Geopolitical Barriers to Globalization

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This paper estimates and quantifies how geopolitical alignment shapes global trade across three distinct eras: the Cold War, hyper-globalization, and contemporary fragmentation. We construct a novel measure of bilateral alignment using large language models to compile and analyze 833,485 political events spanning 193 countries from 1950 to 2024. Our analysis reveals that trade flows systematically track geopolitical alignment in both bilateral relationships and aggregate patterns. Using local projections within a gravity framework, we estimate that a one-standard-deviation improvement in geopolitical alignment increases bilateral trade by 20 percent over ten years. Integrating these elasticities into a quantitative general equilibrium model, we find that deteriorating geopolitical relations have reduced global trade by 7 percentage points between 1995 and 2020. Our findings provide empirical benchmarks for evaluating the costs of geopolitical fragmentation in an era of renewed great power competition.

JEL Classification: F14, F15, F51, C55
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1. Introduction

How do geopolitical tensions affect international trade? This question has gained urgency as U.S.-China rivalry, Russia's isolation following its war with Ukraine, and broader great power competition threaten to fragment the global economy built over decades of integration. While recent theoretical work has raced ahead, empirical progress has been shackled by the absence of consistent and comprehensive measures of bilateral geopolitical alignment.[1] In this paper, we break this impasse by constructing a novel measure that opens the door to systematic empirical and quantitative analysis.

We develop an event-based measure of bilateral geopolitical relations that captures both the timing and intensity of diplomatic dynamics across all 193 UN member states from 1950 to 2024. Using local projections within a gravity framework, we estimate the causal effect of geopolitical alignment on trade flows. We then embed these reduced-form elasticities into a quantitative general equilibrium model to quantify the aggregate and distributional welfare implications of changing geopolitical relationships.

We begin by describing our measure of bilateral geopolitical alignment. Building on the event-based framework developed in Fan (2025), we use Gemini 2.5 Pro augmented with web search capabilities to systematically compile and analyze 833,485 bilateral political events across all 193×192 country pairs from 1950 to 2024. For each country pair and year, we identify significant bilateral events—ranging from trade agreements and state visits to sanctions and diplomatic disputes—and classify them using the Conflict and Mediation Event Observations (CAMEO) framework (Schrodt and Yilmaz 2012). Each event receives a Goldstein score quantifying its cooperative or conflictual intensity from −10 (maximum conflict) to +10 (maximum cooperation) (Goldstein 1992). We then construct dynamic bilateral geopolitical scores through weighted moving averages. The resulting measure, normalized to range from −1 (maximum conflict) to +1 (maximum cooperation), tracks the continuous evolution of bilateral relations.

This measure offers four key advantages for studying trade-geopolitics linkages. First, it captures actual bilateral interactions that directly affect economic relationships, demonstrating substantive sensitivity to trade-relevant diplomatic shifts compared to UN voting patterns—for instance, accurately capturing the U.S.-Russia détente that voting similarity misses. Second, it provides substantial within-dyad variation, with 71.2% of variance occurring within country pairs over time, essential for causal identification through panel estimation. Third, it delivers continuous measurement that captures both dramatic transformations (the 1991 U.S.-Russia cooperation surge) and subtle deteriorations (the post-2014 decline). Fourth, it provides comprehensive coverage across all country pairs and seven decades, enabling analysis of how geopolitical alignment shapes trade from

[1] Recent theoretical papers on this question include Broner et al. (2025b) and Clayton, Maggiori, and Schreger (2025), while Gopinath et al. (2025) is a prominent empirical exception.

Cold War bipolarity through contemporary fragmentation.

Before identifying the causal impact of geopolitical alignment on trade, we document revealing patterns in case studies and aggregate trends. Our case studies demonstrate that geopolitical scores systematically lead trade flows by three years across diverse relationships: Russia-U.S. trade collapsed following diplomatic deterioration from NATO expansion through the Ukraine crisis; China-Japan trade surged after 1972 normalization then declined post-2010 amid territorial disputes; Greece-Türkiye economic relations remain vulnerable to political conflict despite NATO membership; and Iran-Saudi trade remains near zero despite geographic proximity due to persistent ideological rivalry. At the aggregate level, improving geopolitical relations from 0.10 to 0.30 during the Cold War's end preceded the hyper-globalization boom, with global trade shares rising from 22% to 50% of GDP. Cross-sectionally, a one-unit increase in geopolitical alignment is associated with 46% higher bilateral trade among major economies after controlling for gravity variables, while UN voting similarity paradoxically shows the opposite sign—highlighting the major advantage of our event-based measure.

We employ local projections to estimate the causal effect of geopolitical alignment on trade flows. Exploiting within-country-pair variation through destination-year, origin-year, and country-pair fixed effects, we isolate how changes in diplomatic relations affect bilateral trade. Our identification leverages the consistent three-year lead documented in the descriptive analysis. The absence of pre-trends validates our causal interpretation, ruling out reverse causality concerns that plague cross-sectional analyses. We find that a unit improvement in geopolitical alignment increases bilateral trade by 28 log points over ten years for major country pairs. Decomposing the effect into transitory versus permanent components reveals that even purely transitory diplomatic improvements generate trade gains persisting 5–7 years, while a one-standard-deviation permanent realignment increases trade by 18 log points (20 percent) in the long run. [2]

Our estimates prove robust across multiple dimensions. When extending beyond major economies, peak elasticities reach 17 log points for pairs between major and non-major economies and 18 log points for all countries. Notably, while non-major economy pairs exhibit smaller peak effects, the impacts are far more persistent—trade remains elevated for over 15 years following geopolitical improvements, reflecting the deeper embedding of political relationships in long-term commercial ties. The temporal stability across radically different trade regimes—from Cold War bipolarity to WTO multilateralism—confirms we are capturing a fundamental economic relationship rather than period-specific institutional features. Alternative identification strategies strengthen our causal interpretation: instrumental variable estimates using diplomatic conflicts as instruments yield larger elasticities of 55 log points, reflecting heightened sensitivity to acute crises,

[2] One standard deviation is 0.23 units, close to the bilateral deterioration between the United States and Russia post-2014 as shown in Figure 1.

while restricting to non-economic geopolitical events produces an attenuated but more persistent elasticity of 25 log points.

We investigate whether these effects operate through formal trade policy channels. Tariffs remain remarkably insulated from bilateral political volatility since 1990: the GATT/WTO system's Most Favored Nation principle and binding schedules have effectively quarantined tariff-setting from geopolitical tensions. By contrast, sanctions and other restrictive policies respond systematically to geopolitical deterioration, with a one-unit decline in relations increasing sanctions probability by 10–18 percentage points. Yet these formal channels account for only 15 percent of the total effect. The majority operates through informal barriers—regulatory scrutiny, supply chain reorientation, elevated risk premia, and consumer preferences—that leave no trace in official statistics but fundamentally reshape commerce. These findings demonstrate that geopolitical alignment represents a first-order determinant of international trade, comparable in magnitude to geographic distance and linguistic barriers.

Finally, we integrate these reduced-form estimates into a quantitative model of international trade. This general equilibrium framework enables us to trace how bilateral geopolitical frictions aggregate into global welfare effects, decomposing the contributions of different trade friction sources. We decompose the evolution of global trade from 1995 to 2020 into three components: geopolitical changes, tariff liberalization, and unobserved factors (including technological improvements and financial integration). Our counterfactual analysis reveals that deteriorating geopolitical relations reduced global trade by 7 percentage points over this period, while tariff liberalization and unobserved improvements contributed 10.2 and 8.8 percentage points respectively. This decomposition reconciles three seemingly contradictory empirical patterns: aggregate trade data showing no deglobalization, massive reductions in formal trade barriers, and clear evidence of political fragmentation. The offsetting forces explain why globalization appears stable in aggregate trade data despite political fragmentation.

These aggregate patterns, however, mask substantial heterogeneity in welfare implications. While tariff liberalization generated widespread benefits—with 94.6% of countries gaining and mean welfare increasing by 1.23%—geopolitical changes produced highly asymmetric effects, with 63.5% of countries experiencing welfare losses averaging 0.57%. The United Kingdom exemplifies this divergence, gaining 5.15% from tariff liberalization but losing 8.56% from geopolitical repositioning, reflecting both Brexit's economic consequences and deteriorating relations with major trading partners. These findings demonstrate that geopolitical realignment has become a first-order determinant of economic welfare, generating effects comparable in magnitude to decades of trade liberalization efforts, though with far more heterogeneous distributional consequences.

Literature. Our paper contributes to three strands of literature: the measurement of geopolitical alignment, the empirical analysis of how geopolitics shapes trade, and the estimation of trade barriers within gravity frameworks.

Measuring Global Geopolitical Alignment. We construct a novel measure of geopolitical alignment covering all UN nations from 1950 to 2024 that offers key advantages over existing approaches. Prior studies mainly rely on UN General Assembly (UNGA) voting similarity (Signorino and Ritter 1999; Bailey, Strezhnev, and Voeten 2017; Qiu, Xia, and Yetman 2024), but this approach suffers from several limitations: UNGA votes primarily capture multilateral positioning rather than bilateral relations, exhibit limited within-dyad temporal variation (Broner et al. 2025a), and fail to preserve consistent meaning across countries and periods (Airaudo et al. 2025).

Alternative measures face constraints in studying the geopolitics-trade nexus. Discrete categorical approaches capture only specific relationship types—strategic rivalries (Thompson 2001; Aghion et al. 2019), alliances (Gibler 2008), sanctions (Felbermayr et al. 2020, 2021), or treaties (Broner et al. 2025b)—missing the full spectrum of bilateral interactions. Additionally, Caldara and Iacoviello (2022) and Fernández-Villaverde, Mineyama, and Song (2024) estimate aggregate measures of global political risk and fragmentation but lack the essential bilateral dimension for trade analysis. Our event-based measure directly captures bilateral alignment through major diplomatic interactions, encompassing the full spectrum from severe conflict to deep cooperation, constructing a continuous score from −1 to +1 that tracks both the timing and intensity of bilateral geopolitical dynamics.

We also advance the literature on leveraging machine learning for measurement construction. While standard text analysis approaches measure political risk through keyword frequencies (Baker, Bloom, and Davis 2016; Caldara and Iacoviello 2022; Hassan et al. 2019), we exploit the contextual understanding capabilities of large language models (Clayton et al. 2025; Dell 2025; Fang, Li, and Lu 2025). Specifically, we implement the Event-CAMEO-Goldstein framework (Fan 2025) using Gemini 2.5 Pro with web search capabilities to systematically compile and analyze 833,485 major geopolitical events—a scale and scope infeasible through traditional data collection methods.

Geopolitics and Trade. Our paper contributes to the growing empirical literature examining how geopolitics shapes trade patterns. While recent theoretical work has advanced rapidly (Couttenier et al. 2024; Clayton et al. 2025; Clayton, Maggiori, and Schreger 2025),[3] empirical progress has lagged due to measurement challenges (see Aiyar and Ohnsorge (2024) for a comprehensive review). Our work bridges existing gaps by providing system-

[3] Early work dates back to Hirschman (1945). Other related theoretical work includes Alesina, Spolaore, and Wacziarg (2000), Becko and O'Connor (2024), and Mayer, Mejean, and Thoenig (2025). See Mohr and Trebesch (2025) for a comprehensive review.

atic evidence on how geopolitical events translate into measurable changes in economic relationships, with welfare implications comparable in magnitude to decades of trade liberalization.

The most closely related empirical work is Gopinath et al. (2025), who analyze trade flows between and within geopolitical blocs defined by UN voting similarity and document recent evidence of fragmentation. While their bloc-level analysis reveals important aggregate patterns, our bilateral event-based measure enables fundamental advances in understanding the geopolitics-trade nexus: we systematically estimate causal elasticities, trace dynamic adjustment paths, and quantify both aggregate and distributional welfare effects through general equilibrium analysis.[4]

Related empirical work includes early studies on international relations and trade (Morrow, Siverson, and Tabares 1998; Mansfield, Milner, and Rosendorff 2000; Martin, Mayer, and Thoenig 2008) and recent contributions examining various channels through which politics interacts with trade (Korovkin and Makarin 2023; Kleinman, Liu, and Redding 2024; Liu and Yang 2025). Goldberg and Ruta (2025) provides a recent review of the relationship between international trade, trade policy, and development in light of geopolitical shifts. Beyond trade, recent work examines geopolitical impacts on innovation (Alfaro et al. 2025; Flynn et al. 2025), global asset allocation (Pellegrino, Spolaore, and Wacziarg 2025), and economic growth (Fan 2025).

Gravity Estimation and Trade Barriers. Our work also contributes to the extensive literature on gravity models and trade barriers (Anderson and Van Wincoop 2003, 2004; Head and Mayer 2014). Our approach of using the local projection method within a gravity framework is similar to Boehm, Levchenko, and Pandalai-Nayar (2023). While traditional gravity estimations focus on observable trade costs such as tariffs (Baier and Bergstrand 2007; Caliendo and Parro 2015), distance (Disdier and Head 2008), language barriers (Melitz 2008), and regulatory standards (Looi Kee, Nicita, and Olarreaga 2009), we demonstrate that geopolitical alignment represents an equally important but often unmeasured component of bilateral trade frictions.

Roadmap. The remainder of the paper is organized as follows. Section 2 introduces our measure of global geopolitical alignment. Section 3 presents descriptive evidence linking geopolitical alignment to trade patterns through bilateral case studies, aggregate trends, and bloc analysis. Section 4 employs local projections within a gravity framework to estimate dynamic trade elasticities. Section 5 embeds these elasticities in a quantitative

[4]Bonadio et al. (2024) measure trade fragmentation through data-driven changes in U.S. and China trade costs (2015–2023). Cai, Xiang, and Zhao (2025) adopt a similar approach to study decoupling in multinational production and trade. Our geopolitical alignment measure complements their approach by showing that political and economic blocs overlap imperfectly, revealing multiple channels through which politics shapes trade.

general equilibrium model to decompose trade evolution and quantify welfare effects. Section 6 concludes.

2. Measuring Global Geopolitical Alignment

This section introduces our novel measure of bilateral geopolitical alignment. We first describe the methodology for compiling and classifying political events (Section 2.1), then explain the construction of dynamic alignment scores (Section 2.2), and finally document the evolution of global geopolitical alignment (Section 2.3).

2.1. Global Geopolitical Events

Event Compilation Framework. We construct a comprehensive measure of bilateral geopolitical alignment by systematically analyzing political interactions between all country pairs over seven decades. Building on the event-based framework developed in Fan (2025), our approach leverages the fact that major bilateral political events constitute a salient component of documented human knowledge, extensively recorded across news archives, government publications, and scholarly databases.

In the implementation, we employ Gemini 2.5 Pro, a large language model augmented with web search capabilities, to identify and classify major bilateral political events for all 193×192 country pairs from 1950 to 2024. This methodology enables comprehensive coverage that would be prohibitively costly through traditional data collection methods while maintaining consistency across the vast scope of our analysis.

For each country pair and year, we extract significant bilateral interactions—ranging from trade agreements and state visits to sanctions and diplomatic disputes. These events are then classified using the Conflict and Mediation Event Observations (CAMEO) framework, a standardized system for categorizing political interactions into verbal and material cooperation or conflict. Each event receives a Goldstein score, a widely used metric in international relations that quantifies its cooperative or conflictual intensity on a scale from −10 (maximum conflict) to +10 (maximum cooperation) (Goldstein 1992).[5] This scoring system enables us to capture not just the occurrence of events but their relative importance for bilateral relationships.

Table 1 illustrates our methodology using U.S.-Russia bilateral events from 2024. The analysis reveals a year dominated by conflict: five of six major events represent hostile actions, with Goldstein scores ranging from −4.5 to −8.0. The REPO Act authorizing seizure

[5] Goldstein scores are assigned following the standard CAMEO-to-Goldstein mapping used by GDELT and ICEWS databases. While we maintain consistency with these established mappings, our LLM implementation allows for limited contextual adjustments based on the bilateral relationship's historical context and event severity. For the reference mapping between CAMEO codes and Goldstein scores, see `https://eventdata.parusanalytics.com/cameo.dir/CAMEO.SCALE.txt`.

TABLE 1. Major U.S.-Russia Bilateral Events in 2024: LLM Analysis Results

Event Name	**Event Description**	**CAMEO Class.**	**Econ. Type**	**Goldstein Score**
US Sanctions on Ukraine War Anniversary	US imposed 500+ sanctions on Feb. 23 targeting Russia's financial infrastructure, military-industrial base, and sanctions evasion networks following Navalny's death	Material Conflict (16-163)	Sanctions	−7.0
US Enacts REPO Act	Biden signed law on Apr. 24 authorizing seizure of frozen Russian sovereign assets for transfer to Ukraine Support Fund for reconstruction	Material Conflict (17-171)	Asset seizure	−8.0
Russia Authorizes Asset Retaliation	Putin signed decree on May 23 establishing legal framework to seize US assets in Russia as compensation for US seizures under REPO Act	Verbal Conflict (13-131)	Not econ.	−6.5
Historic Prisoner Exchange	US and Russia conducted largest prisoner swap since Cold War on Aug. 1, exchanging 16 detainees (including Gershkovich, Whelan) for 8 Russians	Material Coop. (08-084)	Not econ.	+6.0
Russia Detains US Citizen	Russian authorities detained unnamed US citizen on Aug. 12 for alleged 'hooliganism,' adding to pattern of detained Americans	Material Conflict (17-173)	Not econ.	−5.0
US Accuses Election Interference	US accused Russia on Sept. 4 of 'Doppelganger' malign influence campaign targeting 2024 election, seizing 32 domains and issuing sanctions	Verbal Conflict (11-112)	Not econ.	−4.5

of Russian sovereign assets marks the most severe action (−8.0), representing a historic breach of state sovereignty norms. The February sanctions package targeting 500+ entities (−7.0) and Russia's retaliatory asset seizure decree (−6.5) demonstrate the tit-for-tat escalation dynamic characterizing contemporary great power competition. Even the sole cooperative event—a historic prisoner exchange scoring +6.0—remains purely transactional, occurring amid otherwise unrelenting hostility. This pattern exemplifies how our framework captures both the intensity of bilateral conflicts and the evolution of economic statecraft tools.

Aggregate Patterns Across Three Eras. Our comprehensive compilation encompasses 833,485 bilateral political events across all country pairs. Table 2 reveals how international relations have evolved across three distinct epochs.

The data reveal fundamental shifts in global political dynamics. During the Cold War (1950–1990), bipolar tensions generated the highest conflict share (22.1%) and lowest mean cooperation score (2.33), with extreme volatility (SD = 5.04) reflecting superpower

TABLE 2. Summary of Bilateral Geopolitical Events by Era, 1950–2024

	Event Counts				Goldstein Score	
Period	Cooperation	Conflict	Total	Conflict (%)	Mean	SD
Cold War (1950–1990)	206,857	58,770	265,627	22.1	2.33	5.04
Globalization (1991–2009)	220,840	37,958	258,798	14.7	3.92	4.11
Fragmentation (2010–2024)	251,060	58,000	309,060	18.8	3.70	3.68
Full Period	678,757	154,728	833,485	18.6	3.38	4.33

Notes: This table summarizes 833,485 bilateral geopolitical events extracted and classified using our event-based methodology across three distinct eras. Events are categorized as either cooperation (positive diplomatic interactions including treaties, state visits, and economic agreements) or conflict (negative interactions including sanctions, diplomatic disputes, and military tensions). The Conflict (%) column shows the share of conflict events relative to total events. Goldstein scores quantify event intensity on a scale from −10 (maximum conflict) to +10 (maximum cooperation), with positive values indicating cooperative events and negative values indicating conflictual events.

competition and proxy conflicts. The globalization era (1991–2009) marks a structural break: conflict events plummet to 14.7% while mean cooperation scores nearly double to 3.92, with reduced volatility indicating more stable international relationships. This transformation—from ideological confrontation to economic integration—underpins the trade expansion documented in subsequent sections.

The fragmentation period (2010–2024) exhibits partial reversal. While cooperation levels remain above Cold War norms (mean = 3.70), conflict events resurge to 18.8%, driven by great power competition and eroding multilateral institutions. Paradoxically, this era combines record event frequency (309,060 events in just 15 years) with deteriorating relationship quality, suggesting that increased interaction no longer guarantees improved relations. This pattern foreshadows our central finding: the recent decoupling of geopolitical alignment from economic integration threatens to reverse decades of trade expansion. Appendix B.1 provides comprehensive details on event collection and classification procedures.

Comparison with Existing Event Databases. Our approach differs fundamentally from existing global event databases such as GDELT (Leetaru and Schrodt 2013) and ICEWS (Boschee et al. 2015; Liu and Yang 2025). While these databases attempt to capture all international interactions, by leveraging LLMs' context awareness capability, we focus exclusively on major bilateral political events that define geopolitical relationships. This targeted approach yields a more precise measurement of relationship intensity while providing extended temporal coverage from 1950.

2.2. Measuring Bilateral Alignment

Having compiled bilateral political events, we now transform these discrete interactions into a continuous measure of geopolitical alignment. This transformation addresses two key challenges: bilateral relationships exhibit both sudden shocks (crises, breakthroughs) and persistent underlying trends, and the frequency of recorded events varies substantially across country pairs and time periods. Our dynamic scoring approach captures both the immediate impact of political events and the institutional memory that characterizes international relationships.

Construction of Geopolitical Scores. We begin by computing the average Goldstein score for each country pair and year. Let $\left\{s_{ij,t}^{n}\right\}_{n=1}^{\tilde{N}_{ij,t}}$ denote the Goldstein scores for the set of events between countries i and j in year t, where $\tilde{N}_{ij,t}$ is the total number of events. The average event score, normalized to the unit interval, is:

$$\tilde{S}_{ij,t} = \frac{1}{\tilde{N}_{ij,t}} \sum_{n=1}^{\tilde{N}_{ij,t}} s_{ij,t}^{n}/10 \tag{1}$$

where division by 10 scales from the Goldstein range of $[-10, 10]$ to $[-1, 1]$.

Simple annual averages would treat each year independently, missing the persistence that characterizes diplomatic relationships. Treaties remain in force, conflicts cast long shadows, and institutional ties evolve gradually. To capture these dynamics, we construct a dynamic bilateral geopolitical score through weighted moving averages that balance contemporaneous events with historical relationship patterns:

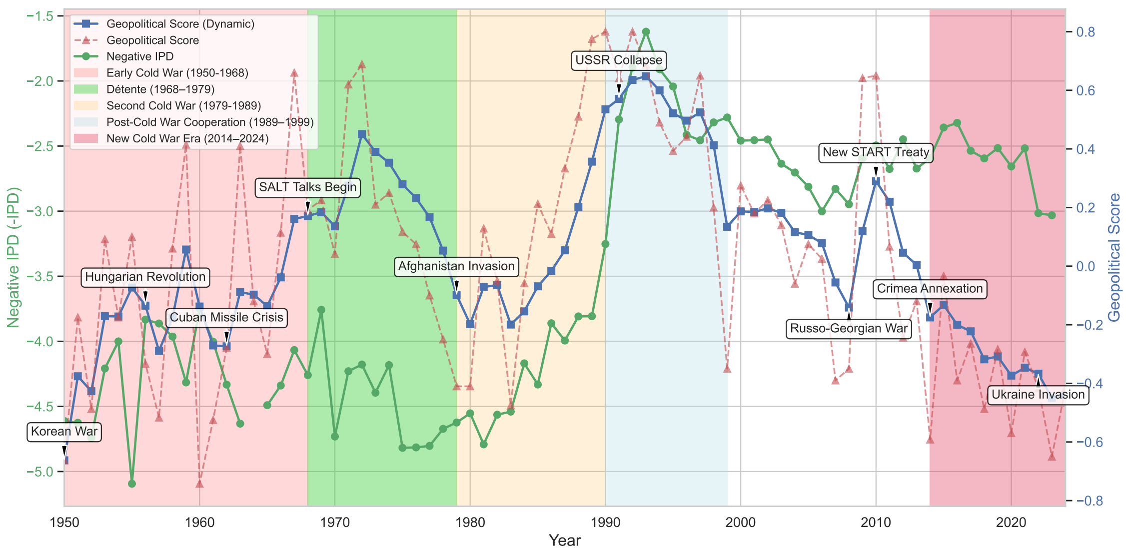
$$\begin{aligned} S_{ij,t} &= \left(1 - \phi_{ij,t}\right) \cdot S_{ij,t-1} + \phi_{ij,t} \cdot \tilde{S}_{ij,t} \\ \phi_{ij,t} &= \tilde{N}_{ij,t}/N_{ij,t}, \quad N_{ij,t} = (1-\delta)\, N_{ij,t-1} + \tilde{N}_{ij,t} \end{aligned} \tag{2}$$

where $\phi_{ij,t}$ is an updating weight that increases with current event frequency, ensuring that periods of intense diplomatic activity receive greater influence while quiet periods allow historical patterns to persist. $N_{ij,t}$ represents the effective cumulative event count with depreciation rate $\delta = 0.3$, approximating a four-year moving average with greater weight on recent events.[6] The resulting geopolitical scores, normalized to range from -1 (maximum conflict) to $+1$ (maximum cooperation), track the continuous evolution of bilateral relations.

[6]This smoothing captures persistent relationship trends while remaining responsive to significant diplomatic shifts. In robustness tests (Appendix A.9.3), we show that unsmoothed event scores yield similar long-run trade effects, confirming that our smoothing procedure preserves economically meaningful variation while reducing noise from isolated diplomatic incidents.

Validation: The U.S.-Russia Case. To demonstrate how our dynamic scoring captures bilateral relationship evolution and its strength over alternative approaches, Figure 1 traces U.S.-Russia (Soviet Union) relations from 1950 to 2024.

FIGURE 1. Geopolitical Scores Between United States and Russia (Soviet Union), 1950–2024



Notes: Time series comparison of geopolitical relationship measures between the United States and Russia/Soviet Union from 1950 to 2024. The blue line shows our dynamic geopolitical score, the orange dashed line shows the yearly geopolitical score, while the green line displays the negative Ideal Point Distance (−IPD) from UN voting data. Shaded regions highlight distinct geopolitical periods: Early Cold War (1950–1968, red), Détente (1968–1979, green), Second Cold War (1979–1990, orange), Post-Cold War Cooperation (1991–1999, light blue), and New Cold War Era (2014–2024, red). Key geopolitical events are annotated on the dynamic score series.

Our dynamic geopolitical score (blue line) reveals the full arc of superpower relations across seven decades. The measure accurately captures major historical episodes: the Korean War and Hungarian Revolution marking early Cold War hostility, the Cuban Missile Crisis representing peak tensions, the dramatic improvement during Détente (1968–mid-1970s) initiated by SALT talks, deterioration following the Soviet invasion of Afghanistan, the remarkable transformation with the USSR's collapse in 1991, and the subsequent decline through the Russo-Georgian War (2008) and Crimean annexation (2014). The 2022 Ukraine invasion marks a new nadir, with bilateral scores reaching levels not seen since the darkest days of the Cold War.

Critically, our event-based measure demonstrates substantial sensitivity to bilateral dynamics compared to the UN voting-based Ideal Point Distance (green line). While the IPD captures broad alignment trends, it misses crucial inflection points: it fails to register the Détente breakthrough,[7] and shows minimal response to the Crimean crisis that fundamentally restructured U.S.-Russia relations. The 2010 New START Treaty appears as a

[7]See government archive: https://history.state.gov/milestones/1969-1976/detente

brief positive spike in our measure—accurately reflecting diplomatic engagement—while the IPD remains flat. This comparison validates our methodology's ability to capture trade-relevant geopolitical shifts that voting patterns overlook, particularly bilateral economic and security interactions that directly affect commercial relationships.

Summary Statistics and Identifying Variation. Table 3 presents summary statistics of our geopolitical alignment measure across distinct periods, revealing three patterns essential for our empirical strategy.

