The Impact of Political Tensions and Geopolitical Risks on Oil Prices in Unstable Environments[★]

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Abstract

This note explores the impact of geopolitical relationships between the US and China on the oil price. Using time-varying local projections, my analysis reveals that these dynamic effects are unstable over time. Indeed, these effects have been more observable since the global financial crisis, with China being increasingly perceived as a threat in the U.S. Instability is detected around the onset of the COVID-19 pandemic. During this period, geopolitical risks and political tensions influence oil price at different time horizons.

Keywords: Time-Varying Local Projections, China, Oil Price, Political Relations, Geopolitical Risks, Global Financial Crisis, COVID-19 pandemic.
JEL: Q4, F51, C32

Highlights:

- I examine the influence of China and the US on the oil market;
- Time-varying local projections evaluate the effect of geopolitical relations;
- The impacts of geopolitical tensions on the oil price are unstable over time;
- These effects are more pronounced after the global financial crisis;
- Instability is significantly detected around the COVID-19 pandemic.

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1. Introduction

Recent geopolitical events, like the War in Ukraine that started on 24 February 2022, illustrate how increasing geopolitical risks and rising political tensions may affect the oil markets. Between January and June 2022, the WTI spot crude oil price increased from around 83 to 114 USD per barrel after the Russian invasion of Ukraine[1]. Mignon and Saadaoui (2024a) explore this question relying on vector autoregressions (VAR) and local projections (LP) methods. They found that geopolitical risk shocks and political tensions shocks may have different impacts on oil prices. Indeed, increasing geopolitical risks may be related to pessimistic expectations, especially fear of supply disruptions. Engaged in a conflict, opponents may target oil production facilities to destroy production abilities.[2] In this case, concerns over the expected supply will drive up oil prices. This may be associated with a risk-off sentiment rather than trades on fundamentals. Besides, a decline in political relations between major players in the oil markets may produce pessimistic expectations on the future states of the economy. In turn, these pessimistic expectations about demand may lower the oil prices.

Before Mignon and Saadaoui (2024), several studies have tried to assess the impact of geopolitical risks and political tensions on the oil markets using different proxies, like the conflict measures coming from the International Risk Country Guide (IRCG) indexes[3], the number of terrorist attacks (Global Terrorism Database)[4], the number of troops deployed in the Middle East, and the

[1] Baumeister (2023) discusses these recent developments.
[2] See for example these two recent examples: https://www.bloomberg.com/news/articles/2024-03-20/ukraine-s-drones-threaten-russian-oil-industry-with-refinery-strikes; https://www.bloomberg.com/news/articles/2024-03-22/russia-crude-oil-refining-drops-to-10-month-low-after-ukraine-drone-attacks.
[3] These data are created and maintained by the PRS group: https://www.prsgroup.com/.
[4] This database is available here: https://www.start.umd.edu/gtd/.

geopolitical risk (GPR) index, a monthly index obtained by running automated text searches on the electronic archives of Anglo-Saxon newspapers (Chen et al., 2016; Lee et al., 2017; Miao et al., 2017; Perifanis and Dagoumas, 2019; Abdel-Latif and El-Gamal, 2020; Qin et al., 2020; Caldara and Iacoviello, 2022). Cai et al. (2022) pioneered the use of the Political Relation Index (PRI) on this question. The PRI provides a quantitative assessment of China's political relationships with its main trade partners (for more details see: Cai et al., 2022; Mignon and Saadaoui, 2024a, 2024b)[5]. Focusing on the relationship between the US and China may be especially important, as these economies are two major players on the oil markets. Indeed, the US is the largest producer and consumer, with China is the second-largest consumer.[6]

This study goes beyond the current literature by providing empirical evidence showing that identified shocks to the PRI and the GPR index have unstable effects on the oil price. Indeed, we will use the time-varying local projection (TV-LP) estimator introduced by Inoue et al. (2024b) to investigate the instability of the impulse response functions (IRF) over time. Importantly, it is very intuitive to assume that the impact of heightened geopolitical risks and political tensions are unstable over time[7]. Important results are revealed. With constant parameters, the results of Mignon and Saadaoui (2024a) are broadly replicated for the full sample. With time-varying parameters for the local projections' IRF, we see significant changes in the impact of the improvement of the PRI between the US and China following the global financial crisis (GFC) and during the COVID-19 pandemic, contributing to an increase in the oil price. Besides, the effects of

[5] Mignon and Saadaoui (2024) relied on subsample analyses to detect time-varying IRF.
[6] According to the BP Statistical Review of World Energy 2021, the US and the Chinese economies are the largest consumers of oil (around 20% and 16% of the world consumption, respectively).
[7] This conjecture may be valid for other sources of uncertainty, see Cascaldi-Garcia et al. (2023) for a complete coverage of the literature on quantitative measures of uncertainty.

