# International Risk-Sharing in a Fragmented World

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# Motivation

- The world economy is increasingly fractured along geopolitical lines
  - Economic relations are shaped not only by economic fundamentals, but also by political alliances and strategic rivalries

- **Key questions:**
  - How does geopolitical risk shape the international allocation of capital?
  - Does financial fragmentation hinder international risk-sharing?
  - What are the welfare implications?

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- **Key questions:**
  - How does geopolitical risk shape the international allocation of capital?
  - Does financial fragmentation hinder international risk-sharing?
  - What are the welfare implications?
- This paper: **fragmentation in official bilateral lending** — facts and theory.

# What we do

Fragmentation of official government-to-government lending

- Long-run dyadic dataset (Horn, Reinhart & Trebesch, 2024)
- Financial fragmentation index

**Findings:**

1. A rise in geopolitical risk leads to higher financial fragmentation
2. Geopolitically aligned countries have more synchronized business cycles
3. Fragmentation weakens lending flows from low-risk to high-risk countries

**Theory of fragmentation:**

- Geopolitical rivalry ⇒ creditor identity matters for repayment incentives
- Rising geopolitical risk ⇒ endogenous fragmentation

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# Related Literature

- **Geoeconomics:** Aiyar, Malacrino, and Presbitero (2024); Aiyar, Presbitero, and Ruta (2023); An and Huber (2026); Sturm Becko and O'Connor (2024); Bianchi and Sosa-Padilla (2024, 2025); Broner, Martin, Meyer, and Trebesch (2024); Caldara and Iacoviello (2022); Catalán, Fendoglu, and Tsuruga (2024); Clayton, Coppola, Maggiori, and Schreger (2024, 2025); Clayton, Maggiori, and Schreger (2024, 2025); De Souza, Hu, Li, and Mei (2024); Fernandez-Villaverde, Mineyama, and Song (2024); Gopinath, Gourinchas, Presbitero, and Topalova (2024); Kempf, Luo, Schäfer, and Tsoutsoura (2023); Kleinman, Liu, and Redding (2024); Pflueger and Yared (2024); Sturm Becko (2024)

  **Fragmentation of official lending: facts and theory**

- **Sovereign debt and limited commitment:** Aguiar & Amador (2011); Aguiar & Gopinath (2006); Arellano (2008); Broner, Martin & Ventura (2010); Eaton & Gersovitz (1981)

  **Geopolitical risk and implications for capital flows and risk-sharing**

# Data

Bilateral govt.-to-govt. lending data from Horn, Reinhart & Trebesch (2024)

- Loans, grants, and guarantees by governments and state-controlled agencies
- Lending flows between 120 creditor and 190 debtor countries, 1910–2024

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Official lending is an ideal laboratory for studying geoeconomic fragmentation

- Dyadic: creditor identity is directly observed
- Long-run coverage spans major geopolitical episodes
- State control makes geopolitics first-order

# Measuring fragmentation

**Goal:** measure whether official lending follows geopolitical alignment

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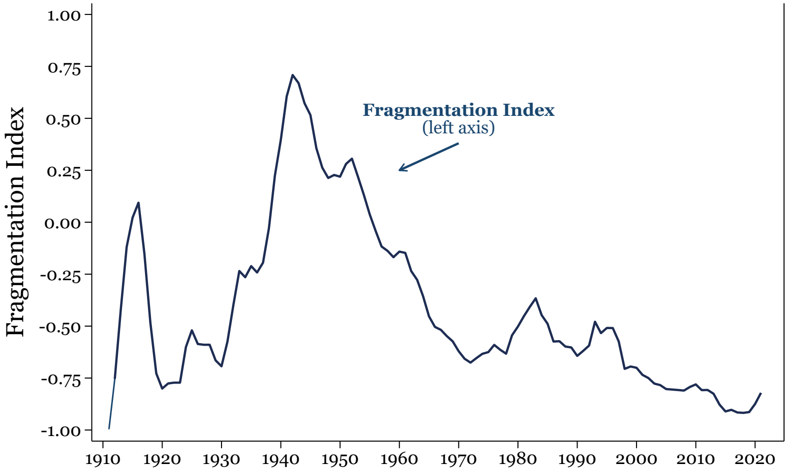
**Identifying Allies and Non-Allies:**

- Military alliances as coded by the Correlates of War Project (Gibler & Sarkees 2004)
- Robustness: UN General Assembly voting similarity (Bailey et al. 2017)

# Fragmentation and geopolitical risk, 1910–2020



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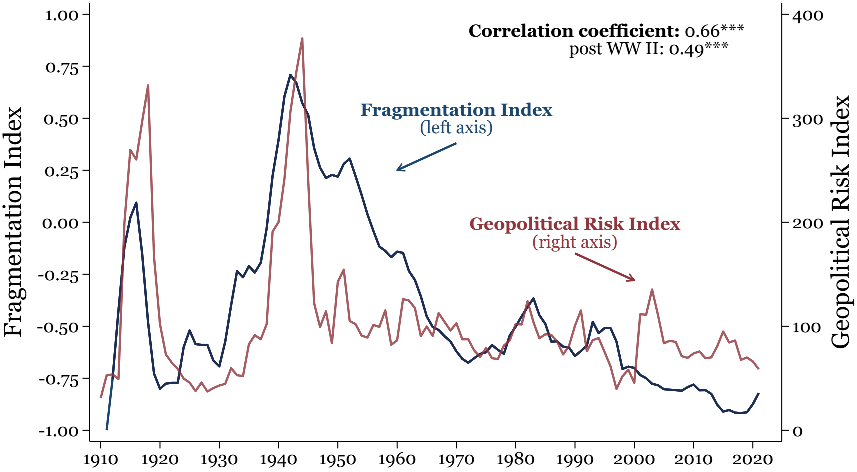


Geopolitical risk: measured as in Caldara and Iacoviello (2022)

