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Adapting to change: macroeconomic shifts and policy responses

Recent evolutions in the global trade system: from integration to strategic realignment

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Recent Evolutions in the Global Trade System: From Integration to Strategic Realignment

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Abstract

This paper analyzes recent structural transformations in the global economic system, emphasizing the increasing geopolitical fragmentation and strategic realignments driven primarily by technological competition. We focus on China's rise as a technological competitor. We introduce novel quantitative metrics such as the Export Similarity Index, the Partner Similarity Index, and the Ideal Point Distance to examine global shifts in trade patterns and sectoral competition. Our findings highlight competitive pressures in critical sectors, including machinery and advanced manufacturing, with implications for geopolitical alignment and economic stability. We explore strategic policy responses by major economies, with a particular focus on the evolving policy stance of the Euro Area, and assess emerging vulnerabilities stemming from changing patterns of import dependence. We conclude by discussing the broader implications of these developments for economic resilience and policy strategy in an increasingly fragmented global economy.

1 Introduction

The global economy is undergoing significant change, with rising geopolitical fragmentation, shifts in trade patterns, and growing technological competition. This paper introduces new quantitative measures to track these trends and offers tools to better understand the forces driving them.

We begin by documenting China's sharp transition from a supplier of low-cost manufactured goods to a strategic competitor in advanced technologies. This shift

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has significantly increased competitive pressure from China in high-tech sectors traditionally led by advanced economies, such as advanced manufacturing, machinery, digital technologies, and semiconductors. To assess and illustrate this evolution, we adapt the established Export Similarity Index (ESI) and introduce a new measure, the Partner Similarity Index (PSI). The ESI measures the extent of global competition between two countries based on the similarity of their export profiles, while the PSI captures how closely one country's exports align with another's import demand—reflecting both competition and complementarity in trade.

We apply these indices to both traditional trade flows and patent data, allowing us to analyze competition in production (via trade) and innovation (via patents and technological output) (de Soyres et al., 2025b; de Soyres, Fisgin, and Santacreu, 2025). The results show a clear pattern of China converging technologically with advanced economies, with strong competitive overlaps in key European markets. A notable methodological advantage of our indices is that they rely on the global sectoral composition of trade rather than bilateral trade linkages, thereby mitigating biases stemming from country-pair-specific factors such as trade agreements, political influences, or idiosyncratic policy interventions. This approach provides a clearer, more fundamental view of comparative advantage and sectoral specialization.

Our empirical analysis identifies critical sectors such as advanced manufacturing, machinery, semiconductors, transport equipment, and other strategic technologies in which European firms increasingly encounter heightened competitive pressures due to China's accelerated technological upgrading.

We then turn to the recent rise in geopolitical tensions, which is increasingly driving trade and investment fragmentation along geopolitical lines. Together with technological rivalry, these shifts are reshaping global trade patterns and strategic alignments. For the Euro Area, the external environment has become even more challenging following Russia’s invasion of Ukraine, which has deepened geopolitical divides, increased energy insecurity, and further disrupted global trade networks. To examine these developments empirically, we use gravity estimation techniques. Our framework incorporates quantitative indicators such as the Ideal Point Distance (IPD), developed by Bailey, Strezhnev, and Voeten (2017), which captures divergence in geopolitical alignment based on UN voting patterns. This allows us to quantify the strategic uncertainty associated with both China’s technological rise and Russia’s geopolitical actions. Following the methodology of Gopinath et al. (2025), as extended by Airaudo et al. (2025), we apply Poisson Pseudo-Maximum Likelihood (PPML) estimation to assess how these geopolitical shocks have affected global trade flows.

Our regression results show that trade decoupling is selective rather than broad-based, hitting technology-intensive sectors vital to Europe’s economic stability and future growth. Specifically, Euro Area countries experience smaller trade declines with distant geopolitical partners than the global average, reflecting resilience from their deep integration in global value chains.

However, our analysis also reveals a clear Euro Area shift away from nonaligned or geopolitically ambiguous partners, especially in high-tech sectors. This selective fragmentation is most pronounced in strategically sensitive industries like semiconductors and advanced manufacturing—sectors highly vulnerable to competition from China's technological rise. Additionally, supply-chain disruptions stemming from geopolitical events, notably Russia's invasion of Ukraine, have further exacerbated these competitive pressures, substantially increasing import concentration within the Euro Area. This growing reliance on a limited set of critical suppliers heightens Europe's strategic vulnerabilities.

Building on the evidence of increased geoeconomic fragmentation, we further document and analyze the rise in strategic and distortive policy interventions adopted both collectively by the European Union and individually by member states. Using detailed data from Global Trade Alert (Evenett et al. 2024), we examine the frequency, nature, and strategic intent of these policy measures. We categorize interventions into two main types. Firstly, external EU-level collective interventions—including anti-coercion measures, foreign investment screenings, and export controls—are specifically designed to mitigate geopolitical and security threats that have intensified due to increased strategic vulnerabilities. Secondly, member-state level interventions tend to reflect more diverse and complex national economic priorities, often manifesting as state aid, targeted subsidies, and industry-specific regulatory frameworks directly addressing domestic economic pressures.

Our analysis reveals a significant shift towards enhanced EU-level coordination, particularly evident through the marked increase in collective interventions since 2018. This evolution is largely a strategic response to the technological ascension of China and escalating global trade tensions, signaling a deliberate move away from fragmented national policies towards cohesive, unified EU strategies. The introduction and deployment of critical policy tools such as the Anti-Coercion Instrument (ACI) and the Carbon Border Adjustment Mechanism (CBAM) epitomize this strategic reorientation aimed at managing the vulnerabilities arising from selective decoupling and heightened competition with China. However, despite the growing centralization of policy measures, the inherent diversity of member-state economic objectives presents an ongoing challenge for policy coherence. Our findings underscore the persistent need for improved intra-EU coordination mechanisms to effectively navigate geoeconomic fragmentation, mitigate strategic vulnerabilities, and enhance long-term economic resilience.

To further investigate these strategic vulnerabilities, we analyze import concentration in the Euro Area using the Herfindahl–Hirschman Index (HHI) to identify supply chain risks. Our results show high concentration in key advanced technology products — especially computing equipment, semiconductors, energy tech, turbo propellers, smartphones, uranium, and nuclear reactor parts. Turbo propellers and Automatic Data Processing (ADP) machine components are particularly vulnerable. These findings underscore the need for targeted policies to diversify suppliers and strengthen economic resilience.

Comparing the Euro Area with the United States, our findings indicate distinctly different patterns of decoupling. While the U.S. has broadly reduced trade reliance on geopolitically distant partners, notably China, as part of its comprehensive decoupling strategy, the Euro Area demonstrates a more nuanced approach, maintaining substantial economic ties with China, particularly in high-tech sectors. This selective strategy reflects Europe’s complex balancing act between economic interests and geopolitical risk management. Additionally, despite high import concentration in certain strategically vital technologies such as turbo propellers and automatic data processing machines, the Euro Area still maintains a comparatively diversified import structure relative to the United States. Nonetheless, both regions exhibit significant vulnerabilities in critical advanced technology supply chains, suggesting that strategic diversification and targeted policies are necessary to bolster economic resilience and mitigate potential disruptions arising from geopolitical tensions.

Based on our findings and the growing protectionist stance of the United States, we identify three key strategic challenges for the Euro Area:

First, strengthening the Single Market is a crucial opportunity amid external geopolitical pressures. To quantify internal barriers to full integration, we use industry-level bilateral trade data and PPML estimation to measure internal and external trade barriers. Controlling for geography, economic size, and trade history, we isolate remaining internal frictions caused by regulatory differences, national standards, infrastructure gaps, and incomplete policy harmonization. Our results show persistent internal trade barriers equivalent to tariffs of 55–70% in strategic sectors like Vehicles, Metals, and Food. These barriers limit competitiveness and economic resilience, highlighting the urgent need for harmonized standards, coordinated regulations, and improved infrastructure.

Second, considering shifting geopolitics and U.S. restrictions, the European Union might be tempted to expand economic and technological ties with China. However, our analysis reveals growing technological competition between European and Chinese firms, especially in advanced manufacturing and machinery. This rivalry creates risks of increased competitive pressure, loss of technological leadership, and strategic misalignment, which require careful policy management if closer cooperation with China is pursued.

Our findings highlight significant challenges for monetary policy in the Euro Area stemming from geoeconomic fragmentation and strategic realignment. Countries unevenly exposed to geopolitically distant suppliers face asymmetric risks of supply-chain disruptions, complicating the unified implementation of monetary policy. This heterogeneity poses challenges similar to those discussed by Kalemli-Özcan, Soylu, and Yıldırım (2025), who show how international production networks and sectoral interdependencies can amplify the macroeconomic effects of tariff and trade shocks, influencing inflation dynamics and monetary policy effectiveness. Their analysis shows that monetary policy reactions to geopolitical shocks must account explicitly for the global interconnectedness of production structures, underscoring the need for coordinated policy responses across different economic jurisdictions. Thus, for the Euro Area, enhancing capital market integration and policy coordination becomes increasingly critical to effectively manage inflationary pressures arising from fragmented and geopolitically vulnerable trade networks.

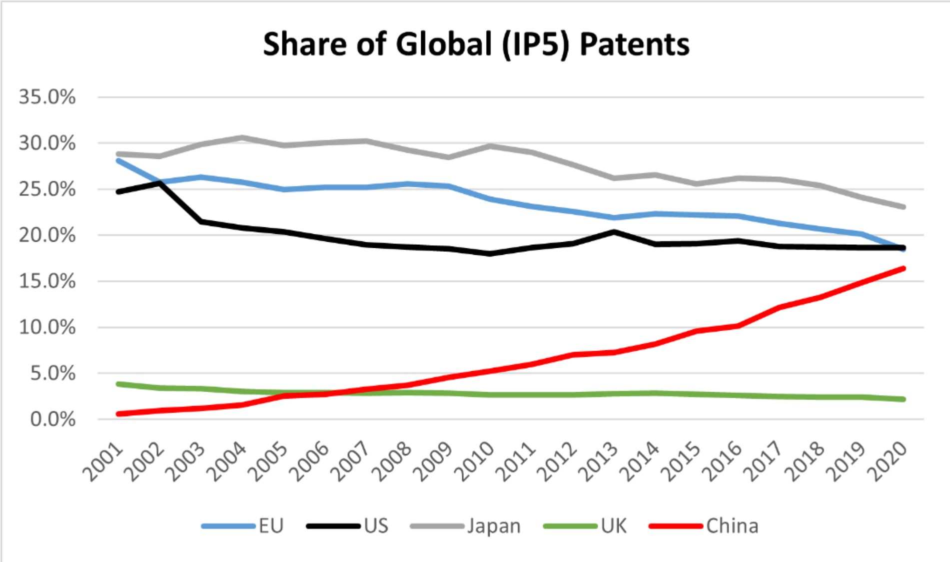
The remainder of the paper is structured as follows. Section 2 provides empirical evidence documenting China’s technological emergence and its strategic implications for global and EU-specific trade dynamics. Section 3 employs gravity-model analysis to quantify selective geoeconomic fragmentation, emphasizing sector-specific impacts and import concentration vulnerabilities facing European industries. Section 4 analyzes strategic and distortive policy interventions undertaken by the EU and its member states, categorizing them into external measures to address geopolitical risks and internal responses reflecting diverse national economic priorities. Section 5 examines broader global patterns of decoupling, strategic realignment, and the role of geopolitical distance in shaping trade flows. Section 6 explores import concentration and strategic vulnerabilities, assessing the risks posed by dependency on geopolitically distant suppliers, particularly in critical technology and mineral sectors. Section 7 discusses broader strategic implications and future policy challenges for the Euro Area, highlighting key priorities, implications of the documented trends for euro area inflation dynamics, and providing suggestions on intra-EU policy coordination to manage external geopolitical pressures and internal market fragmentation. Section 8 concludes.

2 China’s Technological Rivalry and Implications for Trade and Patent Flows: Insights for the Euro Area

China’s integration into the global economy began as a supplier of low-cost, labor-intensive manufactured goods, building strong ties with advanced economies. Over the past decade, however, China has moved up the value chain, increasing its presence in more advanced products and technologies.

This shift—known as the Second China Shock—now challenges the Euro Area’s technological leadership and global competitiveness. Chart 1, constructed using OECD data on IP5 patents (patents filed in at least two jurisdictions, thereby capturing relatively high-quality innovations), clearly illustrates China’s rapid ascent toward the global innovation frontier. From a minimal share at the turn of the century, China's proportion of high-quality global patent filings has surged dramatically, reflecting its transformation from a manufacturing powerhouse to a significant global innovator. From a low-cost supplier with limited innovation capacity in the early 2000s, China has transformed into a direct competitor to advanced economies in both trade and technological innovation.

Chart 1
Share of Global IP5 Patents (2001- 2020)



Sources: OECD.
Notes: IP5 patents are patent that are usually considered of high quality , as they have been filed in at least two Intellectual Property offices worldwide, one of which includes Europe, China, Japan, Korea and the U.S.

To study this transformation—particularly the sharp shift in the sectoral composition of China's trade and innovation—we draw on the methodology of de Soyres et al. (2025b) and de Soyres, Fisgin, and Santacreu (2025), introducing two quantitative indicators: the Export Similarity Index (ESI) and the Partner Similarity Index (PSI). These metrics capture the degree of competitive overlap between the euro area and China in both exports and patenting, highlighting China's evolution from economic partner to technological rival.

Formally, the ESI between countries i and j is given by:

$$\text{ESI}_{ij} = \sum_k \min\left(\frac{X_{ik}}{\sum_k X_{ik}}, \frac{X_{jk}}{\sum_k X_{jk}}\right)$$

where X_{ik} denotes exports from country i in sector k.

The ESI measures how closely two countries' export profiles match across different product sectors. A higher ESI means countries export similar goods, indicating stronger direct competition in global markets. As will be clear below, an increasing ESI between China and Euro Area countries signals growing competition in key technology sectors where Europe has traditionally been strong.

When applied to patents, the ESI measures how similar two countries' patent portfolios are across technological fields. In that context, "exports" refer to a country's patented technologies, reflecting its areas of innovation. A higher Patent ESI means both countries focus on similar technologies, signaling rising technological rivalry and more direct competition in advanced innovation areas.

Complementing this measure, the Partner Similarity Index (PSI) assesses how closely a country's export basket aligns with another country's import needs. Formally:

$$\mathrm{PSI}_{ij} = \sum_k \min\left(\frac{M_{ik}}{\sum_k M_{ik}}, \frac{X_{jk}}{\sum_k X_{jk}}\right)$$

where M_{ik} represents imports of country i and X_{jk} exports of country j in sector k.

The PSI captures how closely the exports of one country match the import demands of another across different product sectors. A rising PSI indicates greater alignment between the goods a country exports (to all destinations) and those its trading partners import from all source countries. This metric helps capture the relationship between an exporter's sectoral specialization and an importer's sectoral dependencies, offering deeper insight into the factors driving international trade. In the context of this paper, a rising PSI between China and the Euro Area implies that China's export strategies have become increasingly aligned with European import patterns, reflecting strategic market penetration and intensifying competitive pressures on European firms.

The Patent Partner Similarity Index (Patent PSI) captures strategic decisions by firms regarding where to seek patent protection internationally, reflecting perceived competitive threats, interest for market access, or intentions toward strategic collaboration. Given the territorial nature of patents—where protection applies exclusively within the jurisdiction granting the patent—the Patent PSI is a measure of the strategic importance of different markets from an innovator's perspective. Specifically, an increase in the Patent PSI signals that the exporting country is actively patenting innovations in technological sectors that closely align with areas where the importing country maintains a competitive advantage or strategic relevance.

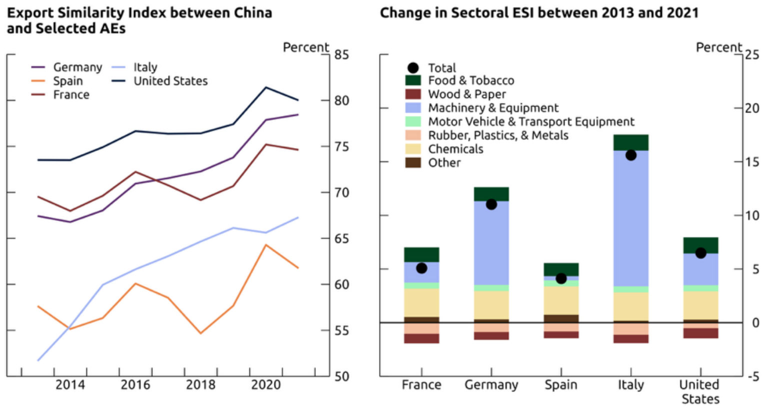
To be sure, the Patent PSI offers a nuanced perspective on firms' strategic behavior. Innovators in exporting countries typically secure patents in sectors where they are actively developing advanced technologies, strategically targeting jurisdictions that play pivotal roles in global technology markets. Such strategic patenting behavior emerges either from defensive motivations—due to perceived competitive threats posed by firms in the importing country—or from proactive ambitions, such as establishing market entry channels through licensing agreements, foreign direct investments, or expanded trade networks.[5] Consequently, a rising Patent PSI signals significant shifts in market dynamics, highlighting evolving competitive relationships and strategic alignments between countries in technologically critical sectors.

[5] For additional discussion, see https://www.stlouisfed.org/on-the-economy/2025/apr/understanding-china-technological-rise-patent-data.

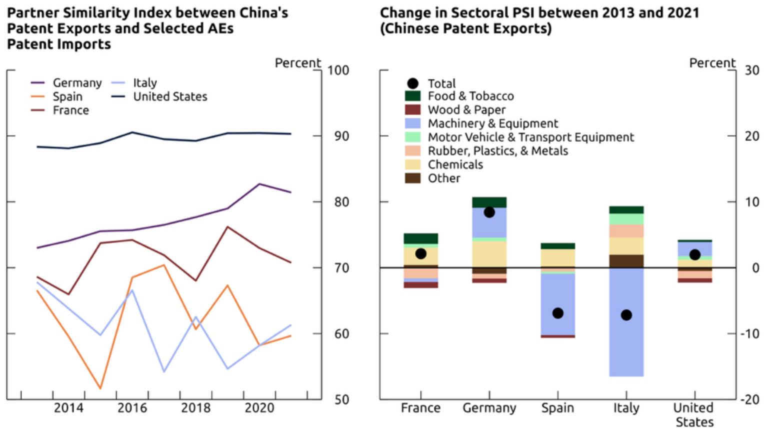
Chart 2

Patent Similarity Indices: Euro Area vs. China (2013- 2021)

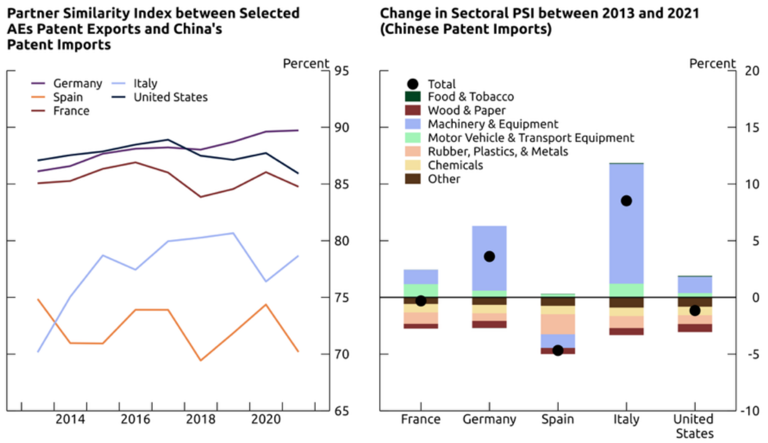
(a) Patent ESI Trends



(b) Patent PSI (Chinese Exports)



(c) Patent PSI (Chinese Imports)



Sources: UN Comtrade.
Notes: The chart shows patent similarity indices between 2013 and 2021. Industries are classified according to the International Standard Industrial Classification (ISIC), Revision 3 (2-digits). Panel (a) illustrates the Patent ESI, measuring overlaps between China's and the Euro Area's patenting activities globally. Rising values indicate growing direct competition in global technological markets. Panels (b) and (c) depict the Patent PSI from the perspective of China's exports and imports, respectively. An increase in PSI for exports (panel b) suggests China is increasingly patenting innovations that overlap strategically with areas of the Euro Area's competitive advantage. Conversely, the rising PSI for imports (panel c) indicates China's domestic market has become strategically important for European innovators, reflecting defensive patenting, market-entry ambitions, or increased strategic collaborations.

