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Working Paper

The economic impact of geoeconomic fragmentation of commodity markets

PIDS Discussion Paper Series, No. 2025-49

Provided in Cooperation with:

Philippine Institute for Development Studies (PIDS), Philippines

Suggested Citation: Quimba, Francis Mark A.; Barral, Mark Anthony A. (2025) : The economic impact of geoeconomic fragmentation of commodity markets, PIDS Discussion Paper Series, No. 2025-49, Philippine Institute for Development Studies (PIDS), Quezon City, <https://doi.org/10.62986/dp2025.49>

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The Economic Impact of Geoeconomic Fragmentation of Commodity Markets

Francis Mark A. Quimba and Mark Anthony A. Barral

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The Economic Impact of Geoeconomic Fragmentation
of Commodity Markets

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PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

December 2025

Abstract

This study develops a multidimensional Geoeconomic Fragmentation (GEF) Index and applies structural gravity modeling to quantify how rising geopolitical tensions, sanctions, and supply-chain disruptions reshape ASEAN and Philippine commodity trade. Using dyad–product–year data (2000–2024), the GEF index integrates political distance, sanctions exposure, tariff barriers, trade intensity, and import volatility. A suite of Poisson Pseudo-Maximum Likelihood (PPML) models – including baseline, structural, and bloc-interaction specifications – captures how fragmentation and global shocks (trade war, COVID-19, Russia–Ukraine war, chip and shipping crises) differentially affect trade with China, the EU, the US, and the rest of the world. Results show that fragmentation re-routes rather than reduces trade, generating asymmetric losses across commodities and identifying highly vulnerable export and import lines for ASEAN and the Philippines.

Keywords: ASEAN trade, commodity vulnerability, geoeconomic fragmentation, gravity model, international trade, political distance, sanctions, supply-chain shocks, tariff barriers, trade diversion, trade intensity

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The Economic Impact of Geoeconomic Fragmentation of Commodity Markets

Francis Mark A. Quimba and Mark Anthony A. Barral¹

1. Introduction

Geoeconomic fragmentation can lead to increased volatility in commodity prices, affecting both producers and consumers across the globe. Geopolitical tensions have historically disrupted supply chains, leading to price spikes in essential commodities like oil and grains. Fragmented markets can exacerbate price volatility and create inefficiencies that hinder economic growth (Baffes and Kabundi 2021, Alvarez et al. 2023, Aiyar and Ilyina 2023). However, while these studies provide valuable insights into specific commodities or regions, there is a lack of comprehensive analysis that connects these fragmented market dynamics to broader economic outcomes.

Geoeconomic fragmentation is defined as a policy-driven reversal of integration, often guided by strategic considerations (Aiyar et al. 2023). It is a condition where countries intentionally implement policies that hinder or reverse the degree of global economic integration, primarily due to national security, achieving greater autonomy, or responding to geopolitical rivalry. It is deliberate strategy of decoupling economic systems, often driven by geopolitical tensions, leading to disruptions in global trade and investment flows. This phenomenon has garnered significant attention due to its potential to destabilize commodity markets, which are integral to global economic stability.

According to Alvarez et al. (2023), geoeconomic fragmentation affects commodity markets, and could lead to substantial price volatility, particularly in markets critical for the clean energy transition, such as minerals and selected agricultural commodities. Using a novel dataset encompassing production and bilateral trade flows of 48 major energy, mineral, and agricultural commodities, offering a granular view of the vulnerabilities within these markets, they conclude that trade disruptions resulting from geopolitical tensions can cause large price changes and increased volatility, posing economic risks globally (Alvarez et al. 2023).

Weighing on this issue, the European Central Bank (ECB) warns that global trade fragmentation, driven by protectionist measures, will result in significant output losses for all countries involved. Such fragmentation leads to more frequent and larger supply shocks in the short term, and increased volatility and inflation in the long term. These insights underscore the broader macroeconomic implications of geoeconomic fragmentation, extending beyond commodity markets to affect overall economic stability (Reuters 2025).