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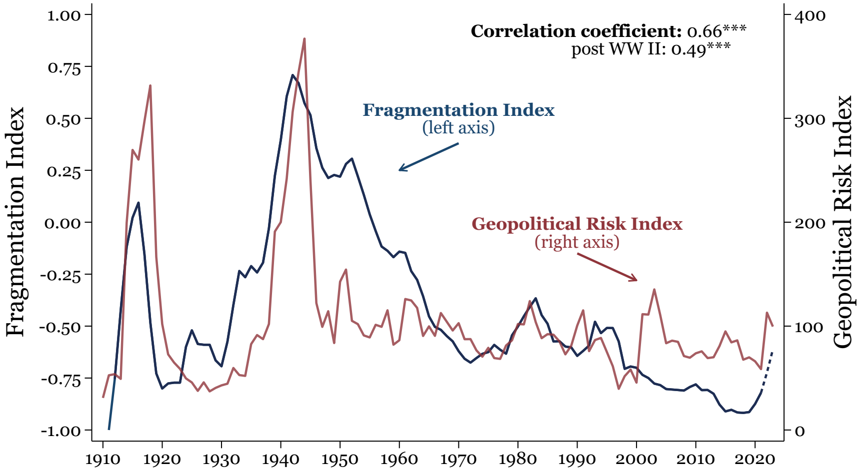


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FINDING 1: A rise in geopolitical risk leads to higher financial fragmentation

# Panel evidence: impact of GPR on Fragmentation

## Panel Local Projections

$$\text{Fragm}_{i,t+h} - \text{Fragm}_{i,t-1} = \alpha^h + \beta^h \log \text{GPR}_{i,t} + \text{controls}_{i,t} + \eta_i^h + \psi_t^h + \epsilon_{i,t}^h$$

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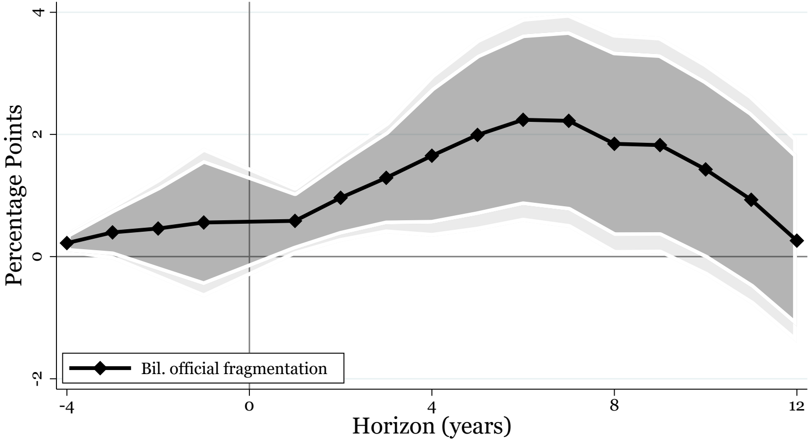

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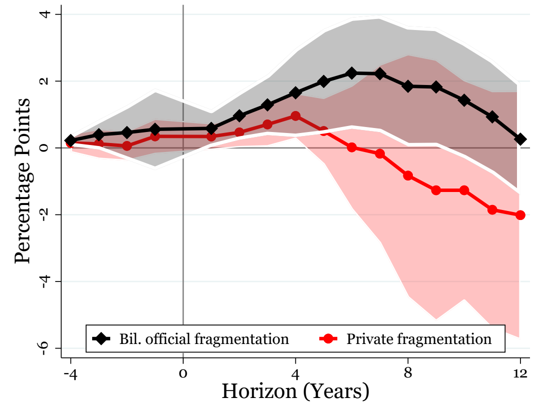


Bilateral vs. private lending

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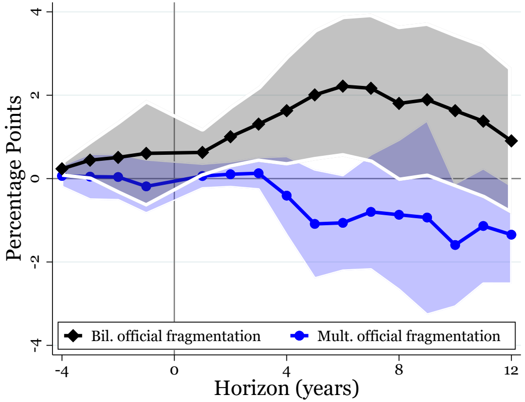
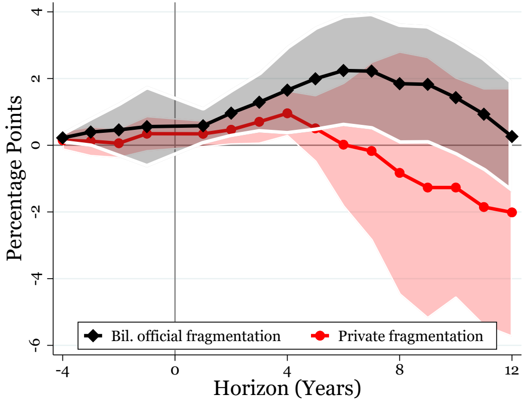


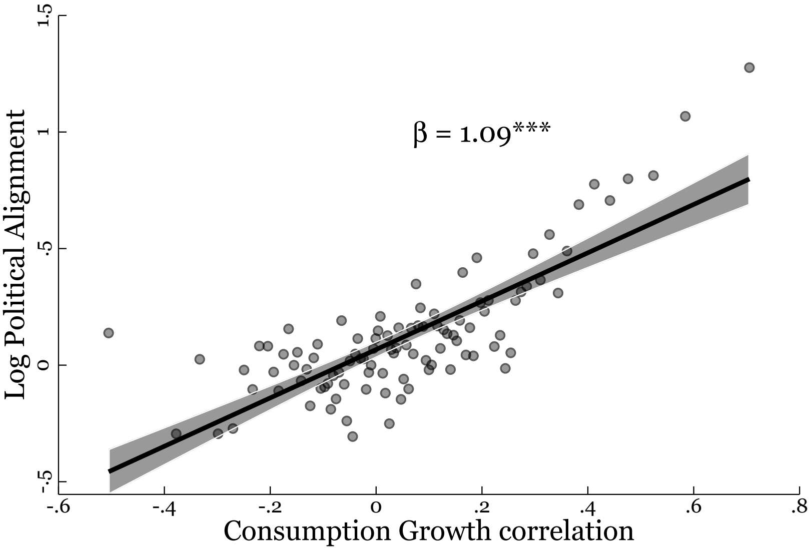

Bilateral vs. multilateral lending




Bilateral vs. private lending

FINDING 2: Aligned countries have synchronized business cycles

# Geopolitical alignment and consumption correlations



FINDING 3: Fragmentation weakens lending flows from low-risk to high-risk countries

