Global fragmentation, fiscal policy, and economic growth: a cross-country analysis

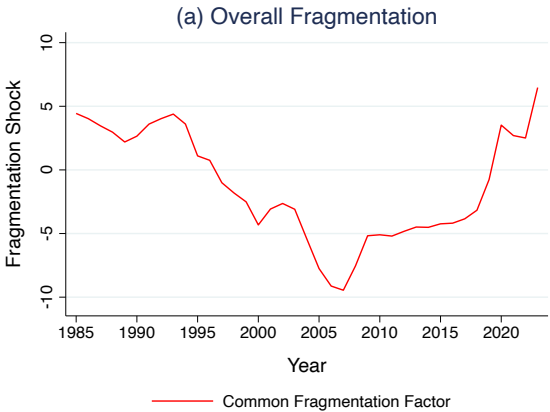
Gazi Salah Uddin [1, 6] Anh H. Le [2] Naoki Yago [3] Donghyun Park [4] John Beirne [5]

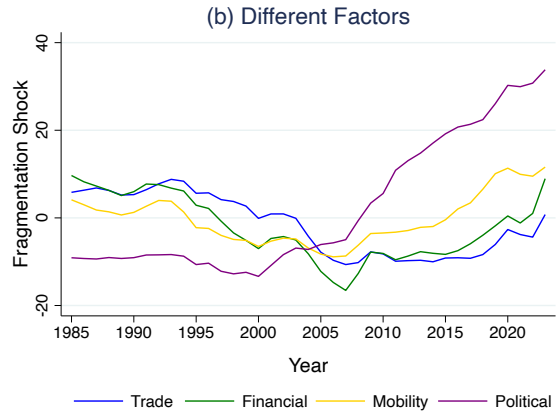
[1]Linköping University [2]Goethe University Frankfurt [3]University of Reading
[4]SEACEN Centre [5]Asian Development Bank [6]Norwegian University of Life Sciences

Any views in this paper are solely the responsibility of the authors and do not necessarily represent those of the ADB, or those of any other person associated with these institutions.

Motivation

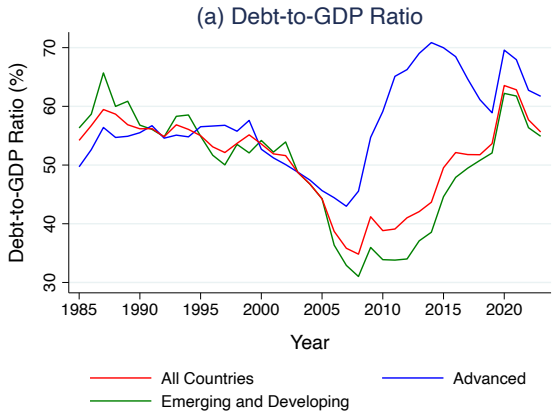
- After decades of globalization, geopolitics is now pulling the world economy apart.
- The Geopolitical Fragmentation Index (Fernández et al., 2024) has risen steadily since the Global Financial Crisis.

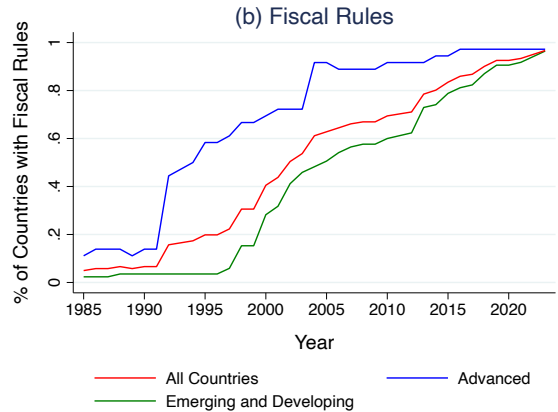




Motivation

- Disruptions to trade and finance are straining budgets and worsening debt risks—debt-to-GDP is already at record highs.
- Meanwhile, fiscal rules have become increasingly widespread.





This paper

Question

1. What are the dynamic macro and fiscal effects of fragmentation shocks?
2. Do fiscal rules mitigate output losses and debt dynamics?
3. What is the role of fiscal-monetary interaction in dealing with fragmentation?

This paper

Question

1. What are the dynamic macro and fiscal effects of fragmentation shocks?
2. Do fiscal rules mitigate output losses and debt dynamics?
3. What is the role of fiscal-monetary interaction in dealing with fragmentation?

- Using an intensive panel data for 121 countries, 1985-2023:
  - Employ the State Dependent Local Projection (Jordà (2005)) to shed light of the fragmentation risk
  - Macro fiscal and productivity effects of the global fragmentation risk
  - The role of having active fiscal rules
  - The role of interaction of fiscal rule and monetary policy stances (exchange rate regime and central bank independence = CBI)

Preview of main findings

- The rise in fragmentation has contractionary effects on the real economy and worsens fiscal sustainability in the medium- to long-run (Macro-fiscal effects).
- It also dampens productivity and reduces the incomes of poor people disproportionately (Development effects).
- The presence of a fiscal rule helps to mitigate both the effects
- Having fiscal rules with inflation-targeting (float exchange rate) monetary policy and high CBI also helps to mitigate both effects

Literature

Fiscal policy and sustainability: Fernández-Villaverde et al. (2015); Ramey and Zubairy (2018); Ardanaz et al. (2024); Esquivel and Samano (2026); Grosse-Steffen et al. (2025); Potrafke (2025); Antolin-Diaz and Surico (2025); Fatás et al. (2026), ...

⇒ *We focus on the fiscal framework to deal with fragmentation risks*

Fiscal monetary interaction: Leeper (1991); Sims (1994); Woodford (1995); Cochrane (1998); Araujo et al. (forthcoming); Bajaro et al. (2025), ...