Further, such fragmentation, which has accelerated since geopolitical events like Russia's invasion of Ukraine, could cause large price changes and volatility in many commodities. Mineral markets critical for the clean energy transition and selected agricultural commodity markets appear among the most vulnerable. While global surplus losses may be modest due to offsetting effects across commodity-producing and consuming countries, the heterogeneous

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impacts on economic surplus across nations warrant careful consideration by policymakers (Alvarez et al. 2023).

In the context of Southeast Asia, geoeconomic fragmentation poses specific challenges. The region's economies are deeply integrated into global commodity markets, making them susceptible to disruptions. Studies focusing on the Association of Southeast Asian Nations (ASEAN) highlight the need for regional cooperation to mitigate the adverse effects of such fragmentation. By strengthening intra-regional trade and investment, ASEAN countries can enhance their resilience against external shocks.

Rising geopolitical tensions and inward-looking policies lead to geoeconomic fragmentation, affecting trade and capital flows in both the Euro area and ASEAN+3 regions. While ASEAN+3 trade values have remained stable, trade patterns have shifted, underscoring the need for enhanced regional cooperation to maintain economic resilience (ESM 2024).

In Indonesia, Malaysia, the Philippines, Singapore, and Thailand, increased regional integration can bolster resilience against external shocks stemming from global fragmentation. To uphold the vision of ASEAN regional architecture, member states should strengthen their unity and regional cooperation mechanisms to navigate the complexities of geoeconomic fragmentation (Hussain 2024). However, despite progress in trade integration, there is significant room for advancing financial integration among ASEAN-5 members to better withstand fragmentation risks (Baek et al. 2023). While global economic cooperation scenarios can enhance ASEAN's participation in global value chains, regional cooperation within ASEAN is crucial to mitigate the negative impacts of geoeconomic fragmentation (Plummer 2023).

Moreover, countries are adopting inward-focused strategies to enhance economic and national security, significantly influencing trade and capital flows in regions characterized by high trade openness (Upadhyaya 2024).

Geoeconomic fragmentation, driven by rising geopolitical tensions and protectionist policies, disrupts global trade and investment flows, intensifies commodity price volatility, and generates inefficiencies that hinder economic growth. While existing studies highlight specific sectoral or regional vulnerabilities, there remains a lack of comprehensive analysis linking fragmented commodity markets to broader macroeconomic outcomes such as inflation, output stability, and long-term resilience. The impacts of fragmentation are uneven across nations, with commodity producers and consumers facing heterogeneous risks, underscoring the need for differentiated policy responses. For Southeast Asia, member states are deeply integrated into global value chains, these challenges are compounded by gaps in financial integration and limited regional cooperation, leaving the region highly susceptible to external shocks and threatening its capacity to uphold economic stability and its vision of deeper integration.

Against this backdrop, this paper addresses the question “What is the overall economic impact of geoeconomic fragmentation on regional and domestic commodity markets?” Specifically, the paper addresses the questions:

- a. How does geoeconomic fragmentation affect commodity trade?
- b. What are the trade patterns under geoeconomic fragmentation?
- c. How does fragmentation affect commodity-dependent economies, especially in Southeast Asia?

Guided by these questions, this paper has the following objectives:

General Objective: To assess the economic impact of geoeconomic fragmentation on commodity markets.

Specific Objectives:

- a. To analyze trade volatility in fragmented markets.
- b. To analyze trade trends in fragmented commodity markets.
- c. To assess the vulnerability of commodity-dependent economies to fragmentation.

2. Foundations and Drivers of Geoeconomic Fragmentation

2.1. Rivalry and Security

Geoeconomic fragmentation has gained prominence in global policy and academic discourse, particularly in the aftermath of renewed geopolitical tensions. The International Monetary Fund (IMF) refers to it as a multidimensional process of economic ramification resulting from policy-driven reversal of global economic integration (Aiyar et al. 2023). It is the breaking down of global economic order as a consequence of weaponizing economic interdependence and deliberate decoupling of international economic relations manifested through tariffs, sanctions, investment restrictions, or export controls that disrupt global trade and financial integration (Abdullahi, Ibrahim, and Mahmud 2025).

