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On the time-varying impact of China's bilateral political relations on its trading partners (1960–2022)[*]

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Abstract

We assess the impact of China's bilateral political relations with three main trading partners—the US, Germany, and the UK—on current account balances and exchange rates, over the 1960Q1-2022Q4 period. Relying on the lag-augmented VAR approach with time-varying Granger causality tests, we find that political relationships with China strongly matter in explaining the dynamics of current accounts and exchange rates. Such relationships cause the evolution of the exchange rate (except in the UK) and the current account; these causal links being time-varying for the US and the UK and robust over the entire period for Germany. These findings suggest that policymakers should account for bilateral political relationships to understand the global macroeconomic consequences of political tensions.

JEL Classification: C22; F51; Q41.

Keywords: Political relations; time-varying causality; lag-augmented vector autoregression; China.

1 Introduction

International trade across main trading blocs and countries can be either fostered or hampered depending on the level of the political tensions and/or relations between two nations, which can arise from differences in political systems, ideology, resource scarcity, etc.[1] For instance, bilateral trade between China and the US or between China and Germany, may benefit from good political relations.[2] Such blocs are economically interdependent. Indeed, the US is China's largest export market, and China is the US's largest import market. Hence, the overall relevance of China becomes in itself a geopolitical challenge,[3] as it could be the source of the emergence of a bipolar world (see, e.g., Hang 2017; Xuetong 2019).

The war in Ukraine is a recent example of how political tensions can significantly impinge on economic and financial decisions and developments. The conflict has indeed been accompanied by major geopolitical reallocations of trade and massive impacts on the financial and foreign exchange markets. Therefore, one might expect to observe some causal links running from political relations (notably frictions and agreements) to bilateral exchange rates and current account balances.

This paper tackles this issue and aims to assess the time-varying causal relationships between bilateral political relations, current account balances, and exchange rates between China and three major trading partner economies, namely, (i) the US, the first trading partner of China, (ii) Germany, first China's European trading partner, and (iii) the UK, a key trading partner outside America, ASEAN, and Europe.

Such potential causal relationships are not straightforward as they can be bidirectional in addition to being time-varying depending on the periods under study. Indeed, the depreciation of a currency against the Chinese renminbi (RMB) and increasing current account deficits against China may generate political tensions between China and its trading partner country. On the other hand, bilateral tightened political relations are expected to hamper trade relationships between China and its trading partner, thus deteriorating the partner's current account and the bilateral exchange rate.

Moreover, the link between political relations and exchange rates can be understood through volatility. In addition to fundamental drivers, exchange rate fluctuations are strongly influenced by political relations. The latter may affect foreign exchange rate markets by leading to new policies—or significant changes in existing policies. More generally, bilateral tensions can impact the considered partner country's economic growth and various macroeconomic variables. For instance, in the case of tense political relations, this could threaten the stability of a country's financial system, impacting its currency. On the other hand, improving bilateral relations can be a sign of positive prospects regarding the economic growth of the

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[1]Several studies exist on the link between political relations and trade, showing that bilateral trade decreases because of military conflicts (Hegre et al. 2010; Long 2008; Morrow et al. 1998), disputes over territories (Simmons 2005), and conflicting political objectives (Pollins 1989*a*,*b*). See also Du et al. (2017) and Cai, Saadaoui & Wu (2023) for recent investigations.

[2]For example, Fuchs & Klann (2013) show that meetings between the Dalai Lama and countries' officials may harm trade ties with China.

[3]On the role of China in the world economy, see Taylor (2016).

considered country and the stability of its economic and financial system, positively affecting both the current account balance and the exchange rate.

Regarding previous literature, various recent studies have investigated the link between political relations and some macroeconomic variables. Guo & Chen (2023) report that trade tariffs and negative events/news can significantly depreciate the RMB vis-à-vis the US dollar. In addition, political frictions similarly matter for the exchange rate. Liu & Pauwels (2012) also addressed the issue of political developments, notably by officials or institutions, as drivers of bilateral exchange rates. They mention that political statements (in terms of political pressure), notably from the US, EU member states, Japan, and major international organizations increase the daily conditional volatility of the RMB central parity.

Besides, Andresen & Sturm (2023) show that geopolitical interests may affect exchange rates and stock market development. Temporary members of the United Nations Security Council (UNSC) receiving an IMF program may face a higher risk premium (higher bond and bill yields and weaker exchange rates). Among the several drivers of exchange rates, the literature has also pointed out the relevance of political relations (factors) in addition to international capital controls, monetary policy, interest rate differentials (in the short run), and differences in labor productivity (in the long run) (see, for instance, Frieden 1994, and Korus & Celebi 2019).

Regarding political relations' economic and financial relevance, Cai, Chang & Chang (2023) find that shifts in US-China political relations make long-lasting Granger causal impacts on stock market variations, but the reverse effects are short-lived. Cai et al. (2022) also assess the potential impact of political US-China tensions on the oil market, reporting evidence that conflicting political relationships may undermine market stability.

Finally, let us mention the recent paper by Caldara & Iacoviello (2022), who show that, in the US, investment decreases more in industries that are exposed to the so-called aggregate geopolitical risk; the latter index being constructed by the authors based on articles mentioning adverse geopolitical events in leading newspapers.

In the present paper, we go further than the previous literature in various ways. First, we do not only consider the US-China political relationships but also the political links between China and two other major partner countries, namely the UK and Germany. Second, we do not limit our investigation to exchange rates and consider current account balances, which are expected to be impacted by the nature—rival or friendly—of the relationship between countries. Third, turning to methodological aspects, we go further than the usual retained specifications by investigating time-varying causal relationships. To this end, we rely on the lag-augmented vector autoregression (LA-VAR) approach and use three different recursive strategies—forward expanding window, rolling window, and recursive evolving window—to capture the causal relationships.

Our main findings show that political relationships with China matter in the dynamics of exchange rates and current accounts in the US, the UK, and Germany over the 1960Q1-2022Q4 period. Specifically, we find that political relationships cause the evolution of the exchange rate (except in the UK) and the current account, and that these causal links are time-varying for the US and the UK. In the case of Germany, the causality running from its political relationship with China is at play over the entire period.

The rest of the paper is organized as follows. Section 2 presents the methodology and data, and provides some stylized facts. Section 3 deals with the empirical analysis. Section 4 concludes.

2 Methodology, data, and stylized facts

2.1 Methodology

Following Shi et al. (2020), we rely on the lag-augmented vector autoregression (LA-VAR) approach (Toda & Yamamoto 1995; Dolado & Lutkepohl 1996) for testing time-varying causality between current account balances, bilateral exchange rates, and political relationships. The approach used in this paper does not require any choices concerning the detrending or differencing of the series. Besides, it explicitly allows for unknown changing points in the causal relationships. The LA-VAR model is expressed as follows for a n-dimensional vector y_t,

$$y_t = \gamma_0 + \gamma_1 t + \sum_{i=1}^{k} J_i y_{t-i} + \sum_{j=k+1}^{k+d} J_j y_{t-j} + \varepsilon_t \qquad (1)$$

where t is a time trend, k is the lag order of the original VAR model, d denotes the maximum order of integration of the variables in y_t, and ε_t is the error term. The regression can also be written as follows,

$$y_t = \boldsymbol{\Gamma} \tau_t + \boldsymbol{\Phi} x_t + \boldsymbol{\Psi} z_t + \varepsilon_t, \qquad (2)$$

where $\boldsymbol{\Gamma} = (\gamma_0, \gamma_1)_{n \times 2}$, $\tau_t = (1, t)'_{2 \times 1}$, $x_t = \left(y'_{t-1}, \ldots, y'_{t-k} \right)'_{nk \times 1}$, $z_t = \left(y'_{t-k-1}, \ldots, y'_{t-k-d} \right)'_{nd \times 1}$, $\boldsymbol{\Phi} = (J_1, \ldots, J_k)_{n \times nk}$, and $\boldsymbol{\Psi} = (J_{k+1}, \ldots, J_{k+d})_{n \times nd}$.

The null hypothesis of Granger non-causality is given by the restrictions

$$H_0 : \boldsymbol{R}\phi = 0 \qquad (3)$$

where $\phi = vec(\boldsymbol{\Phi})$ using row vectorization, and $\boldsymbol{R}$ is a $m \times n^2 k$ matrix. The elements of the coefficient matrix $\boldsymbol{\Psi}$ of the final d lagged vectors are taken to be zero. Then, Equation (1) can be extended to a more compact form as,

$$Y = \tau \boldsymbol{\Gamma}' + X \boldsymbol{\Phi}' + Z \boldsymbol{\Psi}' + \varepsilon \qquad (4)$$

Figure 1: Forward expanding (FE) window
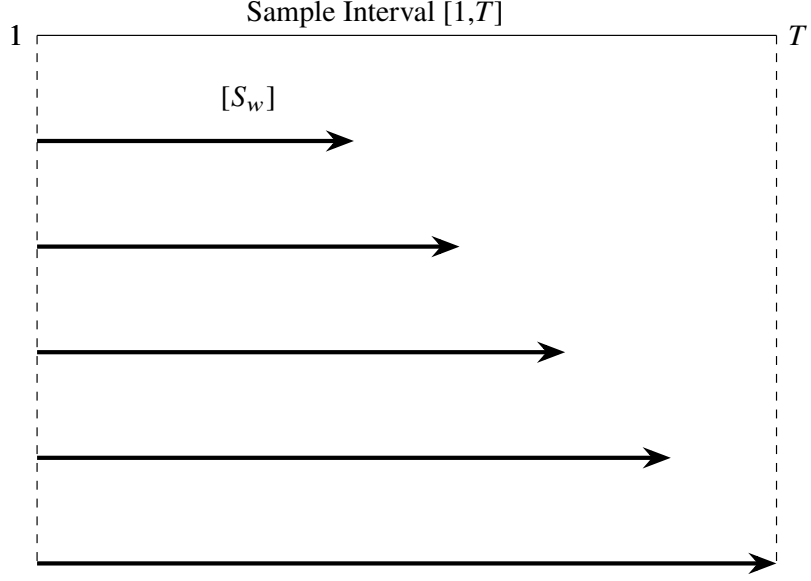
Source: Adapted from Baum et al. (2021, 2022).

where $Y = (y_1, y_2 \ldots, y_T)'_{T \times n}$, $\tau = (\tau_1, \ldots, \tau_T)'_{T \times 2}$, $X = (x_1, \ldots, x_T)'_{T \times nk}$, $Z = (z_1, \ldots, z_T)'_{T \times nd}$, and $\varepsilon = (\varepsilon_1, \ldots, \varepsilon_T)'_{T \times n}$.