# Fragmentation and Risk-Sharing

## Gravity specification: official credit flows, tail-risk gaps, and political alliance

$$\begin{aligned}\text{Flow}_{ijt} = \alpha + \beta \left(\text{TailRisk}_{i,t}^{debtor} - \text{TailRisk}_{j,t}^{creditor}\right) + \gamma\,\text{Alliance}_{ijt} \\ + \psi\,\text{Alliance}_{ijt} \times \left(\text{TailRisk}_{i,t}^{debtor} - \text{TailRisk}_{j,t}^{creditor}\right) + \theta_{ij} + \delta_t + \epsilon_{ijt}.\end{aligned}$$

- $\beta > 0$: official credit flows from lower-risk creditors to higher-risk borrowers

$\Rightarrow$ official lending provides insurance

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  $\Rightarrow$ official lending provides insurance

- $\gamma > 0$: allied countries lend more to each other
- $\psi < 0$: the response to tail-risk differences is weaker inside alliances

  $\Rightarrow$ within-bloc lending provides weaker insurance

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|---|---|---|---|
| Tail-risk difference | 2.32*** | 2.47*** | 3.12*** |
| | (0.54) | (0.54) | (0.63) |
| Alliance | | 0.38*** | 0.41*** |
| | | (0.14) | (0.14) |
| Tail-risk difference × Alliance | | | −2.13* |
| | | | (1.26) |
| Observations | 45,461 | 45,461 | 45,461 |
| Sample | 1910–2020 | 1910–2020 | 1910–2020 |
| Dyad FE | ✓ | ✓ | ✓ |
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# Taking Stock

1. A rise in geopolitical risk leads to higher financial fragmentation

2. Aligned countries have synchronized business cycles

3. Fragmentation weakens lending flows from low-risk to high-risk countries

Geopolitical risk leads to a reallocation of capital within geopolitical blocs and this fragmentation hinders risk-sharing

# Model

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- **Period 1:** Home signs bilateral state-contingent contracts
  - Home: risk-averse. Allied and Rival: risk-neutral
- **Period 2:** Aggregate shock $s \in \{s_g, s_b\}$ with $y(s_b) < y(s_g)$
  - Home repays or defaults

# Geopolitical Externality

Home country's objective at $t = 1$:

Geopolitical externality

$$\sum_s \pi(s)u(c(s)) - \eta V^*$$

where $V^*$ is the Rival's expected payoff.

- $\eta > 0$ captures the desire to gain strategic advantage over geopolitical rivals

# Repayment and Default

**Repayment**, $d(s) = 0$:

$$c(s) = y(s) - \tilde{a}(s) - a^*(s)$$

Payments To Ally Payments To Rival

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**Default**, $d(s) = 1$:

$$c(s) = \underbrace{(1-\phi)}_{\text{Income cost of default}}\, y(s) - \overbrace{\tilde{a}_-(s) - a^*_-(s)}^{\text{Keep assets if positive}}, \qquad x_- \equiv \min\{0, x\}$$

- **Non-discriminatory default:** Home cannot selectively default on Rival alone

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  - Empirical support ▸ Arrears

# Ally and Rival Countries

- Period-1 utility values is given by expected consumption

$$\tilde{V}(\tilde{a}, s) = \sum_{s \in S} \pi(s) \left[\tilde{y}(s) + (1 - d(s))\tilde{a}(s) + d(s)\tilde{a}_{-}(s)\right]$$

$$V^*(a^*, s) = \sum_{s \in S} \pi(s) \left[y^*(s) + (1 - d(s))a^*(s) + d(s)a^*_{-}(s)\right]$$

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- Consumption must be positive in each state

$$\tilde{y}(s) + (1 - d(s))\tilde{a}(s) + d(s)\tilde{a}_{-}(s) \geq 0$$

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Geopolitical cost of repaying Rival

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When $\eta = 0$: IC depends only on total repayment $\tilde{a} + a^*$

When $\eta > 0$: defaulting becomes more tempting the larger is the share of debt owed to rival

# Optimal Bilateral Contracts

$$\max_{c(s),\,\tilde{a}(s),\,a^*(s)} \sum_s \pi(s)u(c(s)) \;-\; \eta V^*$$

subject to

**Participation:** $$\sum_s \pi(s)\,\tilde{a}(s) \geq 0, \quad \sum_s \pi(s)\,a^*(s) \geq 0$$

**Incentives:** $$u(c(s)) - \eta(y^*(s) + a^*(s)) \geq u\big((1-\phi)y(s) - a^*_-(s) - \tilde{a}_-(s)\big) \\ -\eta\big(y^*(s) + a^*_-(s)\big) \quad \forall s$$

**Feasibility:** $$c(s) = y(s) - \tilde{a}(s) - a^*(s), \quad \tilde{a}(s) \geq -\tilde{y}(s), \quad a^*(s) \geq -y^*(s) \quad \forall s$$

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Incentive constraint binds in the good state because govt. repays in good state

$\Rightarrow$ limits insurance in the bad state

# Simplifying Assumptions

- **Equal state probabilities:**

$$\pi(s_g) = \pi(s_b) = 0.5$$

$$\Rightarrow \quad \tilde{a}(s_g) = -\tilde{a}(s_b) \quad \text{and} \quad a^*(s_g) = -a^*(s_b)$$

  - Good-state repayment equals the bad-state insurance transfer.

- **Same good-state endowment across countries:**

$$y(s_g) = \tilde{y}(s_g) = y^*(s_g)$$

  - Insurance capacity determined by bad state output.

