

International Risk-Sharing in a Fragmented World

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The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of
Minneapolis or the Federal Reserve System.

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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 - ▶ 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. When geopolitical tensions rise, bilateral lending **follows geopolitical alignment**
2. Geopolitically aligned countries have **more synchronized business cycles**
3. Fragmentation weakens risk-sharing

Theory of fragmentation:

- Geopolitical risk \Rightarrow **creditor identity matters** for repayment incentives
- Rising geopolitical risk \Rightarrow **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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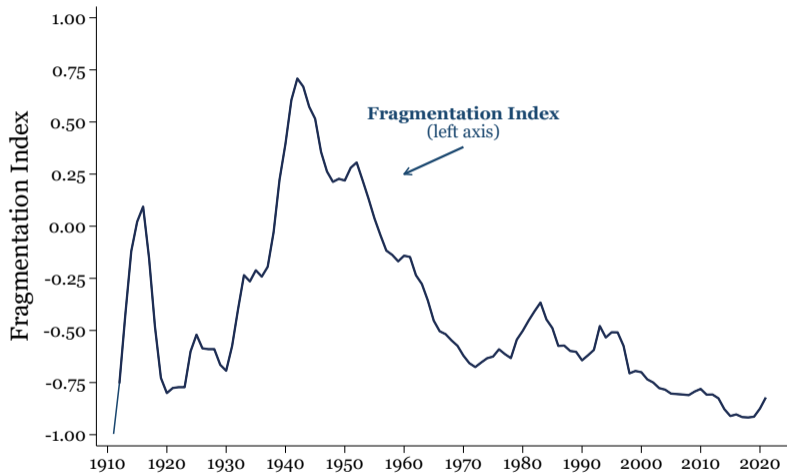
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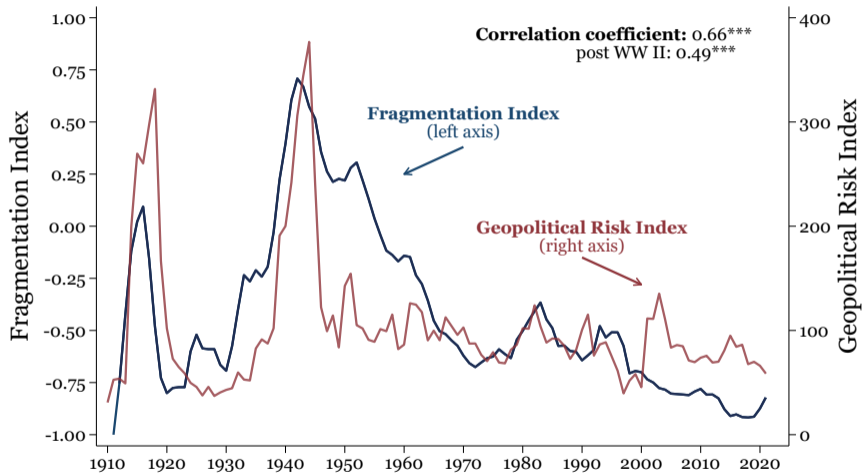
Identifying Allies and Non-Allies:

- 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

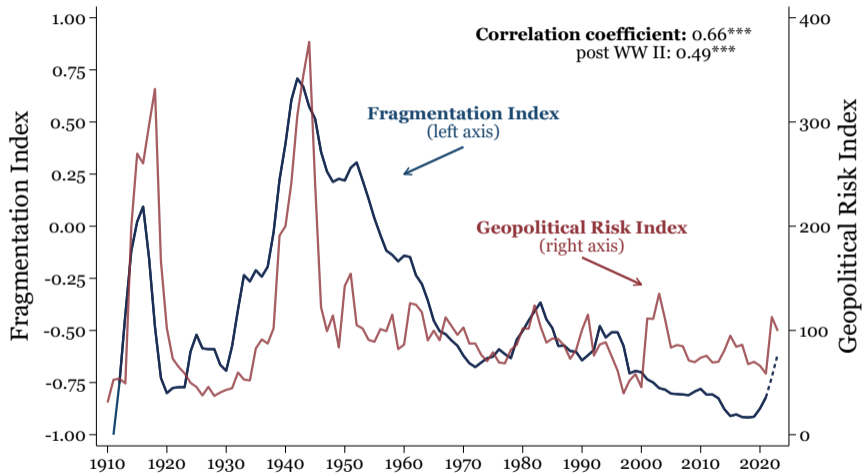


Fragmentation and geopolitical risk, 1910–2020



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

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FINDING 1: When geopolitical risk is high, lending follows political alignment