Let us posit: $Q_\tau = I_T - \tau \left(\tau' \tau \right)^{-1} \tau'$ and $Q = Q_\tau - Q_\tau Z \left(Z' Q_\tau Z \right)^{-1} Z' Q_\tau$. The OLS estimator is:

$$\widehat{\mathbf{\Phi}} = Y' Q X \left(X' Q X \right)^{-1}. \tag{5}$$

The standard Wald statistic $\mathcal{W}$ to test the hypothesis H_0 is,

$$\mathcal{W} = (\boldsymbol{R}\widehat{\phi})' \left[\boldsymbol{R} \left\{ \widehat{\Sigma}_\varepsilon \otimes \left(X'QX \right)^{-1} \right\} \boldsymbol{R}' \right]^{-1} \boldsymbol{R}\widehat{\phi}, \tag{6}$$

where $\widehat{\phi} = \text{vec}(\widehat{\mathbf{\Phi}})$, $\widehat{\Sigma}_\varepsilon = \frac{1}{T} \widehat{\varepsilon}' \widehat{\varepsilon}$, and $\otimes$ denotes the Kronecker product.

Three recursive strategies, combined with Granger causality tests, can be used: (i) the forward expanding (FE) window method, (ii) the rolling window (RW) method, and (iii) the recursive evolving (RE) window method. According to the simulations by Shi et al. (2020)), the RE window algorithm provides the most reliable results, followed by the RW method.[4]

Specifically, the FE window method fixes the starting point at the first observation and moves the end-

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[4]In their simulations, Shi et al. (2020) considered different cases for the order of integration in a bivariate VAR model: both variables are stationary (case 1), one variable is I(1) and the other one is stationary (cases 2 and 3), and both are non-stationary (case 4). All the tests are very close to the nominal size of 5 percent and the RE method shows power improvements when (i) the causal strength is moderate (0.8), (ii) the sample size is large ($T = 200, T = 300$), and (iii) the minimum window size is below 24% of the observations.

Figure 2: Rolling window (RW)
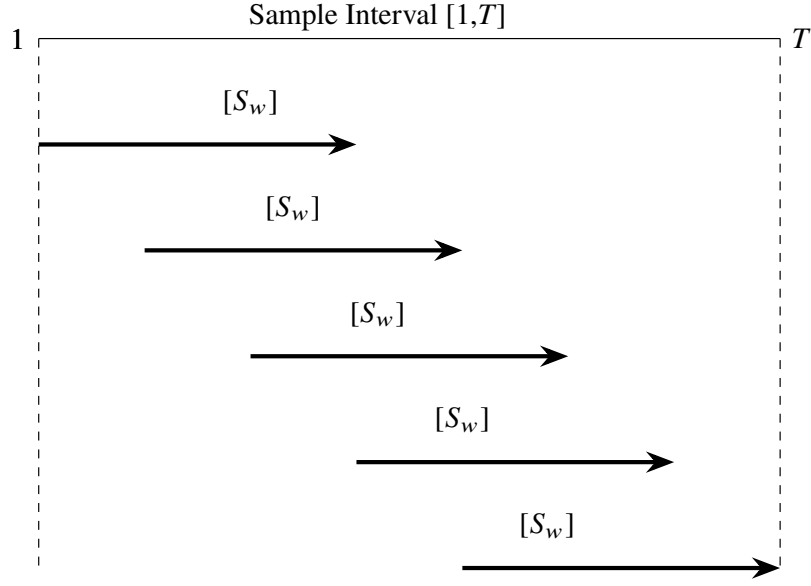
Source: Adapted from Baum et al. (2021, 2022).

ing points from S_w to T (see Figure 1). Next, the RW technique moves the starting and ending points together with a constant distance S_w (see Figure 2). The window size is thus kept constant across the time variation. Regarding the RE window method, the ending point S_2 varies across the range $[S_w, T]$. However, the starting point changes from 1 to $(S_2 - S_w) + 1$ (see Figure 3).

Thanks to the aforementioned recursive strategies, we can obtain a series of Wald statistics:[5]

$$\mathcal{W}_{S_1, S_2}^{S_1 \in [1, (S_2 - S_w)+1]_{S_2 \geq S_w}}. \tag{7}$$

To test for the Granger non-causality hypothesis, Shi et al. (2020) propose a sup-Wald statistic when the RE window technique is utilized:

$$\mathcal{S}up - \mathcal{W}_{Sw} = \sup_{S_2 \geq S_w, S_1 \in \left[1, (S_2 - S_w)+1\right]} \{\mathcal{W}_{S_1, S_2}\}. \tag{8}$$

Alternatively, Shi et al. (2020) construct a sub-sample Wald test statistic with heteroskedastic errors,

$$\mathcal{W}^* = T_w \left(\mathbf{R}\widehat{\phi}\right)' \left[\mathbf{R}\left\{\hat{V}^{-1}\widehat{\Sigma}\hat{V}^{-1}\right\}\mathbf{R}'\right]^{-1}\mathbf{R}\widehat{\phi}, \tag{9}$$

where $\widehat{\phi} = \text{vec}\left(\widehat{\mathbf{\Phi}}\right)$ and $\widehat{\mathbf{\Phi}}$ is the OLS estimate for the sub-sample running from S_1 to S_2. Besides,

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[5]When S_w is equal to S_2, then S_1 is equal to 1 and the window size can expand until reaching S_2, as can be seen in the upper part of Figure 3. When S_w is equal to $(1/2)S_2$, then S_1 is equal to $1/2$ and the window size can expand until reaching S_2, as can be seen in the lower part of Figure 3.

Figure 3: Recursive evolving (RE) window
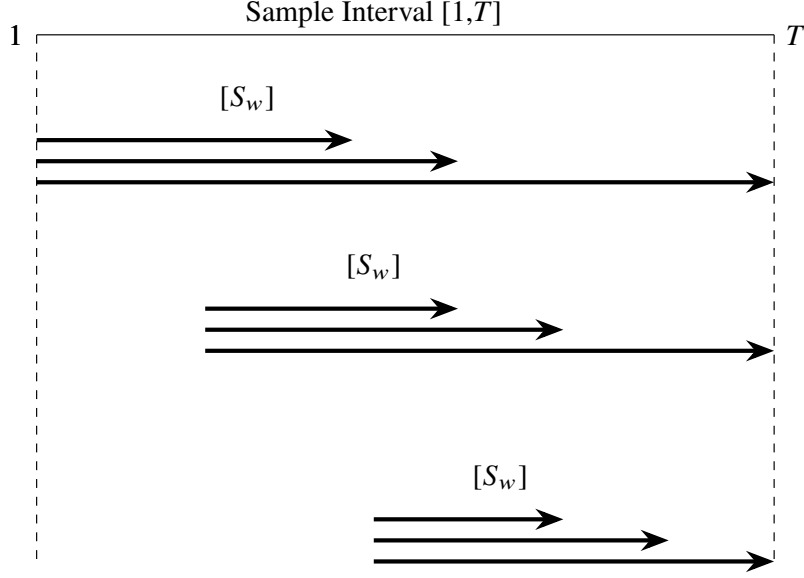
Source: Adapted from Baum et al. (2021, 2022).

$$\hat{V} = I_n \otimes \hat{Q} \text{ with } \hat{Q} = \frac{1}{T_w} \sum x_t x_t' \, ,$$
$$\hat{\Sigma} = \frac{1}{T_w} \sum \widehat{\xi}_t \widehat{\xi}_t' \text{ with } \widehat{\xi}_t = \widehat{\varepsilon}_t \otimes x_t. \tag{10}$$

Therefore, the heteroskedastic-consistent sup-Wald test statistic can be expressed as,

$$\mathcal{S}up - \mathcal{W}_{Sw}^* = \sup_{S_2 \geq S_w, S_1 \in \left[1, (S_2 - S_w) + 1\right]} \left\{ \mathcal{W}_{S_1, S_2}^* \right\} . \tag{11}$$

2.2 Data

We use quarterly data for China, the US, Germany, and the UK from the first quarter of 1960 to the last quarter of 2022 (see Table A1 in Appendix A for the descriptive statistics). Bilateral exchange rates are extracted from the International Financial Statistics database provided by the IMF,[6] and the current account data are obtained from the Main Economic Indicators database of the OECD.[7] The bilateral political relationship index (PRI) for the main economic partners of China is produced by the Institute of International Relations at Tsinghua University.[8] The PRI varies from -9 and 9, and 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). The bilateral exchange rates and the PRIs are also available at a monthly frequency.

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[6]Source: https://db.nomics.world/IMF/IFS. A rise denotes a depreciation of the Chinese currency.

[7]Source: https://db.nomics.world/OECD/MEI.

[8]Source: http://www.tuiir.tsinghua.edu.cn/imiren/info/1091/1320.htm. Dreher et al. (2009) use an alternative way to measure geopolitical interest or relations by analysing the temporary Security Council membership at the UN. This approach is not relevant in our case as we focus on the relations between permanent members of the UNSC, like the US, China, and the UK.

2.3 Stylized facts

Figure 4 displays the bilateral PRIs for the three considered countries vis-à-vis China. As shown, whereas PRIs globally followed an increasing trend until the mid-2010s, bilateral political relations strongly deteriorated for the three countries after 2015-2016, especially in the cases of the US and the UK. Regarding the US, the main explanation lies in the trade war engaged by Donald Trump when he came into power. During its campaign speech in June 2016, Donald Trump announced that, if elected, he intended to sanction China which he accused of manipulating foreign exchange markets, to take legal actions against its "unfair" trade practices, and to apply tariffs on imports from China. This paved the way for the trade war between the two countries, which began in January 2018 when the US introduced tariffs and trade barriers on various Chinese products. In response, China established a list of several products for which tariffs would increase significantly. The conflict escalated in 2019, leading to the signing of a tense agreement in January 2020, which expired in December 2021.

Turning to the UK, the political tensions are primarily explained by the accumulation of frictions regarding notably (i) Hong Kong, with the UK opposition to the Hong Kong national security law, (ii) the Uyghur Muslim minority in Xinjiang, and (iii) Huawei, with the announce of the UK to ban all equipment from the Chinese group from its 5G networks. Considering the case of Germany, although its political relations with China started to tighten after 2019, they followed an increasing trend over the entire period.

