How Do Political Tensions and Geopolitical Risks Impact Oil Prices?

Valérie Mignon[1]   Jamel Saadaoui[2]

[1] EconomiX-CNRS, University of Paris Nanterre, and CEPII, Paris, France

[2] University of Strasbourg, University of Lorraine, BETA, CNRS, 67000, Strasbourg, France

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Outline

Research question

Motivation

- ▶ China has become a significant player in the oil market: 16.4% of global consumption in 2021

- ▶ The US is the first largest consumer: 19.9% of world oil consumption (21% in 2022), and producer: 16.8% of world oil production

- ▶ Investigating the impact of political tensions and geopolitical risks on oil prices
  - ▶ We rely on three different measures: PRI (US-China), GPR (specific to China), ICGR (Internal and External Conflicts)

- ▶ Several papers use proxy variables: Chen et al., 2016; Lee et al., 2017; Miao et al., 2017; Caldara and Iacoviello, 2018; Perifanis and Dagoumas, 2019; Abdel-Latif and El-Gamal, 2020; Qin et al., 2020; Cai et al., 2022
  - ▶ Proxy for political tensions: military spending, number of U.S. troops deployed in the Middle-East, number of terrorist attacks, ICRG index, GPR index, PRI index

- ▶ **To what extent the US-China geopolitical relationship matters for the oil price dynamics?**

Theoretical intuitions

Table 1. Possible mechanisms

	Increase in GR (Increase in GPR and decrease in PRI and ICRG)	Reduction in GR (Decrease in GPR and increase in PRI and ICRG)
GR on Expected Demand	Higher expected demand leads to higher future inflation leads to a reaction from the central bank (US and then other) which raises interest rates and causes demand to fall. Increase in the risk premium, if agents become more averse. Explanation may hold for GPR. **Demand expected to fall, thus oil price decreases.**	An improvement in relations with the US could lead to an anticipated improvement in the global world economy and hence the price of oil and other commodities. Increase in world trade. This explanation may hold for PRI and ICRG. **Demand expected to grow, thus oil price increases.**
GR on Expected Supply	Fear of a conflict that could jeopardise sources of supply through military strikes that would destroy production capacity (fear-on, fear-off rather than trading on fundamental). Strategic military alliances which reduce the degree of competition on the world market (after the war in Ukraine, some countries are livening their strategic alliances for their purchases). Explanation may hold for GPR. **Supply (production capacity) is expected to fall, so the price rises.**	Some producers may engage in a price war by increasing their production market share (Saudi Arabia (discount) vs Russia, 2014, 2020) in the event of political tension / geopolitical risks ("fight for supremacy", shale oil, COVID). Explanation may hold for GPR. **Supply expected to grow, thus oil price decreases.**

Source: Reuters - Middle East Turmoil; The Economist - Oil price war.

Motivation

Figure 1. The zig-zagging price of oil (The Economist — Expresso)

Notes: consulted on October 12 on the following URL:

`https://espresso.economist.com/64ca07cd423602e0a1806f17f6c51e43`.

Research question

Motivation

- ▶ **The Political Relation Index (PRI)** is maintained by Xuetong Yan and his team at the Institute of International Relations at Tsinghua University

- ▶ Measures the political relationships between China and its major trading partners (see Yan (2010) for a discussion)

- ▶ Ranging between -9 and 9, indicates whether the countries are rivals (between -9 and -6), in a tense relationship (between -6 and -3), in a bad relationship (between -3 and 0), in a normal relationship (between 0 and 3), in a good relationship (between 3 and 6), and friends (between 6 and 9)

- ▶ PRI fluctuates according to a scale similar to the Goldstein scale (Goldstein, 1992)

- ▶ Each month, bad or good events appearing in People's Daily and on the Chinese Ministry of Foreign Affairs website are included to update the index

Research question

Motivation

▶ **The China-specific bilateral version of the Geopolitical Risk Index (GPR)**, see Caldara and Iacoviello (2018)

▶ GPR is a monthly index obtained by running automated text searches on the electronic archives of 11 newspapers that counts the percentage of articles related to adverse geopolitical events (wars, terrorist attacks, tensions between countries, etc.)