This arises when geopolitical divisions reshape economic relations, a process that fosters regional trading blocs and strategies that foster friend-shoring, relocating production to politically aligned countries. This means that politics, not just markets, determine economic linkages, resulting in higher prices and reduced access to goods and services (Rozenov and Zhang 2025). Geopolitics, policy, and technology are reshaping economic integration in a complex and interconnected cycle. Geopolitical tensions drive governments to create policies that influence how and where technology is developed and deployed – indicating how political rivalries and strategic considerations reshape economic ties, undermining multilateral cooperation and globalization’s efficiency gains (Baldwin and Ruta). The growing geopolitical and economic fragmentation, driven by increased restrictions on international trade, could weaken long-term growth by limiting technological diffusion, lowering efficiency in resource and capital allocation, and intensifying financial volatility by dividing markets into regional blocks (IMF 2023).

It is a strategic shift away from global economic integration towards a system where nations prioritize their own sovereignty and security as characterized by policies that disrupt interconnectedness, such as tariffs, export controls, and regulatory fragmentation; this fragmentation is not just a simple withdrawal from global trade but as a new and strategic paradigm of “gated globalization”, which implies that countries still participate in global trade but they do so in their own terms, selectively controlling access to their markets and supply chains for their own security (Azim et al. 2025).

Geoeconomic fragmentation materializes in multiple channels of disruption, including trade restrictions, technological barriers, labor mobility, capital flow restrictions, and uncertainty shocks.

Trade barriers in the forms of tariffs and non-tariff measures (e.g., export bans, sanctions) increase trade costs and reduce efficiency in global value chains. The US-China trade war, for instance, introduced tariff hikes across hundreds of billions of dollars in goods, disrupting supply chains in electronics and agriculture. These measures fragment global trade into competing blocs, undermining economies of scale and driving price volatility in commodities (Aiyar et al. 2023). These trade restrictions can cause sizeable output losses, particularly in low-income countries (Bolhuis, Chen, and Kett 2023).

Export controls, knowledge restrictions, and digital standards divergence create technological decoupling that slows innovation and productivity growth. For instance, restrictions imposed on semiconductor exports to China limit global trade diffusion. While cross-border knowledge flows are crucial for sectoral productivity growth, technological decoupling could cut GDP by around 5 percent in several economies (Cerdeiro et al. 2021 and Goes and Bekker 2022). Thus, fragmentation reduces the potential technological catch-up, particularly for emerging economies.

On cross-border labor mobility, restrictions hinder human capital development and knowledge transfer. Policies that limit visas, migration, or professional recognition reduce the exchange of skills across countries. Such measures weaken the accumulation of human capital, especially in countries that are reliant on remittances and labor exports, which, overtime, undermines productivity and inclusive growth (Aiyar et al. 2023).

Fragmentation also manifests in capital controls, screening of foreign direct investment (FDI), and financial sanctions, restricting access to external financing and deterring investments in geopolitically misaligned economies. Friend-shoring is estimated to increase trade costs that results in up to 4.6 percent losses in global GDP (Javorcik et al. 2022). Lower greenfield FDI flows, correlated by greater geopolitical distance, demonstrate that greater *geopolitical distance* correlates with lower greenfield FDI flows. These findings suggest that fragmentation constrains capital mobility and increases vulnerability for smaller economies highly dependent on FDI, such as ASEAN member states. The greater the geopolitical distance between countries the less the greenfield FDI flows are, suggesting that geopolitical fragmentation makes it harder for capital to move freely and leaves smaller economies that are heavily reliant on foreign investments more vulnerable (Aiyar, Malacrino, and Presbitero 2024).