Figures 5 and 6 respectively display the current account balance and the bilateral PRI, and the bilateral exchange rate and the PRI for the three countries. Regarding the current account balance for the US, its global deterioration up until the mid-2000s goes along with an improvement in the political relation with China; hence the negative correlation between the current account and the PRI over the full period (correlation = -0.49, see Table 1). From the second half of the 2000s, the pattern has significantly changed, with a tendency of the series to move commonly; the correlation being equal to 0.48 after 2010. This illustrates the relevance of investigating the existence of a time-varying relationship between the two series. This is also the case for the exchange rate. Indeed, as shown in Figure 6, during the 1970s, an improvement in the PRI went along with an appreciation of the RMB, contrary to the 1980s. On the other hand, in the 1980s, an amelioration in the US-China political relation was observed alongside a depreciation of the RMB vis-à-vis the US dollar. Regarding the recent period, the degradation of the political relations between the two countries is accompanied by a depreciation of the Chinese currency.

For the UK, Figures 5 and 6 globally show an improvement in the bilateral political relation with China, together with both a deteriorating trend of the UK current account (correlation = -0.62), and a depreciating tendency of the RMB vis-à-vis the GBP.

The overall pattern differs for Germany compared to the US and the UK. As shown in Figure 6, the current account balance improves mostly throughout the period at hand, together with a positive trend in

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Table 1: Correlations between political and macroeconomic variables

Pairwise correlations over the whole period			
Variables	PRI US/CN	PRI UK/CN	PRI GER/CN
RMB per USD	**0.376**	0.751	0.772
RMB per GBP	0.266	**0.624**	0.558
RMB per DEU/EUR	0.464	0.800	**0.830**
US CAB	**-0.491**	-0.759	-0.774
UK CAB	-0.307	**-0.650**	-0.716
GER CAB	-0.094	0.589	**0.744**
Pairwise correlations after 1990			
Variables	PRI US/CN	PRI UK/CN	PRI GER/CN
RMB per USD	**0.188**	-0.047	-0.136
RMB per GBP	0.502	**0.108**	-0.269
RMB per DEU/EUR	0.345	0.120	**-0.001**
US CAB	**-0.067**	-0.277	-0.338
UK CAB	0.057	**-0.392**	-0.633
GER CAB	-0.180	0.552	**0.916**
Pairwise correlations after 2000			
Variables	PRI US/CN	PRI UK/CN	PRI GER/CN
RMB per USD	**0.148**	-0.027	-0.833
RMB per GBP	0.506	**0.255**	-0.642
RMB per DEU/EUR	0.436	0.372	**-0.234**
US CAB	**-0.147**	0.149	0.644
UK CAB	-0.051	**-0.092**	-0.495
GER CAB	-0.149	0.179	**0.915**
Pairwise correlations after 2010			
Variables	PRI US/CN	PRI UK/CN	PRI GER/CN
RMB per USD	**-0.548**	-0.175	0.051
RMB per GBP	0.758	**0.590**	-0.143
RMB per DEU/EUR	0.379	0.419	**-0.244**
US CAB	**0.475**	0.743	0.777
UK CAB	-0.200	**-0.087**	-0.273
GER CAB	0.062	0.275	**0.678**

Note: Source: authors' calculations. Note: an increase in the PRI indicates an improvement of the political relation with China. An increase in the RMB exchange rate indicates a depreciation of the Chinese currency. CAB: current account balance.

Figure 4: Bilateral political relation indices (PRI)

Source: http://www.tuiir.tsinghua.edu.cn/imiren/info/1091/1320.htm
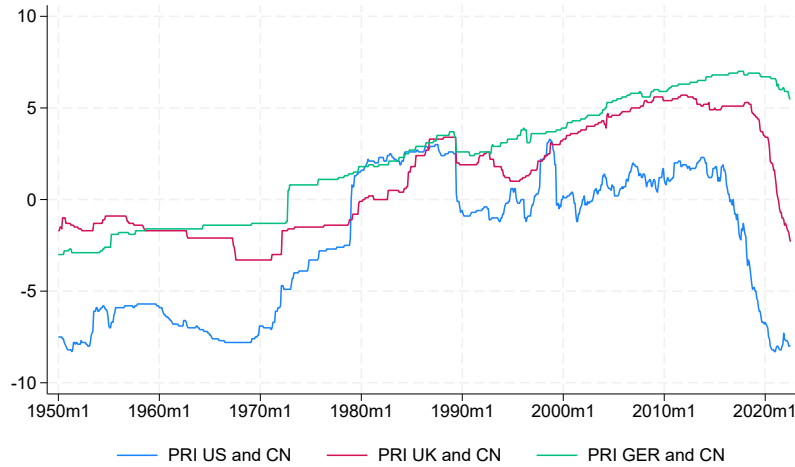
the China-Germany PRI (correlation = 0.74). Improving political relations between the two countries is also associated with a depreciation of the RMB vis-à-vis the German currency during most of the period (up until the end of the 2000s), while an appreciation of the Chinese currency is at play after.

Overall, this preliminary analysis shows the existence of a significant correlation between bilateral political relations and the current accounts and the exchange rates of the three China's partners. Furthermore, the links between (i) political relations and (ii) current account balances and exchange rates evolve over time, especially in the case of the US and, to a lesser extent, the UK. Germany follows a quite different pattern as the links between the PRI and the German macroeconomic variables seem to be rather stable over time. This calls for a deeper investigation through the estimation of LA-VAR models and the implementation of time-varying causality tests.

3 Empirical results

3.1 Unit root tests and LA-VAR lag order

The LA-VAR procedure does not involve pre-filtering the data by removing the trend or taking the first difference. However, it requires the application of unit root tests to determine the maximum order of integration of the series.

Table 2 reports the results of the augmented DF-GLS test (Elliott et al. 1996) and the ADF-max test of Leybourne (1995), which account for residual serial correlation.[9] As shown, the maximum order of

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[9] Roughly speaking, the DF-GLS test is an efficient test that consists of detrending or demeaning the considered series using GLS, and performing usual ADF unit root tests on the resulting transformed data. The ADF-max test consists of estimating Dickey-Fuller-type regressions using forward and reverse realizations of the data. Those two tests outperform usual unit root tests in terms of power. See Otero & Baum (2017, 2018) and Baum et al. (2022) for more details.

Figure 5: Current account balances and political relations
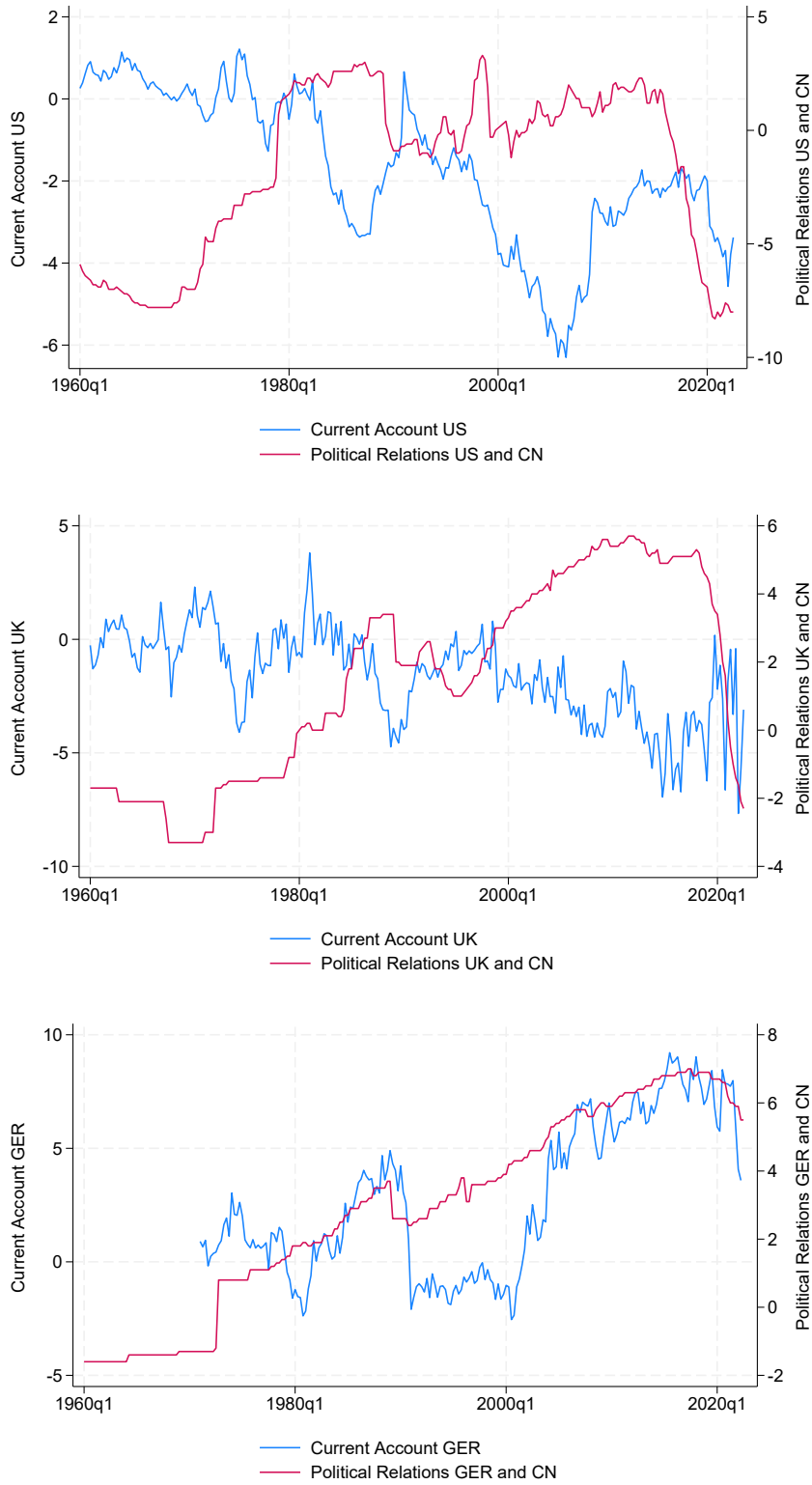
Source: see Section 3.2. On the left-hand side scale, current balance as a percentage of GDP. On the right-hand scale, political relationship with China, PRI $\in [-9, 9]$.

