geopolitical oil price surprises accurately identifies the episodes with elevated geopolitical risk. Of the 475 months in the surprise series, 268 were identified as having at least one day where the *GeoThreats* index exceeded the specified threshold. In general, several major geopolitical events during the sample period are accompanied by sharp movements in oil futures prices.

### 2.3 Diagnostics of the geopolitical oil price surprises series

In this section, we perform diagnostic analyses to assess the reliability of our series of geopolitical oil price surprises by studying the correlation of the series with other estimated oil supply and uncertainty instruments and shocks.

**Correlation with other shocks and uncertainty surprises.** To check that our series of oil price surprises is distinct from other instruments or conventional shocks identified in the literature, Table 1 reports the correlation coefficients (column 1) and the standard errors (in parentheses) from regressing our instrument on alternative oil price shock series, instruments, and uncertainty indicators used in previous studies (column 2). The estimated correlation coefficients are uniformly close to zero and statistically non-significant. Notably, the coefficient associated with the oil supply news shocks in Känzig (2021) is nearly zero (0.07) and non-significant, despite our measure of geopolitical oil price surprises being based on a similar series of oil futures prices.

## 3 Proxy VAR model, data, and instrument validation

This section presents the VAR model and the identification strategy, describes the data and the correction applied to account for extreme observations during the Covid-19 pandemic

Table 1: Correlation Coefficients

| **Other Shocks/indices** | **Geopolitical Instrument** | **Source** |
|---|---|---|
| | (1) | (2) |
| Oil supply news instrument | 0.07<br>(1.38) | Känzig (2021) |
| Oil supply news shock | 0.02<br>(0.57) | Känzig (2021) |
| Economic activity shock | 0.02<br>(0.67) | Baumeister and Hamilton (2019) |
| Oil consumption demand shock | 0.16<br>(3.71) | Baumeister and Hamilton (2019) |
| Oil inventories demand shock | 0.00<br>(1.09) | Baumeister and Hamilton (2019) |
| Oil supply shock | -0.09<br>(1.52) | Baumeister and Hamilton (2019) |
| Oil demand shock | -0.08<br>(0.93) | Caldara et al. (2019) |
| Oil supply shock | -0.08<br>(0.92) | Caldara et al. (2019) |
| CBOE Volatility Index (VIX) | 0.01<br>(20.86) | Chicago Board Options Exchange's (CBOE) |
| Economic Policy Uncertainty | 0.09<br>(89.42) | Baker et al. (2016) |

*Notes*: Correlation coefficients between the instrument constructed in this paper and alternative oil price series, instruments, and uncertainty indicators (column 1) with standard errors (in parentheses) from alternative studies (column 2).

that could bias the VAR estimates, and tests the validity of our instrument, showing that it is orthogonal to alternative oil shocks in the literature.

**VAR model and identification.** We use our series for geopolitical oil price shocks as an external instrument in a VAR model to identify the effect and spillovers of a structural geopolitical oil price shock on several macroeconomic variables across countries and commodity markets. Our identification approach is based on the studies by Stock et al. (2012) and Mertens and Ravn (2013), and it exploits the fact that our index accurately represents geopolitical oil price shocks (as we will show and formally test in the next section) while, by construction, being orthogonal to the other shocks in the VAR. Specifically, we base the analysis on the VAR model:

$$\mathbf{y_t} \;=\; \mathbf{\Phi x_{t-1}} + \mathbf{B}\boldsymbol{\varepsilon}_\mathbf{t}, \tag{2}$$

where $\mathbf{y_t} = (y_{1t}, y_{2t}, y_{3t}, \ldots, y_{nt})'$ is a vector containing our $n$ variables of interest (that we are going to describe in the next section), $\mathbf{x_{t-1}} = (1, y_{t-1}, y_{t-2}, \ldots, y_{t-12})'$ is a matrix containing a constant and twelve lags of our variables of interest as controls, and $\boldsymbol{\varepsilon}_\mathbf{t} = (\varepsilon_{1t}, \varepsilon_{2t}, \ldots, \varepsilon_{nt})'$ is a vector containing the structural shocks of the system of equations. The matrix $\mathbf{B}$ is the impact matrix for the structural shocks and it is defined by:

$$\mathbf{B} \;=\; \begin{bmatrix} b_{1,1} & b_{1,2} & b_{1,3} & \cdots & b_{1,n} \\ b_{2,1} & b_{2,2} & b_{2,3} & \cdots & b_{2,n} \\ b_{3,1} & b_{3,2} & b_{3,3} & \cdots & b_{3,n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ b_{n,1} & b_{n,2} & b_{n,3} & \cdots & b_{n,n} \end{bmatrix}. \tag{3}$$

For exposition purposes and without loss of generality, we order the observable variables so that the geopolitical oil price shock is represented by the first column of our vector of shocks ($\varepsilon_t^{GeoP}$). Using our external instrument for the geopolitical oil price shock, we estimate the entries of the first column in the impact matrix $\mathbf{B}$ following the traditional two-stage procedure and identify the impact effects of unexpected geopolitical oil price shocks on several macroeconomic variables of interest.[14] The approach also allows us to decompose the contribution of geopolitical oil price shocks to explaining the fluctuations in the oil market and other macroeconomic variables over time.

[14] Appendix B provides the analytical derivation for the identification of the geopolitical oil price shock ($\varepsilon_{1t}^{GeoP}$) in the Proxy VAR model. We use these results to perform the empirical identification.

**Data.** We use monthly data covering the sample period from 1975:M1 to 2023:M10.[15] The benchmark model includes the following variables: global oil production, measured in thousands of barrels per day and recorded by the Energy Information Administration (EIA); the real oil price, measured using West Texas Intermediate (WTI) prices deflated by the U.S. Consumer Price Index (CPI) from the Federal Reserve Economic Data (FRED); oil inventories, measured using inventories from OECD countries as in Kilian and Murphy (2014); world industrial production, measured with an extended version of the OECD's index of monthly industrial production in the OECD and six other major countries, which is the measure of economic activity in Baumeister and Hamilton (2019); macroeconomic uncertainty, measured with the index proposed by Jurado et al. (2015); financial uncertainty is proxied using the corporate bond credit spreads, calculated by Zakrajšek et al. (2016), as a measure of financial uncertainty; U.S. industrial production, the U.S. Consumer Price Index, and the market yield on U.S. Treasury securities at 10-year constant maturity, as a measure of the U.S. interest rate, with all three variables taken from FRED.[16] Figure 4 shows the time series of the variables used in estimating the baseline Proxy VAR model.

**Data adjustment for Covid-19.** Our sample includes the Covid-19 pandemic period, which encompasses extreme observations. Several studies (for example, Lenza and Primiceri, 2020; Hamilton, 2025; Ng, 2021) show that the exceptional variation in the data during this period requires adjustments to the estimation procedure to avoid bias in the VAR model estimates. We adjust the data for the Covid-19 period using the approach of Hamilton (2025). Specifically, we adjust the data by using knowledge of the precise timing of the increase in the variance of innovations to macroeconomic variables and by estimating the shift in the volatility of innovations during the Covid-19 pandemic, similar

[15] We also run two additional robustness exercises: the first uses a shorter sample from 1985:M1 to 2023:M10, and the second uses the sample from 1975:M1 to 2023:M10 but excludes the Covid-19 observations (2020:M1 to 2020:M7). The outcomes from both exercises remain robust relative to our benchmark results.

[16] In a series of rubustness exercises, we show that our results hold when using other macroeconomic and financial market variables, such as the U.S. dollar exchange rate and the S&P 500 index.

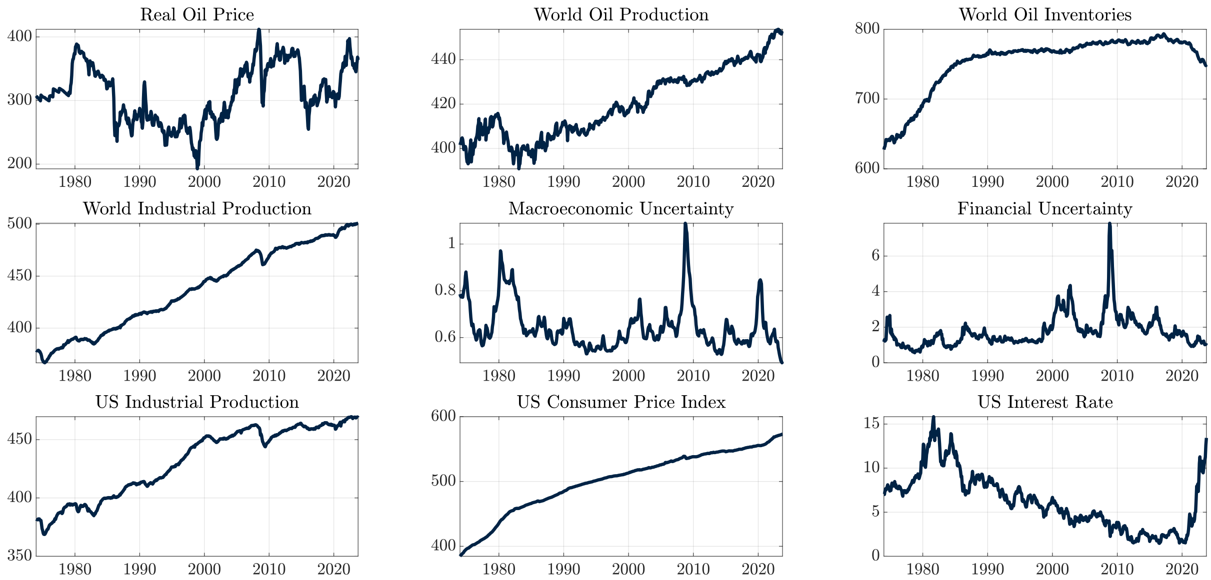


Figure 4: Data. The figure shows the six variables used in our baseline Proxy VAR model. The series for real oil price, world oil production, world oil inventories, world industrial production, U.S. industrial production, and U.S. consumer price index are expressed in (natural) log levels, while the macroeconomic and financial uncertainty indices and the U.S. interest rate are in levels and percentage, respectively.

to the aforementioned studies. Appendix A describes our approach to data adjustment.[17]

**Validation of the instrument.** The prerequisite for the validity of our analysis is that our new instrument is sufficiently correlated with the structural shock of interest while, by construction, being uncorrelated with the other shocks in the VAR. We test this condition of strong correlation using the $F$-test in the first-stage regression of the oil price residuals from the VAR on the instrument, to establish whether the test statistic exceeds the threshold value of 10 suggested by Olea et al. (2021) to rule out weak instruments.[18] The value of the $F$-test is well above the threshold, at 22.35, showing that our instrument for geopolitical oil shocks passes the weak-instrument test and is sufficiently powerful to identify the effects of geopolitical oil price shocks on macroeconomic variables.

[17] To ensure the robustness of our results, we re-estimate our benchmark model excluding observations from the pandemic. This approach follows the reasoning of Schorfheide and Song (2024) and Baumeister and Hamilton (2024), who argue that structural relationships and economic shocks during the pandemic are significantly different and warrant separate treatment. Due to the limited availability of post-pandemic data, we exclude the Covid-19 period (2020:M1-2020:M7) from our sample rather than estimating a separate post-Covid-19 model. The results remain robust to this exclusion.

[18] For further details, see Appendix B.

# 4 Results

In Subsection 4.1, we present the main results by examining impulse response functions, comparing them with related studies, analyzing the forecast error variance explained by the identified geopolitical oil price shock, estimating the historical contribution from these types of shocks to the oil price dynamics over time, and conducting several robustness checks. In Subsection 4.2, we examine the spillovers of geopolitical oil price shocks across commodity markets and countries' industrial production and inflation. We find that these effects are proportional to oil intensity in commodity markets, and, across countries, to energy inventory scarcity and dependence on foreign energy.

## 4.1 Effects of geopolitical oil price shocks in the global oil market and other macroeconomic aggregates

**Impulse response functions.** Figure 5 shows the impulse responses of our variables of interest to the geopolitical oil price shock (black line), normalized to raise the real price of oil by 10 percent on impact, with 68 percent and 90 percent confidence bands (dark and light shaded areas, respectively) computed from 5,000 bootstrap replications.

The geopolitical oil price shock triggers a significant and immediate increase in the real price of oil, accompanied by a reduction in oil production —patterns that resemble a conventional negative oil supply shock. The response of oil inventories, however, deviates from what is typically documented in the literature. Initially, inventories decline to offset the reduction in oil supply, consistent with the standard effects of supply shocks (Baumeister and Hamilton, 2019; Baumeister and Peersman, 2013; Kilian and Murphy, 2014). In the medium run, however, inventories begin to accumulate and remain persistently elevated, reflecting precautionary behavior amid heightened uncertainty. This response is consistent with the forward-looking nature of economic agents, who, following an initial drawdown of inventories to buffer the geopolitical shock, rebuild stocks in anticipation of a potential deterioration in the oil market and broader economic

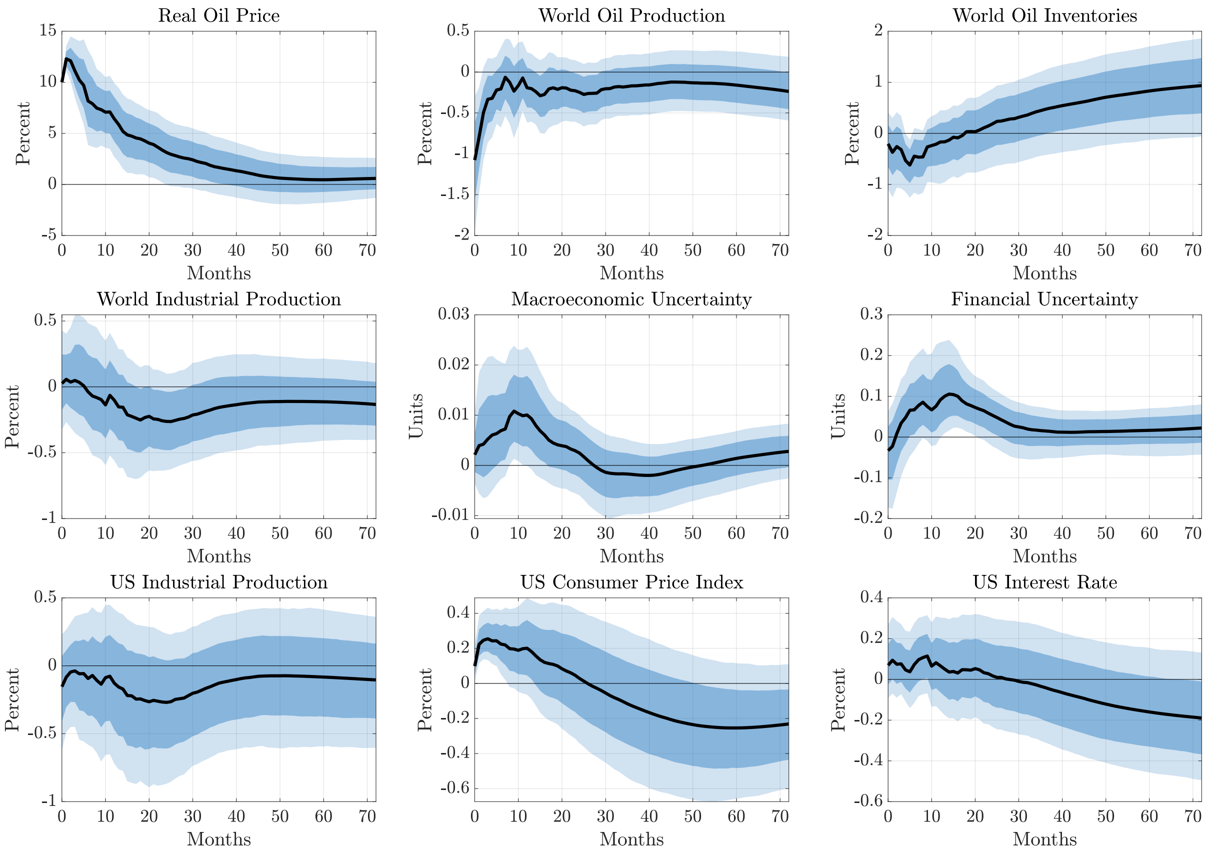


Figure 5: **Impulse responses benchmark model.** Impulse response functions normalized to increase oil prices by 10 percent on impact. The black line shows the median impulse response. Dark (light) blue shaded areas show the 68 percent (90 percent) confidence interval computed with five thousand bootstrap replications.

conditions.[19] The subsequent build-up aligns with the mechanism proposed by Känzig (2021), whereby pessimistic news about future oil supply stimulates the accumulation of oil inventories.