Panel evidence: impact of GPR on Fragmentation

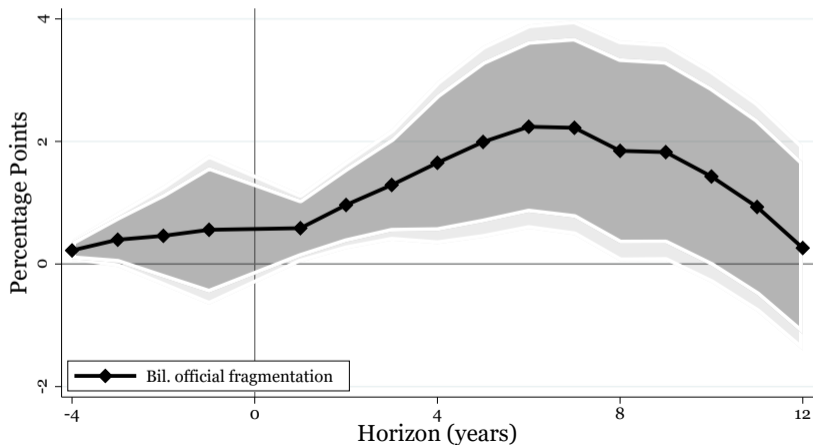
Panel Local Projections:

$$Fragm_{i,t+h} - Fragn_{i,t-1} = \alpha^h + \beta^h \log GPR_{i,t} + controls_{i,t} + \eta_i^h + \psi_t^h + \epsilon_{i,t}^h$$

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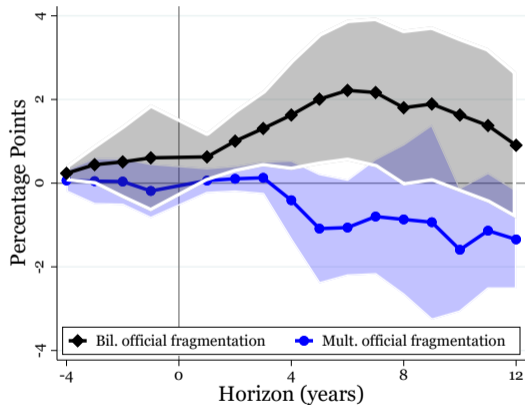
Comparison with other forms of lending types

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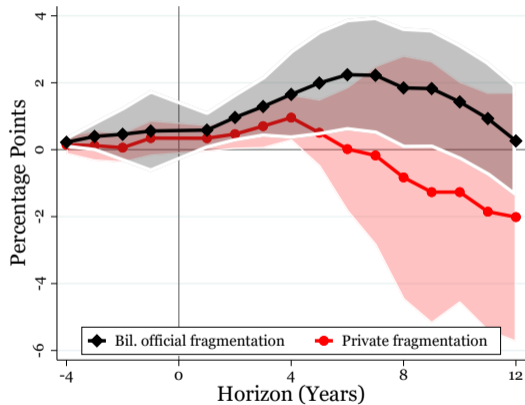
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▶ Data

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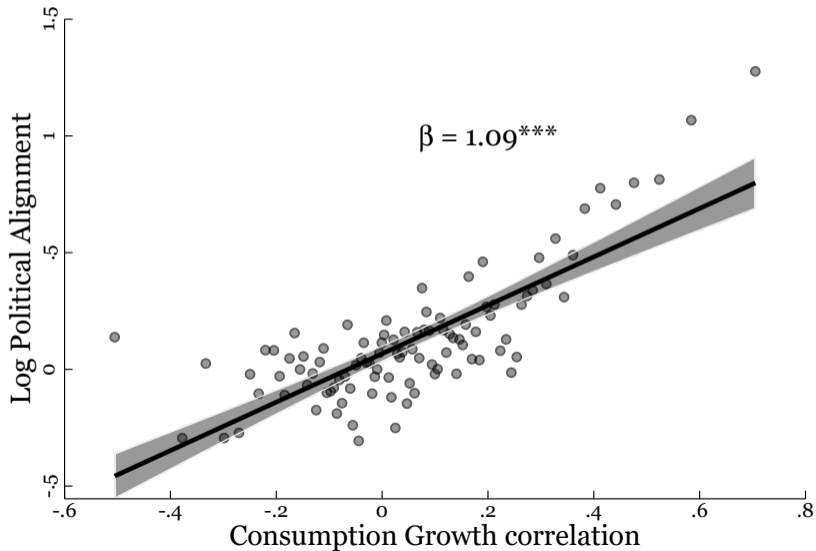
Bilateral vs. **multilateral** lending



Bilateral vs. **private** lending

FINDING 2: Aligned countries have synchronized business cycles

Polit. alignment and cross-country cons. correl.