▶ The bilateral version of GPR refers to the percentage of articles in US newspapers dealing with adverse geopolitical events that concern one specific country, namely China in our case

▶ This bilateral index uses three US newspapers: The New York Times, Chicago Tribune, and The Washington Post

▶ PRI is the Chinese-centered view on the geopolitical events and GPR is the US-centered view on the geopolitical events
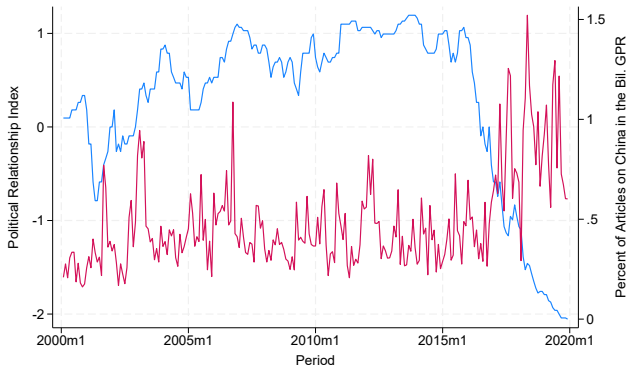
Research question

Motivation

▶ **The International Country Risk Guide (ICRG) index** is maintained by the PRS group (https://www.prsgroup.com/)

▶ It measures the political risks through 12 components: Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religious Tensions, Law and Order, Ethnic Tensions, Democratic Accountability, Bureaucracy Quality

▶ The first five components have a weight of 12 percent, six others of 6 percent, and the last one 4 percent

▶ A higher value means lower risks, a lower value is associated with higher risks

▶ We focus on the following sub-components for China: Internal Conflict (Civil War/Coup Threat, Terrorism/Political Violence and Civil Disorder), External Conflict (War, Cross-Border Conflict, Foreign Pressures)

▶ Focus on China: several developments related to the US, but the index is more general than the PRI
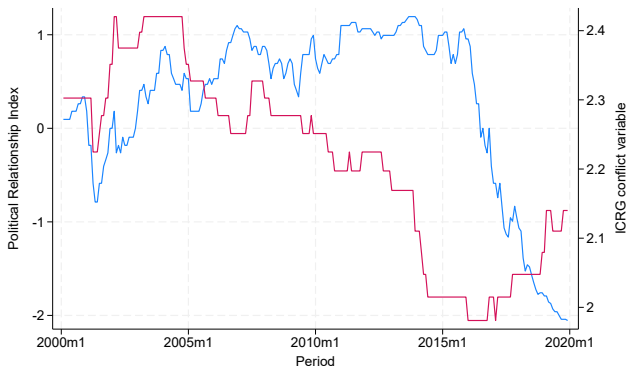
Research question

Figure 2. Political Relationship Index (LHS) and Geopolitical Risk Index (RHS)

Notes: the PRI (Political Relationship Index, in blue) and the bilateral GPR (Geopolitical Risk Index, in red). PRI is expressed as $\text{sign}(x) * ln(|x| + 1)$.

Research question

Figure 3. Political Relationship Index (LHS) and ICRG conflict Index (RHS)

Notes: the PRI (Political Relationship Index, in blue) and the ICRG Conflict index for China (International Country Risk Guide Index, in red). ICRG is expressed as the log of the sum the internal and external conflict components.

Outline

Methodology

Empirical approach

- ▶ Monlthy data January 2000 to December 2019, $T = 239$

- ▶ SVAR with Cholesky identification, SVAR and LP impulse response analyses, Dynamic Multipliers
  - ▶ Variables: bilateral GPR for China (**gprcn**), oil supply (global oil production, million barrels/day, **lpro**), oil demand (OECD and six major non-member economies (Brazil, China, India, Indonesia, the Russian Federation, and South Africa) industrial production), (**ldem**), oil prices (real WTI spot price, **lrpo**), PRI between China and the US (**lprius**), and ICRG Conflict variable for China (**licrgcn**)

  - ▶ Several robustness checks: sub-periods reflecting political regimes, a different proxy for world demand (Kilian's index), **ligrea**, 3 proxies for political tensions, **gprcn**, **lprius**, and **licrgcn**

- ▶ Possible extensions: state-dependent LP
  https://econweb.ucsd.edu/~vramey/research/BRZ_NBERwp.pdf.