Figure 6: Bilateral exchange rates and political relations
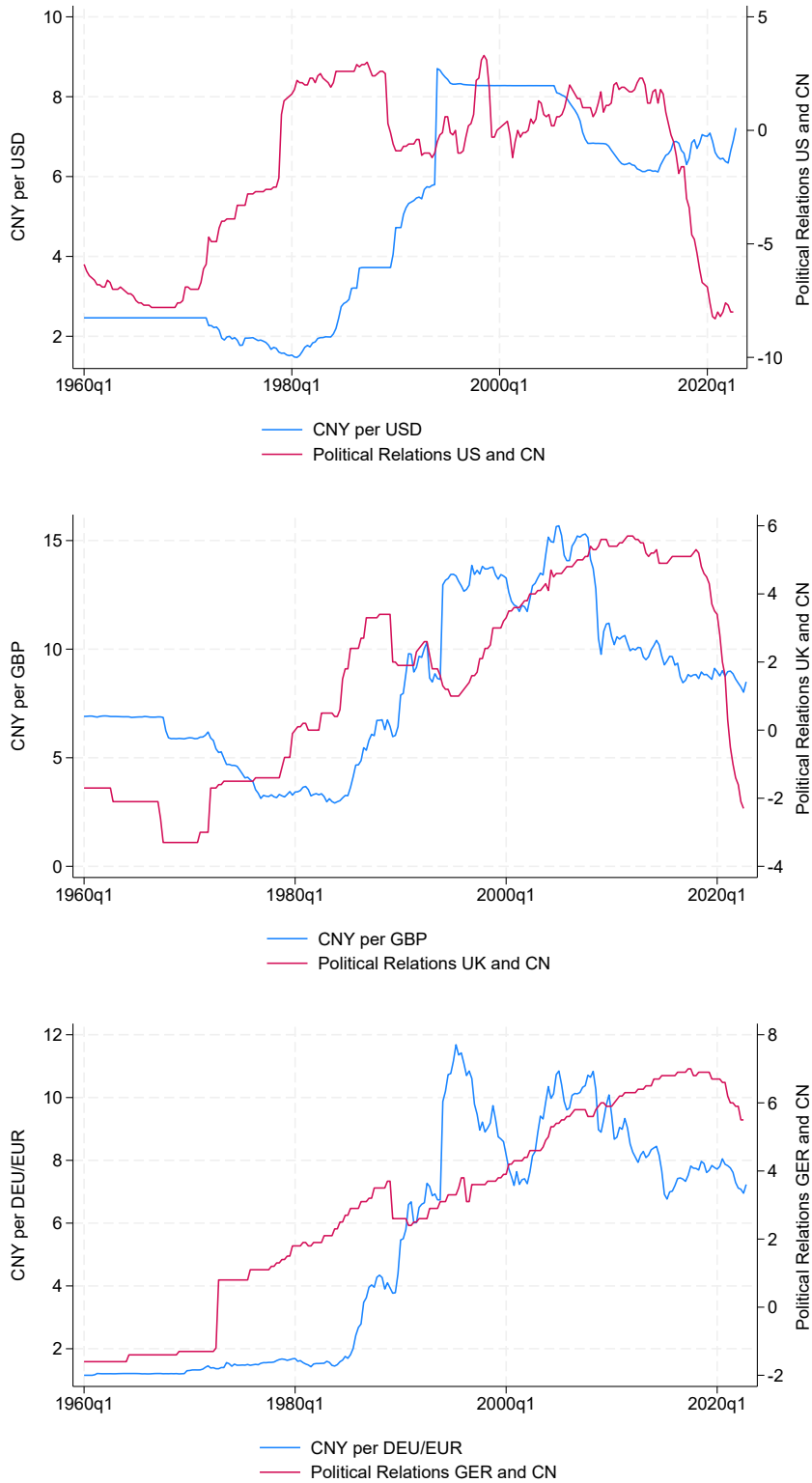
Source: see Section 3.2. On the left-hand side scale, bilateral exchange rate with China (an increase denotes a depreciation of the Chinese currency). On the right-hand scale, political relationship with China, PRI $\in [-9, 9]$.

integration of the series is equal to 1. Therefore, we will consider $d = 1$ in the LA-VAR.

The following step consists of determining the VAR order for each causal relationship between PRIs and the two macroeconomic variables, i.e., the current account balance and the bilateral exchange rate. To this end, we restrict the maximum number of lags to four, as is usual when working with quarterly data. Furthermore, we include a linear trend that enters as an exogenous variable in the VAR. We find that the optimal lag is $k = 2$; the selected lag order in the LA-VAR approach being thus equal to $k + d = 3$.[10]

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[10] The results are available upon request to the authors.

Table 2: Unit root tests

| Variable | DF-GLS | | | | | | ADF-max | | | | | |
| | Levels | | | First difference | | | Levels | | | First difference | | |
	Lags	Statistic	[p-value]	Lags	Statistic	[p-value]	Lags	Statistic	[p-value]	Lags	Statistic	[p-value]
xrus	1	0.211	[0.793]	0	-14.588	[0.000]	1	-0.568	[0.747]	0	-14.584	[0.000]
xruk	2	-0.038	[0.722]	1	-11.482	[0.000]	3	-1.499	[0.303]	1	-11.512	[0.000]
xrger	1	-0.015	[0.729]	0	-11.492	[0.000]	1	-0.219	[0.863]	0	-11.537	[0.000]
lprius	3	-1.622	[0.547]	2	-8.049	[0.000]	3	-1.413	[0.734]	2	-8.124	[0.000]
lpriuk	3	-1.08	[0.835]	3	-3.691	[0.000]	3	0.017	[0.992]	2	-6.065	[0.000]
lpriger	0	-1.275	[0.745]	0	-16.249	[0.000]	0	-1.136	[0.843]	0	-16.434	[0.000]
cabus	0	-0.708	[0.469]	2	-6.399	[0.000]	0	-1.454	[0.322]	0	-14.997	[0.000]
cabuk	4	-1.924	[0.064]	1	-15.046	[0.000]	4	-2.195	[0.089]	3	-11.798	[0.000]
cabger	0	-1.479	[0.164]	0	-14.213	[0.000]	0	-1.746	[0.208]	0	-15.264	[0.000]

Notes: The tests include a constant and a trend for the political relations, and a constant for the other variables. For the PRI, we use the log-modulus transformation as in Mignon & Saadaoui (2023). The number of lags is determined using the AIC criterion considering a maximum of 4 quarters. *xr*: exchange rate, *lpri*: PRI, *cab*: current account balance. Source: Authors' calculations.

3.2 Time-varying Granger causality tests

We report in Table 3 and Figures 7 to 9 the summary of the time-varying causality test results using the RE window approach.[11] As shown, the null hypothesis of non-causality is rejected in several cases. For the three China's partner countries, we find that bilateral political relations have a causal effect on their current account balances. It is worth mentioning that whereas such causality is at play over some sub-periods in the case of the US and the UK, it is observed over the full period for Germany. Clearly, this illustrates that bilateral relations strongly matter in the evolution of China's partners' current accounts, particularly for Germany.

Turning to our second macroeconomic variable, our findings underline a robust causal relationship running from the PRI to the exchange rate in Germany, corroborating the key role played by China. Bilateral political relations also impact the US currency over some sub-periods. On the contrary, the null hypothesis of non-causality from the PRI to the RMB/GBP exchange rate is never rejected. These results are in line with the fact that the US— first China's trading partner—and Germany—first China's European trading partner—are more important partners for China than the UK.[12]

More in detail, regarding the US, our findings highlight the existence of a time-varying bidirectional causality between the PRI and the exchange rate. The most interesting result concerns the recent period, starting in the mid-2010s, for which a depreciation of the Chinese currency accompanies a deterioration of the US-China political relation, the causality being bidirectional. This is linked to the trade war and Donald Trump's accusation against China for manipulating its currency, leading to political tensions between the two countries. More generally, the worsening of the US current account balance and the undervaluation of the Chinese currency have indeed been supposedly two factors that led to the rise of populism (contributing eventually to Donald Trump's election), and to the US-China trade war (Moosa et al. 2020; see Panel (b) of Figure 7). Furthermore, as Autor et al. (2016) and Pierce & Schott (2016) mentioned, changing world trade patterns with China's emergence have contributed to increased unemployment in US industries more exposed to import competition. Even though the US Senate declined to label China as a currency manipulator[13] in 2012, the debates were intense.[14] All these debates may have contributed to the rise of Donald Trump's power and the start of the US-China trade war. As shown in Panel (b) of Figure 7, the RMB/USD exchange rate has indeed been a cause of political tensions from the start of Donald Trump's presidency, the reverse causality being also at play, as displayed in the third column of Table 3.

Tuning to the UK, while there is no causality between the PRI and the RMB/GBP exchange rate, a time-varying causality is observed between the PRI and the current account (Figure 8). The latter is mainly

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[11] The results with the two other approaches are reported in Appendix C.

[12] As shown in Appendix B, our results regarding Germany are robust to the retained approach.

[13] https://www.reuters.com/article/us-usa-china-treasury-idUSBRE8AQ19V20121128

[14] Fred Bergsten talks about "fighting fire with fire on the renminbi", see: https://www.ft.com/content/070e525c-cf1d-11df-9be2-00144feab49a

Table 3: Time-varying causality tests

Tested Causality Relationship H_0: null hypothesis of Granger non-causality	Cannot reject H_0 over the sample	Reject H_0 over some periods	Always reject H_0
$lprius \xrightarrow{\text{GC?}} xrus$	-	1995Q4-1997Q1	-
	-	2015Q3-2017Q2	-
	-	**2018Q2-2022Q3**	-
$xrus \xrightarrow{\text{GC?}} lprius$	-	1976Q4-1978Q3	-
	-	**2016Q2-2022Q3**	-
$lprius \xrightarrow{\text{GC?}} cabus$	-	1980Q1	-
	-	1982Q3-1987Q4	-
	-	1989Q4-1990Q4	-
$cabus \xrightarrow{\text{GC?}} lprius$	1979Q4-2022Q3	-	-
$lpriuk \xrightarrow{\text{GC?}} xruk$	1976Q4-2022Q3	-	-
$xruk \xrightarrow{\text{GC?}} lpriuk$	1976Q4-2022Q3	-	-
$lpriuk \xrightarrow{\text{GC?}} cabuk$	-	2009Q4-2014Q4	-
	-	2019Q1	-
	-	2020Q4	-
	-	2022Q4	-
$cabuk \xrightarrow{\text{GC?}} lpriuk$	-	2019Q3-2020Q1	-
	-	2021Q2-2022Q1	-
$lpriger \xrightarrow{\text{GC?}} xrger$	-	-	**1976Q4-2022Q3**
$xrger \xrightarrow{\text{GC?}} lpriger$	1976Q4-2022Q3	-	-
$lpriger \xrightarrow{\text{GC?}} cabger$	-	-	**1990Q4-2022Q3**
$cabger \xrightarrow{\text{GC?}} lpriger$	1990Q4-2022Q3	-	-

Notes: see Figures 7 to 9. We present the results of the RE window at the 10 percent level for readability purposes. $x \xrightarrow{\text{GC?}} y$ denotes the direction of Granger causality being tested, from *x* to *y*. Source: Authors' calculations.

observed after 2010, i.e., until the deterioration of the political relations between the countries linked to the tensions regarding Hong Kong, Xinjiang, and Huawei.