TABLE 3. Summary Statistics of Bilateral Geopolitical Scores

	All Countries		Major-Major Pairs		Dynamics (All)	
Period	Mean	Std Dev	Mean	Std Dev	% Decline	% Improve
Cold War (1950–1990)	0.092	0.229	0.241	0.287	17.8	13.2
Globalization (1991–2009)	0.146	0.231	0.301	0.257	18.5	15.1
Fragmentation (2010–2024)	0.201	0.232	0.323	0.255	22.1	16.9
Variance Decomposition (All Countries):						
Between-dyad: 28.8%				Within-dyad: 71.2%		

Notes: This table presents summary statistics for our bilateral geopolitical alignment scores covering 18,528 country pairs from 1950 to 2024. The scores range from −1 (maximum conflict) to +1 (maximum cooperation), constructed using weighted moving averages of bilateral events with a depreciation rate of 0.3. The Dynamics columns track year-on-year changes: "% Decline" and "% Improve" represent the share of dyad-years experiencing annual score changes below −0.05 and above +0.05, respectively.

First, mean alignment improved steadily from 0.092 during the Cold War to 0.201 in the Fragmentation era, while the share of deteriorating relationships rose from 17.8% to 22.1%—capturing both the general thawing of international tensions and the recent resurgence of bilateral conflicts. Second, major economy pairs consistently maintain higher alignment scores (0.24–0.32) compared to all country pairs (0.09–0.20), reflecting deeper diplomatic engagement and institutional ties among large economies that both facilitate trade and make decoupling more costly. Third, and most crucial for our identification strategy, the variance decomposition reveals that 71.2% of variation occurs within country pairs over time rather than between pairs. This substantial within-dyad variation enables us to identify causal effects through panel estimation while controlling for time-invariant bilateral characteristics such as distance, colonial history, and cultural ties. The bilateral structure of our measure integrates naturally into gravity models, where time-varying geopolitical alignment $S_{ij,t}$ enters directly as a determinant of bilateral trade costs: $\tau_{ij,t} = f(\text{distance}_{ij}, S_{ij,t}, \ldots)$.[8]

[8] In the gravity framework, our bilateral scores capture relationship-specific frictions that affect trade flows: $\ln X_{ij,t} = \alpha S_{ij,t} + \beta \ln \text{dist}_{ij} + \delta_{it} + \delta_{jt} + \varepsilon_{ij,t}$, where $S_{ij,t}$ represents time-varying political barriers distinct from fixed geographic and cultural factors.

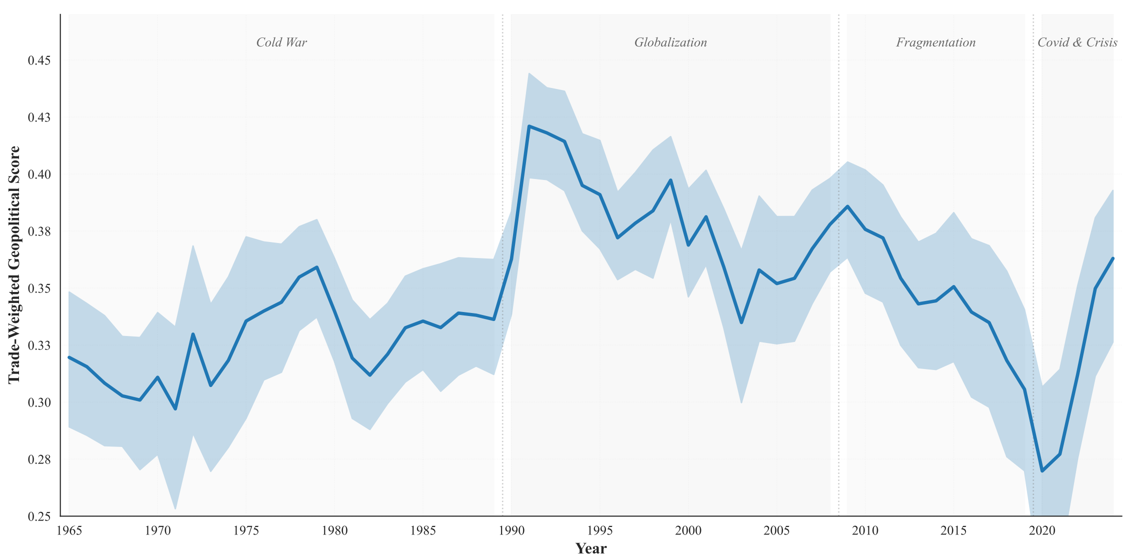
Appendix B.2 provides additional validation exercises demonstrating the measure's ability to accurately capture geopolitical relations across diverse country pairs and historical contexts. With this measure in hand, we now examine how the evolution of global geopolitical alignment has shaped international trade patterns.

2.3. Evolution of Global Geopolitical Alignment

Having constructed bilateral alignment measures, we now aggregate these scores to examine global patterns. We weight bilateral relationships by their share of global trade to capture the geopolitical environment that meaningfully shapes international commerce. This trade-weighted perspective reveals how the political foundations of globalization have evolved from Cold War bifurcation through hyper-globalization to contemporary fragmentation.

Long-Term Trends in Trade-Weighted Alignment. Figure 2 traces the evolution of trade-weighted geopolitical alignment from 1965 to 2024, revealing three distinct epochs that define the modern global economy.

FIGURE 2. Trade-Weighted Geopolitical Score, 1965–2024

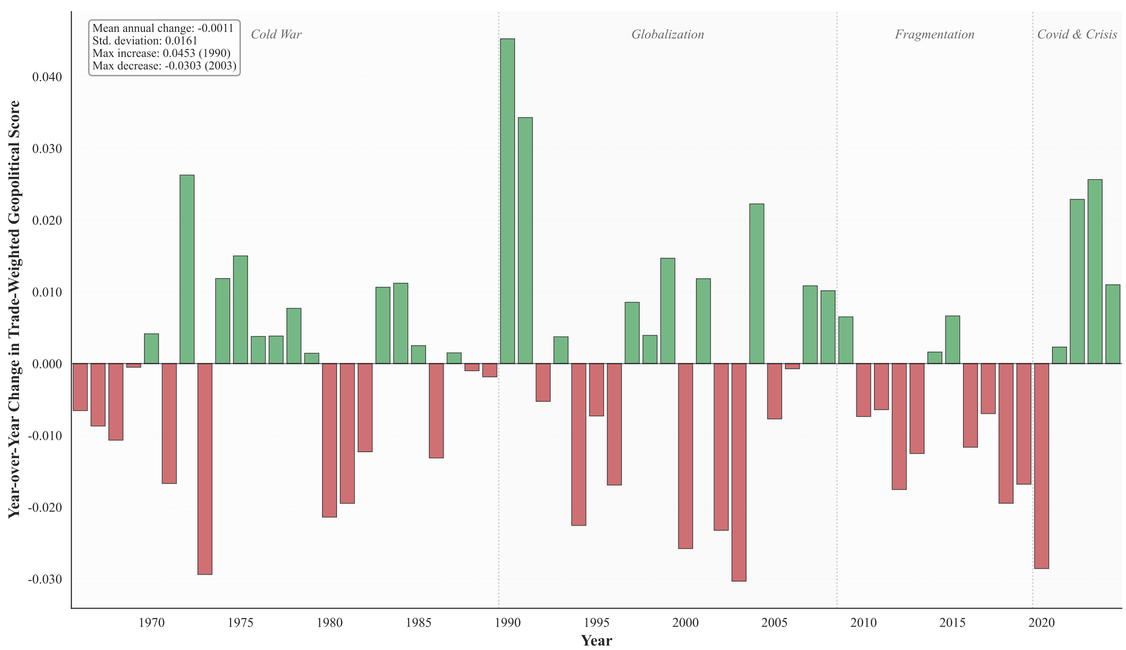


Notes: Trade-weighted average of bilateral geopolitical scores using bilateral trade values as weights. The solid line represents annual weighted means; the shaded band shows 95% confidence intervals from 500 bootstrap iterations. Shaded regions denote distinct geopolitical periods: Cold War (1950–1990), Hyper-globalization (1991–2009), and Fragmentation (2010–2024).

During the Cold War era, alignment remained stable but low around 0.31, reflecting the bifurcated global economy where trade occurred primarily within ideological blocs. This stability masks underlying tensions—superpower competition constrained cross-bloc exchange while intra-bloc trade deepened. The fall of the Berlin Wall triggered a structural break. Trade-weighted alignment surged from 0.34 in 1989 to 0.43 by 1993—a 26% improvement coinciding with the Soviet collapse, German reunification, and China's accelerating reforms. This geopolitical dividend persisted through the hyper-globalization era, with alignment stabilizing between 0.38–0.40 as formerly isolated economies integrated into global value chains. The fragmentation period witnesses a dramatic reversal. Alignment declined from 0.39 in 2010 to 0.28 by 2020, erasing three decades of improvement. The post-2018 acceleration—driven by the U.S.-China trade war, Brexit, and populist backlash—has returned relationships to Cold War-era hostility despite far deeper economic integration than existed during the original Cold War.

Annual Dynamics and Persistence. Figure 3 decomposes these level changes into year-over-year movements, revealing the dynamics underlying long-term trends.[9]

FIGURE 3. Year-over-Year Changes in Trade-Weighted Geopolitical Score



Notes: Annual first differences of trade-weighted geopolitical scores. Green bars indicate improvements; red bars indicate deterioration. The inset box reports summary statistics.

Three features stand out. First, the year 1990 represents the single largest improvement (0.045), capturing the momentous realignments as the bipolar order collapsed. Second, the mean annual change of approximately zero indicates that geopolitical relationships oscillate rather than trend consistently—periods of improvement typically reverse. Third,

[9]We use lagged trade weights to isolate pure geopolitical changes from compositional shifts in trade patterns. Specifically, $\Delta S_t = S_t^w - S_{t-1}^w$ where both terms use trade weights from period $t-1$.

and most concerning, the post-2009 period exhibits unprecedented persistence in deterioration: negative changes in 11 of 15 years, distinguishing structural fragmentation from earlier transitory tensions.

The 2003 decline (−0.030) marking the Iraq War's divisive impact was sharp but isolated. By contrast, contemporary fragmentation shows sustained erosion—each year building on previous deterioration rather than mean-reverting. This persistence suggests we are witnessing not a temporary diplomatic crisis but a fundamental restructuring of the global political economy.

Implications for Global Trade. These aggregate patterns directly link to the trade dynamics we analyze in subsequent sections. The 30% decline in trade-weighted alignment since 2010 represents a first-order shock to the global trading system, comparable in magnitude but opposite in sign to the post-Cold War improvement. That this deterioration accelerated even as formal trade barriers continued declining through regional agreements and WTO commitments underscores a critical insight: political frictions can overwhelm policy liberalization. As we demonstrate in Section 5, these geopolitical headwinds have reduced global trade by 6 percent relative to a counterfactual of maintained 1995-level political relationships.

The patterns documented here—both globally and across regions detailed in Appendix B.3—establish the empirical foundation for our analysis of how geopolitical alignment shapes bilateral trade flows. We now turn to examining these relationships at the country-pair level.

3. Geopolitical Alignment and Trade Patterns

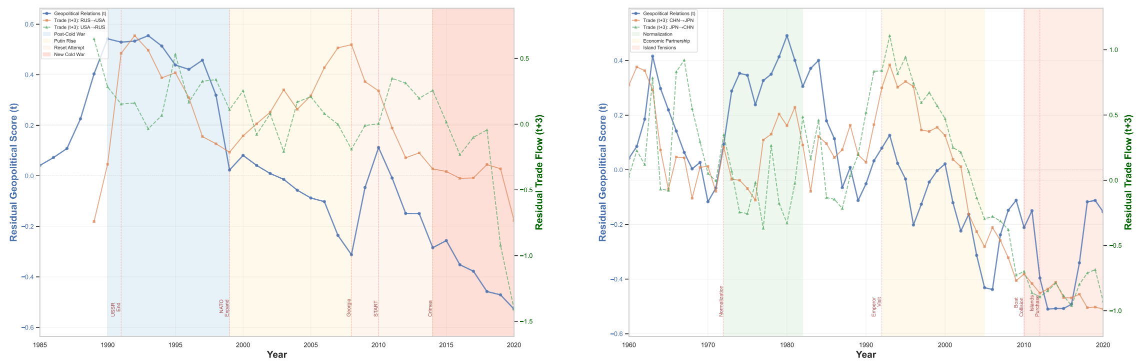
This section documents systematic evidence that geopolitical alignment predicts future trade flows, examining bilateral case studies, aggregate temporal patterns, and bloc analysis that establish the stylized facts underlying our follow-up causal analysis.

3.1. Case Studies: Geopolitics and Trade Dynamics

We examine bilateral relationships that demonstrate how geopolitical alignment systematically predicts future trade flows across diverse geographic, political, and economic contexts. Our analysis reveals a consistent pattern: residual geopolitical scores lead residual trade flows by three years, reflecting the lag between diplomatic shifts and trade reorientation due to existing contracts, investment adjustment costs, and supply chain reconfiguration.[10]

[10] Both series are residualized to isolate bilateral variation from global and country-specific trends. Geopolitical scores are residualized on country1-year, country2-year, and dyad fixed effects. Trade flows (log COMTRADE

FIGURE 4. Geopolitics and Future Trade: Major Power Relationships



A. Russia-U.S. B. China-Japan

Notes: Both panels plot residualized geopolitical relations at time t against residualized bilateral trade flows at time $t+3$. Geopolitical scores are residualized on two country-year fixed effects and dyad fixed effects to isolate bilateral political dynamics from global trends and country-specific shocks. Trade flows (log values from COMTRADE) are residualized on origin-year, destination-year, and origin-destination fixed effects following the structural gravity equation: $\ln X_{ijt} = \alpha_{it} + \beta_{jt} + \gamma_{ij} + \varepsilon_{ijt}$, where the residual ε_{ijt} captures time-varying bilateral trade frictions. Shaded regions indicate major diplomatic periods.

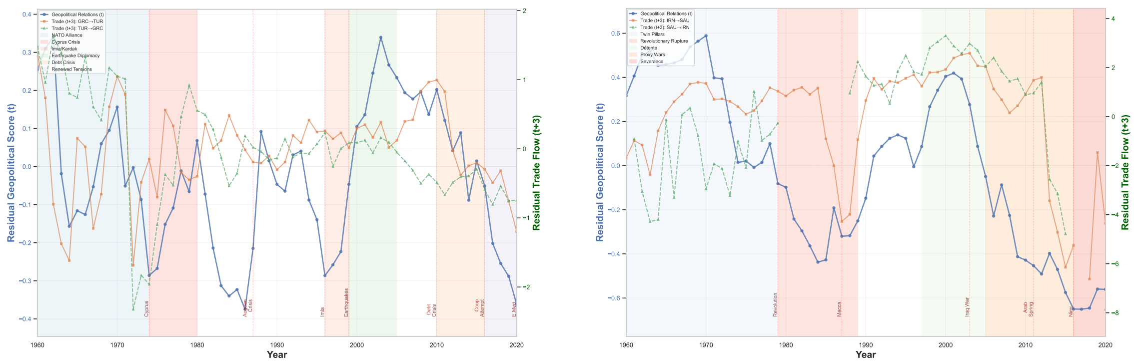
Major Power Dynamics. Figure 4 presents two cases of great power relationships with different geopolitical trajectories. The Russia-U.S. relationship (Panel a) exemplifies how initial optimism can give way to structural antagonism. The Soviet collapse generated unprecedented diplomatic opening (geopolitical scores rising from 0 to +0.5 by 1992), and exports to the United States increased by more than 300% at the onset. Then, the failure to embed Russia in Western institutions manifested first diplomatically: NATO expansion and the Kosovo intervention drove geopolitical scores negative by 2000, three years before trade residuals followed. The Georgia conflict (2008) and Crimea annexation (2014) represent escalating ruptures, with the 2022 sanctions following Ukraine's invasion marking complete economic severance. This trajectory—from potential partnership to systemic rivalry—demonstrates how, absent institutional anchors, geopolitical tensions ultimately overwhelm economic incentives.

The China-Japan relationship (Panel b) reflects six decades characterized by significant volatility. The 1972 normalization marks the sharpest discontinuity: geopolitical scores jump from −0.15 to +0.45 within two years, while trade residuals remain negative until 1975 before surging to +0.3 by 1980—transforming Japan into China's primary technology provider and China into Japan's manufacturing base. The 1992 Emperor visit initiates a second phase of deepening integration, as bilateral trade expanded from \$20 billion to \$240 billion. The post-2010 deterioration following territorial disputes demonstrates the reverse dynamic: geopolitical scores plunge to −0.5 while trade residuals decline to

values) are residualized on origin-year, destination-year, and origin-destination fixed effects. The three-year lead structure reflects the lag between diplomatic shifts and trade reorientation.

−1.5, reflecting active economic decoupling despite continued geographic and economic complementarities.

FIGURE 5. Geopolitics and Future Trade: Regional Tensions



A. Greece-Türkiye

B. Iran-Saudi Arabia

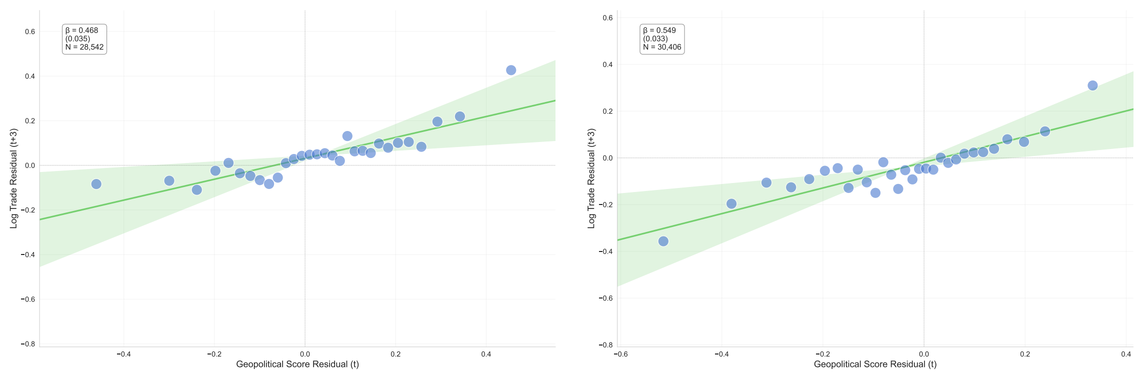
Notes: Both panels plot residualized geopolitical relations at time t against residualized bilateral trade flows at time $t + 3$. Variables are residualized following the methodology described in Figure 4. Shaded regions indicate major diplomatic periods.

Regional Rivalries and Proximity Paradoxes. Figure 5 examines cases where geographic proximity or economic complementarity fails to offset political tensions. The Greece-Türkiye dyad (Panel a) shows sharp co-movements between geopolitical alignment and trade integration. Despite both countries' membership in NATO, formal alliance ties have not insulated their economic relations from political conflict. The 1974 Cyprus invasion marked a decisive rupture: geopolitical residuals fell steeply and bilateral trade collapsed, a pattern repeated during the Aegean crisis of the late 1980s. Relations improved briefly after the 1999 İzmit earthquake, when "earthquake diplomacy" fostered simultaneous increases in political alignment and trade flows. From 2016 onward, however, the consolidation of Erdoğan's more authoritarian regime coincided with renewed tensions in the Eastern Mediterranean, pushing both geopolitical scores and trade residuals to multi-decade lows. This trajectory underscores how geopolitical relationships—rather than geography, economic complementarities, or even formal alliance commitments—have persistently shaped the bilateral trade relationship.

The Iran-Saudi Arabia dyad (Panel b) also demonstrates a tight linkage between geopolitical alignment and economic exchange. Cooperation under the U.S. "Twin Pillars" policy produced modest, positive residuals before 1979. The Iranian Revolution drove a sharp deterioration—geopolitical residuals fall to roughly −0.4 by the mid-1980s—and bilateral trade contracted. A late-1990s/early-2000s détente reversed much of this: geopolitical residuals turned positive and bilateral trade rose markedly. Relations then deteriorated again from the mid-2000s, and the 2016 diplomatic severance following the Nimr execution drove both measures to historic lows. That trade remains near zero despite both nations' positions as major oil exporters—with natural complementarities in refining capacity and market access—illustrates how ideological rivalry can completely override economic rationality.

These patterns extend broadly across our sample. Appendices A.2 and A.3 examine additional U.S. relationships (China, Brazil, Saudi Arabia, Colombia) and intra-Asian dynamics (China-India, Japan-South Korea, China-South Korea, India-Japan), revealing how strategic rivalry undermines interdependence, energy dependence moderates tensions, and shared security interests reinforce trade expansion. Across all cases, the three-year lead relationship remains robust, confirming that geopolitical realignment systematically precedes trade adjustment regardless of the specific bilateral context.

FIGURE 6. Geopolitical Alignment and Trade Intensity: Major Economy Dyads



A. Cold War Era (Pre-1991) B. Post-Cold War (1991–2024)

Notes: Binscatter plots of residualized log trade flows at $t + 3$ against residualized geopolitical scores at t for dyads among 32 major economies. Each point represents the mean values within 30 quantile-based bins. Fitted lines from bivariate regressions shown with 95% confidence intervals. Trade and geopolitical scores are residualized following the specification in Figure 4. Major economies defined as countries ever ranking among the top 20 by GDP at any point since 1960.

Cross Country-Pairs Evidence. Moving from case studies to cross-country patterns, Figure 6 presents binscatter plots of residualized trade flows against residualized geopolitical scores for major economy dyads, comparing the Cold War era with the post-1991 period. The results show a stable relationship across both eras: a one-unit increase in geopolitical alignment is associated with a 47 log point increase in trade during the Cold War ($\beta = 0.468$, s.e. = 0.035) and a 55 log point increase post-1991 ($\beta = 0.549$, s.e. = 0.033), indicating that the dynamics of geopolitics and trade relations are not a Cold War specialty.

We implement a simple variance decomposition of bilateral trade flows to assess geopolitical alignment's quantitative importance (see Appendix A.5). While geographic distance dominates, explaining half of trade resistance variation, geopolitical alignment accounts for 3.4%, comparable to linguistic distance (2.6%) and larger than the border effect (1.1%). This variation analysis reveals that dynamically evolving political relationships shape trade as powerfully as ancient cultural and institutional barriers, making geopolitical alignment the primary policy lever for influencing international trade flows.

3.2. Geopolitics and Trade over Time

We document the co-evolution of geopolitical alignment and trade integration by constructing time series of mean trade shares and average bilateral geopolitical scores across countries and regions from 1950 to 2024. Following the bilateral evidence of geopolitical dynamics leading trade flows, we examine whether this pattern holds at aggregate levels.

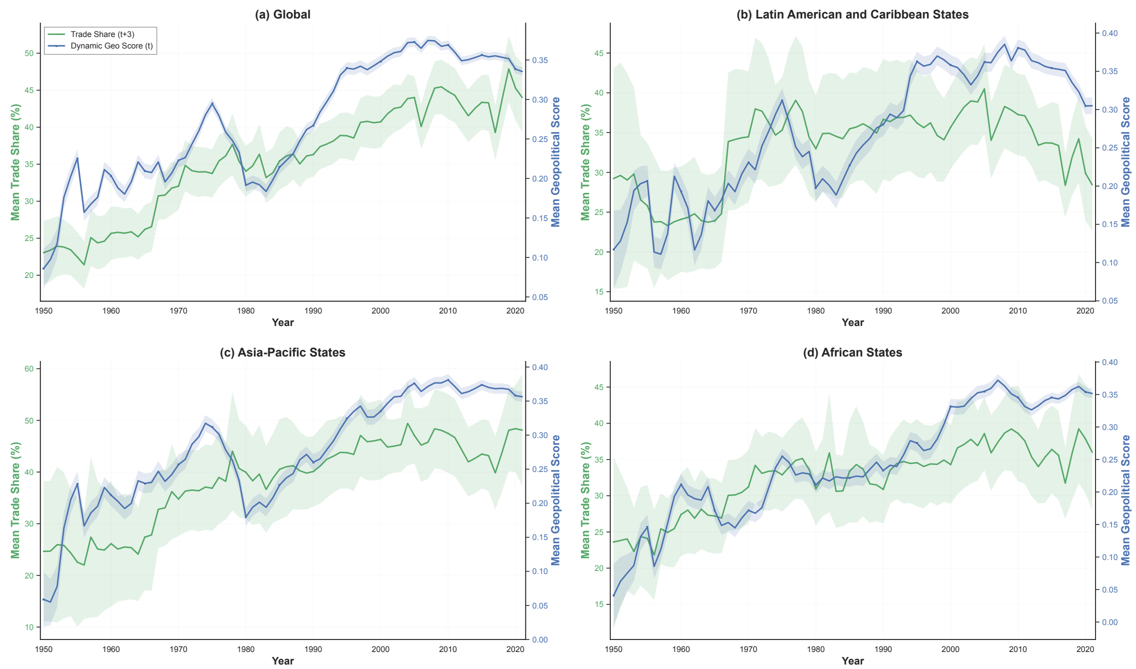
Figure 7 presents the temporal relationship between dynamic geopolitical scores at time t and trade shares at time $t + 3$ for the global economy and three major regional groupings.[11] The three-year lead structure—consistent with our bilateral case studies—captures the lag between diplomatic realignments and trade reorientation due to existing contracts, investment adjustment costs, and supply chain reconfiguration.

Panel (a) illustrates global patterns. From 1950 to 1968—the first half of the Cold War—geopolitical alignment remained low but trended upward, rising from 0.10 to 0.30 amid pronounced fluctuations. Trade shares responded with a lag of roughly three years, increasing from 22% to 32% by the onset of détente. In the late 1970s, alignment temporarily deteriorated, ushering in the "second Cold War," and trade momentum stalled. The end of the Cold War marks a structural break: geopolitical scores rose from 0.25 in 1985 to 0.37 by 1995, foreshadowing the hyper-globalization era in which global trade shares reached 45% by 2008. After 2010, however, geopolitical alignment failed to improve—and in some respects worsened amid great power competition and populist backlash—bringing the trend of trade integration to a halt.

Regional dynamics reveal different trajectories, but the positive link between political alignment and trade integration remains consistent. Latin America (Panel b) exhibits the sharpest swings: geopolitical scores fell steeply during the early 1980s debt crisis and again in the 2010s, with trade shares moving downward in parallel—suggesting that economic openness could not offset recurrent political strains. Asia-Pacific states (Panel c) show the strongest sustained rise, with alignment and trade shares trending upward together from the 1950s through the 2000s, capturing the region's long boom in both politics and commerce. African states (Panel d) follow a more gradual path: political alignment improved steadily after independence, and trade shares increased in tandem, though from a lower base and with a slowdown after 2010. Across all three regions, the

[11] Trade share is calculated as the average of exports-to-GDP and imports-to-GDP ratios. Dynamic geopolitical scores represent weighted averages of bilateral scores using cumulative event counts as weights. Regional scores include all dyads containing at least one country from the region. Appendix Figure A4 presents corresponding patterns for Western and Eastern European states.

FIGURE 7. Geopolitics and Trade over Time across Regions



Notes: Each panel plots mean dynamic geopolitical scores at time t (blue, right axis) against mean trade shares at time $t + 3$ (green, left axis). Trade share is the average of exports/GDP and imports/GDP ratios from The Global Macro Database (Müller et al. 2025). Shaded areas represent 95% confidence intervals. Dynamic geopolitical scores are weighted averages using cumulative bilateral events, capturing the persistent nature of international relationships.

co-movement of the two series underscores that, despite regional heterogeneity in levels and timing, the relationship between geopolitical alignment and trade integration is stable and persistent.

The aggregate patterns corroborate our bilateral findings: geopolitical realignments systematically precede trade adjustments by approximately three years across all regions.[12] This consistency across scales—from specific dyadic bilateral relationships to global aggregates—underscores that political dynamics represent a first-order determinant of international economic integration, not merely an idiosyncratic factor affecting specific country pairs.

