Financial Cooperation in a Fragmented World*

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Abstract

This paper studies the effects of geopolitical risk on financial fragmentation and international risk-sharing based on a new dyadic dataset of official lending from 1910 to 2020. We show that in periods of high geopolitical risk, official lending increasingly follows patterns of geopolitical alignment. Because geopolitically aligned countries face more synchronized shocks, this fragmentation limits the effectiveness of international risk-sharing. To explain these patterns, we introduce geopolitical considerations into a limited-commitment model and show that, even with non-discriminatory default, higher geopolitical tensions redirect official lending toward aligned countries and weaken risk-sharing.

Keywords: geoeconomics, capital flows, financial cooperation, risk-sharing, fragmentation, sovereign default.

JEL classification: F34, H63, G01

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1 Introduction

The international order is undergoing a fundamental shift, with the world economy increasingly fractured along geopolitical lines. This process of geoeconomic fragmentation marks a departure from integrated markets and multilateral economic cooperation toward a world where trade and capital flows are shaped less by economic fundamentals and more by political alliances, strategic rivalries, and national security concerns. In response, a fast-growing literature is beginning to examine the economic ramifications of a more fragmented global order (see, e.g., Clayton, Maggiori, and Schreger, 2025; Broner, Martin, Meyer, and Trebesch, 2024).

Yet, key questions remain: How does geopolitical risk shape the international allocation of capital? To what extent does financial fragmentation hinder countries' ability to absorb shocks and share risk internationally? And what are the broader welfare implications?

In this paper, we study the effects of geopolitical risk on international financial cooperation and risk-sharing based on a new long-run dataset of official (government-to-government) lending over the past 100 years. This historical perspective allows us to look beyond the past decades of relative peace and stability and to study risk-sharing gains from cooperation in eras of low geopolitical tensions and global integration, as well as in times of heightened tensions and fragmented cooperation within competing blocs (e.g., the 1930s and the Cold War). On the theoretical side, we present a simple model of limited commitment and show how geopolitical factors can lead to an endogenous fragmentation in capital flows and hamper risk-sharing.

We document that during times of high geopolitical risk, official lending increasingly follows patterns of geopolitical alignment. We show this by constructing a long-run index of financial fragmentation that tracks the share of official lending that is extended within versus across geopolitical blocs. After reaching record highs during the two World Wars, our measure has been trending downwards for multiple decades. By 2020, on the eve of the War in Ukraine, the fragmentation of the global official lending landscape was lower than at any point in the preceding century. Since then, our index shows a pronounced rise in fragmentation, in line with rising geopolitical risk. We document that such a rise in fragmentation has important implications for the international sharing of disaster risk. Because geopolitically aligned countries

tend to be subject to highly correlated shocks and exhibit closely correlated business cycles, fragmentation limits the effectiveness of risk-sharing through official capital flows.

To rationalize these facts and assess their welfare implications, we develop a simple theory of geoeconomic fragmentation in capital flows. We present a model of sovereign borrowing with limited commitment, extended to incorporate geopolitical considerations, and show how rising geopolitical tensions redirect capital flows toward politically aligned countries and weaken international risk sharing.

In the model, the Home country can enter into state-contingent debt contracts with an Allied bloc, a Rival bloc, or both, and cannot commit to repaying its debts. We make two key assumptions. First, the main departure from standard models of limited commitment is that the Home country places a negative weight on the Rival bloc's welfare. This captures the government's desire to gain an advantage over its geopolitical rivals, and we refer to it as a "geopolitical externality." Second, the Home country cannot discriminate across creditors: it must either repay or default on all its creditors. The geopolitical externality implies that, when deciding whether to repay or default, the government cares about the composition of its liabilities—who gets repaid—not just their total size. Default triggers an income loss at Home, but it also eliminates debt payments to the Rival, thereby reducing the Rival's payoff. As a result, the Home country faces a stronger temptation to default when the Rival holds a large share of its debt.

We characterize the optimal state-contingent bilateral contracts in this environment. We show that an increase in geopolitical tensions—modeled as a rise in the disutility from the Rival bloc—shrinks the Home country's borrowing set and tilts the composition of feasible equilibrium portfolios toward the Allied bloc. In line with our empirical findings, heightened geopolitical tensions fragment capital flows along geopolitical lines. Moreover, when the geopolitical shock is sufficiently large, fragmentation is accompanied by a decline in international risk sharing.

Related literature. This paper contributes to the rapidly growing literature on geopolitical risk and fragmentation (Caldara and Iacoviello, 2022; Clayton, Maggiori, and Schreger, 2025, 2024; Clayton, Coppola, Maggiori, and Schreger, 2025; Broner, Martin, Meyer, and Trebesch, 2024), in both trade (Aiyar, Presbitero, and Ruta, 2023;

Fernandez-Villaverde, Mineyama, and Song, 2024; Kleinman, Liu, and Redding, 2024; De Souza, Hu, Li, and Mei, 2024) and finance (Aiyar, Malacrino, and Presbitero, 2024; Bianchi and Sosa-Padilla, 2024, 2025; Catalán, Fendoglu, and Tsuruga, 2024; Gopinath, Gourinchas, Presbitero, and Topalova, 2024; Kempf, Luo, Schäfer, and Tsoutsoura, 2023). See Aiyar, Presbitero, and Ruta (2023) and Mohr and Trebesch (2025) for overviews. We contribute to this literature by providing a long-run view on how geopolitical tensions drive fragmentation in international capital flows and by studying the potential ramifications of fragmentation, in particular for international risk-sharing.

Our empirical analysis focuses on official capital flows and builds on the data collection by Horn, Reinhart, and Trebesch (2024). We complement this data with newly collected information on the funding structure of multilateral institutions and trace official lending flows through international institutions back to their original source. This approach has a precedent in the work of Coppola, Maggiori, Neiman, and Schreger (2021) who restate bilateral international investment flows that are intermediated via tax havens by matching foreign subsidiaries located in these jurisdictions to their ultimate parent companies. They show that official bilateral investment statistics significantly understate the portfolio investment provided by developed-market investors to firms in large emerging economies. In contrast, our paper examines intermediation through global financial institutions by exploiting their funding structure and highlights the geopolitical implications.

This paper is also related to the large literature on international risk-sharing (Backus et al., 1992; Obstfeld and Rogoff, 2000). While this literature has primarily focused on private international capital flows (Lewis, 1996; Kose, Prasad, and Terrones, 2009; Bai and Zhang, 2012), our focus is on government-to-government lending and the risk-sharing properties of financial cooperation and the global financial safety net. Related studies on international official lending include empirical analyses of patterns of official flows (Barro and Lee, 2005; Horn, Reinhart, and Trebesch, 2024) and models of official lending and sovereign risk (Gourinchas, Martin, and Messer, 2025; Abraham, Carceles-Poveda, Liu, and Marimon, 2024; Arellano and Barreto, 2024; Liu, Liu, and Yue, 2024; Roldán and Sosa-Padilla, 2025). In contrast to these papers, our focus is on how geopolitical considerations shape the international allocation of capital.

Our findings on the interaction of political alignment and risk-sharing are closely related to those found in the large literature on risk-sharing networks between households. Going back to the seminal contributions of Cochrane (1991) and Townsend (1994), this literature has studied how households use gifts and loans to share idiosyncratic income risk in environments of limited enforcement. While theoretical work has emphasized the role of reciprocity and repeated interaction in overcoming enforcement problems (Kocherlakota, 1996; Ligon et al., 2002; Dubois et al., 2008), empirical studies show that risk-sharing networks predominantly follow preexisting family and kinship ties, which come with highly correlated income profiles and shock exposures and therefore limit the scope for risk-sharing.

Finally, our paper also relates to the sovereign-default literature in the tradition of Eaton and Gersovitz (1981), Aguiar and Gopinath (2006), and Arellano (2008). A central aspect of our model, common with Brutti (2011), Broner, Martin, and Ventura (2010), and Gennaioli, Martin, and Rossi (2014), is the inability to discriminate across lender types—here, across aligned and misaligned countries. While this work emphasizes that domestic intermediaries' holdings of government bonds make default costly for the sovereign, we instead study how geopolitical frictions tilt issuance toward aligned countries. In a different vein, Broner, Erce, Martin, and Ventura (2014) develop a framework with creditor discrimination and link it to the post-crisis nationalization of sovereign debt in the Euro area.

Layout. This paper is structured as follows. Section 2 introduces our new dyadic dataset of international official lending through bilateral and multilateral channels. Section 3 presents the key empirical findings. Section 4 presents a theoretical model of limited commitment extended with geopolitical considerations. Section 5 concludes. The Appendix contains the details on the construction of the dataset and our financial fragmentation index, and the proofs of the theoretical analysis.

2 A new dataset of the official safety net

This section introduces our new dyadic dataset of international official lending. We present the key definitions, sources, and principles of data construction and point interested readers to Appendix Section B for further details.

2.1 Definitions and concepts

Our data collection focuses on international *official* lending, that is, lending between governments, either bilaterally or through an international organization.[1] We aim to capture all loans, grants, and guarantees that governments (and their state-owned agencies) extend to foreign governments. Official financial assistance can take two distinct forms: bilateral and multilateral lending. Bilateral lending refers to transactions that are directly extended by a creditor country sovereign to the recipient country sovereign. In contrast, multilateral lending is extended by international financial institutions that are established through political agreements among multiple member countries (International Monetary Fund, 2014; OECD, 2018).

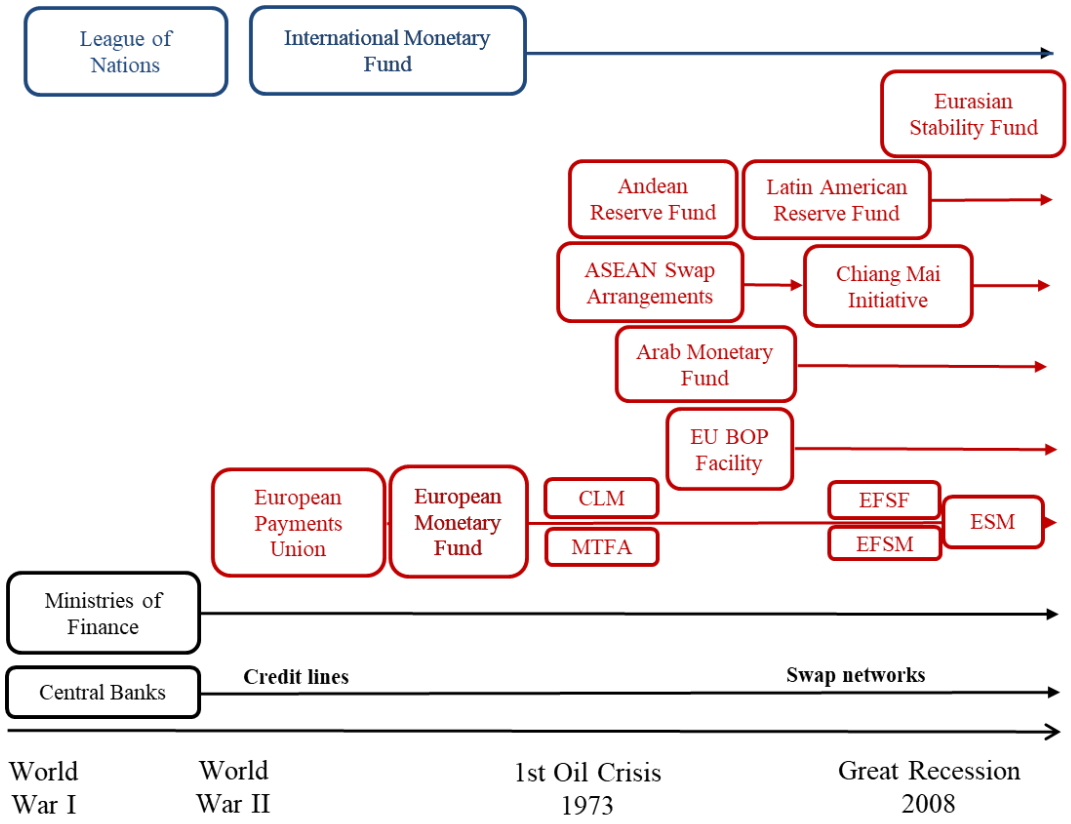
Figure 1 provides a stylized overview of the key institutions and arrangements over the past 100 years, which together are commonly referred to as the "Global Financial Safety Net" (Scheubel and Stracca, 2019). In the first half of the 20th century, official lending was almost exclusively carried out through bilateral channels.[2] After World War II, multilateral arrangements—most notably the IMF—began to play a central role in official lending. Additionally, a growing number of regional financial arrangements, such as the European Stability Mechanism (ESM) and its predecessor institutions in Europe or the Fondo Latinoamericano de Reservas (FLAR) in Latin America, have emerged as important expansions of the Global Financial Safety Net.

Multilateral lending institutions collect and pool funds from their member countries (and private markets) and lend them to other member countries, acting as intermediaries. Figure 2 illustrates this process. A key contribution of this paper is to introduce a new database on the liability structure of multilateral creditors that allows us to trace multilateral lending back to its original funding source. This data allows for a mapping of multilateral flows to their country of origin and thus for the creation of a fully dyadic (creditor-to-debtor country) dataset of official lending.

[1] Our data collection largely follows the widely used definition of official lending by OECD (2018). See Appendix Section B for details.

[2] The one notable exception is stabilization loans extended under "the auspices of the League of Nations' during the 1920s. See Appendix B.3.1 for details.

Figure 1: The Global Financial Safety Net, 1910-2020

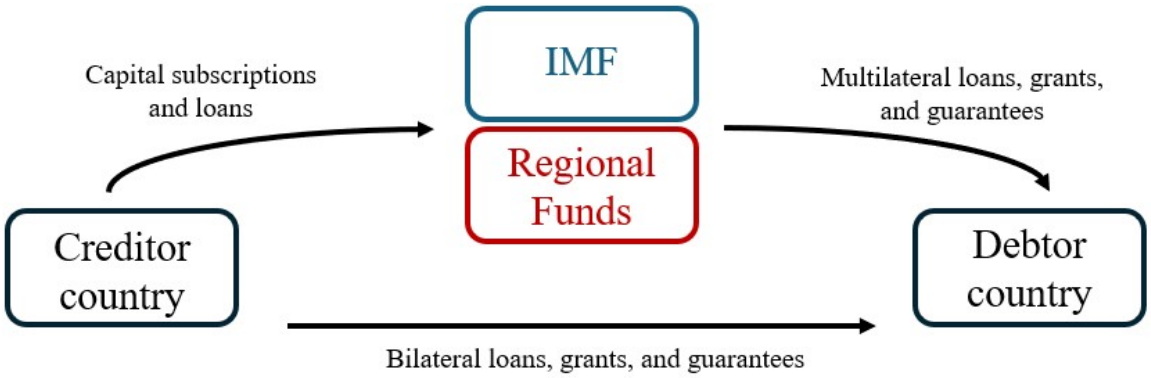


Note: This Figure provides a stylized representation of the Global Financial Safety Net over the past 100 years. It distinguishes between bilateral lending arrangements (in black), regional lending arrangements (in red), and global multilateral forms of lending (in blue). See Appendix Section B.3 for details and abbreviations.