Finally, geoeconomic fragmentation raises policy and market uncertainty, discouraging firms in engaging in long-term investments. Tensions and sudden restrictions create volatile expectations that lead to firms delaying or downscaling projects. This uncertainty channel amplifies the negative impact of fragmentation, especially in commodity markets where price expectations drive investment cycles (Aiyar et al. 2023).

Taken together, these highlight how economic flows are increasingly governed by political priorities, with commodity markets among the most exposed domains.

2.2. Economic Shifts under Geoeconomic Fragmentation

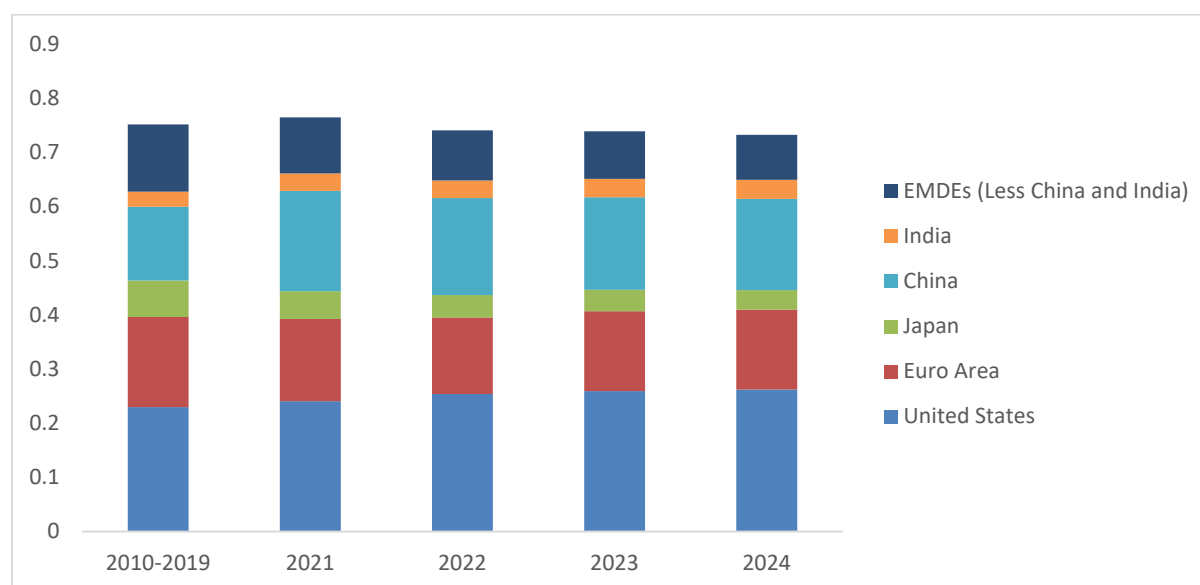
2.2.1 Global GDP

Global GDP shares have shifting patterns of economic weight across major blocs. Between 2010-2019 and 2024, the United States has steadily increased its share of global GDP from about 23 to 26 percent, reinforcing its role as the largest single economy. By contrast, the Euro Area and Japan show long-term decline, with Europe's share dropped from 16 percent to around 14 to 15 percent, while Japan's fell more sharply from nearly 7 to just 3.6 percent (Figure 1). These declines reflect slower growth, demographic headwinds, and structural constraints compared to dynamic emerging economies.

On the other hand, China's rise remains striking, growing from 13.6 percent of global GDP in the 2010s to a peak of 18.5 percent in 2021, although it has moderated toward 16.8 percent in 2024 as growth slows. India, though smaller, shows steady upward momentum, surpassing 3.5 percent by 2024. Meanwhile, Emerging Markets and Developing Economies (EMDEs) (excluding China and India) are losing global GDP weight, falling from 12.4 percent to 8.3 percent, indicating that there are challenges in sustaining growth.