Global and U.S. industrial production do not fall immediately following the shock. This muted short-run response is consistent with Känzig (2021) and can be explained by the initial depletion of inventories and the temporary income gains for oil-exporting countries associated with higher oil prices, which partially offset the negative effects on economic

[19]The heightening of financial uncertainty is consistent with Converse and Mallucci (2025), who show that geopolitical risk triggers broader financial fragmentation and a sharp decline in international capital flows.

activity. In contrast, world industrial production declines in the medium term, reaching a maximum decrease of 3 percent, suggesting that the contractionary effects of the shock prevail as these short-run buffers dissipate. The magnitude of this response aligns with the findings in Blanchard and Galí (2009), who estimated that a 10 percent increase in oil prices is associated with a roughly 3 percent decrease in the U.S. economic activity in the long run. Rising uncertainty generates precautionary motives to safeguard oil production against geopolitical risks, leading to a sustained increase in oil inventories that, in turn, contributes to a prolonged slowdown in industrial production.[20] Consequently, while the geopolitical oil price shock has little short-run effect on aggregate output, it induces a marked medium-run contraction in industrial production. U.S. inflation rises temporarily as higher oil prices push up production costs, prompting interest rates to increase before eventually declining in response to the sustained drop in both output and inflation.

**Comparison with previous results in the literature.** We compare our benchmark IRFs from the geopolitical oil price shock with those reported in Baumeister and Hamilton (2019), who identify a prototypical *oil supply shock*, and with those in Känzig (2021), who study *oil supply news shocks* stemming from communication following OPEC meetings.

The oil supply shock identified in Baumeister and Hamilton (2019) is linked to a broad range of sources, including geopolitical events, natural disasters, and OPEC decisions. Figure 6 shows our benchmark IRFs (black solid line with blue shaded area indicating 68 percent confidence intervals) alongside those from Baumeister and Hamilton (2019) (black dotted line with orange shaded area indicating 68 percent confidence intervals) for real oil prices, world oil production, world oil inventories, and industrial production —the same series used in their study.

The differences in the responses of the series to the same standardized shock, which raises the real oil price by 10 percent on impact, are significant in both magnitude and

[20]The long-run contractionary effect of economic uncertainty on industrial production is consistent with Bloom (2009), Gambetti et al. (2025), Fernández-Villaverde et al. (2024), and Mumtaz and Zanetti (2013) who show that heightened uncertainty causes firms and households to persistently reduce industrial production and consumption, respectively. Unlike these studies, however, we find that uncertainty does not exert an immediate impact on economic activity because the short-run drawdown of oil inventories buffers output from its negative effects.

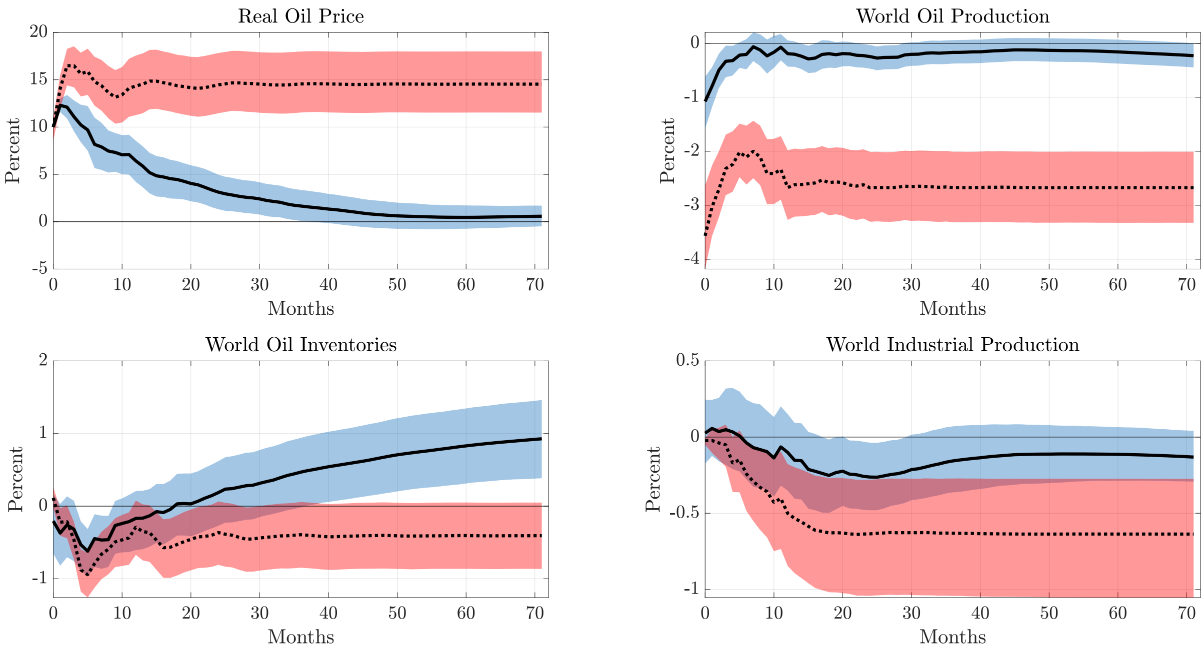


Figure 6: **Impulse responses: comparison with Baumeister and Hamilton (2019).** Impulse response functions normalized to increase oil prices by 10 percent on impact. Black solid and dotted lines show the median impulse responses from our model and Baumeister and Hamilton (2019), respectively; orange and blue areas denote 68 percent confidence intervals.

persistence. While the geopolitical oil price shock is associated with a shorter-lived increase in oil prices compared to a prototypical oil supply shock, the latter induces a larger and more persistent decline in oil production, whereas the decline is only temporary in the case of the geopolitical oil shock. These responses imply that the geopolitical oil price shock elicits a more aggressive supply-side response of prices, since the same initial price increase occurs alongside a smaller production drop. Another key distinction lies in the dynamics of oil inventories: in Baumeister and Hamilton (2019), oil inventories fall in both the short and long run, whereas in our benchmark results they follow a two-phase pattern —declining initially but rising in the long run.

Figure 7 compares our benchmark results with those of Känzig (2021), who study oil supply news shocks arising from communication statements following OPEC meetings. While the response and persistence of real oil prices are quite similar, significant differences emerge in the responses of world oil production and oil inventories. In Känzig (2021),

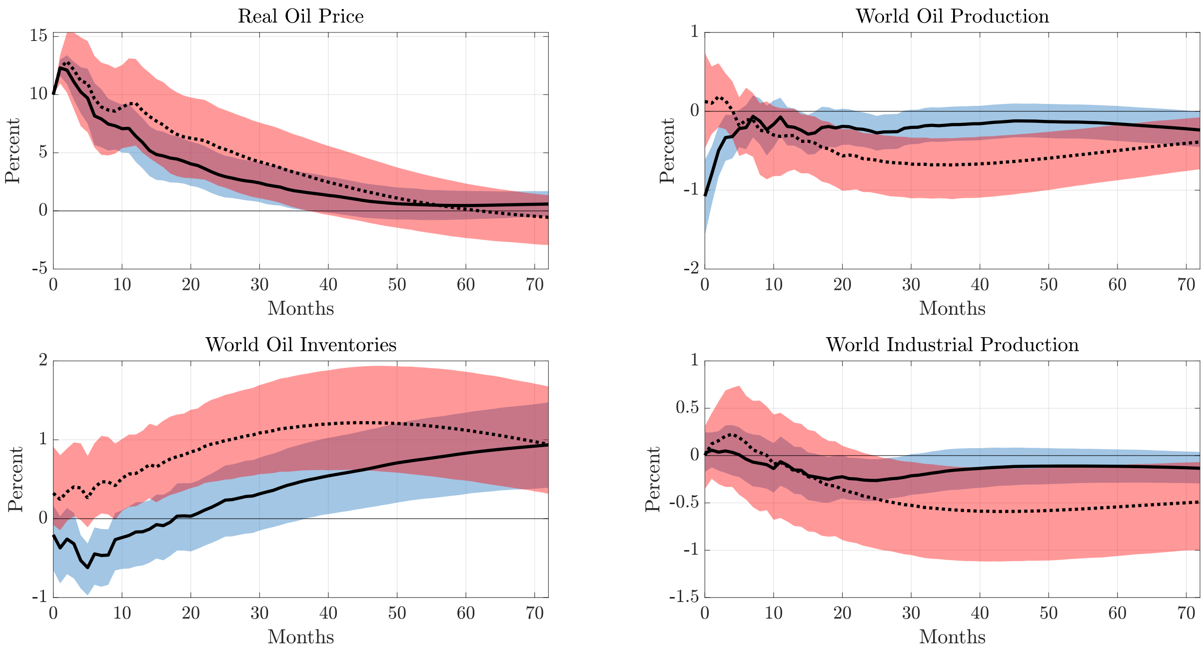


Figure 7: **Impulse responses: comparison with Känzig (2021).** Impulse response functions normalized to increase oil prices by 10 percent on impact. Black solid and dotted lines show the median impulse responses from our model and Känzig (2021), respectively; orange and blue areas denote 68 percent confidence intervals.

world oil production does not respond immediately but instead shows a delayed reaction after several lags. Additionally, oil inventories increase only in Känzig (2021), in contrast with our benchmark results.

Thus, the effect of a geopolitical oil price shock is markedly different from the alternative supply shocks identified in Baumeister and Hamilton (2019) and Känzig (2021), with the key differences lying in the higher magnitudes, the less persistent responses of oil prices and oil production, and the initial fall in oil inventories followed by a persistent increase.

**Magnitude of the responses.** Next, we study the magnitude of the impact response of the variables to the geopolitical oil price shock. A comparison between the responses of oil production and prices indicates that a one percent drop in oil production arising from the geopolitical oil price shock translates into an increase of 11.5 percent in oil prices. We reconcile the large differences between our results and those in other studies, as other approaches conflate powerful sources of supply disruptions, such as natural disasters and OPEC decisions that affect oil supply. In contrast, our exercise isolates the effects of oil price fluctuations arising from significant geopolitical events, thereby disentangling the importance of these events for the oil market.

Our identified shock is characterized by severe, broader consequences of geopolitical events and significant uncertainty surrounding them. The simultaneity of significant changes in the economic outlook and the heightened uncertainty they generate produces sizable shifts in oil prices relative to the response of oil production. Under the standard identification of supply shocks, the response of oil production is nearly proportional to the change in prices, as other supply-side forces are conflated, resulting in much lower impact effects.

As an additional assessment of the magnitude of oil production and price responses, and to provide a check against historical evidence, we compare our estimates with notable historical episodes. Specifically, we focus on three representative episodes marked by elevated geopolitical risk and significant impacts on oil markets. First, during the Iraq's invasion of Kuwait in August of 1990, real oil prices increased from 14.28 to 25.42 U.S. dollars per barrel, while oil production declined by 6 percent, implying a price response of 12.9 percent for a one-percent reduction in production. Second, during the civil war in Libya in February of 2011, real oil prices rose from 40.4 to 46.1 U.S. dollars per barrel, while production fell by 1.38 percent, implying an associated change of 10.3 percent.. Finally, during the Russia's invasion of Ukraine in February 2022, real oil prices increased from 43.9 to 51.5 dollars per barrel, while production declined by 1.1 percent. These changes also imply an associated change of oil prices with respect to oil production of 15.3. Taken together, these numbers show that the estimated responses are consistent with historical oil supply shocks associated with high geopolitical risk.

**Forecast error variance decomposition.** Table 2 shows the share of the forecast error variance explained by the identified geopolitical oil price shock. Geopolitical shocks account for a substantial fraction of the impact response of the total variance in the oil

| **Variable** | **Impact** | **One year** | **Two years** | **Three years** | **Four years** | **Five years** |
|---|---|---|---|---|---|---|
| Real Oil Price | 76.2 | 66.3 | 54.9 | 49.1 | 43.9 | 40.5 |
| World Oil Production | 23.7 | 15.5 | 9.9 | 9.3 | 8.4 | 7.3 |
| World Oil Inventories | 1.0 | 4.2 | 3.2 | 2.4 | 3.4 | 5.1 |
| World Industrial Production | 0.1 | 0.3 | 1.4 | 3.1 | 3.4 | 3.3 |
| Macroeconomic Uncertainty | 1.5 | 3.4 | 6.7 | 6.0 | 5.5 | 5.1 |
| Financial Uncertainty | 1.3 | 2.5 | 9.0 | 10.2 | 9.3 | 8.5 |
| U.S. Industrial Production | 2.5 | 0.7 | 1.2 | 2.2 | 2.0 | 1.7 |
| U.S. Consumer Price Index | 9.0 | 15.5 | 6.9 | 3.4 | 2.8 | 3.5 |
| U.S. Interest Rate | 1.2 | 1.8 | 1.6 | 1.0 | 0.9 | 1.4 |

Table 2: Forecast error variance decomposition for each of the variables in the model. The numbers represent the percent of the total variance explained by the identified geopolitical oil price shock.

market block —particularly for real oil prices (76.2 percent) and oil production (23.7 percent). For real oil prices, the initially large share of variance explained by geopolitical oil supply shocks declines over time but remains substantial at the five-year horizon (40.5 percent). This pattern is consistent with the view that, in the long run, other shocks —such as global demand and oil-specific consumption demand shocks— also play an important role in shaping oil price dynamics. Overall, these results underscore the persistent, though not exclusive, influence of geopolitical disturbances on oil market dynamics.

For variables outside the oil market block, the contribution of the geopolitical oil price shock is more moderate yet economically meaningful. In the short run, we find a notable effect on U.S. consumer price inflation (9 percent), reflecting the immediate pass-through of oil price increases to production costs and consumer prices. In the medium and long run, the shock accounts for a non-trivial portion of the variance in financial uncertainty (10.2 percent), U.S. industrial production (2.2 percent), and U.S. interest rates (1.4 percent). This pattern suggests that while the immediate macroeconomic transmission of the shock is concentrated in prices, its persistent effects are transmitted through broader financial and real economic channels over time.