Chart 2(a) illustrates the Patent Export Similarity Index (ESI) trends between China and selected Euro Area countries from 2013 to 2021. The graph highlights significant increases in technological similarity, particularly pronounced in Germany, where the ESI rose from approximately 65% to nearly 80%. This increase indicates a growing overlap between German and Chinese technological specializations, suggesting intensifying direct competition in innovation-intensive sectors.

The primary driver of this technological convergence has been in machinery and equipment sectors, reflecting China's strategic industrial policies, notably *Made in China 2025*. This policy explicitly aims to upgrade domestic industries and achieve technological self-reliance in high-value sectors traditionally dominated by European firms. China's targeted investments and state-led initiatives in sectors such as advanced robotics, aerospace, and industrial automation have significantly enhanced its capabilities, enabling it to compete directly with traditionally strong European industries.

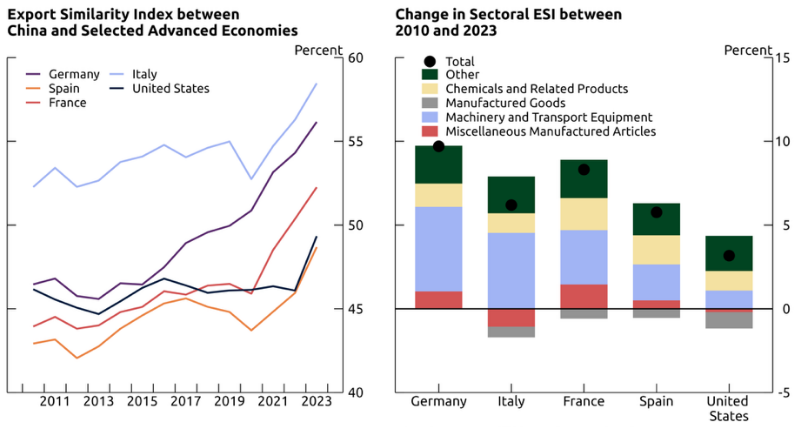
To pursue these goals, Chinese authorities mobilized a broad set of policies, including R&D subsidies, tax incentives, cheap credit provision via state banks, and preferential procurement. They also invested heavily in infrastructure, including ports, rail, highways, and energy production and distribution. As a result, firms like BYD in electric vehicles, CATL in lithium-ion batteries, and Huawei in telecoms have become global leaders through homegrown innovation.

Charts 2(b) and (c) complement this analysis by illustrating trends in the Partner Similarity Index (PSI) related to patents. According to recent analysis (de Soyres, Fisgin, and Santacreu 2025), a rising Patent PSI between China and Euro Area countries, particularly Germany, indicates China's increasing patent activity in sectors where Europe, especially Germany, has historically attracted significant international patent filings. This suggests two critical interpretations: First, European markets, particularly Germany, were traditional hubs for patenting due to their advanced technological infrastructure and strong market demand. Innovators from other countries typically patented their innovations in these sectors to secure intellectual property rights and ensure competitive access to lucrative European markets. Secondly, China's increased patent filings in these sectors demonstrate strategic intent to establish a stronger foothold, directly competing in innovation domains previously led by Europe. Conversely, chart (c), examining PSI trends between advanced economies' patent exports and China's patent imports, highlights Germany's continued prominence in supplying critical technologies aligned with China's strategic industrial priorities. Together, these findings illustrate a complex relationship where China simultaneously seeks to challenge European dominance in certain technologies while remaining dependent on Europe's advanced technological inputs.

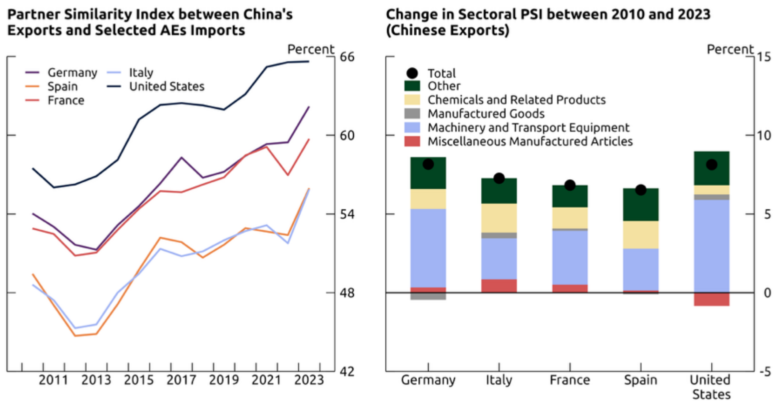
Chart 3

Trade Similarity Indices: Euro Area vs. China (2010–2023)

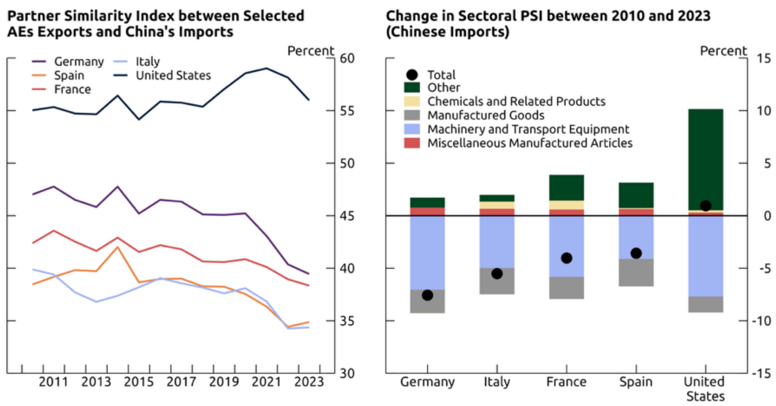
(a) Export Similarity Index (Merchandise)



(b) PSI - China’s Export vs AEs Imports



(c) PSI - AEs Export vs China’s Imports



Sources: UN Comtrade.
Notes: The chart shows trade similarity indices between 2010 and 2023. Industries are classified according to the Standard International Trade Classification (SITC) at 3-digits. Panel (a) illustrates the ESI for merchandise trade, capturing the overlap between China’s and the Euro Area’s global export structures. Rising values indicate growing direct competition in international merchandise markets. Panels (b) and (c) present the PSI from two complementary perspectives: China’s exports versus Advanced Economies’ (AEs) imports (panel b), and AEs’ exports versus China’s imports (panel c). Increasing PSI values for China’s exports (panel b) imply that China is exporting goods increasingly aligned with strategic sectors of the Euro Area’s import demand. Conversely, higher PSI values in panel (c) suggest that China’s domestic market has become strategically significant for Euro Area exporters, highlighting evolving competitive pressures and shifts in bilateral trade dynamics.

Chart 3 (a) extends the analysis to merchandise trade, showcasing ESI trends from 2010 to 2023. This chart highlights significant growth in export similarity between China and major Euro Area economies, particularly Germany and France. Germany, especially, has experienced a notable increase, reflecting the intensifying competition in sectors such as machinery and transport equipment—key industries traditionally central to European economic strength.

Charts 3 (b) and (c) offer additional insights using the PSI. Panel (b) compares China's merchandise exports to the import structures of selected advanced economies, highlighting the increased alignment between Chinese exports and strategic European market demands. The significant role of machinery and transport equipment underscores China's deliberate targeting of Europe's industrial base, intensifying competitive pressures in key sectors. Conversely, panel (c) examines exports from advanced economies relative to China's imports, illustrating strategic divergences and pinpointing sectors in which European economies have either lost market share or experienced declining Chinese demand. Crucially, the observed increases in China's ESI and PSI alignment with Euro Area import patterns may reflect China's deliberate policy-driven expansion of domestic production capacities rather than a mere reshuffling of trade partners. This interpretation aligns closely with strategic initiatives such as the "Made in China 2025" program, explicitly designed to strengthen domestic production capabilities, particularly within critical industries such as automotive manufacturing and advanced machinery, thereby directly challenging established European industries.

The stark evolution of ESI and PSI highlight growing technological convergence between China and the Euro Area, especially Germany. This means both are trading and innovating in many of the same high-value sectors, increasing competitive pressure on European firms. As a result, these firms may experience increased competitive pressures, potential constraints on returns from innovation, and more exposure to supply-chain disruptions, contributing to economic uncertainty. Moreover, there is significant variation among EU member states in their exposure to this competition, with Germany showing the highest levels of overlap and risk. The next section shifts focus to the recent rise in geopolitical tensions and examines how these have led to a realignment of trade flows.

3 Geoeconomic Fragmentation in the Euro Area

The global trading system has undergone a significant transformation in recent years, characterized by increased geoeconomic fragmentation along geopolitical bloc lines. Empirical studies quantifying geopolitical alignment through the United Nations General Assembly (UNGA) voting patterns have consistently documented the growing segmentation of trade flows post-2022. The Ideal Point Distance (IPD) framework, introduced by Bailey, Strezhnev, and Voeten (2017), has been widely used to measure geopolitical alignment. Recent applications by Gopinath et al. (2025), Aiyar et al. (2023), Aiyar, Presbitero, and Ruta (2023), and Campos, Freund, and Ruta (2024) underscore a growing segmentation of global trade, particularly in strategic sectors such as semiconductors, defense technologies, and energy.

Building upon these insights, Airaudo et al. 2025 refine the IPD measurement, introducing a novel alignment index, *seg*, which positions countries relative to geopolitical poles represented by the United States and China. This nuanced measurement emphasizes the importance of recent, broadly political voting patterns over historical or purely economic alignments.

We extend the framework from Airaudo et al. 2025 to investigate whether Euro Area (EA) trade fragmentation differs systematically from global trends. We first construct three geopolitical blocs by classifying countries based on their alignment relative to the United States and China, using their seg scores: a U.S.-aligned bloc, a China-aligned bloc, and a nonaligned group. Country pairs are then classified into three categories: (i) *within-bloc* pairs, where both countries belong to the same bloc; (ii) *between-bloc* pairs, where countries belong to opposing blocs; and (iii) *nonaligned* pairs, where at least one country is classified as nonaligned.[6]

To analyze fragmentation patterns across these categories, we estimate the following gravity regression model:

$$\begin{aligned} Y_{sdt} = \; & \beta_1(\text{BetweenBloc}_{sd} \times \text{Post}_t) + \beta_2(\text{Nonaligned}_{sd} \times \text{Post}_t) \\ & + \gamma_1(\text{BetweenBloc}_{sd} \times \text{Post}_t \times \text{EA}_{sd}) + \gamma_2(\text{Nonaligned}_{sd} \times \text{Post}_t \times \text{EA}_{sd}) \\ & + \delta_{sd} + \tau_{st} + \phi_{dt} + \varepsilon_{sdt} \end{aligned}$$

Here, Y_{sdt} denotes bilateral trade flows between countries s and d in year t. Post_t is a dummy variable capturing the post-invasion period (2022–2023). BetweenBloc_{sd} and Nonaligned_{sd} are dummy identifying between-bloc and nonaligned country pairs, respectively, while within-bloc pairs are the omitted benchmark category. The dummy EA_{sd} specifically identifies country pairs involving exactly one EA country. All regressions are estimated using Poisson pseudo-maximum likelihood (PPML), with standard errors clustered at the country-pair level Anderson, Larch, and Yotov 2018.[7]

Table 1 presents detailed empirical results based on four alternative IPD specifications used to derive the seg measures and construct the blocs: Baseline IPD (2021), IPD 2023, Economic IPD, and Post-1990 IPD. Panel A focuses on total goods trade, while Panel B isolates high-tech goods trade. The analysis of high-tech goods is particularly relevant because these sectors are at the forefront of the global technological competition, driven largely by China's rapid advancements in emerging technologies. High-tech industries also frequently intersect with national security issues and digital sovereignty concerns, making them particularly sensitive to geopolitical tensions.

[6] In the appendix A.1, we present the list of countries falling into each alignment category relative to Germany, a representative EA country.

[7] In Appendix A.2, we replicate the regression analysis using an alternative definition of the post-period, beginning in 2019 instead of 2022. The results confirm milder fragmentation between geopolitical blocs prior to 2022, but reveal early signs of decoupling from nonaligned countries, particularly in high-tech trade.

Table 1
Gravity Regression Results: Geoeconomic Fragmentation in Global and EA Trade

Panel A: Total Goods Trade

	Baseline IPD	IPD 2023	Economic IPD	Post-1990 IPD
Between Bloc × Post	-0.133**	-0.315***	-0.096**	-0.136***
	(0.057)	(0.074)	(0.056)	(0.058)
Nonaligned × Post	-0.030	-0.053	-0.019	-0.026
	(0.076)	(0.063)	(0.057)	(0.074)
Between Bloc × Post × EA	0.036	0.157*	0.004	0.037
	(0.085)	(0.087)	(0.076)	(0.087)
Nonaligned × Post × EA	-0.040	-0.035	0.005	-0.038
	(0.054)	(0.039)	(0.046)	(0.052)
Observations	389,747	389,761	387,589	389,747

Panel B: High-Tech Goods Trade

	Baseline IPD	IPD 2023	Economic IPD	Post-1990 IPD
Between Bloc × Post	-0.112**	-0.229***	-0.090*	-0.113**
	(0.055)	(0.077)	(0.053)	(0.056)
Nonaligned × Post	-0.055	-0.072	0.073	-0.060
	(0.076)	(0.050)	(0.055)	(0.074)
Between Bloc × Post × EA	0.079	0.078	0.058	0.082
	(0.091)	(0.111)	(0.080)	(0.092)
Nonaligned × Post × EA	-0.219***	-0.010	-0.125***	-0.214***
	(0.048)	(0.039)	(0.047)	(0.046)
Observations	291,816	291,702	290,284	291,831

Notes: Poisson pseudo-maximum likelihood (PPML), using annual data for total goods trade for the period 2001–2023, from UN Comtrade (Panel A) and annual data for high-tech goods trade for the period 2001–2023, from CEPII (Panel B). Standard errors are clustered at the country-pair level. We include country-pair, source × time, and destination × time fixed effects. Post is a dummy that captures the post-invasion of Ukraine period and takes the value 1 for the years 2022 and 2023. Each column shows the results using a different IPD measure to construct the country blocs. (1) uses the Baseline IPD measure (2021 UNGA voting data); (2) uses 2023 IPD; (3) uses Economic IPD (economic votes only, 1971–2021); (4) uses post-1990 IPD across all votes. Coefficients are interpreted as exp(coefficient) - 1 × 100. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

The regression results presented in Table 1 confirm significant global trade fragmentation following the 2022 Russian invasion of Ukraine, with estimated trade reductions between opposing geopolitical blocs ranging from approximately 9% under the Economic IPD specification to nearly 27% using the 2023 IPD measure. The variability across IPD specifications offers critical insights into how different definitions of geopolitical alignment affect empirical outcomes. Specifically, the Baseline IPD, which employs alignment data up to 2021, yields moderate but robust fragmentation estimates (around 12%), reflecting long-run geopolitical alignments prior to the invasion. By contrast, the notably larger fragmentation effect observed under the 2023 IPD specification (approximately 27%) emphasizes that recent political developments, particularly the heightened geopolitical tensions arising from the Ukraine conflict and intensified U.S.–China rivalry, have markedly accelerated global trade reorientation. It is important to note, however, that the relationships we document between trade alignment and geopolitical positions do not imply causality. Countries might indeed choose to align politically with nations they anticipate trading more extensively with, rather than geopolitical alignment independently driving trade flows.[8] Although our analysis captures associations and identifies distinct patterns, we refrain from making direct causal claims.

When examining Euro Area-specific interactions, the regression analysis reveals only minimal additional fragmentation for EA trade. Most notably, under the 2023 IPD specification (Panel A), the interaction term involving EA countries ("Between Bloc × Post × EA," 0.157*) is positive and statistically significant at the 10% level, implying that EA trade with geopolitical rivals decreased by roughly 17 percentage points less than the global average. This finding suggests a degree of resilience in EA trade, likely reflecting the structural characteristics of EA economies, particularly their deep embeddedness within GVCs. Integration into GVCs typically involves substantial sunk costs, long-term contractual obligations, and high specificity of inputs and processes, making sudden reorientation or decoupling especially costly. Therefore, EA firms, constrained by these complex production networks, may have exhibited greater continuity in trading relationships, even amidst geopolitical disruptions, compared with global averages.

Additionally, the significant negative interactions for EA trade with nonaligned countries, especially prominent in high-tech goods (Panel B, with coefficients as large as -0.219*** under Baseline IPD and -0.214*** under Post-1990 IPD), indicate selective rebalancing by EA countries away from partners with ambiguous or unclear geopolitical alignment toward more clearly geopolitically aligned trade partners. Such rebalancing is particularly evident in technologically sensitive sectors, which are inherently strategic due to national security concerns, intellectual property risks, and the technological intensity involved. Consequently, while EA countries have largely maintained robust high-tech trade ties with clearly defined geopolitical rivals—most notably China—they have simultaneously scaled back trade with nonaligned or geopolitically ambiguous countries, possibly reflecting efforts to mitigate geopolitical uncertainty or risks associated with unclear alignment.

While our analysis underscores how increased technological rivalry generally amplifies geopolitical frictions and encourages trade fragmentation, our empirical findings reveal nuanced patterns specific to the Euro Area. Despite rising geopolitical tensions following the Russian invasion of Ukraine and intensifying U.S.–China rivalry, Euro Area trade exhibits significant resilience rather than broad-based decoupling. Regression results indicate that Euro Area countries' trade flows with

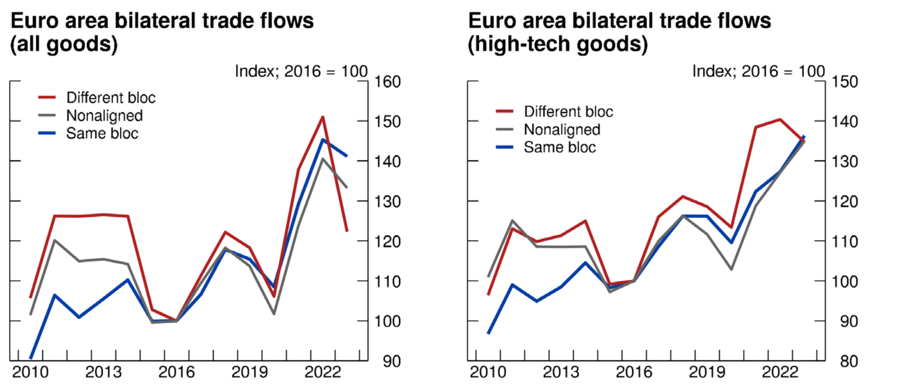
[8] See Kleinman, Liu, and Redding (2024).

clearly defined geopolitical rivals, notably China, have declined significantly less than the global average, highlighting the structural resilience derived from deep integration within global value chains. Moreover, fragmentation appears selectively focused, as evidenced by significant reductions in Euro Area trade primarily with geopolitically ambiguous or nonaligned countries—especially pronounced in high-tech sectors. This selective pattern contrasts sharply with the generalized decoupling observed in U.S.–China trade relations, underscoring the complexity and specificity of fragmentation dynamics within the Euro Area context. Thus, while technological rivalry is undeniably reshaping global trade alignments, its impact on Euro Area trade appears more nuanced, reflecting strategic resilience and selective adjustments rather than comprehensive disengagement.