Methodology

Political Relation Index

- ▶ PRI is updated using the news published in People's Daily and on the website of the Chinese Ministry of Foreign Affairs

$$PRI_t = \frac{\left(\frac{N-PRI_{t-1}}{N}EV^+ + \frac{N+PRI_{t-1}}{N}EV^- \right)}{5} + PRI_{t-1} \tag{1}$$

- ▶ where N denotes the half of the range of the PRI index, EV^+ is the level of good events, and EV^- is the level of bad events during the current month, respectively

- ▶ The formula used to update PRI gives less weight (i) to bad events when the relation deteriorates, and (ii) to good events when the relationship is good

- ▶ The first term after the equal sign is rounded to the smallest increment of 0.1

Methodology

SVAR identification

▶ The SVAR specification is given by:

$$\mathbf{A}\mathbf{y}_t = \mathbf{A}_1\mathbf{y}_{t-1} + \mathbf{A}_2\mathbf{y}_{t-2} + \cdots + \mathbf{A}_p\mathbf{y}_{t-p} + \mathbf{B}\boldsymbol{\varepsilon}_t \tag{2}$$

where $\mathbf{y}_t$ is the vector of endogenous variables, $\mathbf{A}, \mathbf{A}_1, \mathbf{A}_2, \cdots, \mathbf{A}_p$ denote the structural coefficients, and $\boldsymbol{\varepsilon}_t$ are the unobserved orthonormal structural innovations, $\boldsymbol{\varepsilon}_t \sim (0, I_K)$.

▶ We can rewrite Equation (2) as follows:

$$\mathbf{y}_t = \mathbf{C}_1\mathbf{y}_{t-1} + \mathbf{C}_2\mathbf{y}_{t-2} + \cdots + \mathbf{C}_p\mathbf{y}_{t-p} + u_t \tag{3}$$

where $\mathbf{C}_i := \mathbf{A}^{-1}\mathbf{A_i} \quad (i = 1, 2, \ldots, p)$.

▶ The reduced-form error u_t can be expressed by:

$$\mathbf{A}u_t = \mathbf{B}\boldsymbol{\varepsilon}_t \tag{4}$$

$$u_t = \mathbf{A}^{-1}\mathbf{B}\boldsymbol{\varepsilon}_t = \mathbf{S}\boldsymbol{\varepsilon}_t \tag{5}$$

$$\mathbf{E}\left(u_t u_t'\right) = \Sigma_u = \mathbf{A}^{-1}\mathbf{B}\mathbf{B}'\mathbf{A}^{-1'} = \mathbf{S}\mathbf{S}' \tag{6}$$

with $\mathbf{S} = \mathbf{A}^{-1}\mathbf{B}$. To recover $\mathbf{S}$, we rely on the recursive identification scheme by using Cholesky decomposition to obtain a lower triangular matrix

▶ The identified shocks of PRI for the US or GPR / ICRG for China contemporaneously impact oil-related variables, but the reverse effects of other oil shocks take time

Methodology

Dynamic multipliers

▶ To compare the results of VAR and LP, we present the dynamic multipliers

▶ Dynamic multipliers measure the impact of a unit increase in an exogenous variable on endogenous variables over time

▶ The contemporaneous effect of the exogenous variable (the structural shocks on PRI for the US and on GPR / ICRG for China) is not constrained to 1

▶ A regression of endogenous variables at time $t + h$, $\mathbf{y}_{t+h}$, on exogenous variables today, $\mathbf{x}_t$, gives the dynamic multiplier at horizon h:

$$\mathbf{y}_{t+h} = \mathbf{D}^h \mathbf{x}_t + u_{t+h} \tag{7}$$

▶ The matrix $\mathbf{D}^h$ contains the dynamic multipliers at horizon h

▶ For exogenous variables, $\mathbf{x}_t$, we focus on the structural shocks, ε_t, identified in the SVAR for the variables PRI and GPR / ICRG, respectively

▶ Finally, we concentrate on the real price of oil for the endogenous variables, $\mathbf{y}_{t+h}$

Results

Figure 4. Structural and reduced-form shocks for PRI
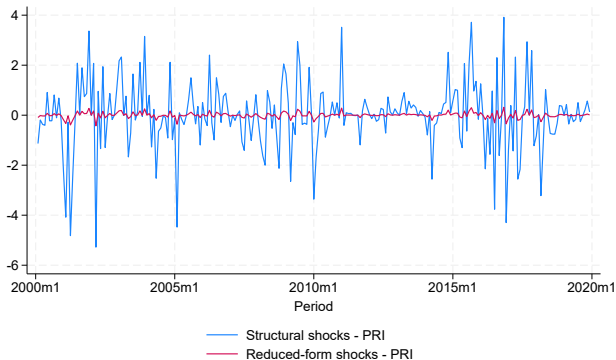
- Structural shocks - PRI
- Reduced-form shocks - PRI