**Historical variance decomposition.** Next, we study the relevance of geopolitical oil price shocks for the historical changes in oil prices. Figure 8 shows the cumulative

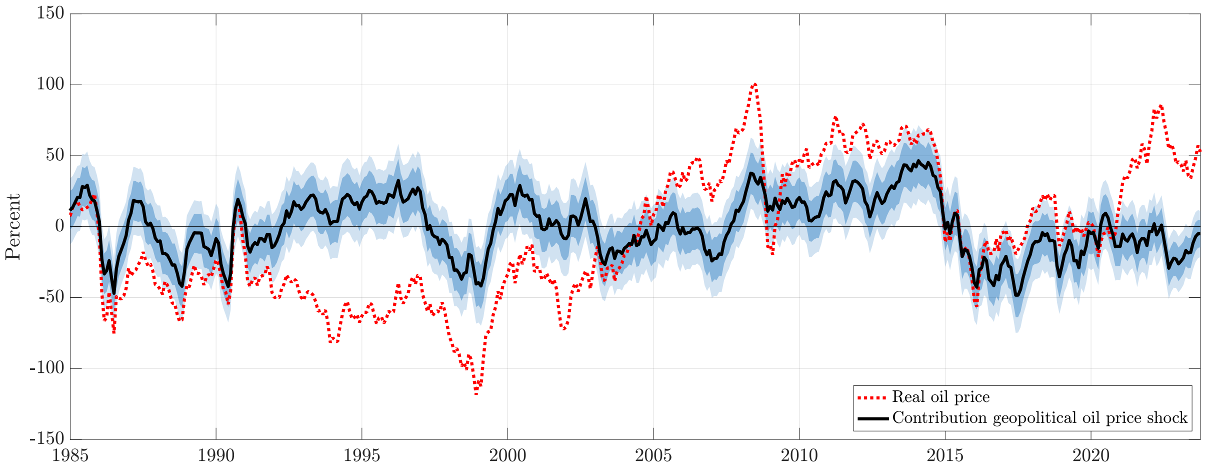


Figure 8: **Historical variance decomposition.** The figure shows the cumulative historical contribution of geopolitical oil price shocks to the real price of oil (black line) together with the 68 percent and 90 percent confidence intervals, and the observed real price of oil (red dotted line), expressed in percent deviations from mean.

historical contribution of the geopolitical oil price shocks to the real price of oil (red-dashed line) and the observed series of the real price of oil (black line), expressed in percentage deviation from the mean over the period 1985-2023. The decomposition captures the surprise to oil price occurring during *elevated* geopolitical risk (i.e., when the level of the *GeoThreats* index exceeds 200 percent, as discussed in Section 2.2).

Geopolitical oil shocks are important drivers of historical variation in oil prices, as evidenced by the strong comovement between the real oil price and the contribution of the geopolitical oil price shock around episodes of elevated geopolitical risk. Looking across key episodes —such as the Gulf War (1990-91) and the escalation of the Iraq-U.S. war (2004-05)— highlights the contribution of our geopolitical oil supply shock to oil price fluctuations, showing that the comovement between the two series strengthens during periods of elevated geopolitical risk, indicating a historically tight link between geopolitical risk and movements in oil prices.

Figure 8 shows that elevated geopolitical risk would have raised oil prices above the observed real oil price in the absence of other shocks in the pre-2004 period. The lower historical real oil prices are driven by weak demand for oil and other commodities in the pre-2004 period, documented in Nakov and Pescatori (2010), which offset the positive contribution of the geopolitical oil shock to the real oil price. In the post-2004 period, however, the pattern reversed, driven by the expansion of oil demand during the Great Moderation —in particular, the rise in demand for crude oil and refined petroleum products from China— which led to a substantial increase in real oil prices relative to the contribution of geopolitical risk. Our results are consistent with Känzig (2021), who study news shocks to oil supply. We also find that the total variance of post-pandemic oil prices was driven by a range of shocks beyond our identified geopolitical oil price shock. This is consistent with Giannone and Primiceri (2024), who show that the sharp rise in inflation since 2021 was largely driven by unexpectedly strong demand forces, in both the U.S. and the Euro Area.

**Robustness analysis.** Appendix C presents several robustness checks for our benchmark specification. The results remain qualitatively unchanged when we: (i) clean our instrument from forces exogenous to the oil market but related to geopolitical risk (such as consumer confidence, trade, or global investment); (ii) use alternative data samples; and (iii) include additional control variables.

**Cleaning results for exogenous forces to the oil market.** Although the use of high-frequency data allows us to isolate oil price movements around periods of heightened geopolitical tensions, spikes in geopolitical tensions may also directly affect confidence, trade, and investment, not only through oil prices. To ensure this does not bias our estimates, we conduct three robustness checks.

In a first exercise, we construct our high-frequency instrument using the recent oil-market-specific geopolitical index developed in Iacoviello and Tong (2026). This index relies on a layered classification architecture that identifies news articles specifically related to geopolitical oil supply disruptions. Using this measure restricts the events employed in our identification strategy to those directly associated with disruptions to oil supply.[21]

[21]For this exercise, we identify days of high geopolitical tensions for the oil market when the index exceeds 1.5 standard deviations above its mean. This criterion identifies 475 days associated with

Figure C.1 reports the results obtained with this alternative instrument. The responses remain qualitatively similar to those in the benchmark specification. The identified shock resembles a severe supply disturbance, characterized by a more persistent effect on oil production and a stronger relationship between oil production and prices.[22] Oil inventories continue to display a dual response: an initial depletion that compensates for the drop in production, followed by an increase reflecting the forward-looking behavior of market participants and concerns about future economic and oil market conditions.

In the second and third exercises, we clean our instrument prior to estimation by controlling for global financial conditions and global demand factors. Specifically, before estimating the Proxy SVAR, we regress our benchmark instrument on an indicator variable for the 2008-09 global financial crisis and on the growth rate of global economic activity, measured by world industrial production. The residuals from these regressions are then used as the instrument in the econometric model. Figures C.2 and C.3 show that the results remain robust under these adjustments.

**Additional robustness exercises.** Our findings are also robust to several alternative specifications. First, we exclude the Covid-19 period from the sample (Figure C.4). Second, we estimate the model using the shorter sample period from January 1985 to October 2023, which excludes the turbulent 1970s (Figure C.5). Third, we include the S&P 500 index in the model (Figure C.6).[23] Finally, we augment the specification by including the U.S. dollar index (Figure C.7).

heightened geopolitical risk related to oil supply disruptions.

[22]Using this instrument, we find that a one percent reduction in production occurring during periods of high geopolitical risk is associated with an increase in oil prices of about 30 percent. This magnitude is consistent with the index capturing severe oil supply disruptions occurring in particularly tense geopolitical environments, which strengthens the sensitivity of prices to production changes.

[23]Recent work in Mori and Peersman (2024) shows that some results in Känzig (2021) change when the S&P 500 index is included in the SVAR model. In our case, however, the main results remain robust to the introduction of this financial variable.

## 4.2 Spillovers of geopolitical oil price shocks

In this section, we study the transmission of geopolitical oil price shocks across countries and commodity markets, focusing on spillovers to: (i) commodity prices, (ii) national industrial production indices, and (iii) national consumer price indices. We show that spillovers are stronger for oil-intensive commodities (such as natural gas and fertilizers), and for countries with low energy inventories and high dependence on foreign energy.

We study the spillover effects of increases in the geopolitical oil price shock using the following local projections model:

$$y_{i,t+h} = \beta_0^i + \psi_h^i \varepsilon_t^{GeoP} + \sum_{l=1}^{L} \beta_{h,l}^i \mathbf{y}_{t-l} + \xi_{i,t,h}, \qquad \text{for } h = 0, 1, 2, ..., H, \tag{4}$$

where $y_{i,t}$ is the vector comprising the variables of interest indexed by $i$ (either commodity prices, national industrial production, or national consumer price indices), the index $h$ refers to the horizon ahead with the final horizon equal to $H$, and $\beta_0$ is the constant term. The vector $\psi_h^i$ comprises the response coefficients of the variable $y$ at time $t+h$ for the variable $i$ to the exogenous geopolitical oil price shock $\varepsilon_t^{GeoP}$ occurring at time $t$, identified using our VAR model in Section 3. The vector $\mathbf{y_{t-l}}$ comprises lagged control variables that include real oil prices and world industrial production, with the sub-index $l$ representing the number of lags, and the vector $\xi_{i,t,h}$ comprises the error terms. We estimate equation (4) at each horizon $h$ and construct impulse responses using the coefficient estimates, without imposing any structure as in the VAR model. The model is estimated using monthly data for commodity prices from the World Bank Commodities Price Data (Pink Sheet), industrial production from the Organization for Economic Cooperation and Development (OECD), and consumer price indices from Ha et al. (2023). The panel data are unbalanced due to inconsistent observations for some developing countries. The overall sample period is from 1975:M1 to 2023:M9, although this period varies across countries depending on the data availability.

We focus on the spillovers of geopolitical oil price shocks to the prices of several

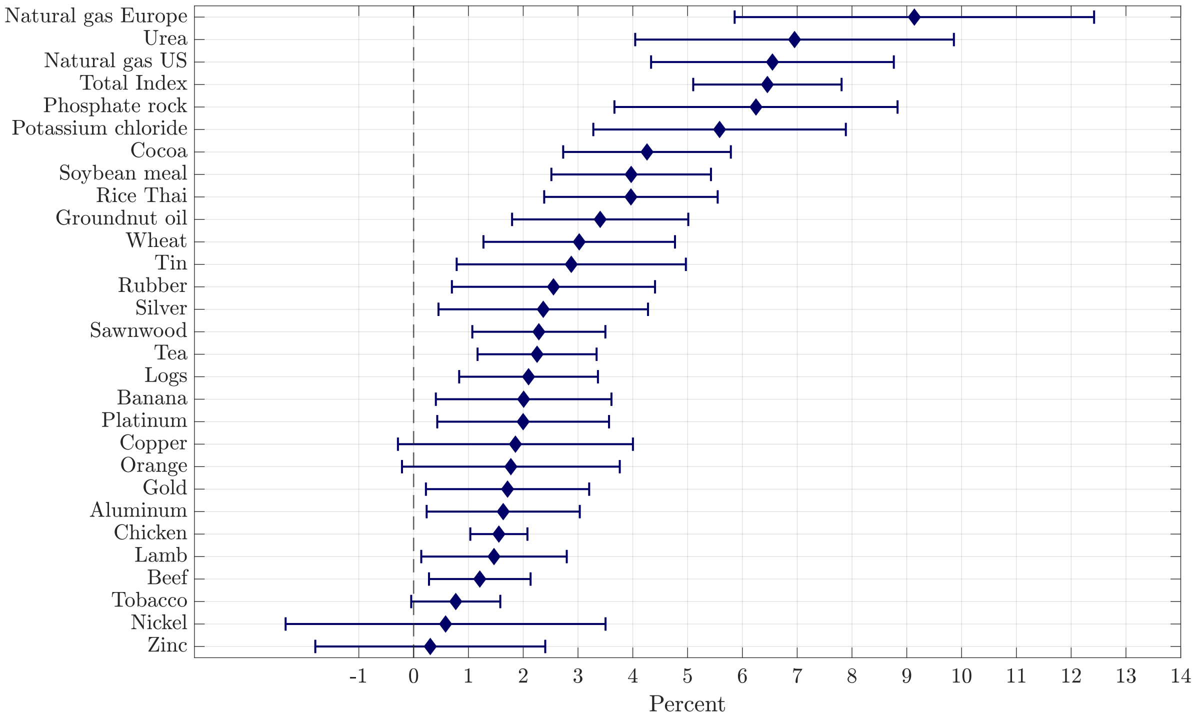


Figure 9: **Spillovers into commodity prices across markets.** The figure shows the strongest adverse responses of a range of commodity prices to a geopolitical oil supply shock that increases oil prices by 10 percent, with one-standard deviation confidence intervals.

commodities, and national industrial production and consumer prices across countries, resulting from a shock that increases oil prices by 10 percent on impact, as in our benchmark model. We present the *strongest adverse* response of each series to the shock as our representative cumulative measure of spillovers, and we report the one-standard-deviation confidence interval for each response.

**Spillovers into commodity prices across markets.** Figure 9 shows the strongest adverse response of the prices of different commodities to the geopolitical oil price shock.[24] Most commodity prices exhibit a positive and significant response to the geopolitical oil price shock, while a small number of commodities respond insignificantly.

The total commodities price index has a significant response of 6.4 percent to the

[24]Figure D.1 in Appendix D examines the horizon of the strongest adverse responses and shows that several commodities reach their peak response within one year of the shock.

geopolitical oil price shock. The strongest response, approximately 9.1 percent, is observed for natural gas in Europe, followed by urea (a widely used fertilizer)at about 7 percent. These results are consistent with the evidence in Baffes (2007), which documents significant comovements between oil prices and oil-intensive commodities such as natural gas and fertilizers. Moreover, we find that geopolitical oil price shocks spill over significantly to the prices of other key commodities, including aluminum, silver, and gold.

Geopolitical oil supply shocks produce a significant increase in the total commodity price index, reaching a maximum response of 6.5 percent increase. Oil-intensive commodities, such as natural gas and fertilizers, exhibit the largest price responses, at about 9.1 percent and 7 percent, respectively, reflecting their strong input and cost linkages with crude oil markets. Other groups and individual commodities also show significant responses to these types of shocks, such as food, raw materials, and precious metals, although the magnitude of these responses remains around a 2 percent increase. Because energy constitutes a key production input and transportation cost for these commodities, fluctuations in oil prices are rapidly transmitted along the supply chain. These findings corroborate established evidence in the literature documenting substantial comovement between oil prices and oil-intensive commodities, including natural gas and fertilizers (see Baffes, 2007; World Bank, 2016; World Bank, 2019; World Bank, 2024).

**Spillovers into industrial production across countries.** Figure 10 shows the strongest adverse response of several national indices of industrial production to the geopolitical oil price shock.[25] The range of responses is wide, from 0 to -2 percent, and the confidence bands show that the estimates remain significant. The response of OECD countries, representative of the average response across developed countries, is significantly negative at about -0.5 percent.[26]

To study the key forces generating the wide range of responses of industrial production

[25] Figure D.3 in Appendix D shows the timing of the strongest response for the different national indices of industrial production, indicating that several countries reach the peak negative response about twelve months after the occurrence of the shock.

[26] While our focus is on the spillovers across countries, Egorov et al. (2025) show that restrictions on cross-border trade imposed for geopolitical purposes also exert a strong contractionary effect on real activity in the receiving economy, like the EU sanctions imposed on Russia after February 2022.