Chart 4 further illustrates these dynamics visually, showing stable or growing EA trade with China, especially in high-tech sectors, versus sharp declines with other rivals like Russia. This underscores selective fragmentation, emphasizing strategic economic considerations and sector-specific resilience rather than comprehensive decoupling.

Chart 4

Euro Area Trade by Geopolitical Bloc (2010–2023)



Sources: UN Comtrade; authors' calculations

Notes: The left panel displays total goods trade, while the right panel illustrates trade in high-tech goods. Trade values are indexed to 2016 (2016 = 100). The classification of geopolitical blocs ("Same bloc," "Nonaligned," and "Different bloc") follows the all votes 2023 IPD alignment measure described in (Airaudo et al. 2025) using a U.S-China segmented distribution based on UNGA votes 1946-2023. "Same bloc" refers to countries that, like the Euro Area (proxied by Germany), are aligned with the U.S. geopolitical pole. "Different bloc" includes countries aligned with the opposing geopolitical pole, primarily represented by China. "Nonaligned" includes countries whose geopolitical positions are intermediate or ambiguous in the U.S.–China alignment spectrum. High-tech goods include sectors such as electronics, pharmaceuticals, and precision instruments. Trade intra-Euro Area is excluded.

The trade dynamics illustrated in Chart 4 complement the regression results from Table 1. The chart presents the evolution of Euro Area trade flows by categorizing partner countries into distinct geopolitical blocs—countries aligned with the Euro Area ("Same bloc"), nonaligned countries, and countries in a geopolitically distant or opposing bloc ("Different bloc")–based on the 2023 IPD classification. The left panel illustrates total goods trade, while the right panel focuses specifically on high-tech sectors.

A close examination reveals a noticeable decline in Euro Area trade with geopolitically distant countries in recent years. Further analysis, specifically removing China from the chart, accentuates this decline, indicating that the overall resilience or stability initially observed is driven by continued strong trade relations with China. Conversely, removing Russia has minimal impact, suggesting that the sharp drop observed is primarily associated with reduced trade flows with other geopolitically distant countries beyond Russia, rather than with Russia alone. This analysis underscores the selective nature of the Euro Area's fragmentation: sustained trade engagement with China contrasts sharply with broader strategic disengagement from other geopolitically distant partners, highlighting complex strategic considerations beyond simplistic geopolitical alignments. Thus, Chart 3 provides strong empirical evidence of selective fragmentation rather than broad-based decoupling: the Euro Area maintains robust trade connections with China, despite geopolitical tensions, while significantly reducing economic ties with Russia.[9]

Moreover, the results shown in Chart 4 (right panel) underscore further complexities. While the regression results for high-tech trade do not show significantly greater fragmentation for the EA compared with the global average, there is notable evidence of selective disengagement from nonaligned or geopolitically ambiguous partners (as indicated by significant negative interaction coefficients, e.g., -0.219*** under Baseline IPD). This pattern suggests that, even as EA countries maintain or expand strategic high-tech linkages with major geopolitically distant economies, they are simultaneously reducing economic exposure to countries whose geopolitical positioning remains uncertain or ambiguous, reflecting cautious management of geopolitical risks in strategic sectors.

Taken together, these empirical results support the broader narrative of targeted resilience rather than wholesale decoupling. Euro Area trade policy appears oriented towards cautious rebalancing, selectively preserving strong economic ties with strategically important geopolitically distant (such as China in high-tech sectors) while carefully limiting exposure to ambiguous geopolitical partners. This strategy highlights the complexity of economic policy responses in an increasingly fragmented global geopolitical environment, characterized by both robust economic engagement and deliberate risk mitigation.

The selective fragmentation we have documented in high-tech and strategic sectors may strengthen market positions for certain European firms, potentially leading to somewhat higher profit margins and markups due to reduced external competition. Recent ECB analysis (Lane, 2025) highlights that selective decoupling could disproportionately impact manufacturing firms, potentially compressing profit margins, influencing market dynamics, and affecting wage structures through higher input costs and reduced flexibility in sourcing. These disruptions could contribute to inflationary pressures, presenting challenges for price stability and complicating the transmission of monetary policy.

[9] In the Appendix (Chart A.1) we reproduce the charts in Chart 1 excluding China and show the quarterly trade in goods between Euro Area and U.S. with China and Russia (Chart A.3).

4 Strategic Trade Interventions and Policy-Driven Fragmentation

The empirical evidence presented above demonstrates significant economic realignments within the Euro Area, particularly pronounced in strategic high-tech sectors. However, these fragmentation patterns are not merely passive market adaptations to geopolitical events. Rather, they have arisen largely from proactive, strategic policy interventions explicitly aimed at managing geopolitical risk exposure and competitive pressures—especially those from intensified technological competition with China. In this section, we document and analyze specific distortive trade policy measures adopted by the European Union and its member states, highlighting how these policies actively shape strategic fragmentation.

We analyze distortive trade policies implemented by the European Union (EU), documented systematically by the Global Trade Alert (GTA) New Industrial Policy Observatory (NIPO) database (Evenett et al. 2024). The GTA NIPO database provides detailed records of economic policy interventions (“acts”) implemented globally since 2017 and systematically classifies interventions as either *distortive* or *liberalizing*. Distortive policies explicitly discriminate against foreign commercial interests, either through restricting market access or providing preferential support to domestic industries, thereby revealing strategic economic objectives and geopolitical intentions. Each act in the database includes information on both the implementing entity (which may be a country or a supranational body such as the EU) and the affected trading partner(s), allowing us to identify the direction and target of EU trade policy interventions.

Each policy intervention in the database is also categorized along multiple dimensions, including its sectoral target, motive, policy type, and instrument. Importantly, these classifications are non-exclusive: a single act may be assigned to multiple categories within a dimension—or none. For example, an intervention might simultaneously support several sectors or reflect more than one strategic motive. As a result, charts that report the distribution of interventions across these dimensions (e.g., by sector or motive) show the total number of classifications, not distinct interventions, and the height of each bar may exceed the number of unique policy acts or affected jurisdictions.

The use of distortive trade interventions by EU countries has significantly increased since 2017, intensifying notably after 2018, following the escalation of global trade tensions, and particularly the imposition of U.S. tariffs on China. Chart 5 illustrates this strategic shift distinctly. Panel (a) highlights a marked increase in EU-level collective distortive interventions, reflecting a strategic pivot towards a more unified and coordinated protectionist policy stance. Member-state interventions continue to rise, but EU-level collective actions grow at an even faster pace, indicating a shift toward more centralized decision-making within the EU rather than stabilization or decline of national measures. This pattern suggests that, although individual countries still deploy their own distortive tools, the EU as a bloc has assumed a larger and growing share of policy actions, likely to enhance strategic coherence and reduce fragmentation that arises when member states act unilaterally.

This centralization also reflects a broader regulatory push. Major instruments—such as the Anti-Coercion Instrument (ACI), the Carbon Border Adjustment Mechanism (CBAM), and the Foreign Subsidies Regulation (FSR)—were adopted in 2023 to help the EU respond cohesively to external pressures, ensure fair competition, and project common environmental and strategic standards. Although not all are fully activated, their adoption marks a structural shift toward a more assertive, coordinated EU trade policy, aligning with the rise in bloc-level distortive interventions shown in Chart 5 and gradually supplanting some nationally led measures.

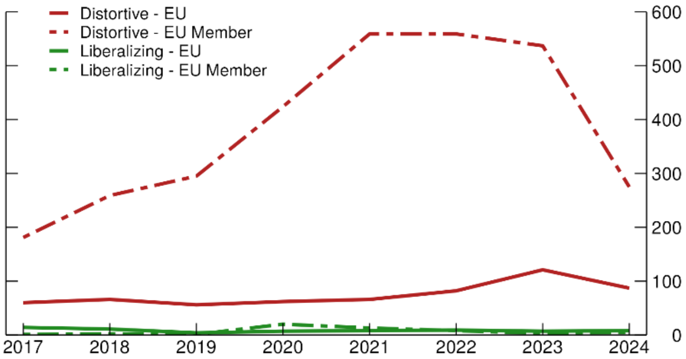
Panel (b) complements this perspective by showing that, since 2018, the number of distinct countries targeted by EU distortive measures has risen substantially. In other words, EU trade policy now addresses not only traditional geopolitical rivals but also a broader set of strategic competitors and even some longtime partners. This widened targeting underscores how the EU is adapting its economic toolkit to navigate complex geopolitical uncertainties.

Chart 5

EU Trade Interventions: Policy Actions and Scope of Strategic Targeting

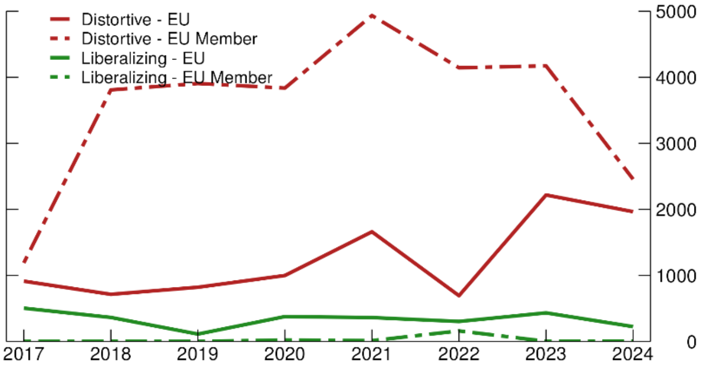
(a) Distortive and liberalizing interventions by EU-level and individual members (2017–2024)

Number of interventions by EU and EU members



(b) Number of countries affected by EU-level and individual members distortive interventions

Number of affected countries by EU and EU member interventions

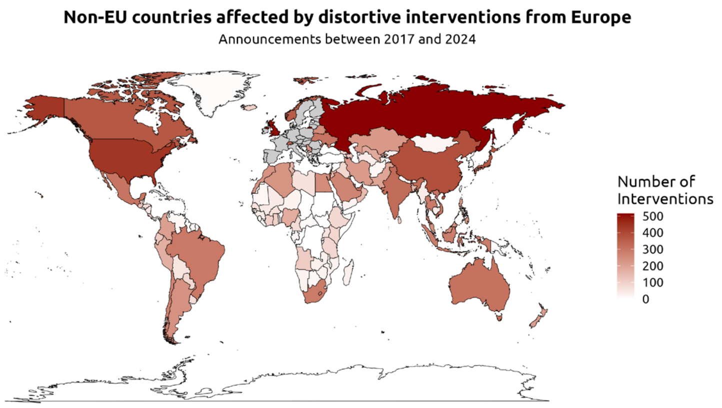


Sources: Data from the Global Trade Alert (GTA) NIPO database (Evenett et al. 2024); authors' calculations.
Notes: Panel (a) shows the annual count of distortive and liberalizing trade interventions implemented by the European Union collectively and by individual member states, irrespective of targeted jurisdictions. Panel (b) presents the geographic reach of EU-origin distortive measures, counting each affected country separately per intervention. Therefore, a single intervention affecting multiple countries contributes multiple counts in this panel.

The geographic patterns observed in recent EU trade interventions further highlight the strategic selectivity and complexity underlying Europe's trade policy responses. Chart 6 shows that countries frequently targeted by EU distortive measures, notably China and Russia, align closely with longstanding geopolitical rivalries. However, the substantial targeting of traditional allies such as the United States, the United Kingdom, and Canada illustrates that strategic economic relationships transcend simplistic geopolitical dichotomies. This broader geographic targeting pattern, particularly intensified post-2018 as indicated in Chart 5 (b), underscores those strategic considerations increasingly shape EU trade policies toward a wider array of partners, encompassing both geopolitical rivals and traditional allies. Moreover, the clear decline or stabilization of unilateral interventions by individual EU member states (Chart 5 (a)) suggests a deliberate policy shift toward enhanced collective strategic action, potentially reflecting a concerted effort by the EU to manage complex geopolitical and economic relationships more coherently.

Chart 6

Non-EU countries targeted by EU or EU-member distortive interventions (2017–2024).

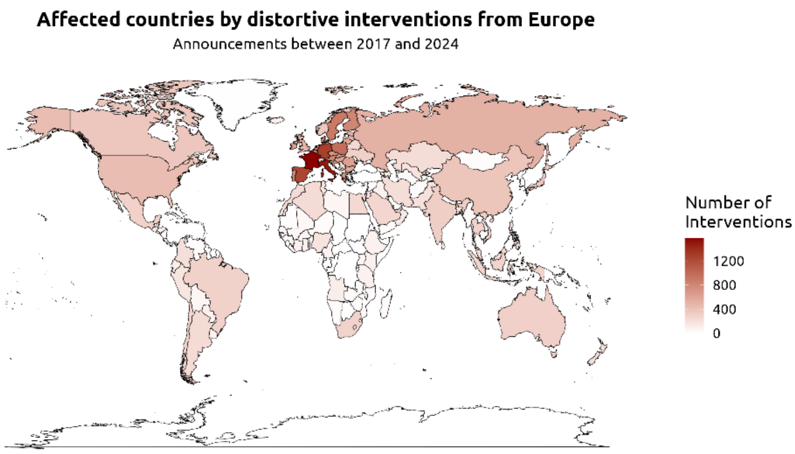


Sources: Global Trade Alert (GTA) NIPO database (Evenett et al. 2024); authors' calculations.
Notes: Number of distortive trade policy interventions announced by the EU and its member states that affected each non-EU country between 2017 and 2024. Color intensity reflects how many distinct interventions targeted a given country. A single policy act is counted once per affected country; thus, interventions targeting multiple non-EU countries appear multiple times. Interventions targeting other EU member states are excluded and shown separately in Chart 7.

Nevertheless, internal EU fragmentation remains a critical and persistent feature of recent trade policy dynamics. Chart 7 demonstrates that EU member states themselves frequently emerge as targets of distortive trade interventions imposed by other member states. Such internal targeting emphasizes persistent divergences in national industrial policies and strategic economic priorities within the EU, creating ongoing tensions despite increased collective EU-level coordination. The coexistence of centralized EU policy initiatives with continued internal policy fragmentation highlights the intricate balance European policymakers must navigate between achieving strategic cohesion externally and managing internal economic diversity. Taken together, these findings highlight the internal and external complexities facing EU market coherence and strategic coordination, suggesting that contemporary EU trade policy balances multiple national interests rather than being guided solely by geopolitical considerations.

Chart 7

All countries targeted by EU or EU-member distortive interventions, including EU member states (2017–2024).

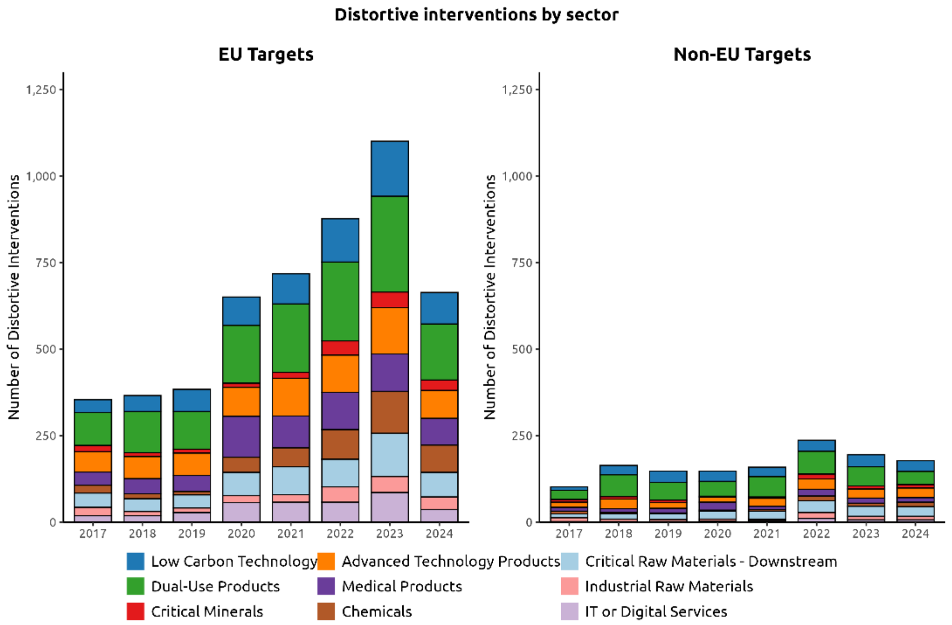


Sources: Global Trade Alert (GTA) NIPO database (Evenett et al. 2024); authors' calculations.
Notes: Number of distortive trade policy interventions announced by the EU and its member states that affected each country between 2017 and 2024, including other EU member states. Color intensity reflects how many distinct interventions targeted a given country. As in Chart 6, each intervention is counted once per affected country; acts that target multiple jurisdictions are recorded multiple times.

Sectoral analysis reinforces the strategic selectivity evident in EU interventions. Chart 8(a) highlights those distortive interventions targeting non-EU countries predominantly focus on strategically critical sectors, such as dual-use technologies, critical raw materials, and low-carbon technologies, where the EU has historical comparative advantage. This selective targeting directly aligns with the EU's overarching goals related to technological sovereignty, supply chain resilience, and strategic autonomy. Such interventions are consistent with the expanded geographic targeting and broader strategic scope of EU-level policies shown in Chart 5, Panel (b), underscoring the deliberate strategic alignment of EU-wide trade policies with broader geopolitical and economic priorities. Conversely, in Chart 8(b) we observe that within-EU interventions span a broader and more varied set of sectors, reflecting the fragmented and competitive nature of national industrial policies. As highlighted previously in Charts 6 and 7, internal EU interventions emphasize diverse and often conflicting national priorities rather than unified strategic objectives, contributing to internal market fragmentation. These sector-specific and geographic differences highlight two distinct approaches within EU trade policy. Externally, EU interventions are strategically coordinated and targeted. Internally, however, interventions are more varied and reflect individual national interests. This internal variation poses challenges to maintaining coherence within the EU's internal market.

Chart 8

Sectoral distribution of distortive interventions targeting EU vs. non-EU countries (2017–2024).