2.2 Data construction

Our data collection builds on and expands the official international lending data collected by Horn et al. (2024). This data source features granular information on cross-border official lending by bilateral creditors and multilateral creditor organizations since 1800. We expand this data source by merging it with newly collected data on the funding structure of multilateral creditors, which allows us to trace official lending flows through international organizations and back to their original source.

Figure 2: Bilateral and multilateral official lending



Note: This figure provides a stylized illustration of the official lending process through bilateral and multilateral arrangements. See Appendix Section B.3 for a detailed discussion at the creditor entity level.

Specifically, we track the funding structure of the 16 different multilateral creditor organizations that are shown in Figure 1 above.[3] For this purpose, we first conduct a systematic review of the funding structures of these organizations by tracking their annual reports and balance sheets over the full life cycle of each institution's existence. Our review reveals that multilateral creditors have primarily relied on two different forms of financing from their member countries. First, and most importantly, member countries provide paid-in capital in the form of hard currency. With respect to the IMF, for example, member countries put a share of their foreign exchange reserves at the disposal of the IMF (the so-called reserve tranche). Secondly, multilateral creditors have supplemented paid-in capital by borrowing through standing credit lines. Borrowing either takes the form of direct borrowing from member country treasuries and central banks or of borrowing in private capital markets against the paid-in capital or explicit financial guarantees of member countries (James, 1996; Cheng and Lennkh, 2019).

As explained in much greater detail in Appendix Section B, we use dozens of country and organization-specific sources to track both paid-in quota resources and

[3]We focus on these multilateral creditors since they are explicitly mandated to provide funding to help recipients cope with negative shocks and crises. The analysis could be extended to other multilateral institutions that provide financing for development (e.g., the World Bank or Regional Development Banks) or for other public goods (e.g., the World Health Organization or the United Nations) (see Horn et al., 2024, for a comprehensive overview of different multilateral lending agencies). Given their mandates, these institutions, however, are arguably less relevant for the mitigation of financial crisis and the international sharing of risk.

outstanding lending to multilateral creditors by their member countries. On this basis, we derive each member country's funding share in a multilateral creditor institution as follows:

$$\omega_{jto} = \frac{PAID.IN_{jto} + CREDIT_{jto}}{\sum_{k}^{N} (PAID.IN_{kto} + CREDIT_{kto})}$$

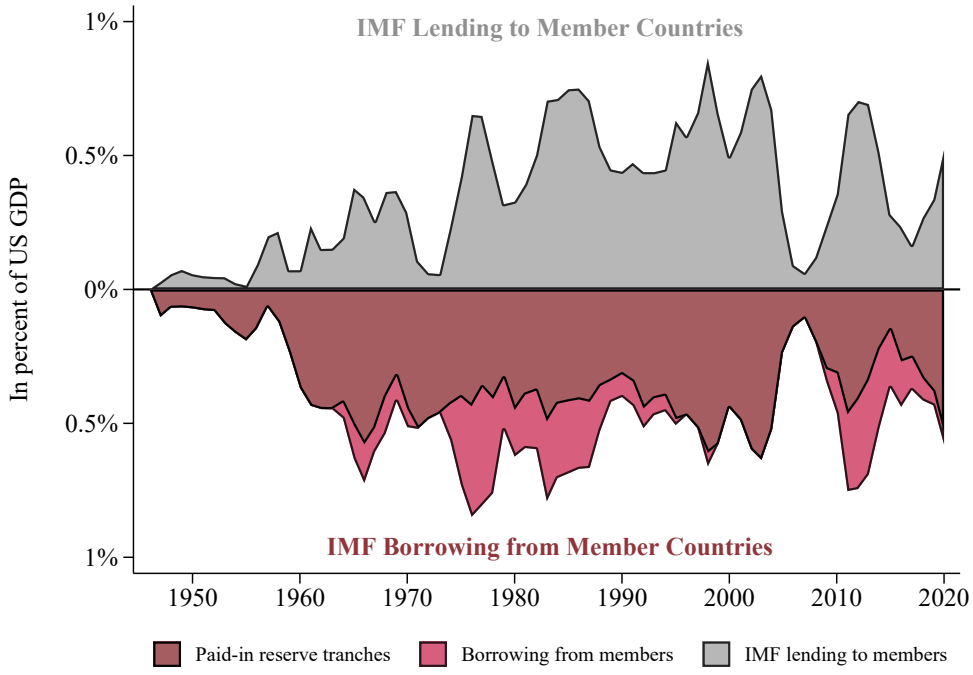
where $PAID.IN_{jto}$ represents the capital that country j has paid into the multilateral creditor organization o in year t, and $CREDIT_{jto}$ presents any outstanding credit by country j to organization o. Once funding shares are constructed, we map multilateral into dyadic flows by assuming that each sovereign creditor's share in a multilateral loan is proportional to its funding share of the corresponding multilateral organization in the same year.

Tracing in- and outflows to the IMF: To illustrate our novel database on the liability structure of multilateral creditors, we proceed by presenting data on lending by and through the International Monetary Fund.[4] Panel A of Figure 3 shows the liabilities and assets of the IMF as a share of US GDP and illustrates the time variation in IMF funding and lending. While the IMF's outstanding lending programs (in grey) have received considerable attention in the literature (see e.g. Barro and Lee, 2005; Reinhart and Trebesch, 2016; Horn et al., 2024), much less is known about the IMF's funding operations (shown in red).

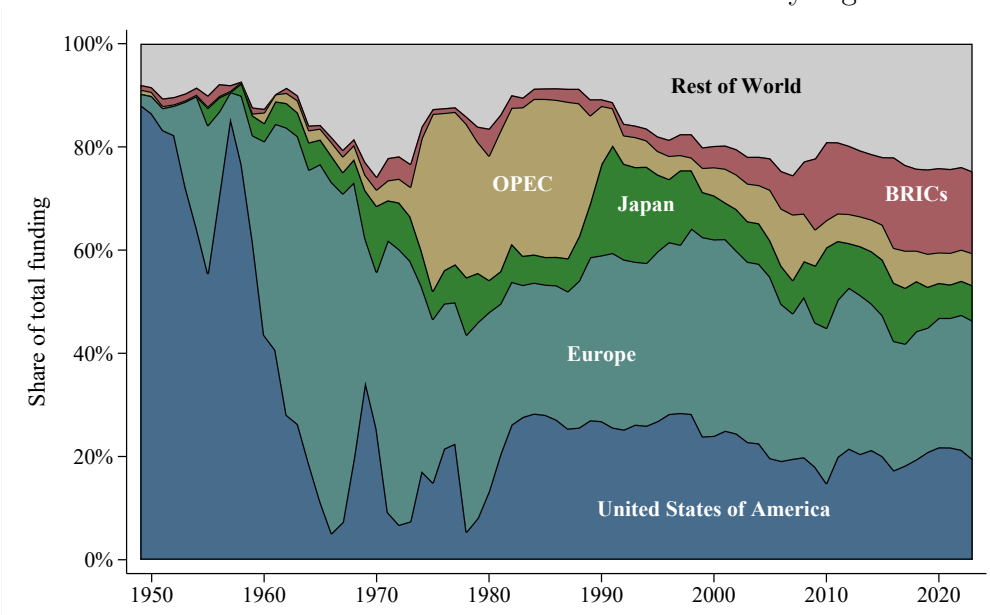
[4]Appendix Sections B.3.1 and B.3.3 provide similar discussions of lending by the League of Nations and regional financial arrangements.

Figure 3: International official lending through the IMF

Panel A. IMF: Outstanding assets and liabilities, 1945-2020



Panel B. Who funds the Fund? IMF liabilities by region



Note: This figure shows how the IMF functions as an intermediary for international official lending. Panel A shows IMF assets (in grey) and liabilities (in red) in the form of reserve tranches and credit lines. All values are scaled by the GDP of the largest shareholder, the US. Panel B shows the share of funding ω - as defined above - by different regional groups over time.

Panel A of Figure 3 shows that the IMF's lending operations increase in response to widespread global crisis and that these increases in outstanding credit need to be met with comparable increases in member country contributions to the IMF, which primarily come in the form of paid-in reserve tranches. During times of high demand for IMF funds, however, the IMF has repeatedly activated borrowing facilities and drawn additional funding from selected members.[5]

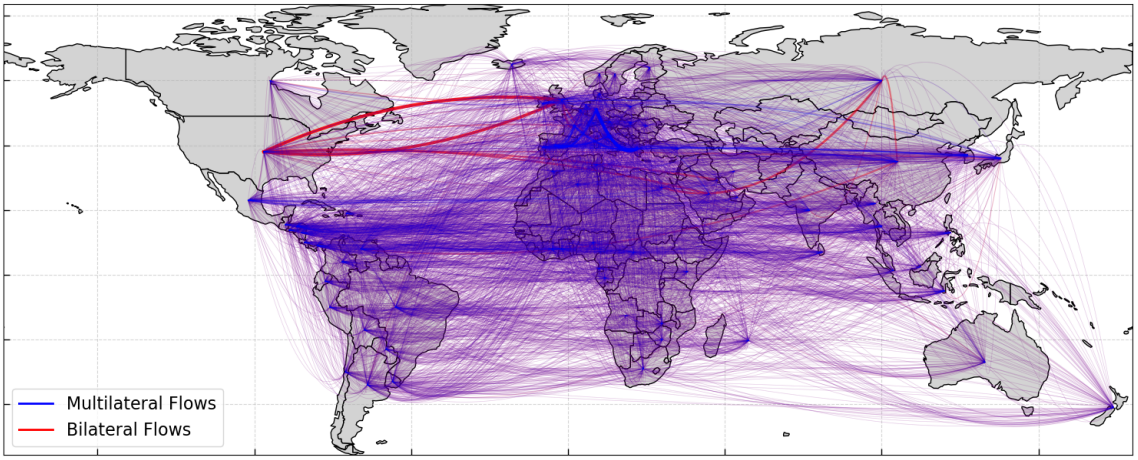
As a consequence of these distinct funding modes, funding shares in the IMF display significant time variation. Panel B of Figure 3 illustrates this point by showing IMF funding shares of different country groups over the course of the Fund's history. During the oil price crises of the 1970s, for example, the Fund substantially increased its funding from OPEC countries by setting up bilateral borrowing lines. Official recycling of petrodollars allowed oil importers such as Western European countries and the US to reduce their contributions to the Fund at times, when they faced high demand for reserve assets themselves. Similarly, during the 1960s, when the US and the UK, along with other advanced countries, came under market pressure and sought IMF assistance to finance the defense of the Bretton Woods system, selected Western European surplus countries, such as Germany and the Netherlands, stepped in and provided the Fund with additional resources via bilateral credit (James, 1996). In recent decades, a larger part of the IMF's financing burden shifted towards Japan (in the 1990s) and China (in the 2000s), which made use of bilateral credit lines with the IMF to recycle parts of their large current account surpluses.

2.3 Final dataset

Our final dataset covers official lending extended by 132 creditor economies to 198 debtor economies since 1910. The total value of lending that we capture amounts to more than 8 trillion USD in 2015 terms. The entire dataset is dyadic, i.e., the observational unit is the creditor-debtor-year level. Figure 4 illustrates the data and the magnitude of flows through bilateral and multilateral arrangements over the past 100 years.

[5]Prominent examples of IMF borrowing arrangements include the General Agreements to Borrow (established during the defense of Bretton Woods exchange rate arrangements in 1962) and the Oil Facilities, through which the IMF borrowed additional funds from OPEC countries during the Oil Crises of the 1970s. See Appendix Section B.3.2 for a detailed list and James (1996) for a detailed historical account of these episodes.

Figure 4: Official lending through bilateral and multilateral channels, 1910 - 2020



Notes: This figure shows our dyadic official lending data through bilateral (in red) and multilateral (in blue) channels. Line width is proportional to total lending amounts. See text and Appendix Section B for details on sources and data construction.

To study risk-sharing properties, we combine the official capital flow data with different measures of creditor and debtor economy business cycles and macroeconomic tail risk. Our primary measure is an indicator of macroeconomic tail risk developed by Marfè and Pénasse (2024). This measure has the advantage of being available for more than 100 years and for a broad cross-section of more than 40 major emerging and advanced countries. For further details on these variables, see Appendix Section C.3.

3 Geopolitical risk, fragmentation, and risk-sharing

In this section, we use our new data to present three empirical facts on the interaction between geopolitical risk, fragmentation, and international risk-sharing. First, we document that official lending fragments along geopolitical lines during periods of heightened geopolitical risk (Stylized Fact I). Second, we show that politically aligned countries tend to exhibit more synchronized business cycles and more correlated macroeconomic tail risks (Stylized Fact II). As a result, fragmentation in lending limits the scope for international risk-sharing (Stylized Fact III). We discuss each of these findings in turn.

Fact 1. *During episodes of high geopolitical risk, official flows follow geopolitical alignment.*

We begin our analysis by studying the dynamics of official lending flows during episodes of high geopolitical risk. A key advantage of the long-run lending data is that it allows us to look beyond recent decades of relative peace and stability and to study earlier episodes of intense geopolitical rivalry and conflict. With respect to private capital flows and for the more recent past, Catalán, Fendoglu, and Tsuruga (2024) and Aiyar, Malacrino, and Presbitero (2024) show that private investment is increasingly allocated towards geopolitically friendly countries when geopolitical risk is high. To test whether official flows exhibit similar dynamics, we proceed in two steps. We begin our analysis with a simple non-parametric approach that measures the degree of fragmentation of international official lending over the past 100 years. In a second step, we estimate local projections to trace out the dynamic response of financial fragmentation to increases in geopolitical risk.