China-specific GPR shocks were different during the pandemic, as they contributed to lower the oil price. Overall, these empirical results support the view that geopolitical risks and political tensions have causal effects that are unstable over time. The remainder of the paper presents the data and the methodology in the following section. Section 3 presents the empirical results for the time-varying IRF and time-varying parameter plots. Finally, we conclude in the last section.

2. Data and Methodology

I use the dataset built in Mignon and Saadaoui (2024a) from January 1985 to January 2022. This monthly dataset of 445 observations gathers the real price of oil, the oil supply, two proxies for the oil demand and two proxies for geopolitical tensions, namely, one for the geopolitical risks specific to China, and another one for the political tensions between the US and China. For the sake of brevity, we will focus on the impact of geopolitical risks and political tensions on the oil price (see Figure 1). All the definitions, sources and related literature for this dataset are provided in Appendix A.

[Insert Figure 1 about here]

I will use the TV-LP approach (Inoue et al, 2024b) to provide further empirical evidence about the effects of political tensions shocks and geopolitical risks shocks on the oil price in the context of an unstable environment. Thanks to the Stata package written by Inoue et al. (2024a), I use TV-LP as our baseline results in the following figures. The LP approach (Jordà, 2005) presents several advantages, including the estimation by single equation OLS at each horizon, a simple inference for impulse response coefficients, the effects being local to each horizon (i.e., no cross-period

restrictions), the straightforwardness of the estimation of very nonlinear and flexible models. . Moreover, the approach can be easily scaled to panel data. Regarding our research question, all features of the TV-LP approach will help us to provide time-varying dynamic evidence on the political tensions and geopolitical risks shocks. Besides, the TV-LP is especially relevant in the context of our research question due to the evolving geopolitical context. As I am interested in measuring the effect of a one-unit shock on identified shocks of political tensions ($lpri$) / geopolitical risks shocks (gpr) (ϵ_s, see Mignon and Saadaoui, 2024a) on the price of oil ($lrpo$). Thus, I can formulate the TV-LP approach as follows:

$$lrpo_{t+h} = c_{t+h} + \beta_{h,t+h}\epsilon_{s_t} + \sum_{j=1}^{24} \alpha'_{j,t+h}\mathbf{z}_{t-j} + v_{t+h} \qquad h = 0,1,\dots \qquad (1)$$

$$\text{IRF}(h) = \beta_{h,t+h}$$

where $\boldsymbol{z} = (lrpo, lpro, ldem, \epsilon_s)'$. The parameter of interest is the time-varying impulse response $\beta_{h,t+h}$. I can mention that $lrpo$, is the explained variable, h, the horizon, ϵ_s, the impulse variable (a unit shock on identified shocks of political tensions ($lpri$) / geopolitical risks shocks (gpr), $\mathbf{z}$ is a vector of control variables, IRF, stands for the impulse response function and v, is the error term.

3. Empirical results

Our results highlight the instability of IRF for the oil price following a shock on both the political relationship index and the geopolitical risk index shown in Figures 2 to 7. These findings may indicate that the effect of political relations between the US and China, along with the effect of geopolitical risks specific to China, are unstable and regime dependent. Indeed, China has been

increasingly perceived as a threat by the US following the Global Financial Crisis. I found that during this new regime of diplomatic relations the effects of PRI and GPR shocks have been much more pronounced. In the Appendix B, we provide several robustness checks with another proxy for global demand (Kilian, 2019).

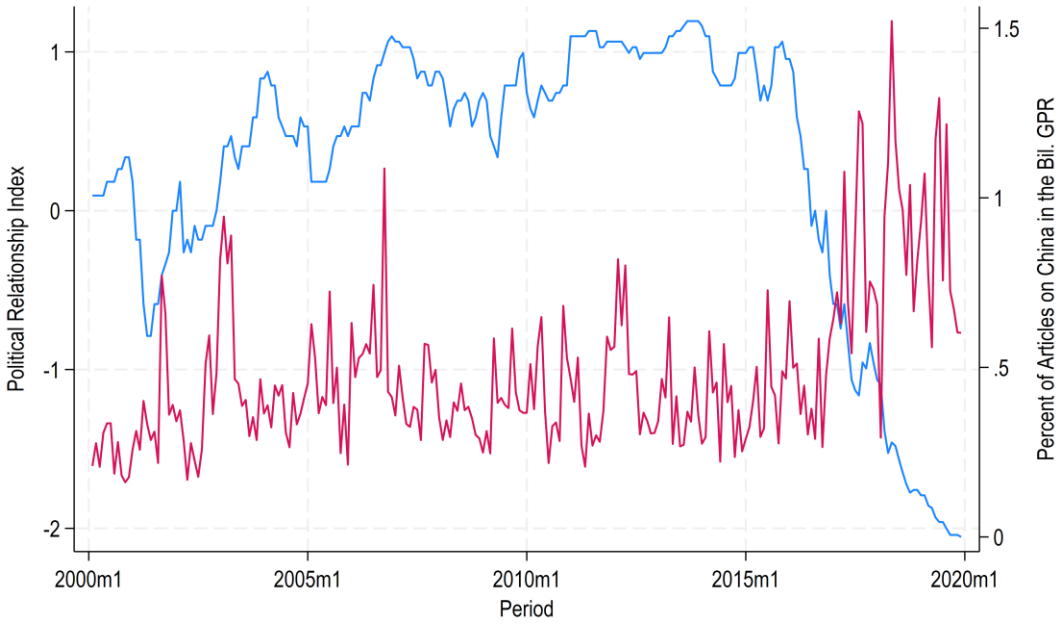
[Insert Figure 2 to 7 about here]