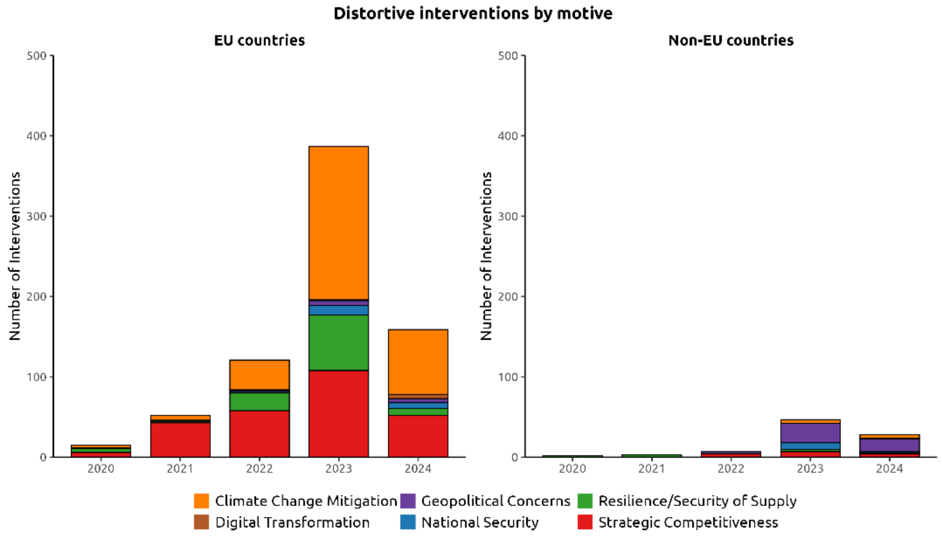
Sources: Data from the Global Trade Alert (GTA) NIPO database (Evenett et al. 2024); authors' calculations.
Notes: Number of EU-origin distortive interventions categorized by the sectors affected, based on GTA classification. The left panel shows interventions targeting EU countries, while the right panel targets non-EU countries. Each intervention can impact multiple sectors or none, so the total bar height (sum of stacked sectors) does not equal the number of distinct interventions or affected jurisdictions in Chart 5 (b).

Chart 9 highlights clear differences in the motivations behind EU trade interventions. Measures targeting non-EU countries frequently emphasize national security, geopolitical rivalry, and resilience to external supply shocks, consistent with the geographic and sectoral patterns identified earlier. These external interventions reflect a coordinated EU-level strategy focusing on managing geopolitical risks and securing strategic sectors. Internally, however, interventions commonly reference strategic competitiveness and security of supply, indicating a distinct set of priorities aligned more closely with national economic interests. This difference matches observations from Charts 7 and 8, suggesting that internal EU interventions are influenced by diverse national concerns rather than by unified geopolitical strategies.

Strategic interventions, such as targeted subsidies and restrictive trade measures, while aiming to mitigate geopolitical vulnerabilities, might unintentionally strengthen market concentration and reduce competition domestically. Enhanced market power resulting from these policies could further solidify firms' pricing power, contributing to rigid price dynamics and more entrenched inflationary pressures in the euro area. Our revised paper explicitly compares EU trade and industrial policies with those of the US and China, highlighting potential risks such as subsidy races or market distortions resulting from divergent strategic responses.

Chart 9

Motivations behind EU distortive interventions by target group (EU vs. non-EU).



Sources: Data from the Global Trade Alert (GTA) NIPO database (Evenett et al. 2024); authors' calculations.
Notes: Number of EU-origin distortive interventions, categorized by stated strategic motivations according to GTA. The left panel pertains to interventions aimed at EU countries, while the right panel pertains to interventions targeting non-EU countries. Each intervention can be associated with multiple or no motivations, causing the total height of each stacked bar to differ from the count of distinct interventions or affected jurisdictions shown in Chart 4 (b).

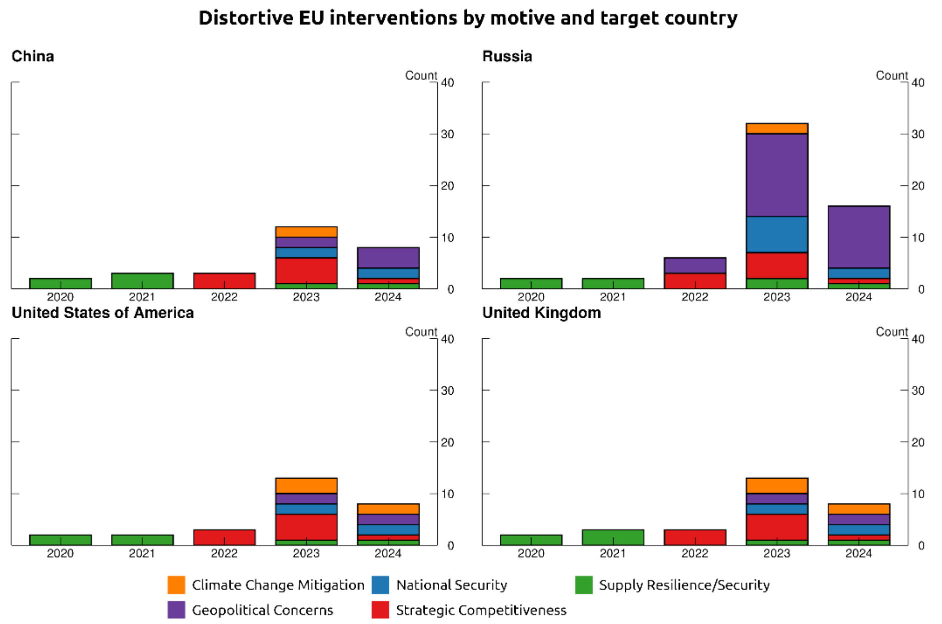
Detailed country-level analysis presented in Chart 10 highlight variations in the strategic motivations behind EU trade interventions. Measures targeting Russia predominantly focus on geopolitical rivalry and national security, particularly following the events of 2022. This finding aligns with broader patterns observed earlier (Charts 5 (b) and 6), showing increased attention to geopolitical considerations.

Interventions targeting China combine competitive and geopolitical motivations, reflecting China's dual position as both a rival and an essential economic partner. This supports previous sector-specific observations (Chart 8), particularly within high-tech and sensitive sectors.

For traditional partners such as the U.K. and the U.S., interventions display a mix of competitive and geopolitical considerations, consistent with earlier results (Charts 6 and 9). This suggests EU trade policies involve complex assessments beyond simple geopolitical alignments.

Chart 10

EU distortive interventions by strategic motivation for select major trade partners (2017–2024).



Sources: Number of EU distortive interventions targeting China, Russia, the United States, and the United Kingdom, categorized by stated strategic motivations (GTA classification). Each panel represents interventions targeting one specific country. Each intervention may have multiple or no associated motivations; hence the total bar height exceeds the actual number of distinct interventions.
Notes: Data from the Global Trade Alert (GTA) NIPO database (Evenett et al. 2024); authors' calculations.

Examining the specific policy instruments used, in Chart 11, highlights distinct patterns in EU interventions. Policies aimed at non-EU countries often include sanctions and energy-security measures, reflecting geopolitical priorities identified earlier (Charts 5(b) and 10). These instruments serve the EU's objective of managing external risks—particularly in relations with countries such as Russia and China. Internally, EU interventions frequently focus on competitiveness measures, infrastructure projects, subsidies, and support for research and development; these domestic policies reflect diverse national economic goals and align with earlier observations of internal fragmentation (Charts 7 and 8). Together, Chart 11 shows how externally coordinated responses coexist with nationally driven strategies within EU trade policy.

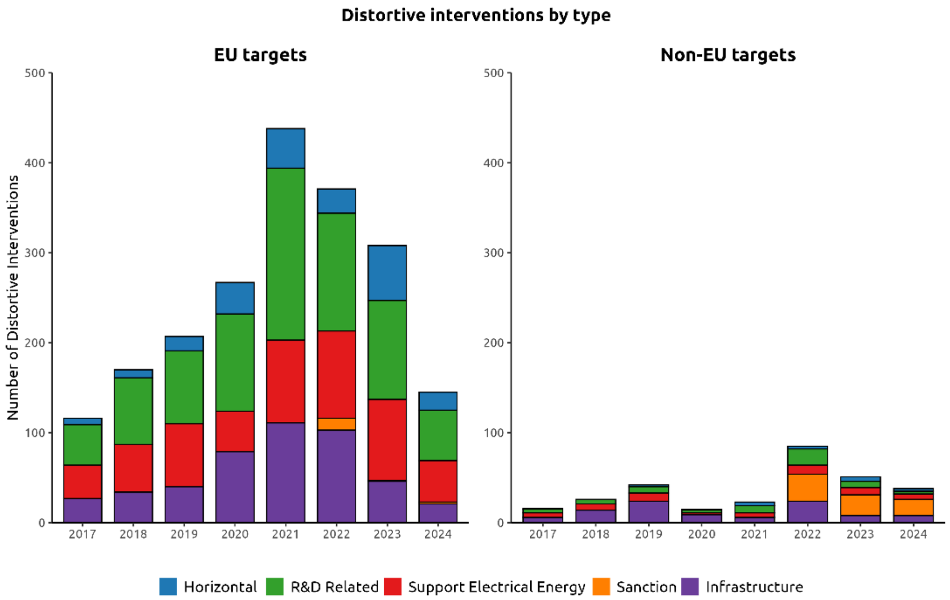
Chart 12 places EU measures in a broader context by comparing them with U.S. and Chinese interventions. The figure shows the annual count of five categories of distortive interventions—industrial policies (purple), export restrictions (blue), import restrictions (green), fair-trade enforcement (red), and "other" measures (gray)—for the EU (split into EU-to-EU and EU-to-Non-EU), the United States, and China. As before, each intervention is given equal weight.

Across all jurisdictions, we observe a sharp increase in industrial policy interventions after 2020. The EU more than doubles its count of internal measures by 2021–2023, reflecting a surge in national-level subsidies and export incentives. The U.S. pivots decisively away from "other" tools toward large-scale industrial support, aligned with the introduction of the CHIPS and Inflation Reduction Acts. China, starting from an already high baseline of industrial policies, maintains an upward trajectory through 2023. This convergence indicates that all three actors increasingly view state-backed support as central to industrial competitiveness. In the EU's case, however, the dispersion of these interventions across member states also reinforces the pattern of internal fragmentation highlighted earlier.

Taken together, these panels suggest a domestic subsidy race, and potential supply-chain distortions as firms navigate overlapping but not fully coordinated policies.

Chart 11

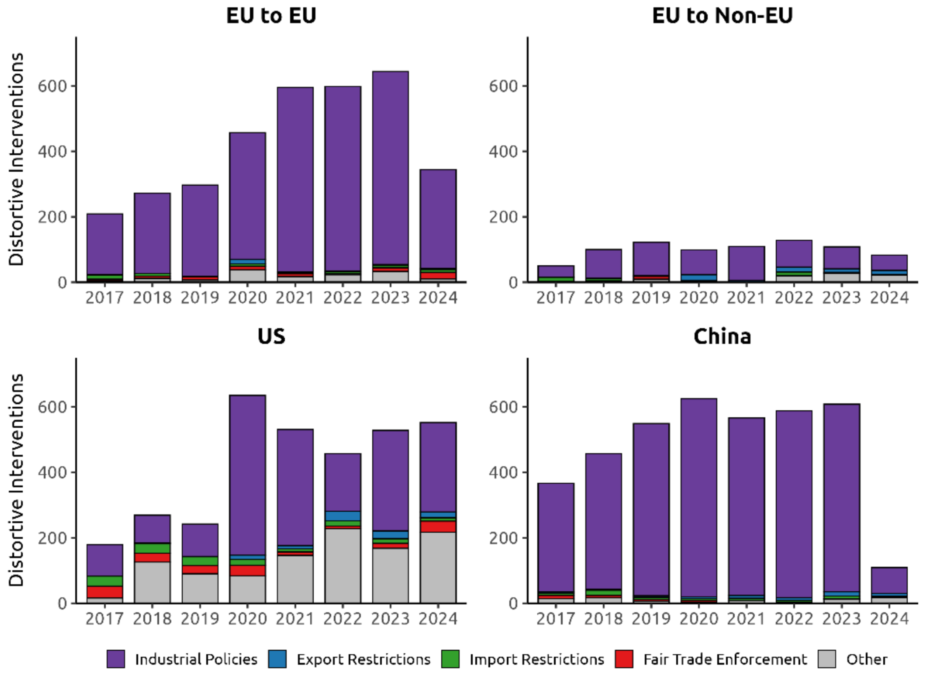
Distortive EU interventions categorized by policy type (2017–2024).



Sources: Data from the Global Trade Alert (GTA) NIPO database (Evenett et al. 2024); authors' calculations.
Notes: Number of EU-origin distortive interventions categorized by policy type based on GTA classification. The left panel reflects interventions targeting EU countries, while the right panel captures interventions aimed at non-EU countries. Because interventions can involve multiple policy types, total bar heights (sum of segments) do not equal the number of distinct interventions or jurisdictions shown in Chart 4 (b).

Chart 12

Distortive EU interventions categorized by policy instrument (2017–2024).



Sources: Data from the Global Trade Alert (GTA) NIPO database (Evenett et al. 2024); authors' calculations.
Notes: Each panel shows the annual count of distortive interventions, by policy category (industrial policies = purple; export restrictions = blue; import restrictions = green; fair-trade enforcement = red; other = gray), for the EU, the U.S., and China. Top row panels display EU policies to EU members as target (left) and EU policies to non-EU targets (right). Bottom row panels aggregate all U.S. interventions (left) and all Chinese interventions (right), regardless of target. In "Industrial policies" we included the interventions classified as subsidies and export incentives, "fair trade enforcement" includes interventions classified as trade defence, which includes anti-dumping measures, while "other" we included interventions classified as FDI, localization, and other in GTA classification. Each intervention may include several instruments, meaning total bar heights exceed the number of unique interventions or jurisdictions indicated in Chart 4 (b).

Taken together, these results highlight a clear difference in EU trade policy approaches. Externally, policies generally reflect coordinated strategic aims focused on managing geopolitical tensions and securing key supply chains. Internally, however, policies vary significantly, driven more by national economic priorities and interests. This contrast underscores the inherent challenge in balancing external coherence with internal diversity within the EU.

These policy insights align with the gravity model findings, which indicate that Euro Area trade shows selective, rather than broad, fragmentation along geopolitical lines. Specifically, there is targeted disengagement from economically or geopolitically ambiguous partners rather than widespread decoupling from major rivals. This selective approach illustrates the complexity the EU faces in maintaining external strategic coherence while simultaneously managing varied internal economic objectives.

5 Broader Global Decoupling and Strategic Realignment

The empirical evidence of EU trade interventions reveals a targeted use of policies aimed at reshaping economic ties amid escalating geopolitical tensions. However, strategic realignment and decoupling are not exclusive to the Euro Area but represent broader global phenomena. To place the EU's approach into an international context, this section steps back from detailed EU analysis and systematically documents global trends in economic decoupling and strategic realignment, specifically highlighting measures of import-share shifts and changes in exposure to geopolitically distant countries.

First, we quantify decoupling by tracking shifts in import shares from major trading partners, explicitly documenting changes in sourcing patterns across different economies, notably the United States and the Euro Area. Next, we use a geopolitical distance metric to quantify how geopolitical alignment influences bilateral trade exposure over time.

5.1 Decoupling, De-risking, and Friendshoring

Over the past decade, geopolitical tensions have increasingly reshaped global economic ties, prompting significant strategic realignments across major economies. This process began notably with escalating U.S.-China trade tensions around 2018, leading the United States to markedly reduce its reliance on China, as evidenced by the decrease in China's share of U.S. imports from approximately 22% in 2018 to less than 14% by 2023. Concurrently, the U.S. has actively pursued friendshoring, strategically redirecting trade toward politically aligned countries and regions.

The Euro Area, while sharing similar strategic concerns, and as we have documented in our previous analysis, has adopted a more selective approach to de-risking rather than pursuing comprehensive decoupling. The 2022 Russian invasion of Ukraine significantly accelerated these trends in Europe, leading to swift and substantial reductions in EU economic dependence on Russia, particularly noticeable in energy imports. European imports of Russian natural gas dropped dramatically from over 20% in 2020 to approximately 5% by mid-2023. Using detailed trade data from the CEPII-BACI database (HS96-version), which includes annual bilateral trade flows at the HS 6-digit level from 1996 to 2023, we document these trends specifically within high-tech, medium-tech, and low-tech sectors (Appendix Table 2).

We measure changes in import shares as:

$$\Delta \text{Share}_{ijt} = \text{Share}_{ijt} - \text{Share}_{ijt-1},$$

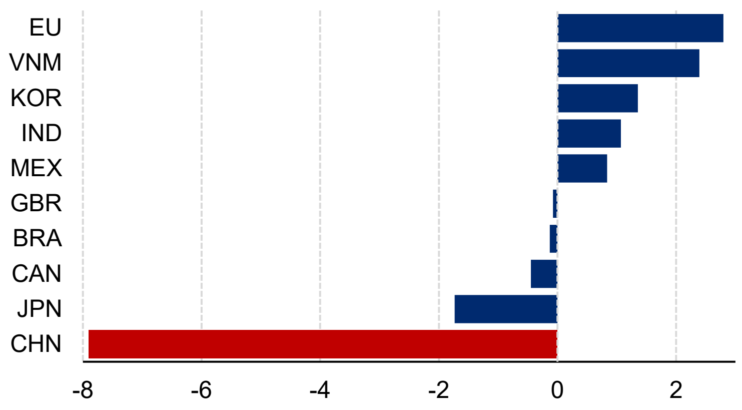
where Share_{ijt} denotes country i's import share from country j at time t.

Chart 13 highlights these changes, illustrating substantial declines in U.S. import shares from China across key sectors. Simultaneously, the U.S. has expanded its trade connections with allies and regional partners, notably Canada, Mexico, Vietnam, and the European Union. This shift emphasizes a strategic intention to reduce economic dependencies and mitigate geopolitical risks by strengthening economic partnerships within politically aligned blocs.

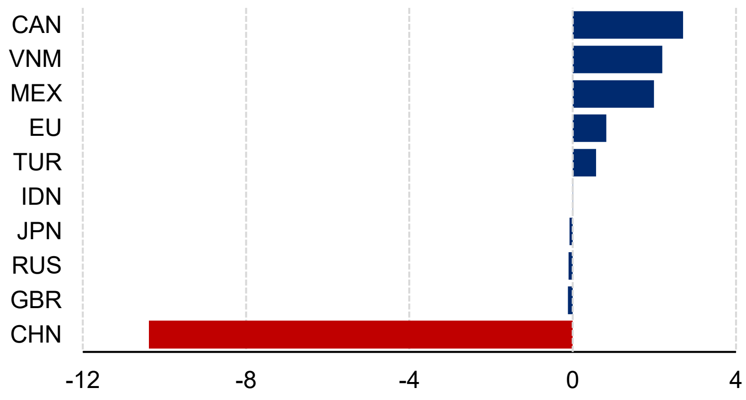
Chart 13

Changes in U.S. Import Shares across Major Trading Partners and Sectors (2017-2023)

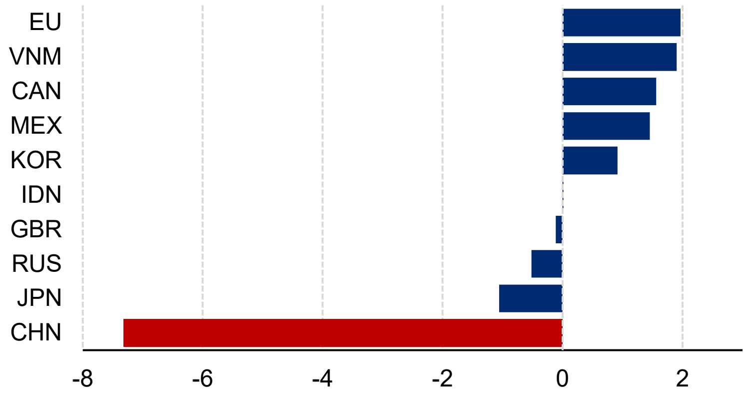
(a) High-Tech



(b) Low-Tech



(c) Overall



Notes: Charts show U.S. import share changes from major trading partners between 2017 and 2023.Source: UN COMTRADE.