FINDING 3: Fragmentation weakens risk-sharing

Fragmentation and Risk-Sharing

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

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

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- $\beta > 0$: official credit flows from lower-risk creditors to higher-risk borrowers
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- $\gamma > 0$: 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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	(1)	(2)	(3)
Tail-risk difference	2.32*** (0.54)	2.47*** (0.54)	3.12*** (0.63)
Alliance		0.38*** (0.14)	0.41*** (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	✓	✓	✓
Year FE	✓	✓	✓

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Implied response to tail-risk differences in column (3): non-allies = 3.12; allies = 3.12 – 2.13 ≈ 0.99.

Taking Stock

1. During episodes of high geopolitical risk, official flows follow geopolitical alignment
2. Aligned countries have synchronized business cycles
3. Fragmentation weakens flows from lower-risk creditors to higher-risk borrowers

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

Model

Model Environment

- Two periods, two aggregate shocks, three countries (home, allied, and rival)

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- **Period 1:** Home signs bilateral state-contingent contracts
 - ▶ Home: risk-averse. Allied and Rival: risk-neutral

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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** on all creditors

Geopolitical Externality

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

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

Geopolitical
externality



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

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

Repayment and Default

Repayment, $d(s) = 0$:

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

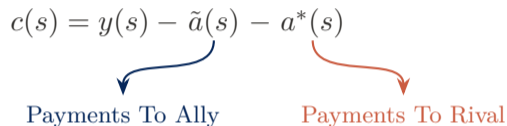
Payments To Ally

Payments To Rival

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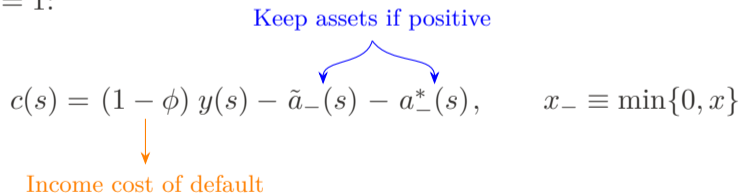


Payments To Ally Payments To Rival

Default, $d(s) = 1$:

Keep assets if positive

$$c(s) = (1 - \phi) y(s) - \tilde{a}_-(s) - a^*_-(s), \quad x_- \equiv \min\{0, x\}$$



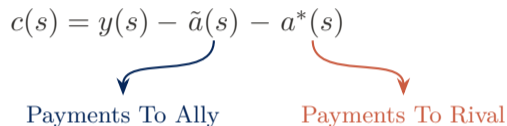
Income cost of default

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

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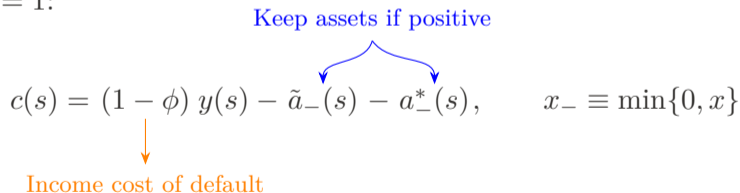


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Income cost of default

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 - ▶ Empirical support ▶ Arrears

Ally and Rival Countries

- Period-1 utility values is given by expected consumption

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

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

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- Consumption must be positive in each state

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

$$y^*(s) + (1 - d(s))a^*(s) + d(s)a^*_-(s) \geq 0$$

The Incentive Constraint

$$u(y(s) - \tilde{a} - a^*) - \eta a^* \geq u((1 - \phi) y(s))$$

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The Incentive Constraint

Geopolitical cost
of repaying Rival


$$u(y(s) - \tilde{a} - a^*) - \eta a^* \geq u((1 - \phi) y(s))$$

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

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

$$\text{(IC) No-default:} \quad u(c(s)) - \eta(y^*(s) + a^*(s)) \geq u((1 - \phi)y(s) - a_-^*(s) - \tilde{a}_-(s)) \\ - \eta(y^*(s) + a_-^*(s)) \quad \forall s$$