3.3. Bloc Analysis

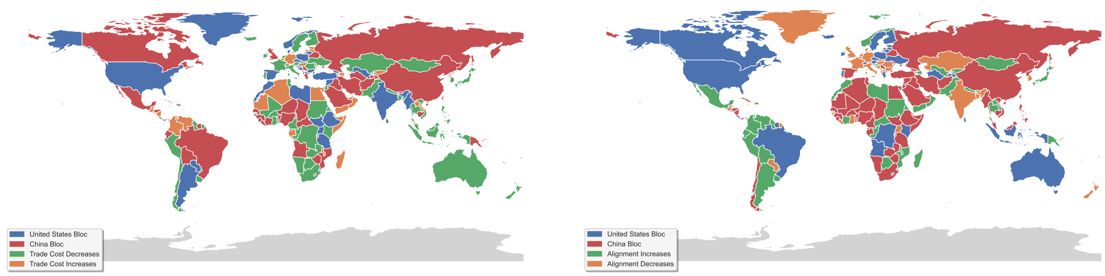
The recent period of geopolitical fragmentation has generated renewed interest in whether the global economy is dividing into competing blocs. We examine this question by classifying countries based on their evolving relationships with the United States and China—the

[12]Pearson correlations between dynamic geopolitical scores at t and trade shares at $t + 3$ are: Global (0.896), Asia-Pacific States (0.812), African States (0.876), Latin American and Caribbean States (0.663), Western European and Other States (0.801), and Eastern European States (0.791).

two poles of contemporary strategic competition.

Figure 8 presents our bloc classification for 2015–2023 using two complementary approaches. To construct trade-based blocs (Panel A), we estimate the regression $\Delta \ln \text{Trade}_{od} = \delta_o + \delta_d + \omega_{od}$, where the negative of $\hat{\omega}_{od}$ captures the change in bilateral trade costs between 2015 and 2023 after controlling for origin and destination fixed effects. Countries are classified into the U.S. bloc (blue) if their trade costs with the United States decreased while costs with China increased, and into the China bloc (red) under the opposite pattern. For geopolitical blocs (Panel B), we apply an analogous methodology using $\Delta S_{od} = \delta_o + \delta_d + \xi_{od}$, where $\hat{\xi}_{od}$ captures changes in bilateral geopolitical alignment.

FIGURE 8. Country Bloc Classifications, 2015–2023



A. Trade Blocs

B. Geopolitical Blocs

Notes: Panel A assigns blocs based on changes in trade costs estimated from $\Delta \ln \text{Trade}_{od} = \delta_o + \delta_d + \omega_{od}$. Countries are classified into the U.S. bloc (blue) if trade costs with the United States decreased while costs with China increased, and into the China bloc (red) under the reverse pattern. Countries with decreasing costs to both powers are shown in green; those with increasing costs to both in orange. Panel B uses an analogous classification based on changes in geopolitical alignment from $\Delta S_{od} = \delta_o + \delta_d + \xi_{od}$.

Three key patterns emerge. First, the correspondence between trade and geopolitical blocs is imperfect. While traditional U.S. allies in Europe and the Pacific align both economically and politically with the United States, several Latin American and African countries exhibit divergent patterns—maintaining improved geopolitical relations with one power while deepening trade ties with the other.[13] This decoupling of political and economic alignment suggests that complete economic blocs have not yet formed.

Second, a significant number of countries resist bipolar alignment. Nations shown in green (experiencing improved relations with both powers) and orange (deteriorating relations with both) demonstrate that many states pursue multi-alignment strategies rather than choosing sides. This “connector” role is particularly pronounced among Southeast Asian and European economies.

Third, the geographic distribution reveals regional clustering effects. The U.S. bloc concentrates in North America, Western Europe, and key Pacific allies, while China’s

[13]The seemingly counterintuitive finding that Canada and Mexico align with the China trade bloc is consistent with Bonadio et al. (2024).

influence radiates through Central Asia, parts of Africa, and its immediate periphery. These patterns suggest that geographic proximity and existing regional architectures continue to shape alignment choices despite the global nature of U.S.-China competition.

The incomplete overlap between trade and geopolitical blocs indicates that while political tensions are reshaping global commerce, the full fragmentation into hermetic economic spheres remains unrealized. This partial decoupling aligns with our econometric findings that geopolitical alignment affects trade with significant lags, suggesting that the economic consequences of current political realignments may intensify over the coming decade.

4. Trade Elasticities to Geopolitical Alignment

Having documented systematic patterns linking geopolitical alignment to trade flows—from bilateral case studies to aggregate trends revealing co-movement across seven decades—we now establish causal identification. This section provides estimates through complementary econometric strategies. We first present cross-sectional gravity estimates that establish the economic magnitude and temporal stability of the geopolitics-trade relationship. We then employ local projections to identify dynamic causal effects, exploiting within-dyad variation that isolates how changes in diplomatic relations affect bilateral trade. These reduced-form elasticities provide the foundation for the quantitative welfare analysis in Section 5.

4.1. Cross-Country Gravity Estimates

We begin with a standard gravity framework to establish three stylized facts about the geopolitics-trade relationship: its economic magnitude, comparison with alternative measures, and temporal evolution. While these correlations cannot establish causality, they provide essential context for understanding the economic relevance of geopolitical relationships and motivate our subsequent dynamic identification strategy.

Gravity Specification. We estimate the following gravity equation:

$$\ln X_{od,t} = \alpha S_{od,t} + \boldsymbol{\beta}'\mathbf{Z}_{od} + \delta_{ot} + \delta_{dt} + \varepsilon_{od,t}$$

where $X_{od,t}$ denotes bilateral trade from origin o to destination d in year t, $S_{od,t}$ is our geopolitical alignment measure, and $\mathbf{Z}_{od}$ contains time-invariant gravity controls: geographic distance, contiguity, and linguistic distance. Origin-year (δ_{ot}) and destination-year (δ_{dt}) fixed effects absorb all country-specific time-varying factors including GDP, multilateral resistance terms, and unilateral trade policies, ensuring estimation comes from cross-sectional variation in bilateral relationships.

We estimate this specification for two samples. Our primary analysis focuses on trade among 32 major economies—countries that have ranked among the top 20 by GDP since 1960—which account for 70% of global trade while minimizing zero trade flows that complicate gravity estimation. We then extend to all country pairs to examine whether geopolitical effects vary with economic development.

Main Results. Table 4 presents our baseline estimates. The geopolitical alignment coefficient is positive and highly significant across all specifications. For major economies (columns 1–2), a one-standard-deviation increase in alignment (0.28 units, approximately the magnitude of the U.S.-Russia deterioration between 2014 and 2024) is associated with 12.8 log points higher bilateral trade after controlling for geography and language. The raw correlation without controls yields 20.4 log points, indicating that while some of the bivariate relationship reflects correlation with distance and cultural factors, the majority represents an independent geopolitical effect.

TABLE 4. The Effect of Geopolitical Relationship on Trade

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	log Trade Value					
	Major Countries			All Countries		
Geopolitical Relation	0.729	0.458		2.571	1.096	
	(0.121)	(0.106)		(0.043)	(0.027)	
IPD			0.342			0.084
			(0.045)			(0.013)
Geographic Distance		-0.813	-0.947		-1.448	-1.562
		(0.052)	(0.051)		(0.016)	(0.017)
1[neighbor]		0.226	0.257		0.843	0.765
		(0.171)	(0.157)		(0.079)	(0.083)
Linguistic Distance		-1.099	-1.705		-1.701	-1.905
		(0.330)	(0.301)		(0.075)	(0.078)
Mean Dep. Var.	12.52	12.52	12.72	7.23	7.23	7.26
Observations	58,948	58,948	50,946	1,087,543	1,087,543	974,780

Notes: The unit of observation is an origin-destination country pair in a year. Columns 1–3 report results for country pairs among 32 major countries, while Columns 4–6 include all country pairs. All specifications include origin-year and destination-year fixed effects. Standard errors are clustered at the country pair level.

The effect amplifies substantially when including all countries (columns 4–5): a one-standard-deviation improvement corresponds to 25.2 log points higher trade after controlling for gravity variables, suggesting that smaller economies' trade flows are more sensitive to political relationships. This pattern likely reflects both limited institutional capacity to maintain trade despite political tensions and greater reliance on government-facilitated trade promotion.

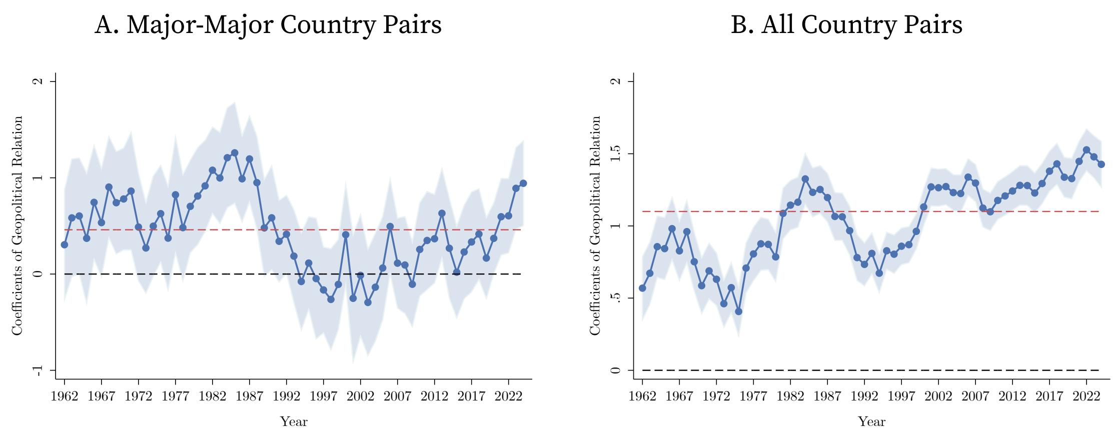
To validate our measure, columns 3 and 6 replace geopolitical alignment with the Ideal Point Distance (IPD) derived from UN voting patterns—the standard measure in the existing literature. The results reveal a fundamental problem: IPD generates positive coefficients, implying that countries with divergent voting patterns trade more intensively. This counterintuitive finding exposes the limitation of voting-based measures: they capture multilateral positioning rather than bilateral relationships. Countries may vote similarly due to shared regional or developmental concerns while maintaining hostile bilateral relations that inhibit trade, whereas strong trading partners may diverge in UN votes due to differing alliance obligations. As demonstrated in Appendix Figures B3 and B4, hostile dyads such as India-Pakistan and Greece-Türkiye maintain high UN voting similarity despite their adversarial relations.

Temporal Variation and Interpretation. Figure 9 examines whether the geopolitics-trade relationship has evolved across different international systems by estimating year-specific coefficients from 1962 to 2024. Three distinct epochs emerge. During the Cold War (1962–1990), the coefficient for major economies peaks around 1.2, confirming that political alignment dominated trade patterns in a bipolar world where economic blocs coincided with security alliances. The coefficient attenuates during hyper-globalization (1991–2008), falling below 0.5 as WTO rules, regional agreements, and global value chains temporarily decoupled commerce from politics. Since 2018, however, the coefficient has surged back to 1980s levels, driven by the U.S.-China trade war, sanctions proliferation, and broader fragmentation.

This resurgence reflects not only the return of great power competition but also the increasing prevalence of material conflicts—sanctions, trade restrictions, and economic coercion—that generate particularly severe trade disruptions. As demonstrated in Section 4.3.3, trade flows are especially sensitive to material conflicts, with sanctions and militarized disputes producing trade elasticities nearly double those of diplomatic tensions alone. The post-2018 period has witnessed a proliferation of such material conflicts: comprehensive sanctions against Russia, technology export controls targeting China, and reciprocal tariff escalations. These instruments of economic statecraft directly sever commercial relationships rather than merely chilling them, explaining why the geopolitics-trade coefficient has returned to Cold War magnitudes despite the persistence of multilateral institutions. This U-shaped pattern suggests that while institutions can temporarily insulate trade from political tensions, geopolitical forces—particularly when manifested through material conflicts—reassert themselves during periods of systemic competition.[14]

[14]The contrasting results for IPD (shown in Appendix Figure A5) further validate our measure's advantage.

FIGURE 9. Conditional Correlation between Trade and Geopolitics by Year



Notes: This figure plots the estimated coefficients of geopolitical relations on log trade values by year. Specifically, we estimate $\ln X_{odt} = \delta_{ot} + \delta_{dt} + \sum_{\tau=1962}^{2024} \beta_\tau S_{odt} \times \mathbf{1}[t = \tau] + \text{Controls} + \epsilon_{odt}$, where controls include geographic distance, contiguity, and linguistic distance. The red dashed lines depict the corresponding estimates obtained from pooling all years. Panel (a) shows results for major-major country pairs (corresponding to column 2 in Table 4), while Panel (b) shows results for all countries (corresponding to column 5 in Table 4). Standard errors are clustered at the country-pair level.

The cross-sectional evidence establishes that geopolitical alignment represents a first-order determinant of trade with effects comparable to fundamental gravity forces. However, these correlations leave causality unresolved: do political relationships drive trade, does trade foster diplomatic cooperation, or do omitted factors explain both? We now turn to dynamic analysis that resolves this identification challenge.

4.2. Dynamic Geopolitical Effects on Trade

We estimate the dynamic causal effects using local projections (Jordà 2005; Jordà and Taylor 2025). This approach enables us to characterize both the immediate impact and adjustment path of trade flows following changes in geopolitical alignment, while addressing the inherent persistence of both political relationships and trade patterns.

4.2.1. Empirical Specification

We estimate the dynamic causal effect of geopolitical alignment on bilateral trade using local projections within a structural gravity framework.[15] Our specification traces the full

The IPD coefficients display an unexpected temporal pattern: they peak positively during the détente period when superpower competition temporarily relaxed. This counterintuitive relationship underscores that voting-based measures fail to capture the bilateral dynamics that actually determine trade flows.

[15]Following Boehm, Levchenko, and Pandalai-Nayar (2023), we employ local projections to explicitly account for the stochastic processes of geopolitics and trade.

impulse response function:

$$\ln X_{od,t+h} = \beta_h S_{od,t} + \sum_{\ell=1}^{L} \gamma_{h,\ell} \ln X_{od,t-\ell} + \sum_{\ell=1}^{L} \phi_{h,\ell} S_{od,t-\ell} + \delta_{od} + \delta_{ot} + \delta_{dt} + \varepsilon_{od,t+h} \tag{3}$$

for horizons $h \in \{-8, -7, \ldots, 19, 20\}$. The coefficient β_h captures the response of bilateral trade at horizon h to a unit change in geopolitical alignment at time t, controlling for persistence in both variables through $L = 3$ lags.[16]

Our identification strategy exploits within-dyad temporal variation through a stringent triple fixed effects structure. Country-pair fixed effects (δ_{od}) absorb all time-invariant bilateral determinants—geographic distance, colonial history, common language, and other standard gravity variables. Origin-year (δ_{ot}) and destination-year (δ_{dt}) fixed effects control for all country-specific time-varying factors including GDP, multilateral resistance terms, unilateral trade policies, and global value chain participation. This structure ensures that identification derives exclusively from differential changes in bilateral geopolitical alignment, isolating the relationship-specific component from both global trends and country-level shocks.

The local projection approach offers four key advantages over VAR methods for our gravity setting (Jordà 2005; Montiel Olea and Plagborg-Møller 2021; Plagborg-Møller and Wolf 2021). First, it remains robust to misspecification of the underlying dynamic process, avoiding the potentially restrictive assumptions required for VAR identification. Second, it directly estimates impulse responses at each horizon without recursively compounding estimation errors. Third, it naturally accommodates our high-dimensional fixed effects structure that would be computationally infeasible in a VAR framework. Fourth, and most importantly for causal identification, estimating pre-treatment responses for $h < 0$ provides a direct test for reverse causality and anticipation—whether future geopolitical changes are affected by or anticipated from current trade patterns.

4.2.2. Main Results

We implement local projections to estimate the dynamic causal effect of geopolitical alignment on bilateral trade flows. Our analysis focuses on major economy pairs for both econometric and economic reasons. Econometrically, restricting to major economies minimizes the zero trade flow problem that plagues gravity estimations (Head and Mayer 2014).[17] Economically, major economies account for approximately 70% of global trade

[16] Appendix Figure A6 demonstrates robustness to alternative lag specifications. Using $L = 5$ yields virtually identical impulse responses, confirming that three lags adequately capture the relevant dynamics without overfitting.

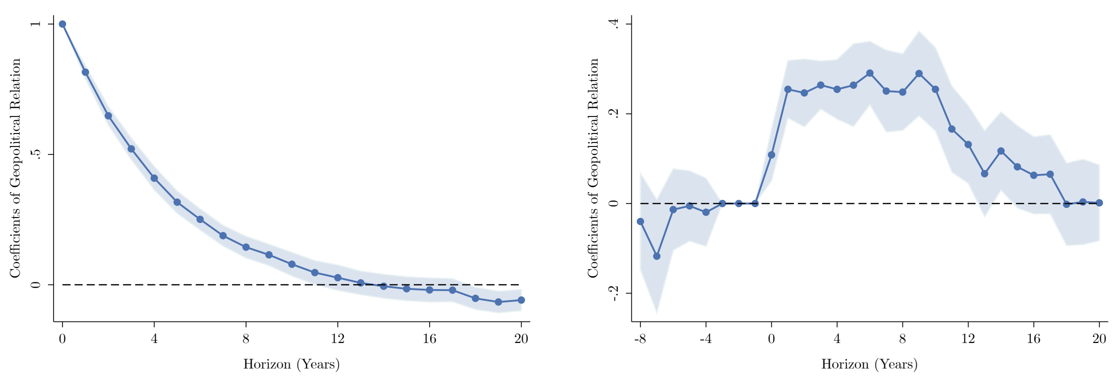
[17] Among the 32 major economies in our sample, fewer than 5% of potential bilateral trade flows are zeros, compared to over 50% in the full sample. This near-complete trade matrix allows us to interpret our linear projection estimates as changes in trade costs within the structural gravity framework.

despite representing fewer than 3% of potential country pairs, making them the primary drivers of global trade patterns.

Figure 10 presents our core findings. Panel A demonstrates that geopolitical relations exhibit modest persistence following a shock.[18] A unit improvement in alignment decays gradually, with approximately 50% persisting after three years and fully dissipating after ten years. This persistence—analogous to the autocorrelation of productivity shocks in growth models—drives the cumulative trade impact.

FIGURE 10. Dynamic Effect of Geopolitical Relations on Trade

A. Autocorrelation of Geopolitical Relations B. Effect of Geopolitical Relations on Trade



Notes: Panel A reports estimates from: $S_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \phi_h S_{od,t} + \sum_{\ell=1}^{3} \phi_{h,\ell} S_{od,t-\ell} + \varepsilon_{od,t+h}$. Panel B shows estimates from equation (3). The sample includes country pairs among 32 major economies. Both panels report estimated coefficients with 95% confidence intervals based on Driscoll-Kraay standard errors.

Panel B reveals three key patterns in the trade response. First, the absence of pre-trends for horizons −8 to −1 validates our identification strategy, confirming that future geopolitical changes do not drive current trade flows—ruling out reverse causality concerns that plague cross-sectional analyses.[19] Second, trade responds gradually to geopolitical shocks, with the coefficient rising from 10 log points on impact to a peak of 28 log points between years 2 and 10. This gradual adjustment reflects the time required to establish new trading relationships, redirect supply chains, and overcome switching costs—consistent with the sluggish trade adjustment documented in the trade liberalization literature (Baier and Bergstrand 2007). Third, the response exhibits a hump shape, declining after year 10 as the underlying geopolitical impulse dissipates.

Our inference employs Driscoll-Kraay standard errors to account for serial correlation and cross-sectional dependence arising from common shocks (Driscoll and Kraay 1998).

[18]Our construction of dynamic geopolitical scores adds persistence to the mean-reverting process of unsmoothed geopolitical events, as shown in Appendix A.9.3.

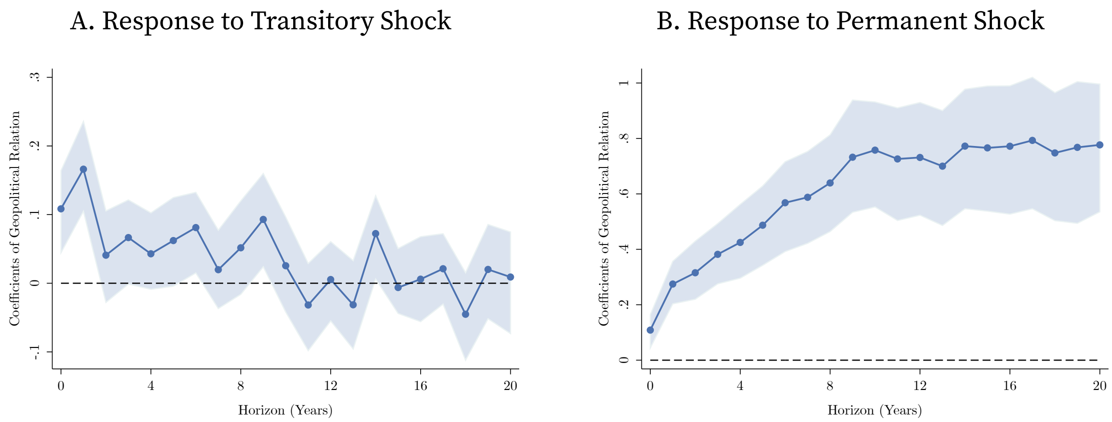
[19]Appendix Figure A8 provides additional evidence by showing that trade shocks have no effect on future geopolitical relations, confirming unidirectional causality from politics to trade. This finding is consistent with the possibility that nations cooperate diplomatically to promote trade.

Appendix Figure A7 demonstrates robustness to alternative inference methods: clustering at the country-pair level yields nearly identical confidence intervals, while bootstrap inference accounting for estimation uncertainty in the geopolitical measure produces only marginally wider bands.

4.2.3. Decomposing Transitory and Permanent Effects

The impulse responses in Figure 10 capture the combined effect of an initial geopolitical shock and its subsequent persistence. To isolate the economic mechanisms, we decompose responses into purely transitory versus permanent components following Bilal and Känzig (2024).[20]

FIGURE 11. Trade Responses to Transitory and Permanent Geopolitical Shocks



Notes: Panel A presents the impulse response of log trade to a purely transitory unit shock in geopolitical relations. Panel B shows the cumulative response to a permanent unit shock. Both panels use the baseline specification with three lags and triple fixed effects. 95% confidence intervals are from 200 bootstrap iterations with country-pair block resampling.

Figure 11 Panel A reveals that even purely transitory diplomatic events generate persistent trade effects. A unit transitory improvement in relations—such as a state visit or bilateral agreement that does not fundamentally alter the relationship—increases trade by 15 log points on impact, with effects persisting for 5–7 years before returning to baseline. This persistence reflects sunk costs in establishing trade relationships: once firms invest in market entry, distribution networks, and regulatory compliance, they continue trading even after the initial political catalyst fades.

Panel B demonstrates the cumulative gains from permanent improvements in geopolitical alignment. Trade flows increase steadily, reaching 78 log points higher after 20 years when relations permanently improve by one unit. The trajectory stabilizes after year 15, suggesting convergence to a new steady state. To translate this to our main estimates: a

[20] Appendix A.8 provides technical details on the decomposition methodology.

one-standard-deviation permanent improvement (0.23 units) generates approximately 18 log points (20 percent) in long-run trade gains, closely matching our cross-sectional estimates in Table 4.

The decomposition reveals an important policy implication: temporary diplomatic tensions can inflict lasting trade damage by disrupting business relationships and eroding market access, whereas temporary improvements may generate persistent gains if they spur private sector investment. This hysteresis in trade relationships—where short-lived shocks produce enduring effects—underscores the importance of stable geopolitical relations for sustaining economic integration.

4.3. Robustness

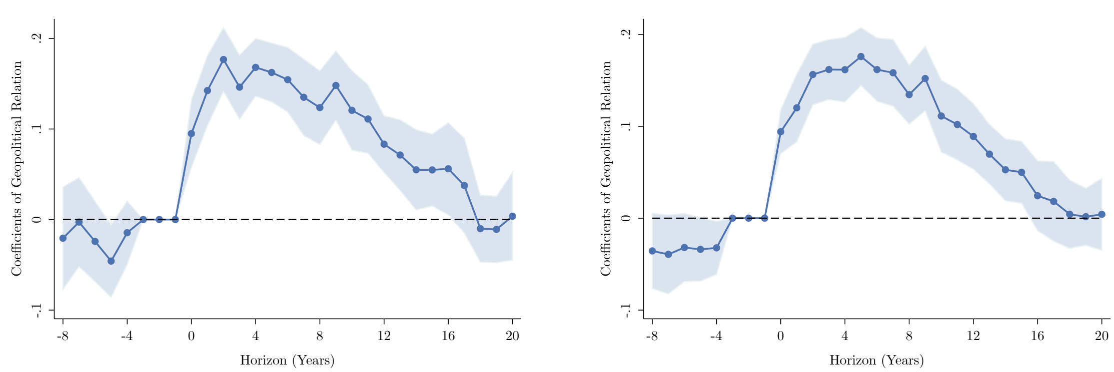
We examine the stability of our dynamic trade elasticities along three dimensions. First, we test whether the effects persist across different country samples beyond major economies. Second, we assess temporal stability across distinct trade regimes. Third, we strengthen causal identification using variation from non-economic events and material conflicts.

4.3.1. Alternative Country Samples

Figure 12 extends our analysis beyond major economy pairs to examine whether geopolitical effects on trade are universal or concentrated among large economies.

FIGURE 12. Dynamic Trade Responses Across Country Groups

A. Major-Nonmajor Country Pairs B. All Countries



Notes: Estimates from: $\ln X_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \beta_h S_{od,t} + \sum_{\ell=1}^{3} \gamma_{h,\ell} \ln X_{od,t-\ell} + \sum_{\ell=1}^{3} \phi_{h,\ell} S_{od,t-\ell} + \varepsilon_{od,t+h}$, controlling for three lags of both log trade and geopolitical relations. Panel A includes country pairs between major and non-major economies. Panel B includes all country pairs. 95% confidence intervals use Driscoll-Kraay standard errors.

Panel A examines trade between major and non-major economies—dyads where power asymmetries could shape how politics affects commerce. The peak elasticity reaches 17 log points, somewhat smaller than the baseline 28 log points for major-major pairs. However, the effect is far more persistent: trade remains positively influenced by geopolitical alignment for more than 15 years after the initial shock. This pattern suggests that while asymmetric relationships exhibit lower peak sensitivity, they embed political shocks more deeply into long-run trade patterns, reflecting both dependence on major powers and the difficulty of reversing strategic commercial ties once formed.

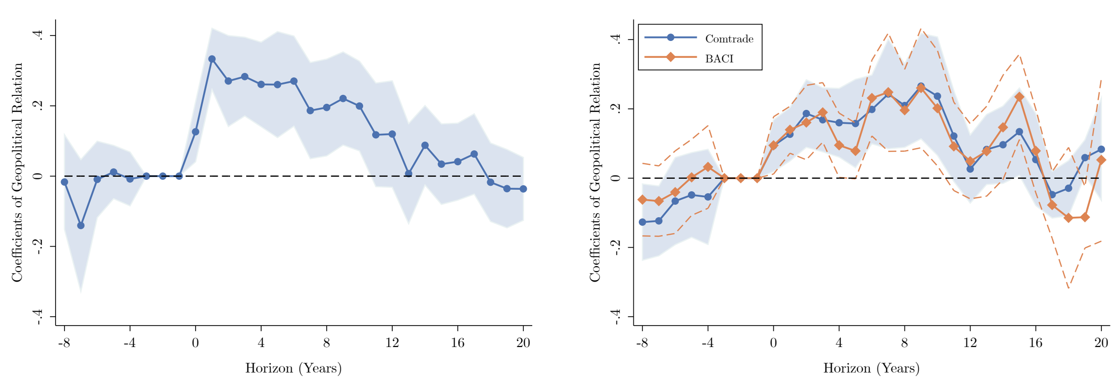
Panel B incorporates all country pairs in our sample. The coefficients remain positive and significant but attenuate to a peak around 18 log points, reflecting the inclusion of many small economy pairs where political considerations may be secondary to capacity constraints and market access. The slower adjustment—peak effects emerge only after 5 years—likely reflects the limited diplomatic resources of smaller countries to rapidly reconfigure trade relationships following geopolitical realignments. Notably, the absence of pre-trends remains robust across all samples, validating our identification strategy even with substantial sample heterogeneity.

4.3.2. Temporal Stability

The global trade regime has undergone fundamental transformations over our sample period, from Cold War bipolarity through WTO-centered multilateralism to contemporary fragmentation. Figure 13 examines whether the geopolitics-trade nexus has evolved across these distinct eras.