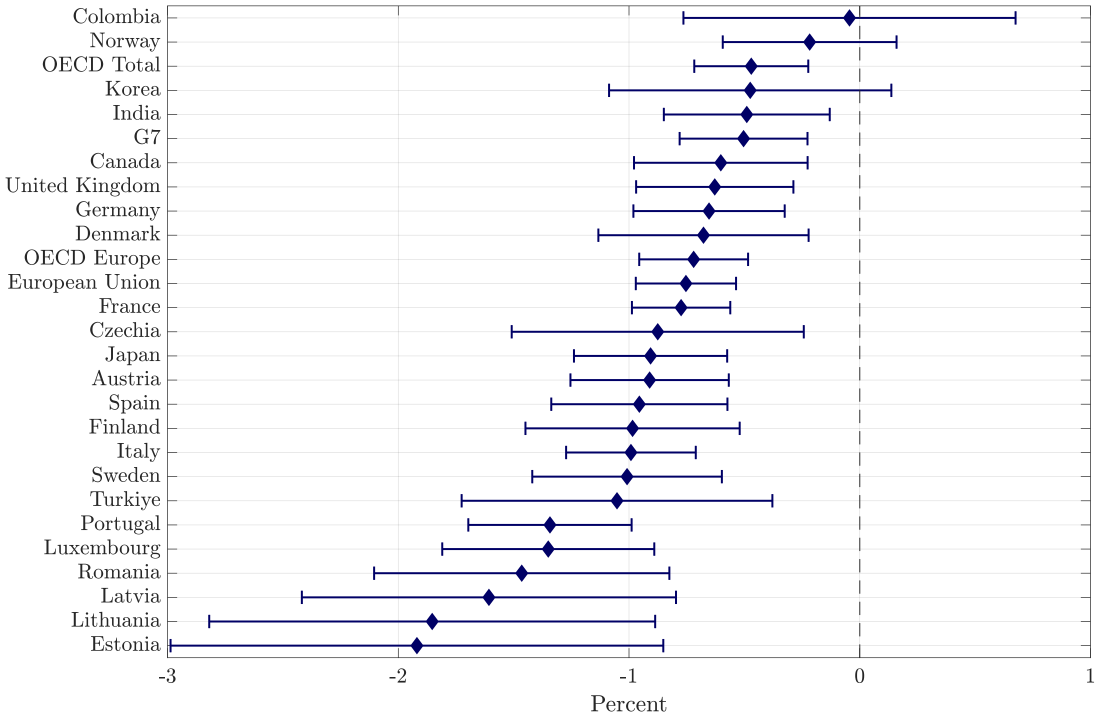


Figure 10: **Spillovers into industrial production across countries.** The figure shows the strongest adverse responses of a range of industrial production indices across countries to a geopolitical oil supply shock that increases oil prices by 10 percent, with one-standard-deviation confidence intervals.

to the geopolitical oil shock across the different countries, we focus on two dimensions: (i) the self-resilience of the country to oil shocks by studying the relationship between the magnitude of the responses of national industrial production with the share of national energy inventories, and (ii) the dependence of the country from the external supply of energy by studying the relationship between the magnitude of the response of national industrial production and the share of energy purchases from abroad.[27]

The left panel of Figure 11 shows scatter plots of the strongest adverse response of industrial production against the change in countries' energy inventories as a share of total inventories. Countries with low national energy inventories exhibit a larger negative response of industrial production to the geopolitical oil supply shock. Similarly, the right panel shows that countries with high dependence on foreign energy experience a more

[27]The data on energy and total inventories and purchases from abroad of oil are from the Input-Output Tables (IOTs) produced by the OECD for the year 2019.

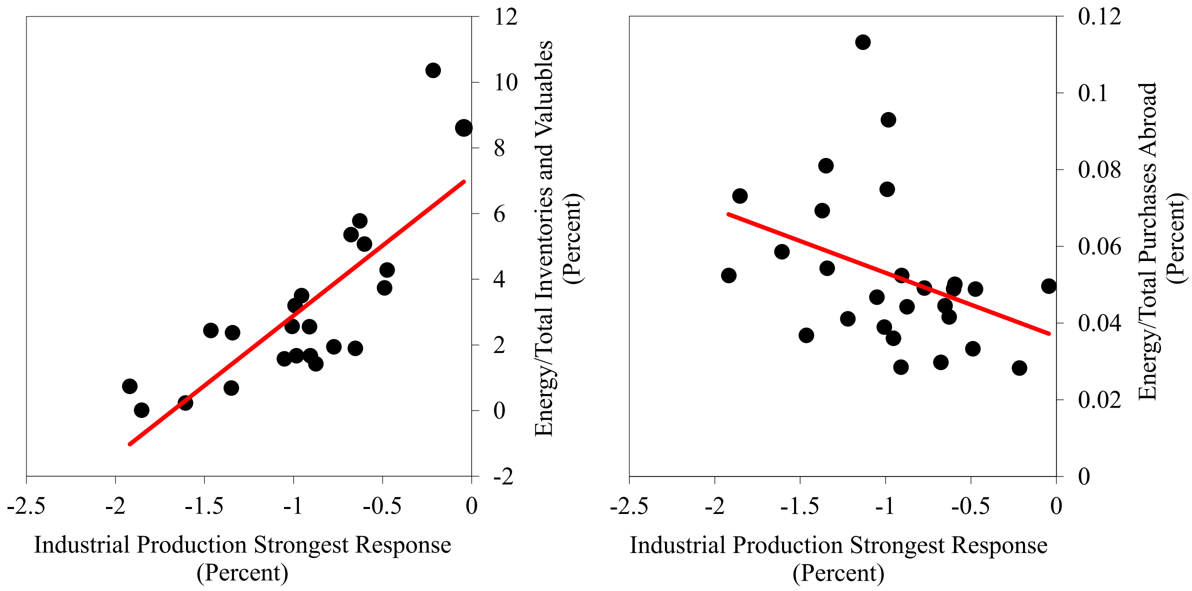


Figure 11: **Response of industrial production, energy inventories, and purchases from abroad.** The left panel shows the relationship between the change in countries' energy inventories, expressed as a share of total inventories, and the strongest adverse response of each industrial production across countries. The right panel shows the relationship between countries' energy purchases from abroad, expressed as a share of total purchases, and the strongest adverse response in each country's industrial production.

negative response of industrial production to the geopolitical oil price shock. Overall, the results indicate that the decline in industrial production in response to the geopolitical oil price shock is significantly stronger in countries with low energy inventories and high reliance on foreign energy.

We also analyze heterogeneity between oil-importing and oil-exporting economies.[28] Figure E.1 in Appendix E reports the average peak responses for each group. Oil-importing economies exhibit economically and statistically significant declines in industrial production following a geopolitical oil supply shock. These effects might be explained by the mechanism in which higher oil prices raise import bills, increase production costs, and reduce real income, leading to lower output. Specifically, a geopolitical oil supply shock that increases oil prices by 10 percent on impact is associated with an average decline of approximately 0.8 percent in industrial production among oil-importing countries.

In contrast, oil-exporting economies show a much smaller and statistically insignificant

[28] Countries are categorized as oil-exporting or oil-importing economies following the World Bank classification.

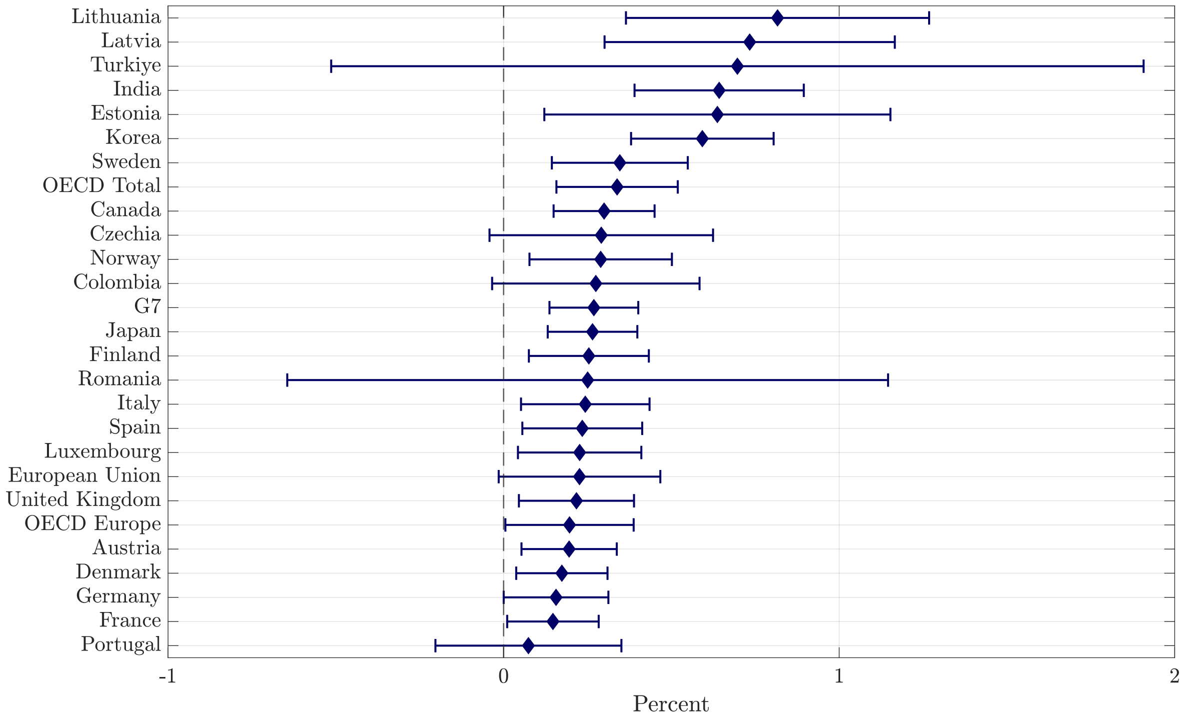


Figure 12: **Spillovers into consumer prices across countries.** The figure shows the strongest adverse responses of a range of consumer price indices across countries to a geopolitical oil supply shock that increases oil prices by 10 percent, with one-standard-deviation confidence intervals.

response. On average, industrial production changes by 0.3 percent following a 10 percent geopolitical oil price increase. Higher oil prices tend to support income and activity in exporting economies in the short run, offsetting adverse cost effects. Over the medium- to long-run, however, weaker global demand associated with geopolitical shocks dampens activity, resulting in a loss of production even for these economies.

**Spillovers into consumer prices across countries.** Figure 12 shows the strongest adverse response of several consumer price indices to the geopolitical oil price shock.[29] The estimates lie within the unit interval and are statistically significant for most countries, indicating that geopolitical oil shocks contribute to increases in consumer price indices across countries, although the effect is mild.

[29] Figure D.2 in Appendix D shows the timing of the strongest response for the different national consumer price indices, indicating that several countries reach the peak positive response within one year of the shock.

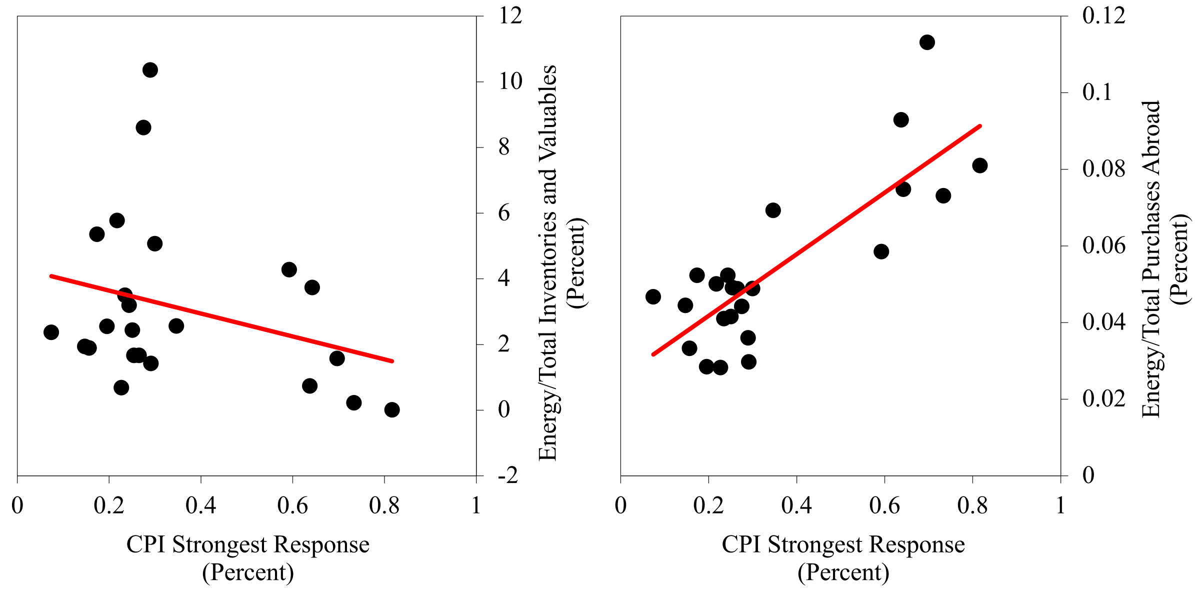


Figure 13: **Response of CPI, energy inventories and purchases from abroad.** The left panel shows the relationship between changes in countries' energy inventories, expressed as a share of total inventories, and the response in consumer price indices in each country's headline consumer price index. The right panel shows the relationship between countries' energy purchases from abroad, expressed as a share of total purchases, and the response in consumer price indices in each country's headline consumer price index.

Consistent with our analysis of national industrial production indices, we study the differences in the magnitude of national consumer price responses to the geopolitical oil shock by focusing on (i) a country's self-resilience to oil shocks, inferred from the share of national energy inventories, and (ii) a country's dependence on external energy supply, inferred from the share of energy purchases from abroad. The left panel of Figure 13 presents scatter plots of the consumer price indices response of national consumer price indices against changes in countries' energy inventories as a share of total inventories. The lower a country's national energy inventories, the greater the increase in its consumer price index arising from the geopolitical oil supply shock. The right panel shows that countries with high dependence on foreign energy exhibit a stronger consumer price index response to the geopolitical oil price shock. Overall, these results indicate that geopolitical oil shocks significantly raise national consumer price indices, with the magnitude of the increase rising alongside the scarcity of national energy inventories and reliance on foreign energy.

Figure E.2 in Appendix E reports the average peak responses for oil-exporting and oil-importing countries. Geopolitical oil supply shocks generate inflationary pressures in both oil-importing and oil-exporting economies. On the one hand, oil-importing countries experience a peak increase of about 0.4 percent in consumer prices, while oil-exporting economies record a rise of roughly 0.3 percent; both effects are statistically significant. These findings suggest that geopolitical oil supply shocks raise production costs and disrupt supply chains, setting in motion inflationary pressures that are ultimately passed through to consumers.

Overall, the results suggest that geopolitical oil price shocks generate substantial spillovers to other commodity markets and propagate to national industrial production and CPIs, leading to lower output and higher prices. The spillovers are stronger in countries with low energy inventories and high dependence on foreign energy. Moreover, they produce no clear winners. Economic activity declines, and inflationary pressures intensify across countries, regardless of whether they are oil exporters or importers, with no group experiencing net gains. Although exporters may benefit from higher oil prices, these gains might be largely offset by heightened uncertainty and disruptions to trade and financial conditions. At the same time, importing economies face higher production costs and lower real incomes, further dampening growth. Taken together, the evidence indicates that geopolitical oil supply shocks generate broad-based macroeconomic costs and reinforce global economic fragility.

# 5 Conclusions

In this paper, we exploit episodes of sharp increases in geopolitical threats to identify and disentangle the effects of geopolitical oil price shocks on both the global oil market and the U.S. economy. We analyze how these shocks propagate across commodity markets and examine their spillovers to output and inflation across countries. This approach allows us to isolate the macroeconomic consequences of oil price fluctuations driven by geopolitical factors, shedding light on their transmission channels and cross-country heterogeneity.

Taken together, the results indicate that geopolitical oil price shocks differ systematically from those observed during normal market conditions. When oil prices move in extreme geopolitical developments, the resulting dynamics combine features of standard supply disruptions with heightened uncertainty and forward-looking risk. These episodes are associated not only with sharp price increases and production declines, but also with a persistent medium-run inventory accumulation, as market participants engage in precautionary stock building in response to concerns about future supply conditions.