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

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

Simplifying Assumptions

- **Equal state probabilities:**

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

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

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

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

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

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- **Log utility:**

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

Proposition, part i: Full Insurance

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

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

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

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

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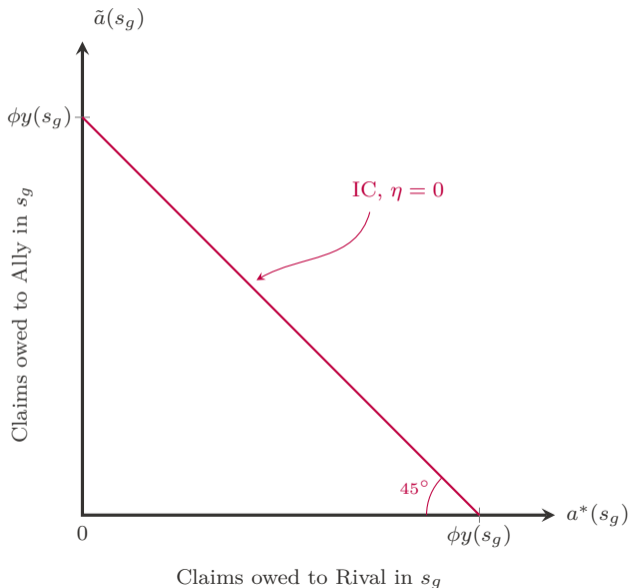
- **Complete fragmentation**, $\phi \leq \underline{\phi}$: *No borrowing from rival*

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

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

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Graphical Illustration

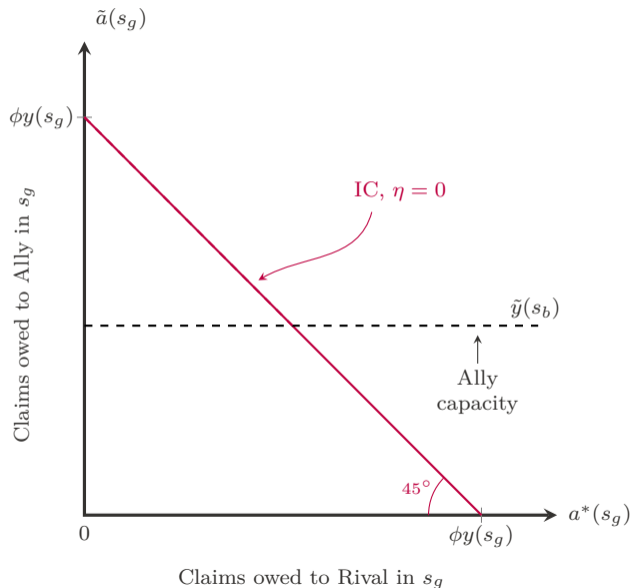


Benchmark: $\eta = 0$

Only **total repayment** matters.

The split between Ally and Rival is irrelevant for repayment incentives.

Graphical Illustration

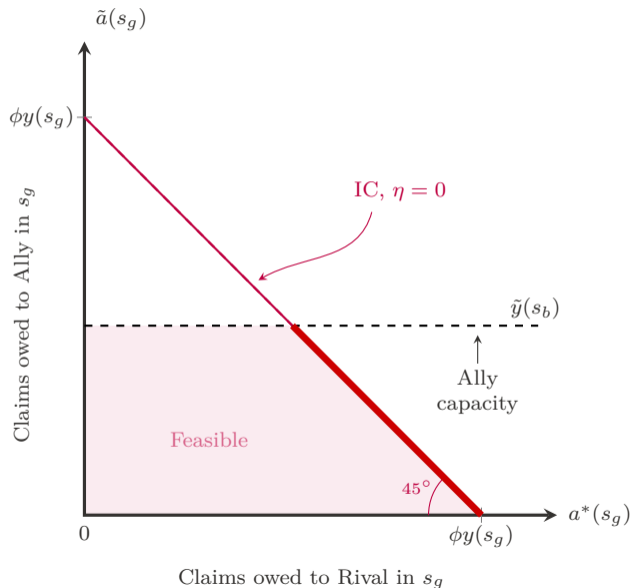


Ally capacity

The Ally cannot fully insure Home on its own.

So full insurance requires some lending from the Rival.

Graphical Illustration

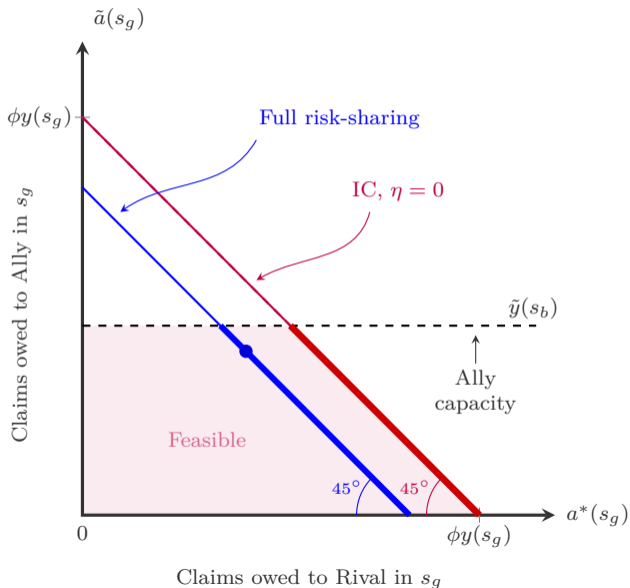


Ally capacity

The Ally cannot fully insure Home on its own.