⇒ *We measure the interaction empirically in dealing with fragmentation*

Productivity and unequal effect: Auerbach (2025); Antolin-Diaz and Surico (2025); Aoyagi and Ganelli (2015); Zouhar et al. (2021); Clements et al. (2022, 2025); Uddin et al. (2025), ...

⇒ *We focus on the implication of fragmentation risks*

Baseline empirical strategy: panel local projections

This paper addresses the macroeconomic implications of geopolitical fragmentation risks and the role of fiscal rules in mitigating them. We use a fragmentation index, constructed using a dynamic hierarchical factor model by Fernández-Villaverde et al. (2024), as an exogenous shock. Baseline local projection:

$$Y_{i,t+h} - Y_{i,t-1} = \beta_h Frag_t + \theta_h X_{i,t-\ell} + z_i + \varepsilon_{i,t+h}, \quad h = 0, 1, 2, \ldots$$

- $Frag_t$: global fragmentation shock
- z_i: country fixed effects
- X: set of control variables including: real GDP, real consumption, real investment, inflation rates, the government debt-to-GDP ratio, the real effective exchange rate, the current account-to-GDP ratio, the financial development index, the financial institution index, capital account openness, VIX, and oil price.

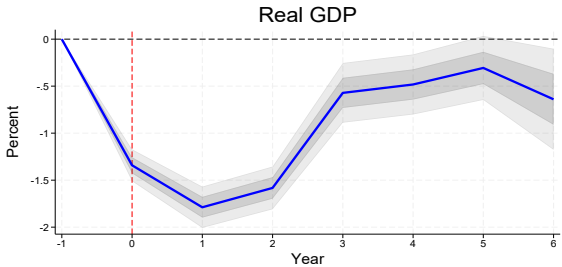
State dependence via interactions (fiscal rule, exchange rate regime, CBI) to obtain conditional IRFs.

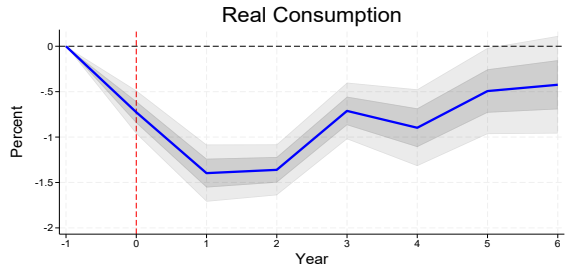
Selected variables

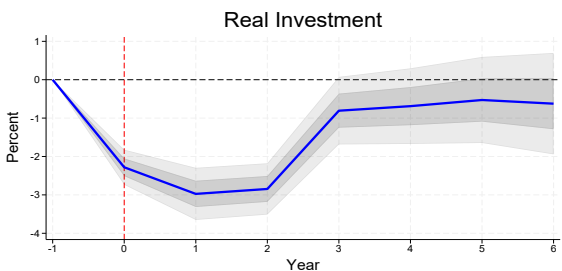
Variables	Descriptions & Source
Geopolitical Fragmentation	Fernández-Villaverde et al. (2024)
Fiscal Rule	IMF (Alonso-Albarran et al. (2025))
Real GDP	GMD (Müller et al. (2025))
Real Consumption	GMD (Müller et al. (2025))
Real Investment	GMD (Müller et al. (2025))
Government Debt to GDP	GMD (Müller et al. (2025))
Inflation Rate	GMD (Müller et al. (2025))
Real Effective Exchange Rate	GMD (Müller et al. (2025))
Unemployment Rate	GMD (Müller et al. (2025))
Real Government Spending	Gethin (2024)
Income Distribution	World Inequality Database (WID)
Financial Market Index	IMF, IFS
Financial Development Index	IMF, IFS
TFP (constant price)	PWT (Feenstra et al. (2015))
TFP-Welfare Relevance (constant price)	PWT (Feenstra et al. (2015))
WTI Spot Crude Oil Price	FRED
CBOE Volatility Index	FRED

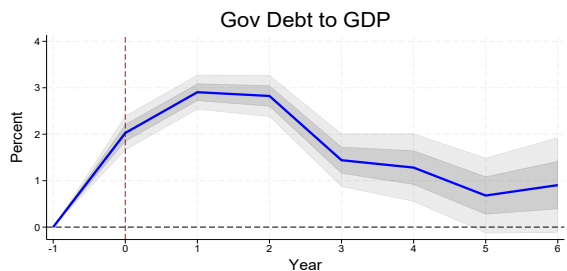
Macroeconomic effects

Fragmentation shocks lead to persistent recession and can be a **growth** and **debt** problem simultaneously.



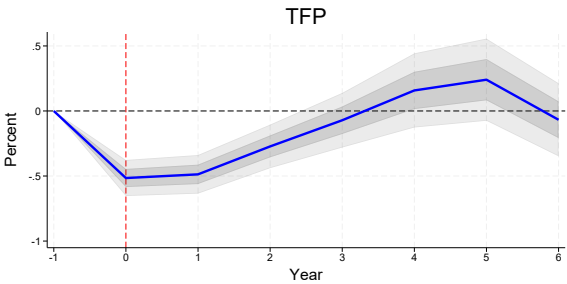


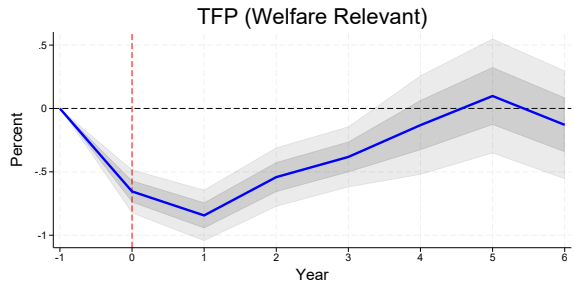




Development effects

Fragmentation shocks dampen the long-run growth through TFP





State dependent analysis: Fiscal rule and monetary fiscal interactions

(1) State dependence with a fiscal rule

$$Y_{i,t+h} - Y_{i,t-1} = \beta_h Frag_t + \delta_h D^{FR}_{i,t} + \gamma_h Frag_t \times D^{FR}_{i,t} + \theta_h X_{i,t-l} + z_i + \epsilon_{i,t+h} \quad h = 0, 1, 2, \ldots,$$