The case of Germany is particularly interesting. As shown in Table 3 and Figure 9, a one-way causality runs from the PRI to the exchange rate and the current account over most of the considered period. Globally, the continuously improving political relationships between China and Germany are accompanied by a depreciation of the RMB and growing current account surpluses, except at the end of the period where the tense relations that are beginning to emerge go hand in hand with the appreciation of the Chinese currency. After the entrance of China into the WTO,[15] the relation between China and Germany was at the heart of the Global Value Chains. This particular link was reinforced during the enlargement in 2004 to Eastern Europe, as Germany began to become the industrial core of this new EU with a center of gravity that shifted to the East. Overall, Germany and China have become two major players in terms of trade flows (Miranda-Agrippino et al. 2020). According to Heiduk (2014), Germany's 'Chinapolitik' under Chancellor Gerhard Schröder was driven by economic interests and, despite a meeting with the Dalai Lama in 2007, Chancellor Angela Merkel did not change this 'Realpolitik'. On the whole, our findings show that good political relations were a prerequisite to the expansion of trade between China and Germany.
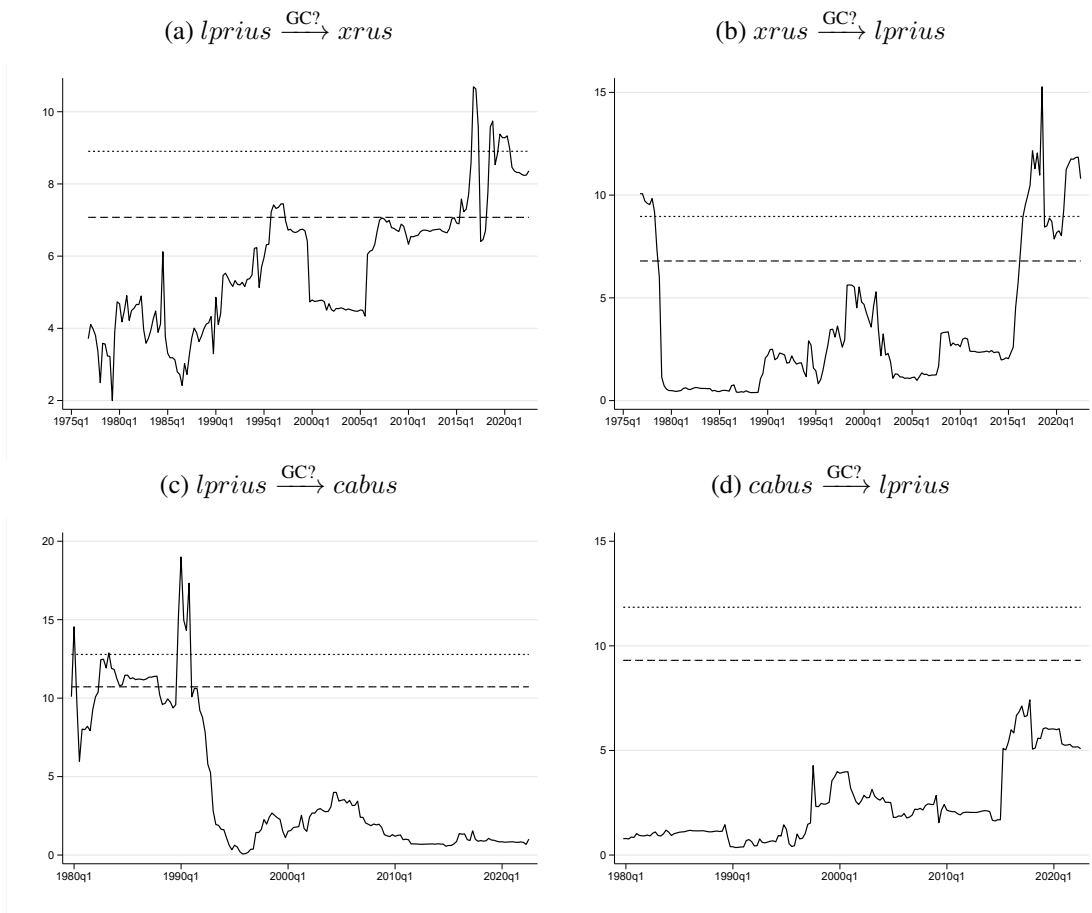
4 Conclusion

In the context of the growing importance of China worldwide, this paper aims to assess the impact of Chinese bilateral political relations with three of its main trading partners—the US, Germany, and the UK—on their current account balances and exchange rates. Relying on the LA-VAR approach with time-varying Granger causality tests, our findings show that political relationships with China strongly matter in explaining the dynamics of its partners' current accounts and exchange rates.

Specifically, we find that political relationships cause the evolution of the bilateral exchange rate (except in the UK) and the current account, and that these causal links are time-varying for the US and the UK. Regarding Germany, the causality running from its political relationship with China is observed over the entire period.

These findings suggest that policymakers should account for bilateral political relationships to understand the global macroeconomic consequences of political tensions and international politically relevant decisions.
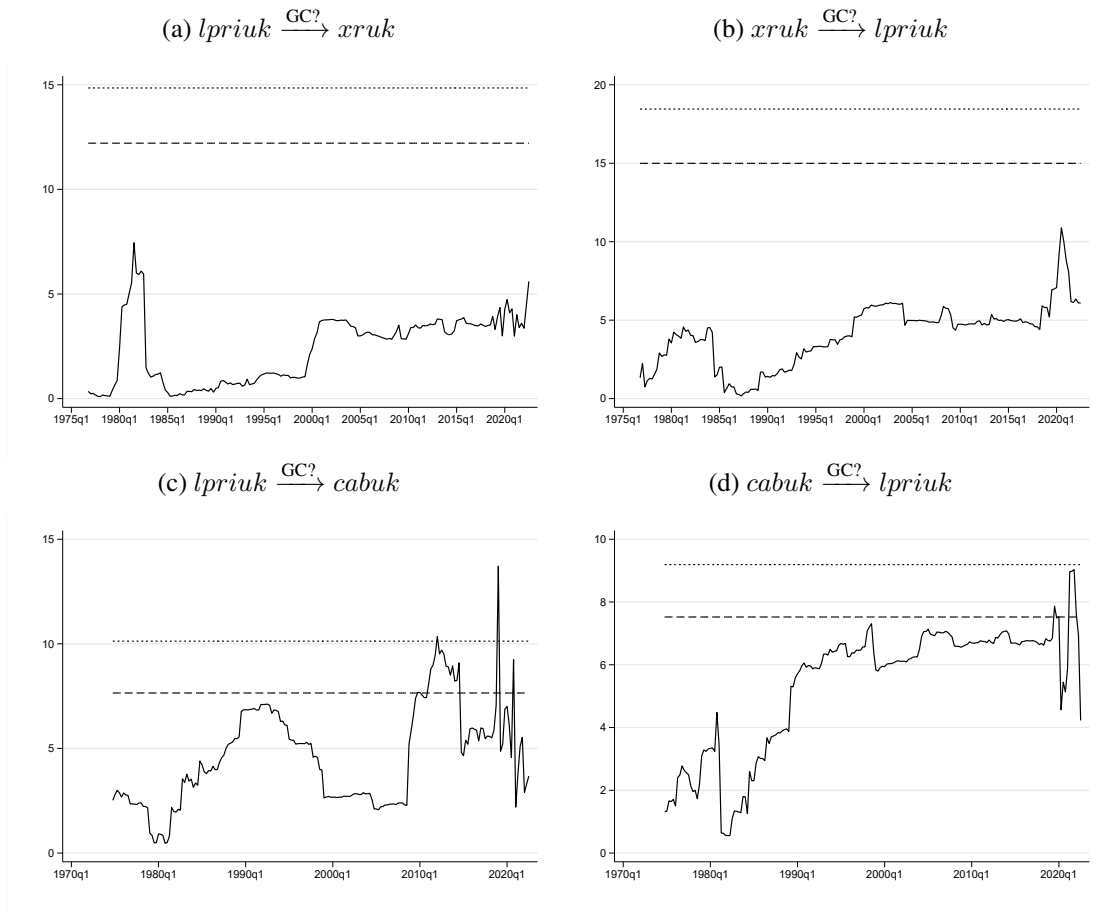
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[15]For an interesting investigation of the behavior of the Chinese real effective exchange rate around some particular events—including China's accession to WTO—see Gao et al. (2022).

Figure 7: Time-varying causality for China and the US

(a) $lprius \xrightarrow{\text{GC?}} xrus$

(b) $xrus \xrightarrow{\text{GC?}} lprius$

(c) $lprius \xrightarrow{\text{GC?}} cabus$

(d) $cabus \xrightarrow{\text{GC?}} lprius$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. We present the results of the RE window at the 5 and 10 percent levels for readability purposes. Results for the other algorithms are available in Appendix C. Source: author's calculations.