Around the start of the COVID-19 pandemic, the effect of shocks on PRI and GPR was different from those obtained with non-time-varying LP estimates. Indeed, a positive shock to the PRI (i.e., better relations between the US and China) contributed to an increase in the price of oil 8 months later. Similarly, positive shocks to GPR (i.e., increase in geopolitical risks related to China) contributed to a reduction in the price of oil 22 months later.

4. Conclusions

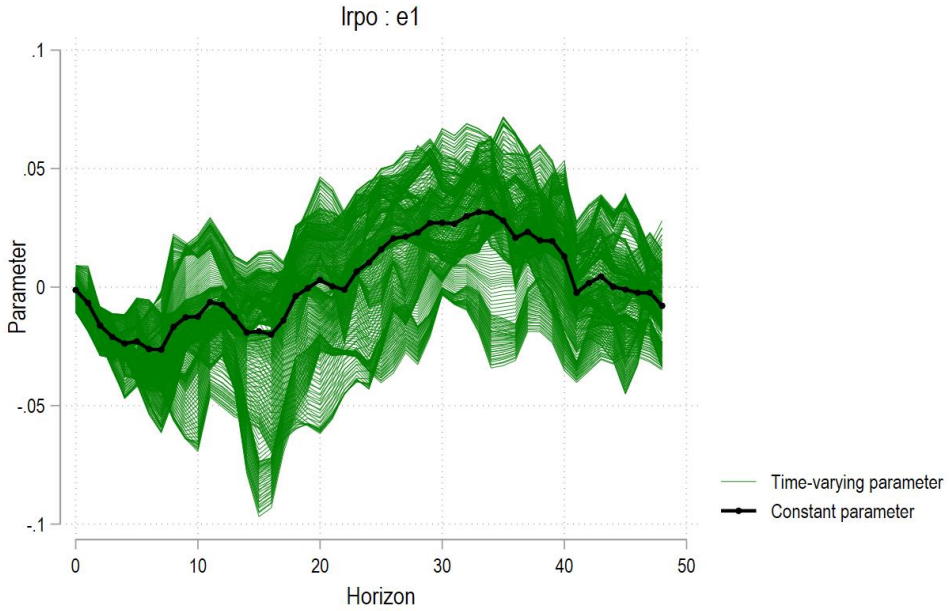
Geopolitical risks and political tensions are increasingly recognized as major factors that affect the world economy. In this research, I focused on the impact of geopolitical relations between the US and China. The effect of geopolitical relations on the oil market are not stable over time. In line with recent research, these effects are more pronounced after the Global Financial Crisis, when the relations between the US and China have seen a regime shift. Instabilities are detected before the start of the COVID-19 pandemic. Exploring whether IRF are different during cycles of rising tensions and cycles of diminishing tensions will be the object of future investigations.

Figure 1. Political relation index (PRI) and Geopolitical Risk specific (GPR) to China



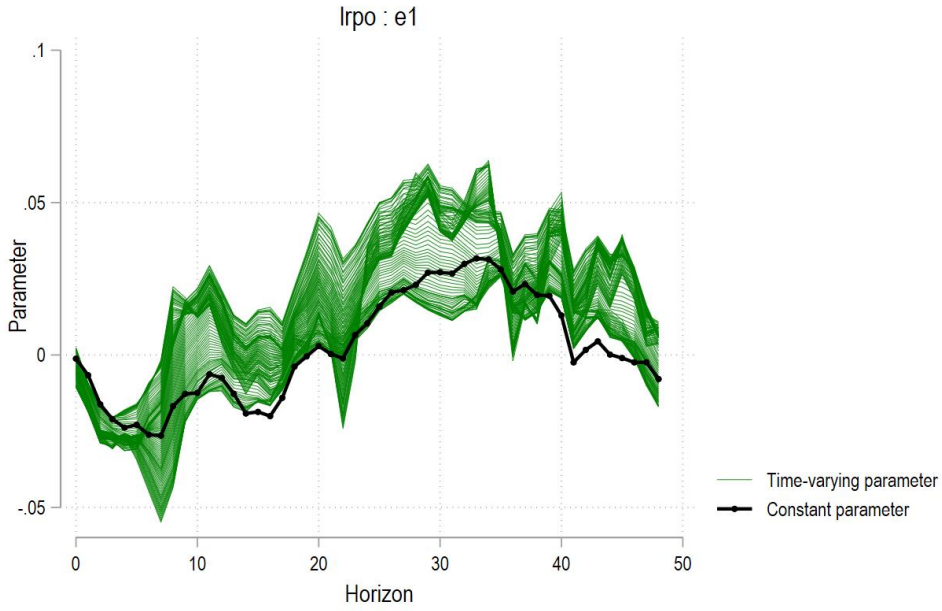
Source: Mignon and Saadaoui (2024). The PRI is computed as an influential score based on Chinese sources that fluctuates between -9 and 9. A higher value corresponds to better diplomatic relations between the US and China. The GPR is computed by Caldara and Iacoviello (2022), where a higher value represents more articles related to geopolitical risk and China in the US press.