So full insurance requires some lending from the Rival.

Graphical Illustration

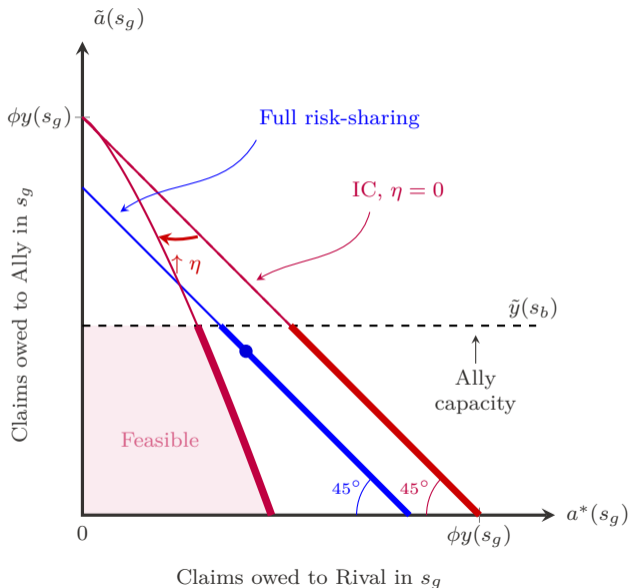


Full insurance is feasible

Home uses both creditors.

Consumption can be fully smoothed across states.

Graphical Illustration

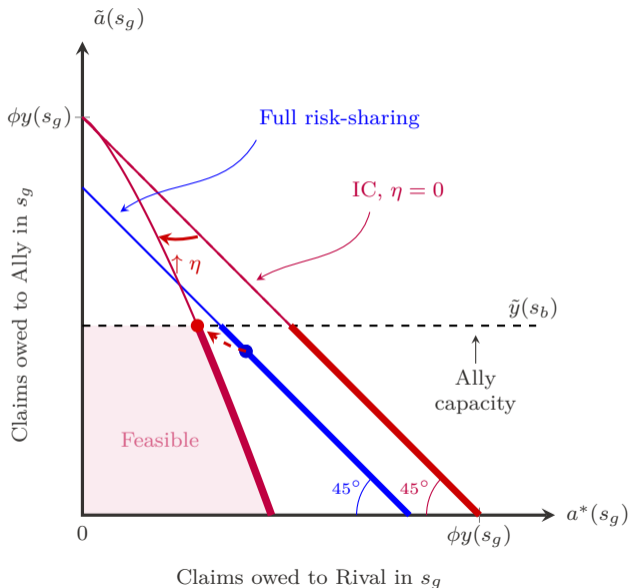


Increase in η

Repaying the Rival becomes more costly.

The incentive constraint tightens away from Rival claims.

Graphical Illustration

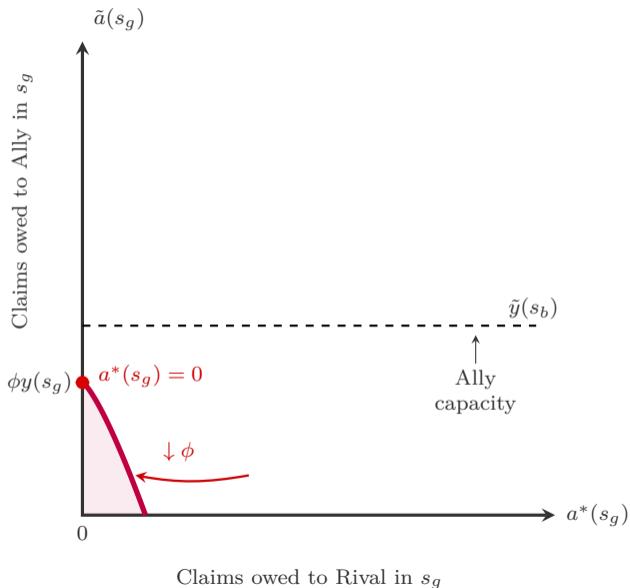


Full insurance breaks down

The Ally maxes out.