FIGURE 13. Dynamic Trade Responses Across Time Periods

A. First 30 Years Subsample (1965–1994) B. Last 30 Years Subsample (1995–2024)



Notes: Local projection estimates for major economy pairs across two 30-year periods. The specification matches our baseline with three lags and triple fixed effects. 95% confidence intervals use Driscoll-Kraay standard errors.

The effect of geopolitics on trade is evident in both periods, though with different dynamics. Panel A shows that during the first 30-year period—largely overlapping with the Cold War and characterized by explicit trade blocs and COCOM restrictions—the trade response to geopolitical alignment was immediate. The effect rose sharply within the first few years, peaking at 33 log points two to three years after the shock, before gradually dissipating. Panel B, by contrast, demonstrates that in the subsequent 30-year subsample, despite the WTO's multilateral framework and proliferation of regional trade agreements, the response became more gradual and hump-shaped: trade reacted more slowly to changes in alignment, with effects building over several years and peaking at 23 log points around horizons 6–8 before tapering off.

This temporal comparison yields substantively important insights. Although the adjustment dynamics differ—immediate during the Cold War and more gradual in the post-Cold War era—the peak effect of geopolitical alignment on trade remains remarkably similar across periods (33 versus 23 log points). This stability suggests that political relationships operate through deeper channels than formal trade policy alone. Even as tariffs fell, non-tariff barriers were harmonized, and global value chains proliferated, the fundamental role of bilateral political alignment in facilitating or hindering trade remained constant. Diplomatic trust, security considerations, and political risk assessments continue to shape commercial decisions regardless of the prevailing trade architecture.

The temporal results provide additional support for our identification strategy. The dynamics of geopolitical effects are intuitive in both periods, with clear adjustment paths and no evidence of pre-trends. These dynamic results are not inconsistent with our earlier cross-sectional estimates. The cross-country regressions capture average correlations that blend both short- and long-run effects, whereas the local projections isolate the timing of adjustment. Because the immediate response of trade to geopolitical shocks is weaker in the post-Cold War period, the corresponding cross-sectional coefficient for those years is mechanically smaller. This interpretation reinforces rather than undermines our baseline findings, while also underscoring the instability of IPD-based estimates, which show contradictory and theoretically inconsistent patterns across periods.[21]

The implications are sobering for contemporary policy debates. Despite decades of institution-building designed to depoliticize trade, geopolitical alignment remains as consequential today as it was during the Cold War. The recent deterioration in great-power relations may therefore trigger trade disruptions on a scale comparable to historical precedents, as the underlying geopolitics-trade nexus appears resilient to changes in the formal institutional environment.

[21] Appendix Figure A9 illustrates this instability. During 1965–1994, IPD indicates negative effects on trade—the expected sign—but after 1995 the coefficients become insignificant or even positive. This reversal, combined with the positive cross-sectional correlation in Table 4, highlights the inability of voting similarity to capture trade-relevant bilateral dynamics consistently, in contrast to our event-based measure.

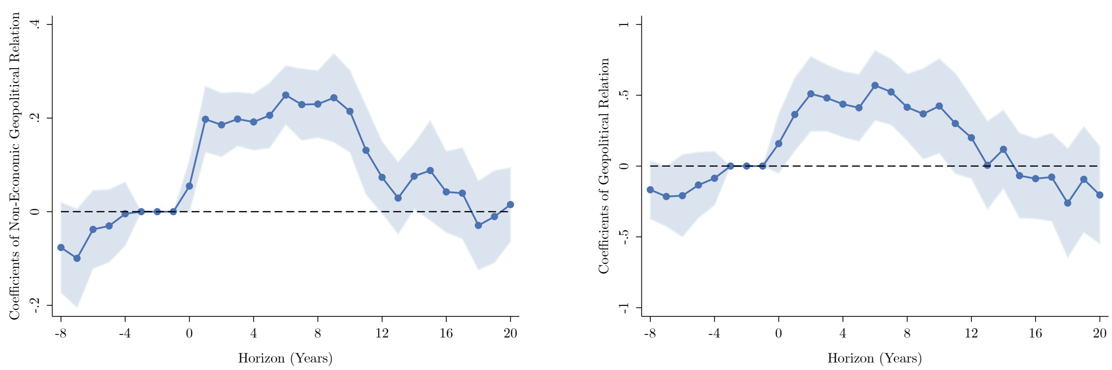
4.3.3. Non-Economic Events and Conflicts

While our local projection estimates control for an extensive set of fixed effects and demonstrate no pre-trends, concerns about reverse causality or omitted variables warrant additional identification strategies. We address these concerns by examining variation from non-economic geopolitical events and by instrumenting with major diplomatic conflicts that lack direct economic content.

FIGURE 14. Dynamic Effect of Geopolitical Relations on Trade: Identification

A. Non-Economic Geopolitical Relations

B. LP-IV with Major Conflicts



Notes: Panel A: effect of non-economic geopolitical relations (excluding trade agreements, sanctions, and economic events) on trade. Panel B: LP-IV estimates using three major diplomatic conflict indicators (militarized conflicts, coercive diplomatic measures, and disputes) as instruments for overall geopolitical relations. Both specifications include three lags and triple fixed effects. Sample includes major economy pairs. 95% confidence intervals use Driscoll-Kraay standard errors.

Panel A of Figure 14 isolates the effect of purely non-economic geopolitical events on trade flows. By excluding all events with explicit economic content—such as trade agreements, sanctions, tariff disputes, and investment restrictions—we focus on diplomatic, security, and political interactions, including territorial disputes, human rights criticisms, military exercises, state visits, and ideological disagreements. These non-economic events generate a peak trade elasticity of 25 log points, closely mirroring our baseline estimate of 28 log points. Focusing on non-economic shocks helps mitigate concerns about reverse causality, since these events are unlikely to be driven by contemporaneous trade flows. The significant effect thus reinforces that geopolitical dynamics shape trade through broader relationship channels rather than simply reflecting parallel economic negotiations.

Panel B implements a local projection instrumental variables (LP-IV) strategy, exploiting variation from major diplomatic conflicts to identify causal effects. We instrument overall geopolitical relations with three indicators of non-economic material conflicts: militarized conflicts (military confrontations, border clashes), coercive diplomatic measures (diplomatic expulsions, asset freezes of political figures), and substantive diplomatic disputes (heated diplomatic exchanges, recall of ambassadors).[22] These instruments plausibly satisfy the exclusion restriction: major non-economic diplomatic conflicts—border skirmishes, ambassador recalls, military exercises near disputed territories—are typically triggered by security concerns, territorial disputes, or ideological disagreements rather than trade considerations, making reverse causality from trade flows to these conflicts highly unlikely.

The LP-IV estimates reveal peak elasticities reaching 55 log points, substantially larger than our baseline OLS estimate of 28 log points. This amplification suggests that trade flows are particularly sensitive to the variation induced by militarized conflicts and diplomatic confrontations. The larger IV coefficients likely reflect heterogeneous treatment effects: while our baseline estimates average across all types of geopolitical variation (including gradual diplomatic drift), the IV identifies local average treatment effects for relationships experiencing acute diplomatic crises. Military confrontations, border incidents, and coercive diplomatic actions generate particularly sharp trade responses as firms and governments immediately reassess commercial risks. A border clash or diplomatic expulsion signals potential escalation, triggering precautionary trade reductions that exceed the average response to geopolitical tensions.

This heterogeneity has important policy implications. The IV results suggest that preventing diplomatic crises and militarized conflicts should be a priority for maintaining trade relationships, as these acute tensions generate disproportionate economic damage. Conversely, the smaller OLS estimates indicate that gradual relationship improvements through routine diplomatic engagement yield more modest trade gains. The asymmetry—where conflicts destroy trade more readily than cooperation creates it—underscores why maintaining stable geopolitical relations is crucial for economic integration.

The robustness of our findings to these identification strategies, despite the difference in magnitudes, validates our causal interpretation. Both approaches confirm that geopolitical alignment shapes trade flows, with the variation in effect sizes reflecting the differential impact of acute conflicts versus gradual diplomatic evolution. This evidence strengthens our conclusion that political relationships represent first-order determinants of international economic exchange.

4.3.4. Robustness to Unsmoothed Event Scores

Our final robustness test examines whether our results depend on the specific construction of the geopolitical measure. We re-estimate the impulse responses using unsmoothed average event scores $\tilde{S}_{ij,t}$ that directly reflect contemporaneous bilateral events without incorporating historical persistence. While individual diplomatic events exhibit rapid

[22] Specifically, we use events classified as material conflicts (CAMEO root codes 15–20) that are not associated with economic diplomacy.

mean reversion—with approximately 65% of the initial shock dissipating within one year—the trade response remains economically significant. The peak elasticity attenuates to 10 log points (versus 28 log points in our baseline), reflecting the transitory nature of individual events.

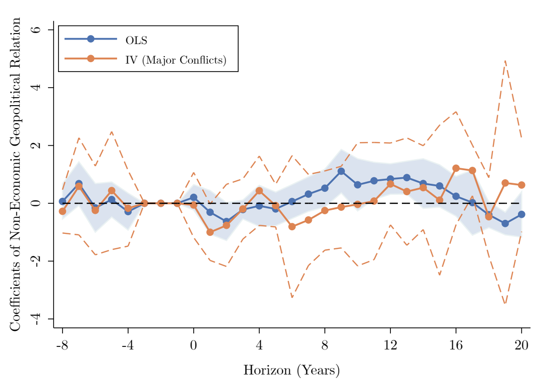
Crucially, when we construct the response to a permanent shift in event flows, the long-run trade effect converges to our baseline estimate of 78 log points.[23] This convergence across methodologies confirms that the geopolitics-trade relationship is not an artifact of our measurement choices but reflects a fundamental economic relationship. Whether measured through smoothed scores that capture relationship persistence or raw events that isolate diplomatic shocks, geopolitical alignment emerges as a first-order determinant of international trade. Appendix A.9.3 provides detailed decomposition analysis.

4.4. Trade Policies: Sanctions and Tariffs

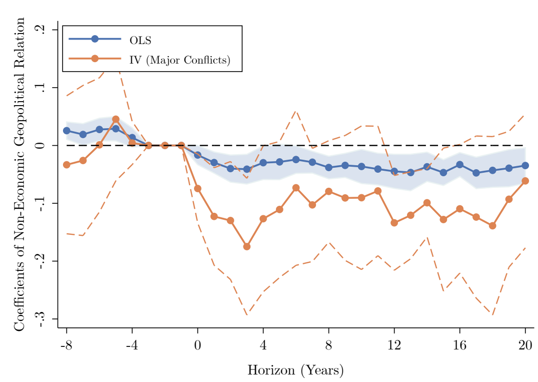
We investigate whether geopolitical alignment operates through formal trade policy instruments—tariffs and sanctions—or through broader economic frictions. Using tariff data from Teti (2024) and sanctions data from the Global Sanctions Database (Felbermayr et al. 2020; Yalcin et al. 2025), we estimate how non-economic geopolitical events affect these policy instruments.[24]

FIGURE 15. Dynamic Effect of Geopolitical Relations on Trade Policies

A. Tariffs



B. Trade Sanctions



Notes: Local projection estimates from: $Y_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \beta_h S^{NE}_{od,t} + \sum_{\ell=1}^{3} \gamma_{h,\ell} Y_{od,t-\ell} + \sum_{\ell=1}^{3} \phi_{h,\ell} S^{NE}_{od,t-\ell} + \epsilon_{od,t+h}$, where the dependent variable is $\ln(1+\text{tariff rate}_{od,t})$ in Panel A and $\mathbf{1}[\text{sanction}_{od,t}]$ in Panel B. Controls include three lags of both the dependent variable and non-economic geopolitical relations. Orange lines show LP-IV estimates instrumenting with material conflicts. Sample includes country pairs among 32 major economies. 95% confidence intervals use Driscoll-Kraay standard errors.

[23]By construction, a permanent increase in the unsmoothed score is equivalent to the same permanent increase in our dynamic score.

[24]The GSDB records both complete and partial trade sanctions, thereby encompassing a broader set of restrictive trade policies than simple trade embargoes.

Figure 15 reveals starkly different responses of tariffs and sanctions to geopolitical tensions. Panel A shows that tariffs remain unresponsive to bilateral political shocks: both OLS (blue) and IV (orange) estimates hover near zero throughout the 20-year horizon, with coefficients never exceeding 1 percentage point in magnitude. This null relationship reflects the multilateral architecture of modern trade policy—since our tariff data begin in 1988, the GATT/WTO system's Most Favored Nation principle and binding schedules have effectively insulated tariff-setting from bilateral political volatility.

Panel B demonstrates that trade sanctions, by contrast, respond systematically to geopolitical deterioration. The OLS estimates show that a one-unit decline in non-economic relations increases sanctions probability by 3–4 percentage points, with the effect emerging after a 3–5 year lag and persisting throughout the horizon. The IV estimates, instrumenting with militarized conflicts, coercive diplomatic measures, and substantive diplomatic disputes, reveal substantially larger effects—a one-unit deterioration increases sanctions probability by 10–18 percentage points, peaking around years 3–4. This amplification indicates that acute diplomatic crises (military confrontations, territorial disputes) trigger sanctions far more readily than gradual relationship deterioration. The multi-year lag reflects both institutional inertia and the diplomatic escalation ladder that typically precedes economic coercion.

These divergent patterns illuminate how geopolitical tensions translate into economic decoupling. While multilateral rules successfully quarantine tariff policy, sanctions operate as flexible instruments of bilateral statecraft. Yet even combined, these formal channels account for only around 15% of our estimated trade response to geopolitical realignment.[25] The majority of the geopolitics-trade nexus therefore operates through informal barriers—regulatory scrutiny, supply chain reorientation, elevated risk premia, consumer resistance—that leave no trace in official statistics but fundamentally reshape global commerce. These informal mechanisms reflect firms' anticipatory responses to political tensions, governments' administrative discretion in non-tariff measures, and the erosion of trust that underpins complex international transactions. Appendix A.10 provides complementary evidence on the trade-reducing effects of these policies, documenting both their direct impact magnitudes and persistence patterns that help explain the prolonged nature of geopolitical decoupling.

[25] Following the approach in Appendix A.8, we estimate the IRF of a permanent sanction shock on trade to be around −0.4 in the long run. A permanent one-unit shock to geopolitical relations increases the probability of a trade sanction by approximately 30%. Taken together, the sanction channel accounts for $0.3 \times 0.4/0.78 \approx 15\%$ of the total effect of geopolitical relations on trade. Using the IV estimates of the impact of geopolitical relations on sanctions, this share rises to 40%.

5. Model and Quantitative Results

We study the effect of geopolitics on trade through the lens of an Armington model with perfect competition. Consider a world with N countries indexed by $o, d \in \{1, 2, \ldots, N\}$, where o denotes origin and d denotes destination. Each country produces a unique variety using labor as the sole input. Country d has a fixed labor endowment ℓ_d.

5.1. Model

Preferences and Consumption. Country d consumes varieties from all countries with CES preferences. The aggregate consumption index is given by:

$$C_d = \left[\sum_{o=1}^{N} c_{od}^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \tag{4}$$

where c_{od} denotes country d's consumption of the variety from country o, and $\sigma > 1$ is the elasticity of substitution between varieties.

Production Technology. Labor is the only input, and producers in country o produce according to $y_o = z_o \ell_o$, where z_o is country o's productivity level, ℓ_o is labor employed in country o, and workers earn wage w_o. Bilateral trade is subject to iceberg trade costs $d_{od} \geq 1$, where d_{od} units must be shipped from country o for one unit to arrive in country d. Additionally, we incorporate ad valorem tariffs where $\tilde{\tau}_{od} \equiv 1 + \tau_{od}$ represents the gross tariff factor. The expenditure share of country d on varieties from country o is:

$$\pi_{od} = \left(\frac{p_{od}}{P_d}\right)^{1-\sigma},$$

where $p_{od} = w_o d_{od}/z_o$ is the delivered price of the variety from country o in country d, and the price index is:

$$P_d = \left[\sum_{o=1}^{N} p_{od}^{1-\sigma}\right]^{\frac{1}{1-\sigma}}.$$

Market Clearing. Labor market clearing requires that total income in country o equals total sales:

$$w_o \ell_o = \sum_{d=1}^{N} \frac{X_d \pi_{od}}{\tilde{\tau}_{od}},$$

where X_d is total expenditure in country d.

Trade Balance. The trade balance condition ensures that each country's imports equal its exports:

$$\sum_{d=1}^{N} \frac{X_d \pi_{od}}{\tilde{\tau}_{od}} = \sum_{d=1}^{N} \frac{X_o \pi_{do}}{\tilde{\tau}_{do}}.$$

Equilibrium in Changes. To analyze counterfactual scenarios, we employ exact hat algebra to compute equilibrium changes (Dekle, Eaton, and Kortum 2008). We denote proportional changes from the initial equilibrium using hat notation: $\hat{x} = x'/x$, where x represents the initial equilibrium value and x' denotes the counterfactual equilibrium value. Given an exogenous shock to trade costs $\hat{d}_{od}$, we solve for the resulting changes in all endogenous variables using the system of equations derived in Appendix A.

5.2. Bringing the Model to the Data

We implement the model using OECD ICIO data for 74 countries from 1995 to 2020 to decompose trade flow changes into contributions from geopolitical relationships, tariffs, and unobserved barriers.

Trade Cost Decomposition. We parameterize trade costs as:

$$\ln d_{od,t} = \mathrm{Geo}_{od,t} + \ln \tilde{\tau}_{od,t} + \mathbf{Z}_{od}\boldsymbol{\beta} + \epsilon_{od,t},$$

where $\mathrm{Geo}_{od,t}$ captures geopolitical factors, $\mathbf{Z}_{od}$ contains time-invariant characteristics (distance, borders, language), and $\epsilon_{od,t}$ represents unobserved barriers.

Changes relative to base year t_0 decompose as:

$$\ln \hat{d}_{od,t} = \Delta\mathrm{Geo}_{od,t} + \ln \hat{\tilde{\tau}}_{od,t} + \hat{\varepsilon}_{od,t}.$$

Dynamic Geopolitical Effects. Geopolitical relationships affect trade with persistence. We model cumulative impacts as:

$$(1-\sigma)\Delta\mathrm{Geo}_{od,t} = \sum_{s=1}^{t-t_0} \hat{\beta}^{\mathrm{geo}}_{t-s} \left(S_{od,t_0+s} - S_{od,t_0+s-1}\right),$$

where $\hat{\beta}^{\mathrm{geo}}_{t-s}$ captures the impact of past geopolitical changes on trade flows,[26] which we estimate using the local projection results presented in Section 4.2.3. The trade elasticity $\sigma - 1 = 3$ is obtained from the IRF of trade flows to the tariff rate in Appendix A.10.

Identification. Following Head and Ries (2001) and assuming symmetric trade cost shocks ($\hat{\varepsilon}_{od,t} = \hat{\varepsilon}_{do,t}$), we recover unobserved trade cost changes from bilateral trade flows:

$$\hat{\varepsilon}_{od,t} = \left[\frac{\hat{\pi}_{od,t}\hat{\pi}_{do,t}}{\hat{\pi}_{oo,t}\hat{\pi}_{dd,t}}\right]^{\frac{1}{2(1-\sigma)}} \left[\hat{\tilde{\tau}}_{od,t}\hat{\tilde{\tau}}_{do,t}\right]^{-\frac{1}{2}} \exp(-\Delta\mathrm{Geo}_{od,t}), \tag{5}$$

where $\hat{\pi}_{od,t}$ denotes the change in trade shares, $\hat{\tilde{\tau}}_{od,t}$ represents observable trade costs (tariffs), and $\Delta\mathrm{Geo}_{od,t}$ captures changes in geopolitical alignment. This yields the complete

[26] Because we directly observe the path of bilateral geopolitical relations, $\hat{\beta}(\sigma - 1)$ corresponds to the IRF of trade flows to a permanent change in geopolitical score.

decomposition of total trade costs:

$$\hat{d}_{od,t} = \hat{\varepsilon}_{od,t} \times \hat{\hat{\tau}}_{od,t} \times \exp(\Delta \text{Geo}_{od,t}), \tag{6}$$

separating unobserved frictions, observable tariffs, and geopolitical factors.

This framework enables us to quantify how geopolitics, tariffs, and unobserved factors each contributed to the evolution of global trade from 1995 to 2020.

5.3. Counterfactual Framework

To decompose the evolution of global trade from 1995 to 2020, we conduct four counterfactual experiments that isolate the contributions of geopolitical relationships, tariffs, and unobserved barriers. We hold technology levels fixed at 1995 values to focus exclusively on trade cost changes.

For each year $t \in \{1996, \ldots, 2020\}$, we implement four scenarios:

a. **Baseline:** All factors evolve as observed

$$\hat{d}^{\text{baseline}}_{od,t} = \hat{\varepsilon}_{od,t} \times \hat{\hat{\tau}}_{od,t} \times \exp(\Delta \text{Geo}_{od,t})$$

b. **No geopolitical changes:** Fix geopolitical relations at 1995 levels

$$\hat{d}^{\text{no-geo}}_{od,t} = \hat{\varepsilon}_{od,t} \times \hat{\hat{\tau}}_{od,t}$$

c. **No tariff changes:** Fix tariffs at 1995 levels

$$\hat{d}^{\text{no-tariff}}_{od,t} = \hat{\varepsilon}_{od,t} \times \exp(\Delta \text{Geo}_{od,t})$$

d. **Only unobserved changes:** Fix both geopolitics and tariffs at 1995 levels

$$\hat{d}^{\text{only-unobs}}_{od,t} = \hat{\varepsilon}_{od,t}$$

Comparing trade outcomes across these scenarios reveals the separate contributions of each factor. The difference between scenarios (1) and (2) isolates the effect of geopolitical changes; comparing scenarios (1) and (3) identifies the impact of tariff liberalization; and scenario (4) captures the role of unobserved barriers, including non-tariff measures and supply chain frictions.

Throughout these counterfactual analyses, we hold productivity constant at 1995 levels to isolate the effects of trade cost changes from technological progress.

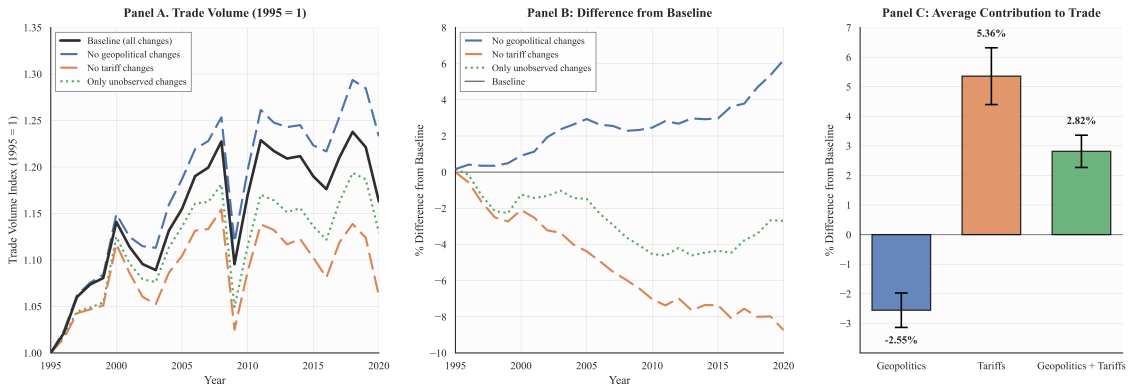


FIGURE 16. Counterfactual Analysis of Global Trade Flows, 1995–2020

Notes: Panel A shows trade volume indexed to 1995 = 1 for four scenarios: baseline (all changes), no geopolitical changes, no tariff changes, and only unobserved changes. Panel B displays percentage differences from baseline. Panel C presents average annual contributions to trade growth with 95% confidence intervals. All scenarios hold productivity fixed at 1995 levels.

5.4. Aggregate Trade Effects

Figure 16 presents the evolution of global trade under four counterfactual scenarios, revealing how geopolitical shifts, tariff liberalization, and unobserved barriers have shaped trade patterns from 1995 to 2020.

Panel A reveals that global trade share grew by only 16.3% over 25 years when holding productivity fixed at 1995 levels—a substantial deceleration from earlier decades. The counterfactual trajectories decompose this modest growth into three forces. Panel B and Table 5 show that without tariff liberalization (orange line), trade would have grown by merely 6.1%, demonstrating that tariff reductions contributed 10.2 percentage points to growth. Conversely, had geopolitical relations remained at 1995 levels (blue dashed line), trade would have grown by 23.3%, indicating that deteriorating geopolitical alignment reduced trade by 7.0 percentage points.[27] The gap between the baseline and the unobserved-only scenario reveals the combined effect of tariff and geopolitical changes on trade.

Panel C quantifies the average annual contributions to trade growth. Two distinct forces shaped global trade evolution: tariff liberalization contributed 5.36% annually, while deteriorating geopolitical relations subtracted 2.55% annually. This decomposition reveals a crucial insight: without geopolitical deterioration, global trade would have grown approximately 23.3% rather than 16.3%, suggesting that political fragmentation

[27]The contributions to growth are calculated as differences between counterfactual scenarios: geopolitical deterioration equals baseline minus no geopolitical changes (16.3% – 23.3% = –7.0 pp), tariff liberalization equals baseline minus no tariff changes (16.3% – 6.1% = +10.2 pp). The decomposition reveals that the modest 16.3% trade growth over 25 years resulted from tariff liberalization (+10.2 pp) being largely offset by geopolitical deterioration (–7.0 pp).

TABLE 5. Decomposition of Trade Growth, 1995–2020

Scenario	2000	2010	2020	Total Growth
Baseline (all changes)	1.141	1.170	1.163	16.3%
No geopolitical changes	1.149	1.196	1.233	23.3%
No tariff changes	1.117	1.087	1.061	6.1%
Only unobserved changes	1.125	1.115	1.130	13.0%
Contribution to trade growth relative to baseline (percentage points):				
Geopolitical deterioration				−7.0
Tariff liberalization				+10.2
Combined				+3.3

Notes: This table decomposes global trade growth from 1995 to 2020 into three components using counterfactual analysis. Trade volumes are indexed to 1995 = 1.00, with productivity held constant at 1995 levels across all scenarios to isolate the role of trade costs. The four scenarios are: (1) Baseline—incorporates all observed changes in tariffs, geopolitical relations, and unobserved trade costs; (2) No geopolitical changes—holds bilateral geopolitical scores fixed at 1995 levels while allowing tariffs and unobserved costs to evolve; (3) No tariff changes—freezes tariffs at 1995 levels while allowing geopolitical and unobserved changes; (4) Only unobserved changes—isolates the effect of non-tariff, non-geopolitical trade cost changes.

has forgone trade gains equivalent to four decades of tariff liberalization.

Our decomposition provides a fundamental explanation for recent findings that globalization is decelerating rather than reversing (Antràs 2021; Goldberg and Reed 2023). While aggregate trade data show limited evidence of deglobalization, we identify the underlying forces at work: tariff liberalization and technological improvements continue to promote trade integration, but these gains are substantially eroded by geopolitical deterioration. This offsetting dynamic reconciles the apparent paradox between modest aggregate impacts, massive tariff reductions, and severe geopolitical fragmentation.

5.5. Country-Level Welfare Effects

While aggregate trade grew modestly, the welfare impacts varied dramatically across countries. We compute welfare changes as $\hat{\omega}_i = \hat{w}_i/\hat{P}_i$, capturing both nominal income changes and price index effects through the lens of our general equilibrium model.

Figure 17 reveals substantial heterogeneity in how trade cost changes affected individual countries. Panel A demonstrates contrasting distributions: tariff liberalization generated widespread benefits with a positively skewed distribution centered at 1.23% gains, while geopolitical changes produced a negatively skewed distribution with severe losses in the left tail. Panel B shows that most countries cluster in the lower-right quadrant—gaining from economic integration while losing from political realignment.

The distributional statistics in Table 6 quantify this divergence. Nearly all countries (94.6%) benefited from tariff liberalization with relatively uniform gains averaging 1.23%.