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- **Log utility:**

$$u(c) = \log(c)$$

# Proposition, part i: Full Insurance

If $\phi \geq \hat{\phi}$, we have **full insurance**:

$$c(s_g) = c(s_b) = \frac{y(s_g) + y(s_b)}{2}$$

$$\tilde{a}(s_g) + a^*(s_g) = \frac{y(s_g) - y(s_b)}{2}$$

**Thresholds**: $\hat{\phi} \equiv 1 - \frac{y(s_g)+y(s_b)}{2y(s_g)} \exp\left(-\eta \left[\frac{y(s_g)-y(s_b)}{2} - \tilde{y}(s_b)\right]\right)$ $\underline{\phi} \equiv \frac{\tilde{y}(s_b)}{y(s_g)}$

# Proposition, part ii: Imperfect Insurance

If $\phi < \hat{\phi}$, we have **imperfect insurance**:

$$c(s_g) > c(s_b)$$

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Imperfect insurance takes two forms:

- Partial fragmentation, $\underline{\phi} < \phi < \hat{\phi}$ : Ally maxes out

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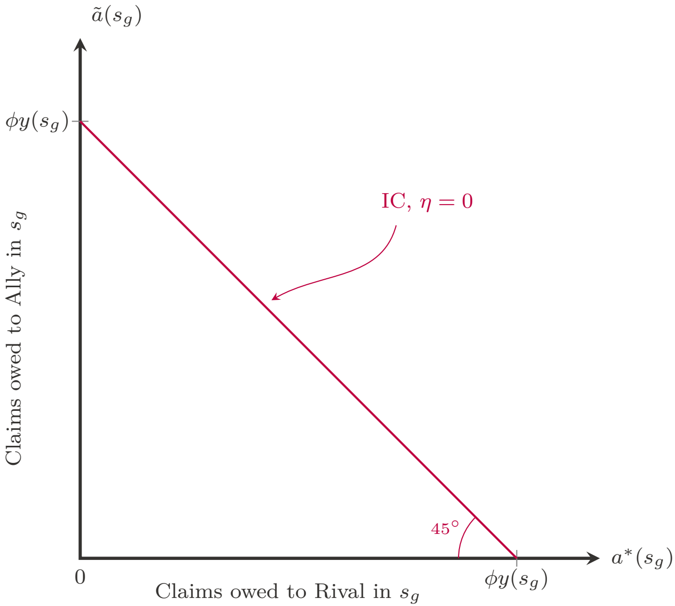
- Complete fragmentation, $\phi \leq \underline{\phi}$ : No borrowing from rival

$$\tilde{a}(s_g) = \phi y(s_g) \leq \tilde{y}(s_b), \qquad a^*(s_g) = 0$$

**Thresholds**: $\hat{\phi} \equiv 1 - \frac{y(s_g)+y(s_b)}{2y(s_g)} \exp\left(-\eta \left[\frac{y(s_g)-y(s_b)}{2} - \tilde{y}(s_b)\right]\right)$ $\qquad \underline{\phi} \equiv \frac{\tilde{y}(s_b)}{y(s_g)}$

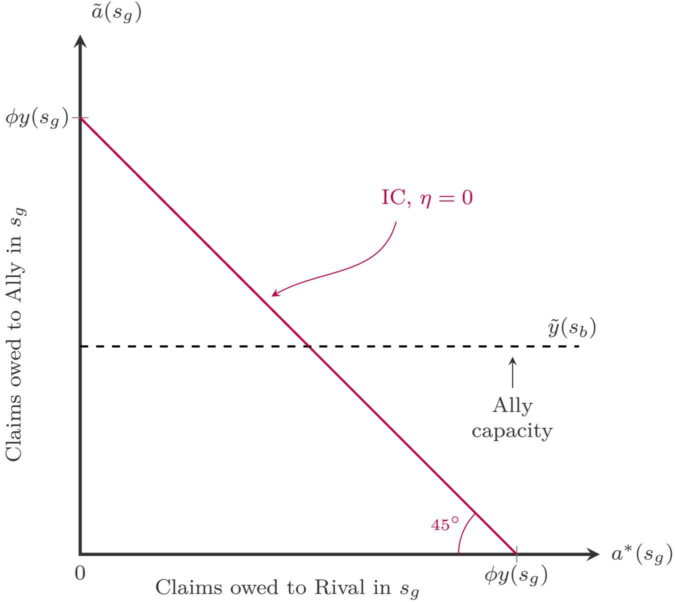
# How Geopolitical Risk leads to Fragmentation




**Benchmark:** $\eta = 0$

Only **total debt** matters: split between Ally and Rival is irrelevant

# How Geopolitical Risk leads to Fragmentation

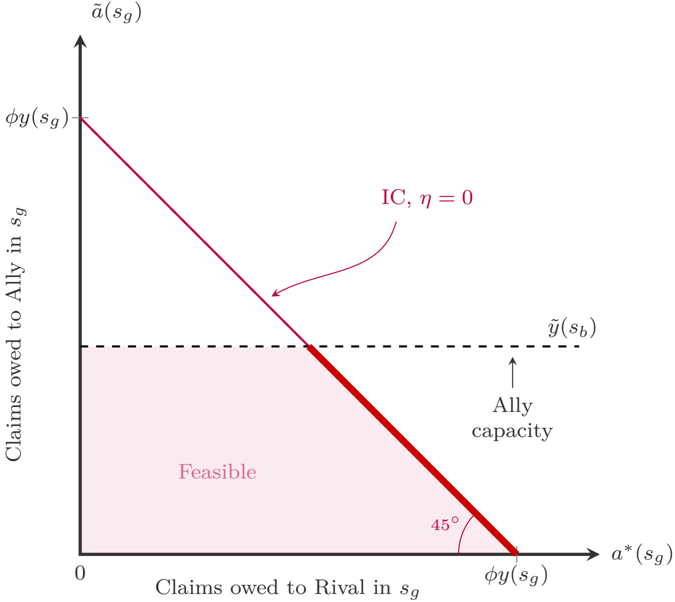



**Ally capacity**

The Ally cannot fully insure Home on its own.

So full insurance requires some lending from the Rival.