(2) State dependence with monetary-fiscal interactions (FX regime)

$$\begin{aligned}\Delta_h Y_{i,t} = \beta_h Frag_t + \delta_h D^{FR}_{i,t} + \zeta_h D^{EX}_{i,t} + \gamma_h (Frag_t \times D^{FR}_{i,t}) + \kappa_h (Frag_t \times D^{EX}_{i,t}) \\ + \xi_h (Frag_t \times D^{FR\times EX}_{i,t}) + \theta_h X_{i,t-\ell} + z_i + \varepsilon_{i,t+h}.\end{aligned}$$

- $D^{FR}_{i,t} = 1$: fiscal rule, *no* flexible FX, 0 otherwise
- $D^{EX}_{i,t} = 1$: flexible FX, *no* fiscal rule, 0 otherwise
- $D^{FR\times EX}_{i,t} = 1$: fiscal rule & flexible FX, 0 otherwise

(3) State dependence with monetary-fiscal interactions (CBI): replace $D^{FR}_{i,t}$ with $D^{CBI}_{i,t}$

- $D^{FR}_{i,t} = 1$: fiscal rule, CBI is lower than the median, 0 otherwise
- $D^{CBI}_{i,t} = 1$: CBI is higher than the median, *no* fiscal rule, 0 otherwise
- $D^{FR\times CBI}_{i,t} = 1$: fiscal rule & CBI is higher than the median, 0 otherwise

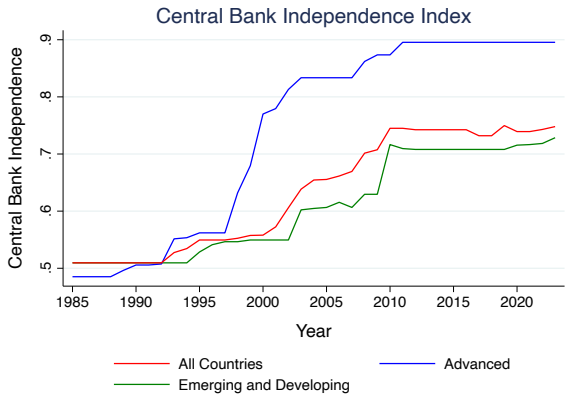
Definition of Fiscal Rules

We define $D_{i,t}^{FR} = 1$ if at least one of the following rules is implemented. (Alonso-Albarran et al., 2025)

- Debt rule: Explicit anchor or ceiling for public debt, expressed in percentage of GDP.
- Budget balance rule rule: Constraint on the budget aggregate that primarily influences the debt ratio.
- Expenditure rule: Limits on total, primary, or current government expenditures.
- Revenue rule: Ceilings or floors on revenues aimed at boosting revenue collection and/or preventing an excessive tax burden.

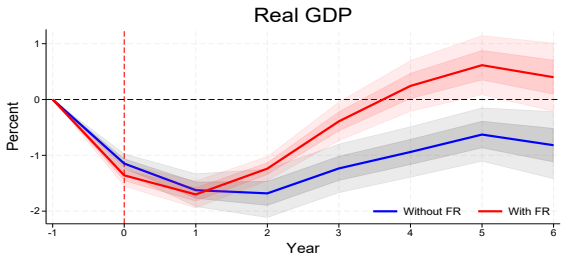
Central Bank Independence

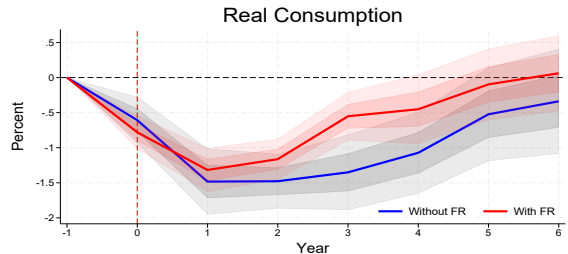
- Central banks are becoming increasingly independent (Romelli, 2024).

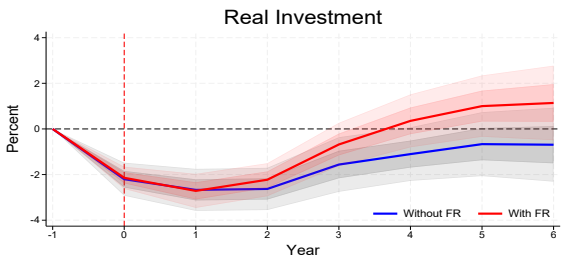


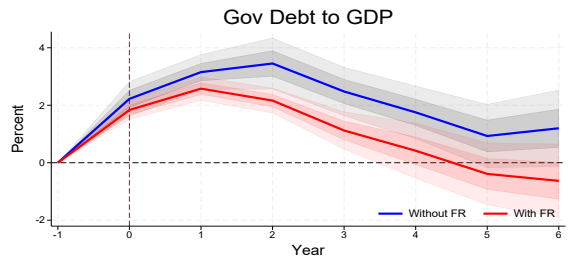
Fiscal rules mitigate output losses and debt accumulation

Fragmentation shocks are mitigated with the presence of fiscal rules in both the macroeconomic environment and fiscal sustainability