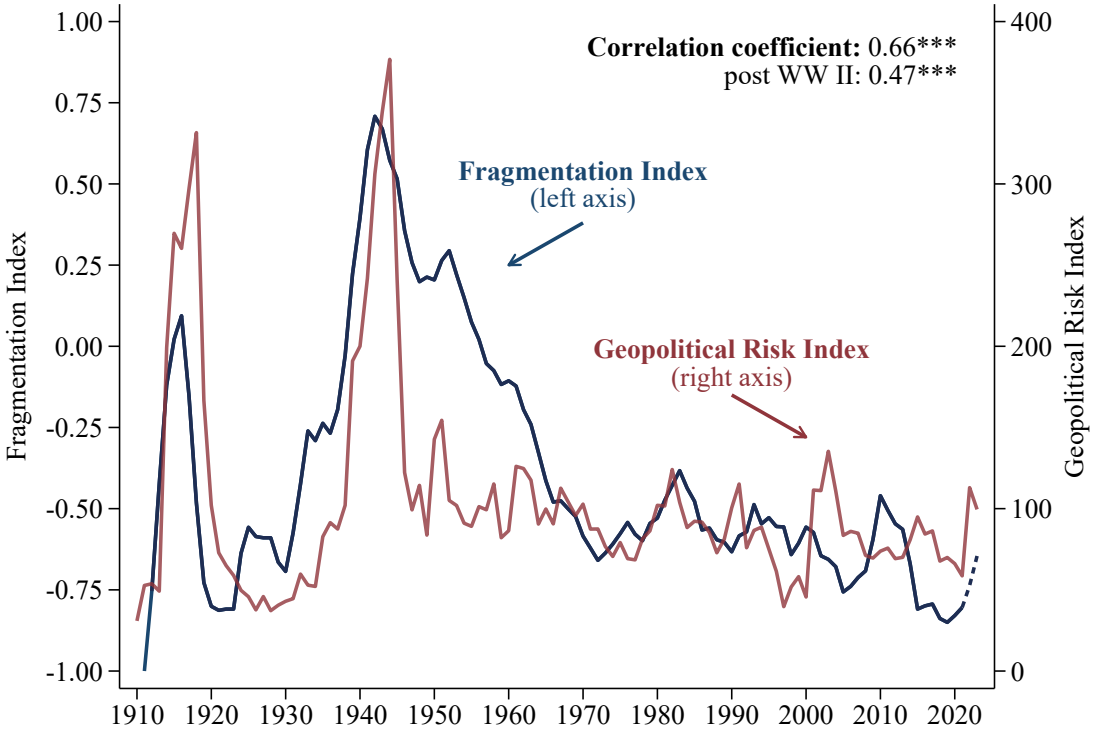
More specifically, we construct a *fragmentation index* that measures the extent to which official lending occurs *within* versus *across* geopolitical blocs. To categorize country pairs into blocs over time, we rely on military alliances as coded by the Correlates of War project (Gibler and Sarkees, 2004; Gibler, 2009) and compute the total volume of lending that is transferred between allies and the total volume that

occurs between non-allied countries. The fragmentation index is then derived as follows:

$$\text{Fragmentation Index}_t = \frac{\text{Lending between allies}_t - \text{Lending between non allies}_t}{\text{Total lending}_t} \quad (1)$$

This measure resembles External-Internal (E-I) indices commonly used in network analysis (Krackhardt and Stern, 1988). Positive values indicate that lending is concentrated within blocs (i.e., 'fragmented'), whereas negative values signal a high share of lending across blocs.

Figure 5: Fragmentation and geopolitical risk, 1910-2023



Notes: This figure shows our novel fragmentation index (blue line) and geopolitical risk (red line) as measured by Caldara and Iacoviello (2022). To ease visualization, the fragmentation index is displayed as a five-year moving average. The dashed line for the years 2021 to 2023 indicates that data collection is still preliminary. See text and Appendix B for details on sources and data construction.

Figure 5 shows the resulting index over the past one hundred years (in blue) and plots its co-movement with geopolitical risk as measured by Caldara and Iacoviello (2022) (in red). Both indices show a strong and positive correlation of 0.66. This

positive comovement is particularly strong during the two World Wars, which stand out as times in which official lending almost exclusively followed along lines of geopolitical alignment (also see Horn et al., 2024) and during which geopolitical risk spiked. Fragmentation of lending remained elevated throughout the height of the Cold War in the 1950s and 1960s and then began a slow and persistent downward trajectory in an environment of low geopolitical risk after the collapse of the Soviet Union. By 2020, on the eve of the War in Ukraine, the fragmentation of the global official lending landscape was lower than at any point in the preceding century. Russia's war on Ukraine significantly altered this long-run trend and triggered a significant uptick in financial fragmentation, driven by increased lending between Western allies and Ukraine (Trebesch et al., 2023).[6]

The aggregate dynamics displayed in Figure 5 conceal large heterogeneity in lending patterns at the country and country-dyad level. They also leave open the question of whether the association of fragmentation and geopolitical risk is driven by other—observed or unobserved—factors. To address these questions, we construct country-level versions of the fragmentation index in Figure 5, by looking at the inflow each country receives from allies and non-allies, respectively. We then use them to estimate the dynamic impact of geopolitical risk on fragmentation using the following panel local projection specification:

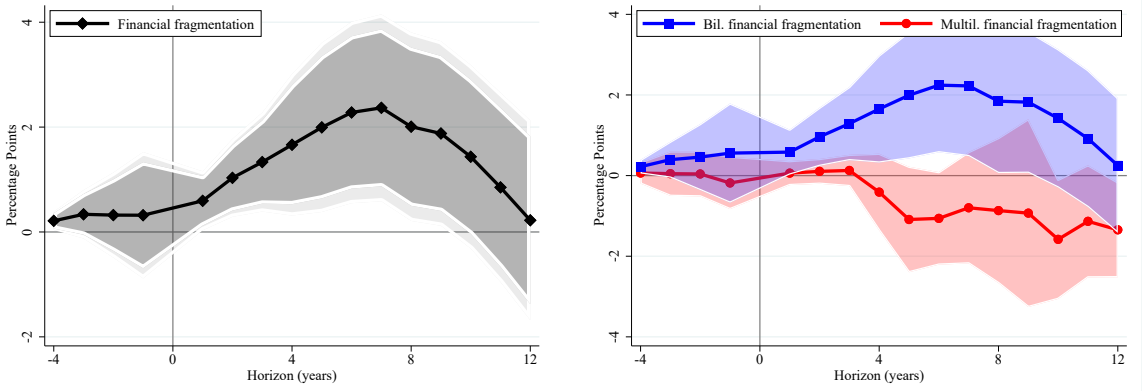
$$Fragm_{i,t+h} - Fragm_{i,t-1} = \alpha^h + \beta^h GPR_{i,t} + controls_{i,t} + \eta_i^h + \psi_t^h + \epsilon_{i,t}^h \,, \qquad (2)$$

where the dependent variable is the h-years ahead cumulative change in financial fragmentation for country i. The coefficient that captures this effect is β^h, which multiplies country-specific geopolitical risk. The controls we include in the specification encompass country i's real GDP, its exports and imports expressed in constant USD, its disaster risk, as well as several indicators for financial, banking, and sovereign debt crises. Furthermore, we add country and time fixed effects. Standard errors are clustered at the country level.

[6]The values for our fragmentation index after 2020 are still preliminary, given that some of the underlying data sources on bilateral lending are only published with considerable time lags (see Horn et al. (2024) for details). For those subsets of the data where no recent updates are yet available, we construct the index under the assumption that the share of allied versus non-allied lending has remained constant. As a result, the shown increase in fragmentation (the dashed line) is likely to understate the true increase in fragmentation.

Figure 6a shows that a 10% increase in a country's geopolitical risk increases the fragmentation of its borrowing within one year, with the effect peaking at around 2 percentage points and persisting for several years. Extrapolating linearly, a 200% increase in geopolitical risk (such as during the World Wars) would correspond to roughly a 40 percentage point increase in fragmentation or an increase in the fragmentation index from, for example, 0 to 0.4. Geopolitical shocks can have massive implications for the allocation of official lending between and across allies. Figure 6b breaks down this result into bilateral and multilateral lending. As expected, the increase in fragmentation after a geopolitical risk increase comes almost exclusively from bilateral lending, while the response of fragmentation in multilateral lending is not significantly different from zero.

Figure 6: Dynamic impact of geopolitical risk on financial fragmentation



(a) Total financial fragmentation **(b)** By lending type

Notes: This figure shows the dynamic response of financial fragmentation - measured at the country level - to increases in geopolitical risk in a panel local projection specification. Controls include real GDP, imports, exports, tail risk, and several crisis indicators. All specifications include country and year fixed effects. The shaded areas represent 90 and 95 % confidence intervals in panel (a) and 95% confidence intervals in panel (b). Standard errors are clustered at the country level.

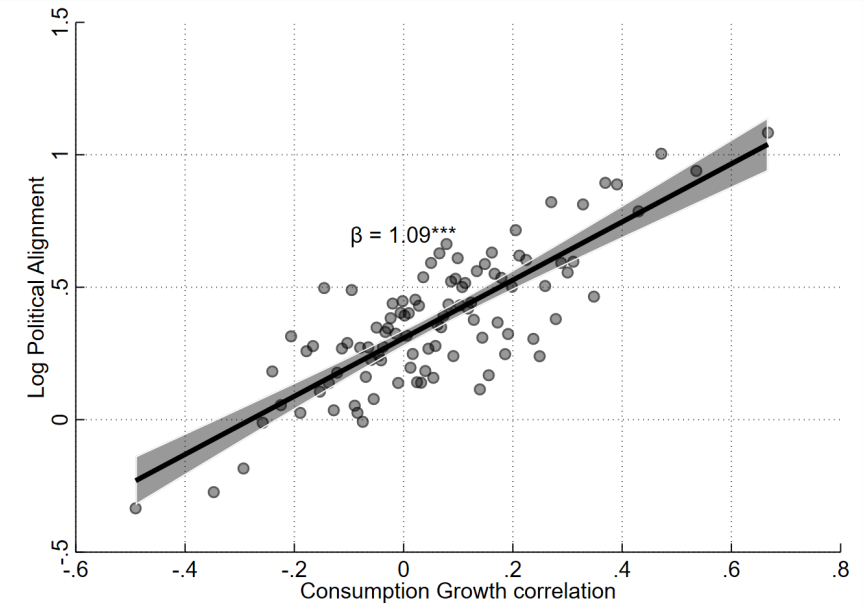
Taken together, these results provide strong evidence for the fragmentation of official lending under high geopolitical risk. When geopolitical tensions rise, bilateral lending increasingly follows geopolitical fault lines.

Fact 2. *Aligned countries have synchronized business cycles.*

We have established that official lending tends to follow geopolitical alignment when geopolitical risk rises. What does this imply for the risk-sharing benefits of international financial cooperation? A key determinant of the scope for international risk-sharing is the degree to which countries experience correlated shocks. If countries face highly synchronized business cycle dynamics, the scope for mutually beneficial insurance is limited (Backus et al., 1992; Obstfeld and Rogoff, 2000).

To examine whether geopolitical alignment is associated with more synchronized macroeconomic fluctuations, we analyze the relationship between political alignment and business cycle co-movement at the country-pair level. Specifically, we compute the pairwise correlation of real consumption growth between countries and relate it to their average level of political alignment, measured using similarity in UN General Assembly voting (Bailey et al., 2017).

Figure 7: Politically aligned countries have more synchronized business cycles



Note. This figure shows the correlation between (log) average political alignment and the correlation of consumption growth at the country-pair level. Country pairs are sorted into 100 bins according to the correlation of consumption growth, and the figure plots the average political alignment within each bin. We also show a linear fitted line and a 95% confidence interval. Data on UN voting is from Bailey et al. (2017), and consumption is from the Penn World Tables (Feenstra et al., 2015).

Figure 7 plots this relationship. Each observation represents a bin of country pairs, with the horizontal axis reporting the correlation of consumption growth and

the vertical axis showing the average degree of political alignment. The figure reveals a clear positive relationship: countries that are more closely aligned politically tend to exhibit significantly more synchronized business cycles.

This pattern suggests that geopolitical allies are exposed to more similar macroeconomic shocks. Such synchronization may arise through multiple channels, including stronger trade integration, shared geopolitical shocks, or shorter geographic distance. Whatever the underlying mechanism, the result suggests that financial cooperation within geopolitical blocs provides less scope for risk-sharing, because lenders and borrowers are more likely to experience shocks at the same time.

Appendix Figure A3 shows that this relationship extends beyond business cycle fluctuations. Politically aligned countries also exhibit more strongly correlated macroeconomic disaster risk, measured using the tail-risk indicator of Marfè and Pénasse (2024). We also document that the result holds when using formal alliances, as measured by Gibler and Sarkees (2004), instead of UN voting similarity (see Figure A4).

Fact 3. *Fragmentation in official lending limits the scope of risk-sharing.*

In this subsection, we turn to the risk-sharing properties of official lending flows by studying their cyclical co-movement with macroeconomic tail risk in both the debtor and creditor economies. In particular, we ask whether official lending reallocates resources from countries facing relatively low macroeconomic tail risk to countries facing higher risk, and whether this pattern changes when lending occurs between geopolitically aligned partners.

To address this question, we exploit the dyadic structure of our data and estimate the following specification:

$$\begin{aligned} Flow_{ijt} = \alpha_{ij} + \beta \times (TailRisk_{i,t}^{debtor} - TailRisk_{j,t-1}^{creditor}) + \gamma \times alliance_{ij} \\ + \psi \times alliance_{ij} \times (TailRisk_{i,t}^{debtor} - TailRisk_{j,t-1}^{creditor}) + \theta_{ij} + \delta_t + \epsilon_{ijt} \end{aligned} \quad (3)$$

The dependent variable is the lending flow in constant USD by creditor country j to debtor country i in year t (through both bilateral and multilateral channels). The main explanatory variable of interest is the difference between debtor country i's and creditor country j's level of macroeconomic tail risk, as measured by Marfè and

Pénasse (2024). This differential captures the scope for forward-looking risk-sharing: when a country facing relatively low macroeconomic risk lends to a country facing higher risk, lending serves as a form of insurance against adverse shocks.