Figure 8: Time-varying causality for China and the UK

(a) $lpriuk \xrightarrow{\text{GC?}} xruk$

(b) $xruk \xrightarrow{\text{GC?}} lpriuk$

(c) $lpriuk \xrightarrow{\text{GC?}} cabuk$

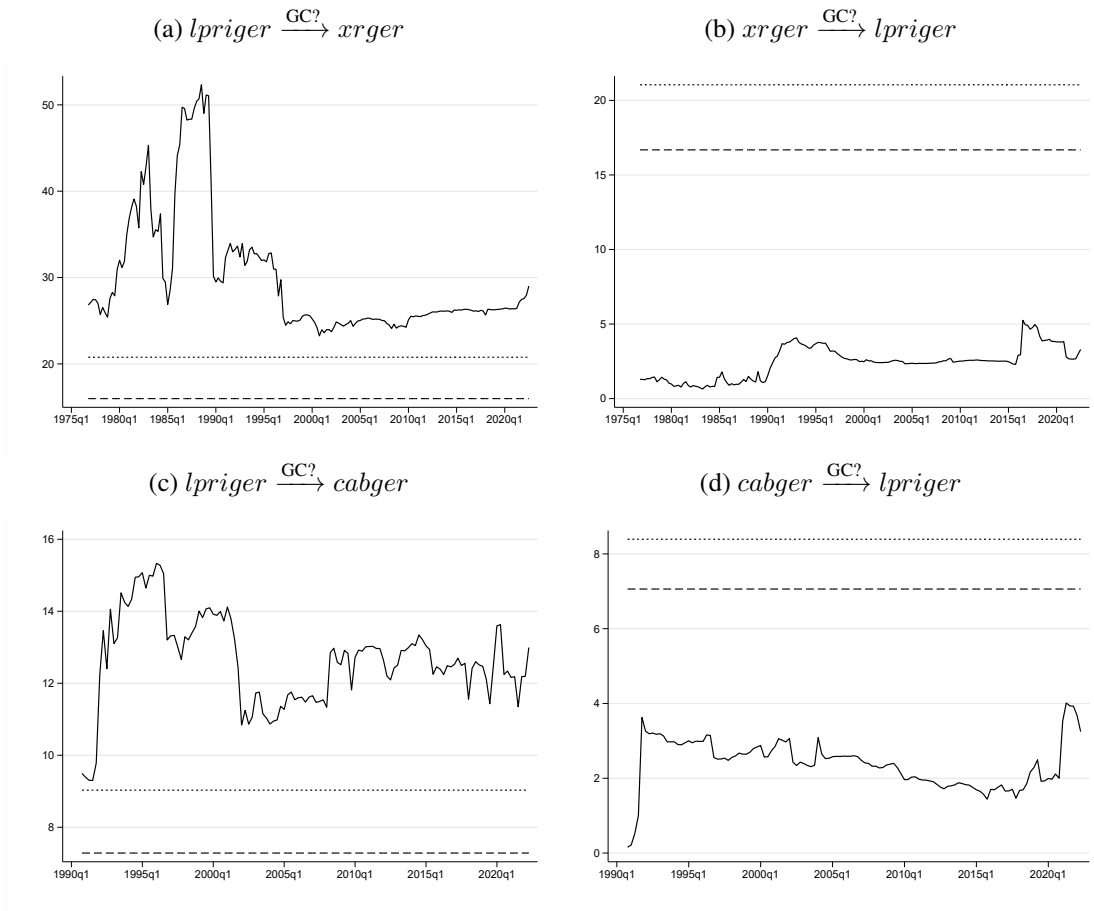(d) $cabuk \xrightarrow{\text{GC?}} lpriuk$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. We present the results of the RE window at the 5 and 10 percent levels for readability purposes. Results for the other algorithms are available in Appendix C. Source: author's calculations.

Figure 9: Time-varying causality for China and Germany

(a) $lpriger \xrightarrow{\text{GC?}} xrger$

(b) $xrger \xrightarrow{\text{GC?}} lpriger$

(c) $lpriger \xrightarrow{\text{GC?}} cabger$

(d) $cabger \xrightarrow{\text{GC?}} lpriger$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. We present the results of the RE window at the 5 and 10 percent levels for readability purposes. Results for the other algorithms are available in Appendix C. Source: author's calculations.

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A Data description

Table A1: Descriptive statistics (1960Q1 – 2022Q4)

	(1)	(2)	(3)	(4)	(5)
Involved variables	Obs.	Mean	SD	Min	Max
RMB per USD (*xrus*)	264	4.768	2.523	1.472	8.704
RMB per GBP (*xruk*)	264	8.307	3.550	2.915	15.68
RMB per DEU/EUR (*xrger*)	264	5.100	3.623	1.146	11.68
Political Relations US and CN (*prius*)	291	-2.320	3.861	-8.300	3.300
Political Relations UK and CN (*priuk*)	291	1.077	2.864	-3.300	5.700
Political Relations GER and CN (*priger*)	291	2.182	3.182	-3.000	7.000
Current Account US (*cabus*)	251	-1.666	1.843	-6.300	1.214
Current Account UK (*cabuk*)	270	-1.419	2.007	-7.667	3.806
Current Account GER (*cabger*)	206	2.768	3.350	-2.542	9.211

Source: authors' calculations.

B Alternative approach

Figure B1: Wald statistic sequence for the QLR* test

(a) $lpriger \xrightarrow{\text{GC?}} xrger$
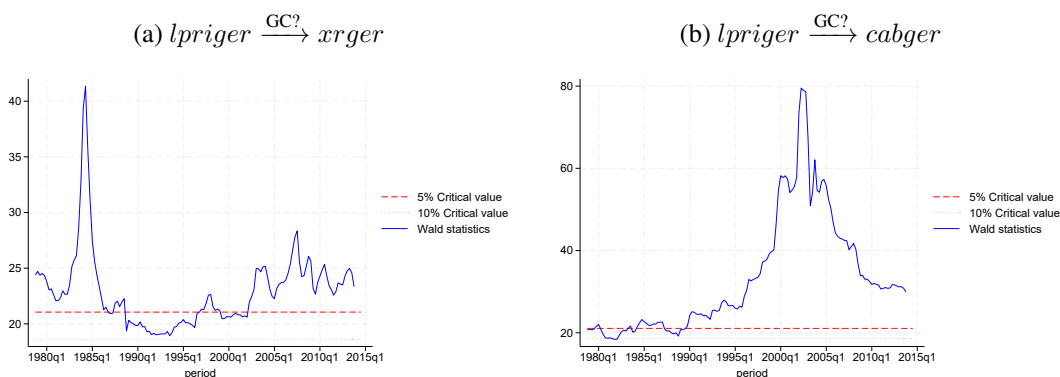
(b) $lpriger \xrightarrow{\text{GC?}} cabger$

Source: authors calculations.

Table B1: Robust Granger causality tests

	ExpW*	Mean W*	Nyblom*	QLR*
$lpriger \xrightarrow{\text{GC?}} xrger$: Test statistics	16.11	23.13	20.11	41.35
P-value	0.00	0.00	0.00	0.00
$lpriger \xrightarrow{\text{GC?}} cabger$: Test statistics	35.70	33.47	12.61	79.52
P-value	0.00	0.00	0.00	0.00

Note: This table reports p-values of the statistics of the robust Granger causality test. We use a reduced form VAR; similar results are obtained with a VAR-LP. Source: Authors' calculations.

We use the alternative approach proposed by Rossi & Wang (2019) to test Granger non-causality in presence of instability in the case of the following two relationships: $lpriger \xrightarrow{\text{GC?}} xrger$ and $lpriger \xrightarrow{\text{GC?}}$

cabger.

Firstly, their approach consists in using a reduced-form VAR with time-varying parameters,

$$A_t(L)\mathbf{y}_t = \mathbf{u}_t \tag{B1}$$

$$A_t(L) = \mathbf{I} - \mathbf{A}_{1,t}L - \mathbf{A}_{2,t}L^2 - \cdots - \mathbf{A}_{p,t}L^p \tag{B2}$$

$$\mathbf{u}_t \overset{\text{i.i.d}}{\sim} (\mathbf{O}, \mathbf{\Sigma}) \tag{B3}$$

where $\mathbf{y}_t = [y_{1,t}, y_{2,t}, \ldots, y_{n,t}]'$ is an $(n \times 1)$ vector and $\mathbf{A}_{j,t}, j = 1, \ldots, p$, are $(n \times n)$ time-varying coefficient matrices.

Secondly, Rossi & Wang (2019) consider a direct multistep VAR-LP (LP stands for Local Projection) forecasting with time-varying parameters. By iterating (B1), $\mathbf{y}_{t+h}$ can be projected onto the linear space generated by $(\mathbf{y}_{t-1}, \mathbf{y}_{t-2}, \ldots, \mathbf{y}_{t-p})'$, specifically,

$$\mathbf{y}_{t+h} = \mathbf{\Phi}_{1,t}\mathbf{y}_{t-1} + \mathbf{\Phi}_{2,t}\mathbf{y}_{t-2} + \cdots + \mathbf{\Phi}_{p,t}\mathbf{y}_{t-p} + \boldsymbol{\epsilon}_{t+h} \tag{B4}$$

where $\mathbf{\Phi}_{j,t}, j = 1, \ldots, p$ are functions of $\mathbf{A}_{j,t}, j = 1, \ldots, p$ in (B1), and $\boldsymbol{\epsilon}_{t+h}$ is a moving average of the errors $\mathbf{u}$ from time t to $t+h$ in (B1) and therefore uncorrelated with the regressors but serially correlated.[16]