Rival lending falls.

Graphical Illustration



Complete fragmentation

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

No borrowing from the Rival:

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

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 geopolitical risk to fragmentation in official lending and limits to risk-sharing

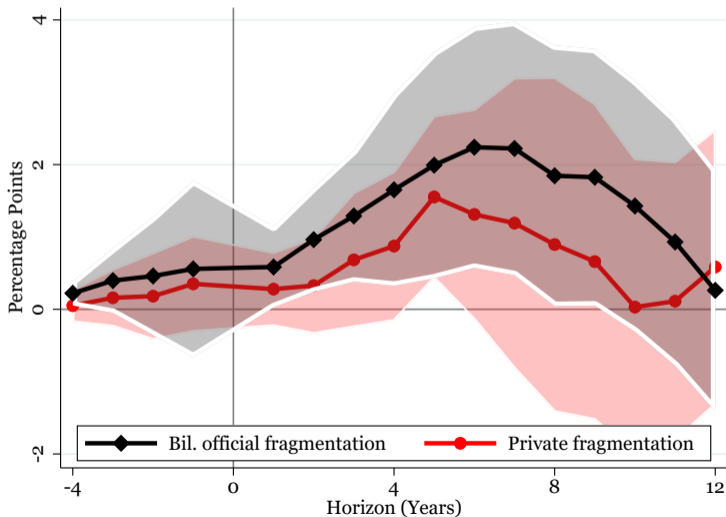
Appendix

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

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 - ▶ 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



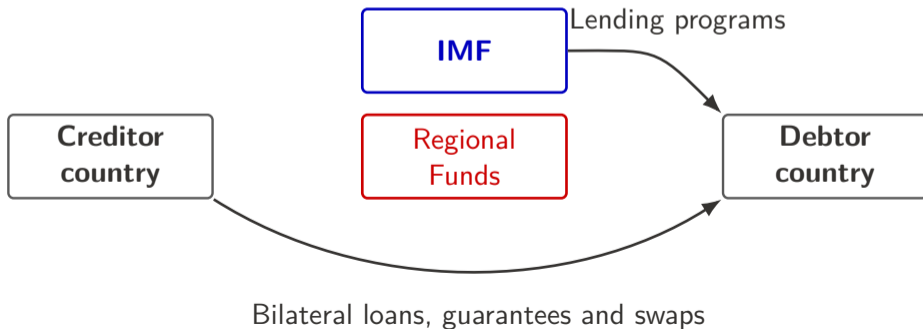
Data on multilateral lending flows

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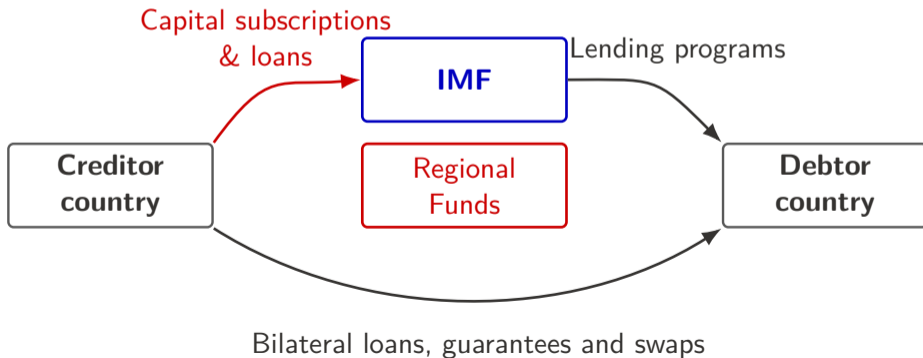
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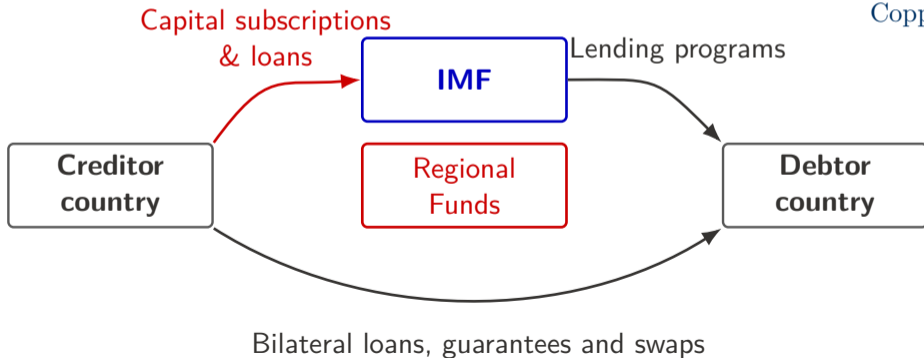
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Related approach:
Coppola et al. (2021)