Table 1: International risk-sharing through official lending

	Dep. variable: Dyadic lending flows			
	(1)	(2)	(3)	(4)
Tail risk difference	4.08***	3.74***	4.48***	4.28***
	(0.32)	(0.40)	(0.35)	(0.43)
Alliance			0.74***	0.25**
			(0.13)	(0.10)
Tail risk × Alliance			-1.49**	-1.66*
			(0.71)	(0.95)
Observations	75749	72262	75749	72262
Sample	1910 - 2020	1910 - 2020	1910 - 2020	1910 - 2020
Dyad FE		✓		✓
Year FE		✓		✓

Notes: PPML regression results using gross bilateral lending commitments as dependent variable (in real USD). All explanatory variables enter with lagged values. The models include creditor and debtor fixed effects and additional time varying controls (debtor and creditor GDP, democracy, population). Robust standard errors, clustered at the creditor-debtor dyad, are shown in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level.

Table 1 reports the results from Poisson Pseudo Maximum Likelihood (PPML) estimations with different fixed effects. Across specifications, the coefficient on the tail-risk differential is positive and statistically significant. This indicates that official lending tends to flow from relatively safe to relatively risky economies. In this sense, financial cooperation through official lending contributes to international risk-sharing.

Columns (3) and (4) examine how this relationship changes when lending occurs between allied countries. The interaction between the alliance dummy and the tail-risk differential is negative and statistically significant. This implies that the risk-sharing properties of official lending are weaker when flows occur between geopolitically aligned countries.

Takeaway. Taken together, these facts reveal the state-contingent nature of official lending as a global stabilizer. Official lending flows reallocate resources from safer to

riskier economies, but the capacity to insure against shocks depends on geopolitical risk and fragmentation. When geopolitical risk rises, lending shifts toward politically aligned partners with highly synchronous business cycles, thereby limiting the scope for international risk sharing.

4 Model

In this section, we present a model of sovereign borrowing with limited commitment and geopolitics. The three empirical facts documented above motivate the key ingredients of the model: geopolitical alignment maps to the Allied/Rival bloc structure, and the degree of geopolitical tension is captured by a "geopolitical externality," controlled by parameter η. We use the model to articulate how rising geopolitical tensions lead to more fragmented capital flows and a reduction in risk-sharing.

4.1 Environment

There are three country blocs: a Home country, an Allied bloc, and a Rival bloc. The total mass of the world economy is normalized to one, and each bloc has equal measure. The key distinction between the Allied bloc and the Rival bloc is that the Home country places a negative value on the welfare obtained by the Rival bloc. We think about Europe as the Home country, the US as the Allied bloc, and China as the Rival bloc.

Endowments, shocks, and timing. There are two dates, $t = 1, 2$. At $t = 2$, the economy is hit by an aggregate income shock, with state $s \in S$ occurring with probability $\pi(s)$. We assume that households in the home country are risk-averse, which gives them a motive to smooth consumption across states, whereas foreign households are risk-neutral and therefore value payoffs only in expected terms.

At $t = 1$, before the resolution of uncertainty, the home country signs a bilateral state-contingent contract with each of the foreign blocs. We abstract from trade

between the Allied and the Rival blocs.[7] At $t = 2$, given the realized state and the outstanding debt positions, the home country either repays or defaults.

Home country. The home country's preferences over period-2 consumption $\{c(s)\}_{s\in S}$ are given by

$$\sum_{s\in S} \pi(s)\big[u(c(s)) - \eta V^*\big].$$

where u is a continuously differentiable, strictly increasing, and strictly concave utility function, and V^* denotes the welfare of the Rival bloc, to be explained below. Following Bianchi and Sosa-Padilla (2024), we refer to this as a "geopolitical externality," which captures in a simple way the quest of a country to prevail over its geopolitical rivals.

In period $t = 2$, the Home country receives its income $y(s)$, collects the returns of the claims, chooses to make payments or not on its debt, and consumes. As is standard in the literature on sovereign default (e.g., Brutti, 2011, Broner et al., 2010, and Gennaioli et al., 2014), we assume the Home country government cannot default selectively; if it defaults on any lender, it defaults on all lenders. In Appendix A.4, we test this assumption in bilateral data of missed principal and interest payments during sovereign default episodes over the past fifty years. In line with the non-discriminatory default assumption, we find no systematic evidence that sovereigns discriminate against rival countries when accumulating arrears. In addition, we assume that if the country defaults on the claims it owes to a certain bloc, it keeps any positive claims it may hold against the other bloc.

We let $\tilde{a}(s)$ and $a^*(s)$ denote the state-contingent payoffs owed to the Allied and Rival blocs, respectively, where a positive value represents a debt for the home country. If the home country repays in state s, its period-2 budget constraint is

$$c(s) = y(s) - \tilde{a}(s) - a^*(s)\,. \tag{4}$$

[7] Because foreign blocs are both risk-neutral, there would be no trade between foreign blocs in the absence of geopolitical factors. However, it is possible to extend the framework to allow for trade between the two foreign blocs. If the Allied bloc does not feature a disutility over the Rival bloc's welfare, it could act as an intermediary between the Home and Rival blocs. To the extent that the Allied bloc faces the same disutility as the home country, our results would remain qualitatively unchanged.

If instead the home country defaults, income is reduced by the proportional cost $\phi \in [0, 1)$, and only claims in the home country's favor (i.e., negative positions on $\tilde{a}(s)$ and $a^*(s)$) are honored. The period-2 budget constraint in this case is

$$c(s) = (1 - \phi)\, y(s) - \tilde{a}_-(s) - a^*_-(s)\,, \tag{5}$$

where the payoff of each contingent claim in default is defined by

$$\tilde{a}_-(s) := \min\{0, \tilde{a}(s)\}, \quad a^*_-(s) := \min\{0, a^*(s)\}.$$

Foreign blocs. At $t = 1$, the foreign blocs trade state-contingent claims with the home country. We denote by $\tilde{y}(s)$ and $y^*(s)$ the endowment of the Allied and Rival blocs, respectively. At $t = 2$, foreign blocs collect any returns on the claims or make payments. The period-2 utility values are given respectively by

$$\tilde{V}(\tilde{a}, s) = \sum_{s \in S} \pi(s) \left[\tilde{y}(s) + (1 - d(s))\tilde{a}(s) + d(s)\tilde{a}_-(s)\right]\,, \quad \text{and} \tag{6}$$

$$V^*(a^*, s) = \sum_{s \in S} \pi(s) \left[y^*(s) + (1 - d(s))a^*(s) + d(s)a^*_-(s)\right]\,, \tag{7}$$

where a repayment decision by the Home country is given by $d(s) = 0$, and a default decision is given by $d(s) = 1$.

We assume that the Allied and Rival blocs must have positive consumption in each state. That is

$$\tilde{y}(s) + (1 - d(s))\tilde{a}(s) + d(s)\tilde{a}_-(s) \geq 0\,, \quad \text{and} \tag{8}$$

$$y^*(s) + (1 - d(s))a^*(s) + d(s)a^*_-(s) \geq 0\,. \tag{9}$$

These two constraints will impose restrictions on the amount of insurance that the foreign blocs can provide to the home country.[8]

[8] These constraints can also be motivated by limited commitment on the side of the foreign blocs.

4.2 Equilibrium

We solve for the optimal bilateral contracts subject to incentive-compatibility and participation constraints. At $t = 2$, given the realized state s and portfolio $(\tilde{a}(s), a^*(s))$, the Home country decides whether to repay ($d(s) = 0$) or default ($d(s) = 1$). Its value in state s is

$$V_2(\tilde{a}, a^*; s) = \max \Bigg\{ \underbrace{u\big(y(s) - \tilde{a}(s) - a^*(s)\big) - \eta\big(y^*(s) + a^*(s)\big)}_{\text{repay}}, \\ \underbrace{u\left((1-\phi)y(s) - \tilde{a}_-(s) - a^*_-(s)\right) - \eta(y^*(s) + a^*_-(s))}_{\text{default}} \Bigg\}. \quad (10)$$

Crucially, because of the geopolitical externality, the home country needs to keep track of the composition of its claims and not just the total amount.

We consider, without loss of generality, a situation where the home country does not default in equilibrium.[9] The optimal bilateral contracts for the home country satisfy

$$\max_{\{\tilde{a}(s), a^*(s)\}_{s\in S}} \sum_{s\in S} \pi(s) \left[u\left(y(s) - \tilde{a}(s) - a^*(s)\right) - \eta\left(y^*(s) + a^*(s)\right)\right] \quad (11)$$

subject to

$$\sum_{s\in S} \pi(s)\, \tilde{a}(s) \geq 0 \quad (12)$$

$$\sum_{s\in S} \pi(s)\, a^*(s) \geq 0 \quad (13)$$

$$u(y(s) - \tilde{a}(s) - a^*(s)) - \eta(y^*(s) + a^*(s)) \geq u\big((1-\phi)y(s) - a^*_-(s) - \tilde{a}_-(s)\big) \\ - \eta\big(y^*(s) + a^*_-(s)\big) \quad \forall s. \quad (14)$$

[9] If default were to happen, the price of the security would be zero, in which case the government would not want to borrow in the first place.

$$\tilde{a}(s) \geq -\tilde{y}(s), \quad \forall s \tag{15}$$

$$a^*(s) \geq -y^*(s), \quad \forall s \tag{16}$$

Constraints (12) and (13) represent the participation constraints for the foreign blocs, where risk neutrality implies that they must receive, on expectation, non-negative payments from the home country. Constraints (15) and (16) are the non-negativity constraints for consumption in the foreign blocs. Finally, constraint (14) reflects the no-default (or incentive compatibility) constraint of the Home country in state s. Crucially, a higher geopolitical externality, η, induces a tighter constraint, as foreign blocs realize that the Home country perceives that repaying the claims would increase the value for the Rival bloc and hurt its own welfare.

Definition 1. An equilibrium in this economy is given by a set of state contingent claims $\{a^*(s), \tilde{a}(s))\}$ that solve (11)–(14).

4.3 Results

To simplify the characterization, we assume that the aggregate shock can take only two values, denoted s_g ("good") and s_b ("bad"), with $y(s_g) > y(s_b)$. Each state occurs with equal probability, $\pi(s_g) = \pi(s_b) = 1/2$. Moreover, we assume that good–state income is identical across blocs, so that $y(s_g) = \tilde{y}(s_g) = y^*(s_g)$.

We first show the following Lemma.

Lemma 1. *In equilibrium, both participation constraints* (12) *and* (13) *hold with equality. Moreover, we have that*

$$\tilde{a}(s_g) = -\tilde{a}(s_b), \quad \textit{and} \quad a^*(s_g) = -a^*(s_b)\,.$$

Proof. In Appendix D.1 □

In addition, assume that $u(c) = \log(c)$ and that the following holds:

Assumption 1.

$$\tilde{y}(s_b) < \frac{y(s_g) - y(s_b)}{2} \leq y^*(s_b)$$

The expression in the middle corresponds to the net resources that the Home country needs to receive in the bad state to achieve constant consumption across states (i.e., full consumption insurance). The first inequality states that the Rival bloc does not have sufficient resources alone to lend to the Home country, enabling it to equalize consumption across states. On the other hand, the second inequality implies that the Rival bloc has enough resources in the bad state to fully insure the Home country. Under this assumption, we can dispense with constraint (16) in the characterization of the optimal contract and focus on the no-default constraints and on the resources that the Allied bloc has available in bad times.

We present the main results in the following proposition.

Proposition 1 (Global equilibrium fragmentation)**.** *Suppose that Assumption 1 holds. Let* $\hat{\phi} \equiv 1 - \frac{\bar{y}}{y(s_g)} e^{-\eta\left[\frac{y(s_g)-y(s_b)}{2} - \tilde{y}(s_b)\right]}$*. We have the following results:*

(i) If $\phi \geq \hat{\phi}$*, the optimal contract features full insurance:*

$$c(s_g) = c(s_b) = \frac{y(s_g) + y(s_b)}{2} \equiv \bar{y}\,. \tag{17}$$

(ii) If $\phi < \hat{\phi}$ *then the full-insurance contract cannot be implemented. We have*

$$\tilde{a}(s_g) = \tilde{y}(s_b), \quad a^*(s_g) < \frac{y(s_g) - y(s_b)}{2} - \tilde{y}(s_b)\,, \tag{18}$$

which implies consumption dispersion across states

$$c(s_g) > c(s_b)\,. \tag{19}$$

In this case, an increase in the geopolitical externality η *leads to a decrease in borrowing from the Rival bloc and to higher consumption dispersion across states.*

Proof. In Appendix D.2 □

The first element of the proposition states that when the default cost is sufficiently high, the home country can equalize consumption across the good and bad states. Moreover, the higher the geopolitical externality, the higher needs to be the default

cost to ensure that full risk-sharing is feasible. Notice that in general, there are multiple bilateral contracts that are consistent with full risk-sharing. We can also see that as the geopolitical externality gets larger, the maximum level of insurance that can be obtained from the Rival bloc decreases.

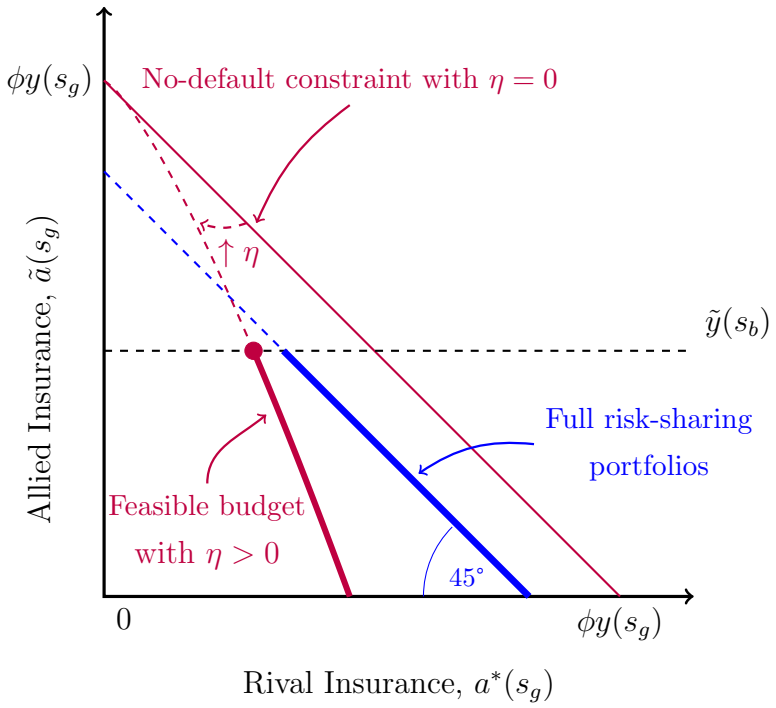
The second element of the proposition presents the case where the no default constraint (23) binds, and so does the non-negativity constraint of the Allied bloc's consumption, (24). Intuitively, when the no-default constraint becomes binding, borrowing more from the Rival bloc makes the constraint more binding. At the optimum, the contract therefore specifies that the Home country should get the maximum insurance attainable from the Allied country. In this case, an increase in the geopolitical externality leads to not only a fragmentation of capital flows but also to a strict worsening of risk-sharing.