# How Geopolitical Risk leads to Fragmentation

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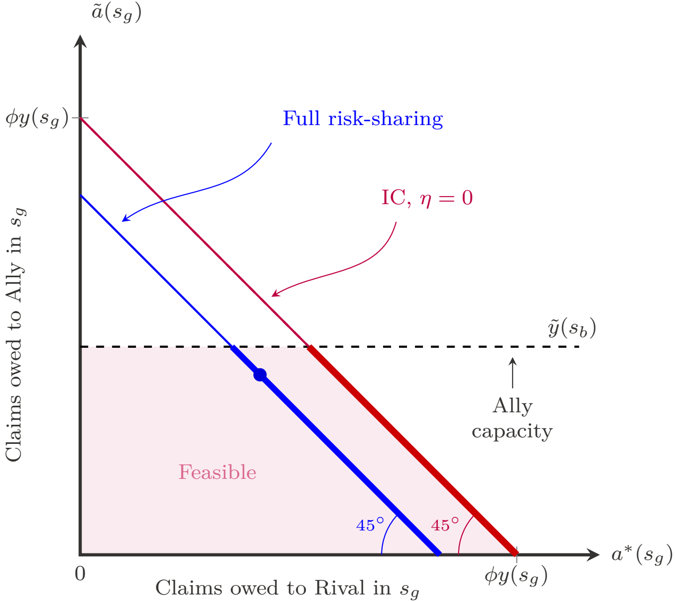
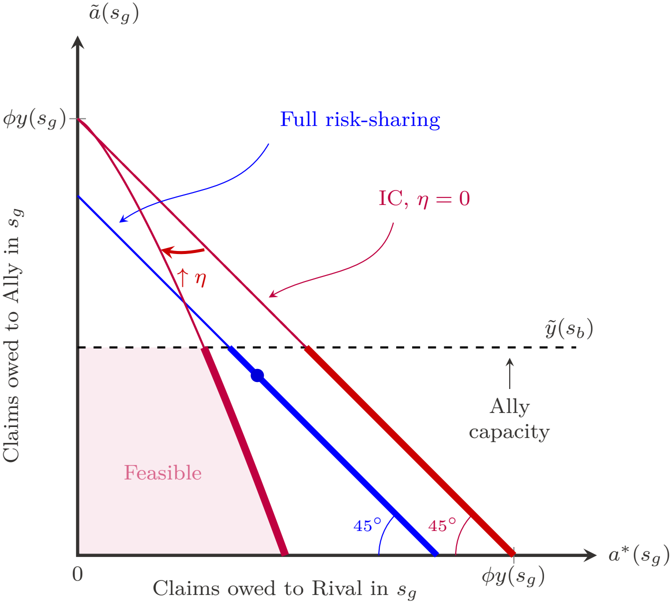



**Full insurance is feasible**

Home uses both creditors.

Consumption can be fully smoothed across states.

# How Geopolitical Risk leads to Fragmentation

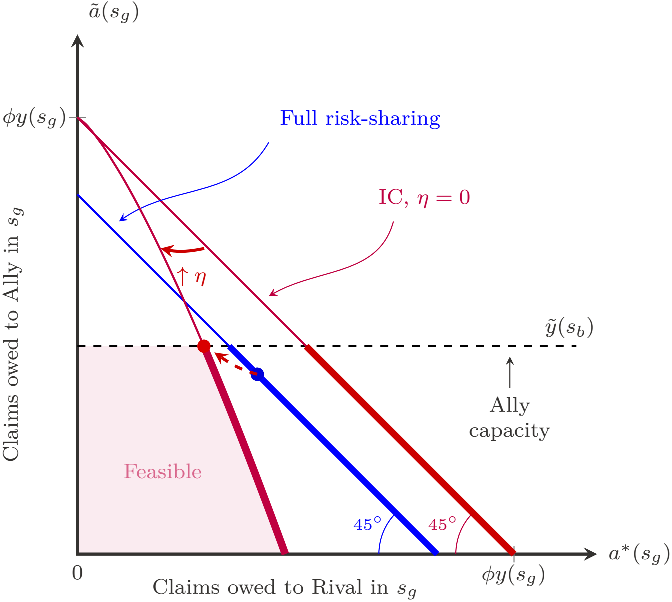



**Increase in $\eta$**

Repaying Rival becomes more costly.

More borrowing from Ally

# How Geopolitical Risk leads to Fragmentation

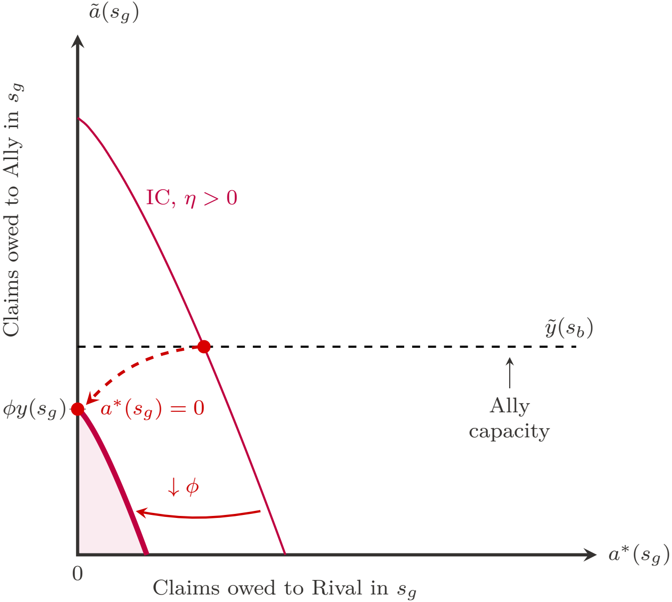



**Full insurance breaks down**

The Ally maxes out.

Rival lending falls.

# How Geopolitical Risk leads to Fragmentation




### Complete fragmentation

If the default cost is sufficiently low, Home borrows only from the Ally.

$$a^*(s_g) = 0.$$

# Conclusions

- We use a long-run dyadic dataset on government-to-government lending to examine financial fragmentation
- We document that increases in geopolitical risk lead to fragmentation in official lending and lower risk-sharing
- We build a sovereign debt model with limited commitment that links strategic rivalry to fragmentation in official lending and limits to risk-sharing

# Appendix

# Data on private lending

Back to LPs

- Measuring private international lending at the dyadic (creditor-debtor country) level is complicated by:
  - active trading in secondary markets
  - intermediation through offshore financial centers (e.g. Coppola et al. 2021)

# Data on private lending

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  - Cross-border lending by commercial banks, bond issuance and supplier credits to public and publicly-guaranteed entities in 120 emerging market and developing countries, 1970–2024
  - Creditor country identified on a residency basis
  - USD 1.7 trillion by private creditors from 116 countries to 120 recipients