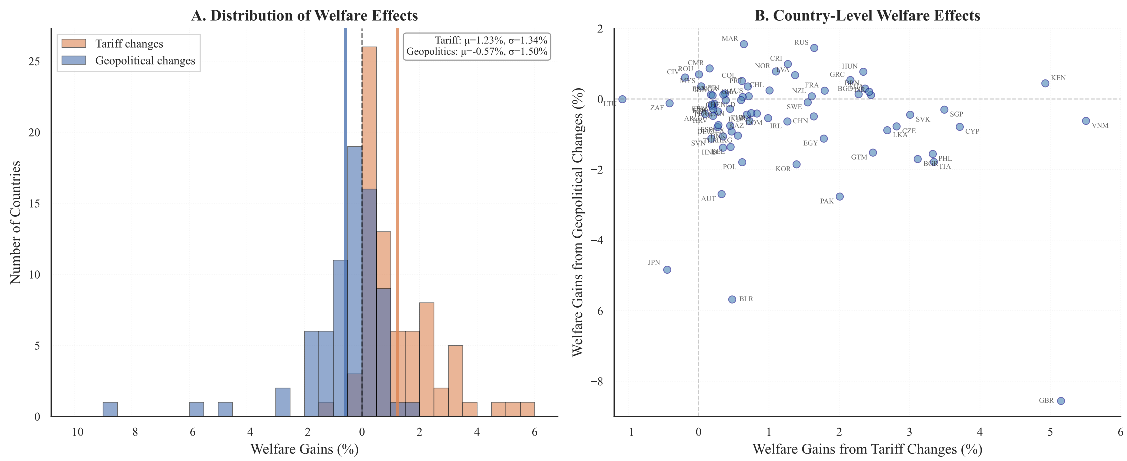


FIGURE 17. Distribution and Heterogeneity of Welfare Effects, 1995–2020

Notes: Panel A: Histogram of welfare changes from tariff liberalization (orange) and geopolitical realignment (blue). Panel B: Scatter plot where each point represents a country, with welfare gains from tariff changes on the x-axis and from geopolitical changes on the y-axis. The dashed lines at zero divide gains from losses.

In contrast, geopolitical realignment produced a 1:2 ratio of winners to losers, with extreme negative skewness (−3.41) reflecting concentrated losses among countries experiencing major diplomatic disruptions. The range of geopolitical effects (from −8.56% to +1.55%) far exceeds that of tariff changes, indicating that political relationships generate more heterogeneous economic consequences than trade policy.

The country-specific results highlight how global forces interact with national circumstances. The United Kingdom appears at both extremes: gaining 5.15% from tariff liberalization through its EU integration and open economy, yet losing 8.56% from geopolitical repositioning—the largest loss in our sample—reflecting Brexit's economic consequences and deteriorating relations with both the EU and China (Sampson 2017). Vietnam's 5.51% tariff gain reflects its rapid integration into global value chains, while Russia's modest geopolitical gain stems from strengthened ties with China and other non-Western partners despite Western sanctions.

The welfare decomposition reveals three distinct country groups. First, approximately 35% of countries benefited from both forces, typically through strategic neutrality or strengthened regional ties (Morocco, Costa Rica, Norway). Second, the majority (59.5%) reaped gains from economic integration while suffering from deteriorating political relationships—including major economies like the United States, China, and most EU members. Third, a small group (5.4%) faced losses on both dimensions, notably Japan, which experienced limited tariff gains due to already-low rates while suffering from regional geopolitical tensions.

This pattern—nearly universal gains from trade liberalization offset by heterogeneous and often severe losses from geopolitical realignment—underscores that the future of

TABLE 6. Distribution of Welfare Effects, 2020

	Welfare Ratio: Baseline/Counterfactual	
	Tariff Changes	Geopolitical Changes
Mean	1.0123	0.9943
Median	1.0069	0.9970
Std. Deviation	0.0134	0.0150
Skewness	1.82	−3.41
Countries gaining	70 (94.6%)	27 (36.5%)
Countries losing	4 (5.4%)	47 (63.5%)
Range of effects	[−1.08%, +5.51%]	[−8.56%, +1.55%]

Notes: This table presents the distribution of welfare effects from tariff liberalization and geopolitical realignment between 1995 and 2020. Welfare ratios compare the baseline scenario (with all observed changes) to counterfactual scenarios where either tariffs or geopolitical relations are held fixed at their 1995 levels. Values above 1.0 indicate welfare gains from the respective change, while values below 1.0 indicate losses. The mean and median capture central tendencies, while skewness measures the asymmetry of the distribution.

globalization depends as much on managing political relationships as on trade policy. While the multilateral trading system successfully reduced formal barriers, the breakdown in geopolitical cooperation imposed new costs concentrated among countries caught between competing powers. The net result—modest aggregate gains masking dramatic cross-country variation—suggests that geopolitical fragmentation represents a first-order threat to the welfare gains from economic integration achieved over the past quarter-century.

6. Conclusion

This paper provides a comprehensive empirical evaluation of how geopolitical alignment shapes global trade by constructing a novel measure from 833,485 political events across all 193×192 country pairs from 1950–2024. Our event-based approach captures the continuous evolution of bilateral relationships from maximum conflict (−1) to maximum cooperation (+1), revealing fundamental transformations in the global political economy. Trade-weighted mean alignment improved from 0.31 during the Cold War to 0.43 at peak globalization before deteriorating to 0.28 amid contemporary fragmentation—erasing three decades of diplomatic progress. These aggregate dynamics manifest systematically across multiple scales: bilateral case studies reveal a consistent three-year lead of geopolitical changes over trade adjustments; regional and global temporal patterns exhibit correlations exceeding 0.80 between geopolitical alignment and trade shares; and bloc analysis demonstrates substantial overlap between trade and geopolitical spheres, while many countries maintaining multi-alignment strategies rather than choosing sides in the emerging bipolar competition.

Using local projections that exploit within-dyad temporal variation, we identify causal effects that are both economically significant and remarkably persistent. Our baseline specification with triple fixed effects yields no pre-trends while revealing peak trade responses of 28 log points following one-unit geopolitical improvements. Even transitory diplomatic shocks generate trade gains lasting 5–7 years, while one unit permanent realignments increase trade by 78% in the long run—effects that prove robust across alternative samples, time periods, and identification strategies. Embedding these elasticities in a quantitative general equilibrium model demonstrates that geopolitical factors now rival traditional trade policy in economic importance: while tariff liberalization contributed 10.2 percentage points to global trade growth from 1995–2020, deteriorating political relations subtracted 7.0 percentage points. The distributional consequences diverge starkly—95% of countries gained from tariff reductions (mean welfare +1.23%) while 64% lost from geopolitical realignment (mean loss −0.57%), with asymmetric impacts concentrated among nations caught between competing powers.

Future research should extend our empirical analysis in several directions. Examining firm-level adjustment would illuminate microeconomic mechanisms underlying our aggregate elasticities. Analysis of supranational institutions like the EU could reveal whether deep integration provides insurance against bilateral political volatility. Extending to FDI, technology transfer, and financial flows would provide a comprehensive view of how geopolitics shapes economic integration. Finally, developing forward-looking models of geopolitical alignment could help policymakers and firms anticipate and hedge against future disruptions.

Our empirical benchmarks establish that maintaining cooperative international relationships is as crucial for globalization as formal trade liberalization. The elasticity of trade to geopolitical alignment—20% for a one-standard-deviation change—has remained remarkably stable across seven decades, suggesting fundamental economic consequences of international alignment. As great power competition intensifies and countries face pressure to choose sides, these estimates provide crucial metrics for gauging the costs of political fragmentation. In an era where geopolitical deterioration can eliminate gains from decades of tariff reductions, understanding and quantifying the economic value of political cooperation has become indispensable for both researchers and policymakers.

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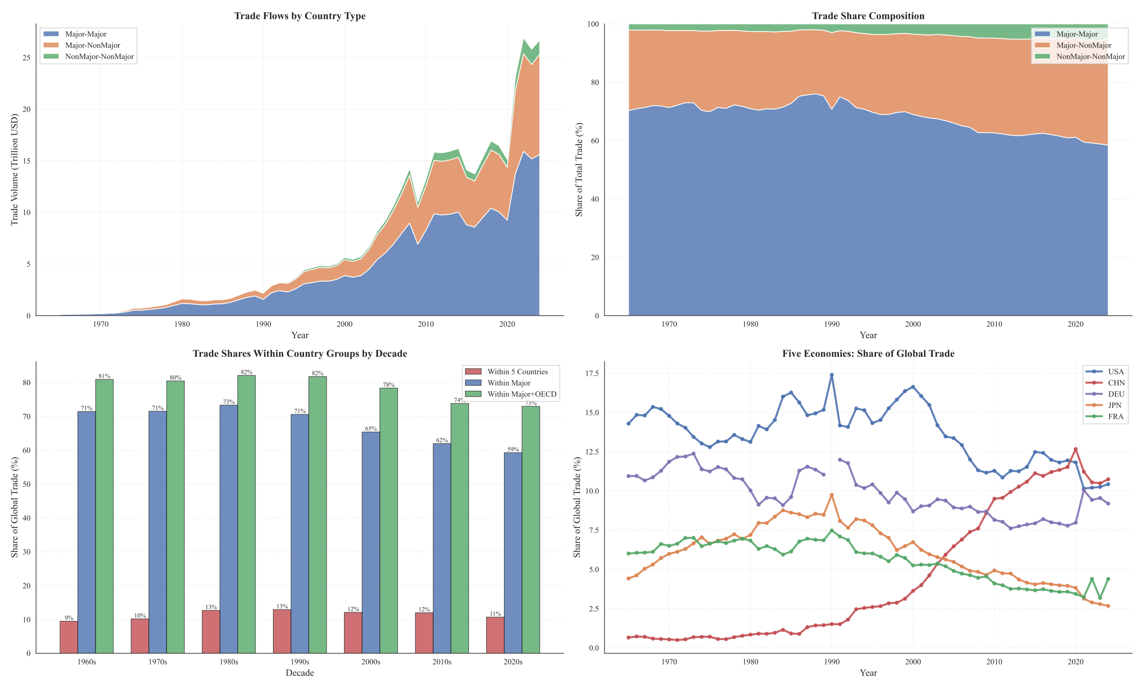
Appendix A. Additional Empirical Results

A.1. Trade Decomposition: Major Countries

Our empirical analysis focuses on 32 major countries that have ranked among the world's top 20 economies by GDP at any point since 1960.[28] This restriction mitigates extensive-margin concerns in trade data (Helpman, Melitz, and Rubinstein 2008; Head and Mayer 2014) while capturing the bulk of global commerce. Figure A1 demonstrates that these major economies dominate global trade patterns, validating our sample selection.

FIGURE A1. Trade Flow Decomposition by Country Groups, 1962–2024



Notes: Panel A shows absolute trade volumes by country-pair type. Panel B displays the corresponding shares. Panel C presents within-group trade concentration by decade. Panel D tracks individual country shares of global trade. Major economies are defined as countries ever ranking in the top 20 by GDP since 1960.

Three key patterns emerge from the decomposition. First, trade among major economies accounts for approximately 70% of world trade throughout our sample period, despite these dyads representing fewer than 3% of potential country pairs. This concentration reflects both size effects and deeper economic integration among developed economies.

Second, concentration has declined over time, indicating broadening participation in global trade. Trade shares within the five largest economies decreased from 13% in the

[28] The 32 major economies in our sample are: Argentina, Australia, Austria, Belgium, Brazil, Canada, China, Denmark, France, Germany, India, Indonesia, Iran, Iraq, Italy, Japan, Mexico, Netherlands, Nigeria, Philippines, Poland, Russia, Saudi Arabia, South Korea, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States, Venezuela, and South Africa.

1980s to 11% in the 2020s, while the overall major economy share fell from 71% to 59%. This trend reflects the integration of emerging markets into global value chains and the geographic dispersion of production networks.

Third, China's rise has fundamentally restructured global trade geography. China's share increased from near zero in 1970 to 12% by 2024, matching the United States' stable 12–15% share and surpassing Japan, whose share declined from 10% to 5%. This rebalancing has simultaneously reduced Europe's collective share, illustrating how the emergence of new economic powers reshapes established trade patterns even as overall concentration diminishes.

A.2. Additional Case Studies: U.S. Trading Partners

We examine four distinct U.S. bilateral relationships that exemplify how geopolitical dynamics shape trade flows: strategic rivalry (China), ideological divergence (Brazil), energy interdependence (Saudi Arabia), and security cooperation (Colombia). These cases complement our regional analysis by demonstrating that residualized geopolitical scores systematically predict bilateral trade flows with a three-year lead, regardless of the underlying relationship structure.

FIGURE A2. US Bilateral Relations: Geopolitical Alignment and Future Trade Flows

Notes: Each panel plots residualized geopolitical relations at time t against residualized bilateral trade flows at time $t + 3$ for US trading partners. All variables are residualized following the methodology in Figure 4. The China-USA panel begins in 1970 to focus on the post-opening period. Shaded regions indicate major diplomatic periods with distinct geopolitical characteristics.

China-USA: Strategic Rivalry Overwhelming Economic Interdependence. Figure A2a traces the transformation from engagement to competition. The Nixon opening (1972) through WTO accession (2001) generated substantial trade expansion, with residuals reaching +2.3 by 2005. The 2008 financial crisis marked a structural break: as strategic competition intensified, geopolitical scores turned negative and trade residuals declined to 0.5 by 2020. Remarkably, this deterioration occurred despite bilateral trade exceeding $560 billion, demonstrating that deep commercial interdependence offers limited protection against great power rivalry.

Brazil-USA: Ideological Distance Attenuating Geographic Proximity. Figure A2b reveals how political alignment shapes hemispheric trade. Carter's human rights emphasis (1977) created diplomatic friction preceding the 1980s trade contraction. Brazil's subsequent pursuit of foreign policy autonomy under Lula (2003–2011) generated persistently negative trade residuals despite geographic proximity and natural economic complementarities. This pattern confirms that ideological divergence can substantially offset the trade-creating effects of proximity—a key deviation from standard gravity model predictions.

Saudi Arabia-USA: Energy Anchoring Political Volatility. Figure A2c demonstrates remarkable resilience through energy interdependence. Although the 1973 oil embargo produced sharp negative spikes in both measures, the subsequent petrodollar recycling arrangement (1974) established a durable foundation that has weathered severe diplomatic crises. Post-9/11 tensions and the 2018 Khashoggi assassination generated only transitory disruptions, with trade residuals consistently returning to equilibrium. This resilience suggests that fundamental economic complementarities—particularly in strategic commodities—can effectively insulate bilateral trade from political shocks.

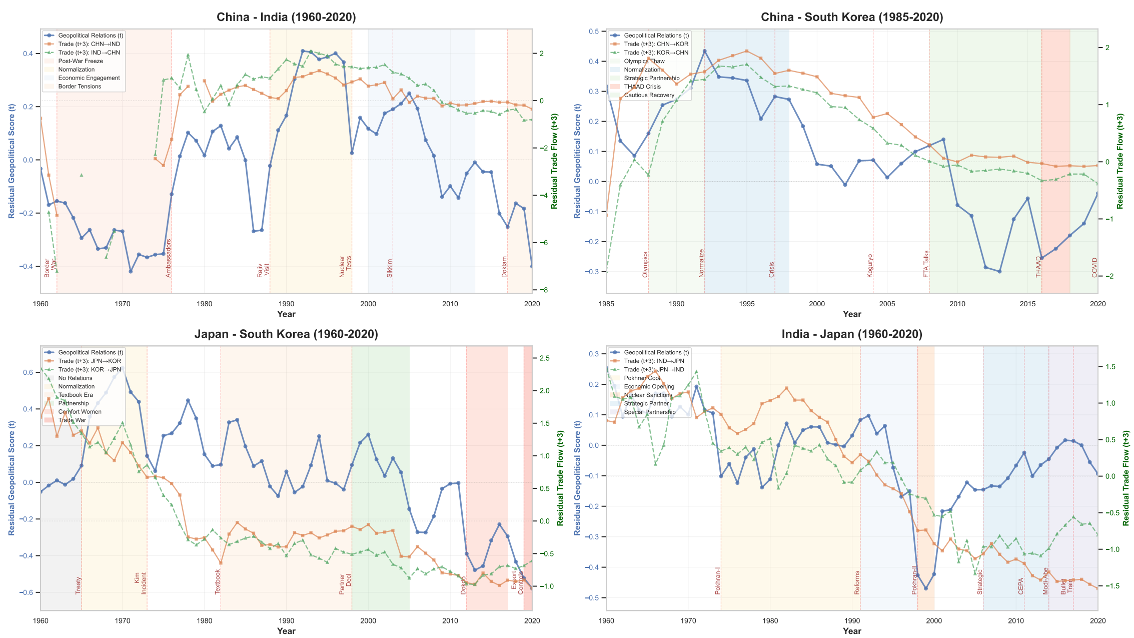
Colombia-USA: Security Partnership Driving Trade Integration. Figure A2d illustrates how comprehensive security cooperation creates lasting economic benefits. Plan Colombia (2000), involving $10 billion in military assistance, initiated sustained improvement in geopolitical scores that translated into enhanced trade integration. Trade residuals peaked following the 2012 Free Trade Agreement, but notably, the improvement began a decade earlier with security cooperation. This sequencing suggests that security partnerships generate more durable trade expansion than purely commercial agreements, likely by establishing trust and institutional frameworks that facilitate broader economic exchange.

These four cases reveal distinct mechanisms through which geopolitics shapes trade: strategic rivalry can override massive economic stakes (China), ideological alignment matters more than geography (Brazil), resource dependence provides exceptional stability (Saudi Arabia), and security cooperation creates foundations for lasting commercial integration (Colombia). Across all variations, the three-year lead relationship remains robust, confirming that geopolitical realignment systematically precedes trade adjustment regardless of the specific bilateral context.

A.3. Additional Case Studies: Asian Trading Networks

Intra-Asian trade now accounts for 40% of global commerce, yet operates under fundamentally different dynamics than U.S.-centered relationships. We examine four dyads—China-India, China-South Korea, Japan-South Korea, and India-Japan—that reveal three distinctive features of Asian trade networks: persistent historical tensions constraining integration, security considerations dominating economic complementarities, and heightened volatility absent hegemonic stability. Despite these regional characteristics, residualized geopolitical scores systematically predict bilateral trade flows with a three-year lead across all Asian dyads.

FIGURE A3. Asian Bilateral Relations: Geopolitical Alignment and Future Trade Flows



Notes: Each panel plots residualized geopolitical relations at time t against residualized bilateral trade flows at time $t + 3$ for major Asian trading partners. All variables are residualized following the methodology in Figure 4. The China-South Korea panel begins in 1985 when indirect trade through Hong Kong commenced following decades of Cold War separation. Shaded regions indicate major diplomatic periods with distinct geopolitical characteristics.

China-India: Territorial Disputes Binding Economic Potential. Figure A3a reveals how unresolved borders constrain integration between the world's two most populous economies. The 1962 war established persistent hostility that erupts periodically—Doklam (2017) and Galwan Valley (2020) being recent manifestations. Despite \$95 billion in bilateral trade, geopolitical residuals remain negative while trade residuals plummeted from +2 (early 2000s) to −1 (2020). This trajectory demonstrates that strategic rivalry increasingly dominates natural complementarities between these massive neighboring markets.

China-South Korea: Security Imperatives Trumping Economic Integration. Figure A3b captures the vulnerability of smaller economies caught between great powers. Post-1992 normalization drove rapid expansion, with residuals reaching +2 as South Korea became China's fourth-largest trading partner. Yet the 2016 THAAD deployment—essential for Korean security but perceived as containment by China—triggered immediate economic retaliation through unofficial boycotts and regulatory barriers. The swift reversal from deep integration to negative residuals illustrates how security choices can instantly unravel decades of supply chain development.

Japan-South Korea: Historical Memory Overriding Rational Economics. Figure A3c exemplifies persistent inefficiency from unresolved history. Despite sharing U.S. alliance structures, democratic governance, and complementary industrial specializations, colonial-era grievances generate recurring crises. The 2019 escalation—from forced labor compensation rulings to semiconductor export controls and intelligence-sharing threats—drove both measures to historic lows. This pattern reveals how historical animosity can override compelling economic logic and shared security interests, imposing continuous deadweight losses on both economies.

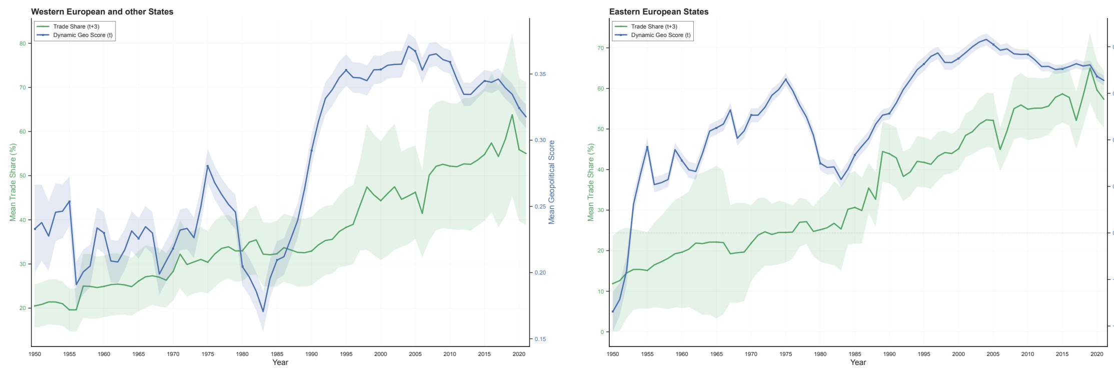
India-Japan: Strategic Convergence Enabling Sustained Integration. Figure A3d provides the regional exception: shared strategic concerns sustaining positive trajectories. The 2006 Strategic and Global Partnership initiated consistent improvement in both measures, reflecting aligned interests—Japan seeking China diversification while India needs technology and capital. Recovery from India's 1998 nuclear tests demonstrates that sufficient strategic convergence (here, regarding China's rise) can overcome significant bilateral frictions. This unique stability within volatile Asia underscores how geopolitical alignment remains the binding constraint on regional economic integration.

These Asian cases reveal a region where historical legacies and security dilemmas systematically impede economic rationality. Unlike U.S. relationships where different mechanisms operate (ideology, resources, security partnerships), Asian dyads face common obstacles: unresolved historical grievances (Japan-South Korea), active territorial disputes (China-India), and the destabilizing absence of regional hegemonic order (China-South Korea). Only when strategic interests strongly align (India-Japan) can these barriers be overcome. The consistent three-year lead relationship across all cases confirms that even in this distinct regional context, geopolitical realignment necessarily precedes trade adjustment.

A.4. Additional Regional Analysis: European States

Figure A4 examines how EU institutions mediate the relationship between geopolitical alignment and trade integration, revealing a unique capacity to insulate economic exchange from political tensions.

FIGURE A4. Geopolitics and Trade Evolution: Western versus Eastern Europe



A. Western European and Other States

B. Eastern European States

Notes: Both panels plot mean dynamic geopolitical scores at time t (green, right axis) against mean trade shares at time $t+3$ (blue, left axis). Trade share is the average of exports/GDP and imports/GDP ratios. Shaded areas represent 95% confidence intervals.

Western Europe: Institutional Deepening in Two Phases. Panel (a) reveals distinct integration stages. The first phase (1957–1975) saw trade shares double from 20% to 40% following the Treaty of Rome and EFTA formation, while geopolitical scores remained stable at 0.20–0.25—suggesting that initial economic integration proceeded without requiring deeper political alignment. The second phase, triggered by the Single European Act (1986), fundamentally transformed both dimensions: geopolitical scores rose from 0.20 to 0.37 by 1995, preceding an unprecedented trade expansion to 80% of GDP by 2007.

Remarkably, the post-2008 period exhibits a structural break in the geopolitics-trade relationship. While geopolitical alignment declined from 0.35 to 0.29—reflecting Brexit, sovereign debt tensions, and populist challenges—trade shares stabilized at 65–70% rather than contracting proportionally. This divergence suggests that mature EU institutions now provide effective insulation against political fragmentation.

Eastern Europe: From Autarky to Integration. Panel (b) documents an even more dramatic transformation. The 1989 revolutions catalyzed immediate geopolitical realignment, with scores surging from −0.10 to +0.30 within six years. Following our three-year lag, trade shares expanded from 35% to 55% by 1998. Successive EU accessions (2004, 2007, 2013) drove convergence with Western levels, reaching 65% by 2008.

Eastern Europe exhibits the same post-2014 pattern as the West: despite geopolitical deterioration driven by the Ukraine crisis and democratic backsliding, trade shares remain stable at 65%. This resilience, achieved after just two decades of integration compared to Western Europe's six decades, underscores the powerful stabilizing force of EU membership.

Theoretical Implications. The correlation between geopolitical scores at t and trade shares at $t + 3$ remains strong in both regions (Western: 0.801, Eastern: 0.791), confirming our fundamental lead-lag relationship. However, the post-crisis divergence between declining political alignment and stable trade integration represents a crucial deviation from global patterns. While our main results show that geopolitical fragmentation directly reduces trade flows, European experience demonstrates that sufficiently deep institutional integration can break this link.

This finding has profound implications for understanding economic integration. The EU's ability to maintain trade flows despite political tensions—through binding legal frameworks, common regulatory standards, and dispute resolution mechanisms—suggests that institutional architecture can substitute for political alignment once integration reaches critical depth. The threshold appears to be around 65% trade-to-GDP, beyond which political shocks no longer translate into commercial disruption. This European exceptionalism highlights both the potential and limitations of institutional solutions to geopolitical fragmentation.

A.5. Variance Decomposition of Gravity Determinants

We decompose the variance of bilateral trade flows to quantify the relative importance of geopolitical alignment versus traditional gravity factors. By sequentially excluding each determinant from the baseline specification, we measure each variable's contribution to explaining trade variation:

$$\ln X_{od,t} = \alpha_{ot} + \beta_{dt} + \beta_1 \text{Geo}_{od,t} + \beta_2 \ln \text{dist}_{od} + \beta_3 \text{border}_{od} + \beta_4 \text{ling}_{od} + \varepsilon_{od,t} \tag{A1}$$

Table A1 reports regression coefficients and the reduction in R^2 when each variable is excluded.

Three findings emerge from the decomposition. First, geopolitical alignment accounts for 3.4% of trade variation across all countries, exceeding linguistic distance (2.6%) and tripling the border effect (1.1%). This contribution is notable because linguistic and border factors reflect fixed historical legacies, while geopolitical alignment responds to contemporary policy choices. The economic magnitude is substantial: a one-standard-deviation improvement in alignment increases trade by 29%, comparable to eliminating a linguistic barrier.

Second, geographic distance dominates the decomposition at 42–50% of explained variation, consistent with gravity model foundations. Yet among time-varying, policy-relevant factors, geopolitical alignment emerges as the primary instrument for influencing bilateral trade flows. This finding underscores that while geography remains destiny in

TABLE A1. Gravity Equation Coefficients and Variance Decomposition

	Regression Coefficients (S.E.)				R^2 Loss (%)			
Sample	Geo Score	Distance (log)	Border	Linguistic Dist.	Geo Score	Distance	Border	Ling. Dist.
Panel A: All Countries								
Full Period (1962–2024)	1.10 (0.027)	-1.45 (0.016)	0.84 (0.079)	-1.70 (0.075)	3.4	42.5	1.1	2.6
Pre-1990	1.08 (0.043)	-1.29 (0.023)	0.54 (0.104)	-0.88 (0.112)	4.8	48.1	0.4	0.9
Post-1990	1.08 (0.032)	-1.50 (0.017)	1.02 (0.082)	-2.10 (0.076)	2.5	40.0	1.1	3.2
Panel B: Major Economies								
Full Period	0.46 (0.106)	-0.81 (0.052)	0.23 (0.171)	-1.10 (0.330)	2.2	49.7	0.6	2.8
Pre-1990	0.78 (0.141)	-0.68 (0.069)	0.10 (0.213)	-0.91 (0.422)	8.6	44.8	0.0	2.6
Post-1990	0.20 (0.139)	-0.92 (0.052)	0.33 (0.172)	-1.24 (0.332)	0.4	50.6	0.8	3.1
Full R^2 (Full Period)		All: 0.268	Major: 0.179		Observations: 1,087,543 / 58,948			

Notes: Left panel: coefficients from gravity equation with origin-year, destination-year, and standard gravity controls. Standard errors clustered by dyad in parentheses. Right panel: percentage point reduction in R^2 when variable excluded. Major economies defined as countries ever ranking in top 20 by GDP since 1960.

international trade, political relationships constitute the main malleable determinant.