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. PRI: Political Relationship Index.
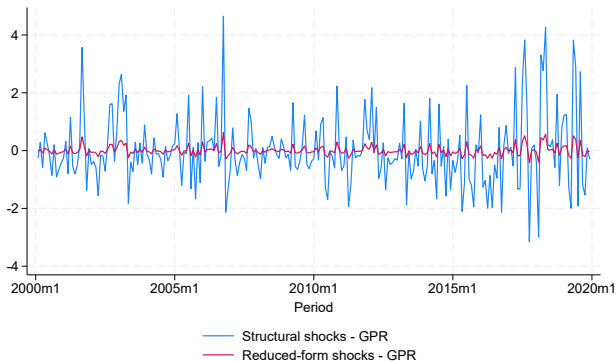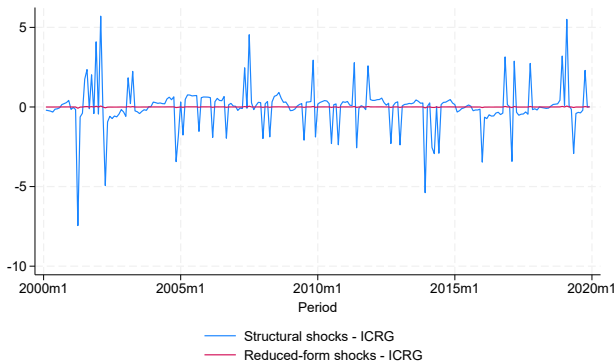
Results

Figure 5. Structural and reduced-form shocks for GPR

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. GPR: Geopolitical Risk Index.
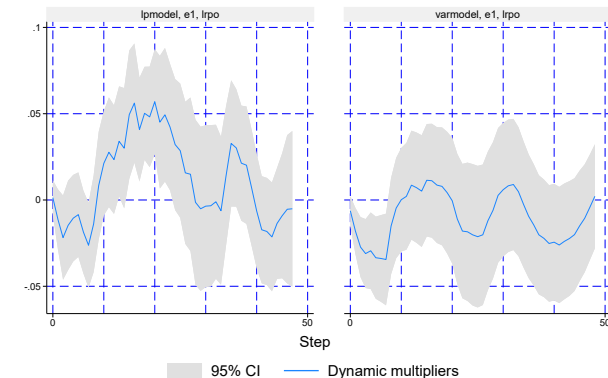
Results

Figure 6. Structural and reduced-form shocks for ICRG

Structural shocks - ICRG
Reduced-form shocks - ICRG

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. ICRG: International Country Risk Guide Index.

Results

Figure 7. Dynamic multipliers for the real price of oil (shocks on PRI for the US)

Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. The results are robust to different orderings. The real price of oil and the series of structural shocks in the PRI for the US are not correlated. PRI: Political Relationship Index.

Results

Figure 8. Dynamic multipliers for the real price of oil (shocks on GPR for China)
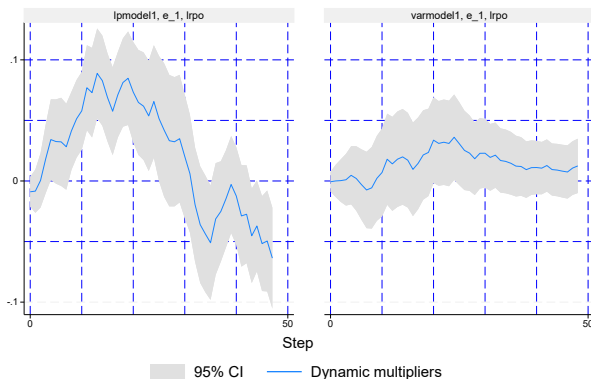
Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. The results are robust to different orderings. The real price of oil and the series of structural shocks on GPR for the US are uncorrelated. GPR: Geopolitical Risk Index.