Figure 2. Real Price of Oil Reaction to a One-Unit Political Tension Shock (PRI)



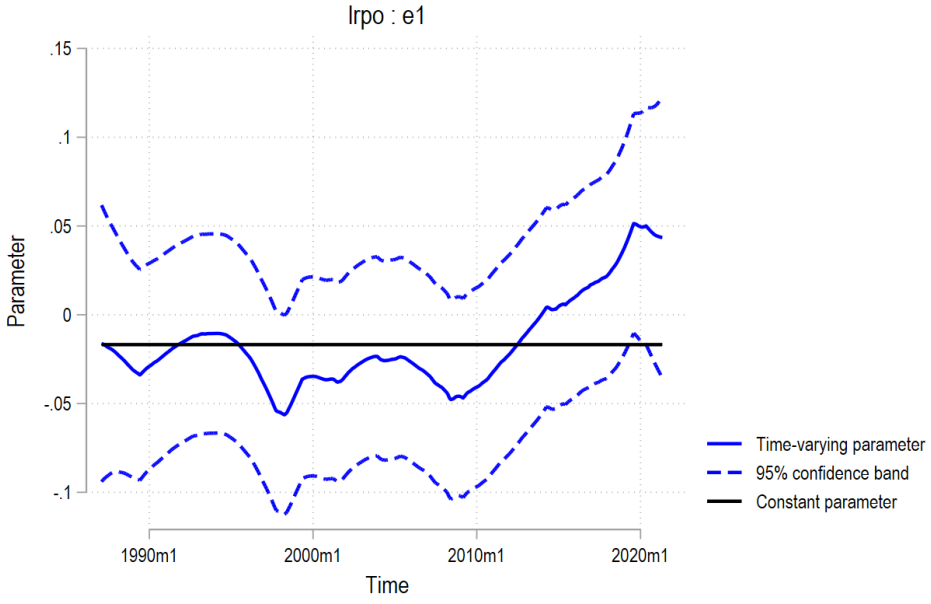
The black curve is the standard LP's IRF, and the green ones are the time-varying IRF. For each time horizon, we have an IRF. The time horizon for the IRF is 48 months.

Figure 3. Real Price of Oil Reaction to a One-Unit Political Tension Shock (PRI) after GFC



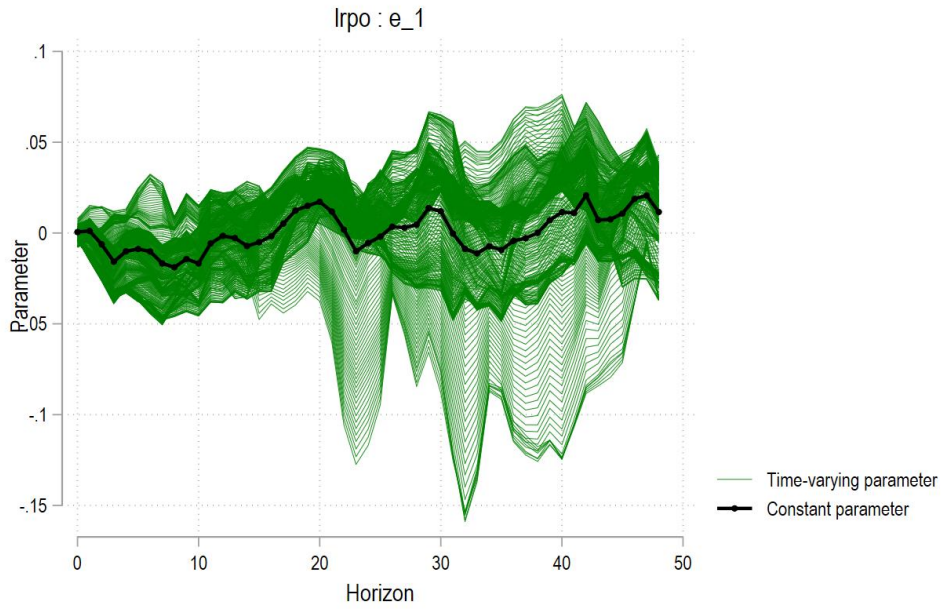
The black curve is the standard LP's IRF, and the green ones are the time-varying IRF. For each time horizon, we have a specific IRF. After the GFC, shocks on PRI contributed positively to the oil prices.