These shifts do not perfectly align with global wealth shares, since GDP reflects annual production, while wealth captures accumulated assets. Still, the trends show where economic influence lies; that is, concentration in the US and China, relative decline in traditional powers, and fragility among EMDEs. This imbalance heightens vulnerabilities to geoeconomic fragmentation and commodity market shocks.

Figure 1. Contribution to Global GDP

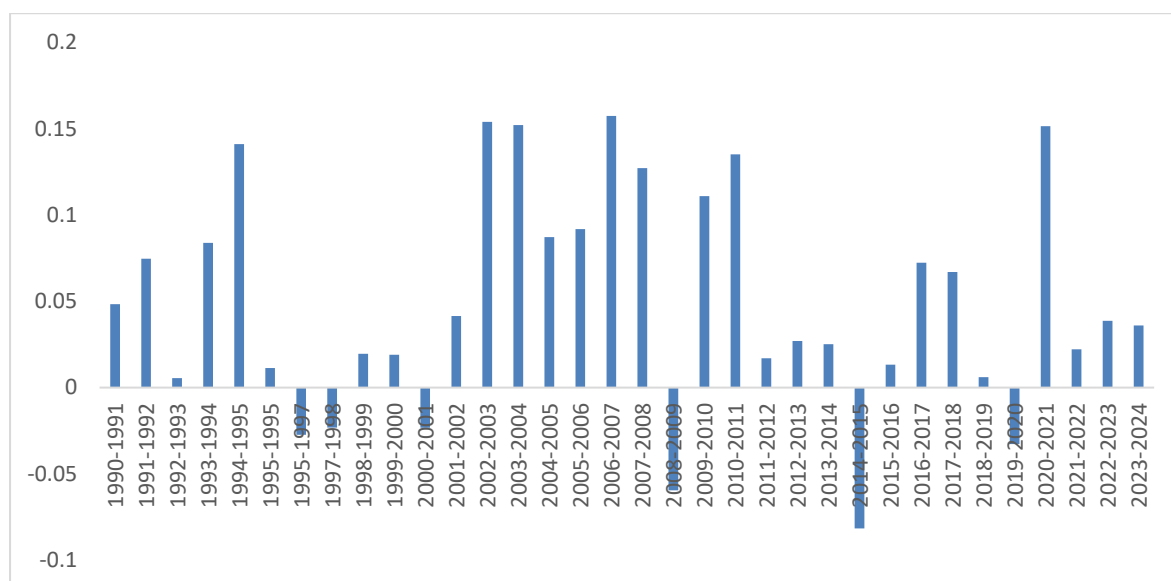


Note: EMDEs include countries from East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa.

Source: Authors' Construct

For EMDEs (including China and India), the growth rates show cyclical fluctuations, with periods of strong expansion observed in mid-1990s, early 2000s, early 2010s, but interrupted by sharp downturns during the late 1990s, 2008-2009, 2014-2016, and 2019-2020 (Figure 2). Average growth has been positive, reflecting the structural catch-up of EMDEs, but volatility remains high compared to advanced economies.

Figure 2. Growth in EMDEs



Source: Authors' Construct

Growth rose steadily, peaking at 14 percent in 1994-1995, coinciding with trade liberalization, global recovery from the early 1990s slowdown, and reforms across Asia and Latin America. This period reflects EMDE integration into global trade and capital flows.

Sharp declines are observed at 2.7 percent in 1995-1997 and 2.3 percent in 1997-1998, reflecting the Asian Financial Crisis. During this period, currencies collapsed, capital outflows surged, and GDP growth across Southeast Asia fell sharply, dragging the aggregate EMDE growth.