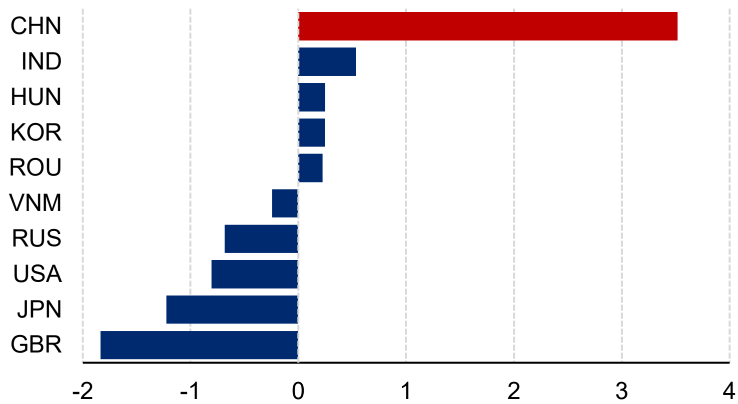
Chart 14 highlights the strategic adjustments of the EU, indicating a decreased dependence in the low-tech sectors on geopolitically sensitive partners such as Russia and Great Britain, in addition to increased sourcing from more politically stable suppliers such as Turkey, Vietnam, and the Czech Republic.

In contrast, EU dependence on Chinese imports in high-tech sectors has notably increased, reflecting a fundamental tension in Europe's trade strategy. Despite the rhetoric on "strategic autonomy," European economies have deepened their technological reliance on China, diverging significantly from the U.S. approach. Traditional high-tech partners, including Great Britain, Japan, and the United States, have seen their shares in EU imports decline. Overall, these patterns underscore Europe's selective de-risking, balancing economic interests with geopolitical considerations.

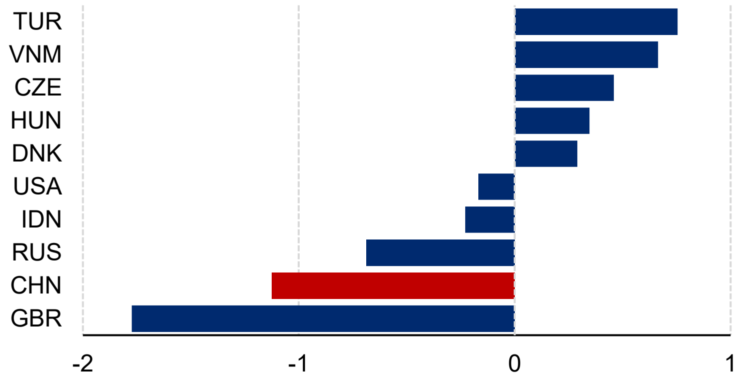
Chart 14

Changes in EU Import Shares across Major Trading Partners (2017-2023)

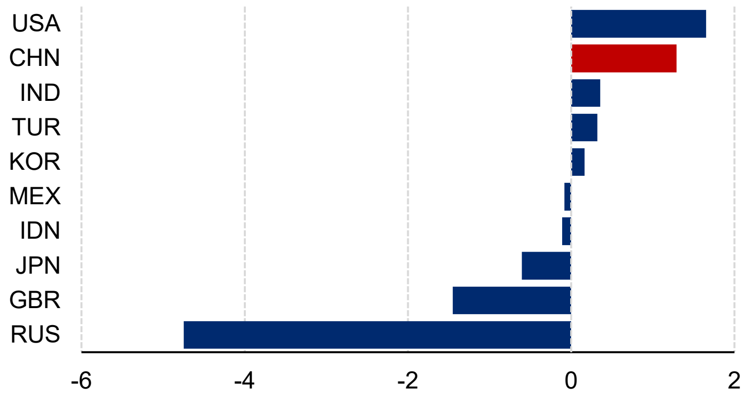
(a) High-Tech



(b) Low-Tech



(c) Overall



Notes: Charts illustrate EU import share changes from major trading partners between 2017 and 2023. Source: UN COMTRADE.

Taken together, trade data pinpoint 2018 as the initial inflection point marking the beginning of U.S.-China decoupling, largely driven by tariff escalations and increasing geopolitical frictions. A second major turning point emerged in 2022, prompted by Russia's invasion of Ukraine, leading to accelerated economic disengagement by Western nations from Russia, especially in sectors critical to national security such as energy. These events have initiated a broader structural trend of selective disengagement, reflecting a more strategic approach to managing economic relationships with geopolitically risky economies. The sustained nature of these adjustments suggests a lasting shift in global economic integration patterns, prioritizing security and resilience over traditional economic efficiency considerations.

5.2 Geopolitical Distance, Trade Exposure, and Strategic Realignments

The documented strategic shifts in global trade underscore the need to explicitly understand the role of geopolitical tensions. The decoupling strategies identified previously in U.S.-China and EU-Russia trade relations raise questions about whether geopolitical factors systematically influence these patterns. To investigate this, we construct a quantitative measure of geopolitical distance and analyze its impact on trade exposure, linking the observed strategic realignments with underlying geopolitical dynamics.

Our measure of geopolitical distance is based on countries' ideal point indices, derived from voting patterns at the UNGA relative to the United States as the benchmark country, following Bailey, Strezhnev, and Voeten (2017) methodology. Formally, the normalized geopolitical distance measure is defined as:

$$GP_{int}^{norm} = \frac{|ideal_i - ideal_n|}{\max(ideal) - \min(ideal)},$$

where $ideal_i$ represents the ideal point index of country i, and $ideal_{US}$ is that of the United States. Normalization ensures comparability across countries, with values ranging from 0 (full alignment with the U.S.) to 1 (complete divergence).

We then assess how this geopolitical alignment translates into countries' actual economic dependencies by constructing an exposure metric that combines bilateral trade shares with geopolitical distance:

$$Exposure_{it} = \sum_{n=1}^{M} s_{in,t} \times \overline{GP_{in}^{norm}},$$

where $s_{in,t}$ denotes the bilateral trade share of country i from country n at time t, and $\overline{GP_{in}^{norm}}$ is the average normalized geopolitical distance between countries i and n over the sample period. This measure captures stable, long-term geopolitical alignments rather than short-term fluctuations. This exposure measure is bounded between 0 and 1.

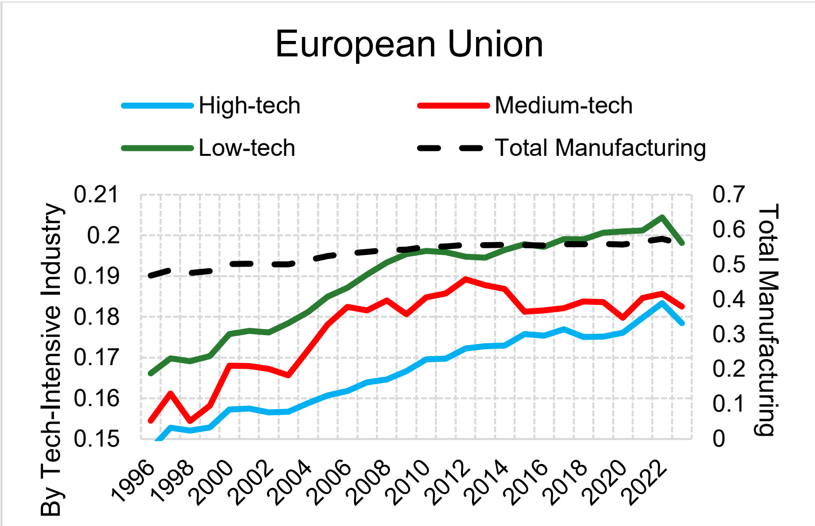
Chart 15 illustrates the evolution of trade exposure to geopolitically distant countries for the Euro Area and the United States from 1996 to 2023. Panel (a) clearly shows a consistent increase in the Euro Area's exposure across all technological sectors, with the largest rise observed in the low-tech sector—from approximately 0.17 in 1996 to over 0.20 by 2023, reflecting an 18% increase. Medium-tech and high-tech sectors experienced similar growth, albeit at slightly slower rates. This steady upward trend highlights persistent economic integration with geopolitically distant countries, despite rising concerns about strategic autonomy.

Conversely, Panel (b) illustrates the evolution of U.S. trade exposure to geopolitically distant partners for total manufacturing. Exposure steadily increased from 1996, before experiencing a modest decline by 2023. This recent reduction aligns with the timing of explicit policy-driven "decoupling" efforts, suggesting a moderate yet noticeable strategic shift in U.S. trade policy driven by geopolitical considerations.

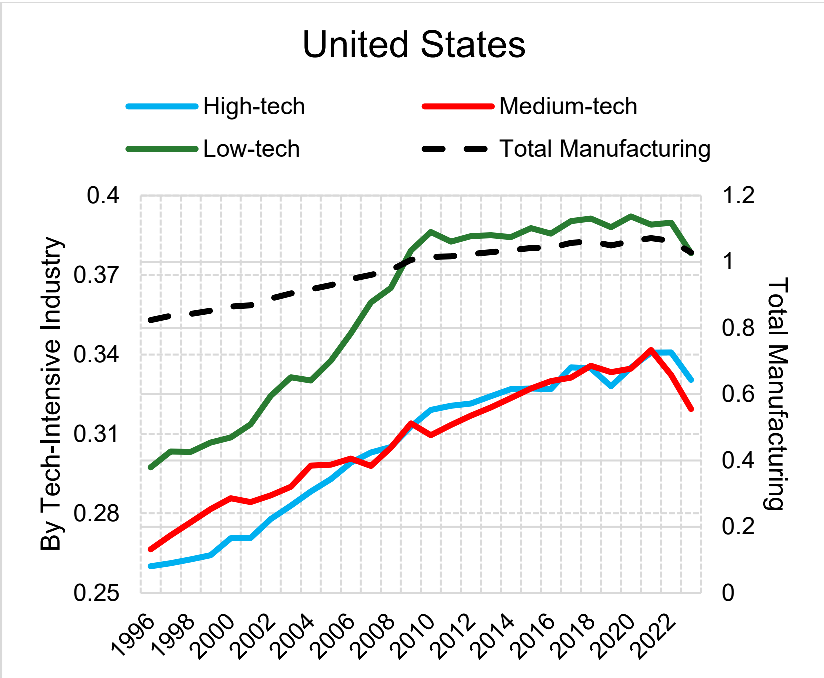
Chart 15

Trade Exposure to Geopolitically Distant Countries (1996-2023)

(a) European Union



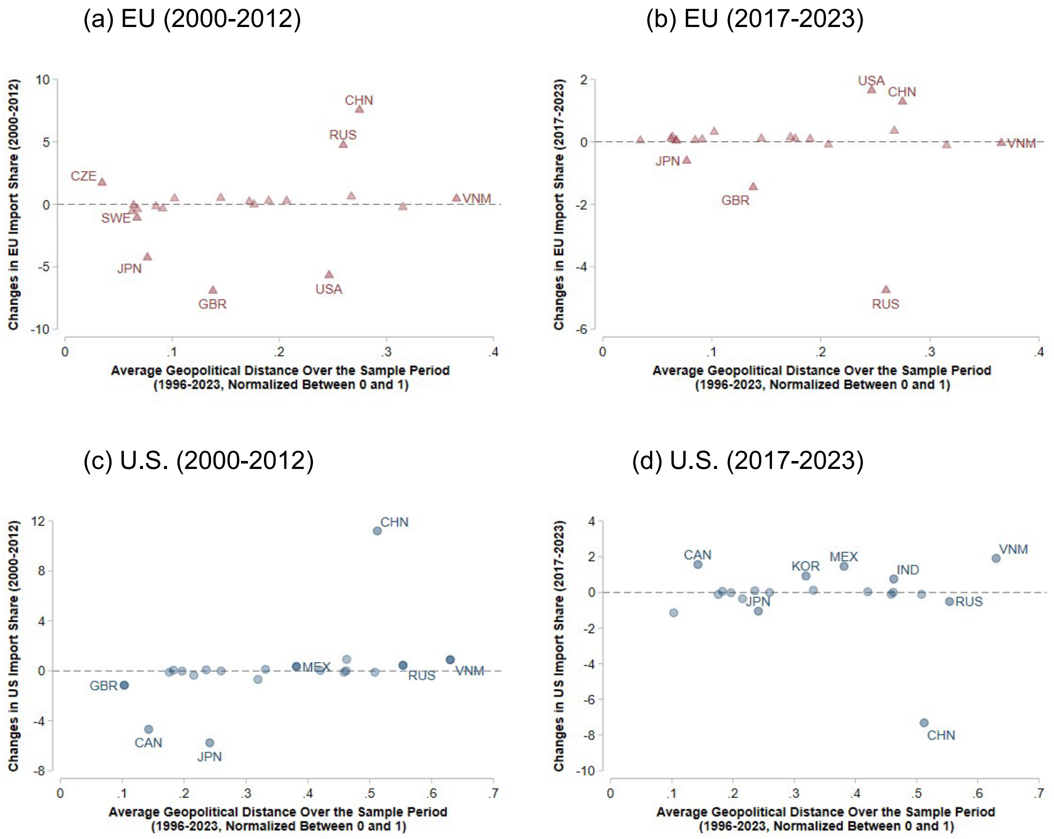
(b) United States



Notes: Exposure measured by sectoral trade shares weighted by geopolitical distance. Higher values indicate increased trade reliance on geopolitically distant countries. Note that the lower level of exposure for the EU compared with the U.S. partially reflects fewer “geopolitically distant” countries by construction (given Europe’s generally aligned political landscape), thus implying a mechanically moderated trend compared with the U.S.

Chart 16

Changes in Import Shares vs. Geopolitical Distance



Notes: Positive (negative) slopes indicate increasing (decreasing) import shares with greater geopolitical distance.

Next, we investigate the drivers of these contrasting trends by analyzing how changes in import shares correlate with geopolitical distance. Chart 16 plots changes in import shares against geopolitical distance, providing a clear illustration of shifting trade strategies. Between 2000 and 2012, both the EU and the U.S. significantly increased imports from geopolitically distant countries, driven primarily by cost efficiencies rather than strategic alliances—an era often referred to as the “first China shock.”

However, from 2017 onwards, the U.S. clearly reversed its earlier strategy, reducing trade shares from geopolitically distant partners such as China and Russia, while simultaneously increasing reliance on politically aligned countries, a clear example of friendshoring. The EU exhibited a more nuanced shift during the same period, selectively reducing reliance on Russia and cautiously recalibrating its relationship with China, maintaining engagement but moderating growth.

In summary, the global trade alignment has evolved through three distinct phases since 2000. From 2000 to 2012, economic considerations primarily drove trade relationships, emphasizing cost efficiency and extensive integration with geographically distant economies, notably China. This period was characterized by rapid globalization, where geopolitical risks were largely secondary to economic opportunities. Between 2012 and 2017, a divergence began emerging between the United States and Europe. The U.S. began reassessing its strategic economic dependencies, setting the stage for subsequent policy shifts, while the Euro Area continued its approach emphasizing economic integration, reflecting stability in existing trade relations and less immediate geopolitical reassessment.

The final phase, from 2017 to 2023, saw geopolitical and security considerations move decisively to the forefront, significantly reshaping international trade strategies. During this period, the United States intensified its decoupling from geopolitically risky economies, notably China, and increased its trade alignment with politically stable allies, explicitly pursuing "friendshoring." The Euro Area adopted a targeted approach, reducing trade dependence on geopolitically distant nations like Russia while maintaining moderated but sustained economic relations with China. These developments highlight a pronounced shift from purely economic motivations towards a more complex interplay of economic, geopolitical, and security factors, fundamentally redefining global trade patterns and strategic economic alignments.

Looking ahead, we may be entering a new phase characterized by increased protectionist measures, notably higher tariffs and more restrictive trade policies. Recent policy announcements suggest an increasing emphasis on economic nationalism and reduced reliance on foreign suppliers, potentially further altering global trade dynamics.

6 Import Concentration and Strategic Vulnerabilities

The past fifteen years have underscored the strategic importance of diversification in an interconnected world. Europe has weathered a series of disruptive events—a financial crisis, a global pandemic, and an energy shock triggered by Russia's invasion of Ukraine—that have exposed the continent's dependence on fragile global systems. These episodes have questioned the focus on efficiency that has shaped trade and supply chain policies. In response, European firms have had to reassess the balance between openness and resilience, recognizing how economic specialization can expose hidden vulnerabilities during crises.

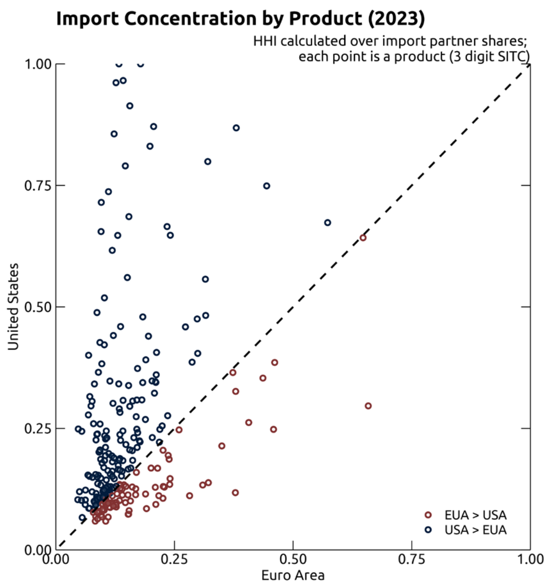
6.1 Measuring import concentration

Against this backdrop, and building on earlier work such as Mejean and Rousseaux 2024 and Balteanu, Schmidt, and Viani 2025, we analyze import concentration patterns in the Euro Area relative to the United States, with a view to drawing implications for economic resilience and strategic autonomy.
We measure import concentration using the Herfindahl–Hirschman Index (HHI), calculated from import shares across trading partners for each product. The product-level HHI for region i, product p, and year t is computed as follows:

$$HHI_{i,p,t} = \sum_j \left(\frac{\text{Imports}_{j,p,t}}{\text{Total imports}_{i,p,t}} \right)^2$$

Chart 17 illustrates import concentration at the product level, comparing the Euro Area (horizontal axis) and the United States (vertical axis) for the year 2023. Each point represents an individual product category classified by SITC at the 3-digit level. Points lying above the 45-degree line indicate products where the United States has a higher import concentration, suggesting greater strategic vulnerability for these products in the U.S. Conversely, points below the line suggest higher import concentration and thus potential vulnerabilities in the Euro Area.

Chart 17
Import Concentration by Product in Euro Area and United States (2023)



Sources: Authors' calculations based on UN Comtrade data (2023). Import concentration measured using the Herfindahl–Hirschman Index (HHI) at the SITC 3-digit product level.