The estimated price responses during these episodes are economically large and consistent with major historical disruptions. By focusing on oil price movements that coincide with sudden increases in geopolitical risk, the analysis captures market behavior in which expectations, risk premia, and uncertainty play central roles. As a result, oil prices adjust much more sharply relative to observed changes in physical supply than in periods characterized by routine market fluctuations.

These differences have important implications for the transmission of oil supply shocks across commodity markets and to the global economy. Oil price increases arising around intense geopolitical contexts propagate more strongly to energy-intensive commodities and generate larger and more persistent contractions in economic activity. The effects are particularly pronounced in oil-importing economies, where higher energy costs and external imbalances amplify the downturn, while oil exporters experience more limited net benefits. Overall, the findings indicate that oil price movements associated with severe geopolitical events are not simply larger versions of normal market conditions shocks, but reflect a distinct regime in which uncertainty and forward-looking behavior materially alter the economic consequences of oil price fluctuations.

These findings have important implications for policy design. Oil price increases that arise in intense geopolitical contexts require a different policy response than routine energy price fluctuations. Because these episodes are associated with heightened uncertainty, precautionary inventory accumulation, and amplified macroeconomic spillovers, conventional stabilization tools may be less effective. For oil-importing economies, strengthening energy security through strategic petroleum reserves, diversifying energy sources, and building targeted fiscal buffers becomes especially important as geopolitical risks rise. For oil-exporting economies, the results highlight that higher prices during geopolitical crises do not translate into sustained gains, reinforcing the need for stabilization mechanisms and economic diversification.

Our findings highlight several important directions for future research. For instance, the persistent reduction in output and the temporary increase in uncertainty following the geopolitical oil price shock coincide with a long-lasting increase in oil inventories and a persistent contraction in oil production, underscoring the nexus between geopolitical oil shocks, uncertainty and oil inventories in generating persistent macroeconomic effects. The development of models incorporating geopolitical risk, spare capacity of resources to absorb shocks, and the development of mechanisms to produce long-lasting effects of temporary geopolitical shocks would certainly be an important extension.[30] More broadly, an interesting avenue for future research is to formalize geopolitical risk within a structural framework of business cycle fluctuations.[31] Lastly, future research would benefit from developing models that account for the interplay between geopolitical risk and economic conditions to study the reciprocal feedback loop between geopolitics and macroeconomic conditions. We plan to explore some of these extensions in future work.

[30] Michaillat and Saez (2015), Ghassibe and Zanetti (2022) and Bai et al. (2024, 2026) provide a general framework to include spare capacity in macroeconomic models. Models with complementarities in production—such as those by Fernández-Villaverde et al. (2021, 2025b); Fernández-Villaverde et al. (2024)—offer a useful framework for accounting for the persistent effects of temporary shocks.

[31] Clayton et al. (2024, 2026, 2025) develop models that provide a general framework for analyzing the macroeconomic consequences of geopolitical shocks.

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# Online Appendices

## The Effects of Geopolitical Oil Price Shocks

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### Contents

# A. Data adjustment for Covid-19 pandemic shock

There are different approaches that have been proposed in the existing literature to deal with the challenge of modeling time series that include the extreme variation of the Covid-19 period. For example, Schorfheide and Song (2024) argue that, if the final goal of the practitioner is to estimate the parameters of a model during normal times, she should just ignore the observations from the Covid-19 pandemic. Alternatively, Ng (2021) argues that the large changes in the time series during the Covid-19 period were not driven by economic shocks alone but also by the large and persistent health event that the pandemic entailed. Therefore, she proposes using Covid-19 indicators to *"de-Covid"* the data and isolate the economic factors and shocks. Other studies, like Lenza and Primiceri (2020) propose to use a model of time-varying volatility to make a data re-scaling that is *common* for all shocks given that we know the exact timing in the increase of the variance of macroeconomic variables. They suggested that the practitioner could think of observations during the Covid-19 pandemic as having a variance-covariance matrix that is multiplied by a large scale factor during the pandemic, which might vary during each of its first three months. Hamilton (2023) argues that a simpler idea would be to use a constant scale factor for all the months of the pandemic regime, such that:

$$\Omega_2 \quad = \quad \delta^2 \Omega_1$$

where $\Omega_2$ is the variance-covariance matrix during the pandemic regime, $\Omega_1$ is the matrix during normal times, and $\delta$ is the scale parameter that takes a value greater than one ($\delta_t > 1$) during the Covid-19 months and equal to one ($\delta_t = 1$) during normal times. Here, we can write the log likelihood as

$$\begin{aligned} \mathcal{L}(\Pi_1, \Omega_1, \delta) \quad &= \quad -\frac{Tn}{2} log(2\pi) - \frac{T_2 n}{2} log\delta^2 - \frac{T}{2} log\,|\Omega_1| \\ &\quad\quad -\frac{1}{2}\sum_{t=1}^{T}(y_t^* - \Pi_1 x_{t-1}^*)'\Omega_1^{-1}(y_t^* - \Pi_1 x_{t-1}^*) \end{aligned}$$

Where $\Pi_1$ is the parameter that characterize the normal times, $y_t^*$ and $x_{t-1}^*$ are the adjusted series by the scale parameter $\delta$ ($y_t^* = y_t/\delta$ and $x_{t-1}^* = x_{t-1}/\delta$), $T$ is the total number of observations, and $T_2$ the number of observations from the Covid-19 regime. Lenza and Primiceri (2020) used Bayesian methods to proceed with the estimation of their adjustment. An advantage of Hamilton's approach is that his simpler version can be estimated using maximum likelihood. If we knew $\delta$, the MLE of $\Pi_1$ and $\Omega_1$ would be given by:

$$\hat{\Pi}_1 \quad = \quad \left(\sum_{t=1}^{T} y_t^* x_{t-1}^{*'}\right)\left(\sum_{t=1}^{T} y_t^* x_{t-1}^{*'}\right)^{-1} \tag{A.1}$$

$$\hat{\Omega}_1 \;=\; T^{-1}\sum_{t=1}^{T}\left(y_t^* - \hat{\Pi}_1 x_{t-1}^*\right)\left(y_t^* - \hat{\Pi}_1 x_{t-1}^*\right)' \qquad \text{(A.2)}$$

If we knew the value of $(\Pi_1, \Omega_1)$ we can estimate the value of $\delta$ by taking the derivative of the log likelihood equation with respect to $\delta$:

$$\hat{\delta}^2 \;=\; (T_2 n)^{-1}\sum_{t=1}^{T}(y_t - \Pi_1 x_{t-1})'\Omega_1^{-1}(y_t - \Pi_1 x_{t-1})\mathbb{1}(Covid) \qquad \text{(A.3)}$$

Where $\mathbb{1}(Covid)$ is an indicator variable for the Covid-19 regime. Equations (A.1), (A.2), and (A.3) represent a zigzag algorithm to find the MLE of $(\Pi_1, \Omega_1, \delta)$. We start by guessing a value for $\hat{\delta}^{(1)}$ to get a weighted regression estimates of $(\Pi_1^{(1)}, \Omega_1^{(1)})$ from equations (A.1) and (A.2) to get a better estimate of $\hat{\delta}^2$, and iterate until we reach a fixed value from the iteration, that would be the MLE of $(\Pi_1, \Omega_1, \delta)$.

We follow this procedure because it allows to downweight the Covid-19 observations by dividing them by a scale parameter without completely ignoring them. It also has an easy computation and allows for adjusting all the variables in the model. For the adjustment, we use our four variables in our model, that are included in the vector $\mathbf{y_t} = (q_t, WIP_t, p_t, \Delta i_t^*)'$, where $q_t$ is oil production, $WIP_t$ is our proxy for global economic activity; $p_t$ is the real oil price, and $\Delta i_t^*$ is the change in oil inventories. We use twelve lags and a constant in our vector of controls. Following Hamilton's method, we define the Covid-19 regime as the months from January 2020 to July 2020. We obtain a value for $\delta$ of 5.70. Figures A.1 and A.2 show the adjusted oil market series, as well as the world industrial production index. As we can observe, all the adjusted series exhibit a more moderate behavior during the Covid-19 pandemic period, since now we are controlling for the extreme variation that the series experienced during such a regime.

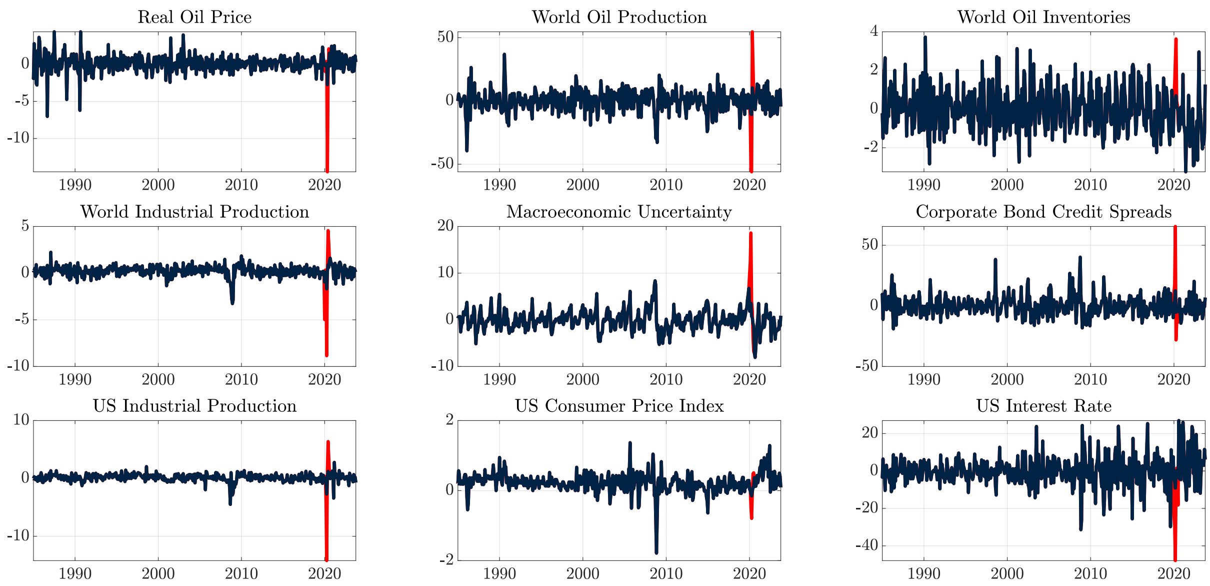


Figure A.1: **Data adjustment.** Corrected time series using Hamilton proposed method (1985-2023).

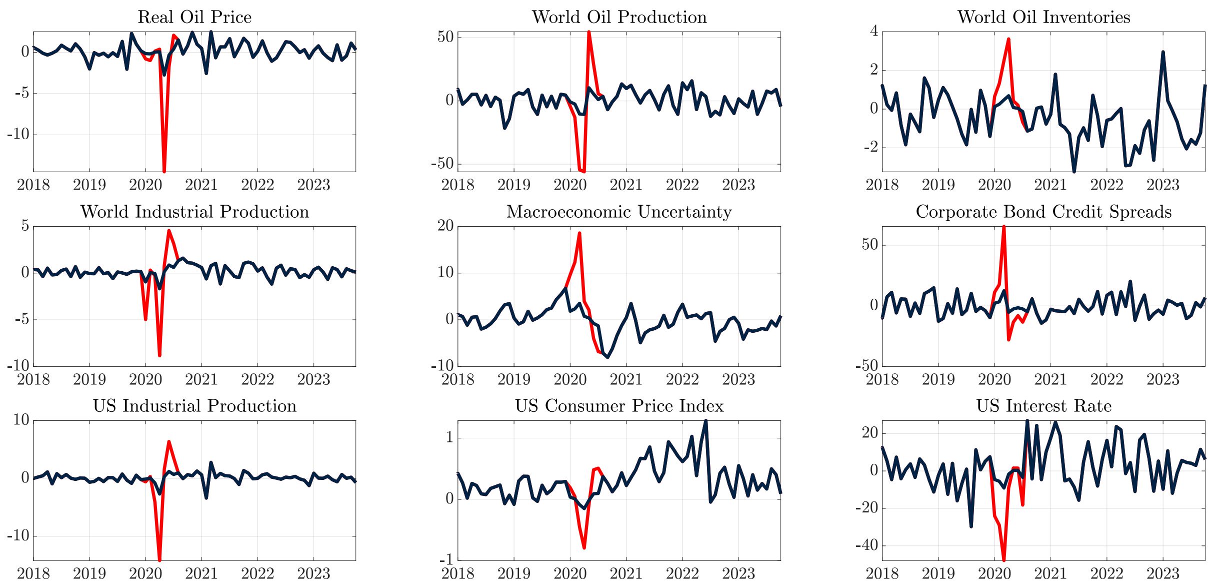


Figure A.2: **Data adjustment.** Corrected time series using Hamilton proposed method (2018-2023).

# B. Estimation of the Proxy VAR with One Instrument

This appendix outlines the methodology for estimating a Proxy Structural Vector Autoregressive (Proxy SVAR) model with one instrument, following the approach employed in Kanzig (2021). The Proxy VAR framework is used to identify structural shocks by leveraging an external instrument that is correlated with the shock of interest but uncorrelated with other structural shocks in the model.

## 1. Model Setup

Consider a reduced-form VAR model:

$$\mathbf{y}_t = \mathbf{A}(L)\mathbf{y}_t + \mathbf{u}_t, \quad \mathbf{u}_t \sim \mathcal{N}(\mathbf{0}, \mathbf{\Sigma}), \tag{A.1}$$

where:

- $\mathbf{y}_t$ is an $n \times 1$ vector of endogenous variables (e.g., macroeconomic indicators such as GDP growth, inflation, oil prices).
- $\mathbf{A}(L)$ is a lag polynomial capturing the dynamic relationships among the variables.
- $\mathbf{u}_t$ is the $n \times 1$ reduced-form error vector with covariance matrix $\mathbf{\Sigma}$.

The objective is to recover the structural shocks $\varepsilon_t$ from the reduced-form residuals $\mathbf{u}_t$ using the structural equation:

$$\mathbf{u}_t = \mathbf{B}\varepsilon_t, \quad \varepsilon_t \sim \mathcal{N}(\mathbf{0}, \mathbf{I}), \tag{A.2}$$

where $\mathbf{B}$ is an $n \times n$ matrix mapping structural shocks to reduced-form residuals.

## 2. Identification with an External Instrument

To identify a specific structural shock (e.g., an oil supply shock), an external instrument $z_t$ is introduced. The instrument must satisfy the following conditions:

1. **Relevance:** The instrument is correlated with the structural shock of interest ($\varepsilon_{1,t}$), i.e., $\mathbb{E}[z_t \varepsilon_{1,t}] \neq 0$.
2. **Exogeneity:** The instrument is uncorrelated with other structural shocks, i.e., $\mathbb{E}[z_t \varepsilon_{j,t}] = 0$ for $j \neq 1$.

## 3. Estimation Procedure

The Proxy VAR is estimated in the following steps:

1. **Estimate the Reduced-Form VAR:** Estimate the reduced-form VAR model to obtain the residuals $\mathbf{u}_t$ and the covariance matrix $\mathbf{\Sigma}$.

2. **Instrumental Relevance Test:** Regress the first reduced-form residual $u_{1,t}$ on the instrument $z_t$ to verify that the instrument is relevant:

$$u_{1,t} = \gamma z_t + \eta_t. \tag{A.3}$$

A statistically significant $\gamma$ confirms instrument relevance.