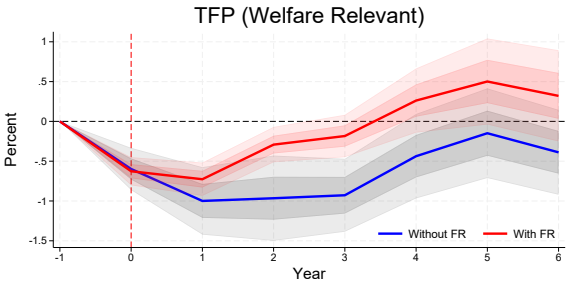


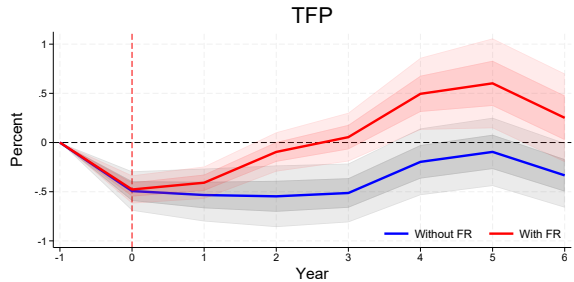


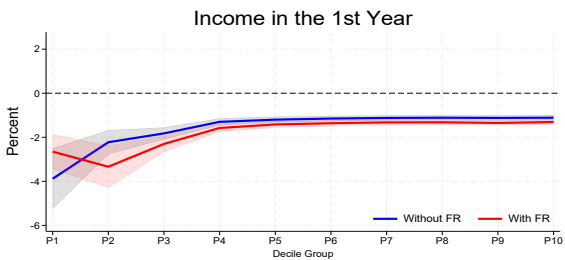


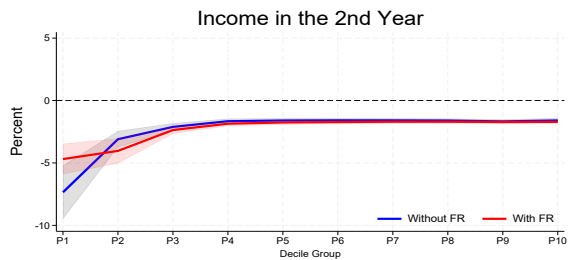


Fiscal rules: Productivity and distributional effects



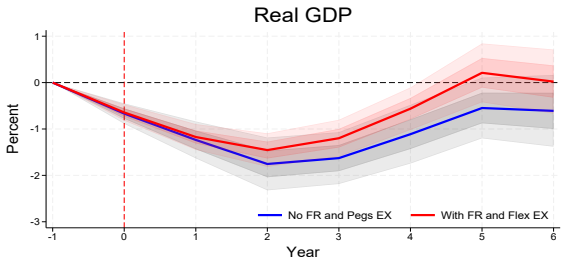


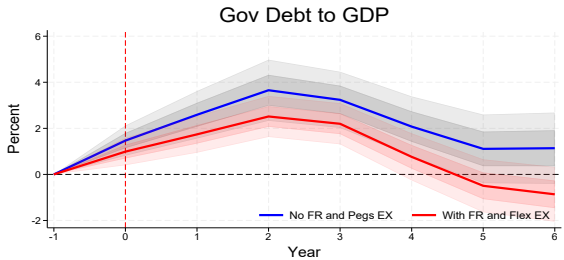


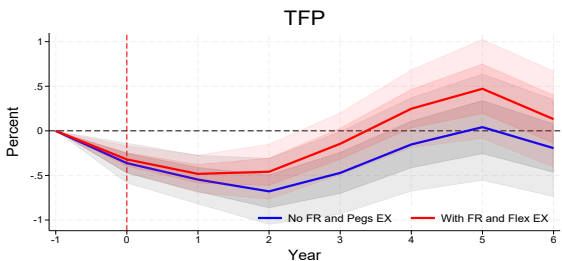


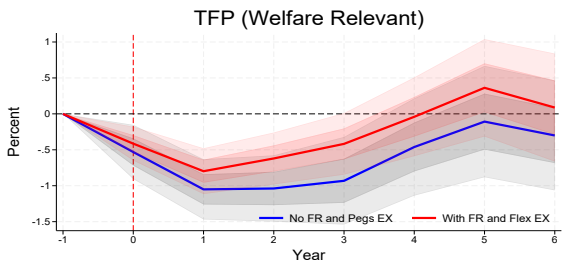
Monetary-fiscal interactions: exchange rate regime

The role of fiscal rules, combined with inflation targeting (a floating exchange rate), helps mitigate the effect, highlighting the role of monetary policy independence.



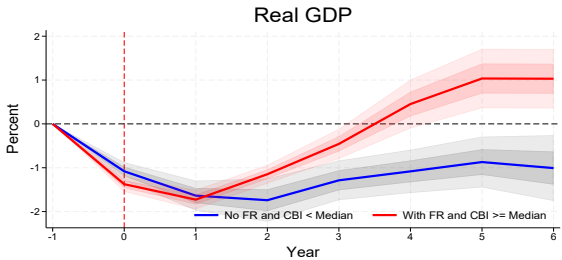


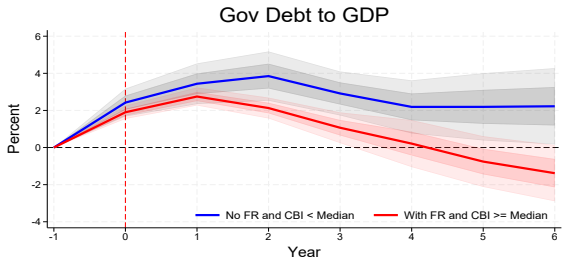


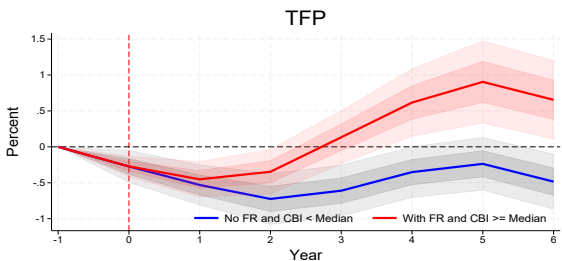


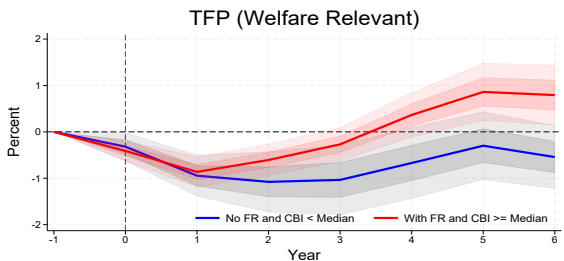
Monetary-fiscal interactions: central bank independence

The role of fiscal rules is more effective when combined with high central bank independence, highlighting the role of monetary policy credibility.