Figure 4. Time-varying parameter plot at horizon T = 8



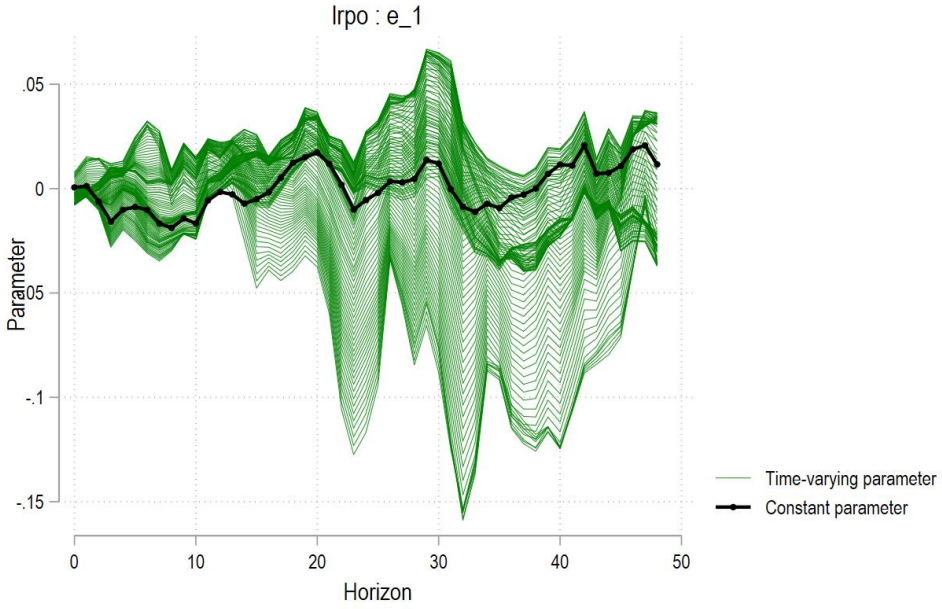
The time-varying parameter for the IRFs is observed at the month 8 in Figure 2. At the beginning of the COVID-19 pandemic, the positive effect of an identified shock on PRI differs significantly from the constant parameter LP at the 5% level. The black line corresponds to the unique IRF at the horizon T = 8 in Figure 2. The blue line corresponds the series of IRF at the horizon T = 8 in Figure 2.

Figure 5. Real Price of Oil Reaction to a One-Unit Geopolitical Risk Shock (GPR)



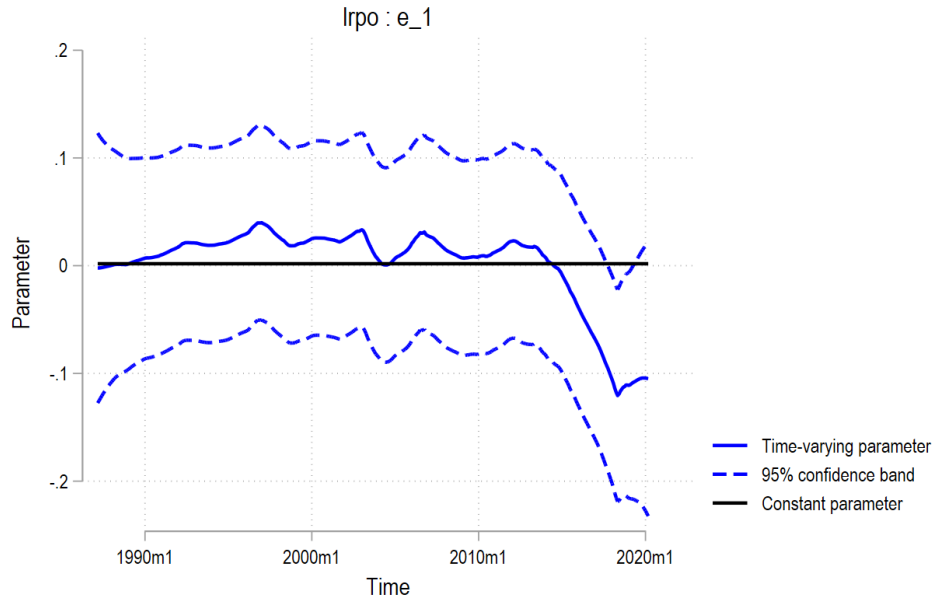
The black curve is the standard LP's IRF, and the green ones are the time-varying IRF. For each time horizon, we have an IRF.