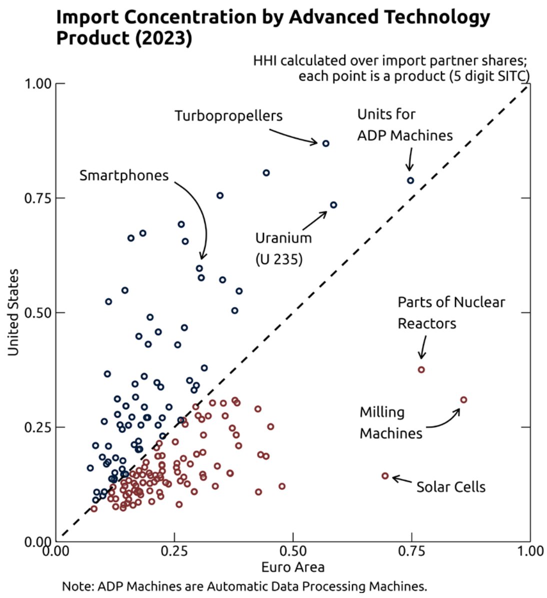
The United States shows substantially higher levels of import concentration across multiple product categories, indicating reliance on fewer import partners. In contrast, the Euro Area displays relatively lower import concentration, suggesting a more diversified import structure.

Chart 18 uses more granular data and focuses on the HHI for advanced technology product imports, comparing the Euro Area (on the horizontal axis) and the United States (on the vertical axis) for the year 2023. Each point corresponds to an individual advanced technology product classified at the 5-digit SITC level. Several products stand out in this analysis, including turbo propellers, smartphones, uranium, and nuclear reactor components. Notably, products such as turbo propellers and components for Automatic Data Processing (ADP) machines exhibit high concentration levels in both the U.S. and the Euro Area, signaling potential vulnerabilities in these critical supply chains.

The implications of these concentrations are significant. High HHI values suggest that reliance on a limited number of suppliers for these essential technologies could expose both regions to disruptions, whether due to geopolitical tensions, natural disasters, or trade restrictions. For example, turbo propellers are crucial for both civilian and military aviation, while ADP machine components are foundational to the broader digital economy. If disruptions occur in the supply of these products, it could have cascading effects, not only on the availability of these technologies but also on the overall resilience of both the U.S. and Euro Area economies.

Chart 18

Import Concentration by Advanced Technology Product (2023).



Sources: Authors' calculations based on UN Comtrade data (2023). Import concentration measured using the Herfindahl–Hirschman Index (HHI) at the SITC 3-digit product level.

Overall, while the Euro Area generally maintains a slightly more diversified import structure than the U.S., certain technology-intensive sectors still show significant concentrations, exposing them to similar strategic risks. This observation underscores the need for a balanced approach to supply chain management, where both regions must assess the trade-offs between efficiency and resilience. Diversifying critical supply chains, particularly in high-stakes sectors, could enhance long-term stability and safeguard against external shocks.

Finally, we decompose the import concentration index into contributions from geopolitically distant countries and all other countries. Since the Herfindahl-Hirschman Index is additive across source shares, we leverage our measure of geopolitical distance to express HHI as the sum of two components:

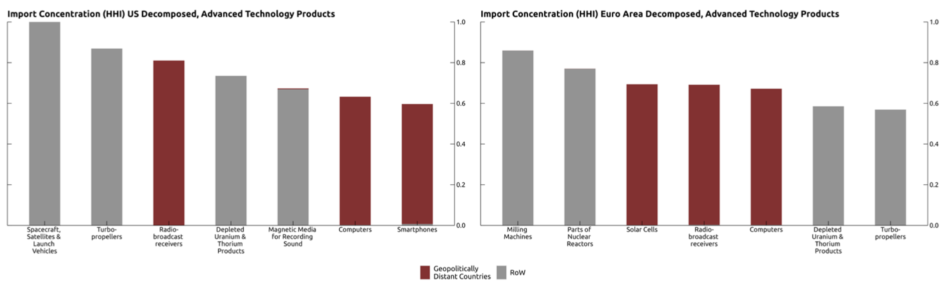
$$\text{HHI}_{i,p,t} = \text{HHI}_{i,p,t}^{\text{distant}} + \text{HHI}_{i,p,t}^{\text{RoW}}$$

where $\text{HHI}_{i,p,t}^{\text{distant}}$ captures the contribution from geopolitically distant countries, and $\text{HHI}_{i,p,t}^{\text{RoW}}$ represents the remainder of the world.

Focusing specifically on advanced technology products (ATP), Chart 19 presents this decomposition for selected sectors with the highest import concentration in 2023, separately for the Euro Area and the United States.

Chart 19

HHI Decomposition for Advanced Technology Products



Sources: UN Comtrade.
Notes: Top Concentrated Sectors (2023). The import concentration (HHI) is decomposed into the contribution of geopolitically distant countries (dark red) and the rest of the world (gray) for the U.S. (left panel) and the Euro Area (right panel). The chart reveals clear strategic vulnerabilities and sourcing strengths in key technological sectors

The decomposition highlights significant strategic contrasts. Certain critical products, notably Computers and Smartphones in the U.S., and Solar Cells and Computers in the Euro Area, exhibit high dependency on geopolitically distant sources. Conversely, other technologically sensitive products, such as Spacecraft, Turbo-propellers, and Nuclear Reactor Parts, primarily originate from non-distant, more geopolitically aligned or neutral suppliers. This polarization in import concentration underscores the importance of geopolitical alignment and strategic diversification considerations within trade policy and industrial strategy frameworks.

6.2 The case of critical materials

We now turn to the role of critical raw materials, which are central to the clean energy transition but often subject to concentrated supply chains and geopolitical risk. Understanding the global distribution of their extraction and processing is essential for assessing Europe’s exposure and shaping strategies for resilience.

Chart 20 illustrates the geographic concentration of both extraction and processing for four key materials—rare earths, lithium, cobalt, and copper. While extraction is somewhat distributed, it remains reliant on a few dominant suppliers. The

Democratic Republic of Congo (DRC) accounts for the bulk of cobalt extraction, lithium is sourced mainly from Australia, Chile, and China, and copper is concentrated in Chile, Peru, and the DRC. Rare earth extraction is heavily skewed toward China. This limited diversification exposes supply chains to geopolitical, environmental, and governance risks, particularly as demand for clean technologies accelerates.

Processing is even more centralized, with China holding a dominant position across nearly all materials shown. It controls the vast majority of global processing for rare earths, lithium, and cobalt and a significant share of copper refining. This midstream dominance creates a critical chokepoint, increasing the risk of disruption from export restrictions, domestic policy shifts, or international tensions. These data underscore the need for policies that support diversification, regional cooperation, and strategic investment in refining and processing infrastructure outside of China.

The empirical analysis presented in this section illustrates how the geographic concentration of critical minerals, particularly lithium, cobalt, and nickel, contributes to broader structural transformations within the global trading system. Our findings highlight that the dependence of European industries on geographically concentrated sources of critical minerals exposes these industries to supply disruptions, elevated input costs, and limited flexibility in responding to geopolitical uncertainties. These vulnerabilities are especially pronounced given the limited scope for immediate substitution of these critical inputs, intensifying the potential economic impacts of disruptions.

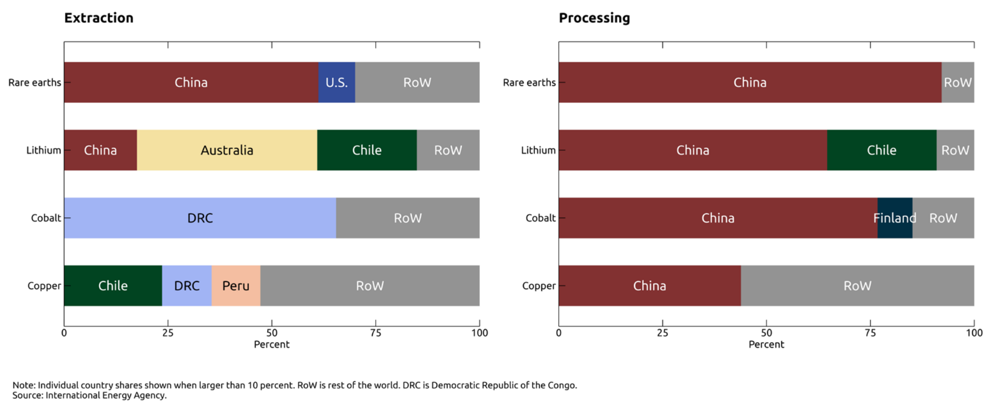
Our findings complement the approach of Mejean and Rousseaux (2024), who emphasize that evaluating strategic vulnerabilities should consider both the existing concentration of foreign sourcing and the potential for ex-post diversification. Consistent with this view, our analysis underscores that the structural risk associated with geographically concentrated supply chains for critical minerals is exacerbated by the limited ex-post substitutability, or "stickiness," of these inputs. The combination of geographic concentration and low substitutability thus significantly constrains the capacity for rapid diversification following disruptions, reinforcing structural vulnerabilities within European industries.

These findings have important implications for innovation in downstream industries, aligning closely with recent research by Alfaro et al. (2025). They document how supply disruptions in critical materials, driven by restrictive trade policies such as China's export controls on rare earth elements, have spurred technological innovation and productivity adjustments globally. Similarly, our identification of significant geographic concentration in the supply of critical minerals suggests downstream industries may increasingly respond by adopting directed technological change—developing alternative production methods or substitutable technologies. These strategic responses can help mitigate immediate vulnerabilities while simultaneously reshaping industry structures, enhancing resilience, and influencing long-term competitive dynamics.

Selective decoupling, particularly in critical sectors such as advanced manufacturing and critical minerals, presents economic risks by directly influencing firms' market power and profitability. Increased concentration and reliance on fewer suppliers, often from geopolitically distant countries, heighten exposure to input cost volatility and potential supply chain disruptions, compressing profit margins and reducing competitive pressures. Such vulnerabilities have significant implications for wage dynamics, productivity growth, and consequently wage growth. Moreover, fragmentation directly affects price stability, a critical concern for monetary policy makers. Divergent policy responses among major global economies, notably the EU, the US, and China, exacerbate these vulnerabilities, potentially triggering competitive subsidy races or market distortions. Addressing these challenges effectively requires targeted policies prioritizing supply-chain resilience, fostering intra-EU policy coherence, and carefully balancing economic efficiency with strategic resilience.

Chart 20

Global Concentration of Critical Mineral Supply Chains (2023)



Sources:International Energy Agency
Notes: Individual country shares shown when larger than 10 percent. RoW is the rest of the World. DRC is the Democratic Republic of Congo.

7 Implications and Future Challenges for the Euro Area

The Euro Area faces significant challenges arising from shifting geopolitical dynamics and intensified global economic competition, particularly driven by China's rapid technological ascent. Traditionally strong partnerships are evolving into increasingly complex competitive relationships, necessitating a careful strategic reassessment. Recent protectionist trade policies adopted by the United States add further complexity, prompting the Euro Area to critically evaluate both its external economic alliances and internal market dynamics. Navigating these multifaceted developments requires balancing the trade-offs between deepening internal market integration and strategically managing external economic relationships, each path presenting distinct opportunities and associated risks.

In light of these developments and building upon the empirical evidence presented throughout this paper, we highlight three key areas requiring particular attention from Euro Area policymakers. First, we document persistent internal market fragmentation using detailed gravity-model estimations, quantifying substantial intra-European trade barriers and underscoring the importance of continued efforts toward deeper economic integration. Second, we discuss the strategic implications of intensifying technological competition with China, leveraging the results on the ESI and PSI. To further quantify these implications, we perform a counterfactual analysis within a structural trade model that explicitly captures the transition from complementary trade toward increased technological rivalry, allowing us to assess the macroeconomic consequences of this evolving relationship. Finally, we discuss how rising geopolitical fragmentation and varying exposures across Euro Area member states could pose new challenges for monetary policy formulation by the European Central Bank, emphasizing the importance of explicitly considering economic heterogeneity and structural vulnerabilities in policy decisions.

7.1 Internal Trade Barriers

Despite sustained efforts toward deeper integration, substantial internal trade barriers within the Euro Area remain significant, as evidenced by persistently high tariff-equivalent trade barriers. Recent literature highlights that the European Single Market still harbors significant untapped potential for further trade liberalization (Fontagne and Yotov 2024).

The EU has continuously sought to diminish internal trade frictions among member states, while simultaneously managing external trade relationships with countries outside the bloc (Rest of the World, ROW). Next, we quantitatively evaluate and compare the absolute levels of internal trade barriers within the EU, between EU member states and ROW countries, and between ROW countries themselves. This approach provides insights into whether intra-EU integration has progressed towards the levels observed in other international trading relationships.

We adopt a structural gravity model to estimate trade flows and explicitly identify three distinct border effects: within the EU (EU–EU), between the EU and ROW (EU–ROW), and among ROW countries (ROW–ROW). Our baseline specification is given by:

$$X_{ijkt} = \exp\Big(\beta_t^{EU-EU}\text{Border}_{ij}^{EU-EU} + \beta_t^{EU-ROW}\text{Border}_{ij}^{EU-ROW} + \beta_t^{ROW-ROW}\text{Border}_{ij}^{ROW-ROW} \\ + \gamma'\text{Gravity}_{ij} + \delta_{jkt} + \theta_{ikt}\Big)\epsilon_{ijkt},$$

where X_{ijkt} is trade flow from exporter j to importer i in industry k at time t. The variables Border^{EU-EU}, Border^{EU-ROW}, and $\text{Border}^{ROW-ROW}$ are indicator variables that equal one if countries i and j are located in the respective categories (both EU members, one EU member and one ROW country, or both ROW countries), and zero otherwise. Specifically, these variables capture whether the trade flow crosses an international border within the EU, between the EU and ROW, or within ROW pairs. Gravity$_{ij}$ represents a vector of standard gravity controls including geographic distance, contiguity, and common language. To account for time-varying unobserved heterogeneity at the industry level, we include exporter-industry-time fixed effects (δ_{jkt}) and importer-industry-time fixed effects (θ_{ikt}).

This specification differs from the approach used by Head and Mayer (2021), who employ dyadic (country-pair) fixed effects rather than explicit gravity variables. The main advantage of their dyadic fixed-effects approach is the ability to rigorously control for all unobservable bilateral time-invariant characteristics, isolating only temporal changes in border effects. However, the primary disadvantage is that this specification does not allow for estimation of absolute levels of border frictions. In contrast, our explicit inclusion of gravity controls allows us to identify the absolute magnitude of border frictions directly, at the cost of relying more heavily on observed bilateral characteristics.

To provide a meaningful economic interpretation of the estimated border coefficients, we convert them into tariff-equivalent trade barriers. The tariff equivalent for each border effect is computed as:

$$\text{Tariff Equivalent (\%)} = 100 \times \left(\exp\left(-\frac{\beta}{\sigma}\right) - 1\right),$$

where β is the estimated border coefficient and σ is the elasticity of substitution (gravity trade elasticity), assumed to be 5, consistent with values commonly found in the trade literature (e.g., Head and Mayer 2021).

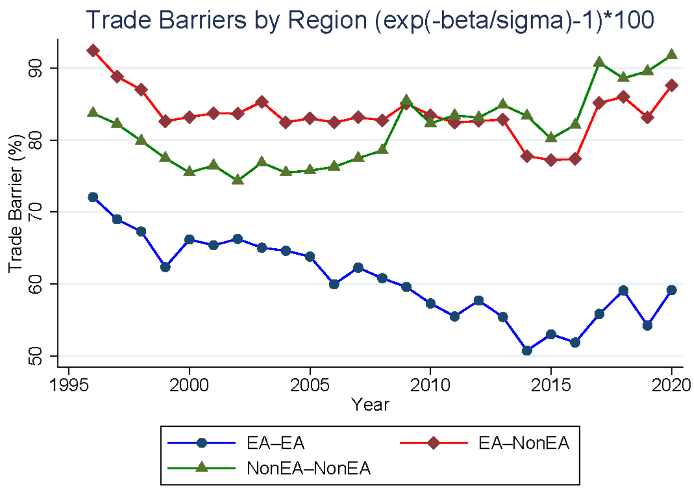
The tariff-equivalent measure quantifies the ad-valorem tariff rate that would equivalently reduce trade flows as observed under the actual border friction. A higher tariff equivalent indicates greater trade barriers and lower integration. By computing this metric separately for EU–EU, EU–ROW, and ROW–ROW trade flows, we directly compare the levels of trade integration across different types of economic relationships and observe their evolution over time. It is important to emphasize that these estimates reflect not only formal tariffs but also a variety of non-tariff barriers. These include regulatory divergences, differing national standards, infrastructure inefficiencies, administrative procedures, and other implicit costs that collectively impede trade flows across borders.

Initially, this calculation is performed for the average industry by pooling all industries together. Subsequently, we conduct separate regressions at the individual industry level, which allows us to identify heterogeneous patterns in the evolution of border frictions and trade integration across sectors.

Average Internal Barriers.

Chart 21 presents the estimated tariff-equivalent trade barriers (expressed as ad valorem equivalents in percent) across three regional categories (EA–EA, EA–NonEA, and NonEA–NonEA) from 1996 to 2020. These tariff equivalents quantify the implied ad valorem tariff rate that would equivalently reduce trade flows by the same magnitude as the estimated border frictions, thus providing a straightforward economic interpretation.

Chart 21
Trade Barriers by Region (Tariff Equivalents, %)



Sources:
Notes: Tariff equivalents are computed from estimated border coefficients obtained from PPML gravity regressions, using an elasticity of substitution $\sigma = 5$. EA–EA denotes trade within Euro Area countries, EA–NonEA denotes trade between Euro Area and non-Euro Area countries, and NonEA–NonEA denotes trade between non-Euro Area countries. Higher tariff equivalents imply larger trade frictions.

Several important insights emerge. First, trade barriers remain consistently highest between Euro Area and Non-Euro Area countries (EA–NonEA), starting at approximately 90% in 1995 and remaining elevated throughout the period. These substantial tariff-equivalent barriers highlight significant and persistent frictions in trade between EU members and countries outside the bloc, indicating substantial scope for improving external integration.

Second, barriers among Non-Euro Area countries (NonEA–NonEA) are intermediate, fluctuating generally between 70% and 85%. Such variation suggests heterogeneous integration and differing effectiveness of trade liberalization policies in other global regions.

Third, and notably, even though trade barriers within the Euro Area (EA–EA) are lower, they remain high in absolute terms—persistently around 60% even in recent years. This result implies that despite decades of integration policies, significant implicit trade barriers persist within the EU internal market. These barriers are likely driven by regulatory divergence, differences in standards, public procurement preferences, and infrastructure limitations, all contributing to ongoing internal market fragmentation.

Our results align broadly with existing literature on EU trade integration. For instance, Head and Mayer (2021) report internal EU tariff-equivalent trade barriers generally ranging from around 40% to 70% depending on methodology and period, and Mayer, Vicard, and Zignago (2019) find similarly high internal frictions when assessing the "cost of non-Europe." Thus, our findings that tariff equivalents within the Euro Area are around 55–70% reinforce previous evidence highlighting continued significant barriers despite extensive integration efforts.

Over the sample period, intra-EU trade barriers decline from around 70% in 1995 to about 55–60% by the mid-2010s, reflecting successful efforts toward deeper internal integration. However, a modest increase after 2015 suggests emerging internal challenges, potentially influenced by recent disruptions like Brexit, increased protectionist policies, and regulatory divergence, underscoring the importance of ongoing policy initiatives aimed at further reducing internal trade frictions.