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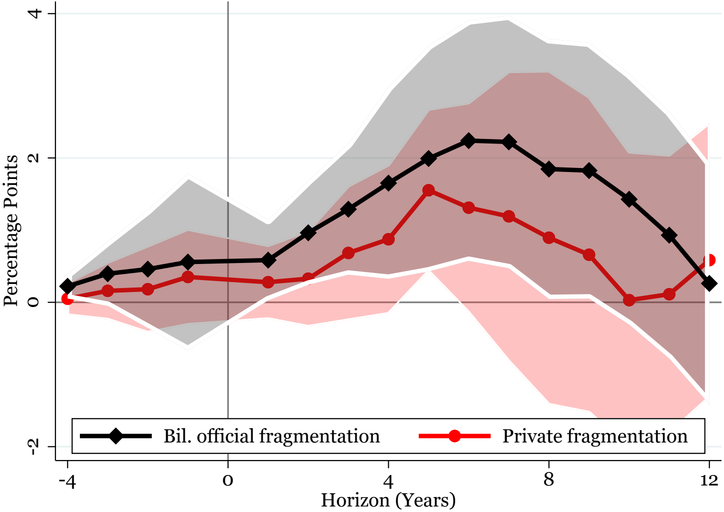
- Robustness in 1970–1990 syndicated bank lending sample

# Fragmentation in syndicated bank lending, 1970-1990




▸ Back to LPs

# Data on multilateral lending flows

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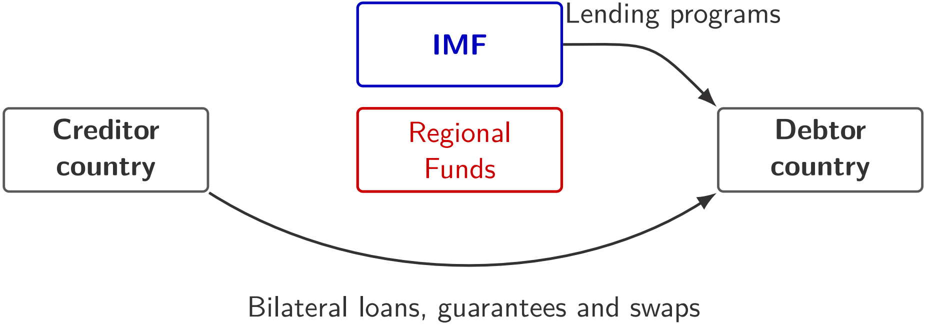

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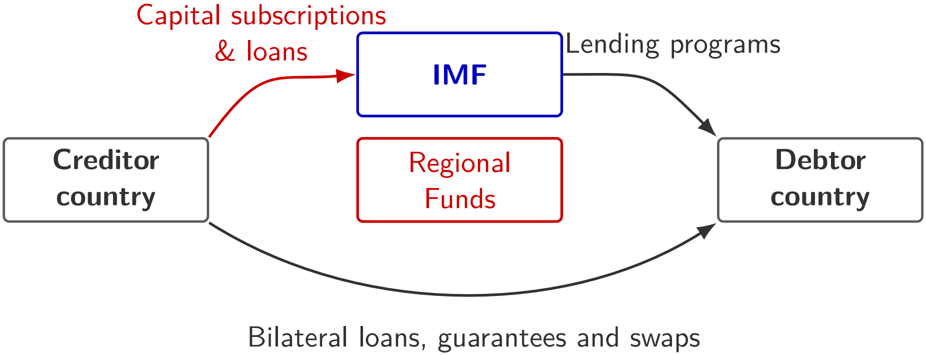

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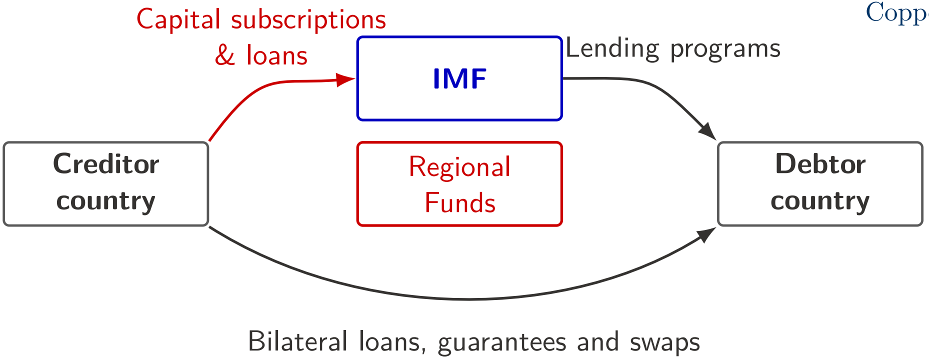
Related approach: Coppola et al. (2021)



# Imputing lending through multilateral institutions

- We compute the funding share of creditor country $j$ in organization $o$ in period $t$

$$\omega_{jot} = \frac{PAID.IN_{jot} + CREDIT_{jot}}{\sum_{k=1}^{N}(PAID.IN_{kot} + CREDIT_{kot})}$$

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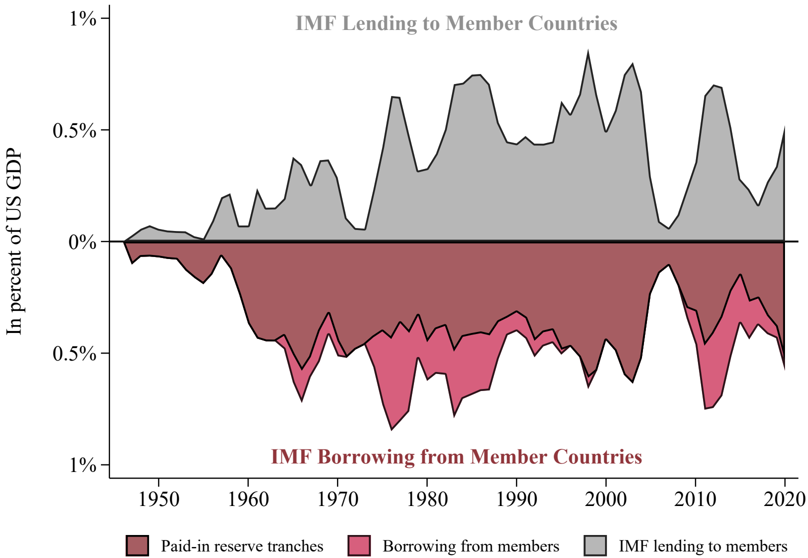
- Finally, total multilateral lending from country $j$ to country $i$ in period $t$ is:

$$\sum_{o} LOAN_{ijot}$$

Back to LPs

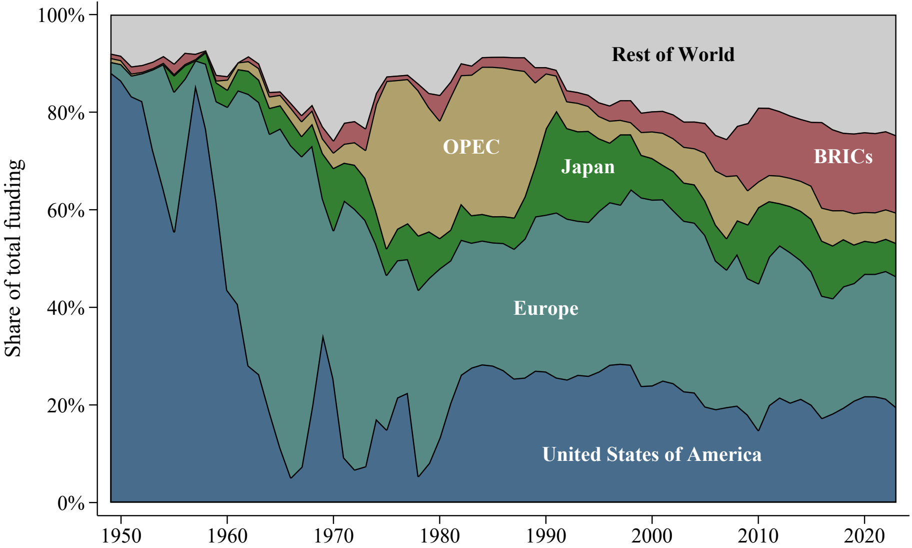
# IMF borrowing and lending

Back to LPs



# Example: Who funds the IMF?

▸ Back to LPs



# Sources

Back to LPs

Agreement to establish Andean Reserve Fund, 1976

Capital

Article 5. The initial capital of the Fund is five hundred million ($500,000,000) dollars of the United States of America, suscribed as follows:

| | |
|---|---|
| Bolivia: | sixty-two million five hundred thousand ($62,500,000) dollars. |
| Colombia: | one hundred twenty-five million ($125,000,000) dollars. |
| Ecuador: | sixty-two million five hundred thousand ($62,500,000) dollars. |
| Peru: | one hundred twenty-five million ($125,000,000) dollars. |
| Venezuela: | one hundred twenty-five million ($125,000,000) dollars. |

Agreement to establish Euopean Monetary Fund, 1955

| CONTRACTING PARTIES | AMOUNT OF CONTRIBUTIONS *(in units of account)* |
|---|---|
| Germany | 42,000,000 |
| Austria | 5,000,000 |
| B.L.E.U. | 30,000,000 |
| Denmark | 15,000,000 |
| France | 42,000,000 |
| Greece | 2,850,000 |
| Iceland | 1,000,000 |
| Italy | 15,000,000 |
| Norway | 15,000,000 |
| Netherlands | 30,000,000 |
| Portugal | 5,000,000 |
| United Kingdom | 86,575,000 |
| Sweden | 15,000,000 |
| Switzerland | 21,000,000 |
| Turkey | 3,000,000 |
| TOTAL | 328,425,000 |

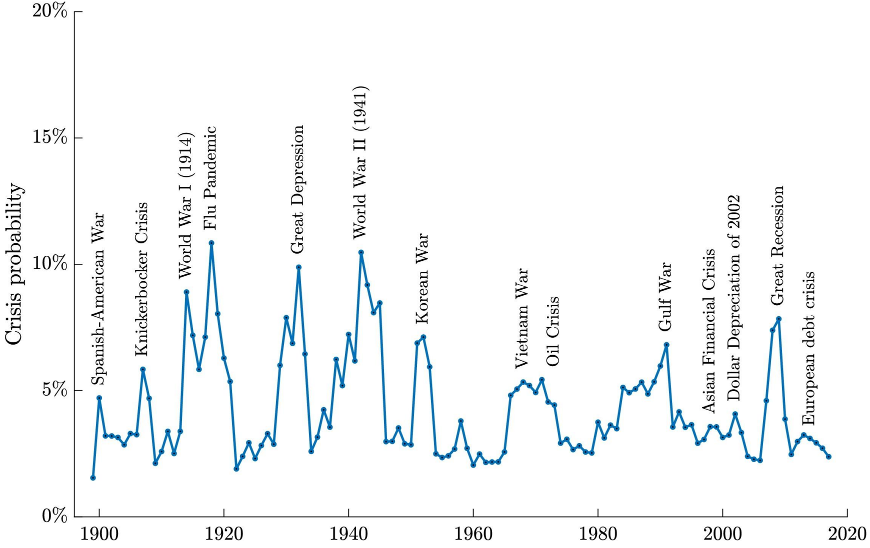
# Coverage - International Financial Institutions

Back to LPs

| **Institution** | Operating time | Authorized capital (in bn USD) | Number of member countries |
|---|---|---|---|
| League of Nations | 1920 - 1946 | n.a. | 63 |
| International Monetary Fund | 1946 - 2020 | 1350 | 189 |
| Andean Reserve Fund | 1978 - 1991 | 2 | 5 |
| Arab Monetary Fund | 1977 - 2020 | 5 | 22 |
| BRICS Contingent Reserve Arrangement | 2014 - 2020 | 100 | 5 |
| Chiang Mai Initiative | 2000 - 2020 | 240 | 10 |
| Eurasian Anti-Crisis Fund | 2009 - 2020 | 9 | 6 |
| European Monetary Fund | 1958 - 1973 | 0.6 | 16 |
| European Community Loan Mechanism | 1975 - 1988 | n.a. | 12 |
| European Financial Assistance Facility | 1975 - 1988 | n.a. | 12 |
| European BOP Facility | 1988 - 2020 | 60 | 28 |
| European Financial Stability Facility | 2010 - 2013 | 1040 | 19 |
| European Financial Stability Mechanism | 2010 - 2013 | 75 | 28 |
| European Stability Mechanism | 2012 - 2020 | 780 | 19 |
| Latin American Reserve Fund | 1991 - 2020 | 4 | 8 |
| NAFTA Swap Facility | 1994 - 2020 | 7 | 3 |