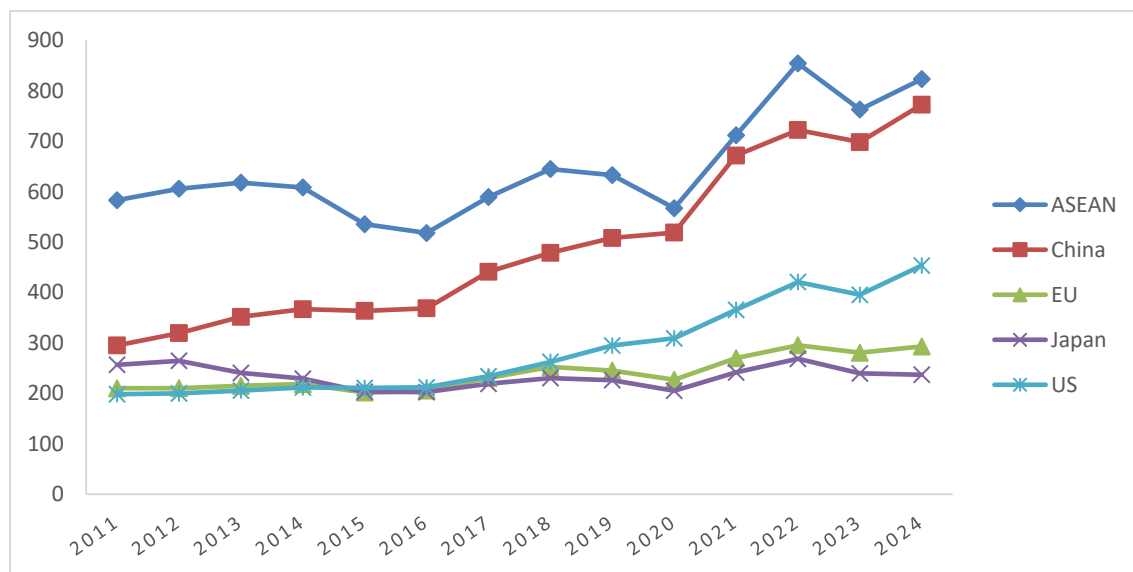
It was not long before another cycle would be witnessed by the world. In 2002-2007, there was a robust growth of around 8.7-15.7 percent, driven primarily by China's commodity demand, rapid globalization, and capital inflows. However, 2008-2009 recorded a contraction of approximately 5.9 percent, reflecting the Global Financial Crisis, with sharp falls in trade and commodity prices.

Recovery followed quickly in 2010-2011 (11-13.5 percent) as stimulus in China and advanced economies spurred EMDE demand.

2.1.2 ASEAN Trade in Goods, by Selected Major Economies

Intra-ASEAN trade has always been the largest share of total ASEAN trade. Reported at USD 583 billion in 2011, it peaked at USD 854 billion in 2022 before slightly declining at USD 823 billion in 2024 (Figure 3).

Figure 3. ASEAN Total Trade in Goods, in billion USD



Source: Authors' Construct

The sharp decline in 2015-2016 reflects the impact of slowing global demand and commodity price downturns, before rebounding strongly after 2017. Meanwhile, the post-2020 trends align with COVID-19 recovery, digital trade acceleration, and regional supply chain reconfiguration.

Of its external partners, China has become ASEAN's most important partner, increasing at about 162 percent from 2011 to 2024, surging consistently even during the pandemic. This underscores the resilience of ASEAN-China supply chains and the role of RCEP.

US, on the other hand, recorded more than double over the period. Growth accelerated after 2016, with strong post-pandemic jumps. This trend reflects US re-engagement with Asia, growing FDI, and demands for ASEAN exports on electronics, services, and digital trade, among others.