Results

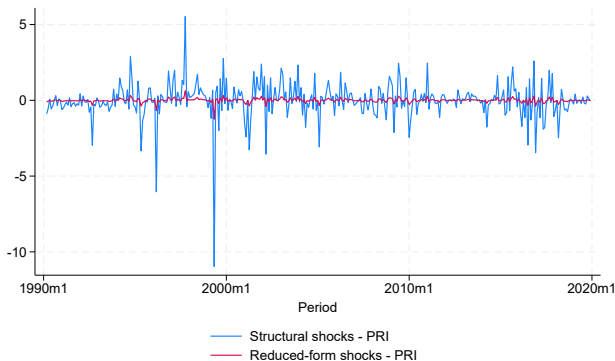Figure 9. Dynamic multipliers for the real price of oil (shocks on ICRG for China)
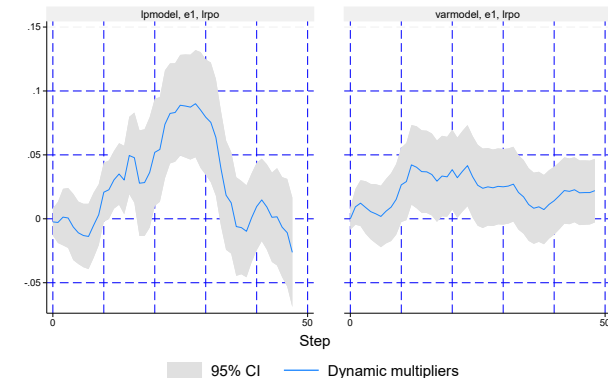
Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. ICRG: International Country Risk Guide Index.
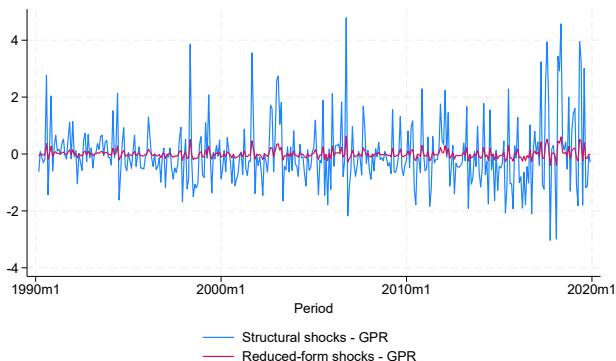
Case studies I

Figure 10. Structural and reduced-form shocks for PRI after the 1989 Tiananmen Square events

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. PRI: Political Relationship Index.

Case studies I

Figure 11. Structural and reduced-form shocks for GPR after the 1989 Tiananmen Square events

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. GPR: Geopolitical Risk Index.

Case studies I

Figure 12. Dynamic multipliers for the real price of oil (shocks on PRI for the US) after the 1989 Tiananmen Square events
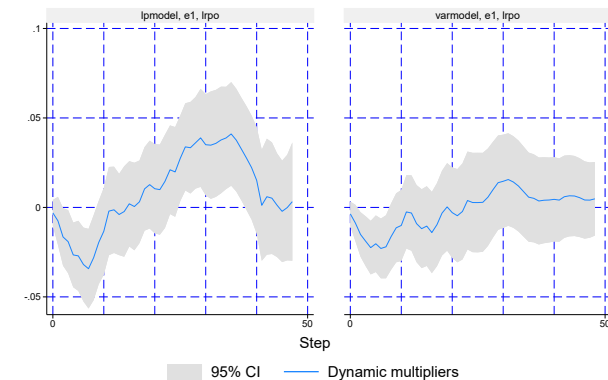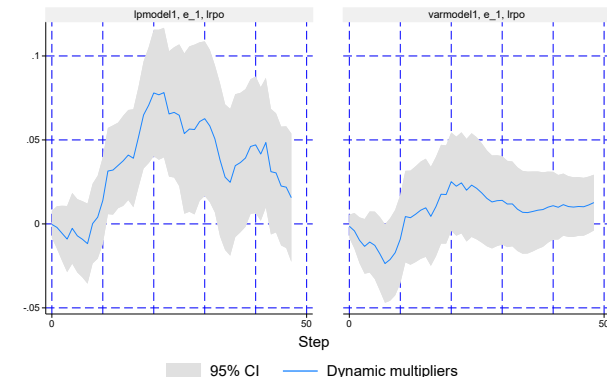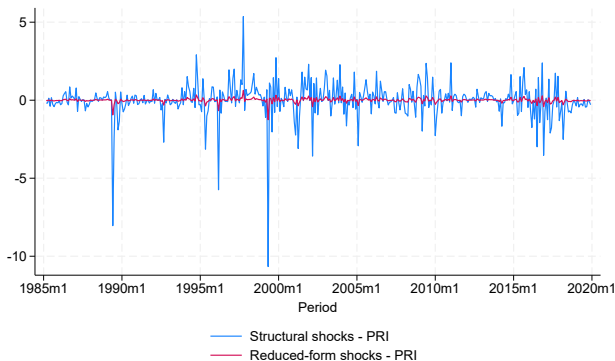

Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. The results are robust to different orderings. The real price of oil and the series of structural shocks on the PRI for the US are not correlated. PRI: Political Relationship Index.