Illustration. The results of Proposition 1 are illustrated in Figure 8. This figure displays the combination of feasible insurance contracts. On the x-axis, we have the amount of borrowing from the Rival bloc, $a^*(s_g)$, and on the y-axis, we have the amount of borrowing from the Allied bloc, $\tilde{a}(s_g)$. Recall that the higher these values are, the larger the claims received by the home country in the bad state (i.e., the higher the insurance). The figure illustrates a situation where η is initially zero, and there is a geopolitical shock that induces $\eta > 0$.

The blue line denotes the set of bilateral insurance contracts that would achieve the full-risk sharing allocation. That is, the pairs of $\{a^*, \tilde{a}\}$ that deliver consumption equal to mean income in each state. The red straight line indicates an initial no-default constraint when $\eta = 0$ (i.e., absent geopolitical externalities). For bilateral insurance contracts on that line, the home country is indifferent between repaying and defaulting. Above this line, the government chooses to default, and below this line, the government chooses to repay. In the absence of geopolitical externalities, the slope of that line is -1: the decision to default depends on total debt, but not about its composition. Notice then that under $\eta = 0$, we start from a situation where the full risk-sharing is feasible. Finally, the black dashed horizontal line indicates the maximum amount of insurance that is feasible for the Allied country to provide, per condition (15).

Consider now a geopolitical shock, where $\eta > 0$. In response, the no-default constraint steepens. Starting from a point of indifference between repaying and defaulting, a one-unit increase in the insurance from the Rival bloc and an equal reduction from the Allied bloc moves the home country into a default state. As the figure shows, an increase in the geopolitical externality η shrinks the borrowing set for the Home country and tilts the set of possible equilibrium portfolios toward Allied countries.[10] Given the limit on the insurance that the Allied bloc can provide, we have that a full risk-sharing portfolio is not feasible, and the feasible set is depicted by the thick purple line. The optimal portfolio is at the point of the line with the lowest insurance provided by the Rival bloc, depicted by the solid purple dot in Figure 8.

Figure 8: How a geopolitical shock generates fragmentation and lower risk-sharing



[10]Notice that with the geopolitical externality, the no-default constraint becomes non-linear, stemming from the risk-aversion in the Home country.

5 Conclusion

Recent international events have sparked concerns and debates about the potential redrawing of the map of capital flows based on geopolitical affiliations, where nations prioritize trade and investments with partners sharing close diplomatic and political ties.

Our paper contributes to this debate in two ways. First, we construct a new dyadic dataset of the global financial safety net from 1910 to 2020 and document that during times of high geopolitical risk, official lending increasingly follows patterns of geopolitical alignment. This fragmentation limits the risk-sharing benefits of international cooperation, as geopolitically aligned countries tend to have highly correlated business cycles. Second, to interpret these patterns, we develop a simple theory of geoeconomic fragmentation in capital flows that embeds geopolitical considerations into a standard limited-commitment framework. We show how the interplay between the geopolitical externality and strategic default constrains the set of feasible state contingent debt contracts, inducing countries to lend within geopolitical blocs.

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Online Appendix for

Financial Cooperation in a Fragmented World

by Javier Bianchi, Sebastian Horn, Giovanni Rosso and César Sosa-Padilla

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A Additional results

This section presents additional empirical results as well as robustness checks for the empirical facts presented in Section 3.

A.1 Using different geopolitical risk measures

Table A1 re-estimates the specifications presented in the main text with different sets of fixed effects and a debtor-specific geopolitical risk index (column 1) as well as a creditor-specific risk index (column 2). We confirm that political alignment matters in explaining the international allocation of official lending and that this link is particularly pronounced during episodes of high geopolitical risk.

Table A1: Official lending, geopolitical risk and fragmentation

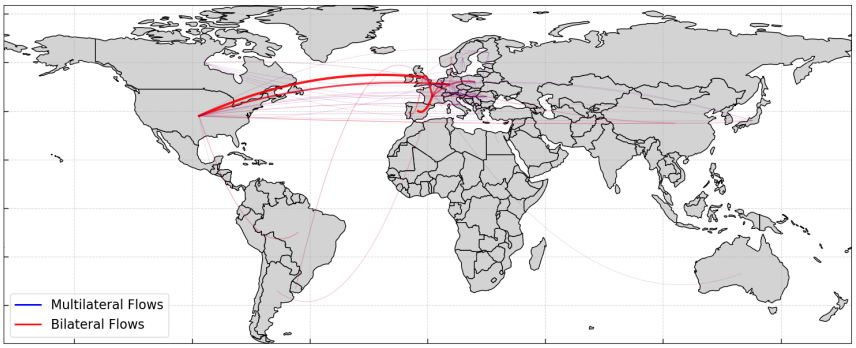
	Dyadic lending flows	
	(1)	(2)
Pol. alignment	0.39***	0.32***
Pol. alignment x Geopolitical risk of debtor	0.06***	
Pol. alignment x Geopolitical risk of creditor		0.11***
Observations	97,891	91,975
Country Pair FE	Yes	Yes
Debtor x Year FE	No	Yes
Creditor x Year FE	Yes	No

Notes: This table presents results from a PPML gravity regression of dyadic official lending flows on a measure of political alignment based on absolute distance in UN general assembly voting (Bailey et al., 2017). Political alignment is interacted with a debtor-specific measure of geopolitical risk in column 1, and interacted with a creditor-specific measure in column 2. Data is from Caldara and Iacoviello (2022). Both regressions include country pair fixed effects plus creditor-year fixed effects (column 1) or debtor-year fixed effects (column 2). Standard errors are clustered at the creditor-debtor dyad level.

A.2 International financial cooperation in a globalized and a fragmented world

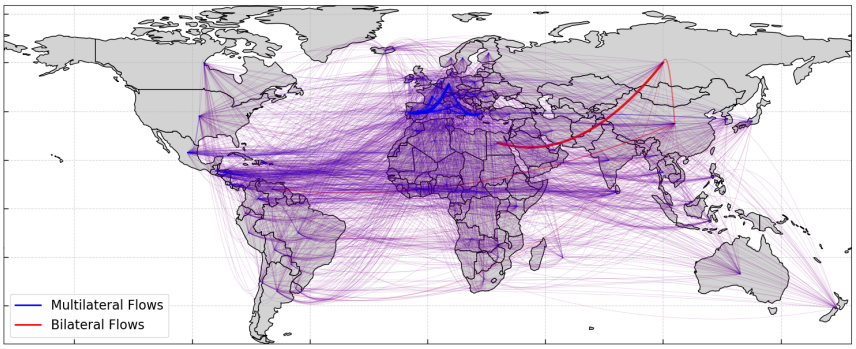
Figures A1 and A2 illustrate how patterns of international financial cooperation between governments have differed over the past 100 years. Figure A1 shows official flows during the inter-war period—an era with comparatively high geopolitical tensions. Figure A2 shows official lending flows during the decade of the Global Financial Crisis – an episode of intense global, multilateral cooperation.

Figure A1: Fragmented cooperation, 1920-1935



Notes: This figure shows our dyadic official lending data through bilateral (in red) and multilateral (in blue) channels. Line width is proportional to total lending amounts.

Figure A2: Global cooperation, 2008

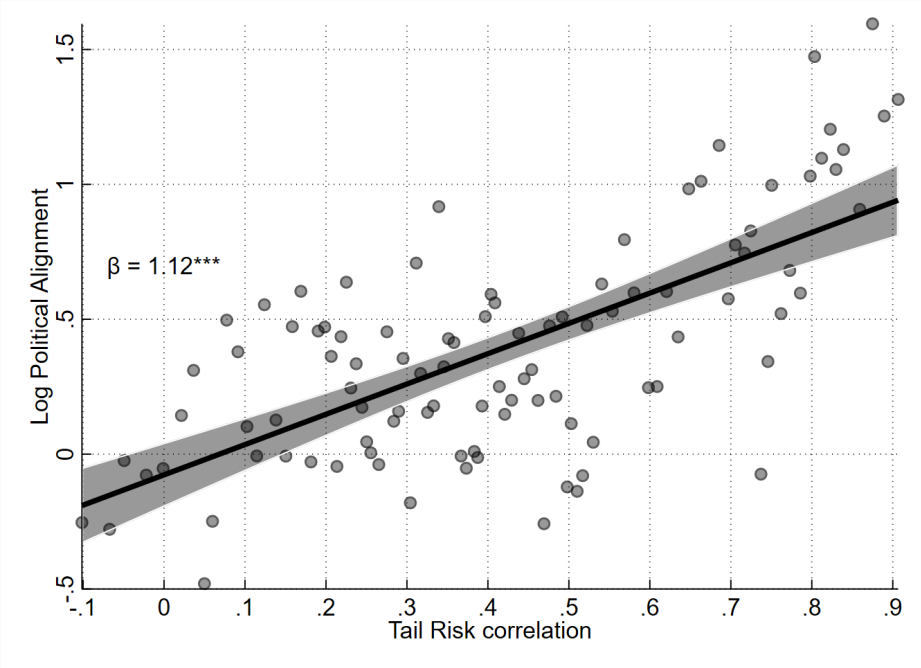


Notes: This figure shows our dyadic official lending data through bilateral (in red) and multilateral (in blue) channels. Line width is proportional to total lending amounts.

A.3 Political alignment and business cycle synchronization

In Section 3 we showed that geopolitically aligned countries exhibit closely synchronized business cycle patterns, as measured by a high degree in consumption growth correlation. In this appendix subsection, we show that this is also the case for correlation in macroeconomic tail risk. For that purpose, Figure A3 shows a binned scatter plot for the relation of geopolitical alignment (vertical axis) and the pairwise correlation of macroeconomic tail risk (horizontal axis). Both measures show a strong positive and statistically significant correlation.

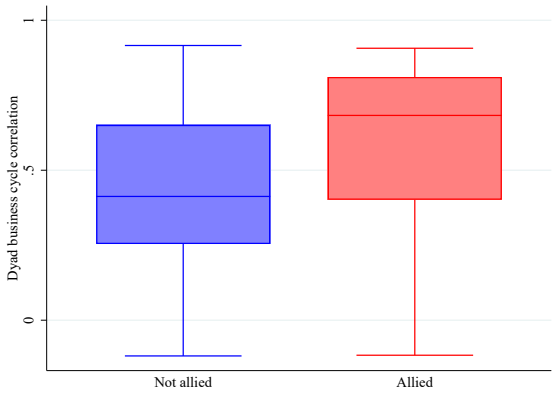
Figure A3: Geopolitical alignment and synchronization of macroeconomic tail risk



Notes: This figure shows the correlation between (log) average political alignment and the correlation of macroeconomic tail risks at the country-pair level. Data points are grouped in 100 bins. We also show a linear fitted line and a 95% confidence interval. Data on geopolitical alignment is from Bailey et al. (2017) and data on macroeconomic tail risks is from Marfè and Pénasse (2024).

We can also see that the same is true when looking at allied vs non allied countries instead. The boxplot in Figure A4, shows that the allies have more correlated business cycles than non-allies.

Figure A4: Alliances and synchronization of macroeconomic tail risk



A.4 Sovereign defaults on allied and rival countries

This section empirically tests whether sovereigns engage in selective or discriminatory defaults based on political alignment. The official sovereign lending market is particularly well suited for this analysis, as the absence of a secondary market allows to directly trace missed payments to both rival and allied creditor countries.

Data: Our analysis is based on a subset of our new database on dyadic official lending. Specifically, we use bilateral data on missed principal and interest payments ("arrears") from the World Bank's International Debt Statistics, covering the period 1970 to 2020. In this dataset, arrears are defined as late payments on long-term external debt obligations of public or publicly-guaranteed debtors, thus including both central government debt and debt backed by government guarantees.

We merge this data with the database on sovereign default episodes compiled by Asonuma and Trebesch (2016). The resulting dataset allows to trace the accumulation of missed payments towards all bilateral creditors in the years preceding and following a default event. As in the main text, we distinguish between 'rival' and 'allied' creditor countries by separately tracking missed payments on countries with above- and below-average levels of voting similarity in the UN General Assembly (Bailey et al., 2017).

Approach: For each debtor country i, creditor country j and year t, we calculate the arrears-to-debt ratio, i.e., the sum of missed principal and interest payments as a share of the outstanding debt stock to that creditor.[11]

$$ATD_{ijt} = \frac{PrincipalArrears_{i,j,t} + InterestArrears_{i,j,t}}{Debt_{i,j,t}} \tag{20}$$

To analyze whether sovereigns accumulate more arrears on rival countries, we separately estimate the following fixed effects model for both aligned and non-aligned countries:

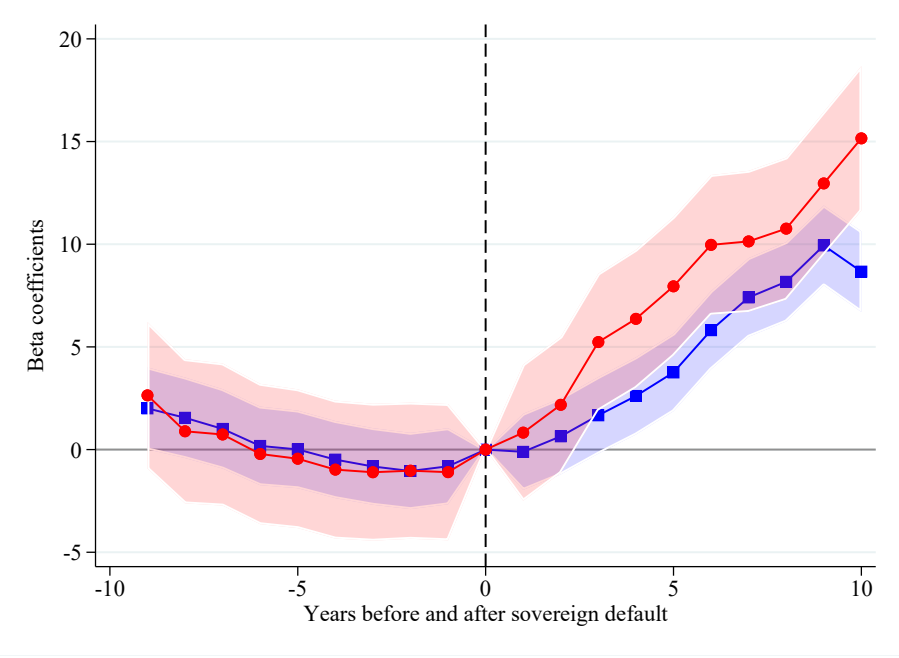
$$ATD_{ijt} = \sum_{k=t-10}^{t+10} \beta_k \times default_{i,t+k} + \theta_j + \omega_t + \epsilon_{ijt} \tag{21}$$

where the dependent variable is the arrears-to-debt ratio as defined above, $default_{i,t}$ is the beginning of a default episode as defined by Asonuma and Trebesch (2016), and θ_j, and ω_t are creditor and year fixed effects, respectively.