Robustness Check: An alternative Identification

- We conduct the alternative identification in two steps
- First, we follow Bilal and Känzig (2026) and extract the innovation part using Hamilton (2018) filter

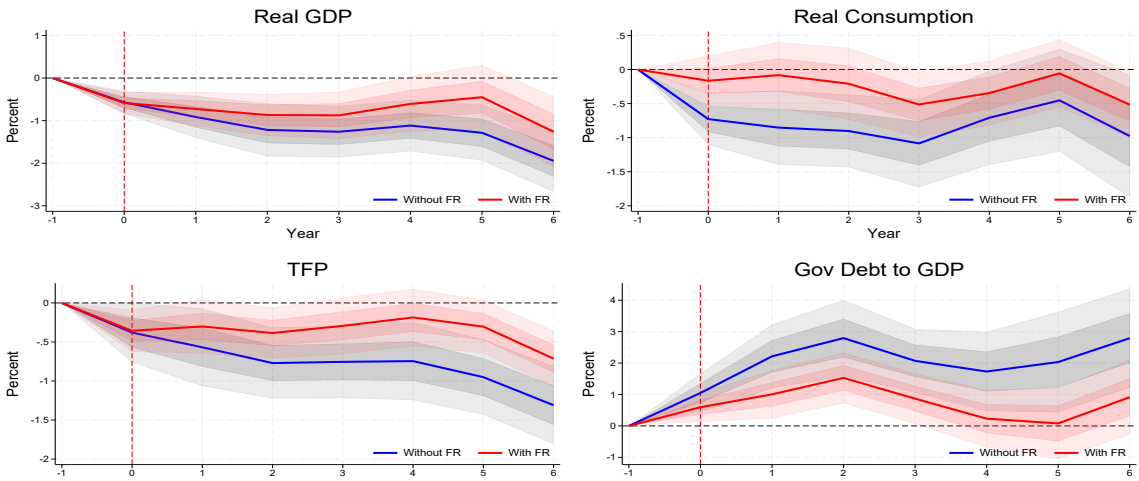
$$\widehat{Frag_t^{\text{Hamilton}}} = Frag_t - (\widehat{\alpha} + \widehat{\beta}_1 Frag_{t-h} + \ldots + \widehat{\beta}_{p+1} Frag_{t-h-p}) \tag{1}$$

- Second, we regress the innovation term $\widehat{Frag_t^{\text{Hamilton}}}$ obtained from the Hamilton filter on three sets of exogenous shocks and extract the residual as our identified shock ($Frag_t^{\text{shock}}$).
- List of shocks: (1) Oil supply news shock from Känzig (2021), and oil demand shock from Baumeister and Hamilton (2019); (2) Military news shock from Ramey and Zubairy (2018); (3) Monetary policy shock from Jarociński and Karadi (2020)

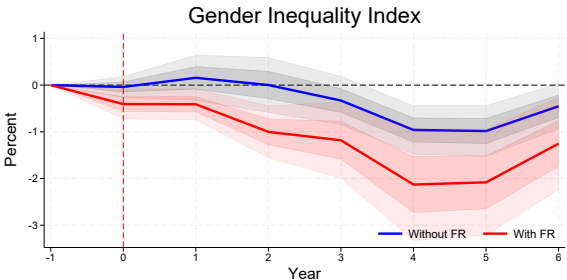
$$Y_{i,t+h} - Y_{i,t-1} = \beta_h \widehat{Frag_t^{\text{shock}}} + \theta_h X_{i,t-l} + z_i + \epsilon_{i,t+h} \quad h = 0, 1, 2, \ldots \tag{2}$$

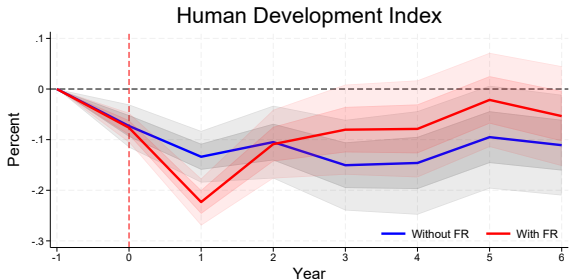
Robustness Check: Results

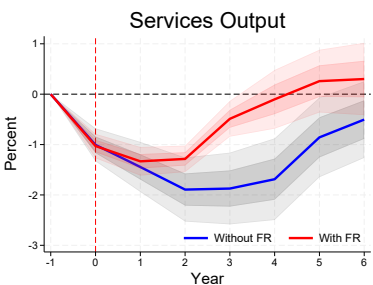
Figure 4: Alternative Identification

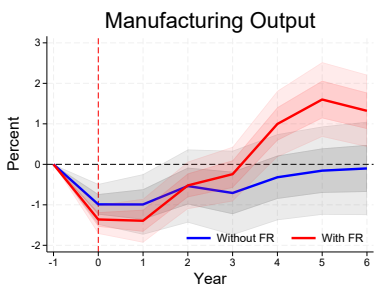


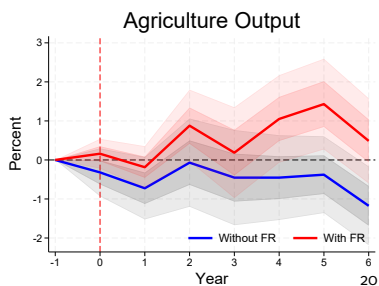
Other results: Sectoral and development effects











Conclusion

- **Fragmentation shocks are contractionary:** They reduce real GDP, consumption, and investment, weaken productivity, and lead to a persistent deterioration in fiscal sustainability (higher debt-to-GDP).
- **Fiscal rules mitigate adverse effects:** Countries with fiscal rules experience smaller and less persistent declines in activity and productivity, and a more contained rise in debt-to-GDP.
- **Monetary-fiscal interaction matters:** The buffering role of fiscal rules is strongest under *independent monetary policy* (proxied by flexible exchange rates) and with higher central bank independence.
- **Heterogeneity and distributional relevance:** Effects are larger—and fiscal rules are more valuable—in EMDEs, in weaker institutional settings (lower political stability / higher corruption), and in more climate-exposed countries. Fiscal rules also help preserve key spending categories and reduce distributional fallout over the medium term.