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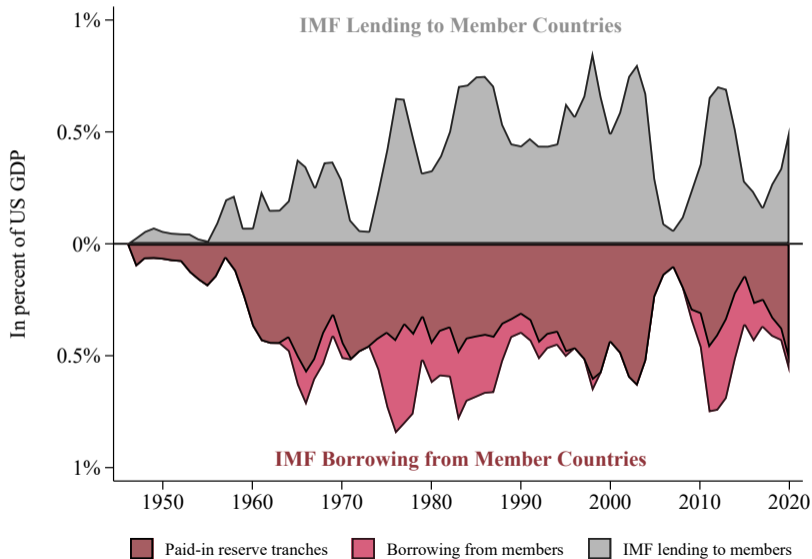
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- Finally, total multilateral lending from country j to country i in period t is:

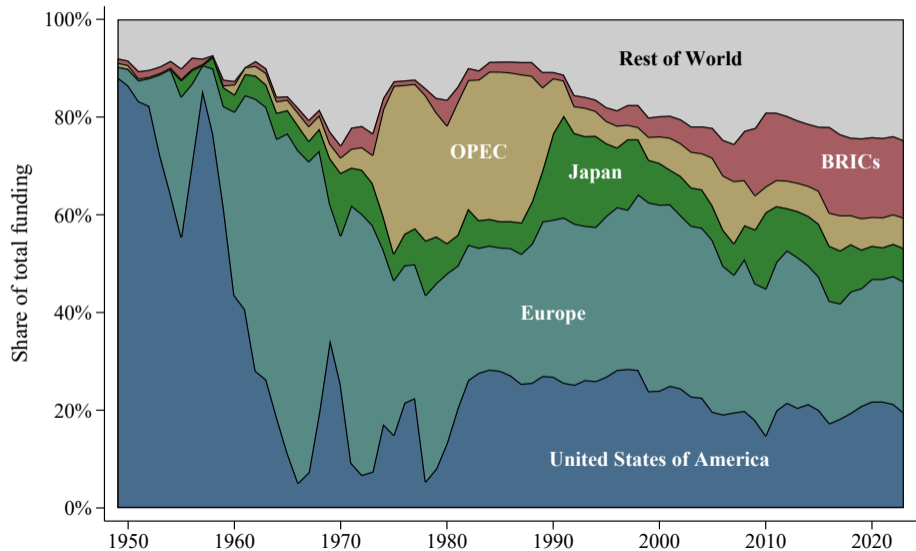
$$\sum_o LOAN_{ijot}$$

IMF borrowing and lending



Example: Who funds the IMF?

[▶ 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, subscribed 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.

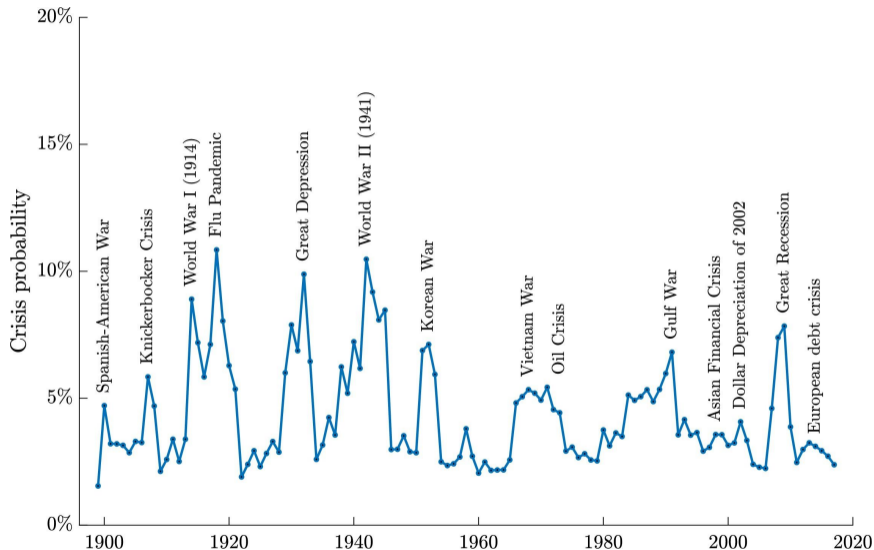
Agreement to establish European Monetary Fund, 1955