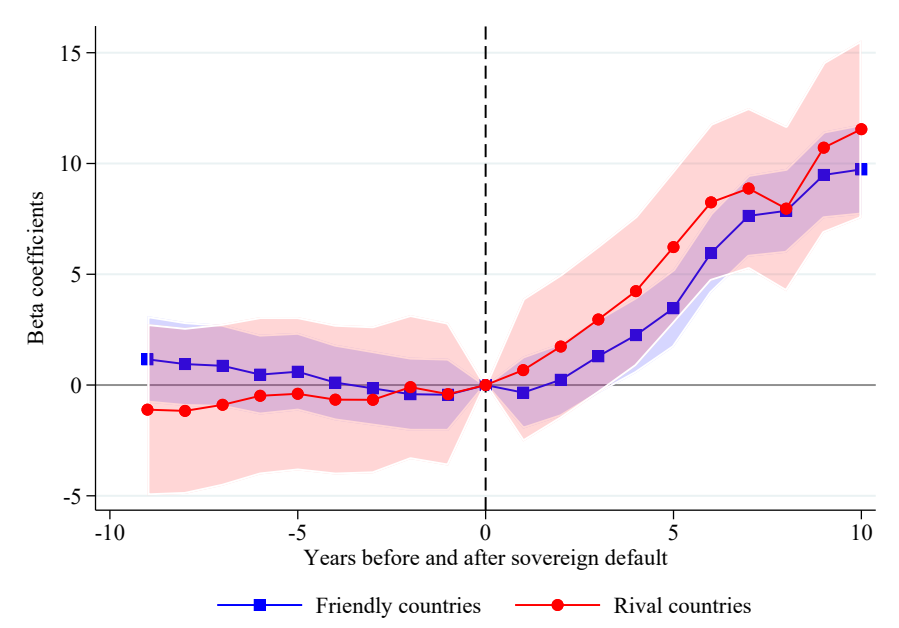
[11] See Schlegl et al. (2019) and Arellano et al. (2023) for similar analyses of arrears patterns.

Figure A5: Missed payments on friendly and rival countries, 1970-2020

Panel A: All sovereign default episodes



Panel B: High geopolitical risk episodes



Notes: This figure shows beta coefficients from a regression of the arrears-to-debt ratio on years before and after sovereign default events for both allied (in blue) and rival (in red) bilateral creditor countries. Shaded arrears show 95 percent confidence intervals. All regressions include creditor country and year fixed effects. Panel A includes all default episodes from Asonuma and Trebesch (2016) with available arrears data. Panel B focuses on the subset of default episodes during which the global geopolitical risk index from Caldara and Iacoviello (2022) is above the sample mean. See text for details on sources.

Our analysis of arrears patterns does not provide evidence of discriminatory payment defaults. Figure A5 presents the estimated β_k coefficients and 95 percent confidence intervals from the regression model described above. Panel A shows results for all default episodes of the past 50 years with available arrears data. Panel B focuses on the subset of defaults that occurred during times of above-average geopolitical risk, as measured by Caldara and Iacoviello (2022).

In both samples, our regression results suggest that sovereign debtors accumulate arrears proportionally across all bilateral creditors, without systematically discriminating against rival countries. While we cannot rule out that debtors have discriminated against rival creditor countries along other margins (e.g., by negotiating less favorable debt restructuring agreements) or have done so during earlier parts of our sample, we interpret this finding as support for our model's assumption of non-discriminatory sovereign defaults.

B A New Dataset of Official International Lending, 1910-2020

A key contribution of this paper is the construction of a new, dyadic dataset of international financial cooperation through official (government-to-government) lending from 1910 to 2020. This appendix section explains our data construction approach and summarizes the scope and key properties of the resulting database.

B.1 Definitions and concepts

Defining official lending: Our data collection efforts focus on cross-border, official lending flows, which we define according to the OECD's widely used approach: *"Official transactions are those undertaken by central, state or local government agencies at their own risk and responsibility, regardless of whether these agencies have raised the funds through taxation or through borrowing from the private sector. This includes transactions by public corporations i.e. corporations over which the government secures control by owning more than half of the voting equity securities or otherwise controlling more than half of the equity holders' voting power; or through special legislation empowering the government to determine corporate policy or to appoint directors"* (OECD, 2018).

This definition captures a wide array of different financial transactions between two sovereigns, including both loans and grants. Loans are defined as all transfers for which the recipient incurs legal debt and the resulting liability is not traded in secondary markets (see for example OECD, 2018). This definition includes concessional and non-concessional instruments, trade advances and credits as well as drawdowns under standing credit lines.[12] We also include in our database cases of private creditor lending that are explicitly guaranteed by the creditor government and aid in the form of cross-border grants – e.g., transfers of goods or services, for which no repayment needs to be made (OECD, 2018).[13]

[12] We follow standard practice and only count credit lines to the extent that they are being drawn down (International Monetary Fund, 2014).

[13] Our data collection also does not cover secondary market purchases of other countries' sovereign debt. Portfolio investments, for example by central banks or sovereign wealth, are sizeable but there

Bilateral versus multilateral lending: Official capital flows can be transferred through both *bilateral* and *multilateral* channels (see Figure 2). Bilateral lending refers to transactions that are directly extended by a creditor country sovereign to the recipient country sovereign. In contrast, multilateral lending is extended by international financial institutions that are established through political agreements among multiple member countries (International Monetary Fund, 2014; OECD, 2018). Multilateral lending institutions collect funds from their member countries (and private markets) and lend them on to other member countries – fulfilling an intermediary function similar to that performed by banks.

For the first half of the 20$^{\text{th}}$ century, *bilateral* lending constituted the main means of official cross-border lending. Only after World War II and the foundation of multilateral creditor organizations, such as the IMF, did multilateral lending increase in importance. During the 1970s, total multilateral lending exceeded total bilateral lending for the first time and during the past decade accounted for around half of total official lending (Horn et al., 2024). The next two subsections discuss our data collection of both types of flows in turn.

B.2 Bilateral lending

Our key source for data on bilateral official lending transactions is the data collected by Horn et al. (2024). This data is granular and recorded at the transaction level. For each transaction, we know the creditor country, the debtor country, the year of commitment, the commitment amount, and - in most cases - the financial terms of the transaction, i.e., the interest rate, grace period and time to maturity. Since bilateral lending comes in a dyadic data format by definition, no further adjustments to this data are needed for the purpose of our analysis.

is no sufficiently detailed data to trace or quantify such investments at a dyadic level. See Alfaro et al. (2014) for a discussion of sovereign-to-sovereign portfolio flows.

B.3 Tracking official lending through international organizations

From a risk-sharing perspective, international organizations are intermediaries that channel funds from sovereign creditors to sovereign debtors. A key contribution of this paper is to introduce a new database on the liability structure of multilateral creditors that allows to trace multilateral lending back to its original funding source. This data allows for a mapping of multilateral into bilateral flows and thus for the creation of a dyadic, micro-level dataset of official lending. This subsection provides a detailed explanation of our sources and approach.

To create a dyadic dataset of multilateral lending, this paper constructs country-specific funding shares in 16 multilateral creditor organizations. As illustrated in Figure 2, multilateral creditors generally rely on two distinct financing mechanisms:

- The primary source of financing for most multilateral creditors is provided in the form of paid-in capital subscriptions of member countries. In most creditor organizations, paid-in capital is proportional to a predefined country quota that reflects the member country's economic size and financial strength.
- Quota resources are often supplemented by borrowing through standing credit lines. Borrowing either takes the form of direct borrowing from member country treasuries and central banks or of borrowing in private capital markets with the guarantees of the member countries.

By combining dozens of country and organization-specific sources that are listed below, we construct a new database on paid-in quota resources and outstanding lending to multilateral creditor that allows to derive each member country's funding share in multilateral creditor organizations as follows:

$$\omega_{jto} = \frac{PAID.IN_{jto} + CREDIT_{jto}}{\sum_{k}^{N} (PAID.IN_{kto} + CREDIT_{kto})}$$

where $PAID.IN_{jto}$ represents the capital that country j has paid into multilateral creditor organization o in year t and $CREDIT_{jto}$ presents any outstanding credit by country j to organization o. Once funding shares are constructed, we can map

multilateral into bilateral flows by using the following approach that assumes that each sovereign creditor's share in a multilateral loan is proportional to its funding share of the corresponding multilateral organization in the same year:

$$TRANSFER_{ijto} = \omega_{jto} * LOAN_{ito}$$

where $TRANSFER_{ijto}$ denotes a loan by creditor country j to debtor country i through organization o in year t and ω_{jto} is sovereign j's funding share of organization o. $Loan_{ito}$ refers to a multilateral loan commitment by organization o to debtor country i.

In its current state, the data collection covers the liabilities of 16 multilateral creditor organizations over the past seven decades (see table B2 for a list of the analyzed arrangements).

Table B2: List of analyzed multilateral lending arrangements

Name	Operating time	Authorized capital (in bn USD)	Number of member countries
Global membership			
League of Nations	1920 - 1946	n.a.	63
International Monetary Fund	1946 - 2020	1350	189
Regional membership			
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

Note: This table shows all multilateral official lending arrangements covered in the analysis of this paper. See text for details.

Our focus on these 16 institutions is guided by our focus on official lending for stabilization and risk-sharing purposes. The multilateral creditors listed in Table B2 all have a clear mandate to stabilize member country economies and to contain the effects of crisis. Besides the IMF, this includes all past and present regional safety nets that have constantly expanded their geographic reach and now span almost the entire globe. While the analysis and data collection could be extended to other multilateral providers of global public goods such as the World Bank or Regional Development Banks (for development and humanitarian aid) or the World Health Organization and the UN, these institutions arguably play a less important role in the sharing of cross-border consumption and financial crisis risks. The next subsections discuss data collection for each arrangement in turn.

B.3.1 The League of Nations

During the 1920s, several Central European countries implemented stabilization programs 'under the auspices of the League of Nations'. In this context, the League endorsed nine macroeconomic adjustment programs that were supported by external loans and guarantees (see Myers (1945) and Flores Zendejas and Decorzant (2006)). Two of these programs qualify as official lending under our definition described above. The two lending programs for Austria in 1923 and 1934 both used financial guarantees from European neighboring countries to help Austria access private capital markets. Guarantees were provided proportional to the market share of the issued amounts in different bond markets across Europe. Table B3 summarizes these shares.

B.3.2 International Monetary Fund

IMF lending operations are financed through two distinct mechanisms:[14]

IMF quota finance: The main funding source for IMF lending is the paid-in capital of member countries (the so-called reserve tranche). Each member country pays a share of its reserve assets into the Fund and the Fund uses these resources to extend credit. A country's capital subscription in the Fund is given by its IMF quota

[14]Our focus here is on IMF lending programs under the General Resource Account. The IMF also extends funding through the Poverty Reduction and Growth Trust that is financed through trust fund contributions from member countries. Since PRGT lending is primarily directed at addressing structural issues, we do not consider it here.

Table B3: Creditor guarantees for League of Nations adjustment programs

Guarantor	Debtor	Year	Amount in USD million	Funding share
United Kingdom	Austria	1923	36.1	25
France	Austria	1923	36.1	25
Italy	Austria	1923	30.2	21
Czecho-Slovakia	Austria	1923	36.1	25
Belgium	Austria	1923	36.1	2
Sweden	Austria	1923	2.9	2
Denmark	Austria	1923	1.5	1
Netherlands	Austria	1923	1.5	1
UK	Austria	1934	29.6	41
France	Austria	1934	29.5	41
Italy	Austria	1934	8.9	12
Switzerland	Austria	1934	2.2	3
Belgium	Austria	1934	1.5	2
Netherlands	Austria	1934	0.9	1

Note: This table summarizes the contributions of different creditor governments to the guarantees provided for two stabilization loans to Austria under the auspices of the League of Nations. The funding share is given in percent of total funding. Data is from Myers (1945), Flores Zendejas and Decorzant (2006) and Horn et al. (2024).

which reflects its relative position in the world economy and represents its maximum financial commitment to the IMF. IMF credit essentially involves a transfer of foreign exchange from creditor members to borrowing members. These transfers reduce the available quota resources from creditors and increase their positions with the IMF by the same amount. Members receive a market-related return on their creditor positions with the IMF. Analogously, the repayment and servicing of IMF credit results in the receipt of foreign exchange from borrowing members. In this case, the foreign exchange is passed on to IMF creditor members, reducing their creditor positions with the IMF (IMF, 2018).

IMF borrowing arrangements: In addition to resources pooled by member states as part of the quota system, the IMF has borrowed extensively from member countries when demand for IMF resources was high. For this purpose, the IMF has standing credit lines with selected member states that it can activate to draw additional

resources. Table B4 provides an overview of past and present IMF borrowing agreements.