Case studies I

Figure 13. Dynamic multipliers for the real price of oil (shocks on GPR for China) after the 1989 Tiananmen Square events

Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. The results are robust to different orderings. The real price of oil and the series of structural shocks on the PRI for the US are not correlated. GPR: Geopolitical Risk Index.
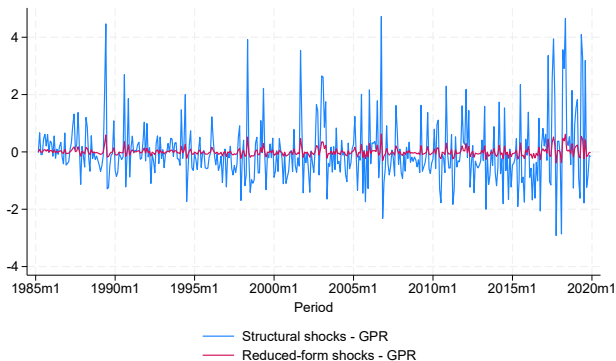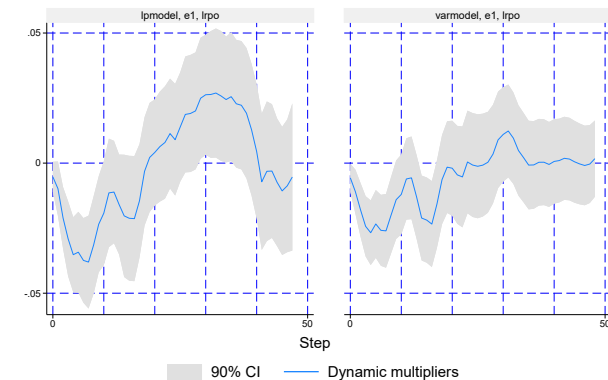
Case studies II

Figure 14. Structural and reduced-form shocks for PRI before the 1989 Tiananmen Square events

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. PRI: Political Relationship Index.

Case studies II

Figure 15. Structural and reduced-form shocks for GPR before the 1989 Tiananmen Square events

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. GPR: Geopolitical Risk Index.

Case studies II

Figure 16. Dynamic multipliers for the real price of oil (shocks on PRI for the US) before the 1989 Tiananmen Square events
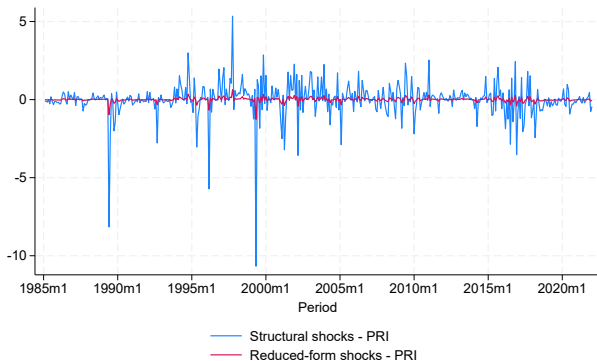

Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. The results are robust to different orderings. The real price of oil and the series of structural shocks on the PRI for the US are not correlated. PRI: Political Relationship Index.

Case studies II

Figure 17. Dynamic multipliers for the real price of oil (shocks on GPR for China) before the 1989 Tiananmen Square events
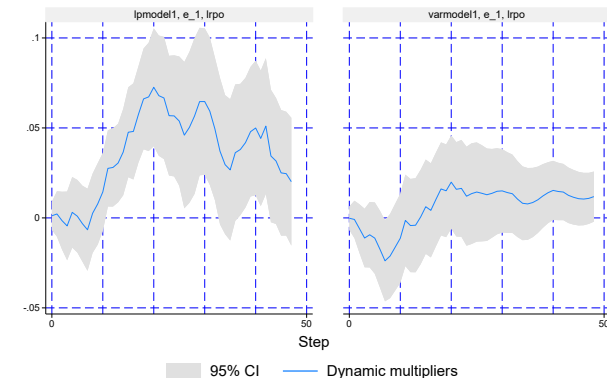
Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. The results are robust to different orderings. The real price of oil and the series of structural shocks on the PRI for the US are not correlated. GPR: Geopolitical Risk Index.
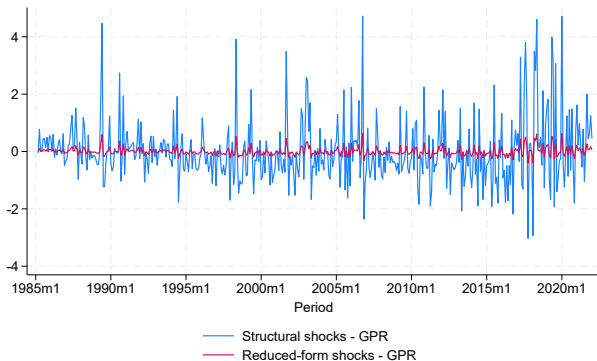
Case studies III