References I

Alonso-Albarran, Virginia, Clara Arroyo, Ozlem Aydin et al. 2025. "Fiscal Rules and Fiscal Councils." *IMF Working Paper* No. 25/198.

Antolin-Diaz, Juan, and Paolo Surico. 2025. "The long-run effects of government spending." *American Economic Review* 115 (7): 2376–2413. 10.1257/aer.20231278.

Aoyagi, Chie, and Giovani Ganelli. 2015. "Asia's Quest for Inclusive Growth Revisited." IMF Working Paper, No. 15/42.

Araujo, Aloisio, Vitor Costa, Paulo Lins, Rafael Santos, and Serge de Valk. forthcoming. "Inflation Targeting under Fiscal Fragility." *American Economic Journal: Macroeconomics*.

Ardanaz, Martín, Carolina Ulloa-Suárez, and Oscar Valencia. 2024. "Why don't we follow the rules? Drivers of compliance with fiscal policy rules in emerging markets." *Journal of International Money and Finance* 142 103046. 10.1016/j.jimonfin.2024.103046.

Auerbach, Alan J. 2025. "Public Finance Implications of Economic Inequality." *Journal of Economic Perspectives* 39 (2): 149–170. 10.1257/jep.20241421.

References II

Bajaro, Donna Faye E., Jaqueson K. Galimberti, and Irfan A. Qureshi. 2025. "Monetary policy under fiscal stress: A forward-looking analysis of fiscal dominance." *Journal of Macroeconomics* 86 103701. 10.1016/j.jmacro.2025.103701.

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.

Bilal, Adrien, and Diego R Känzig. 2026. "The Macroeconomic Impact of Climate Change: Global Versus Local Temperature*." *The Quarterly Journal of Economics* 141 (2): 889–944. 10.1093/qje/qjag011.

Clements, Benedict, Sanjeev Gupta, and João Tovar Jalles. 2025. "Public spending and inclusive growth in developing Asia." *Public Finance Review* 53 (2): 139–168.

Clements, Benedict J, Sanjeev Gupta, and João Tovar Jalles. 2022. "Fiscal policy for inclusive growth in Asia." technical report, Center for Global Development.

References III

Cochrane, John H. 1998. “A Frictionless View of U.S. Inflation.” *NBER Macroeconomics Annual* 13 323–384. 10.1086/ma.13.4623752, Publisher: The University of Chicago Press.

Esquivel, Carlos, and Agustin Samano. 2026. “Expansionary fiscal rules under sovereign risk.” *Journal of International Economics* 159 104198. 10.1016/j.jinteco.2025.104198.

Fatás, Antonio, Bram Gootjes, and Joseph Mawejje. 2026. “Dynamic effects of fiscal rules: Do initial conditions Matter?” *Journal of International Money and Finance* 161 103499. 10.1016/j.jimonfin.2025.103499.

Feenstra, Robert C, Robert Inklaar, and Marcel P Timmer. 2015. “The next generation of the Penn World Table.” *American Economic Review* 105 (10): 3150–3182.

Fernández-Villaverde, Jesús, Tomohide Mineyama, and Dongho Song. 2024. “Are we fragmented yet? Measuring geopolitical fragmentation and its causal effect.” NBER Working Paper, No. 32638.

References IV

Fernández-Villaverde, Jesús, Pablo Guerrón-Quintana, Keith Kuester, and Juan Rubio-Ramírez. 2015. "Fiscal Volatility Shocks and Economic Activity." *American Economic Review* 105 (11): 3352–3384. 10.1257/aer.20121236.

Gethin, Amory. 2024. "A new database of general government revenue and expenditure by function, 1980-2022." technical report, unpublished mimeo, available at https://amory-gethin. fr.

Grosse-Steffen, Christoph, Laura Pagenhardt, and Malte Rieth. 2025. "Committed to flexible fiscal rules." *Journal of Monetary Economics* 154 103809. 10.1016/j.jmoneco.2025.103809.

Hamilton, James D. 2018. "Why You Should Never Use the Hodrick-Prescott Filter." *Review of Economics and Statistics* 100 (5): 831–843. 10.1162/rest_a_00706.

Jarociński, Marek, and Peter Karadi. 2020. "Deconstructing monetary policy surprises—the role of information shocks." *American Economic Journal: Macroeconomics* 12 (2): 1–43.

References V

Jordà, Òscar. 2005. “Estimation and inference of impulse responses by local projections.” *American Economic Review* 95 (1): 161–182.

Känzig, Diego R. 2021. “The macroeconomic effects of oil supply news: Evidence from OPEC announcements.” *American Economic Review* 111 (4): 1092–1125.

Leeper, Eric M. 1991. “Equilibria under ‘active’and ‘passive’monetary and fiscal policies.” *Journal of monetary Economics* 27 129–147.

Müller, Karsten, Chenzi Xu, Mohamed Lehbib, and Ziliang Chen. 2025. “The global macro database: A new international macroeconomic dataset.” technical report, National Bureau of Economic Research.