3. **Identify the Structural Shock:** The external instrument identifies the column of $\mathbf{B}$ corresponding to the structural shock of interest. The identification proceeds by imposing the following condition:

$$\text{Cov}(z_t, \mathbf{u}_t) = \lambda \mathbf{b}_1, \tag{A.4}$$

where $\mathbf{b}_1$ is the column of $\mathbf{B}$ associated with the target shock, and $\lambda$ is a scaling parameter.

4. **Normalization:** Normalize $\mathbf{b}_1$ to ensure that the identified shock has unit variance:

$$\mathbf{b}_1 = \frac{\text{Cov}(z_t, \mathbf{u}_t)}{\sqrt{\mathbf{b}_1^\top \boldsymbol{\Sigma} \mathbf{b}_1}}. \tag{A.5}$$

5. **Recover the Structural Shocks:** Using the identified $\mathbf{B}$ matrix, recover the structural shocks as:

$$\varepsilon_t = \mathbf{B}^{-1} \mathbf{u}_t. \tag{A.6}$$

## 4. Simple Case with One Shock and One Instrument

In this section, we derive the structural impact vector for the simple case of a single instrument and a single shock. Recall the moment conditions for the external instrument:

$$\mathbb{E}[z_t \varepsilon_{1,t}] = \lambda \neq 0, \quad \mathbb{E}[z_t \varepsilon_{2:n,t}] = 0.$$

Under these assumptions, $\mathbf{s}_1$ is identified up to sign and scale. To demonstrate, note:

$$\mathbb{E}[z_t \mathbf{u}_t] = \boldsymbol{\Sigma} \mathbb{E}[z_t \varepsilon_t] = \mathbf{S} \begin{bmatrix} \mathbb{E}[z_t \varepsilon_{1,t}] \\ \mathbb{E}[z_t \varepsilon_{2:n,t}] \end{bmatrix} = \mathbf{S} \begin{bmatrix} \lambda \\ 0 \end{bmatrix}.$$

Partitioning this equation yields:

$$\mathbb{E}[z_t \mathbf{u}_t] = \begin{bmatrix} \mathbf{s}_{1,1} \lambda \\ \mathbf{s}_{2:n,1} \lambda \end{bmatrix}.$$

From this, we can write:

$$\tilde{\mathbf{s}}_{2:n,1} \equiv \frac{\mathbf{s}_{2:n,1}}{\mathbf{s}_{1,1}} = \frac{\mathbb{E}[z_t u_{2:n,t}]}{\mathbb{E}[z_t u_{1,t}]},$$

provided that $\mathbb{E}[z_t u_{1,t}] \neq 0$. This condition is satisfied if $\lambda \neq 0$ and $\mathbf{s}_{1,1} \neq 0$. Thus, $\mathbf{s}_1$ is identified up to scale under these conditions.

## Normalization

To set the scale, impose the normalization:

$$\mathbf{\Sigma} = \mathbf{S}\mathbf{S}'.$$

A common approach is to impose $\mathbf{\Sigma} = \mathbf{I}_n$, implying that a unit positive value of $\varepsilon_{1,t}$ has a one standard deviation positive effect on $y_{1,t}$. Partition $\mathbf{\Sigma}$ and $\mathbf{S}$ as:

$$\mathbf{\Sigma} = \begin{bmatrix} \sigma_{1,1} & \sigma_{1,2} \\ \sigma_{2,1} & \mathbf{\Sigma}_{2,2} \end{bmatrix}, \quad \mathbf{S} = \begin{bmatrix} \mathbf{s}_{1,1} & \mathbf{s}_{1,2} \\ \mathbf{s}_{2,1} & \mathbf{S}_{2,2} \end{bmatrix}.$$

From the covariance restrictions $\mathbf{\Sigma} = \mathbf{S}\mathbf{S}'$, we have:

$$\mathbf{s}_{1,1}^2 + \mathbf{s}_{1,2}\mathbf{s}_{1,2}' = \sigma_{1,1},$$

$$\mathbf{s}_{1,1}\mathbf{s}_{2,1} + \mathbf{S}_{2,2}\mathbf{s}_{1,2}' = \sigma_{2,1},$$

$$\mathbf{s}_{2,1}\mathbf{s}_{2,1}' + \mathbf{S}_{2,2}\mathbf{S}_{2,2}' = \mathbf{\Sigma}_{2,2}.$$

## Solving for $\mathbf{s}_{1,1}$ and $\mathbf{s}_{1,2}$

From the first equation:

$$\mathbf{s}_{1,1} = \pm\sqrt{\sigma_{1,1} - \mathbf{s}_{1,2}\mathbf{s}_{1,2}'},$$

Substituting into the remaining equations allows solving for $\mathbf{s}_{1,2}$:

$$\mathbf{s}_{1,2}\mathbf{s}_{1,2}' = (\sigma_{2,1} - \tilde{\mathbf{s}}_{2,1}\sigma_{1,1})'(\mathbf{S}_{2,2} - \tilde{\mathbf{s}}_{2,1}\mathbf{s}_{1,2})^{-1}.$$

Once $\mathbf{s}_{1,1}$ and $\mathbf{s}_{1,2}$ are obtained, the structural impact vector is:

$$\mathbf{s}_1 = \begin{bmatrix} \mathbf{s}_{1,1} \\ \tilde{\mathbf{s}}_{2,1}\mathbf{s}_{1,1} \end{bmatrix}.$$

# C. Robustness exercises

## C.1. Estimation with an instrument employing Iacoviello and Tong (2026) geopolitical risk index on oil supply disruptions

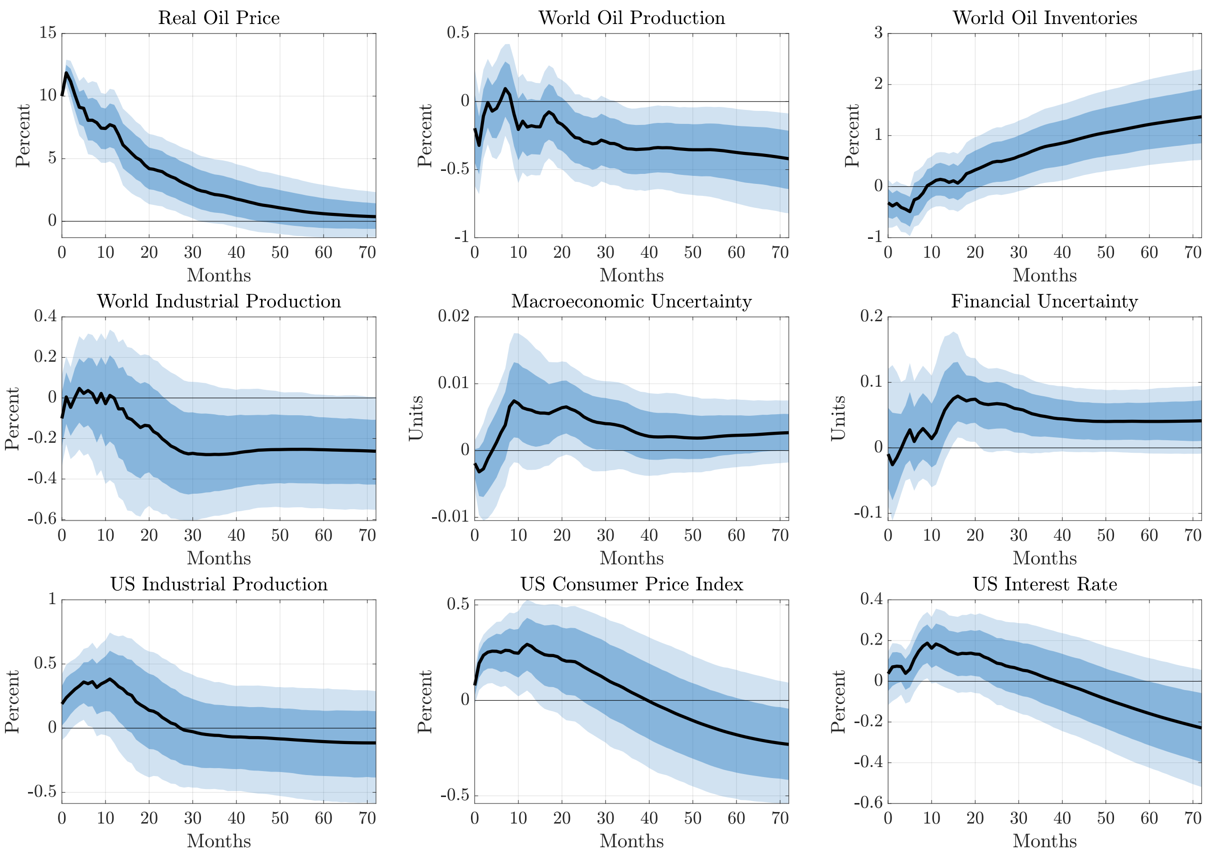


Figure C.1: **Impulse responses benchmark model.** Impulse response functions normalized to increase oil prices by 10 percent on impact. The black line shows the median impulse response. Dark (light) blue shaded areas show the 68 percent (90 percent) confidence interval computed with five thousand bootstrap replications.

## C.2. Estimation cleaning the instrument for the global financial crisis

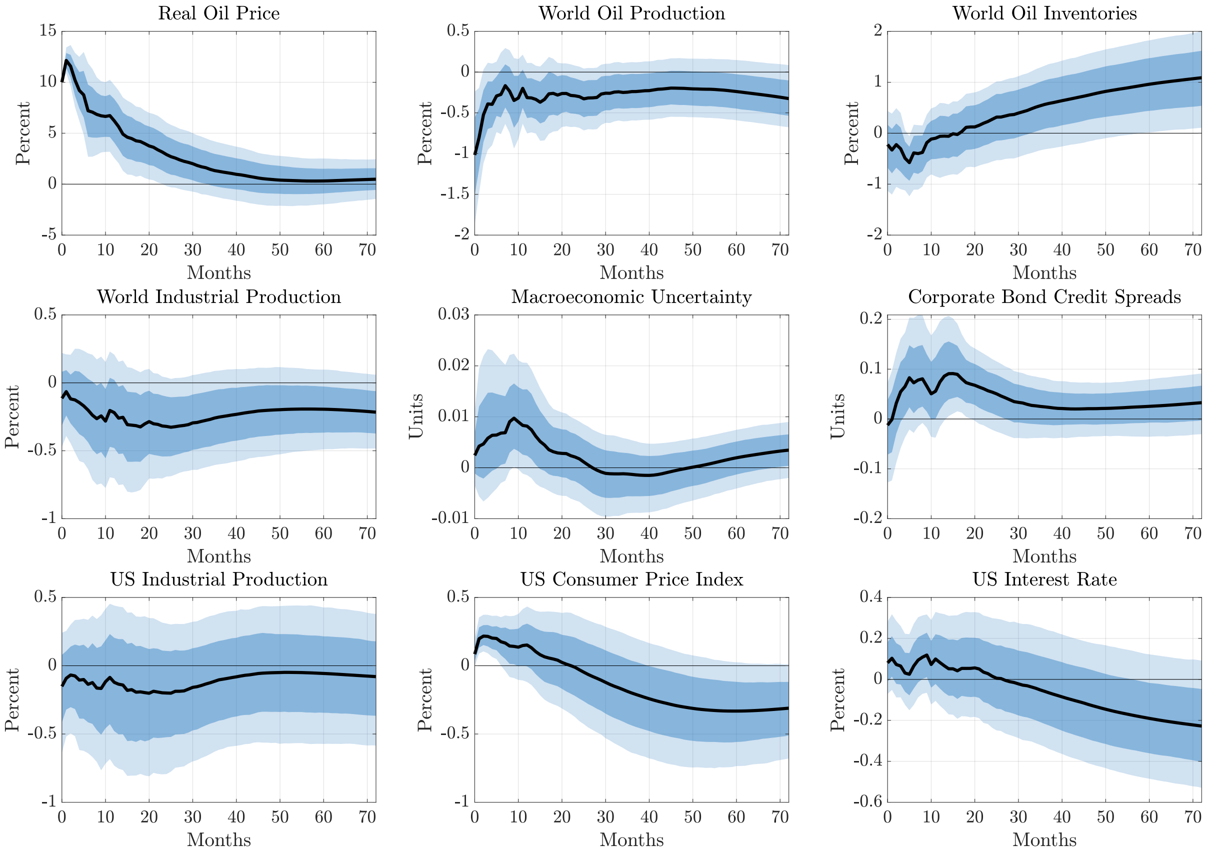


Figure C.2: **Impulse responses, estimated with the instrument cleaned for the Global Financial Crisis.** Impulse response functions normalized to increase oil prices by 10 percent on impact. Dark (light) blue areas represent one-standard deviation (ninety percent) confidence intervals.

## C.3. Estimation cleaning the instrument for global economic activity

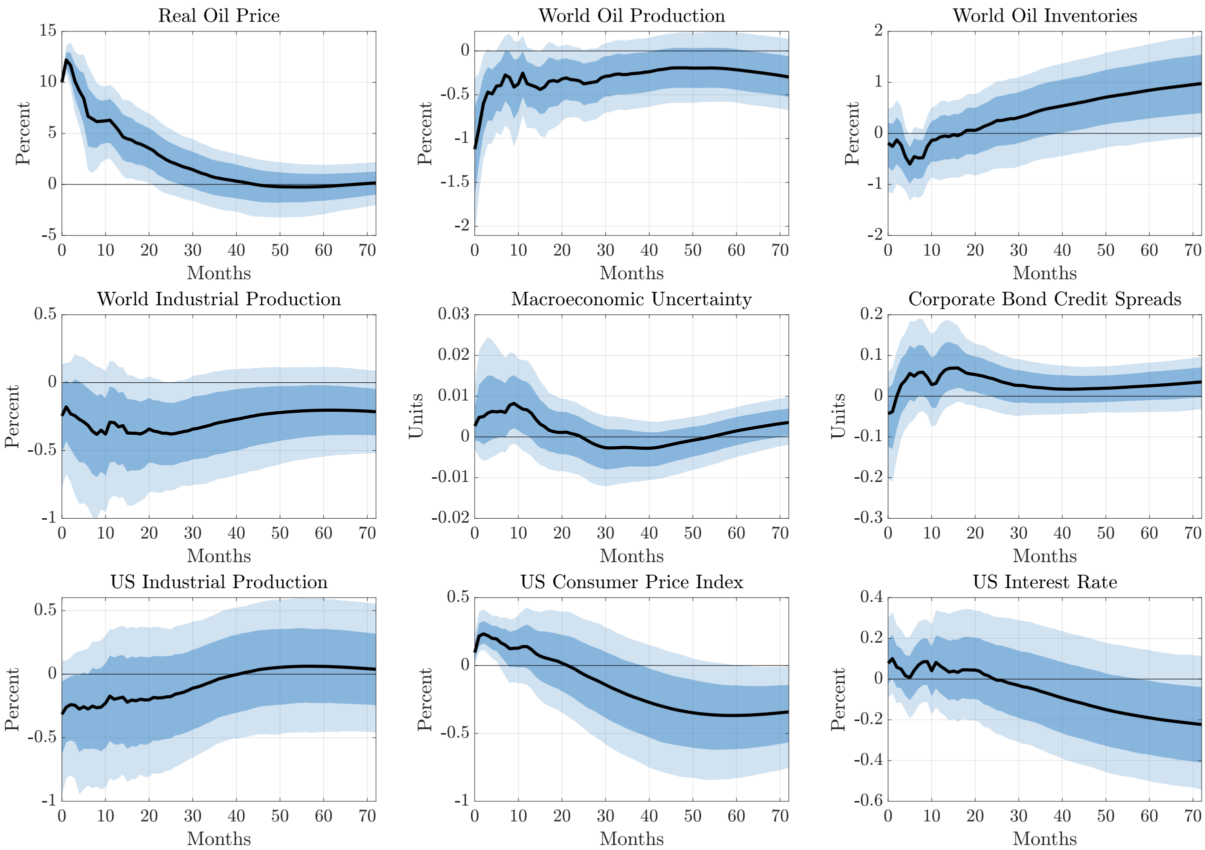


Figure C.3: **Impulse responses, estimated with the instrument cleaned for Global Economic Activity.** Impulse response functions normalized to increase oil prices by 10 percent on impact. Dark (light) blue areas represent one-standard deviation (ninety percent) confidence intervals.