Figure 18. Structural and reduced-form shocks for PRI with the COVID pandemic

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. PRI: Political Relationship Index.
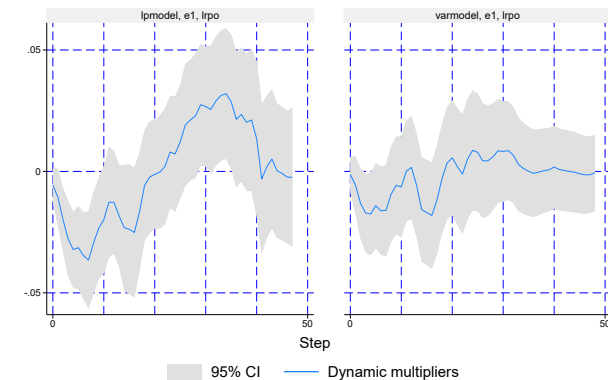
Case studies III

Figure 19. Structural and reduced-form shocks for GPR with the COVID pandemic

Structural shocks - GPR
Reduced-form shocks - GPR

Notes: Structural shocks are obtained in the following way: $\mathbf{B}^{-1}\mathbf{A}u_t = \varepsilon_t$. GPR: Geopolitical Risk Index.

Case studies III

Figure 20. Dynamic multipliers for the real price of oil (shocks on PRI for the US) with the COVID pandemic
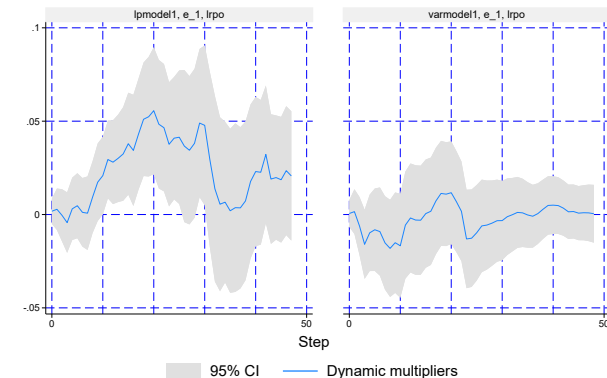

Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. The results are robust to different orderings. The real price of oil and the series of structural shocks on the PRI for the US are not correlated. PRI: Political Relationship Index.

Case studies III

Figure 21. Dynamic multipliers for the real price of oil (shocks on GPR for China) with the COVID pandemic

Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. The results are robust to different orderings. The real price of oil and the series of structural shocks on the PRI for the US are not correlated. GPR: Geopolitical Risk Index.

# PRI, GPR, and expectations

- ▶ Economic agents' expectations play an essential role in explaining the fluctuations in oil prices

- ▶ Indeed, it is widely acknowledged that expectations of business leaders, consumers, and aggregate markets' perspectives will shape their economic behavior

- ▶ In addition, Byrne et al. (2019) show that the impact of expectations on oil prices is variable over time

- ▶ To assess this link, we follow the methodology used by Shi et al. (2020) and investigate the time-varying causality between PRI and the expectations of these three different types of economic agents

- ▶ To this end, we use the consumer confidence indicator (CCI), business confidence indicator (BCI), and composite leading indicator (CLI) constructed by the OECD as proxies for the expectations of consumers, businesses, and market perspectives, respectively
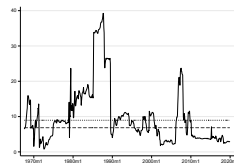
Figure 22. Political relations and expectations - Recursive Window
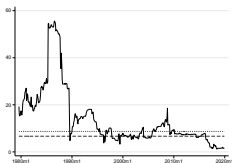
(a) CCI is G-C by PRI
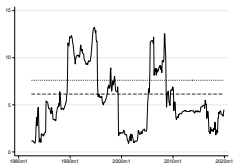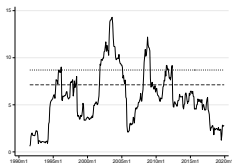
(b) BCI is G-C by PRI

(c) CLI is G-C by PRI

Note: We select a minimum window size of 80 months. We include a trend in the underlying bivariate VAR model. The size of the tests is controlled for 60 months. The dotted line indicates the 90th (lower line) and 95th (upper line) percentiles of the test statistics, where 499 bootstrap replications have been used.
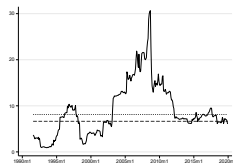
Figure 23. Geopolitical risks and expectations - Recursive Window

(a) CCI is G-C by GPR   (b) BCI is G-C by GPR   (c) CLI is G-C by GPR

Note: We select a minimum window size of 80 months. We include a trend in the underlying bivariate VAR model. The size of the tests is controlled for 40 months. The dotted line indicates the 90th (lower line) and 95th (upper line) percentiles of the test statistics, where 499 bootstrap replications have been used.