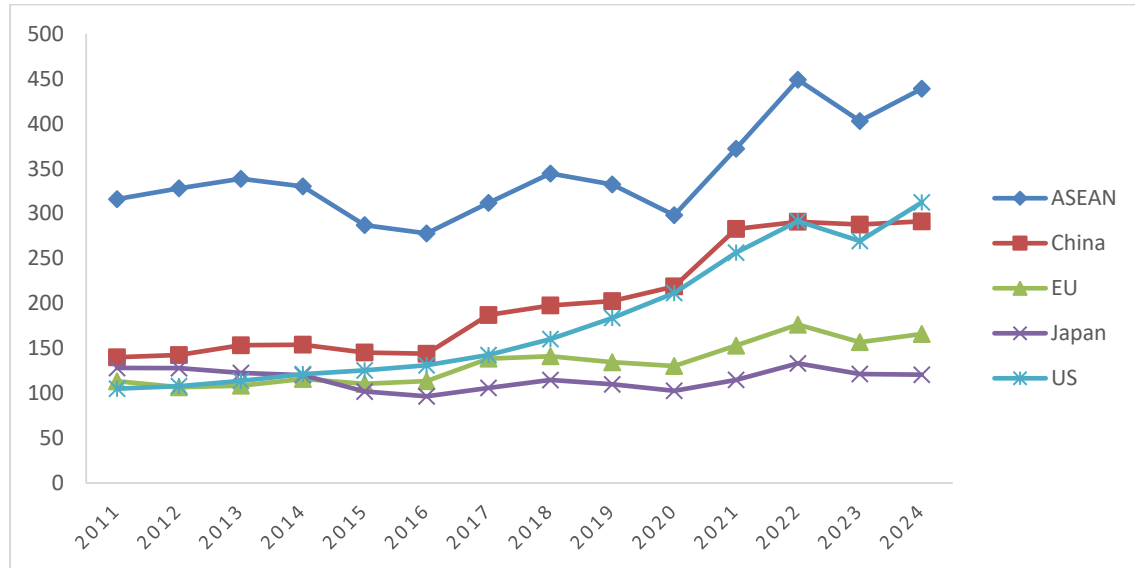
For EU, trade has grown modestly, relatively flat compared to China and US, showing EU's limited role in ASEAN trade. The modest recovery can be observed after 2016, which could have reflected the EU-ASEAN initiatives on sustainability and digital partnerships, but EU remains behind China and the US. Japan has almost similar situation, peaking in the early 2010s but has since declined.

Intra-ASEAN exports have been consistently the backbone of the region's trade. From 2011 to 2024, it has increased by 28 percent, although it has experienced some challenges, dipping in some years (Figure 4). The dip in 2015-2016 corresponds to the sluggish global demand and commodity price collapse but has rebounded post-2017 and strongly surged in 2021-2022, which aligns and highlights the increasing regional integration under the AEC 2015 and the entry into force of RCEP.

Extra-exports trade with China, on the other hand, marks strong ASEAN-China trade partnerships, reflecting China's demand for ASEAN raw materials, electronics, and intermediate goods, as well as the integration into East Asian value chains.

Meanwhile, US is also a close trade partner, with increasing exports tightly competing with Chinese market, and even surpassing China during some periods, particularly post-pandemic, and even overtaking China, EU, and Japan in 2024.

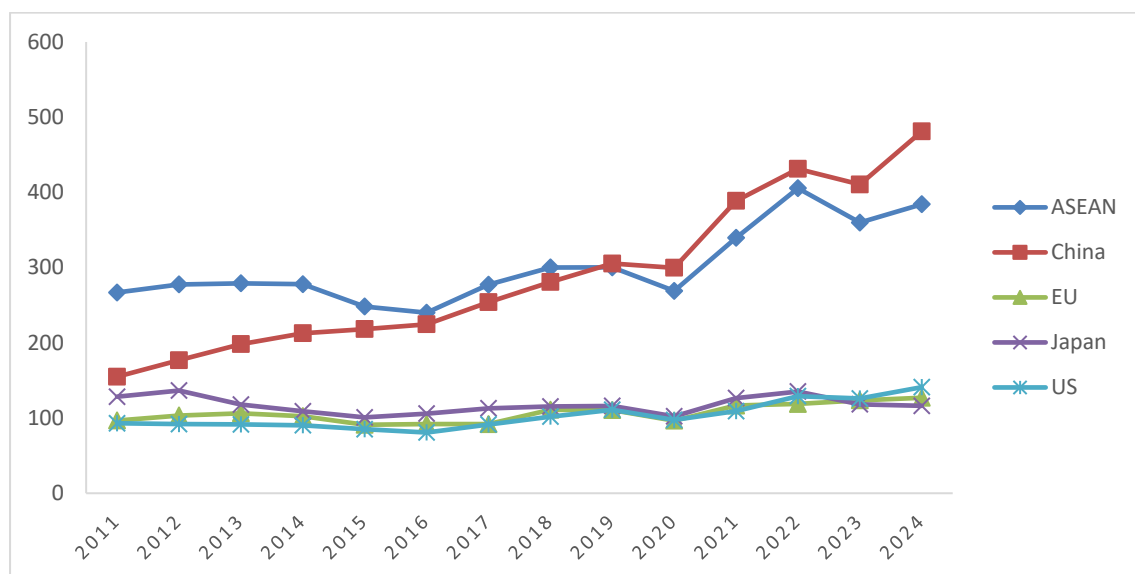
Figure 4. Extra- and Intra-ASEAN Exports, in billion USD