## C.4. Estimation excluding the Covid-19 period

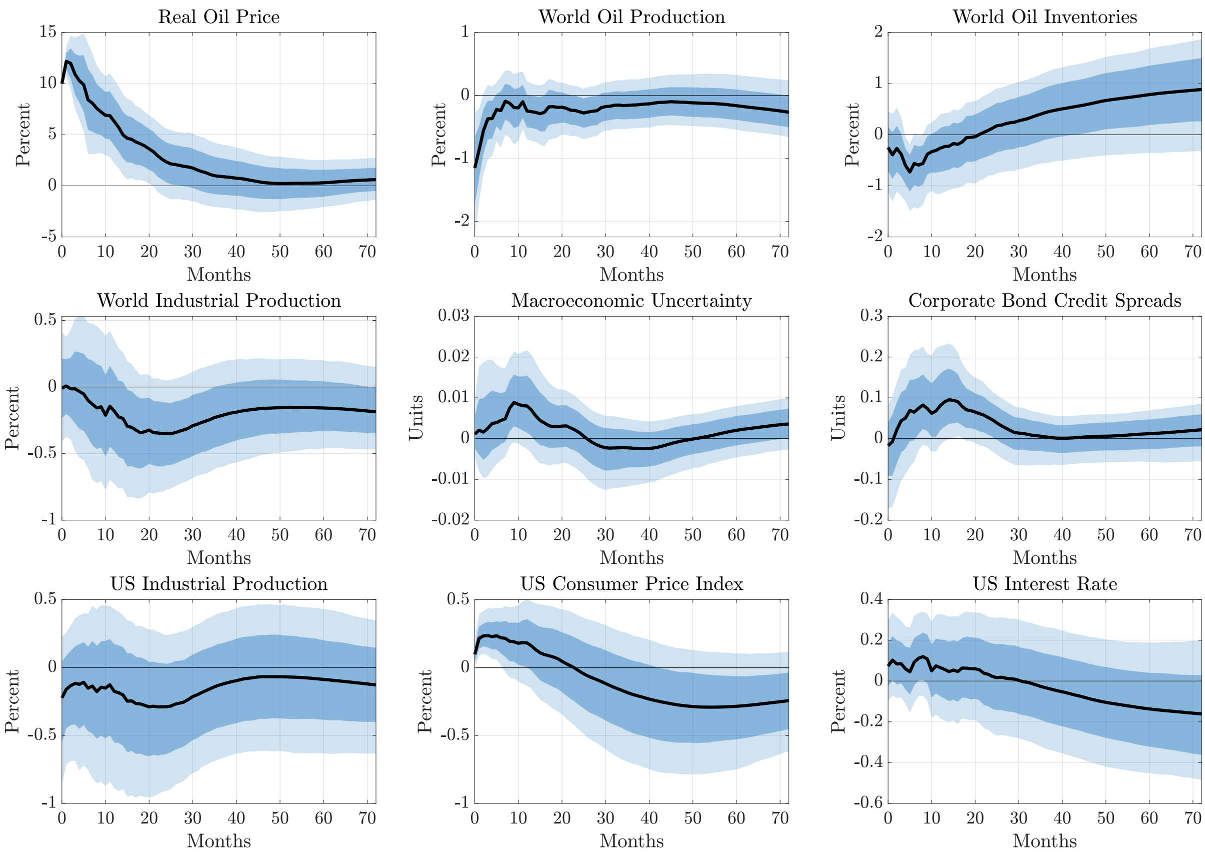


Figure C.4: **Impulse responses, Covid-19 period.** Impulse response functions normalized to increase oil prices by 10 percent on impact. Dark (light) blue areas represent one-standard deviation (ninety percent) confidence intervals.

## C.5. Estimation with a shorter sample (1985-2023)

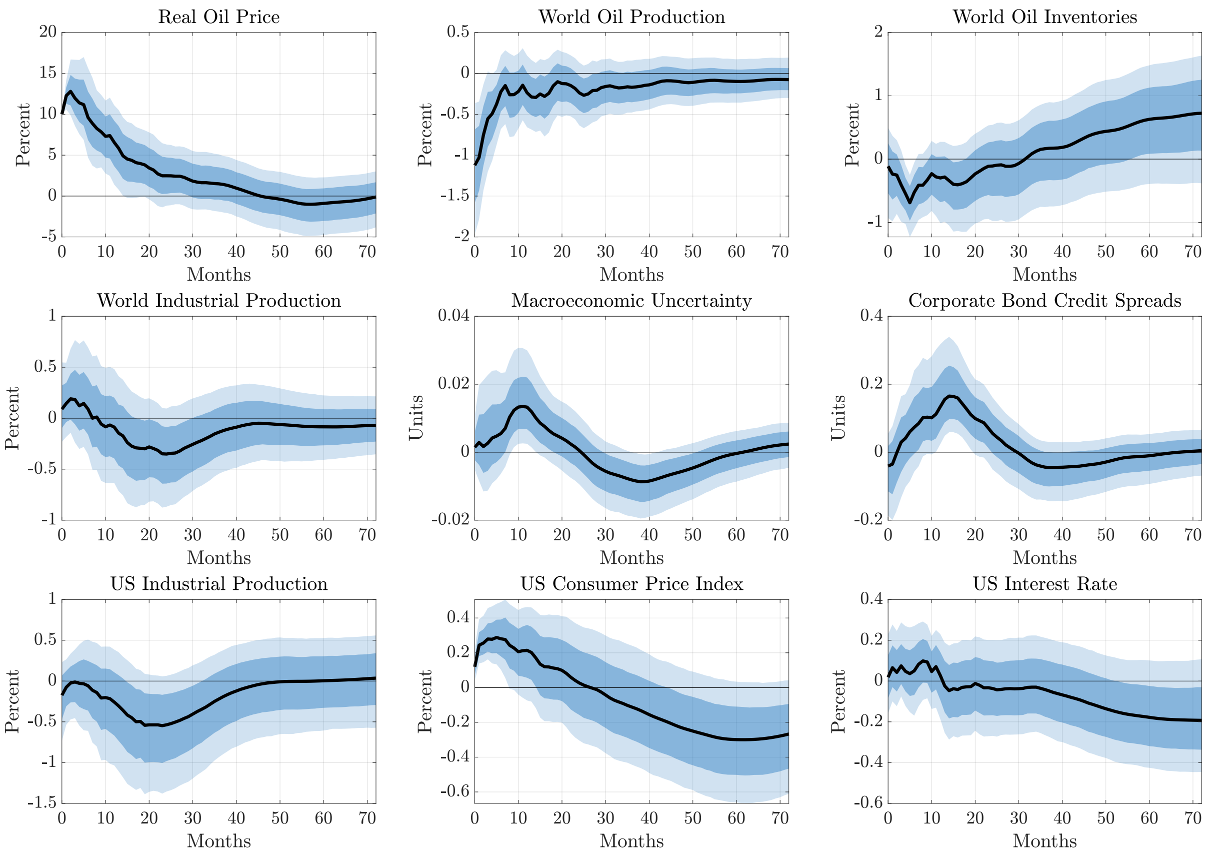


Figure C.5: **Impulse responses, estimated with a shorter sample from 1985 to 2023.** Impulse response functions normalized to increase oil prices by 10 percent on impact. Dark (light) blue areas represent one-standard deviation (ninety percent) confidence intervals.

## C.6. Estimation with the inclusion of the S&P Index

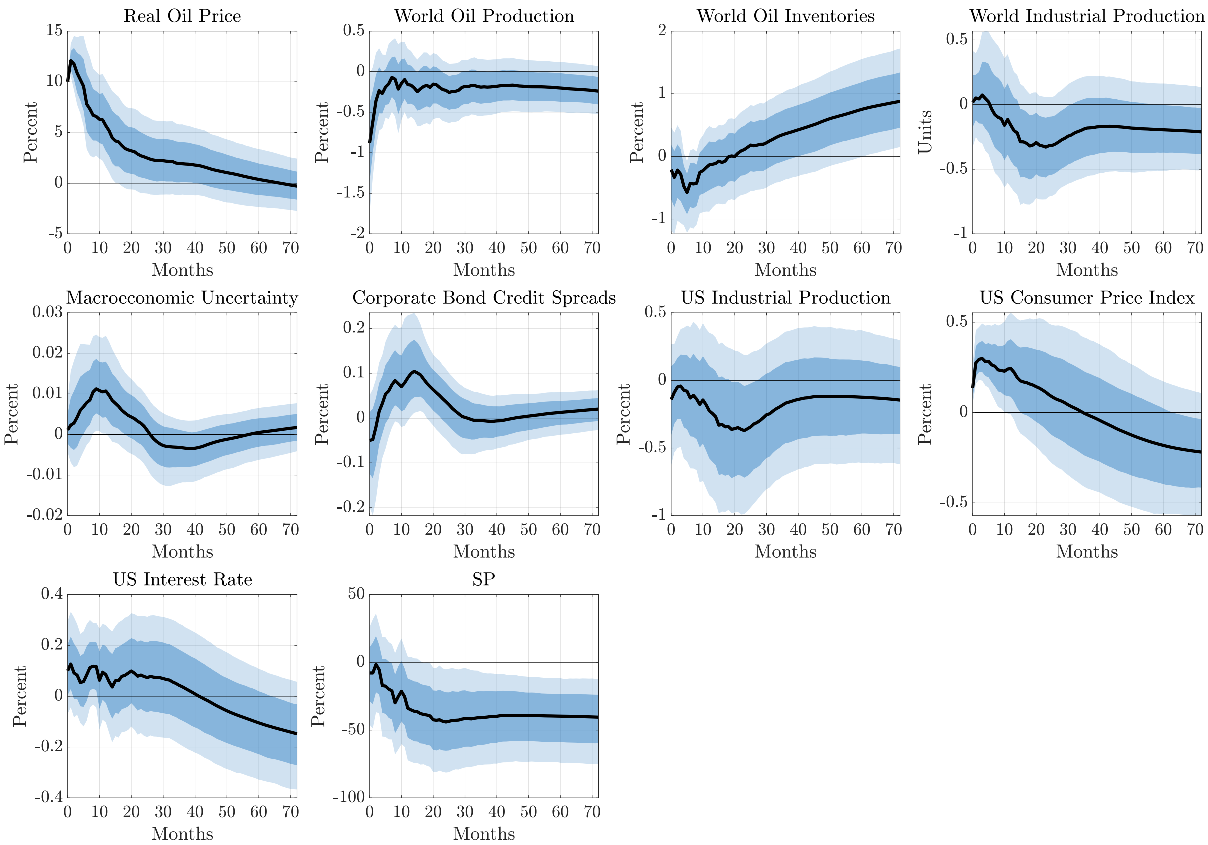


Figure C.6: **Impulse responses including the S&P index.** Impulse response functions normalized to increase oil prices by 10 percent on impact. Dark (light) blue areas represent one-standard deviation (ninety percent) confidence intervals.

## C.7. Estimation with the inclusion of the U.S. Dollar Index

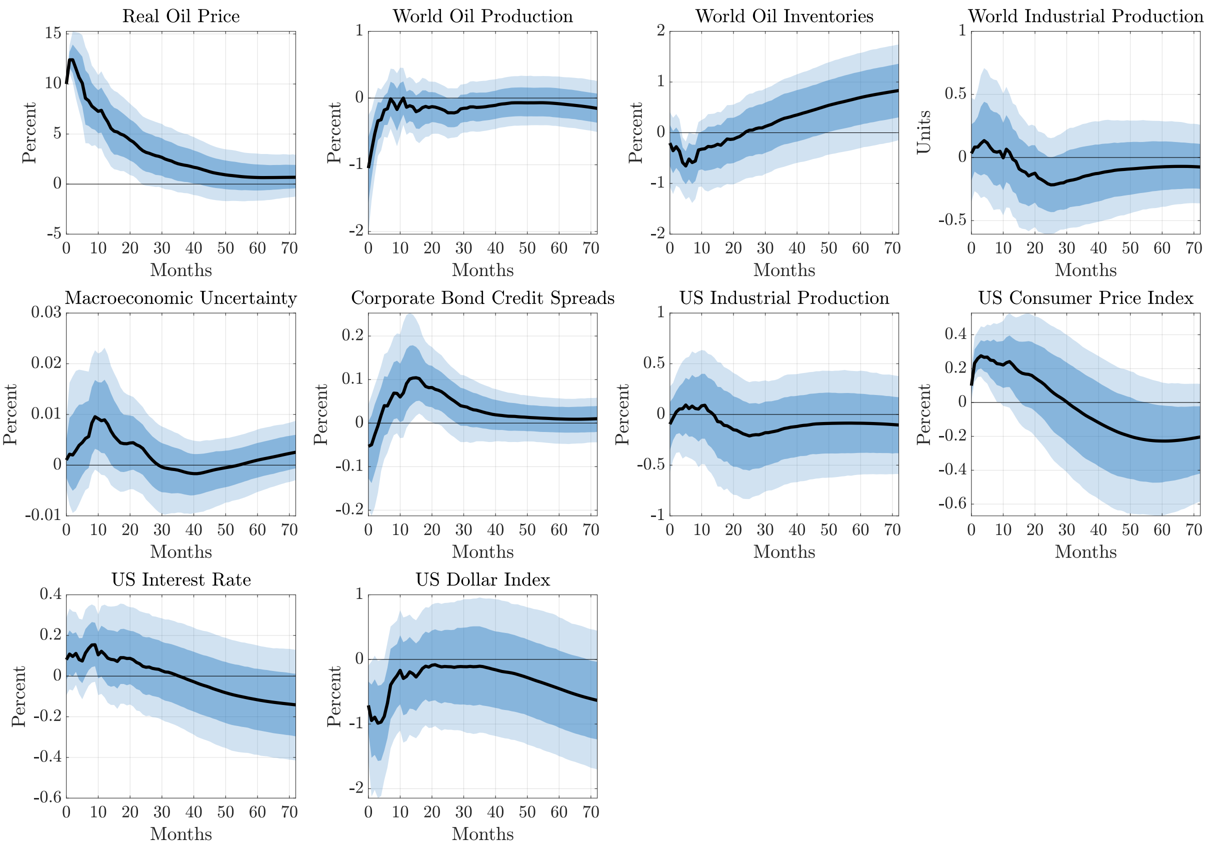


Figure C.7: **Impulse responses including the U.S. dollar index.** Impulse response functions normalized to increase oil prices by 10 percent on impact. Dark (light) blue areas represent one-standard deviation (ninety percent) confidence intervals.