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

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

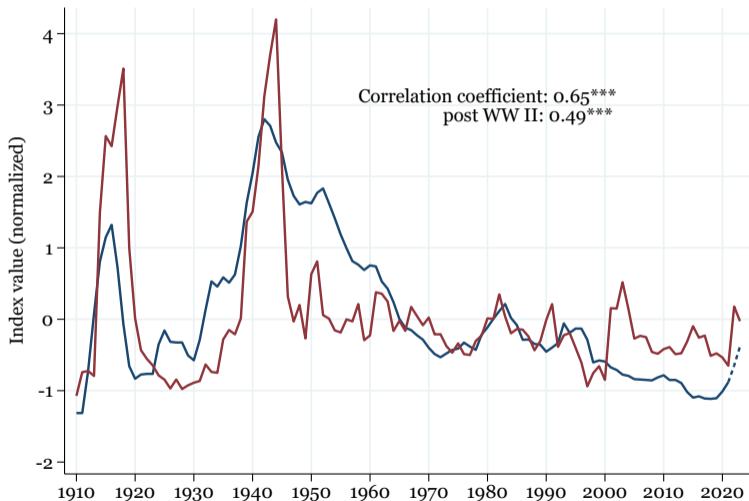
▶ back



Source: Marfe & Penasse (JFE, 2024)

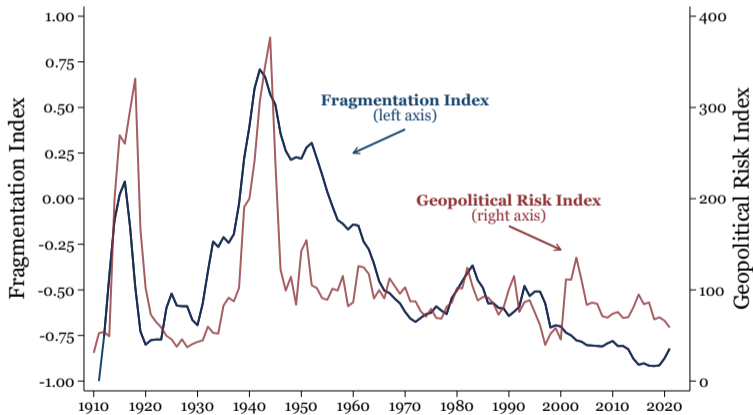
Fragmentation and geopolitical risk – Normalized

▶ back



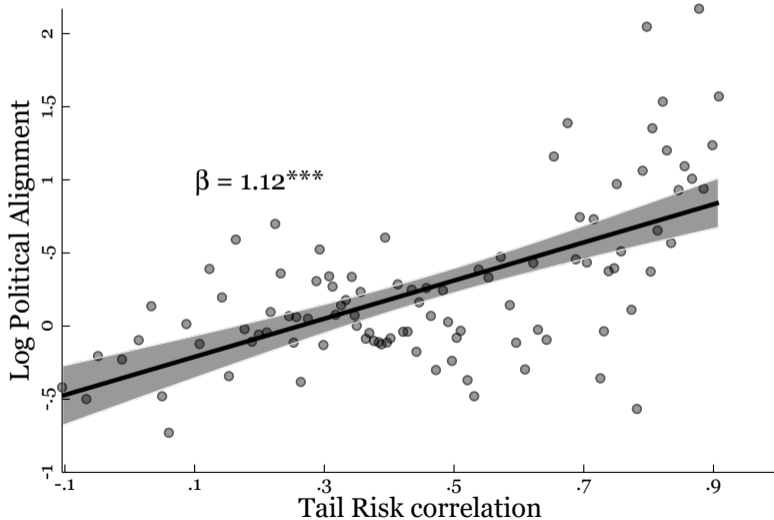
Fragmentation and geopolitical risk – bilateral + multilateral

▶ back



... and more synchronized macro tail risk

▶ back



Accum. of payment arrears on allies and rivals

▶ back