# Macroeconomic tail risk, 1900 - 2020, Aggregate

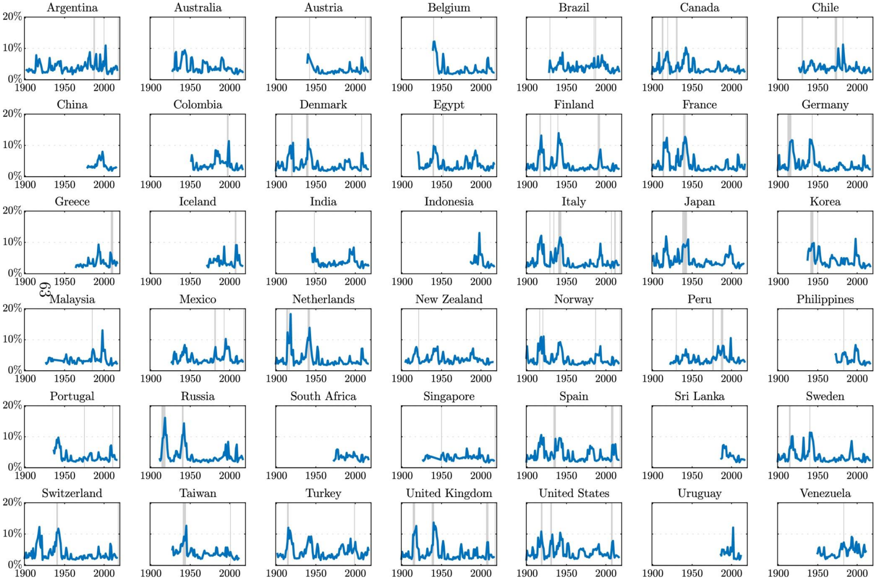
back




Source: Marfe & Penasse (JFE, 2024)

# Macroeconomic tail risk, 1900 - 2020

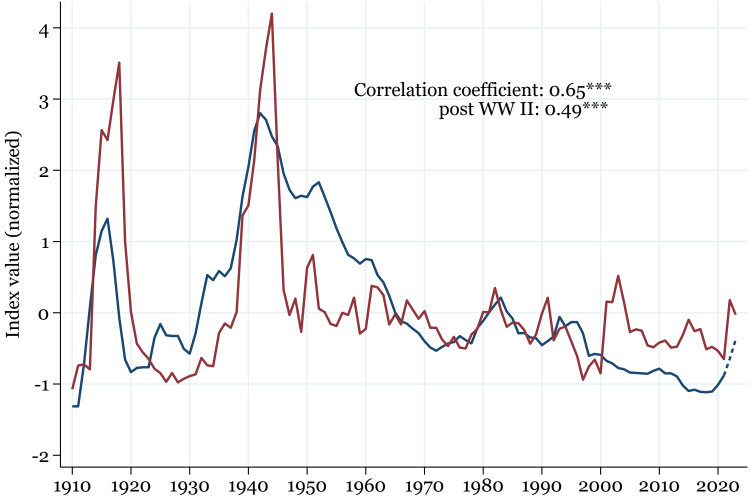
back




Source: Marfe & Penasse (JFE, 2024)

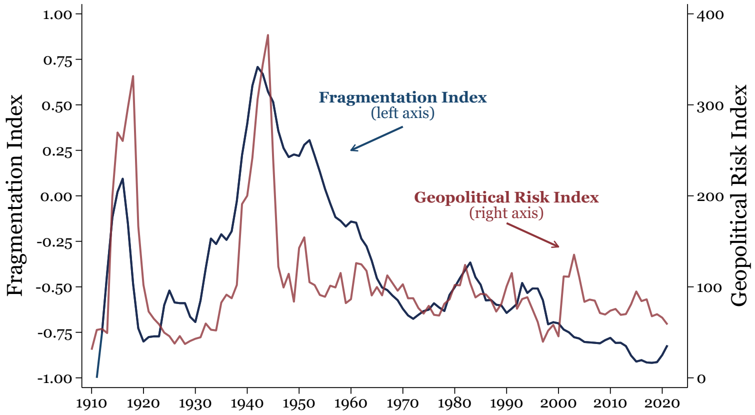
# Fragmentation and geopolitical risk – Normalized

back



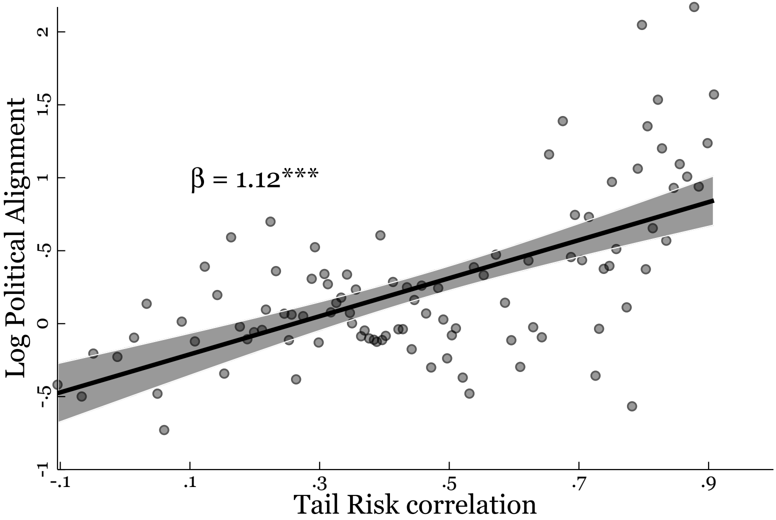
# Fragmentation and geopolitical risk – bilateral + multilateral

▸ back



# … and more synchronized macro tail risk

▸ back



# Accum. of payment arrears on allies and rivals

back