# D. Horizon responses across commodity markets and countries

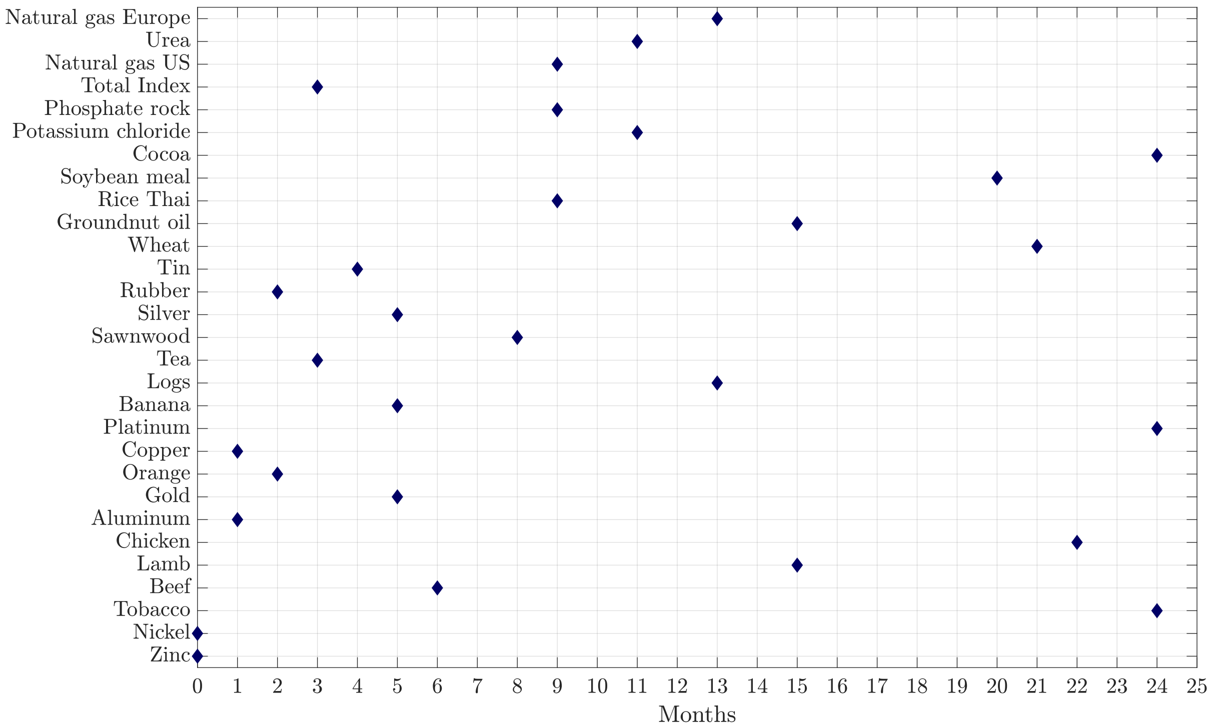


Figure D.1: **Horizon of strongest adverse responses of commodity prices across markets.** The figure shows the horizon of strongest adverse responses of commodity prices to a geopolitical oil supply shock that increases oil prices by 10 percent on impact.

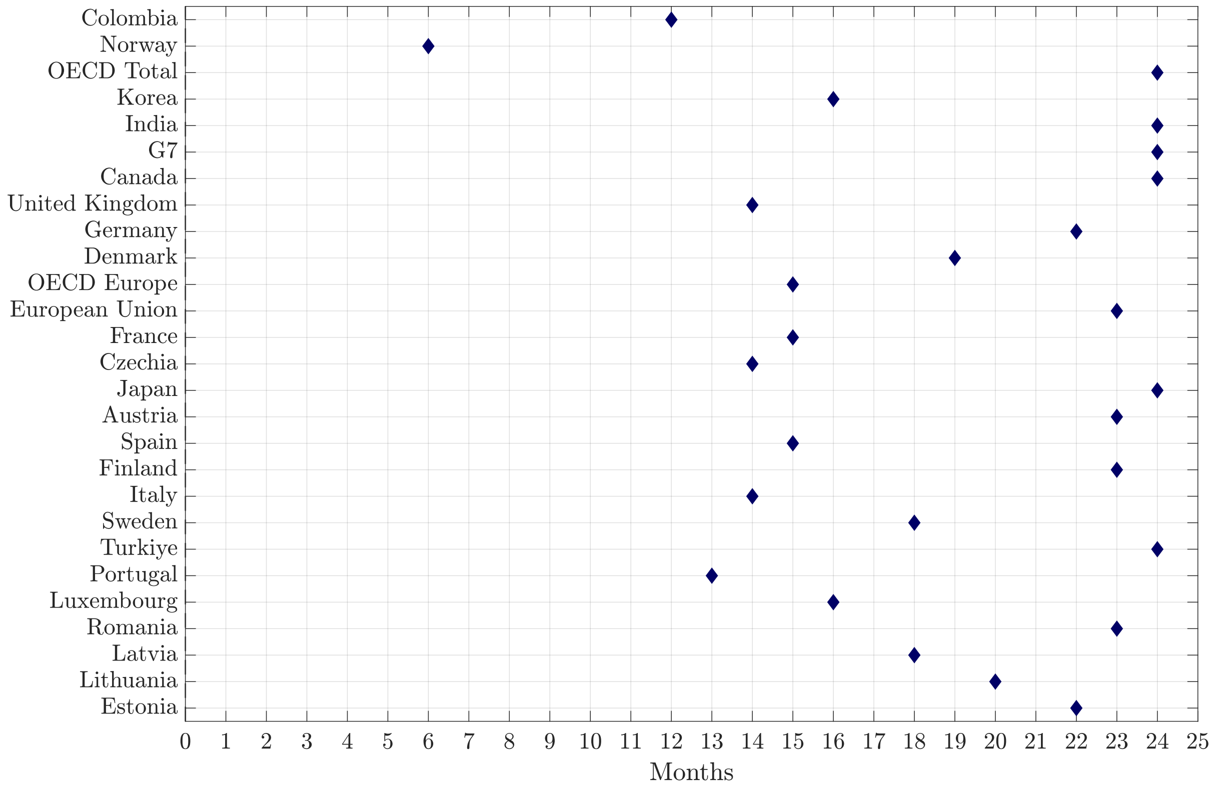


Figure D.2: **Horizon of strongest adverse responses of industrial production across countries.** The figure shows the horizon of the strongest adverse responses of industrial production across countries to a geopolitical oil supply shock that increases oil prices by 10 percent on impact.

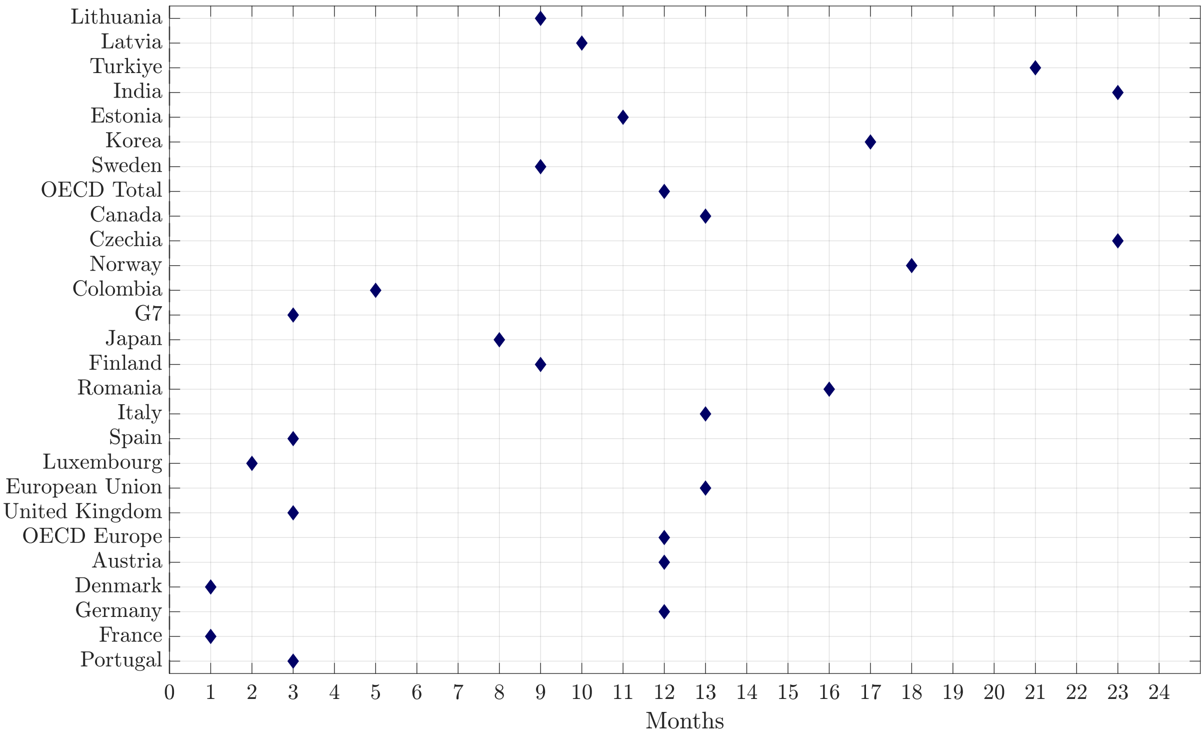


Figure D.3: **Horizon of strongest adverse responses of consumer prices across countries.** The figure shows the horizon of the strongest adverse responses of consumer prices across countries to a geopolitical oil supply shock that increases oil prices by 10 percent on impact.

# E. Spillovers across oil-exporting and oil-importing economies

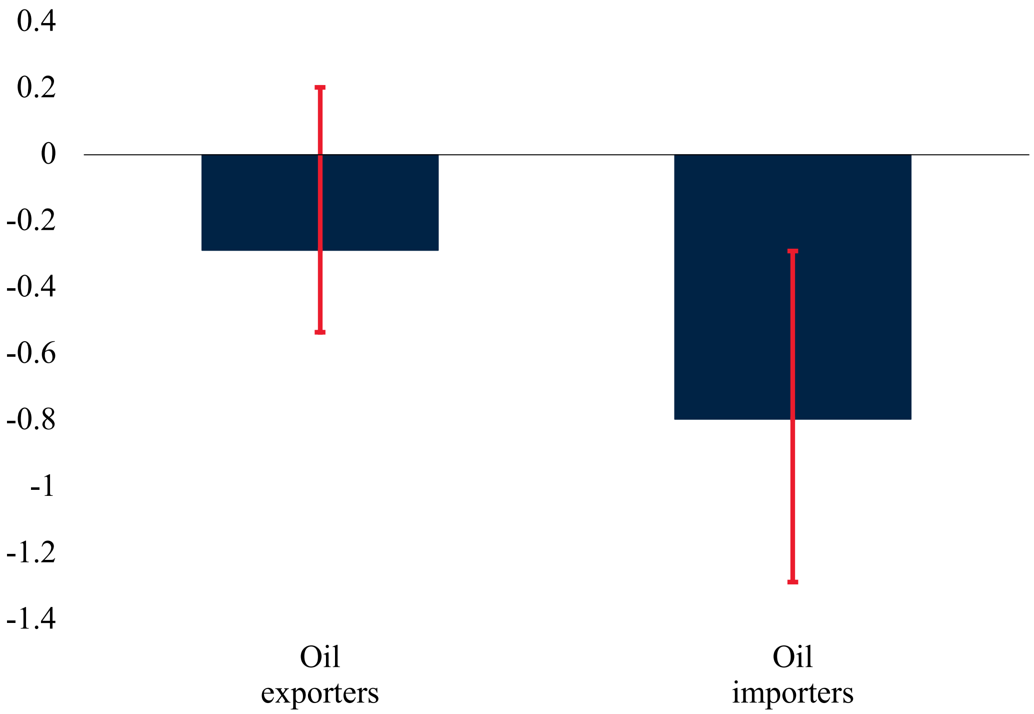


Figure E.1: **Spillovers into industrial production across oil exporters and importers.** The figure shows the average strongest adverse responses of a range of industrial production indices across oil-importing and oil-exporting economies to a geopolitical oil supply shock that increases oil prices by 10 percent, with one-standard-deviation confidence intervals. Oil-importing countries are Austria, Canada, Czechia, Denmark, Estonia, Finland, France, Germany, India, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Portugal, Romania, Spain, Sweden, Turkey, and the United Kingdom. Oil-exporting countries are Canada, Colombia, and Norway. Countries are categorized as oil-exporting or oil-importing economies following the World Bank classification.

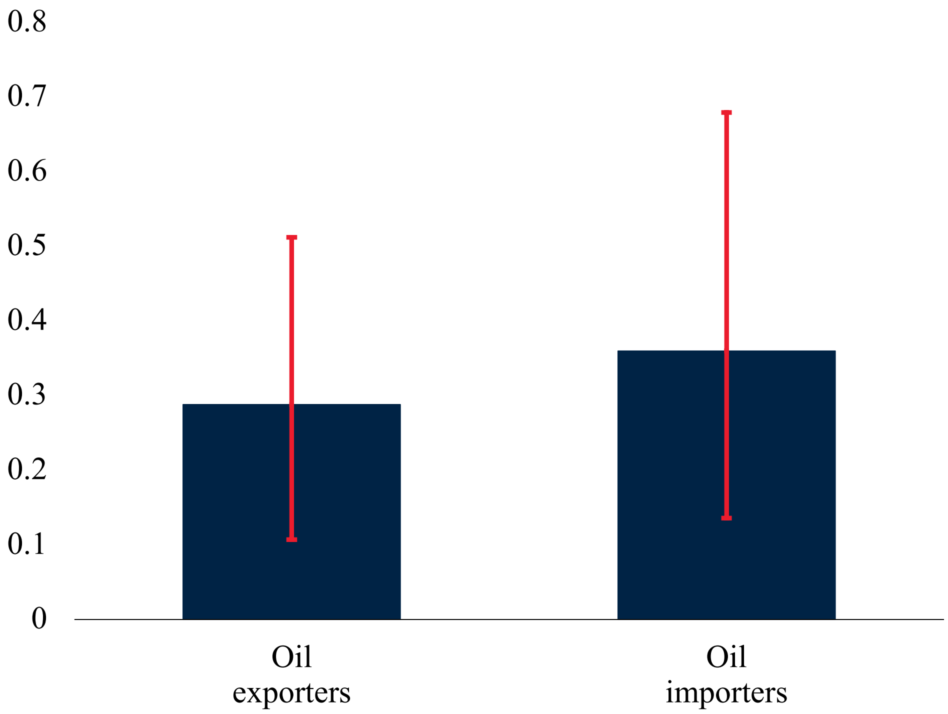


Figure E.2: **Spillovers into consumer prices across oil exporters and importers.** The figure shows the average strongest adverse responses of a range of consumer prices across oil-importing and oil-exporting economies to a geopolitical oil supply shock that increases oil prices by 10 percent, with one-standard-deviation confidence intervals. Oil-importing countries are Austria, Canada, Czechia, Denmark, Estonia, Finland, France, Germany, India, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Portugal, Romania, Spain, Sweden, Turkey, and the United Kingdom. Oil-exporting countries are Canada, Colombia, and Norway. Countries are categorized as oil-exporting or oil-importing economies following the World Bank classification.