Our empirical results highlight persistently substantial tariff-equivalent barriers within the Euro Area, consistently ranging around 55–70%. This indicates that, despite significant integration efforts, the EU internal market continues to exhibit substantial unrealized potential for trade liberalization and economic efficiency gains. In line with Fontagné and Yotov (2025) or Cuba-Borda et al. (2025), these findings suggest that EU member states have only partially capitalized on the potential benefits of deeper internal integration. Consequently, considerable "low-hanging fruit" remain, especially in sectors characterized by high regulatory divergence, fragmented standards, and varied infrastructural capacities.

Industry-Level Tariff Equivalents and Trade Integration.

To understand the heterogeneity underlying aggregate results, Charts 22 and 23 present tariff-equivalent trade barriers separately for groups of industries characterized broadly as high-tech and low-tech. Tariff equivalents are computed as ad valorem equivalents, quantifying implied barriers to trade flows from estimated border coefficients, with an elasticity of substitution $\sigma = 5$. The industry-level results highlight substantial heterogeneity in trade integration both across sectors and between regions.

In high-tech sectors (Vehicles, Machines, Chemicals, and Metals), tariff-equivalent trade barriers exhibit considerable variability (Chart 22), yet display a general pattern consistent with aggregate findings. Notably, intra-Euro Area trade barriers (EA–EA) remain significantly lower than barriers involving non-Euro Area countries, underscoring successful integration efforts within the EU's internal market. However, absolute internal trade barriers remain substantial, particularly in Vehicles and Metals (around 60–70%), implying notable room for further integration. Interestingly, the Machines sector reports relatively lower intra-EA barriers (around 40–50%), reflecting possibly greater regulatory harmonization and integration success. Barriers between EA and NonEA remain consistently high across high-tech industries, peaking around 90–100%, indicating persistent external market segmentation in technology-intensive sectors.

Chart 22

Tariff Equivalents for High-Tech Industries (%)

(a) Vehicles

(b) Machines

(c) Chemicals

(d) Metals

Notes: Tariff equivalents computed from PPML border coefficients, using $\sigma = 5$. EA–EA denotes intra-Euro Area trade, EA–NonEA denotes trade between Euro Area and non-Euro Area, and NonEA–NonEA denotes trade between non-Euro Area countries

In low-tech industries (Food, Textiles, Minerals, and Other), the results indicate even greater diversity in trade integration experiences (Chart 23). The Food sector stands out with exceptionally high tariff equivalents (80–90%) within the Euro Area, reflecting substantial regulatory and quality standard barriers, which notably exceed the average internal barriers. This sector also faces remarkably elevated barriers with NonEA partners, often above 100%, underscoring severe external trade fragmentation. In contrast, Textiles reveal a robust downward trend in intra-EA barriers from about 50% in 1995 to under 20% in recent years, indicating particularly successful internal integration. Minerals exhibit stable and relatively high barriers across all regions, consistent with considerable regulatory divergence and infrastructure bottlenecks, while the "Other" industries category shows volatile and intermediate barrier levels, likely reflecting heterogeneous sub-industries grouped within this category.

Chart 23

Tariff Equivalents for Low-Tech Industries (%)

(a) Food

(b) Textiles

(c) Minerals

(d) Other Industries

Sources:
Notes: : Tariff equivalents computed from PPML border coefficients, using $\sigma = 5$. EA–EA denotes intra-Euro Area trade, EA–NonEA denotes trade between Euro Area and non-Euro Area, and NonEA–NonEA denotes trade between non-Euro Area countries.

On average, intra-EA barriers were found to range from about 55–70%. Industry-level analysis highlights those aggregate averages obscure important sectoral variation. While the aggregate results indicated declining intra-EA barriers up to the mid-2010s, specific sectors like Vehicles and Food exhibit more persistent or even rising internal barriers in recent years, potentially linked to increased regulatory divergence and policy uncertainty. Conversely, sectors like Textiles clearly outperform the aggregate trend, emphasizing successful sector-specific integration efforts.

Overall, these industry-level findings reinforce the conclusion that while aggregate EU integration policies have reduced average internal trade frictions, substantial barriers persist at the sectoral level, necessitating targeted policy interventions tailored to specific industry dynamics.

One strategic response for the Euro Area is to take advantage of the economic potential of the internal market. Despite considerable integration efforts, internal barriers remain substantial. Empirical evidence presented earlier reveals persistent tariff-equivalent trade barriers, frequently ranging between 55% and 70% across various industries. These internal frictions primarily arise from regulatory divergence, heterogeneous national standards, and infrastructure gaps, indicating potential benefits from further integration efforts.

Reducing these internal barriers could improve economic resilience, market efficiency, and competitiveness. Specifically, the Vehicles, Metals, and Food industries present notable areas for targeted intervention, given their above-average internal trade frictions and substantial potential gains from further market harmonization.

However, achieving deeper internal market integration remains challenging due to divergent national economic priorities within the EU. These divergences are particularly evident in the proliferation of strategic and distortionary interventions, such as targeted subsidies, state aid, and restrictive industry-specific regulations adopted by individual member states. Such interventions often reflect distinct national interests and economic objectives, further exacerbating internal fragmentation and creating persistent tensions that impede unified market integration. This dynamic is underscored by empirical evidence of recurrent internal trade disputes and nationally motivated strategic interventions among EU countries, highlighting the complex interplay between collective EU-level strategies and competing national economic agendas. These complexities have been exacerbated by recent developments such as Brexit, rising protectionist tendencies, and increased regulatory divergence, highlighting the considerable effort required to achieve coherent internal policy alignment.

7.2 Diversification of External Alliances: Potential and Risks

Alternatively, recent shifts in U.S. trade policy characterized by increased economic nationalism and trade restrictions compel the Euro Area to reassess its external economic strategies, potentially diversifying its alliances beyond traditional partners. Within this context, China emerges as a possible but complex strategic partner given its sizeable market and technological capabilities.

Economic engagement with China offers potential opportunities, especially in terms of technological collaboration and market expansion. Nevertheless, our analysis on the ESI and PSI indicates increased technological convergence, intensifying direct competition between European and Chinese firms in high-tech sectors, including advanced manufacturing and machinery, creating vulnerabilities for the Euro Area

Moreover, a closer economic relationship with China poses significant geopolitical risks, potentially exacerbating tensions with traditional allies, notably the United States, which has recently adopted more protectionist and isolationist trade policies. Given these dynamics, alignment with China would require careful assessment and prudent management to avoid strategic misalignments and increased geopolitical exposure.

The quantitative model by de Soyres et al. (2025a) effectively captures these evolving dynamics. It illustrates how China's technological convergence, exemplified by rising ESI and PSI indices, translates into reduced economic benefits for the Euro Area from Chinese productivity gains over time. Specifically, between 2011 and 2023, positive productivity shocks in China generate significantly smaller gains for European economies, with notable heterogeneity across countries and sectors based on existing trade linkages. Germany's transport equipment sector, experiencing rapid competitive pressures due to China's expanding automotive production capabilities, particularly exemplifies this intensifying rivalry.

Overall, embedding our empirical findings within the structural framework from de Soyres et al. (2025a) provides critical quantitative insights into the macroeconomic interdependence and evolving competitive dynamics between the Euro Area and China, highlighting both economic opportunities and strategic vulnerabilities.

7.3 Monetary Policy Considerations Amid Geoeconomic Fragmentation

The rising geoeconomic fragmentation and intensified technological rivalry documented throughout this analysis pose specific monetary policy challenges for the ECB. Effective monetary policy formulation in the Euro Area critically depends on accounting for heterogeneous economic impacts across member states, especially concerning inflation dynamics and output volatility. Our measure of geopolitical exposure provides a valuable indicator for identifying such vulnerabilities.

Countries or sectors with significant reliance on trade involving geopolitically distant or risky partners are particularly susceptible to adverse economic shocks, manifesting through several distinct channels. First, increased geopolitical risk increases the likelihood of supply-chain disruptions, potentially resulting in persistent inflationary pressures driven by supply-side constraints (LaBelle and Santacreu, 2022; Comin et al. 2023; de Soyres et al. 2024). Second, the asymmetric exposure to geopolitical tensions across member states implies differentiated inflationary responses, where economies heavily dependent on geopolitically sensitive imports could face sustained inflationary pressures. Such divergence suggests the necessity for nuanced monetary policy frameworks capable of accommodating asymmetric shocks.

Moreover, elevated import concentration from geopolitically distant partners exacerbates vulnerability to disruptions, potentially amplifying economic downturns and generating uneven growth outcomes across the Euro Area. These disparities underscore a long-standing debate regarding the optimal design of monetary policy within the monetary union. Historically, proponents argued that the adoption of a single currency would drive greater economic integration and convergence among Euro Area countries, thereby enhancing monetary policy effectiveness. Yet, despite some progress toward synchronization of business cycles over the past two decades, significant heterogeneity persists, reflecting divergent inflation rates, varying cyclical positions, and incomplete fiscal integration across the area.

Finally, trade fragmentation and geopolitical risk affect euro area inflation dynamics. Increased supply chain vulnerabilities, particularly in strategic high-tech sectors, can result in persistent cost shocks that elevate price levels. Ongoing geopolitical uncertainties may drive continuous adjustments in firms' pricing behaviors, affecting inflation expectations. As documented in ECB analysis (Lane, 2025), fragmentation-related disruptions have persistent inflationary impacts, driven largely by reduced sourcing flexibility and higher input costs. These dynamics pose substantial challenges for monetary policy, complicating effective transmission mechanisms and potentially necessitating more proactive and nuanced policy responses from the ECB.

These challenges were notably acknowledged during ECB President Christine Lagarde’s July 2024 press conference, where she reiterated that monetary policy decisions are formulated for the Euro Area as a whole rather than tailored to individual members. However, in recent communications, including a speech to the European Parliament, President Lagarde emphasized the importance of deepening capital market integration across the European Union to bolster financial stability and enhance monetary policy transmission mechanisms.

Addressing these monetary policy challenges in the context of increased geopolitical fragmentation thus requires careful calibration. The ECB must weigh the trade-offs inherent in applying a uniform monetary stance against the backdrop of heterogeneous economic exposures. Enhancing structural resilience through deeper internal market integration and prudent diversification of external economic alliances may serve as complementary strategies, ultimately supporting more effective monetary policy outcomes.

8 Final Remarks: The Case for Cooperation

Our analysis underscores that effectively addressing monetary policy challenges posed by shifting global trade dynamics needs strategic coordination both within and beyond the European Union. Relying solely on external diversification could unintentionally amplify the very geopolitical vulnerabilities and inflation risks highlighted throughout our findings, given persistent dependence on geopolitically distant suppliers. Conversely, internal market integration initiatives, while crucial, have proven insufficient to eliminate structural barriers fully. The resulting heterogeneity in economic conditions across member states significantly complicates uniform monetary policy responses.

Given these complexities, coordinated policies within the EU aimed at reducing internal fragmentation become paramount. Harmonizing regulations, standards, and infrastructure can lower intra-EU trade barriers, fostering economic convergence and enhancing the ECB's policy effectiveness. Improved internal market coherence would also mitigate differential inflation pressures across member states, enabling monetary policy to function more uniformly and predictably.

Furthermore, international cooperation is essential for mitigating strategic vulnerabilities, particularly in critical sectors such as advanced manufacturing, semiconductors, and energy technologies. Joint international strategies could stabilize global supply chains, dampen inflation volatility, and reduce risks associated with selective decoupling or unilateral protectionist measures. Such cooperative frameworks could encompass coordinated trade agreements, aligned regulatory standards, and joint initiatives for supply-chain resilience.

Lastly, strategic collaboration to foster technological innovation and market standardization can prevent detrimental increases in domestic market concentration. Policies supporting joint R&D investments, shared intellectual property standards, and common technological benchmarks could counteract distortive market dynamics and encourage healthy competition. Collectively, these strategic cooperative efforts—both within the EU and internationally—will be crucial in navigating the intricate interplay between geopolitical fragmentation, market efficiency, and monetary policy stability.

Online Appendix

Country Classification by Geopolitical Alignment with Germany

In Section 3, we classified countries into three blocs: U.S.-aligned, China-aligned, and Nonaligned. Based on this, we assigned each country pair to one of three categories: same bloc, different bloc, or nonaligned, depending on the geopolitical alignment of each country in the pair.

For reference, we present here the list of countries that fall into each category when compared with Germany—a representative euro area (EA) member—using the 2023 IPD with all votes classification. Since Germany is part of the U.S.-aligned bloc, all countries in the "same bloc" category are also U.S.-aligned under this specification.

Same bloc. United States, Canada, United Kingdom, Ireland, Netherlands, Belgium, Luxembourg, France, Monaco, Liechtenstein, Spain, Andorra, Portugal, Poland, Austria, Hungary, Czechia, Slovak Republic, Italy, San Marino, Malta, Albania, Montenegro, North Macedonia, Croatia, Bosnia and Herzegovina, Slovenia, Greece, Bulgaria, Moldova, Romania, Estonia, Latvia, Lithuania, Ukraine, Georgia, Finland, Sweden, Norway, Denmark, Iceland, Israel, Korea, Republic of, Australia, New Zealand, Marshall Islands, Micronesia.

Different bloc. Cuba, Bolivia, Russia, Belarus, Azerbaijan, Sao Tome and Principe, Guinea-Bissau, Equatorial Guinea, Mali, Niger, Burkina Faso, Nigeria, Uganda, Burundi, Somalia, Djibouti, Eritrea, Zimbabwe, South Africa, Namibia, Comoros, Algeria, Tunisia, Libya, Sudan, Iraq, Egypt, Lebanon, Jordan, Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates, Oman, Turkmenistan, Tajikistan, Uzbekistan, China, Mongolia, Dem. People's Rep. of Korea, Sri Lanka, Lao PDR, Vietnam, Malaysia, Brunei Darussalam, Indonesia.

Nonaligned. Bahamas, Haiti, Dominican Republic, Jamaica, Trinidad and Tobago, Dominica, Grenada, St. Lucia, Barbados, Belize, St. Vincent and the Grenadines, Antigua and Barbuda, St. Kitts and Nevis, Mexico, Panama, Guyana, Ecuador, Peru, Brazil, Chile, Argentina, Bolivia, Paraguay, Uruguay, Switzerland, Cyprus, Armenia, Cabo Verde, Gambia, Senegal, Lesotho, Eswatini, Guinea, Liberia, Sierra Leone, Ghana, Togo, Cameroon, Gabon, Central African Republic, Kenya, Ethiopia, Cote d'Ivoire, Congo, Rep., Tanzania, Rwanda, Angola, Mozambique, Zambia, Malawi, Botswana, Madagascar, Mauritius, Seychelles, Morocco, South Sudan, Yemen, Afghanistan, Kazakhstan, Japan, India, Bhutan, Pakistan, Bangladesh, Myanmar, Maldives, Nepal, Thailand, Cambodia, Singapore, Philippines, Timor-Leste, Papua New Guinea, Vanuatu, Solomon Islands, Kiribati, Tuvalu, Fiji, Tonga, Nauru, Palau, Samoa.

Robustness check: alternative definition of Post variable

To test the robustness of our main findings from section 3, here we re-estimate the gravity regressions using an alternative definition of the post-period, setting the Post dummy to begin in 2019 instead of 2022. This earlier cutoff captures the initial shift in global trade dynamics following the onset of the U.S.–China trade tensions and the buildup to the COVID-19 pandemic. While the fragmentation effects between geopolitical blocs are directionally similar but smaller than in Table 1, we still detect some decoupling by euro area countries from nonaligned partners, particularly in high-tech trade. These findings suggest that the sharpest phase of geoeconomic fragmentation emerged after 2022, though some reorientation trends may have begun earlier.

Table 2

Alternative Gravity Regression Results: Geoeconomic Fragmentation in Global and EA Trade

Panel A: Total Goods Trade

	Baseline IPD	IPD 2023	Economic IPD	Post-1990 IPD
Between Bloc × Post	-0.145***	-0.304***	-0.111**	-0.149***
	(0.054)	(0.065)	(0.051)	(0.055)
Nonaligned × Post	-0.123*	-0.109**	-0.051	-0.119*
	(0.063)	(0.050)	(0.054)	(0.062)
Between Bloc × Post × EA	0.030	0.110	-0.002	0.029
	(0.078)	(0.079)	(0.069)	(0.080)
Nonaligned × Post × EA	-0.081*	-0.022	-0.028	-0.074
	(0.046)	(0.034)	(0.040)	(0.045)
Observations	389,747	389,761	387,589	389,747

Panel B: High-Tech Goods Trade

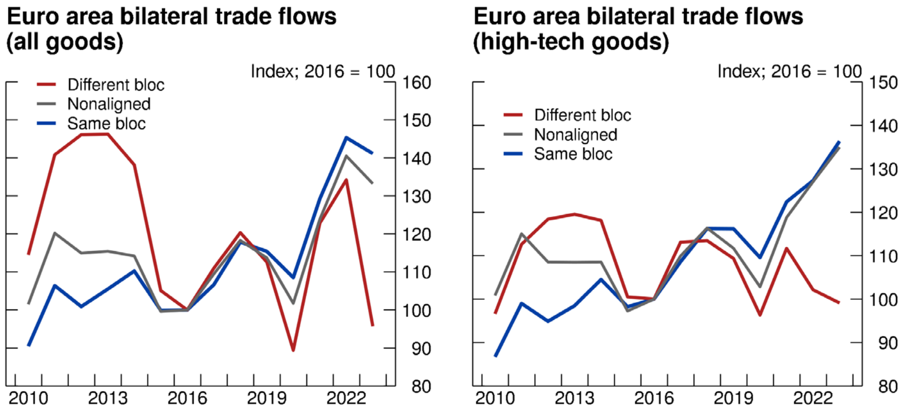
	Baseline IPD	IPD 2023	Economic IPD	Post-1990 IPD
Between Bloc × Post	-0.112**	-0.213***	-0.093**	-0.113**
	(0.049)	(0.068)	(0.046)	(0.049)
Nonaligned × Post	-0.120*	-0.116**	0.032	-0.123**
	(0.063)	(0.047)	(0.059)	(0.062)
Between Bloc × Post × EA	0.067	0.059	0.048	0.069
	(0.081)	(0.097)	(0.071)	(0.082)
Nonaligned × Post × EA	-0.178***	-0.010	-0.130***	-0.175***
	(0.039)	(0.035)	(0.043)	(0.039)
Observations	291,816	291,702	291,702	291,831

Notes: Poisson pseudo-maximum likelihood (PPML), using annual data for total goods trade for the period 2001–2023, from UN Comtrade (Panel A), and annual data for high-tech goods trade for the period 2001–2023, from CEPII (Panel B). Standard errors clustered at the country-pair level. We include country-pair, source × year, and destination × year fixed effects. Post is a dummy equal to 1 in 2019–2023, after the first round of U.S. tariffs to China. Each column corresponds to a different IPD-based bloc classification. Coefficients are interpreted as (exp(coefficient) – 1) × 100. Significance: *** 1%, ** 5%, * 10%.