Final thoughts

Key takeaways

- ▶ Assessing the impact of political risk on the oil price dynamics
- ▶ Changes in the US-China political relationships positively affect the oil market:
    - ▶ Positive shocks on PRI are associated with optimistic expectations regarding future economic activity
    - ▶ PRI linked to consumers' expectations
    - ▶ Higher geopolitical risks increase oil prices, as positive shocks on the GPR also reflect fears of oil supply disruption
    - ▶ Only observed in countries and periods where the development of financial institutions is low
    - ▶ GPR linked to prospects of aggregate markets
- ▶ Political tensions and geopolitical risks play a crucial role, complementary rather than substitute factors in explaining the dynamics of oil prices.
- ▶ Understand the macroeconomic consequences of geopolitical risks by taking into account bilateral political relationships
- ▶ Considering bilateral political relations and geopolitical risk perceptions in the recent surge of inflation after the COVID pandemic and subsequent monetary developments
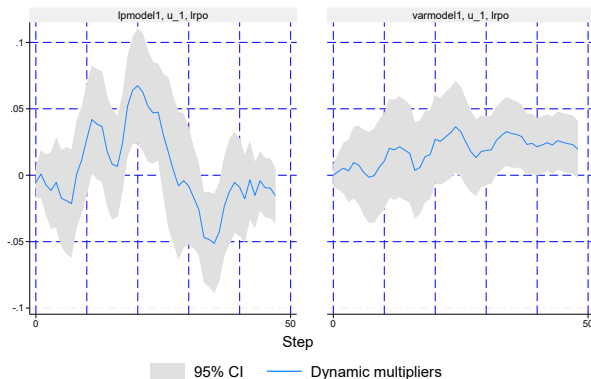
Other proxy for the world demand — PRI
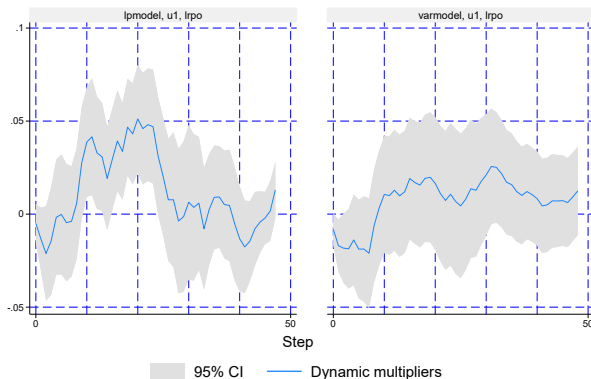
Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. In this robustness exercise, we use an alternative proxy for oil demand: https://www.dallasfed.org/research/igrea. PRI: Political relationship index. IGREA is expressed as $\text{sign}(x) * ln(|x| + 1)$.
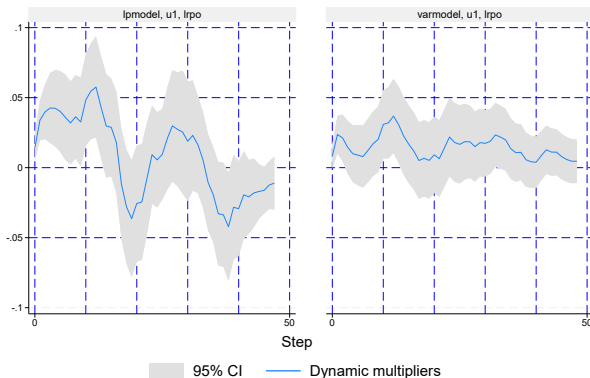
Other proxy for the world demand — GPR

Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. In this robustness exercise, we use an alternative proxy for oil demand: https://www.dallasfed.org/research/igrea. GPR: Geopolitical Risk Index. IGREA is expressed as $\text{sign}(x) * ln(|x| + 1)$.

Other proxy for the world demand — ICRG

Graphs by irfname, impulse variable, and response variable

Notes: Left graph: LP, right graph: SVAR. In this robustness exercise, we use an alternative proxy for oil demand: https://www.dallasfed.org/research/igrea. ICRG: International Country Risk Guide Index.