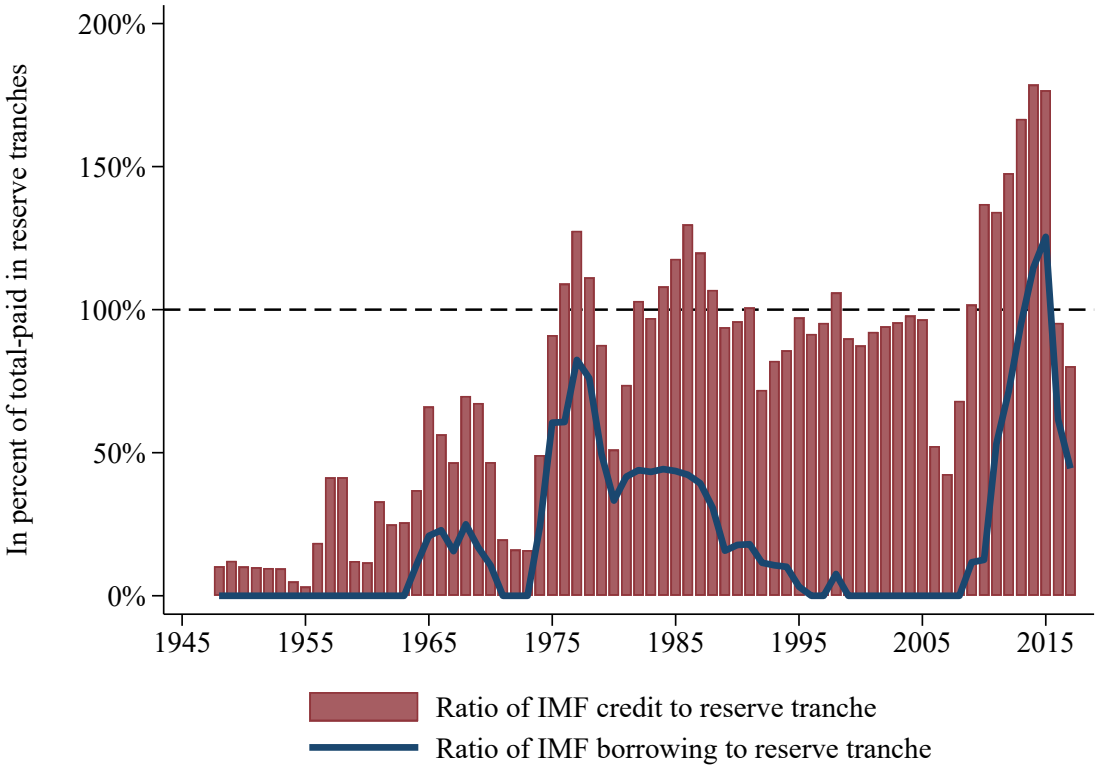
Figure B7 further illustrates the use of quota resources and borrowing from member countries by showing the share of quota resources needed to finance outstanding credit to member countries (red bars). Whenever this share approaches 100 percent and paid-in reserve assets are at the risk of depletion, the IMF has activated its standing borrowing arrangements to supplement its resources (blue line). The cyclical pattern illustrates that the use of borrowing arrangements has been largest during systemic crises, when the distribution of surpluses was skewed towards a comparatively small number of members with relatively small quotas such as during the Oil Crises of the 1970s or the recent Great Financial Crisis.

Table B4: IMF borrowing arrangements: past and present

	Year	Number of participating creditors	Maximum amount in bn USD
Current borrowing arrangements			
Bilateral Loan Agreements	since 2009	35	440
New Arrangements to Borrow	since 1998	40	250
Past borrowing arrangements			
General Arrangements to Borrow	1962 - 2018	10	23
Supplementary financing line with Saudi Arabia	1983 - 2018	1	2
First Oil Facility	1974	7	3
Second Oil Facility	1975 - 1976	12	3.5
Supplementary financing facility	1979 - 1984	14	10.5
Enlarged access to resources			
Medium-term facility with Saudi-Arabia	1981	1	10.5
Short-term facility	1981	19	1.5
Short-term facility with Japan and Belgium Saudi Arabia and BIS	1984	4	8
Bilateral borrowing agreement with Japan	1986	1	4

Note: This table shows past and present IMF borrowing arrangements. The data is taken from IMF Annual Reports (multiple years), IMF (2018) and James (1996).

Figure B6: IMF financing through quotas and borrowing



Note: This figure shows IMF lending and financing over time. Red bars show the degree to which quota resources are used for credit extension. Whenever this share approaches or exceeds a hundred percent, borrowing arrangements are activated and supplement quota resources (blue line). Sources: IMF Annual Reports (multiple years), IMF International Financial Statistics, and IMF (2018)

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Data on paid-in capital, quotas and lending to the IMF comes from the IMF's International Financial Statistics and the IMF's annual reports (multiple years). Data on IMF lending program comes from Reinhart and Trebesch (2016) and from Horn et al. (2024).

B.3.3 Regional financial arrangements

Regional financial arrangements differ with respect to their financing structure (Cheng and Lennkh, 2019). Some RFAs are exclusively financed by the paid-in capital of

member countries, while others leverage paid-in capital by tapping into private capital markets.

Arab Monetary Fund: The Arab Monetary Fund was established in 1976 by 22 different member countries in response to the first oil crisis. It is exclusively financed through paid-in capital from its members and has not made use of market borrowing. Financing is predominantly provided by a small number oil exporters: Algeria, Egypt, Iraq, Kuwait and Saudi Arabia jointly provide more than 50 percent of the Fund's capital. The Fund has been activated 174 times to provide loans to 16 different member countries. Data on subscribed and paid-in capital by each member country was hand-coded from the Fund's annual reports. Data on lending operations is from Horn et al. (2024) and Scheubel and Stracca (2019).

Andean Reserve Fund & Latin American Reserve Fund: The Andean Reserve Fund was established in 1978 by Bolivia, Colombia, Ecuador, Peru and Venezuela as a Reserve Pooling Fund. It was renamed into the Latin American Reserve Fund in 1991 and membership was broadened to include Costa Rica and Uruguay. After the accession of Paraguay in 2014, the Fund currently has 8 members. In terms of financing, both the Andean and the Latin American Reserve Fund have predominantly relied on member country capital subscriptions, although the Fund has the statutory possibility to tap into private capital markets and has repeatedly done so in the 1980s and 1990s. Since its establishment in 1978, the Andean and Latin American Reserve Funds have extended 45 financial assistance programs. Data on subscribed and paid-in capital by each member country were hand-coded from the Andean and Latin American Reserve Funds' annual reports and the inter-governmental treaties that concluded its establishment. Data on lending operations is from annual reports, Horn et al. (2024) and Scheubel and Stracca (2019).

BRICS Contingent Reserve Arrangement: The BRICS CRF was founded in 2014 by Brazil, Russia, India, China and South Africa as an additional liquidity back-stop for its member countries. The facility does not possess any paid-in resources but relies on standing financial commitments in the form of currency swaps by its five member countries that amount to 100 billion USD. The facility has not been activated. Data on capital shares has been coded from the multilateral treaty establishing the facility.

Chiang Mai Initiative: The Chiang Mai Initiative was founded in 2000 in response to the experiences of the Asian Financial Crisis and later expanded into the Chiang Mai

Initiative Multilateralization. It consists of 14 member countries that have committed 240 billion USD to the arrangement. Similar to the BRICS Contingent Reserve Facility, the CMIM does not possess paid-in capital, but relies on promissory notes by member central banks that are only activated when a member country seeks the Initiative's assistance. As of 2019, the CMIM remains inactivated. Data on member commitments has been downloaded from the website of the ASEAN Macroeconomic Research Office.

Eurasian Anti-Crisis Fund: The Eurasian Anti-Crisis Fund was founded in 2009 in response to the Great Financial Crisis. It consists of six member states and is exclusively financed through member countries' subscribed and paid-in capital. With a capital share of 88 percent, Russia is the Fund's key provider of resources. Since its establishment, the Fund has been activated seven times and provided loans to Armenia, Belarus, the Kyrgyz Republic and Tajikistan. Data on subscribed and paid-in capital was taken from the Fund's Annual reports. Data on lending operations is from the Fund's Annual reports and from Horn et al. (2024).

European Monetary Fund: The European Monetary Fund was founded in 1958, when Western European countries returned to current account convertibility. Its main purpose was the provision of official financing to overcome current account deficits. The Fund was terminated in 1973 and replaced by the European Union's Community Loan Mechanism and the Medium-Term Financial Assistance Facility (see below). During the 15 years of its history, the European Monetary Fund provided financial assistance programs to four different member countries: Greece, Iceland, Spain and Turkey. At the liability side, these programs were mainly financed through contributions of member countries. A unique feature of the European Monetary Fund was the contribution of the USA that provided 45 percent of the Fund's initial paid-in capital. Data on the financing and operations of the European Monetary Fund were coded from the Bank for International Settlement's annual reports, data on lending operations is from Horn et al. (2024).

EEC Medium-Term Financial Assistance Facility: The European Economic Community introduced the medium-term financial assistance facility in 1971 to provide mutual financial assistance to members in balance-of-payments difficulties. It was funded through a pre-defined capital key that put most weight on the UK, France, and Germany (22 percent each) and Italy (16 percent). Data on financing and loan

provision was coded from the Official Journal of the European Communities (multiple editions).

EU Community Loan Mechanism: In 1975 the European Economic Community established a Community Loan Mechanism that allowed the Community to borrow funds in private markets backed by the Community budget and pass on the funds to members in balance-of-payments crisis. The mechanism existed until 1988, when it was replaced with the Balance-of-Payments Facility (see below). The mechanism was activated several times and used to provide financial assistance to Italy, Ireland, France and Greece. The EEC's borrowing in private markets was guaranteed by the EEC budget and thus followed a pre-defined capital key. With a joint contribution of more than 80 percent, guarantees were mainly provided by the UK, France, and Germany (22 percent each) and by Italy (16 percent). Data on financing and loan provision was coded from the Official Journal of the European Communities (multiple editions).

European Union Balance-of-Payments Facility: In 1988, the Community Loan Mechanism and the Medium-Term Financial Assistance Facility were merged into the EEC's and - several years later - the EU's Balance-of-Payments Facility. The total lending capacity was initially capped at 16 billion ECU, but was increased to 50 billion EUR in 2009. The facility is financed by member country contributions that are proportional to their funding share in the EU budget. The facility was used to provide financial assistance to Greece and Italy in the 1990s and more recently to Hungary, Latvia and Romania during the Global Financial Crisis. Data on financing and loan provision was coded from the Official Journal of the European Communities and yearly budget reports of the European Commission. Data on lending operations comes from the website of the European Commission and from Horn et al. (2024).

European Financial Stability Facility: The EFSF was created as a temporary fiscal backstop and crisis resolution mechanism by the Euro Area in 2010 to provide financial assistance to Greece, Ireland and Portugal. The assistance programs were financed by bond issuance in private capital markets that was backed by joint and several guarantees from member state with commitments amounting to 780 billion Euros or more than 1 trillion USD. With the foundation of the European Stability Mechanism, the EFSF has stopped to provide new financial assistance programs, but continues to

exist in order to manage outstanding loans. Data on financing and lending has been taken from the EFSF's website and from annual reports.

European Financial Stability Mechanism: The EFSM was set up as an emergency financial assistance fund by the European Union in 2010. The fund is backed by guarantees from the 28 member countries of the EU and has borrowed in private capital markets to fund financial assistance loans to Ireland, Portugal and Greece. Data on financing and loan provision was coded from the Official Journal of the European Communities and yearly budget reports of the European Commission.

European Stability Mechanism: The ESM was founded by Euro Area sovereigns in 2012 to serve as a permanent rescue lending mechanism. It is funded through bond issuances in the private capital market that are guaranteed by the Fund's total callable capital of 620 billion Euro. Member countries have only been required to pay 80 billion Euro into the Fund, but have provided explicit and irrevocable guarantees to pay the full amount if required by the Managing Director. The ESM has provided financing packages to Cyprus, Greece and Spain. Data on financing and loan provision was downloaded from the ESM's website and its annual reports (multiple editions).

Table B5: Capital subscription shares to regional financial arrangements

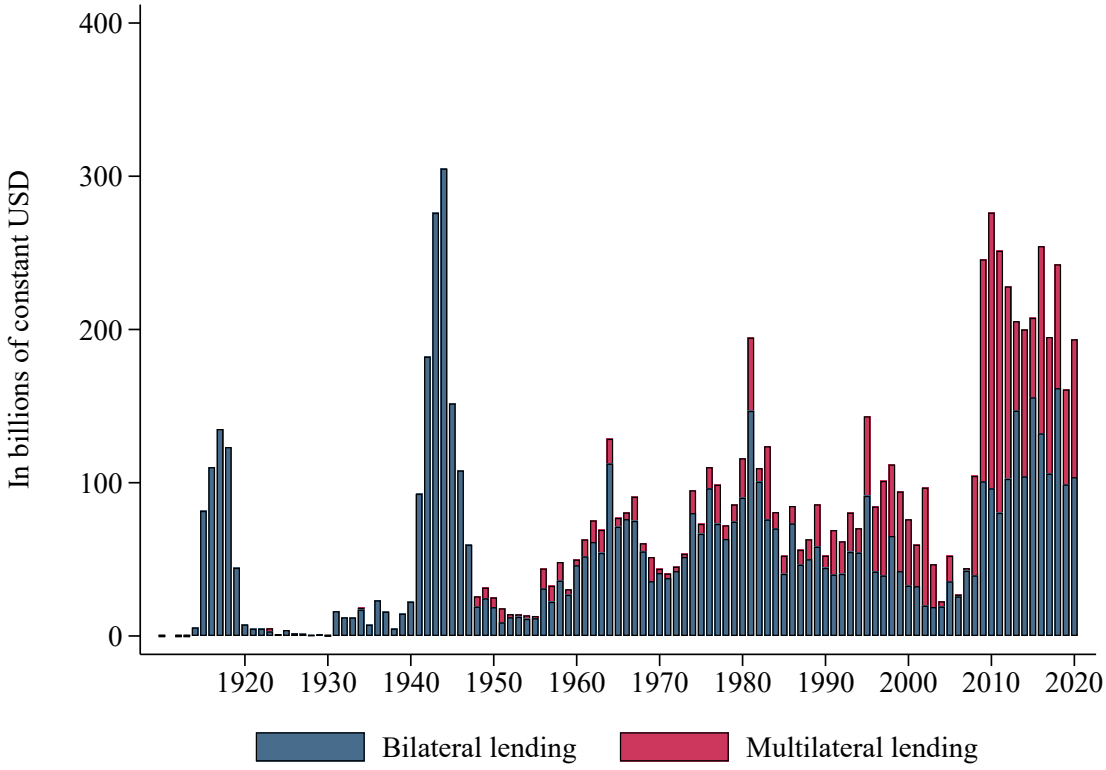
AMF		**BRICS CRA**		**FLAR**		**EEC CLM**		**EU BOP**	
Algeria	13.0	Brazil	18.0	Bolivia	8.3	Belgium	7.3	Austria	2.6
Bahrain	1.5	China	41.0	Colombia	16.7	Denmark	3.3	Belgium	3.6
Comoros	0.1	India	18.0	Costa Rica	16.7	France	22.0	Bulgaria	0.3
Djibouti	0.1	Russia	18.0	Ecuador	8.3	Germany	22.0	Croatia	0.4
Egypt	9.8	South Africa	5.0	Paraguay	8.3	Ireland	1.2	Cyprus	0.1
Iraq	13.0			Peru	16.7	Italy	14.7	Czech Republic	1.3
Jordan	1.7			Uruguay	8.3	Netherlands	7.3	Denmark	1.8
Kuwait	9.8	**ARF**		Venezuela	16.7	United Kingdom	22.0	Estonia	0.2
Lebanon	1.5	Bolivia	12.5					Finland	1.7
Libya	4.1	Colombia	25.0					France	18.3
Mauritania	1.5	Ecuador	25.0	**EMF**		**ESM**		Germany	19.0
Morocco	4.6	Peru	12.5	Austria	0.8	Austria	2.8	Greece	1.4
Oman	1.5	Venezuela	25.0	Belgium	5.0	Belgium	3.5	Hungary	0.9
Palestine	0.7			Denmark	2.5	Cyprus	0.2	Ireland	1.7
Qatar	3.1			France	8.3	Estonia	0.2	Italy	13.2
Saudi Arabia	14.8	**CMI**		Germany	8.3	Finland	1.8	Latvia	0.2
Somalia	1.2	Brunei	0.0	Greece	0.5	France	20.2	Lithuania	0.3
Somalia	1.2	Cambodia	0.1	Iceland	0.2	Germany	27.0	Luxembourg	0.3
Sudan	3.1	China	28.5	Italy	4.2	Greece	2.8	Malta	0.1
Syria	2.2	Hong Kong	3.5	Netherlands	5.0	Ireland	1.6	Netherlands	2.3
Tunisia	2.1	Indonesia	4.0	Norway	2.5	Italy	17.8	Poland	3.3
United Arab Emirates	5.9	Japan	32.0	Portugal	0.8	Latvia	0.3	Portugal	1.5
Yemen	4.7	Korea	16.0	Spain	1.3	Lithuania	0.4	Romania	1.3
		Laos	0.0	Sweden	2.5	Luxembourg	0.2	Slovakia	0.6
EACF		Malaysia	4.0	Switzerland	3.5	Malta	0.1	Slovenia	0.3
Armenia	0.0	Myanmar	0.1	Turkey	0.5	Netherlands	5.7	Spain	8.9
Belarus	0.1	Philippines	3.1	United Kingdom	10.1	Portugal	2.5	Sweden	2.4
Kazakhstan	11.7	Singapore	4.0	United States	45.3	Slovakia	0.8	United Kingdom	12.0
Kyrgyz Republic	0.0	Thailand	4.0			Slovenia	0.4		
Russia	88.1	Vietnam	0.8			Spain	11.8		
Tajikistan	0.0								