Figure 6. Real Price of Oil Reaction to a One-Unit Geopolitical Risk Shock (GPR) after GFC



The black curve is the standard LP's IRF, and the green ones are the time-varying IRF. For each time horizon, we have an IRF. After the GFC, the GPR's identified shocks contribution to the oil prices is mixed.

Figure 7. Time-varying parameter plot at horizon T = 22



The time-varying parameter for the IRF is observed at the month 22 in Figure 5. Before the COVID-19 pandemic, the effect of an identified shock on GPR differs significantly from the constant parameter LP at the 5% level. The black line corresponds to the unique IRF at the horizon T = 22 in Figure 5. The blue line corresponds the series of IRF at the horizon T = 22 in Figure 5.

References

Abdel-Latif, Hany, and Mahmoud El-Gamal. 2019. “Financial Liquidity, Geopolitics, and Oil Prices.” *Energy Economics* 87: 104482. https://doi.org/10.1016/j.eneco.2019.104482.

Baumeister, Christiane. 2023. “Pandemic, War, Inflation: Oil Markets at a Crossroads?” National Bureau of Economic Research. July 1, 2023. https://doi.org/10.3386/w31496.

Baumeister, Christiane, and James D. Hamilton. 2019. “Structural Interpretation of Vector Autoregressions with Incomplete Identification: Revisiting the Role of Oil Supply and Demand Shocks.” *American Economic Review* 109 (5): 1873–1910. https://doi.org/10.1257/aer.20151569.

Cai, Yifei, Valérie Mignon, and Jamel Saadaoui. 2022. “Not All Political Relation Shocks Are Alike: Assessing the Impacts of US-China Tensions on the Oil Market.” *Energy Economics* 114: 106199. https://doi.org/10.1016/j.eneco.2022.106199.

Caldara, Dario, and Matteo Iacoviello. 2022. “Measuring Geopolitical Risk.” *American Economic Review* 112 (4): 1194–1225. https://doi.org/10.1257/aer.20191823.

Cascaldi-Garcia, Danilo, Cisil Sarisoy, Juan M Londoño, Bo Sun, Deepa Dhume Datta, T Ferreira, Olesya V Grishchenko, et al. 2023. “What Is Certain about Uncertainty?” *Journal of Economic Literature* 61 (2): 624–54. https://doi.org/10.1257/jel.20211645.

Chen, Hao, Hua Liao, Bao-Jun Tang, and Yi-Ming Wei. 2016. “Impacts of OPEC’s Political Risk on the International Crude Oil Prices: An Empirical Analysis Based on the SVAR Models.” *Energy Economics* 57: 42–49. https://doi.org/10.1016/j.eneco.2016.04.018.

Inoue, Atsushi, Barbara Rossi, and Yiru Wang. 2024a. “Has the Phillips Curve Flattened?” CEPR. February 18, 2024. https://cepr.org/publications/dp18846.

Inoue, Atsushi, Barbara Rossi, and Yiru Wang. 2024b. “Local Projections in Unstable Environments.” *Journal of Econometrics* 105726. https://doi.org/10.1016/j.jeconom.2024.105726.

Jordà, Òscar. 2005. “Estimation and Inference of Impulse Responses by Local Projections.” *American Economic Review* 95 (1): 161–82. https://doi.org/10.1257/0002828053828518.

Kilian, Lutz. 2019. “Measuring Global Real Economic Activity: Do Recent Critiques Hold up to Scrutiny?” *Economics Letters* 178: 106–10. https://doi.org/10.1016/j.econlet.2019.03.001.

Lee, Chi-Chuan, Chien-Chiang Lee, and Shao-Lin Ning. 2017. “Dynamic Relationship of Oil Price Shocks and Country Risks.” *Energy Economics* 66: 571–81. https://doi.org/10.1016/j.eneco.2017.01.028.

Miao, Hong, Sanjay Ramchander, Tianyang Wang, and Dongxiao Yang. 2017. “Influential Factors in Crude Oil Price Forecasting.” *Energy Economics* 68: 77–88. https://doi.org/10.1016/j.eneco.2017.09.010.

Mignon, Valérie, and Jamel Saadaoui. 2024a. “How Do Political Tensions and Geopolitical Risks Impact Oil Prices?” *Energy Economics* 129: 107219–19. https://doi.org/10.1016/j.eneco.2023.107219.

Mignon, Valérie, and Jamel Saadaoui. 2024b. “Asymmetries in the oil market: Accounting for the growing role of China through quantile regressions.” *Macroeconomic Dynamics*, forthcoming.

Perifanis, Theodosios, and Athanasios Dagoumas. 2019. “Living in an Era When Market Fundamentals Determine Crude Oil Price.” *The Energy Journal* 40 (01). https://doi.org/10.5547/01956574.40.si1.tper.

Qin, Yun, Kairong Hong, Jinyu Chen, and Zitao Zhang. 2020. “Asymmetric Effects of Geopolitical Risks on Energy Returns and Volatility under Different Market Conditions.” *Energy Economics* 90: 104851. https://doi.org/10.1016/j.eneco.2020.104851.