Potrafke, Niklas. 2025. “The economic consequences of fiscal rules.” *Journal of International Money and Finance* 153 103286. 10.1016/j.jimonfin.2025.103286.

Ramey, Valerie A, and Sarah Zubairy. 2018. “Government spending multipliers in good times and in bad: evidence from US historical data.” *Journal of Political Economy* 126 (2).

References VI

Romelli, Davide. 2024. “Trends in central bank independence: a de-jure perspective.” *BAFFI CAREFIN Centre Research Paper*.

Sims, Christopher. 1994. “A Simple Model for Study of the Determination of the Price Level and the Interaction of Monetary and Fiscal Policy.” *Economic Theory* 4 (3): 381–99, https://EconPapers.repec.org/RePEc:spr:joecth:v:4:y:1994:i:3:p:381-99.

Uddin, Gazi Salah, Anh H Le, Boktiar Hasan, John Beirne, and Donghyun Park. 2025. “Public spending and inclusive growth: A cross-country empirical analysis.” *Journal of International Money and Finance* 162 103528. https://doi.org/10.1016/j.jimonfin.2026.103528.

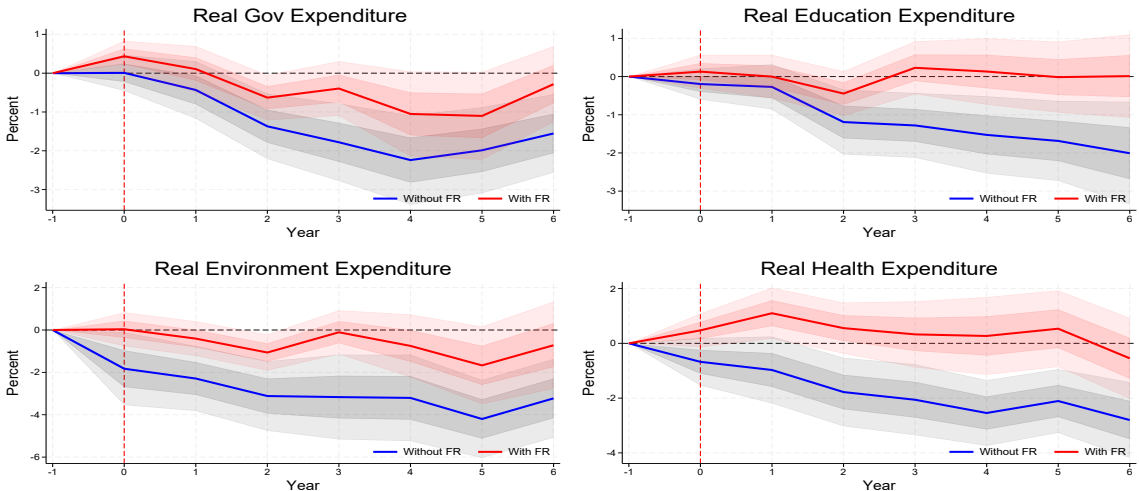
Woodford, Michael. 1995. “Price-level determinacy without control of a monetary aggregate.” *Carnegie-Rochester Conference Series on Public Policy* 43 1–46. 10.1016/0167-2231(95)90033-0.

Zouhar, Younes, Jon Jellema, Nora Lustig, and Mohamed Trabelsi. 2021. “Public Expenditure and Inclusive Growth - A Survey.” IMF Working Paper, No. 21/83.

Appendix

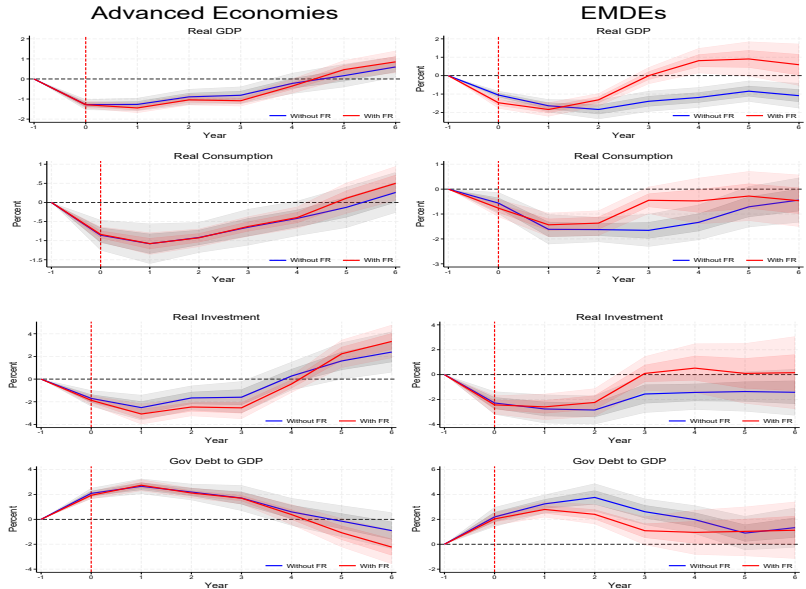
Other results (1)

Figure 5: The response of government expenditures



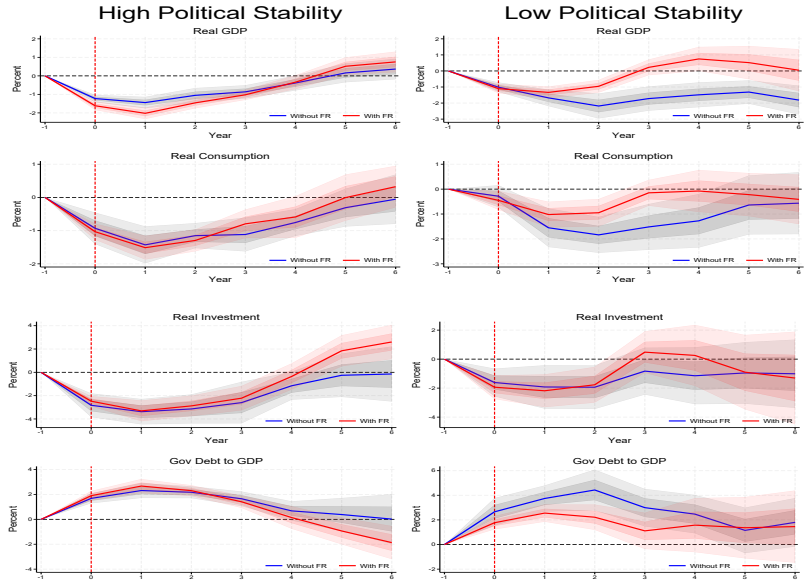
Other results (2)