Table 3
Manufacturing Industries Classified by Technological Intensity

Technology intensity	ISIC Revision 3
High-technology	
1. Chemicals and pharmaceuticals	24
2. Machinery and equipment	29
3. Computer, electronic and optical products	30, 33
4. Electrical equipment	31, 32
5. Transport equipment	34, 35
Medium-technology	**Medium-technology**
6. Petroleum products	23
7. Rubber and plastics	25
8. Basic metals and metal products	27, 28
Low-technology	**Low-technology**
9. Food, beverages, tobacco	15, 16
10. Textiles, apparel, leather	17, 18, 19
11. Wood products	20, 21, 22
12. Non-metallic mineral products	26
13. Furniture & Other Manufacturing	36

Chart A.1
Euro Area Trade by Geopolitical Bloc (2010-2023)



Sources: UN Comtrade; authors' calculations.
Notes: The left panel displays total goods trade, while the right panel illustrates trade in high-tech goods. Trade values are indexed to 2016 (2016 = 100). The classification of geopolitical blocs ("Aligned," "Nonaligned," and "Distant") follows the all votes 2023 IPD alignment measure described in (Airaudo et al. 2025) using a U.S-China segmented distribution based on UNGA votes 1946-2023. High-tech goods include sectors such as electronics, pharmaceuticals, and precision instruments. Intra-Euro area trade is excluded.

The left panel displays total goods trade, while the right panel illustrates trade in high-tech goods. Trade values are indexed to 2016 (2016 = 100). The classification of geopolitical blocs ("Aligned," "Nonaligned," and "Distant") follows the all votes 2023 IPD alignment measure described in (Airaudo et al. 2025) using a U.S-China segmented distribution based on UNGA votes 1946-2023. High-tech goods include sectors such as electronics, pharmaceuticals, and precision instruments. Intra-Euro area trade is excluded.

Robustness check: Excluding China

To assess China's influence on our fragmentation estimates, we re-estimated the PPML gravity models excluding all observations involving China (Table 4) and compared the resulting coefficients with the corresponding full-sample estimates from Table 1.

In Panel A of Table 4, we report results for total goods trade excluding China. The between-bloc × Post coefficient is consistently attenuated relative to Table 1, confirming China's outsized role in early fragmentation. Under the Baseline IPD, the coefficient declines from –0.133** to –0.047, becoming statistically insignificant. In contrast, under the 2023 IPD, the coefficient remains large and significant at –0.244*** (versus –0.315*** in the full sample). This persistence indicates that the goods trade collapse between geopolitically distant country pairs has become more generalized across non-Chinese dyads in recent geopolitical realignments—an effect only captured when countries are classified using 2023 IPDs. The between-bloc × Post × EA interaction, which was previously positive and significant under the 2023 IPD, becomes insignificant once China is excluded, suggesting that the Euro Area's earlier resilience in inter-bloc trade was primarily driven by its strong bilateral trade with China.

Excluding China also alters the estimated effects on trade among nonaligned partners. Under the Baseline IPD, the nonaligned × Post coefficient plunges from –0.030 to –0.183** (≈ –16.8 percent), indicating that China's trade acted as a buffer for the nonaligned group. Once China is excluded, the remaining nonaligned countries exhibit a much sharper contraction in trade. Under the 2023 IPD, however, the nonaligned effect remains insignificant. The nonaligned × Post × EA interaction also remains negative and insignificant across specifications, consistent with the Euro Area's close strategic alignment with the United States.

In Panel B of Table 4, we focus on high-technology goods. Excluding China moderately dampens the estimated bloc-level fragmentation in high-tech trade—e.g., the 2023 IPD coefficient declines from –0.229** to –0.145**—while simultaneously amplifying the high-tech trade contraction among nonaligned countries. This pattern indicates overall fewer disruptions at the bloc level but deeper pull-backs among nonaligned partners.

Overall, the results confirm China’s critical role in shaping early fragmentation dynamics, particularly in nonaligned and high-tech trade. Nevertheless, the broader patterns—selective decoupling, a post-2022 generalization of inter-bloc trade contractions, and the Euro Area’s muted response outside of China—remain robust even when China is excluded from the sample.

Table 4

Gravity Regression Results: Geoeconomic Fragmentation in Global and EA Trade Excluding China

Panel A: Total Goods Trade

	Baseline IPD	IPD 2023	Economic IPD	Post-1990 IPD
Between Bloc × Post	-0.047	-0.244***	0.032	-0.050
	(0.050)	(0.070)	(0.045)	(0.052)
Nonaligned × Post	-0.183**	0.012	-0.102*	-0.177**
	(0.086)	(0.065)	(0.059)	(0.084)
Between Bloc × Post × EA	-0.079	0.124	-0.092*	-0.083
	(0.051)	(0.076)	(0.052)	(0.053)
Nonaligned × Post × EA	0.023	-0.060	0.036	0.024
	(0.055)	(0.038)	(0.047)	(0.053)
Observations	385,459	385,472	383,324	385,459

Panel B: High-Tech Goods Trade

	Baseline IPD	IPD 2023	Economic IPD	Post-1990 IPD
Between Bloc × Post	-0.064*	-0.145**	-0.024	-0.065*
	(0.038)	(0.067)	(0.033)	(0.039)
Nonaligned × Post	-0.251***	-0.036	0.015	-0.255***
	(0.081)	(0.052)	(0.058)	(0.079)
Between Bloc × Post × EA	-0.030	-0.117	-0.014	-0.025
	(0.044)	(0.076)	(0.039)	(0.046)
Nonaligned × Post × EA	-0.162***	-0.034	-0.131***	-0.158***
	(0.051)	(0.037)	(0.047)	(0.050)
Observations	287,537	287,422	286,028	287,552

Notes: Poisson pseudo-maximum likelihood (PPML), using annual data for total goods trade for the period 2001–2023, from UN Comtrade (Panel A) and annual data for high-tech goods trade for the period 2001–2023, from CEPII (Panel B). Standard errors are clustered at the country-pair level. We include country-pair, source × time, and destination × time fixed effects. Post is a dummy that captures the post-invasion of Ukraine period and takes the value 1 for the years 2022 and 2023. Each column shows the results using a different IPD measure to construct the country blocs. (1) uses the Baseline IPD measure (2021 UNGA voting data); (2) uses 2023 IPD; (3) uses Economic IPD (economic votes only, 1971–2021); (4) uses post-1990 IPD across all votes. Coefficients are interpreted as exp(coefficient) - 1 × 100. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Additional analysis: time-varying association between geopolitical distance and international trade

To complement the analysis in Section 3, we examine how the relationship between geopolitical distance and trade flows has evolved over time using a rolling 10-year window analysis from 1990 to 2023 (see Carluccio et al. 2025; Boeckelmann et al. 2024). Chart A.2 presents coefficient estimates from gravity model regressions that include a comprehensive set of fixed effects to control for time-invariant country-pair characteristics and time-varying multilateral resistance terms. The analysis reveals notable temporal variation in how geopolitical alignment affects international trade patterns.

The full sample results show that geopolitical distance had minimal impact on trade flows through the early 2010s, with coefficient estimates hovering near zero and generally not statistically significant. However, beginning around the mid-2010s, a negative relationship emerges, indicating that geopolitically distant countries began trading less with each other. This pattern temporarily weakened during the pandemic years, possibly due to supply chain disruptions and emergency trade needs that overrode geopolitical considerations, but the negative association has resumed and strengthened in the most recent period.

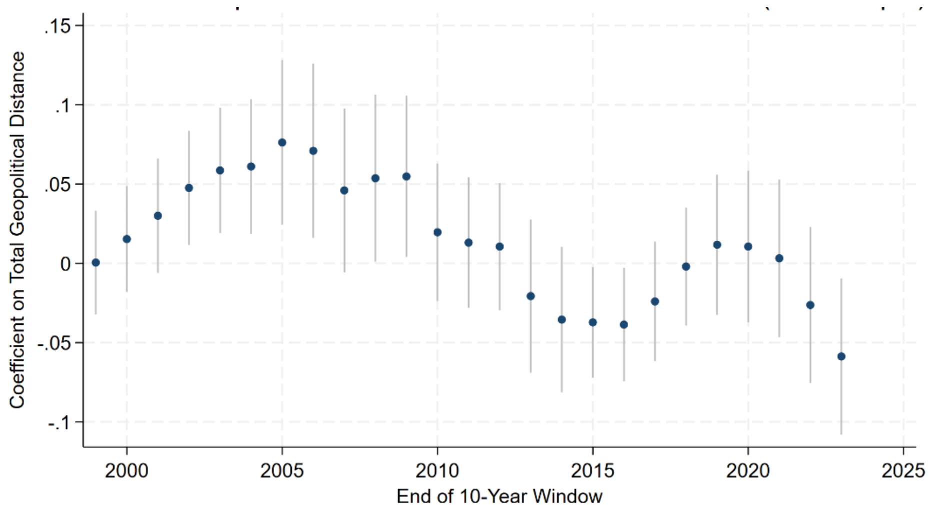
The sample excluding China reveals a markedly more pronounced pattern. When Chinese trade flows are removed from the analysis, the negative effect of geopolitical distance on trade becomes substantially larger in magnitude from the mid-2010s onward. The coefficient estimates in this specification are consistently more negative and show greater statistical significance, suggesting that geopolitical considerations have played a more prominent role in shaping trade relationships among country pairs that do not involve China.

This divergence between the full sample and China-excluded results highlights China's distinctive position in the global trading system. China's trade patterns appear to have been less constrained by geopolitical distance, as the country simultaneously expanded trade relationships with both geopolitically distant partners such as European Union countries and closer regional allies in East Asia. This behavior reduced the overall explanatory power of geopolitical distance in the full sample. However, it is important to note the specific case of US-China trade relations, where geopolitical tensions have demonstrably influenced bilateral trade flows, representing a notable exception to China's otherwise relatively geopolitically-agnostic trade expansion strategy.

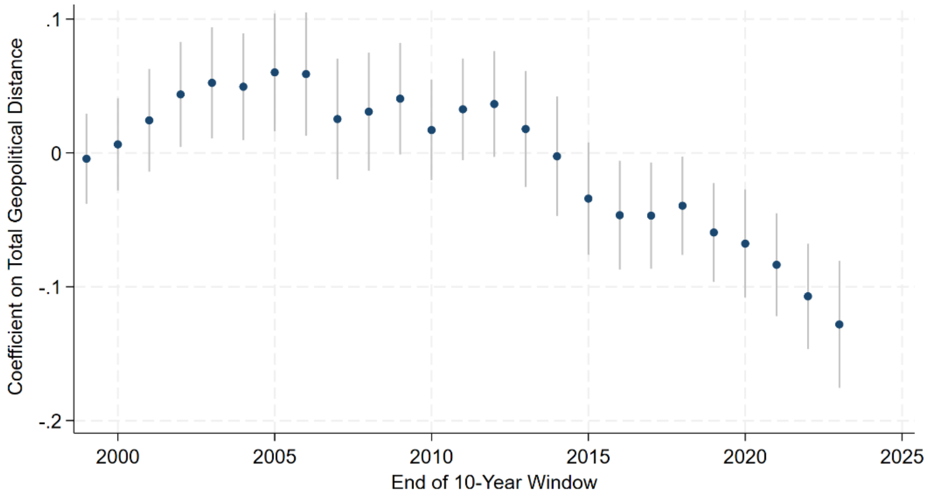
Chart A.2

Time-varying estimates of the association between Geopolitical Distance and Trade

(a) Full sample



(b) Sample excluding China



Sources: UN Comtrade; authors' calculations.
Notes: The coefficients on geopolitical distance come from a PPML regression with a 10-year rolling window beginning in 1990 and ending in 2023. The regression incorporates interacted time and origin/destination fixed effects, respectively, as well as country-pair fixed effects. We also include the PSI as a time-varying bilateral control. Standard errors are clustered at the country-pair level and confidence intervals are at the 95% level.

Chart A.3

Euro Area and U.S. Trade with China and Russia (2011Q1-2025Q1)

Sources: Haver Analytics; U.S. Census Bureau; Authors' calculations.
Notes: This figure displays total quarterly trade in goods (in billions of U.S. dollars) between the Euro Area and China (top-left), the United States and China (top-right), the Euro Area and Russia (bottom-left), and the United States and Russia (bottom-right) from 2011Q1 through 2025Q1. Trade values represent gross flows (exports and imports). Intra-Euro Area trade is excluded.

The figure illustrates contrasting trade patterns across major geopolitical partners. While both China and Russia are classified as geopolitically distant from the Euro Area, trade responses have diverged. Euro Area trade with Russia collapses sharply after 2022, reflecting the impact of sanctions and strategic disengagement. In contrast, Euro Area trade with China remains robust, particularly on the import side. Notably, Euro Area exports to China have stalled in recent years, suggesting increasing difficulty in penetrating Chinese markets. The result is a widening bilateral trade deficit. Meanwhile, U.S. trade with China shows greater balance, with both imports and exports leveling off. These patterns highlight a form of selective fragmentation, where the Euro Area decouples decisively from Russia but maintains deep, albeit asymmetric, trade ties with China.

Additional Figures

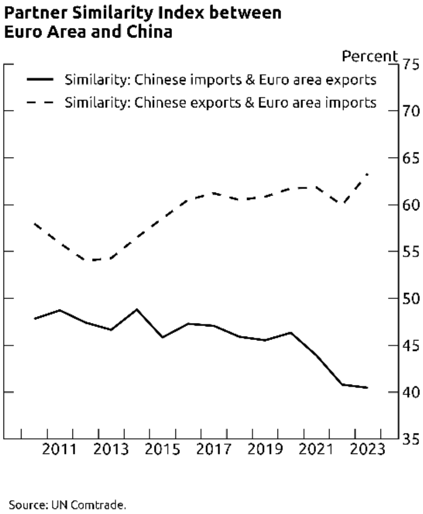
We disaggregate the PSI in Figures 3(b) and 3(c) and present the results separately for the Euro Area, Germany, and the United States. This breakdown allows us to examine how closely China's export structure aligns with the import patterns of each advanced economy—and conversely, how each country's export profile maps onto Chinese import demand. The results reveal important asymmetries: PSI values for China's exports to the Euro Area and Germany have increased notably over time, indicating growing overlap between Chinese exports and European strategic import needs, particularly in manufacturing sectors such as machinery, chemicals, and transport equipment. In contrast, the PSI between China's exports and U.S. imports has remained relatively stable or increased more modestly, suggesting less direct competition in the composition of traded goods.

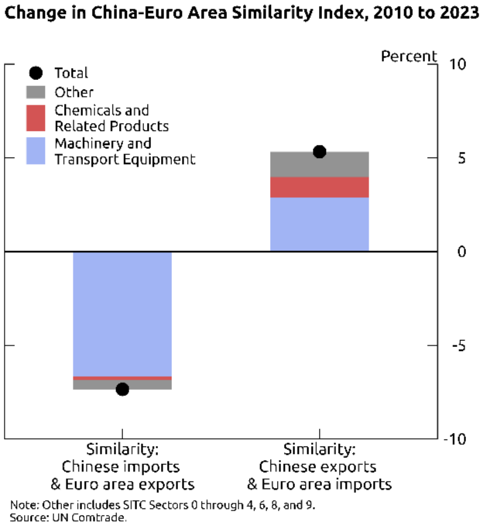
The pattern is reversed when considering exports from advanced economies to China. The PSI between German (and to a lesser extent, Euro Area) exports and Chinese imports shows a declining trend in recent years, indicating that Europe's export bundle is becoming less aligned with Chinese demand. This suggests reduced market access or increased difficulty penetrating Chinese markets, potentially due to import substitution, shifting domestic policy priorities in China, or rising competition from Chinese producers. In contrast, U.S. exports show a flatter PSI trend, suggesting more stable sectoral alignment with Chinese import needs, albeit at lower levels. Taken together, these patterns point to an asymmetric competitive landscape: China is strategically aligning its exports with European demand, while European exporters face growing challenges accessing the Chinese market.

Chart A.4

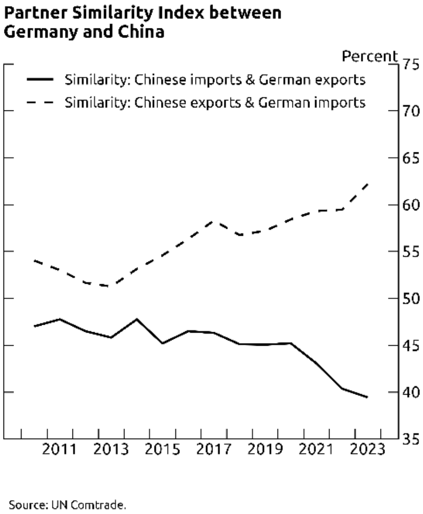
Partner Similarity Index between China and Selected Advanced Economies

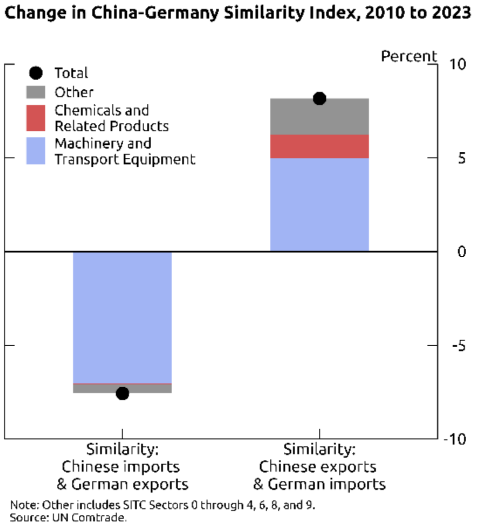
(a) PSI China and the Euro Area



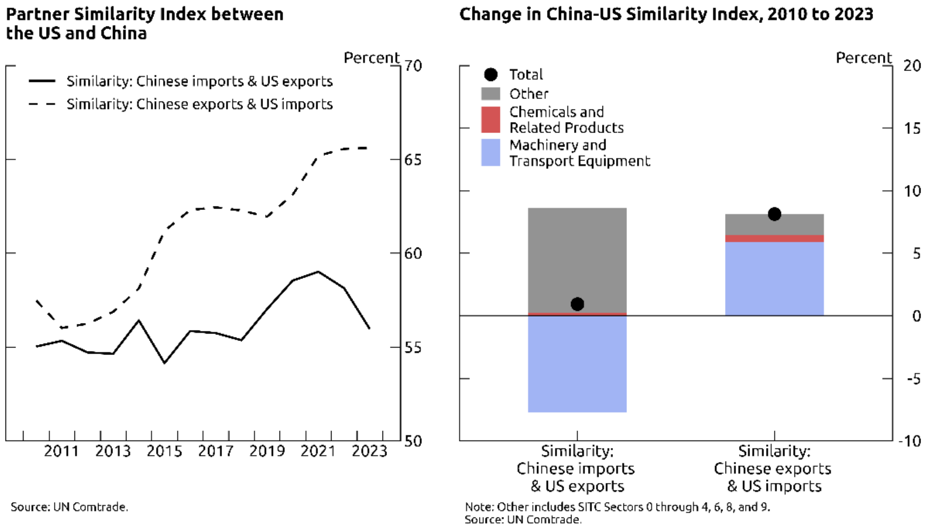


(b) PSI China and Germany





(c) PSI China and the United States



Sources: UN Comtrade.
Notes: The chart shows patent similarity indices between 2013 and 2021. Industries are classified according to the International Standard Industrial Classification (ISIC), Revision 3. Panel (a) illustrates the Patent ESI, measuring overlaps between China's and the Euro Area's patenting activities globally. Rising values indicate growing direct competition in global technological markets. The dashed line depicts PSI from the perspective of China's exports and the advanced economy's imports; the solid line depicts PSI from the perspective of China's imports and the advanced economy's exports. Panel (a) shows the Euro Area; panel (b) shows Germany, and panel(c) shows the United States.

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