Appendix A. Data sources and definitions

Variables sources and definitions for the monthly database:

- Bilateral GPR for China (**gpr**): Percent of articles on China in the Anglo-Saxon press, source: https://www.matteoiacoviello.com/gpr_country_files/gprc_as.htm. See Caldara and Iacoviello (2022) for more details.

- PRI between China and the US (**lpri**): Influential score with events collected in Chinese sources (in log-modulus transform), source: http://www.tuiir.tsinghua.edu.cn/info/1145/6075.htm. See Mignon and Saadaoui (2024) for more details.

- Oil supply (**lpro**): global oil production in millions of barrels per day (in log), source: https://sites.google.com/site/cjsbaumeister/research. See Baumeister and Hamilton (2024) for more details.

- Oil demand (**ldem**): OECD and six major non-member economies (Brazil, China, India, Indonesia, the Russian Federation, and South Africa) industrial production (in log), source: https://sites.google.com/site/cjsbaumeister/research. See Baumeister and Hamilton (2024) for more details.

- Oil prices (**lrpo**) : WTI spot price in real terms, dollars per barrel (in log), source: https://sites.google.com/site/cjsbaumeister/research. See Baumeister and Hamilton (2024) for more details.

Variable for the Robustness checks:

Proxy for world demand (**ligrea**): Proxy for the volume of shipping in global industrial commodity markets, Deviation from trend (in log-modulus transform). See Kilian (2019) for more details.

Appendix B. Robustness Checks with Kilian's Proxy for Global Demand

Figure B1. Real Price of Oil Reaction to a One-Unit Political Tension Shock (PRI)

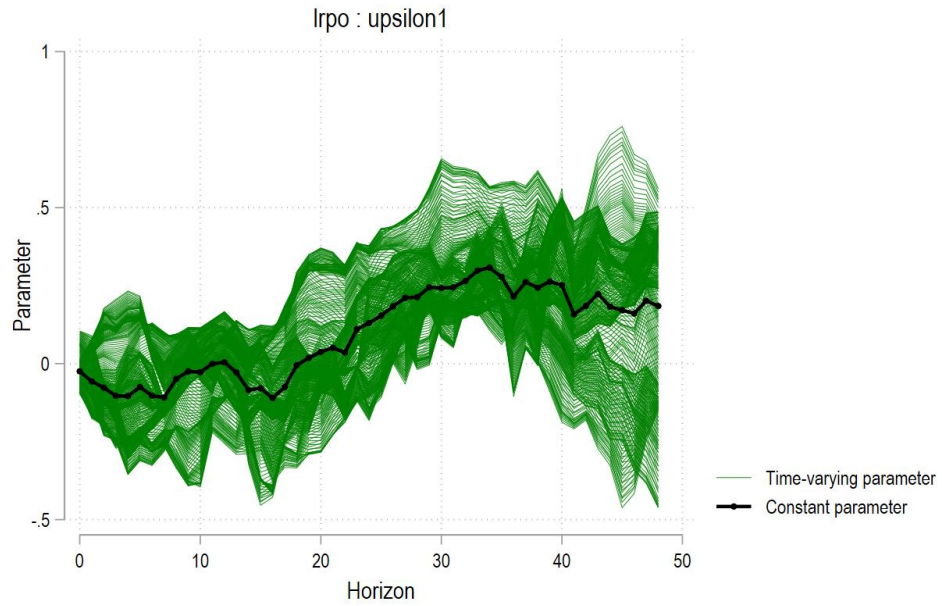


Figure B2. Real Price of Oil Reaction to a One-Unit Political Tension Shock (PRI) after GFC