Third, heterogeneity across samples reveals important structural changes. Major economies show declining sensitivity to geopolitical factors over time: the coefficient falls from 0.78 pre-1990 to 0.20 post-1990, with explanatory power dropping from 8.6% to 0.4%. This attenuation initially suggested that deep integration insulated large economies from political volatility. However, recent sanctions against Russia and U.S.-China decoupling demonstrate that geopolitical constraints ultimately bind even highly integrated economies when political tensions reach sufficient intensity.

In contrast, the coefficient for all countries remains stable at 1.08 across periods, indicating that smaller economies face consistent vulnerability to geopolitical pressures regardless of the prevailing trade regime. This divergence implies that while major economies enjoyed a temporary "end of history" dividend during the hyper-globalization era, most countries never escaped the fundamental constraint that political alignment shapes economic exchange.

A.6. Additional Cross-Country Estimates

Table A2 validates our cross-sectional findings using alternative trade data sources. BACI data (columns 1–6, covering 1995–2023) provides harmonized bilateral flows with superior developing country coverage. IMF Direction of Trade Statistics (columns 7–12, covering 1948–2024) offers extended temporal coverage but limited early-period representation.

Geopolitical alignment coefficients remain positive and significant across data sources, though magnitudes reflect temporal coverage differences. BACI yields 0.177 for major economies with controls (column 2), below our baseline COMTRADE estimate of 0.458. This attenuation reflects the post-1995 period when multilateral institutions temporarily insulated trade from political tensions. Crucially, dynamic estimates in Figure 13 remain

TABLE A2. The Effect of Geopolitical Relationship on Trade: Alternative Trade Measures

	BACI (1995–2023)						IMF (1948–2024)					
	Major Countries			All Countries			Major Countries			All Countries		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Geopolitical Relation	0.276	0.177		2.806	1.114		0.660	0.446		2.483	1.022	
	(0.172)	(0.149)		(0.050)	(0.034)		(0.106)	(0.088)		(0.042)	(0.027)	
IPD			0.210			0.170			0.219			0.018
			(0.053)			(0.014)			(0.041)			(0.012)
Geographic Distance		-0.902	-0.973		-1.515	-1.656		-0.832	-0.915		-1.454	-1.562
		(0.053)	(0.054)		(0.017)	(0.018)		(0.050)	(0.052)		(0.016)	(0.017)
1[neighbor]		0.389	0.355		0.994	0.831		0.211	0.289		0.669	0.616
		(0.173)	(0.161)		(0.085)	(0.089)		(0.154)	(0.159)		(0.072)	(0.076)
Linguistic Distance		-1.180	-1.528		-2.122	-2.342		-0.958	-1.296		-1.608	-1.730
		(0.332)	(0.314)		(0.077)	(0.081)		(0.290)	(0.284)		(0.071)	(0.075)
Mean Dep. Var.	13.94	13.94	14.03	7.57	7.57	7.60	12.26	12.26	12.49	7.45	7.45	7.48
Observations	27,451	27,451	26,601	668,849	668,849	632,568	64,691	64,691	54,701	1,078,076	1,078,076	947,751
Origin × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variable: log trade value. Unit of observation: origin-destination-year. Columns 1–3, 7–9: major economy pairs. Columns 4–6, 10–12: all country pairs. BACI: 1995–2023; IMF: 1948–2024. All specifications include origin-year and destination-year fixed effects. Standard errors clustered at country-pair level.

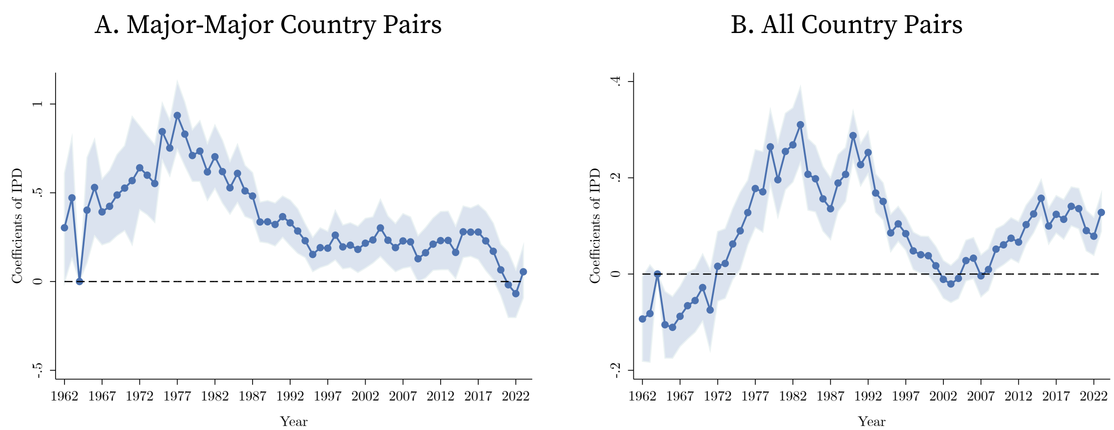
consistent with baseline results, confirming robustness beyond cross-sectional variation. IMF data produces 0.446 for major economies (column 8), virtually identical to our baseline despite different temporal coverage, validating measurement stability across seven decades.

The IPD measure exhibits systematic failures across specifications. BACI estimates yield positive coefficients (0.210 for major economies, 0.170 for all countries)—the opposite of theoretical predictions. IMF data reveals near-zero effects (0.018 for all countries, column 12), indicating negligible relationship between UN voting and trade over the entire post-war period. This pattern—positive when it should be negative, insignificant when theory predicts strong effects—confirms that voting similarity captures multilateral positioning rather than bilateral economic relationships.

Figure A5 exposes IPD's temporal instability. Coefficients peak during 1970s–1980s détente, decline through the post-Cold War era, and turn negative only recently (2020–2024)—finally matching theoretical predictions after decades of contradictory evidence. This instability fundamentally undermines panel identification strategies requiring consistent measurement across periods.

Our event-based measure, by contrast, maintains stable positive coefficients throughout, with magnitudes tracking the evolving intensity of geopolitical constraints on trade: high during Cold War bipolarity, attenuated during hyper-globalization, and resurging amid contemporary fragmentation. This temporal consistency, combined with robustness across data sources, establishes geopolitical alignment as a fundamental determinant of international trade flows rather than an artifact of particular datasets or historical periods.

FIGURE A5. Conditional Correlation between Trade and IPD, by Year



Notes: Estimated coefficients of IPD on log trade by year from: $\ln X_{odt} = \delta_{ot} + \delta_{dt} + \sum_{\tau=1962}^{2024} \beta_\tau \text{IPD}_{odt} \times 1[t = \tau] + \text{Controls} + \epsilon_{odt}$. Controls: geographic distance, contiguity, linguistic distance. Panel (a): major economy pairs. Panel (b): all countries. Standard errors clustered at country-pair level.

A.7. Additional Dynamic Results

This section provides robustness tests supporting the main dynamic results from Section 4.2.

A.7.1. Robustness to Specification Choices

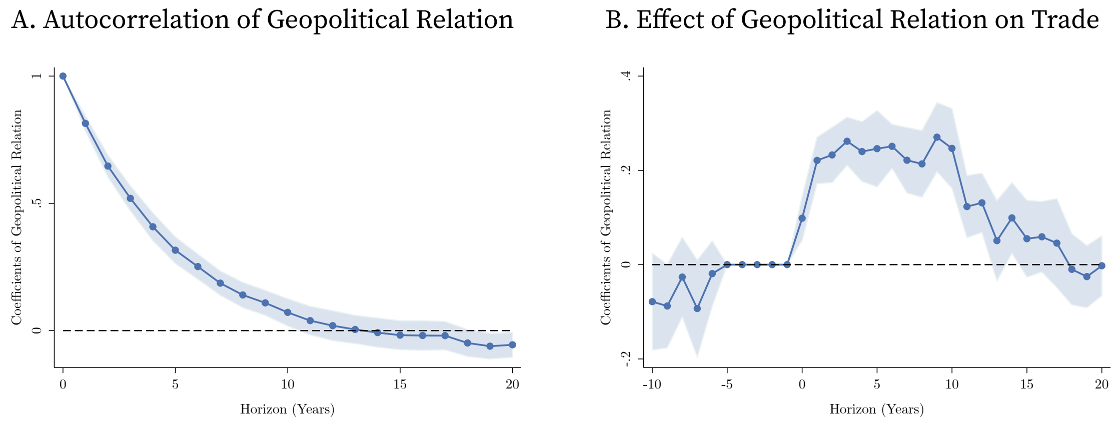
Figure A6 validates our baseline three-lag specification by extending to five lags. Both the autocorrelation function of geopolitical relations (Panel A) and trade impulse responses (Panel B) remain virtually unchanged, with identical peak timing and comparable magnitudes throughout the horizon. This stability confirms that three lags capture the relevant dynamics without overfitting.

Figure A7 examines inference robustness across alternative standard error constructions. Panel A employs two-way clustering at the country-pair level, accounting for arbitrary serial correlation within dyads while excluding cross-sectional dependence. Panel B implements block bootstrap resampling (200 iterations) to incorporate parameter estimation uncertainty. Both methods yield confidence intervals closely matching our baseline Driscoll-Kraay approach, with bootstrap intervals widening marginally at longer horizons. This convergence across inference strategies validates our statistical conclusions.

A.7.2. Testing for Reverse Causality

A fundamental identification concern is reverse causality: does trade foster political cooperation rather than politics driving trade? Figure A8 directly addresses this question by

FIGURE A6. Dynamic Effect of Geopolitical Relationship on Trade: Alternative Lags



Notes: Panel A: $S_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \phi_h S_{od,t} + \sum_{\ell=1}^{5} \phi_{h,\ell} S_{od,t-\ell} + \varepsilon_{od,t+h}$. Panel B: $\ln X_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \beta_h S_{od,t} + \sum_{\ell=1}^{5} \gamma_{h,\ell} \ln X_{od,t-\ell} + \sum_{\ell=1}^{5} \phi_{h,\ell} S_{od,t-\ell} + \varepsilon_{od,t+h}$. Sample: country pairs among 32 major economies. 95% confidence intervals: Driscoll-Kraay standard errors.

estimating whether exogenous trade shocks influence subsequent geopolitical alignment.

We instrument trade with predicted values from a gravity equation using time-varying transportation costs as in Feyrer (2019). Panel A reveals that instrumented trade shocks generate no detectable effect on future geopolitical relations—coefficients remain statistically indistinguishable from zero across the entire 20-year horizon. Panel B reinforces this null finding using non-economic geopolitical events as the outcome, excluding trade agreements, sanctions, and commercial disputes that could mechanically correlate with trade flows. Point estimates continue hovering near zero throughout, confirming that trade expansion does not cause diplomatic improvement.

These null results establish unidirectional causality from geopolitics to trade. While liberal theories of economic interdependence posit that commercial ties generate political cooperation, our evidence indicates the opposite causal ordering—at least bilaterally. Political relationships shape economic exchange rather than emerging from it. This asymmetry aligns with realist international relations theory, where security imperatives and strategic calculations dominate economic considerations in determining interstate alignment. The finding implies that policymakers cannot rely on trade expansion alone to improve diplomatic relations; political reconciliation must precede sustainable economic integration.

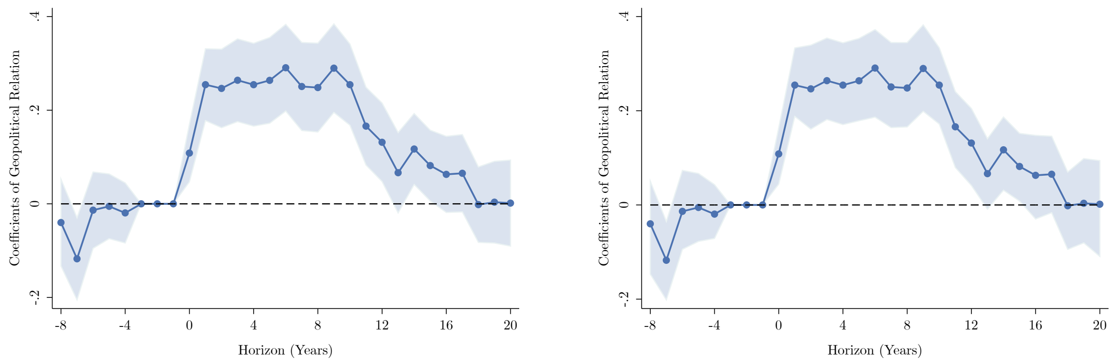
A.8. Decomposition of Transitory and Permanent Shocks

The impulse responses in Section 4.2 combine the initial shock's direct impact with effects from its subsequent persistence. We decompose these components by constructing coun-

FIGURE A7. Dynamic Effect of Geopolitical Relationship on Trade: Alternative Inference

A. S.E. Clustered at Country-Pair Level

B. Bootstrap Confidence Intervals



Notes: Baseline specification: $\ln X_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \beta_h S_{od,t} + \sum_{\ell=1}^{3} \gamma_{h,\ell} \ln X_{od,t-\ell} + \sum_{\ell=1}^{3} \phi_{h,\ell} S_{od,t-\ell} + \varepsilon_{od,t+h}$. Panel A: standard errors clustered at country-pair level. Panel B: 95% confidence intervals from 200 bootstrap iterations with country-pair block resampling. Sample: country pairs among 32 major economies.

terfactual responses to purely transitory versus permanent geopolitical improvements.

A.8.1. Methodology

Following Sims (1986) and Bilal and Känzig (2024), we implement a two-step decomposition. First, we estimate the autocorrelation function of geopolitical relations:

$$S_{od,t+h} = \phi_h S_{od,t} + \sum_{\ell=1}^{L} \phi_{h,\ell} S_{od,t-\ell} + \delta_{od} + \delta_{ot} + \delta_{dt} + \mu_{od,t+h} \tag{A2}$$

where $\{\phi_h\}_{h=0}^{H}$ captures shock persistence.

To generate a purely transitory shock (one at $h = 0$, zero thereafter), we solve for the auxiliary shock sequence $\mathbf{p} = \{p_0, p_1, \ldots, p_H\}$:

$$\mathbf{p} = (\mathbf{\Phi})^{-1}\mathbf{e}_1 \tag{A3}$$

where $\mathbf{\Phi}$ is the lower triangular matrix with elements $\Phi_{ij} = \phi_{i-j}$ for $i \geq j$ (zero otherwise), and $\mathbf{e}_1 = (1, 0, \ldots, 0)'$ represents the target transitory pattern.

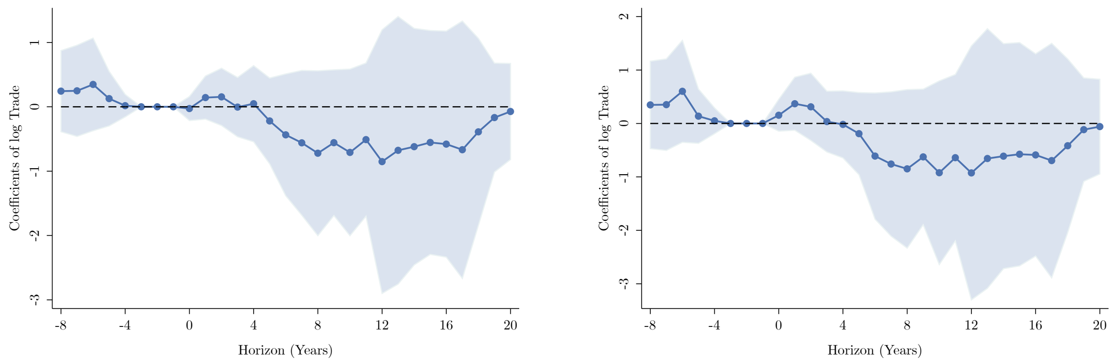
The trade response to this transitory geopolitical improvement becomes:

$$\tilde{\beta}_h = \sum_{s=0}^{h} p_s \beta_{h-s} \tag{A4}$$

where $\{\beta_h\}$ are baseline impulse responses from equation (3). For permanent shocks, we compute cumulative responses: $\sum_{s=0}^{h} \tilde{\beta}_s$.

FIGURE A8. Testing Reverse Causality: Effect of Trade on Geopolitical Relations

A. Effect on Overall Geopolitical Relations B. Effect on Non-Economic Relations



Notes: Estimates from: $S_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \zeta_h \ln X_{od,t} + \sum_{\ell=1}^{3} \gamma_{h,\ell} \ln X_{od,t-\ell} + \sum_{\ell=1}^{3} \phi_{h,\ell} S_{od,t-\ell} + \varepsilon_{od,t+h}$. Trade instrumented with predicted values from gravity equation using time-varying sea and air distance coefficients. Panel B: non-economic geopolitical relations excluding trade agreements, sanctions, and economic events. Sample: major economy pairs. 95% confidence intervals: Driscoll-Kraay standard errors.

A.8.2. Implementation and Inference

We implement this decomposition using estimated impulse responses from our baseline specification with $L = 3$ lags. Statistical inference employs block bootstrap with 200 iterations:

1. Resample country pairs with replacement (block bootstrap) 2. Re-estimate both geopolitical autocorrelation (A2) and trade responses (3) 3. Compute decomposed impulse responses for each bootstrap sample 4. Construct 95% confidence intervals using the 2.5th and 97.5th percentiles

This procedure accounts for estimation uncertainty in both stages while preserving within-pair correlation structure.

A.9. Additional Robustness Results

This section provides supplementary robustness tests supporting our main dynamic results.

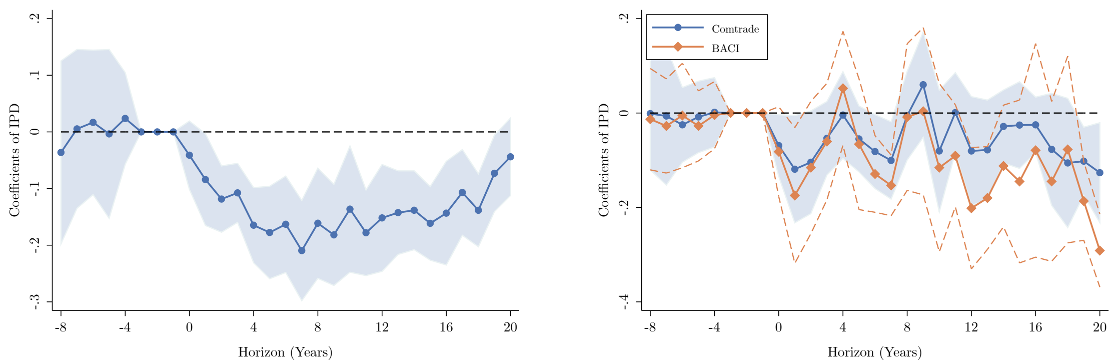
A.9.1. Temporal Instability of IPD Effects

Figure A9 reveals the fundamental instability of UN voting-based measures as trade predictors across different time periods.

The results expose a complete reversal undermining voting-based measures' validity. During the Cold War (Panel A), IPD exhibits the theoretically expected negative relationship: divergent UN voting patterns correlate with declining trade, with coefficients

FIGURE A9. Dynamic Effect of IPD on Trade: Temporal Instability

A. First 30 Years Subsample (1965–1994) B. Last 30 Years Subsample (1995–2024)



Notes: Local projection estimates for major economy pairs across two 30-year periods. Baseline specification with three lags and triple fixed effects. 95% confidence intervals: Driscoll-Kraay standard errors.

reaching −0.18 around year 10. This pattern reflects the bipolar era when UN votes genuinely signaled geopolitical alignment and alliance membership determined market access.

The post-Cold War period (Panel B) shows this relationship's breakdown. IPD coefficients hover near zero with confidence intervals spanning positive and negative values. At several horizons, point estimates turn positive—contradicting both theoretical predictions and earlier-period evidence. This instability reflects fundamental shifts in voting's meaning: in multipolar systems, votes increasingly represent issue-specific coalitions, regional solidarity, and symbolic positioning rather than bilateral alignment affecting trade.

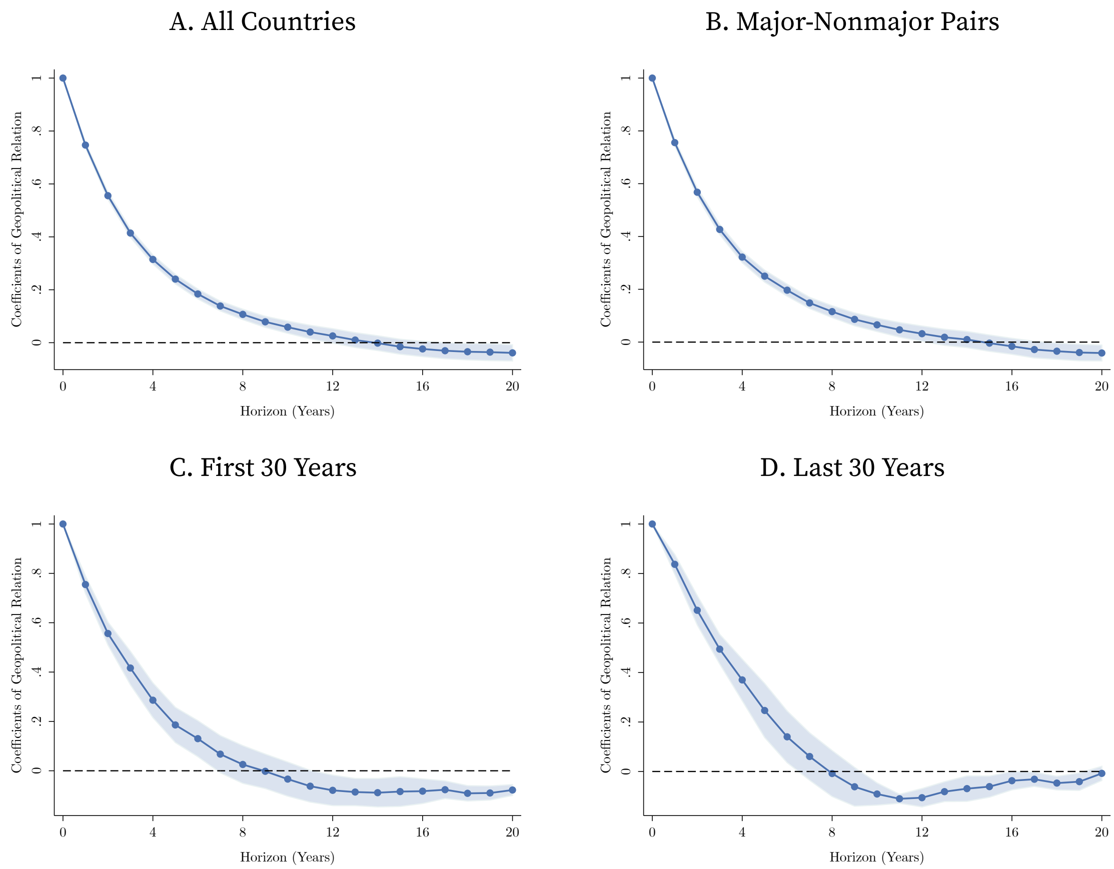
Most problematically, these dynamic results contradict IPD's positive cross-sectional correlations in Table 4. This methodological inconsistency—positive in gravity equations yet negative or null in dynamic specifications—arises because IPD captures multilateral positioning that correlates with, but does not determine, bilateral economic relationships. Such fundamental instability renders voting-based measures unsuitable for identifying causal effects of geopolitical alignment on trade.

A.9.2. Autocorrelation Functions Across Samples

Figure A10 documents heterogeneous persistence of geopolitical shocks across country samples and time periods, contextualizing our cumulative trade effects.

Persistence varies systematically by country type. Major economy relationships exhibit the highest persistence, with 50% of initial shocks remaining after five years. This reflects institutionalized relationships—alliances, strategic partnerships, structured rivalries—that

FIGURE A10. Autocorrelation of Geopolitical Relations: Sample Heterogeneity



Notes: Autocorrelation functions from: $S_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \phi_h S_{od,t} + \sum_{\ell=1}^{3} \phi_{h,\ell} S_{od,t-\ell} + \varepsilon_{od,t+h}$. 95% confidence intervals: Driscoll-Kraay standard errors.

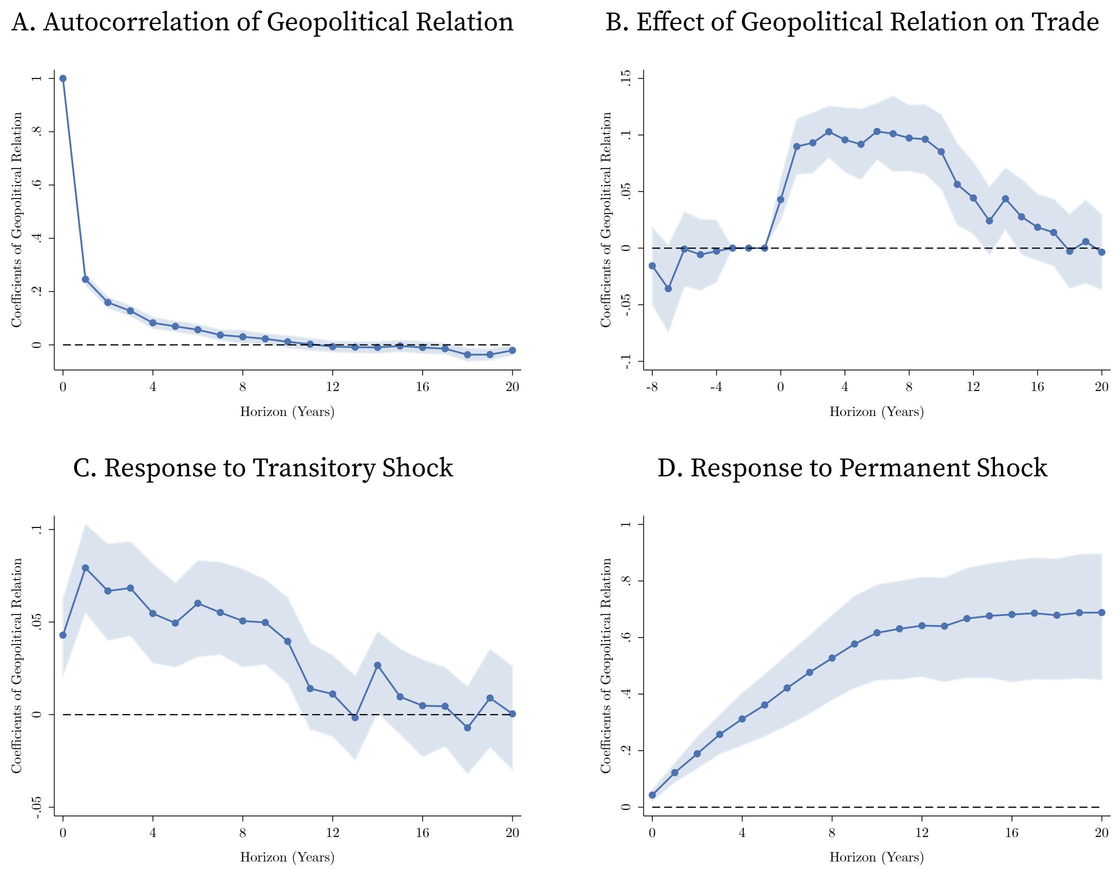
adjust gradually through formal diplomatic channels. Relationships involving smaller economies (Panels A–B) display faster decay, with shocks dissipating within 7–10 years, consistent with more transactional diplomatic engagement lacking deep institutional frameworks.

Temporal stability emerges across radically different international systems (Panels C–D). Both Cold War and post-Cold War periods show effects persisting well beyond a decade, indicating that political realignments generate durable trade consequences independent of the prevailing global order. This temporal invariance reinforces our main finding: the geopolitics-trade nexus represents a fundamental economic relationship rather than an artifact of specific institutional arrangements.

A.9.3. IRFs with Unsmoothed Event Scores

We examine robustness to alternative constructions of our geopolitical alignment measure by using unsmoothed average event scores $\tilde{S}_{ij,t}$—the simple mean of bilateral events in year t without historical smoothing. This approach sets the depreciation rate $\delta = 1$, treating each year's geopolitical relationship as independent.