Let $\boldsymbol{\theta}_t$ be an appropriate subset of $\text{vec}(\mathbf{\Phi}_{1,t}, \mathbf{\Phi}_{2,t}, \ldots, \mathbf{\Phi}_{p,t})$. The null hypothesis of the robust Granger causality test is
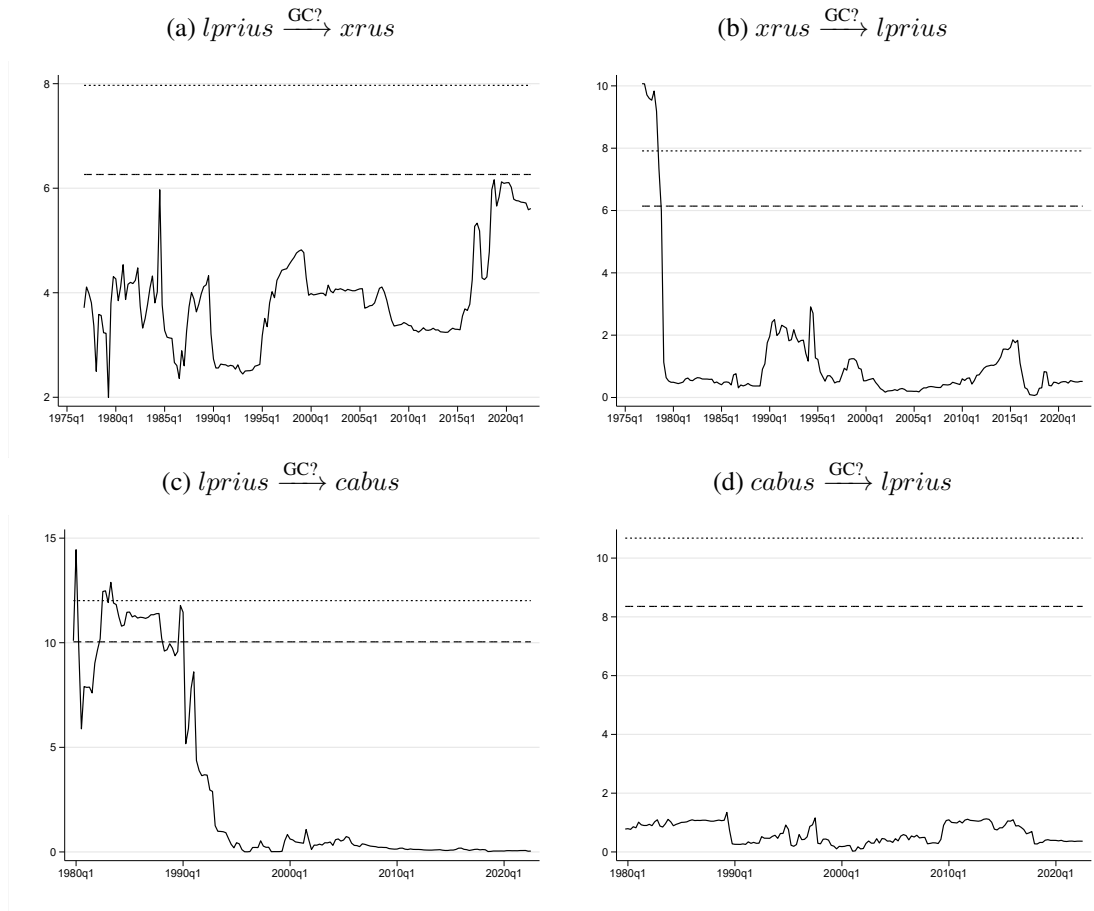
$$H_0 : \boldsymbol{\theta}_t = \mathbf{0} \ \forall t = 1, 2 \ldots T \tag{B5}$$

To test H_0 in (B5), Rossi (2005) proposes four statistics: ExpW* (exponential Wald test), MeanW* (mean Wald test), Nyblom* (Nyblom test), and QLR* (Quandt likelihood-ratio test).
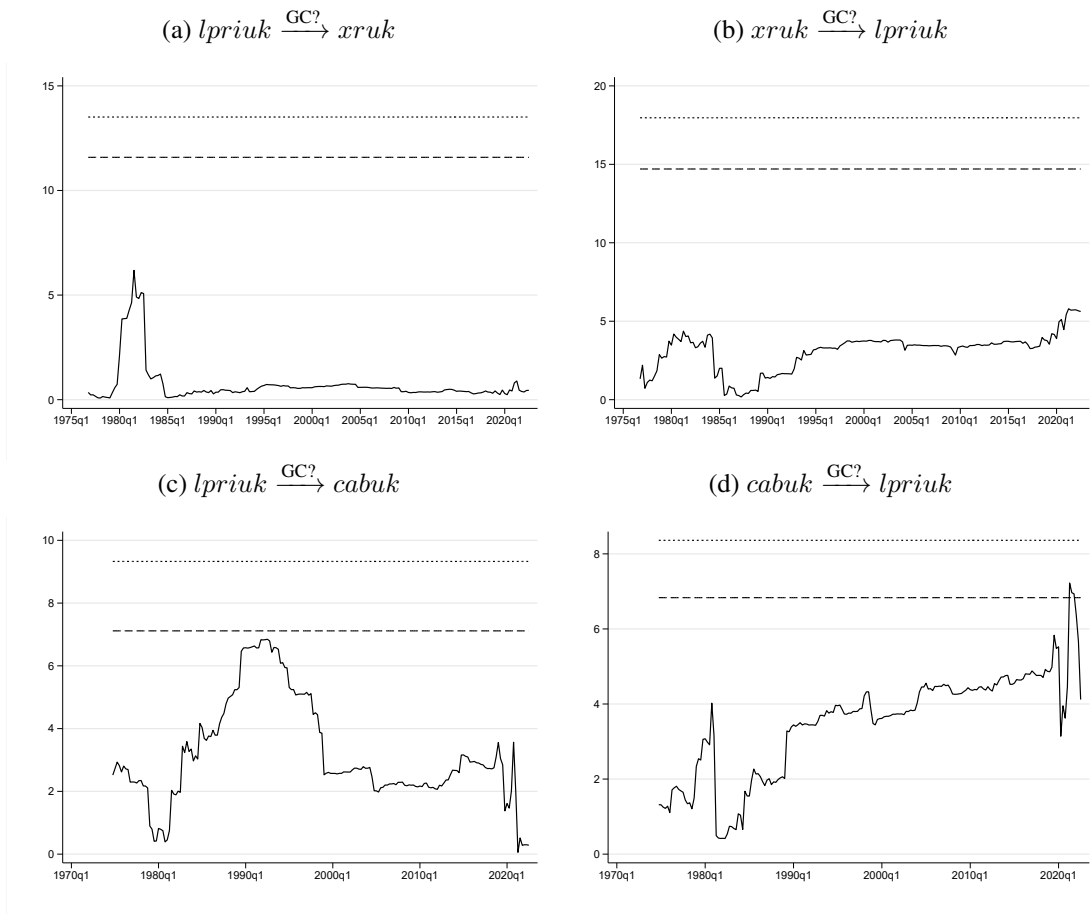
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[16]See Jorda (2005) for more details about LP.

C   Alternative algorithms for the time-varying causality tests

Figure C1: Time-varying causality for China and the US (FE window)

(a) $lprius \xrightarrow{\text{GC?}} xrus$

(b) $xrus \xrightarrow{\text{GC?}} lprius$

(c) $lprius \xrightarrow{\text{GC?}} cabus$

(d) $cabus \xrightarrow{\text{GC?}} lprius$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. Source: Author's calculations.

Figure C2: Time-varying causality for China and the UK (FE window)

(a) $lpriuk \xrightarrow{\text{GC?}} xruk$

(b) $xruk \xrightarrow{\text{GC?}} lpriuk$

(c) $lpriuk \xrightarrow{\text{GC?}} cabuk$

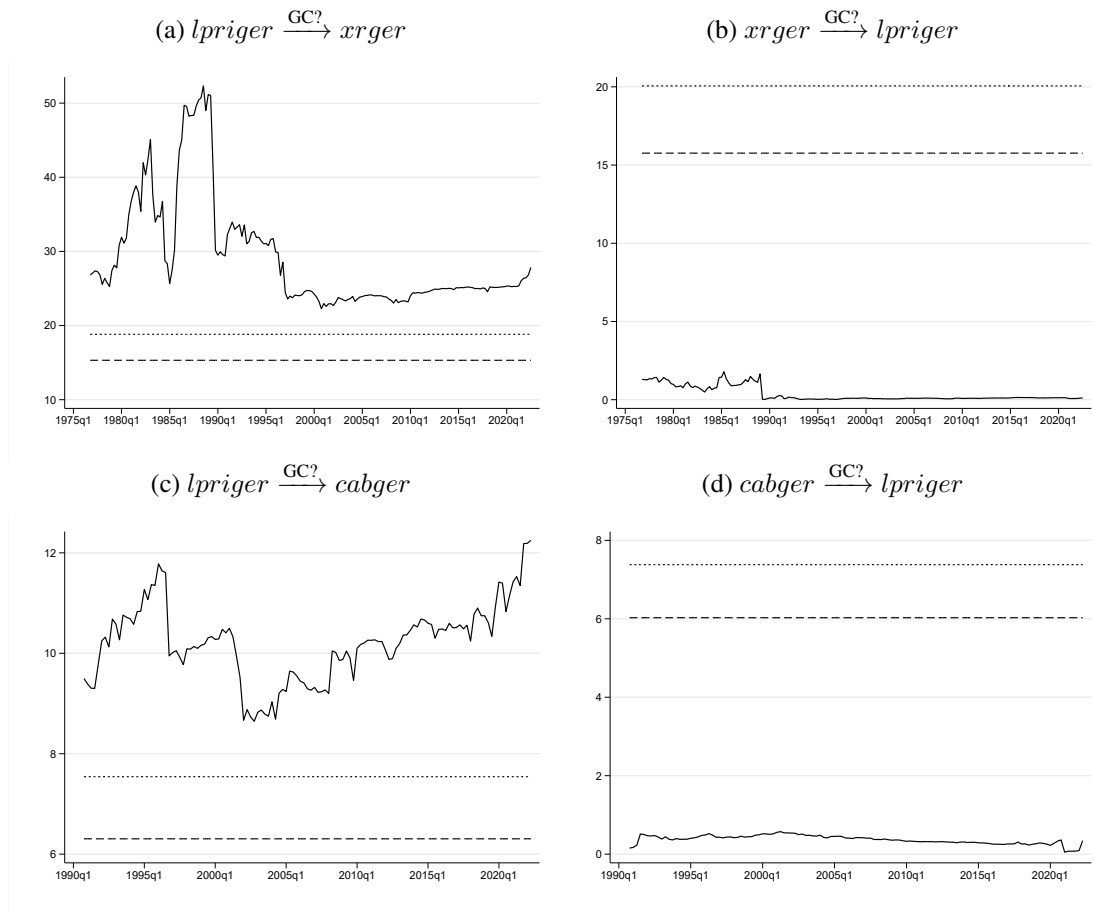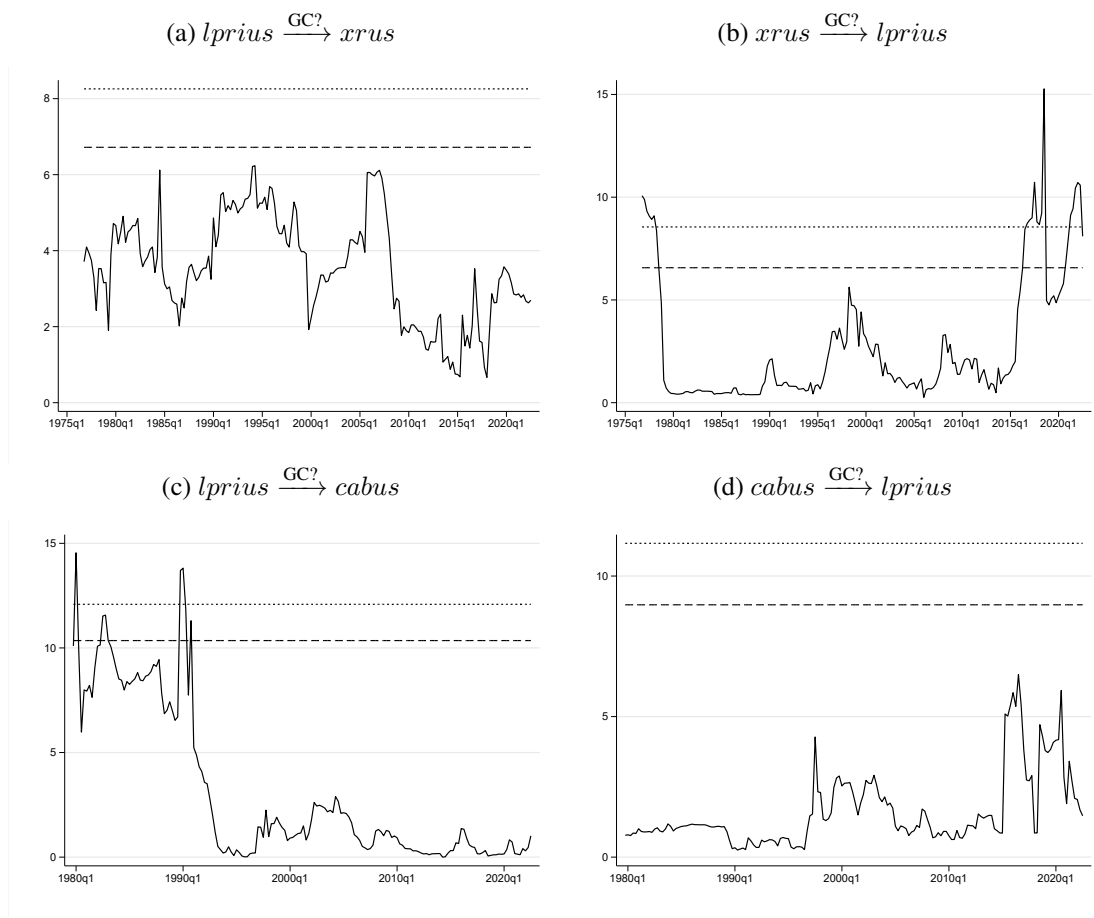(d) $cabuk \xrightarrow{\text{GC?}} lpriuk$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. Source: author's calculations.