Note: This table shows the capital subscriptions of members to regional financial arrangements in percent of total capital. AMF: Arab Monetary Fund; EACF: Eurasian Anti-Crisis Fund; BRICS CRA: BRICS Contingent Reserve Arrangement; ARF: Andean Reserve Fund; CMI: Chiang-Mai Initiative; FLAR: Fondo Latino-Americano de Reservas; EMF: European Monetary Fund; EEC CLM: Community Loan Mechanism of the European Economic Commission; ESM: European Stability Mechanism; EU BOP: Balance-of-Payments Facility of the European Union. For information on sources, see text and reference list below.

B.4 Scope of dataset

This subsection summarizes the scope of our final dataset of dyadic, government-to-government lending after combining all data on bilateral and multilateral loans and after aggregating the data to the country pair-year level. We cover a total of 66,653 transactions (26,329 direct bilateral lending transactions and 40,324 transactions through multilateral creditors) extended by 132 creditor countries to 198 debtor economies. Figure B7 shows the evolution of total lending amounts over the past 100 years, while Figure 4 in the main text illustrates the dyadic nature of the data.

Figure B7: Financial cooperation through official lending, 1910-2020



Note: This figure shows the evolution of bilateral and multilateral official lending – as measured in our dataset – over the past 100 years. All amounts are expressed in billions of constant USD to make amounts comparable over time.

B.5 List of data sources

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Treaty for the Establishment of the Anti-Crisis Fund of the Eurasian Economic Community signed February 4, 2009 in Moscow, Russia.

C Other data

This appendix section introduces all other variables and measures that we use in the empirical analysis of Section 3.

C.1 Geopolitical alignment

To measure geopolitical alignment, we rely on voting patterns in the United Nations General Assembly (UNGA). In particular, we follow Bailey et al. (2017) and use the ideal point distance. This measure accounts for the changing agenda of the UN General Assembly so that differences in alignments over time are not driven by changes in the topics discussed at the UN, but by actual changes in geopolitical alignment between country pairs over time.

C.2 Geopolitical risk

To measure geopolitical risks, we rely on the widely used Geopolitical Risk Index (GPRI) developed by Caldara and Iacoviello (2022). The GPRI is a news-based measure of adverse geopolitical events and associated risks. It is constructed by counting the share of newspaper articles on a monthly basis that discuss adverse geopolitical events or threats on the basis of a dictionary-based method. Figure C8 plots the aggregate geopolitical risk measure over 120 years. In the regressions underlying Table 2 in Section 3 we use the expanded dataset with country-level risk measures for 44 countries built in Caldara et al. (2023).

Figure C8: Index of Geopolitical Risk, 1900 - 2020

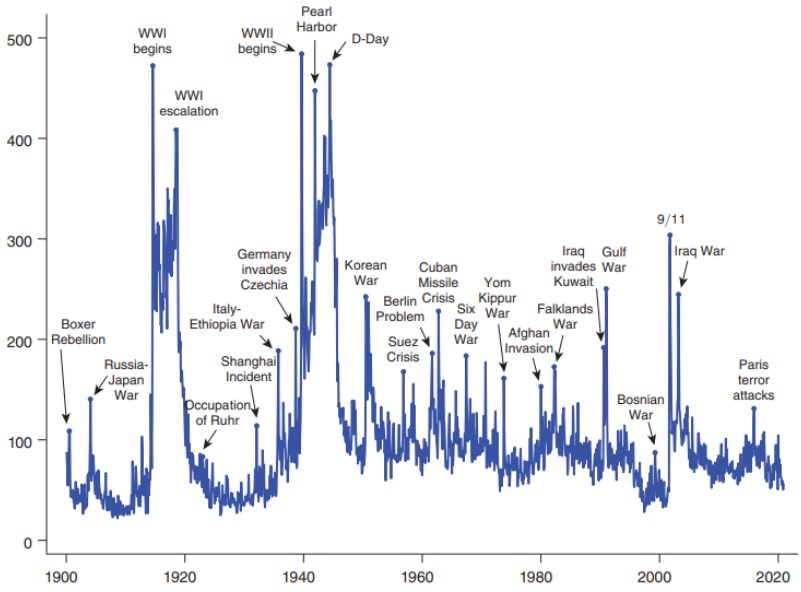


FIGURE 3. HISTORICAL GPR INDEX FROM 1900

Notes: Historical GPR Index from January 1900 through December 2020. Index is normalized to 100 throughout the 1900–2019 period.

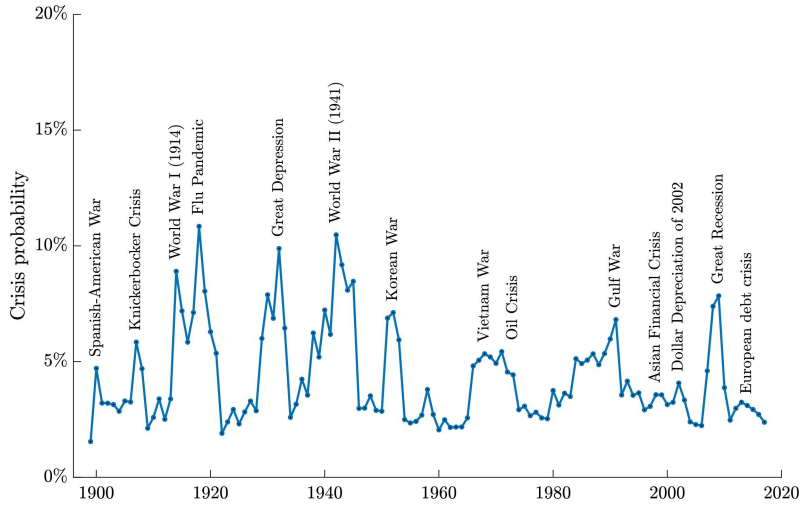
Note: This figure shows the aggregate Geopolitical Risk Index developed by Caldara and Iacoviello (2022) and Caldara et al. (2023).

C.3 Macroeconomic variables

To study the cyclical properties of official lending flows with respect to both creditor and debtor economies we make use of two distinct variables.

Macroeconomic tail risk: To measure macroeconomic tail risks, we rely on estimates of consumption and GDP tail risks developed by Marfè and Pénasse (2024). Marfè and Pénasse (2024) use a predictive approach to estimate time-varying macroeconomic tail risk based on variables that forecast the lower quantiles of consumption growth. This approach has the advantage of being available for a large international panel of countries and over longer time horizons than traditional asset price-based measures of disaster risk. Specifically, their sample includes 42 countries and covers years 1900-2020. Figure C9 shows average macroeconomic tail risk for this sample.

Figure C9: Macroeconomic tail risk, 1900 - 2020



Note: This figure shows macroeconomic tail risk as estimated by Marfè and Pénasse (2024).

Consumption growth: Our data on consumption growth rates is taken from Müller et al. (2025). We normalize real consumption by dividing it by total population and then use a Hodrick-Prescott filter to extract the cyclical component.

D Proofs

D.1 Proof of Lemma 1

Proof. The objective function in (11) is strictly decreasing in $\tilde{a}(s)$ and $a^*(s)$ for all s, since u is strictly increasing. Assume, by way of contradiction, that in an optimum we have $\sum_{s\in S}\pi(s)\tilde{a}(s) > 0$. Then, the Home country can strictly increase its own welfare by decreasing $\tilde{a}(\bar{s})$ for some state $\bar{s}$, in such a way that the participation constraint is still satisfied. So, that initial allocation cannot be optimal. It then follows that in equilibrium we must have $\sum_s \pi(s)\tilde{a}(s) = 0$. The same argument implies that (13) must also hold with equality.

Having (12) and (13) holding with equality, it is then immediate to show that for the case $\pi(s_g) = \pi(s_b) = 1/2$ we have $\tilde{a}(s_g) = -\tilde{a}(s_b)$, and $a^*(s_g) = -a^*(s_b)$. □

D.2 Proof of Proposition 1

Proof. At an optimum, the participation constraints must hold with equality by Lemma 1. In addition, the no-default constraint can only bind in the good state. Furthermore, because positive debt in the good state ($\tilde{a}(s_g) > 0$ or $a^*(s_g) > 0$) tightens the no-default constraint, we can focus on contracts where the home country is a creditor of both countries in the bad state and a debtor of both countries in the good state.

This implies we can write the problem as

$$\max_{\tilde{a}(s_g),\, a^*(s_g)} u\left(y(s_g) - \tilde{a}(s_g) - a^*(s_g)\right) \;+\; u\left(y(s_b) + \tilde{a}(s_g) + a^*(s_g)\right) \tag{22}$$

subject to

$$u\left(y(s_g) - \tilde{a}(s_g) - a^*(s_g)\right) - \eta a^*(s_g) \geq u\left((1-\phi)y(s_g)\right) \tag{23}$$

$$\tilde{a}(s_g) \leq \tilde{y}(s_b) \tag{24}$$

First-order conditions yield

$$-u'(c_g) + u'(c_b) - \lambda u'(c_g) - \mu = 0,$$

$$-u'(c_g) + u'(c_b) - \lambda u'(c_g) - \lambda\eta = 0.$$

where μ and λ are the non-negative Lagrange multipliers on (23) and (24). Combining these two conditions, we arrive at $\mu = \lambda\eta$, which implies that constraints (23) and (24) must either both bind or both be slack. If the constraints do not bind, we have

$$u'(c(s_g)) = u'(c(s_b)) \tag{25}$$

which implies that

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

and using the budget constraint we obtain that (17) holds. Notice that there may be multiple bilateral contracts that can ensure full risk-sharing. To obtain the minimum value of ϕ that satisfies the no-default constraint, we set $\tilde{a}(s) = y(s_b)$ and obtain

$$\log(\bar{y}) - \eta\left(\frac{y(s_g) - y(s_b)}{2} - \tilde{y}(s_b)\right) \geq \log(y(s_g)(1-\phi))\,,$$

from where we arrive at,

$$\phi \geq 1 - \frac{\bar{y}}{y(s_g)} e^{-\eta\left(\frac{y(s_g)-y(s_b)}{2} - \tilde{y}(s_b)\right)} = \hat{\phi}\,.$$

which is the threshold defined in the proposition.

If $\phi < \hat{\phi}$, optimality implies that $\tilde{a}(s_g) = \tilde{y}(s_b)$ and $a^*(s_g)$ is implicitly defined by the binding no-default constraint

$$\log(y(s_g) - a^*(s_g) - \tilde{y}(s_b)) - \eta a^*(s_g) = \log(y(s_g)(1-\phi))\,. \tag{26}$$

Since the condition above implies that $a^*(s_g)$ is increasing in ϕ, we have that $a^*(s_g) < \frac{y(s_g)-y(s_b)}{2} - \tilde{y}(s_b)$. Consumption in the good state is then given by

$$\begin{aligned} c(s_g) &= y(s_g) - \tilde{y}(s_b) - a^*(s_g) \\ &> y(s_g) - \tilde{y}(s_b) - \left(\frac{y(s_g) - y(s_b)}{2} - \tilde{y}(s_b)\right) \\ &> \frac{y(s_g) + y(s_b)}{2} = \bar{y}\,. \end{aligned}$$

Since expected consumption has to be equal to expected income, we have

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

which implies that $c(s_g) > c(s_b)$.

Totally differentiating (26), we obtain

$$\frac{da^*(s_g)}{d\eta} < 0,$$

so borrowing from the Rival bloc decreases as η rises. Combining this with the good-state budget constraint implies

$$\frac{dc(s_g)}{d\eta} > 0 \quad \text{and} \quad \frac{dc(s_b)}{d\eta} < 0,$$

so consumption becomes more dispersed across states as η increases.

□