FIGURE A11. Dynamic Effect of Geopolitical Relationship on Trade: Unsmoothed Scores



Notes: Panel A: $\tilde{S}_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \phi_h \tilde{S}_{od,t} + \sum_{\ell=1}^{3} \phi_{h,\ell} \tilde{S}_{od,t-\ell} + \varepsilon_{od,t+h}$. Panel B: $\ln X_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \beta_h \tilde{S}_{od,t} + \sum_{\ell=1}^{3} \gamma_{h,\ell} \ln X_{od,t-\ell} + \sum_{\ell=1}^{3} \phi_{h,\ell} \tilde{S}_{od,t-\ell} + \varepsilon_{od,t+h}$. Sample: major economy pairs. 95% confidence intervals: Driscoll-Kraay standard errors. Panels C-D: decomposition following Section A.8.

Four key patterns emerge from Figure A11. Panel A reveals fundamental differences in persistence: unsmoothed scores' autocorrelation falls below 0.2 after two years and reaches zero by year five, reflecting the episodic nature of diplomatic events—summits conclude, crises resolve, agreements expire. Our baseline dynamic measure, by contrast, maintains 50% persistence after five years, capturing institutional memory and path dependence in international relationships.

Panel B shows that unsmoothed scores nevertheless generate economically meaningful trade responses. Peak elasticity reaches 0.12 around years 4–6, approximately 40% of baseline. This attenuation reflects individual events' temporary nature—they create disruptions or opportunities that dissipate as normal relations resume. The absence of pre-trends persists, validating our identification strategy regardless of smoothing.

Panels C and D decompose responses into transitory and permanent components. A purely transitory unit improvement—such as an isolated summit—generates 7% trade increases persisting 3–4 years before mean reversion. This persistence despite transitory shocks reflects adjustment costs and trade relationship hysteresis. Panel D reveals that permanent shifts in event flows yield 70% cumulative trade increases after 20 years, converging toward our baseline 78%.

This convergence validates our methodology. Unsmoothed scores capture high-frequency diplomatic volatility but miss persistent relationship components driving long-run trade. The similarity in long-run responses—whether smoothed or unsmoothed—confirms that permanent geopolitical realignments generate comparable trade effects regardless of measurement approach. Our dynamic smoothing extracts persistent signals from noisy bilateral interactions, providing precise estimates while preserving the fundamental economic relationship.

A.10. The Trade Effects of Trade Policies

A.10.1. Econometric Specification

We estimate dynamic impacts of trade policies on bilateral flows and policy persistence using local projections.

For tariffs, we estimate:

Trade response to tariffs:

$$\ln X_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \beta_h \ln(1+\tau_{od,t}) + \sum_{\ell=1}^{3} \gamma_{h,\ell} \ln X_{od,t-\ell} + \sum_{\ell=1}^{3} \phi_{h,\ell} \ln(1+\tau_{od,t-\ell}) + \varepsilon_{od,t+h}$$

Tariff persistence:

$$\ln(1+\tau_{od,t+h}) = \delta_{ot} + \delta_{dt} + \delta_{od} + \phi_h \ln(1+\tau_{od,t}) + \sum_{\ell=1}^{3} \phi_{h,\ell} \ln(1+\tau_{od,t-\ell}) + \varepsilon_{od,t+h}$$

For sanctions, we estimate analogous specifications:

Trade response to sanctions:

$$\ln X_{od,t+h} = \delta_{ot} + \delta_{dt} + \delta_{od} + \beta_h \mathbf{1}[\text{sanction}_{od,t}] + \sum_{\ell=1}^{3} \gamma_{h,\ell} \ln X_{od,t-\ell} + \sum_{\ell=1}^{3} \phi_{h,\ell} \mathbf{1}[\text{sanction}_{od,t-\ell}] + \varepsilon_{od,t+h}$$

Sanction persistence:

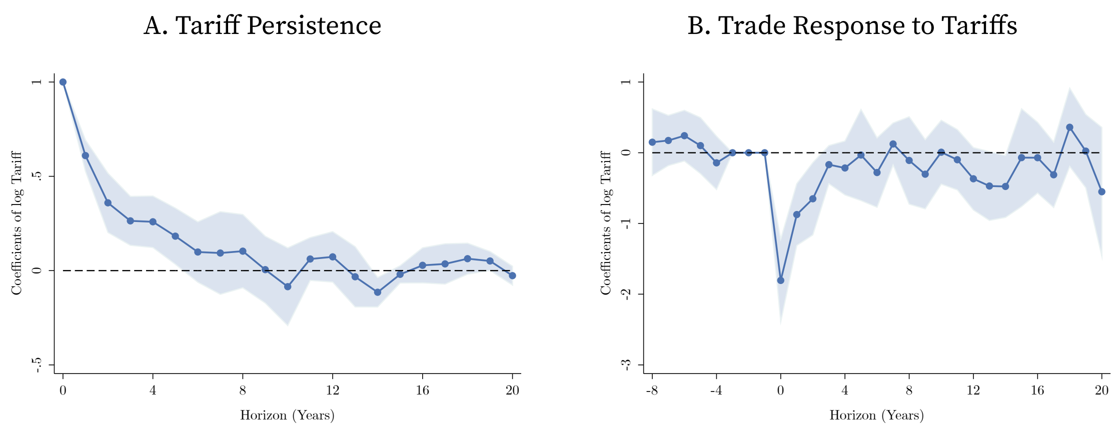
$$\mathbf{1}[\text{sanction}_{od,t+h}] = \delta_{ot} + \delta_{dt} + \delta_{od} + \phi_h \mathbf{1}[\text{sanction}_{od,t}] + \sum_{\ell=1}^{3} \phi_{h,\ell} \mathbf{1}[\text{sanction}_{od,t-\ell}] + \varepsilon_{od,t+h}$$

All specifications include origin-time (δ_{ot}), destination-time (δ_{dt}), and dyad (δ_{od}) fixed effects, with three lags of geopolitical relations as controls. Sample: dyads among 32 major economies.

A.10.2. Results

Figures A12 and A13 present estimated dynamic effects for tariffs and sanctions, displaying both policy persistence and trade impacts.

FIGURE A12. Dynamic Effects of Tariffs

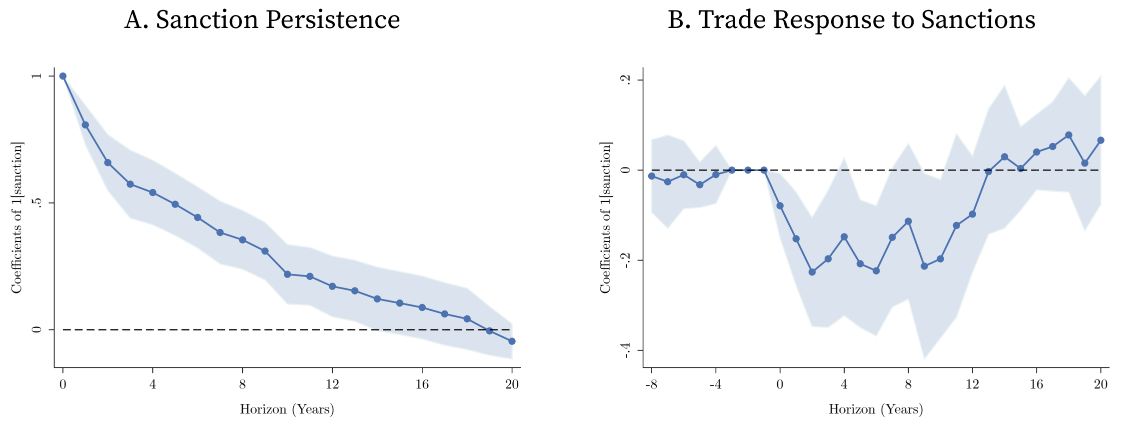


Notes: Panel A: autocorrelation function for tariffs. Panel B: impulse response of bilateral trade to tariff shock. All specifications include origin-time, destination-time, and dyad fixed effects with three lags of dependent variables, policy variables, and geopolitical relations. Sample: 32 major economies. 95% confidence intervals: Driscoll-Kraay standard errors.

Tariff Effects. Figure A12 reveals limited persistence and transitory trade impacts. Tariff shocks decay rapidly (Panel A), with autocorrelation falling below 0.3 after two years and approaching zero by year five. Trade responses are similarly short-lived (Panel B): a one percentage point tariff increase reduces bilateral trade by approximately 2% initially, but effects dissipate within 3–4 years. This transitory nature reflects firms' rapid adjustment through supply chain reorganization and product differentiation.

Sanction Effects. Figure A13 reveals fundamentally different dynamics from tariffs. Sanctions exhibit remarkable persistence (Panel A), with autocorrelation remaining above 0.5 after a decade and declining toward zero only by year 20. This persistence reflects sanctions' political and institutional nature—they signal diplomatic ruptures tied to prolonged conflicts rather than economic protection. Trade impacts are correspondingly severe and

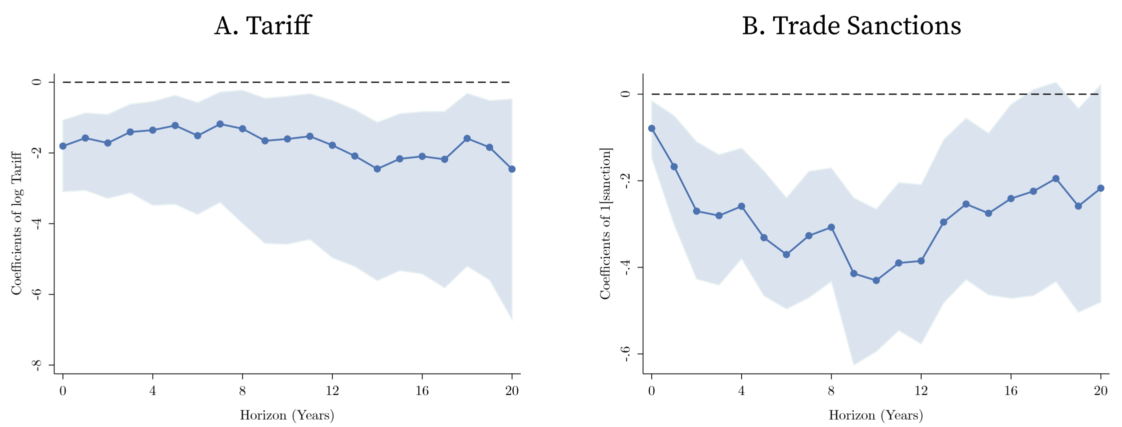
FIGURE A13. Dynamic Effects of Sanctions



Notes: Panel A: autocorrelation function for sanctions. Panel B: impulse response of bilateral trade to sanction shock. Specifications as in Figure A12.

durable (Panel B): sanctions reduce bilateral trade by nearly 20% initially, with effects remaining substantial (10–15%) for over a decade. Unlike tariffs' transitory disruptions, sanctions generate persistent trade destruction extending well beyond the initial shock.

FIGURE A14. Trade Responses to Permanent Trade Policy Shocks



Notes: Panel A: cumulative response of log trade to permanent unit shock of $\ln(1+\tau)$. Panel B: cumulative response to permanent sanction. Specifications from Appendix A.10 with three lags and triple fixed effects. 95% confidence intervals: 200 bootstrap iterations with country-pair block resampling.

Economic Interpretation. These contrasting dynamics reflect fundamental institutional differences. Tariffs operate within multilateral frameworks that promote stability while constraining bilateral targeting—firms adjust through supply chain reorganization and product differentiation, dissipating effects within years. Sanctions signal deeper diplomatic ruptures extending beyond commercial protection, triggering comprehensive economic disengagement. Their persistence and sustained impact demonstrate that even partial sanctions create lasting commercial scars—hysteresis absent from tariff adjustments.

Figure A14 quantifies these differences through permanent shock responses. Tariffs generate immediate but bounded effects: a 1% increase reduces trade by 2% initially, stabilizing at 3% long-run decline. This implies a trade elasticity of 3, corresponding to substitution elasticity $\sigma \approx 4$ in our quantitative framework. Sanctions, conversely, accumulate gradually to devastating effect—permanent sanctions ultimately destroy nearly 40% of bilateral trade. This order-of-magnitude difference underscores that sanctions constitute economic warfare rather than trade policy, fundamentally severing commercial relationships rather than merely raising transaction costs.

A.11. Hat Algebra

Using exact hat algebra, we denote proportional changes as $\hat{x} = x'/x$. The equilibrium conditions in changes are:

Trade shares:

$$\hat{\pi}_{od} = \left(\frac{\hat{w}_o \hat{d}_{od}}{\hat{P}_d} \right)^{1-\sigma}$$

Price index:

$$\hat{P}_d = \left[\sum_{o=1}^{N} \pi_{od} \left(\hat{w}_o \hat{d}_{od} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}$$

Labor market clearing:

$$\hat{w}_o w_o \ell_o = \sum_{d=1}^{N} \hat{X}_d X_d \frac{\hat{\pi}_{od} \pi_{od}}{1 + \hat{\tau}_{od} \tau_{od}}$$

Trade balance:

$$\sum_{d=1}^{N} X'_d \frac{\hat{\pi}_{od} \pi_{od}}{1 + \hat{\tau}_{od} \tau_{od}} = \sum_{o=1}^{N} X'_o \frac{\hat{\pi}_{do} \pi_{do}}{1 + \hat{\tau}_{do} \tau_{do}} = \hat{w}_d w_d \ell_d$$

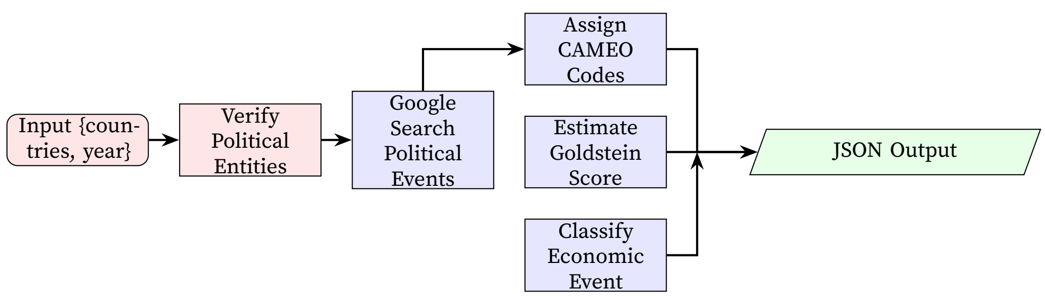
Appendix B. Construction of the Geopolitical Alignment Measure

This appendix details the construction and validation of our bilateral geopolitical alignment measure. Building on Fan (2025) and Fan, Liu, and Xiang (2025), we employ large language models to compile comprehensive event data across all country pairs from 1950–2024. Section B.1 describes bilateral political event compilation and classification. Section 2.2 explains the construction of dynamic geopolitical scores. Sections B.2 and B.2.3 provide validation through case studies and statistical tests demonstrating the measure's ability to capture major international relations episodes and its economic relevance.

B.1. Event Compilation Using Large Language Models

Major bilateral geopolitical events form core elements of LLM training corpora, appearing extensively across news archives, government publications, and scholarly databases. We employ Gemini 2.5 Pro with web search capabilities to systematically compile and analyze these events through structured prompt engineering. Figure B1 illustrates our analysis procedure, with complete specifications in Fan (2025) and Fan, Liu, and Xiang (2025).

FIGURE B1. LLM Geopolitical Event Analysis Procedure



The LLM performs five sequential tasks: (i) verify historical political entities accounting for state succession (e.g., Soviet Union to Russian Federation); (ii) search knowledge base and internet sources for major bilateral events from authoritative sources; (iii) classify events using the Conflict and Mediation Event Observations (CAMEO) framework; (iv) assign Goldstein scores from −10 (maximum conflict) to +10 (maximum cooperation); and (v) categorize economic content when applicable.

Table B1 illustrates the 1972 détente period when U.S.-Soviet cooperation reached unprecedented levels. All six events score positively (+6.0 to +9.0), with SALT I achieving the highest (+9.0) for establishing nuclear arms limitations. The Moscow Summit (+6.0) catalyzed agreements across multiple domains: military de-escalation (Naval Incidents, +8.0), scientific collaboration (Apollo-Soyuz, +7.5), and economic integration (Trade Agreement, +7.0; Grain Deal, +6.0).

Comparing with Table 1 demonstrates our measure's dynamic range. The 52-year

TABLE B1. Major U.S.-Soviet Bilateral Events in 1972: LLM Analysis Results

Event Name	**Event Description**	**CAMEO Class.**	**Econ. Type**	**Goldstein Score**
Moscow Summit	Nixon's historic visit to Moscow (May 22–30) for summit with Brezhnev, first U.S. presidential visit to Moscow, establishing détente framework	Verbal Coop. (04-042)	Not econ.	+6.0
SALT I Accords	Nixon and Brezhnev signed ABM Treaty and Interim Agreement on May 26, first agreements limiting superpowers' nuclear arsenals	Material Coop. (05-057)	Not econ.	+9.0
Naval Incidents Agreement	Agreement signed May 25 establishing protocols to prevent accidents between U.S. and Soviet navies, critical de-escalation measure	Material Coop. (05-057)	Not econ.	+8.0
Apollo-Soyuz Agreement	Space cooperation agreement signed May 24 for joint mission in 1975, shifting from Space Race competition to collaboration	Material Coop. (05-057)	Not econ.	+7.5
Comprehensive Trade Agreement	Trade agreement signed Oct. 18 providing MFN status, establishing trade offices, aiming to triple bilateral trade in three years	Material Coop. (05-057)	Trade	+7.0
Soviet Grain Purchase	USSR purchased 19 million metric tons of U.S. grain in July, nearly 25% of U.S. wheat harvest, cornerstone of trade expansion	Material Coop. (06-061)	Trade	+6.0

arc from comprehensive cooperation (1972) to contemporary hostility—marked by asset seizures (−8.0) and transactional prisoner exchanges amid strategic rivalry—reveals how our compilation captures both relationship valence and substantive evolution. Arms control and space cooperation have given way to economic warfare and cyber accusations, with granular event data enabling precise identification of inflection points critical for understanding how geopolitical alignment shapes trade across historical contexts.

Comparison with Existing Event Databases. Our approach differs fundamentally from GDELT (Leetaru and Schrodt 2013) and ICEWS (Boschee et al. 2015). First, we leverage LLMs' contextual understanding to focus exclusively on major bilateral political events that define geopolitical relationships, rather than attempting comprehensive coverage of all international interactions.[29] This targeted approach yields more precise measurement of relationship intensity. Second, our compilation spans 1950–2024, aligning with economic data availability for panel analysis.[30]

[29] GDELT and ICEWS collect all global events across actors and issue areas, complicating aggregation into meaningful bilateral relationship measures.

[30] GDELT begins in 1979; ICEWS covers only 1995–present, limiting historical economic analysis.

B.1.1. Statistics of Geopolitical Events

Our comprehensive compilation of bilateral geopolitical events spans seven and a half decades (1950–2024) and encompasses 833,485 individual events across all 193×192 country pairs. Table B2 and Figure B2 provide detailed statistics revealing both the scale and evolution of international political interactions over this extended period.

TABLE B2. Summary Statistics of Geopolitical Events by Decade, 1950–2024

	1950s	1960s	1970s	1980s	1990s	2000s	2010s	2020s	Total
CAMEO Event Classification									
Verbal Cooperation	21,709	33,113	43,108	39,089	45,930	70,549	113,422	71,141	438,061
Material Cooperation	13,423	18,314	22,087	22,664	28,743	44,521	58,045	32,899	240,696
Verbal Conflict	11,484	13,953	12,810	14,064	8,241	11,863	16,754	10,104	99,273
Material Conflict	5,598	6,924	6,505	7,782	6,705	6,606	9,556	5,779	55,455
Goldstein Scale Statistics									
Mean	2.02	2.41	3.06	2.61	3.83	4.00	3.76	3.62	3.38
Std. Dev.	5.45	5.12	4.71	4.85	4.35	3.86	3.69	3.66	4.33
Median	4.00	4.50	5.00	4.00	5.00	5.00	4.00	4.00	4.50
Event Categories									
Economic Relations	8,631	12,264	16,324	16,419	22,470	35,396	46,383	25,946	183,833
Diplomatic & Political	19,324	25,498	29,274	28,522	29,716	49,028	87,932	55,222	324,516
Security & Defense	9,267	9,978	9,498	9,817	7,857	10,398	14,940	8,483	80,238
Legal & Territorial	3,061	2,811	3,310	2,813	3,821	6,743	10,031	5,434	38,024
Multilateral Governance	10,562	19,951	23,771	21,353	22,201	26,460	29,560	18,178	172,036
Other Events	1,369	1,802	2,333	4,675	3,554	5,514	8,931	6,660	34,838
Summary									
Total Events	52,214	72,304	84,510	83,599	89,619	133,539	197,777	119,923	833,485

Notes: CAMEO classifications follow the Conflict and Mediation Event Observations framework. Goldstein Scale ranges from −10 (most conflictual) to +10 (most cooperative). Event Categories: Economic Relations, Diplomatic & Political Relations, Security & Defense, Legal & Territorial, Multilateral Governance, and Other Events. The 2020s column covers 2020–2024. All figures represent event counts except Goldstein Scale statistics.

The data reveal a persistent cooperative bias in international relations, with cooperative events (both verbal and material) comprising 81.5% of all recorded interactions (678,757 events) compared to 18.5% for conflictual events (154,728 events). Verbal cooperation represents the single largest category with 438,061 events (52.6%), followed by material cooperation with 240,696 events (28.9%). This distribution confirms that diplomatic communications and tangible cooperative actions—such as trade agreements, aid provision, and joint initiatives—constitute the foundation of international political interaction.

The temporal evolution demonstrates substantial growth in event frequency, with total events nearly quadrupling from 52,214 in the 1950s to a peak of 197,777 in the 2010s. The 2020s show 119,923 events despite covering only five years (2020–2024), suggesting continued high interaction intensity. Notably, the growth concentrates in cooperative

FIGURE B2. Geopolitical Events Summary (1950–2024)

categories: verbal cooperation increases more than fivefold from the 1950s (21,709) to the 2010s (113,422), while material cooperation quadruples (from 13,423 to 58,045). Conflict events show more modest variation, with the ratio of cooperation to conflict remaining remarkably stable across decades.

The Goldstein Scale statistics illuminate critical shifts in relationship intensity over time. The early Cold War (1950s) exhibits the lowest mean cooperation score (2.02) with the highest volatility (standard deviation of 5.45), reflecting the bipolar tensions and uncertainty of the period. Mean scores improve through the 1970s (3.06) before declining in the 1980s (2.61) amid renewed Cold War tensions. The post-Cold War transformation is dramatic: mean scores nearly double from 2.61 in the 1980s to 3.83 in the 1990s, peaking at 4.00 in the 2000s with reduced volatility (standard deviation of 3.86). The 2010s and early 2020s show modest declines (3.76 and 3.62 respectively), suggesting emerging fragmentation while maintaining cooperation levels well above Cold War norms.

Event categories reveal the multifaceted nature of contemporary international relations. Diplomatic and political relations dominate with 324,516 events (38.9%), reflecting the primacy of state-to-state engagement. Economic relations account for 183,833 events (22.1%), underscoring the centrality of economic interdependence—particularly relevant for our analysis of trade flows. The substantial growth in economic events from 8,631 in the 1950s to 46,383 in the 2010s parallels the expansion of global trade networks. Multilateral governance events (172,036 total, 20.6%) highlight the rise of international institutions, while security and defense interactions (80,238 events, 9.6%) remain relatively stable across decades, suggesting that military considerations, while important, no longer dominate bilateral relationships as they did during the Cold War.

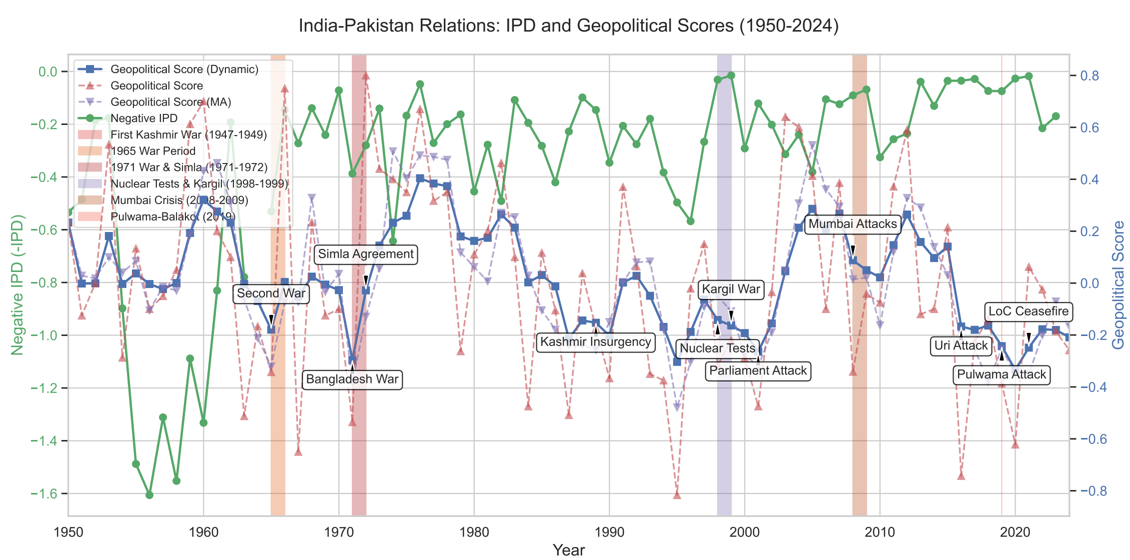
B.2. Validation

This section validates our event-based measure through bilateral case studies, geographic visualization, and statistical tests demonstrating its economic relevance.

B.2.1. Case Studies

We validate our event-based measure by examining four bilateral relationships that reveal fundamental limitations of UN voting-based measures while demonstrating our approach's superior ability to capture trade-relevant dynamics. These cases illustrate how multilateral voting patterns systematically misrepresent bilateral economic relationships.

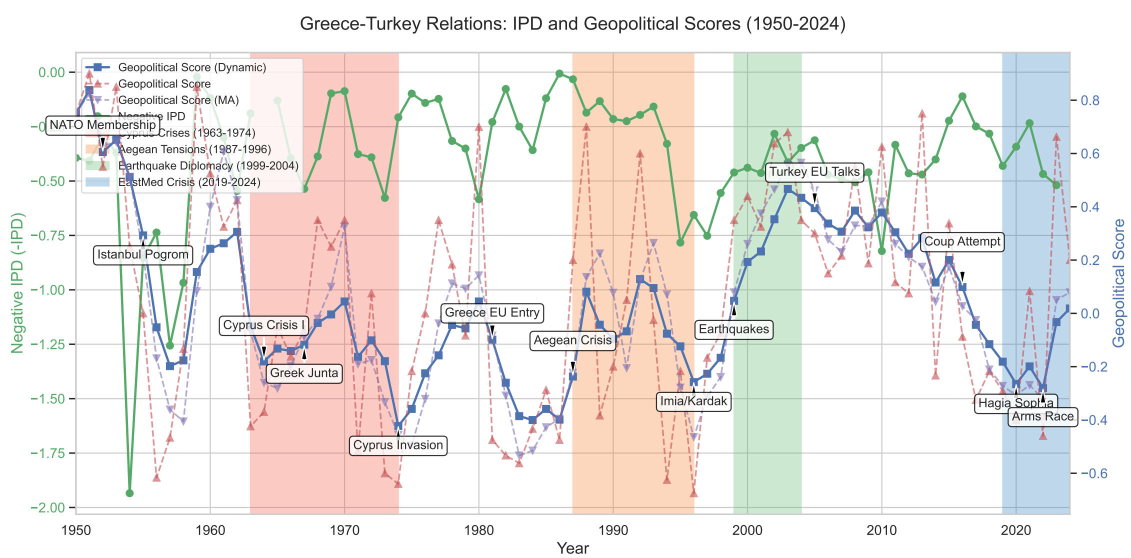
FIGURE B3. India-Pakistan: Geopolitical Scores vs. UN Voting Alignment, 1950–2024



Notes: Despite four wars and persistent hostility, India and Pakistan exhibit similar UN voting patterns (IPD between −0.6 and −0.8) due to shared Non-Aligned Movement membership and Global South solidarity. Our measure captures the bilateral conflict dynamics that render normal trade relations impossible.