Figure 6: Fragmentation shock in AEs and EMDEs



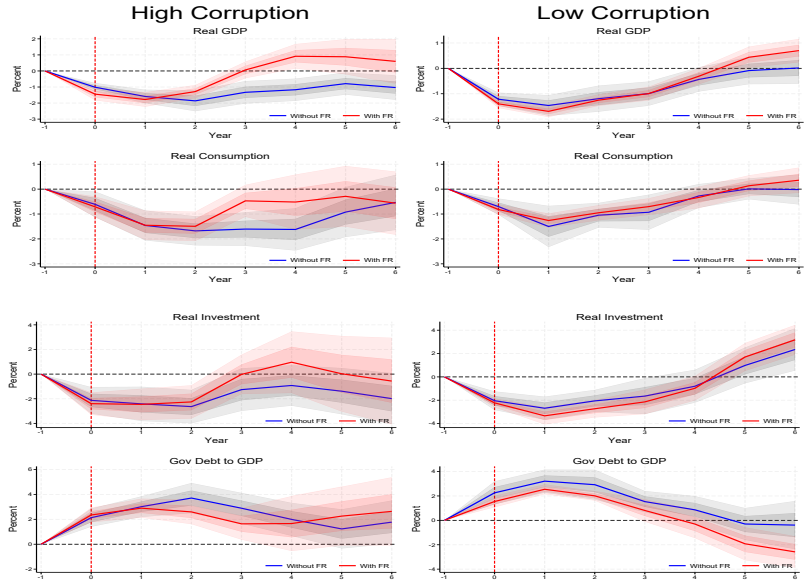
Other results (3)

Figure 7: The role of political stability



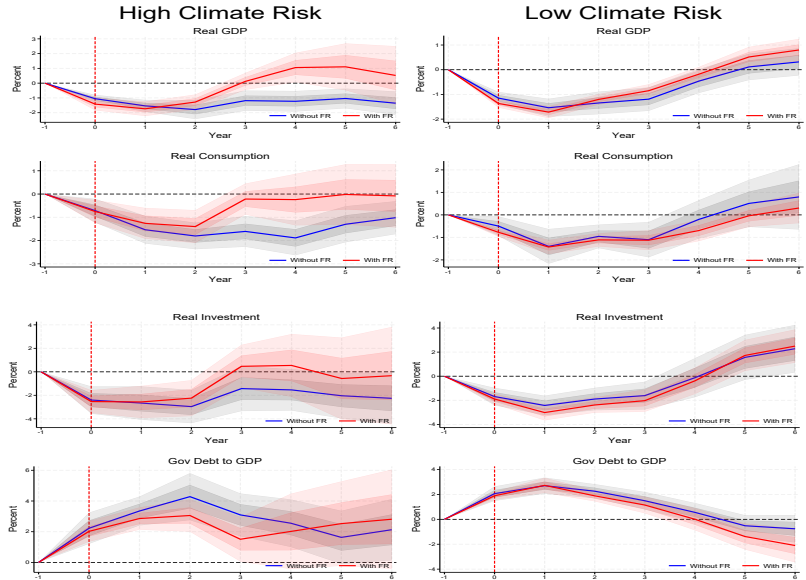
Other results (4)

Figure 8: The role of political corruption



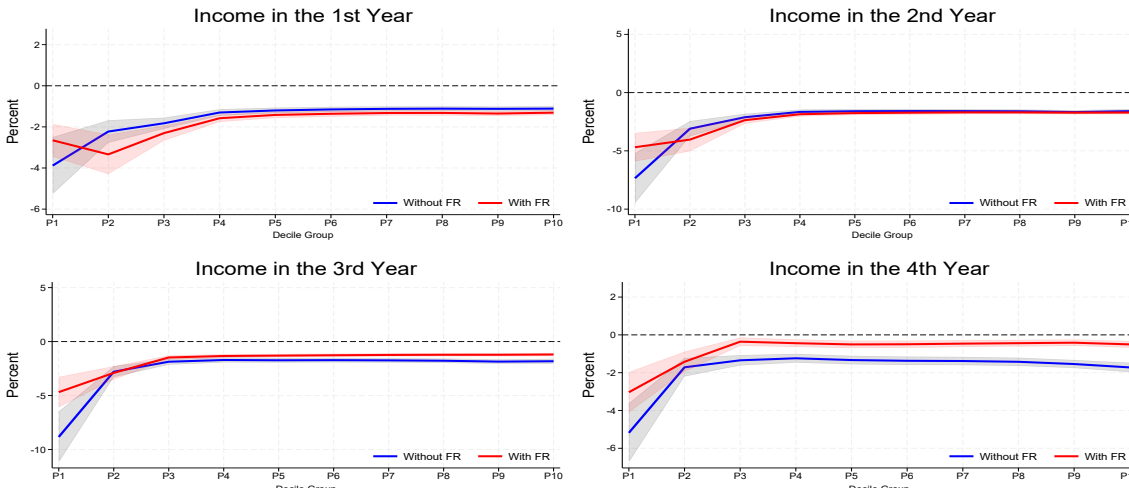
Other results (5)

Figure 9: The role of climate risk



Other results (6)

Figure 10: Distributional effects



Other results (7)

Figure 11: Fragmentation shock with regional analysis