Figure B3. Time-varying parameter at horizon plot T = 32

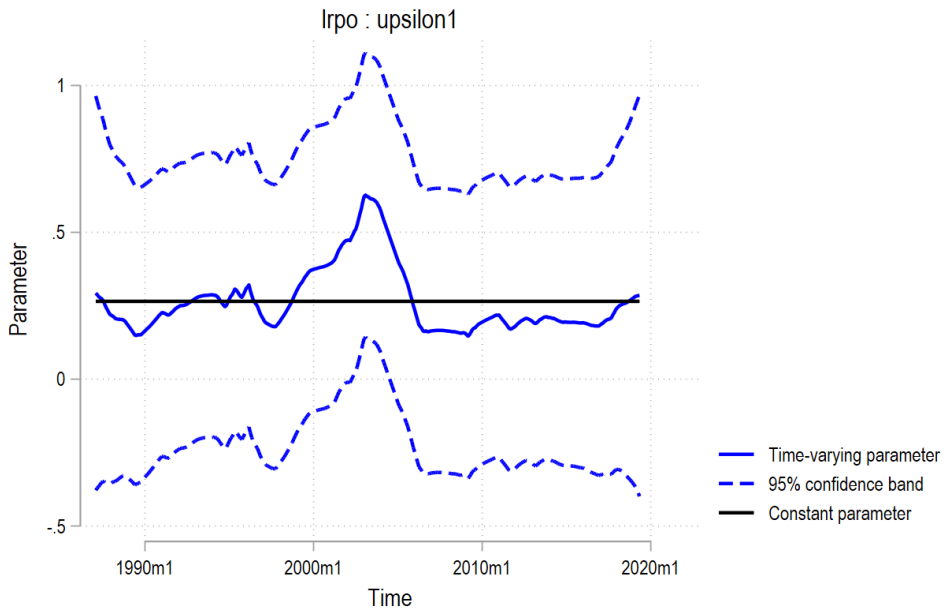


Figure B4. Real Price of Oil Reaction to a One-Unit Geopolitical Risk Shock (GPR)

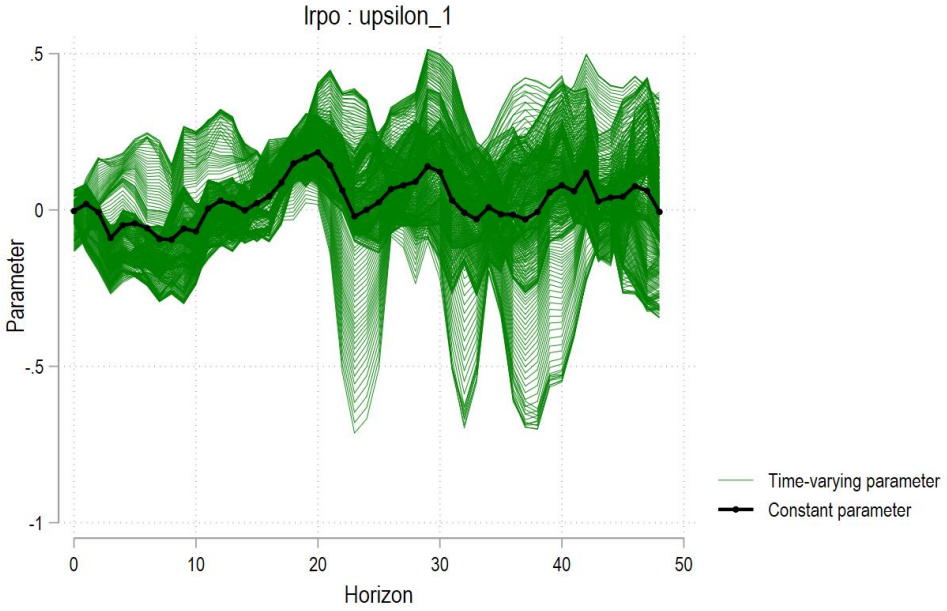


Figure B5. Real Price of Oil Reaction to a One-Unit Geopolitical Risk Shock (GPR) after GFC

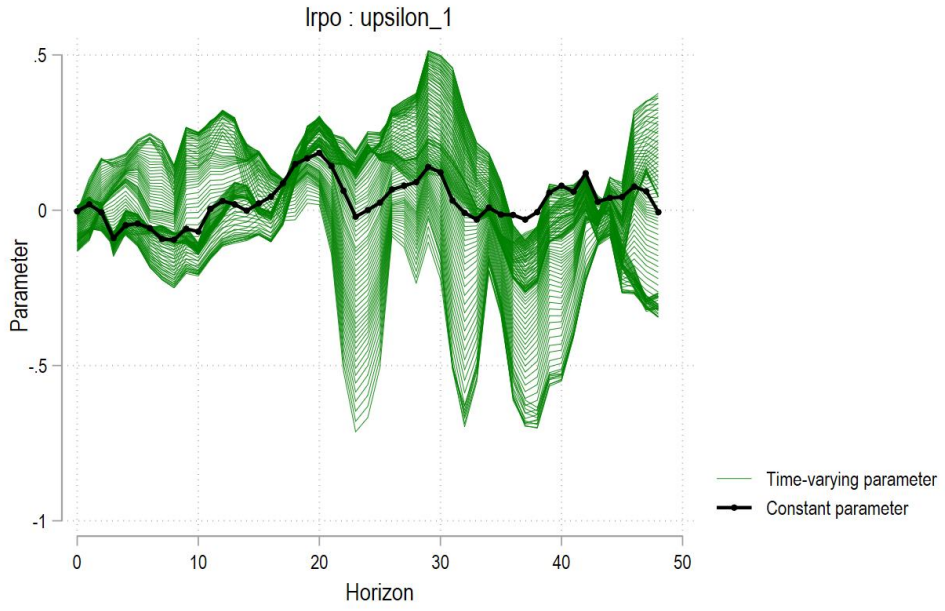


Figure B6. Time-varying parameter plot at horizon T = 22