Figure C3: Time-varying causality for China and Germany (FE window)

(a) $lpriger \xrightarrow{GC?} xrger$

(b) $xrger \xrightarrow{GC?} lpriger$

(c) $lpriger \xrightarrow{GC?} cabger$

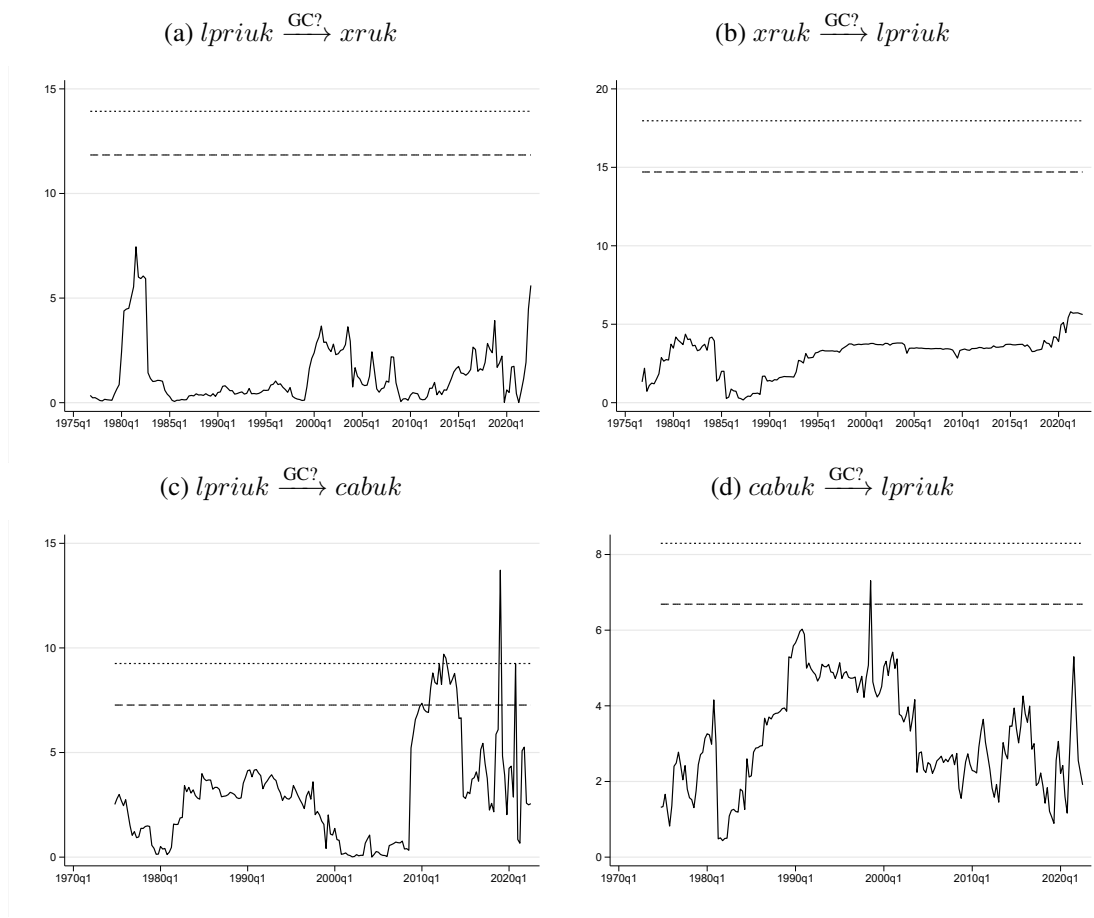(d) $cabger \xrightarrow{GC?} lpriger$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. Source: author's calculations.

Figure C4: Time-varying causality for China and the US (RW window)

(a) $lprius \xrightarrow{\text{GC?}} xrus$

(b) $xrus \xrightarrow{\text{GC?}} lprius$

(c) $lprius \xrightarrow{\text{GC?}} cabus$

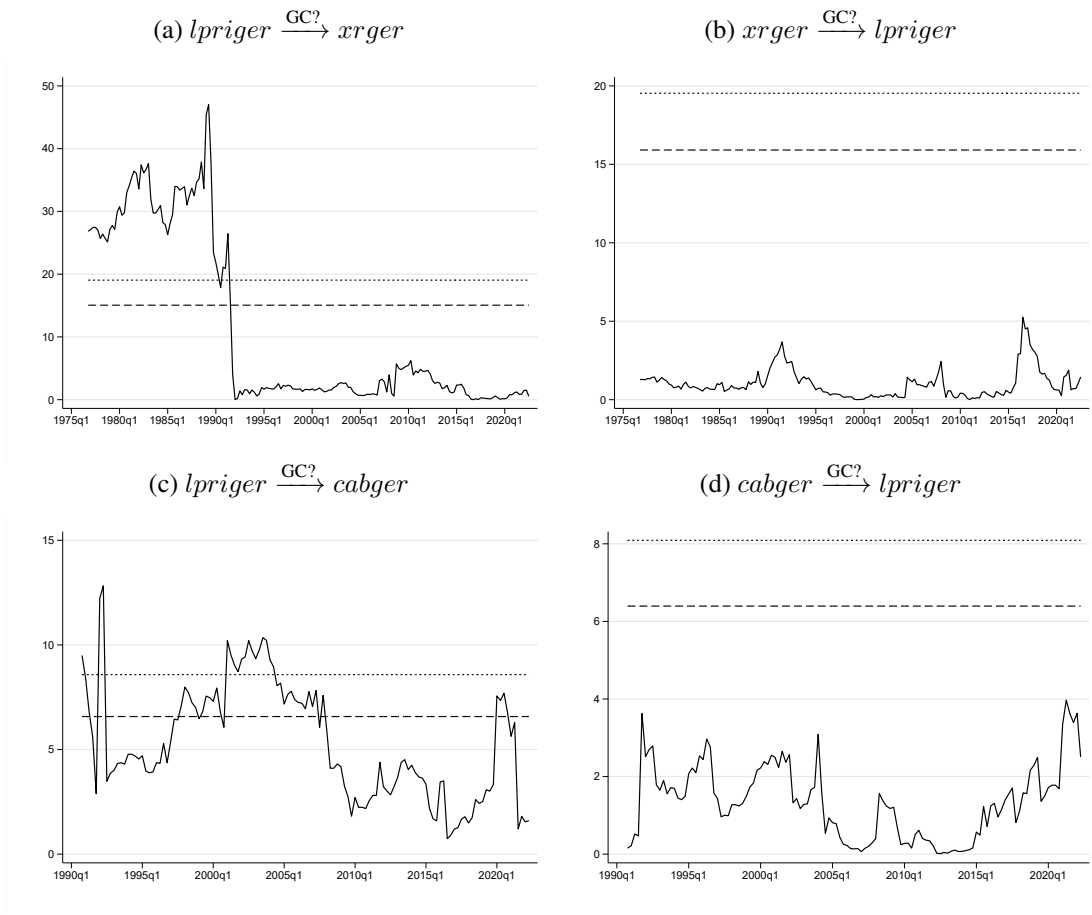(d) $cabus \xrightarrow{\text{GC?}} lprius$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. Source: Author's calculations.

Figure C5: Time-varying causality for China and the UK (RW window)

(a) $lpriuk \xrightarrow{\text{GC?}} xruk$

(b) $xruk \xrightarrow{\text{GC?}} lpriuk$

(c) $lpriuk \xrightarrow{\text{GC?}} cabuk$

(d) $cabuk \xrightarrow{\text{GC?}} lpriuk$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. Source: author's calculations.

Figure C6: Time-varying causality for China and Germany (RW window)

(a) $lpriger \xrightarrow{\text{GC?}} xrger$

(b) $xrger \xrightarrow{\text{GC?}} lpriger$

(c) $lpriger \xrightarrow{\text{GC?}} cabger$

(d) $cabger \xrightarrow{\text{GC?}} lpriger$

Note: We select a minimum window size of 80 quarters. We include a trend in the underlying VAR model. The size of the tests is controlled during 20 quarters. These statistics are robust to heteroskedasticity. The dotted line indicates the 90th (lower line) and 95th (upper line) percentile of test statistics, where 499 bootstrap replications have been used. Source: author's calculations.