The India-Pakistan case (Figure B3) exposes a critical flaw in voting-based measures. Despite their status as archrivals—with four wars (1947, 1965, 1971, 1999) and minimal bilateral trade due to active hostilities—their UN voting similarity remains relatively high (IPD fluctuating between −0.6 and −0.8). This paradox arises because both nations, as Non-Aligned Movement members and developing countries, vote similarly on decolonization, development issues, and Global South concerns. Our measure correctly captures severe bilateral deterioration during wars (scores dropping to −0.4), the brief improvement following the Simla Agreement, and the persistent hostility that precludes normal trade relations. The 2021 Line of Control ceasefire registers as a modest improvement, accurately reflecting tentative trade discussions.

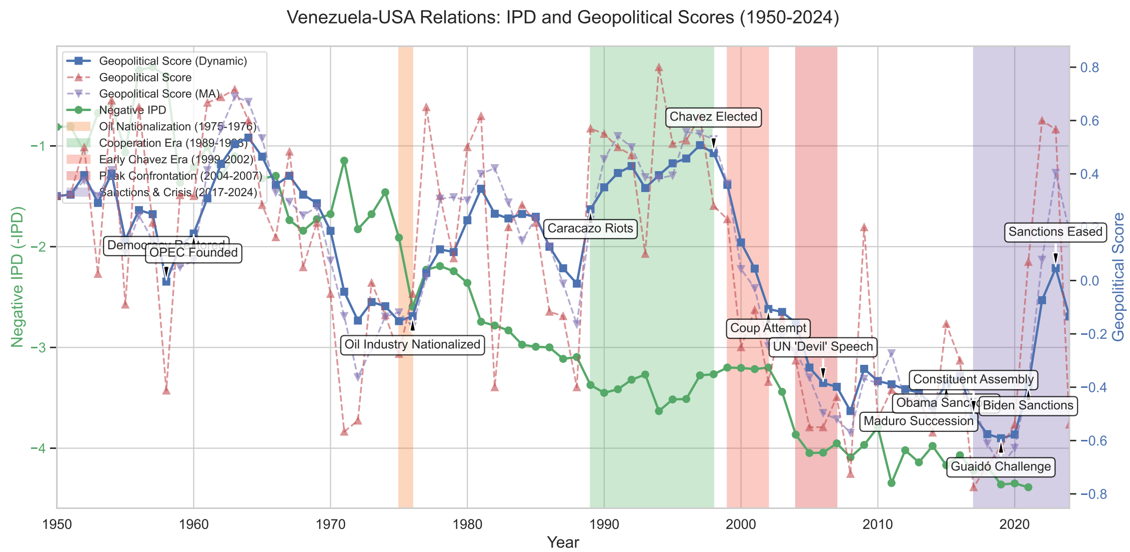
FIGURE B4. Greece-Turkey: Geopolitical Scores vs. UN Voting Alignment, 1950–2024



Notes: Despite NATO alliance, these countries experience severe bilateral crises invisible in UN voting patterns (IPD near −0.8). Our measure captures trade-disrupting tensions including the Cyprus invasion and Eastern Mediterranean disputes.

The Greece-Turkey relationship (Figure B4) further illustrates the inadequacy of voting measures. As NATO members, both countries vote with the Western bloc on most UN resolutions, maintaining high voting similarity (IPD around −0.8) throughout our sample period. Yet this masks dramatic bilateral volatility: the Cyprus invasion (1974) that severed trade relations, the Imia/Kardak crisis (1996) that brought the countries to the brink of war, and ongoing Eastern Mediterranean tensions over energy resources. Our measure captures these trade-disrupting episodes—scores plummeting to −0.4 during Cyprus crises—as well as the remarkable "earthquake diplomacy" (1999) when mutual disaster assistance temporarily normalized trade relations (scores reaching +0.3). The current arms race and energy disputes (2019–2024) register clearly in our measure while leaving the IPD unchanged.

FIGURE B5. Venezuela-USA: Geopolitical Scores vs. UN Voting Alignment, 1950–2024

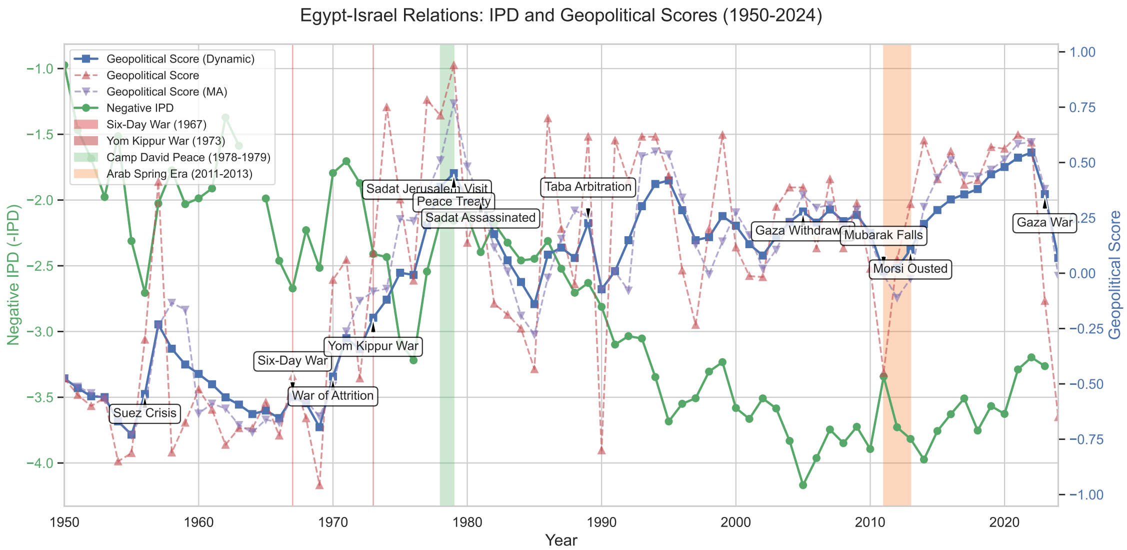


Notes: IPD fails to capture Venezuela's role as a major U.S. oil supplier during 1989–1998. Our measure accurately reflects the economic partnership that made Venezuela the United States' third-largest oil supplier before ideological realignment severed trade relations.

The Venezuela-USA relationship (Figure B5) demonstrates how voting patterns overlook crucial economic partnerships. During the cooperation era (1989–1998), Venezuela served as the United States' third-largest oil supplier, with bilateral trade exceeding \$30 billion annually. Yet the IPD shows persistent divergence throughout this period (around −3.0), failing to distinguish deep economic integration from the current sanctions regime. Our measure accurately captures this transformation: high cooperation scores (+0.4) during the oil partnership years, gradual deterioration under Chávez as Venezuela redirected oil exports to China, and collapse to −0.6 under comprehensive sanctions that virtually eliminated bilateral trade. The 2024 sanctions easing, motivated by global oil market concerns, registers as modest recovery in our measure while remaining invisible in voting patterns.

The Egypt-Israel relationship (Figure B6) provides the starkest validation of our approach. The Camp David Accords (1979) transformed former enemies into trading partners, with bilateral trade growing from zero during the embargo years to over \$2 billion annually, including crucial natural gas agreements. Our measure captures this revolution: scores improving from −0.7 during wars to +0.6 following peace, then stabilizing around +0.3 for the "cold peace" that nonetheless sustains significant economic exchange. The IPD entirely misses this transformation, remaining around −2.5 throughout due to Egypt's continued Arab League membership and obligatory support for Palestinian resolutions.

FIGURE B6. Egypt-Israel: Geopolitical Scores vs. UN Voting Alignment, 1950–2024



Notes: The Camp David Accords fundamentally transformed bilateral trade despite unchanged UN voting patterns. Our measure captures the shift from total embargo to $2 billion in annual trade, while IPD remains static due to Egypt's Arab League obligations.

This disconnect—voting as adversaries while trading as partners—epitomizes why bilateral event measures are essential for understanding trade flows.

These validation cases reveal systematic patterns establishing our measure's superiority for trade analysis: (1) shared multilateral alignments mask bilateral hostilities that prevent trade (India-Pakistan, Greece-Turkey); (2) ideological voting divergence obscures deep economic integration (Venezuela-USA during the oil partnership era); (3) institutional voting obligations conceal fundamental relationship transformations that reshape trade (Egypt-Israel post-Camp David). Our event-based approach captures the bilateral realities—wars, sanctions, peace treaties, energy partnerships—that determine whether and how much countries trade, providing the precise measurement necessary for identifying causal effects of geopolitical alignment on economic exchange.

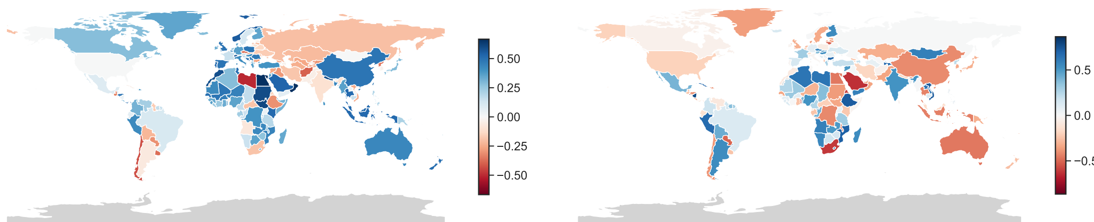
B.2.2. Geographic Validation Through Maps

We validate our measure's ability to capture geopolitical dynamics by examining three pivotal moments in great power competition: Cold War bipolarity (USA-USSR, 1980), emerging multipolarity (USA-China, 2019), and contemporary regional conflict (Ukraine-Russia, 2024).

The 1980 maps (Figure B7) exhibit textbook Cold War geography: near-perfect mirror images confirming zero-sum competition. The United States dominates NATO Europe, Pacific allies, and the Western Hemisphere, while the USSR controls Eastern Europe,

FIGURE B7. Cold War Bipolarity: USA vs. USSR, 1980

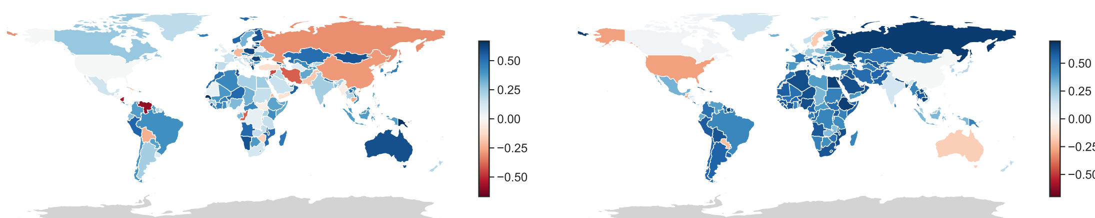
A. United States, 1980 B. Soviet Union, 1980



Cuba, Vietnam, Ethiopia, and Afghanistan. Countries displaying positive relations with one superpower show negative relations with the other—validating our measure's ability to capture mutually exclusive alignment. Notable exceptions such as India and Egypt correctly reflect Non-Aligned Movement membership despite their practical tilts.

FIGURE B8. Emerging Multipolarity: USA vs. China, 2019

A. United States, 2019 B. China, 2019

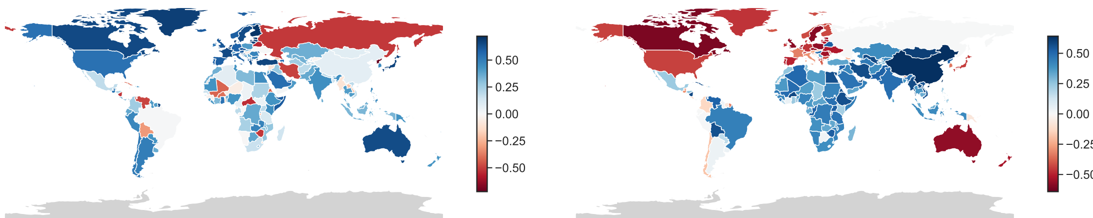


The 2019 comparison (Figure B8) reveals transformed competition patterns. While the United States maintains traditional alliances (NATO, Japan, Australia), sharp bipolar divisions have dissolved. China achieves positive relations across most of Africa and Southeast Asia through economic engagement rather than military alliances. Crucially, many countries maintain positive relations with both powers—the "connector states" that enable continued globalization despite strategic rivalry. China's most negative scores concentrate among U.S. treaty allies, while the United States shows deteriorated relations primarily with Russia, Iran, and Venezuela.

The 2024 Ukraine-Russia maps (Figure B9) demonstrate how regional conflicts generate global polarization. Ukraine achieves unprecedented Western alignment—exceeding even U.S. levels across NATO members—reflecting wartime solidarity. Russia faces near-total isolation from developed democracies while maintaining positive relations with China, India, and parts of Africa resistant to Western pressure. The stark geographic clustering—democratic alignment with Ukraine versus authoritarian and non-aligned support for Russia—validates our measure's sensitivity to how regional crises restructure global alignments. Belarus and Central Asian states' positioning accurately reflects their

FIGURE B9. Regional Conflict Polarization: Ukraine vs. Russia, 2024

A. Ukraine, 2024 B. Russia, 2024



delicate balance between historical ties and sanctions pressure.

Advantages over Existing Measures. Our event-based approach offers three key advantages over existing measures of bilateral geopolitical relations: universal coverage across countries and time, precision in capturing the timing and intensity of bilateral dynamics, and comprehensive measurement from maximum conflict to maximum cooperation.

Existing literature predominantly relies on UN voting similarity to achieve broad coverage (Signorino and Ritter 1999; Bailey, Strezhnev, and Voeten 2017). However, UNGA voting primarily reflects positions on multilateral issues rather than bilateral dynamics, resulting in measures that exhibit greater stability but less responsiveness to bilateral relationship changes (Broner et al. 2025b). Figure 1 illustrates this limitation: while the negative Ideal Point Distance (Bailey, Strezhnev, and Voeten 2017) broadly tracks our measure's trajectory, it fails to capture critical inflection points including the détente period and post-Crimean deterioration.

Our measure also complements categorical approaches that classify relationships using discrete indicators such as *Strategic Rivalry* (Thompson 2001; Aghion et al. 2019), *Sanctions* (Ahn and Ludema 2020; Felbermayr et al. 2021), *Formal Alliance* (Gibler 2008), and *Treaties* (Broner et al. 2025b). While these binary classifications capture important institutional milestones, they necessarily focus on specific relationship thresholds rather than continuous evolution. Our framework incorporates these landmark events—military rivalries, alliance formations, treaty signings—while situating them within a broader spectrum of bilateral interactions.

B.2.3. Statistical Validation

Beyond the narrative evidence presented above, we provide statistical validation of our measure's superiority over existing approaches. Drawing on comprehensive econometric analysis from Fan (2025), we demonstrate that our event-based measure captures economically meaningful variation in economic growth.

Using local projections with country fixed effects, Fan (2025) finds that a one-standard-deviation improvement in geopolitical relations increases GDP per capita by 9.6 log points over 25 years. These persistent effects operate through multiple reinforcing channels—enhanced political stability, increased investment, expanded trade, and productivity gains. Across the sample, geopolitical factors generate GDP variations ranging from −35% to +30%, with developing nations facing particularly severe penalties from international isolation.

Comparison with UN Voting Measures. The most striking validation emerges from comparing our measure with UN General Assembly voting patterns, the predominant approach in existing literature. When Fan (2025) implements identical growth specifications using the Ideal Point Distance (IPD) measure from Bailey, Strezhnev, and Voeten (2017), the results prove unambiguous: UN voting alignment generates no statistically significant effects on economic growth. Using country fixed effects—essential for causal identification—the impulse responses remain near zero throughout a 25-year horizon, with confidence intervals consistently spanning zero. In contrast, our event-based measure produces robust and persistent growth effects, with a one-standard-deviation improvement in geopolitical relations increasing GDP per capita by 9.6 log points over 25 years.

This stark divergence has a clear statistical explanation. UN voting patterns exhibit minimal within-country variation over time, providing insufficient identifying variation for panel estimation. The failure of voting measures extends beyond aggregate effects: even bilateral alignment with the United States—presumably the most economically relevant voting pattern—yields null results when subjected to rigorous panel identification.

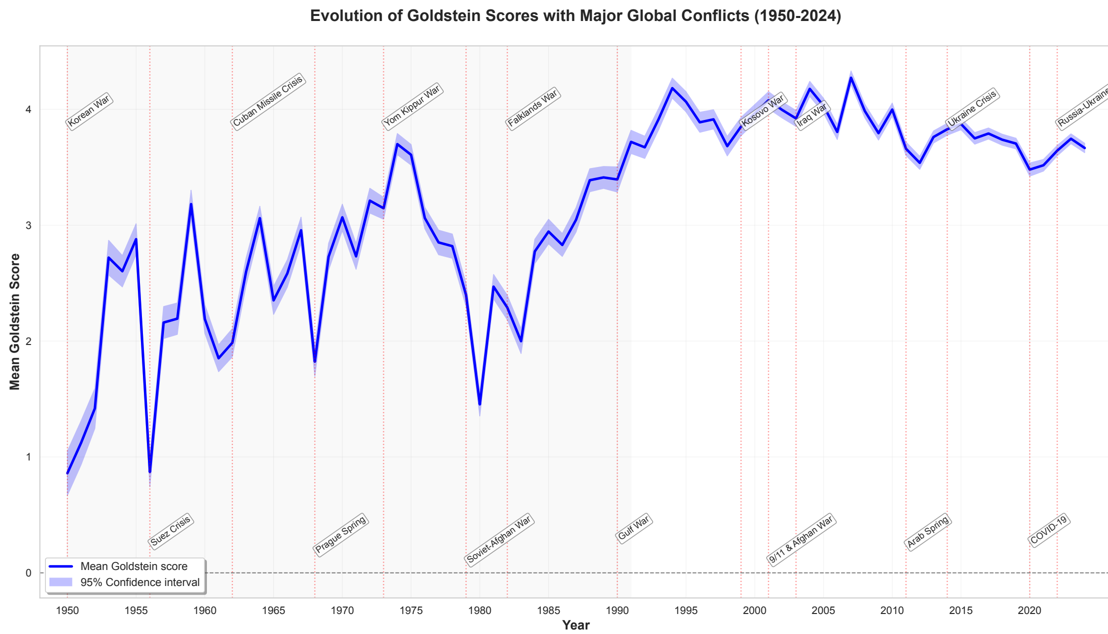
Disentangling Democracy Effects. Our measure enables precise decomposition of political and economic channels affecting growth. Fan (2025) demonstrates that when democracy and geopolitical relations are jointly estimated, democracy's short-run growth effect (0–5 years) virtually disappears—falling from 3.0 log points to near zero—indicating that these immediate benefits operate through improved international relations. However, democracy's long-run effect persists at two-thirds of its original magnitude even after controlling for geopolitics, reflecting additional gains from domestic institutional improvements.

Sanctions as a Subset of Geopolitical Relations. Statistical horse-race specifications reveal that sanctions constitute a subset rather than an independent dimension of geopolitical relations. When Fan (2025) jointly estimates both measures, geopolitical relations maintain their full economic and statistical significance, while the sanctions effect diminishes by 40% and loses significance after year 8.

B.3. Evolution of Global Geopolitical Events

While Section 2.3 examines trade-weighted geopolitical alignment, this appendix documents the underlying evolution of geopolitical event scores globally and across UN geographical regions.

FIGURE B10. Global Mean Goldstein Scores with Major Conflicts, 1950–2024



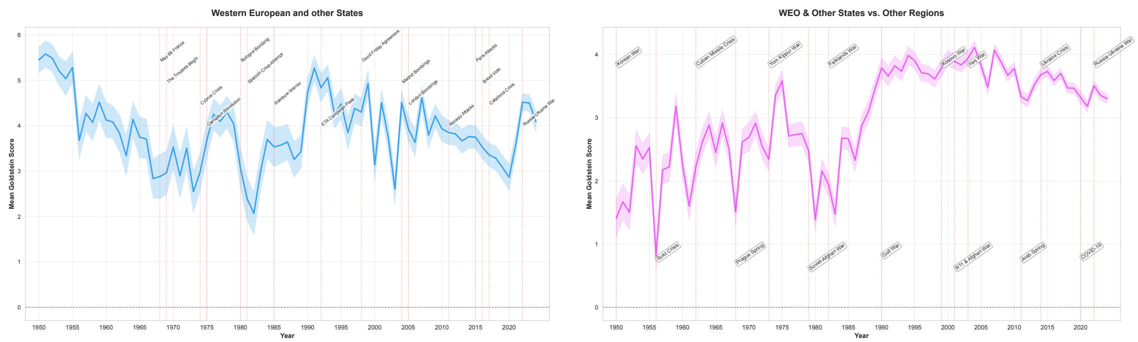
Notes: Mean Goldstein scores across all bilateral country pairs with 95% confidence intervals. Vertical lines indicate major international conflicts. Scores range from −10 (maximum conflict) to +10 (maximum cooperation). Shaded region denotes the Cold War period (1950–1991).

Figure B10 reveals the secular evolution of global geopolitical relations over seven decades. The Cold War period (1950–1991) exhibits persistently low cooperation levels, with mean scores oscillating between 1 and 3, punctuated by sharp deteriorations during major crises—the Korean War (1950), Suez Crisis (1956), Cuban Missile Crisis (1962), and Soviet-Afghan War (1979). The end of the Cold War marks a structural break: mean scores surge from 2.5 in 1989 to above 3.5 by 1993, subsequently stabilizing at this elevated level through the 2000s. This period of hyper-globalization coincides with historically high cooperation scores and reduced variance, reflecting expanded multilateral institutions and deepening economic integration. Since 2010, however, scores have plateaued and begun declining, with the Arab Spring (2011), Ukraine Crisis (2014), and COVID-19 pandemic (2020) marking inflection points toward renewed fragmentation. The Russia-Ukraine War (2022) drives scores to their lowest level since the 1980s, confirming the end of the post-Cold War cooperative equilibrium.

Figure B11 examines Western European and Other States (WEO), the core of the post-

FIGURE B11. Geopolitical Scores for Western European and Other States

A. Western European and Other States   B. WEO States vs. Other Regions



Notes: Panel (a) shows intra-regional scores among Western European and Other States. Panel (b) shows inter-regional scores between WEO states and all other regions. Shaded areas represent 95% confidence intervals.

war liberal order. Panel (a) demonstrates remarkably stable intra-regional cooperation, with scores consistently above 3 and reaching peaks near 5 during periods of institutional deepening—the Single European Act (1986), Maastricht Treaty (1992), and Eastern enlargement (2004). Notable disruptions include the Cyprus Crisis (1974), which temporarily depressed scores to 2.5, and the dual shocks of Brexit (2016) and the Russia-Ukraine War (2022), which have driven scores below 3 for the first time since the 1980s. Panel (b) reveals that WEO states' relationships with other regions broadly track global patterns while maintaining systematically higher baseline cooperation—typically 0.5–1.0 points above the global mean. The divergence since 2015 between stable intra-WEO cooperation and deteriorating WEO-other relations provides stark evidence of selective decoupling: Western states maintain deep integration among themselves while political relationships with the Global South and non-aligned states deteriorate.

FIGURE B12. Regional Geopolitical Scores: Eastern Europe and Asia-Pacific

A. Eastern European States   B. Asia-Pacific States

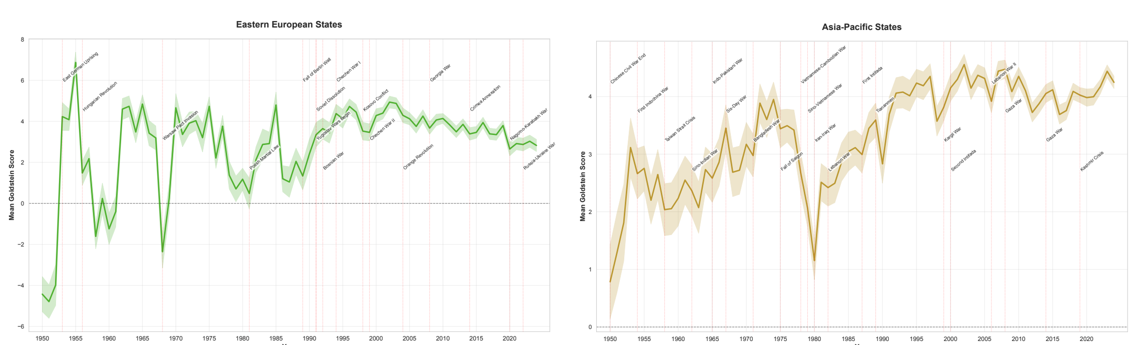
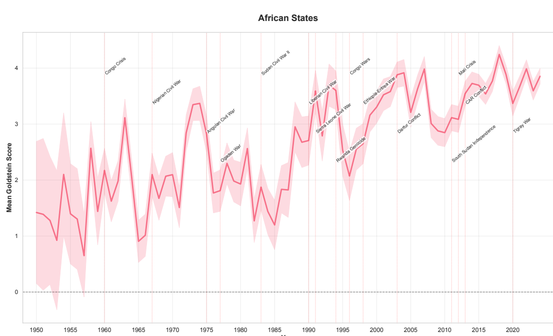


Figure B12 contrasts two regions with divergent trajectories. Eastern European states

(Panel a) exhibit the most extreme volatility in our sample, with scores swinging from −5 during the Hungarian Revolution (1956) to above 7 immediately following German reunification (1990). The Soviet collapse initiates a decade of negative scores as Yugoslavia disintegrates and post-Soviet conflicts erupt. EU accession drives steady improvement from 2000 to 2014, with scores stabilizing around 4. The Crimean annexation (2014) triggers renewed deterioration, while the 2022 invasion produces the sharpest decline in any region, with scores plummeting near zero—effectively marking the end of post-Cold War European integration. Asia-Pacific states (Panel b) display a contrasting pattern of steady improvement from hostile relations in 1950 (Chinese Civil War, Korean War) to consistent cooperation above 4 by 2000. This trajectory reflects sequential conflict resolution—the Vietnam War's end (1975), Sino-Vietnamese normalization (1991), and ASEAN expansion—combined with deepening economic integration. Unlike other regions, Asia-Pacific scores remain stable post-2010 despite U.S.-China tensions, suggesting that economic interdependence continues to moderate political conflicts.

FIGURE B13. Regional Geopolitical Scores: Africa and Latin America

A. African States



B. Latin American States

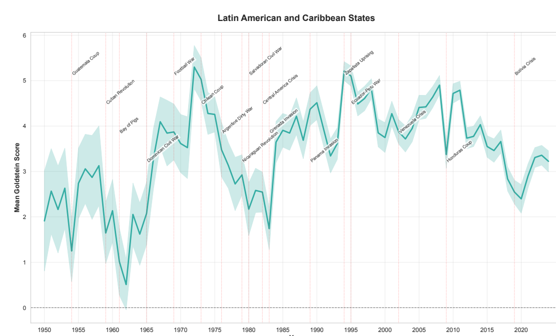


Figure B13 documents geopolitical evolution in the Global South. African states (Panel a) show persistent improvement from below 1 during the decolonization conflicts of the 1950s–1960s to above 4 by 2020. The upward trend is punctuated by severe regional crises—the Nigerian Civil War (1967), Angolan Civil War (1975), Rwandan Genocide (1994), and Congo Wars (1996–2003)—each causing temporary score collapses. The post-2000 acceleration reflects both conflict resolution (the conclusion of Sierra Leone and Liberian civil wars) and expanding South-South cooperation, particularly with China. The Tigray War (2020) marks the first major reversal in two decades. Latin American states (Panel b) display a distinct pattern of high volatility around a stable mean of 3–4. Major disruptions correspond to ideological conflicts—the Cuban Revolution (1959), Chilean coup (1973), Central American crises (1980s)—and economic shocks, particularly the debt crisis (1982) that produces the sharpest decline. The post-2000 period shows unusual stability despite political polarization, suggesting that regional economic integration through Mercosur and the Pacific Alliance provides resilience against bilateral political tensions. The decline since 2019 reflects both Venezuela crisis spillovers and COVID-19's disproportionate impact on the region.