Source: Authors' Construct

From 2011 to 2018, extra-ASEAN trade dominated imports. Since 2019, however, extra-ASEAN trade with China has overtaken imports trade (Figure 5). The steady climb of Chinese goods into the region reflects deepening ASEAN-China supply chain interdependence. The gap widens in 2023 and 2024, indicating China has become ASEAN's largest external import source, signaling not just potential opportunities but also dependence risks.

Figure 5. Extra- and Intra-ASEAN Exports, in billion USD



Source: Authors' Construct

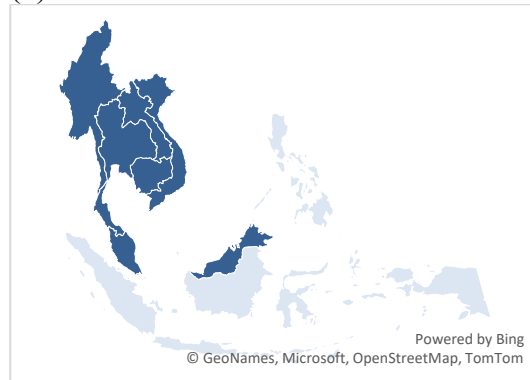
In 1990-2000, ASEAN displayed strong and consistent unity, shown by dark blue shading across almost all members, except Cambodia (Figure 6). This indicates high alignment in their foreign policy positions. This also reflects ASEAN traditional diplomacy of non-interference and consensus-building, and shows coordinated stances supported by the region's mechanisms like the ASEAN Charter and the Treaty of Amity and Cooperation, emphasizing collecting neutrality in global affairs. However, in 2001-2010, differences in voting patterns can be observed. In 2011-2020, ASEAN voting patterns are more coherent before, but deviations were observed again in 2021-2024, particularly by Laos, Myanmar, and Viet Nam, suggesting a decline in cohesion, which coincides with heightened geopolitical fragmentation, the Myanmar crisis, and increasing pressure from major powers like the United States and China, which may have influenced national voting behavior. Overall, however, ASEAN maintained high diplomatic alignment.

Figure 6. UN Voting Patterns in Southeast Asia

(a) 1990-2000



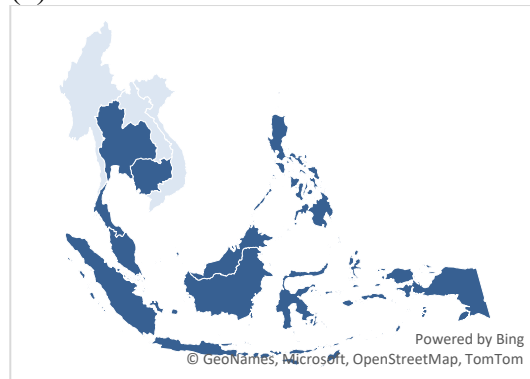
(b) 2001-2010



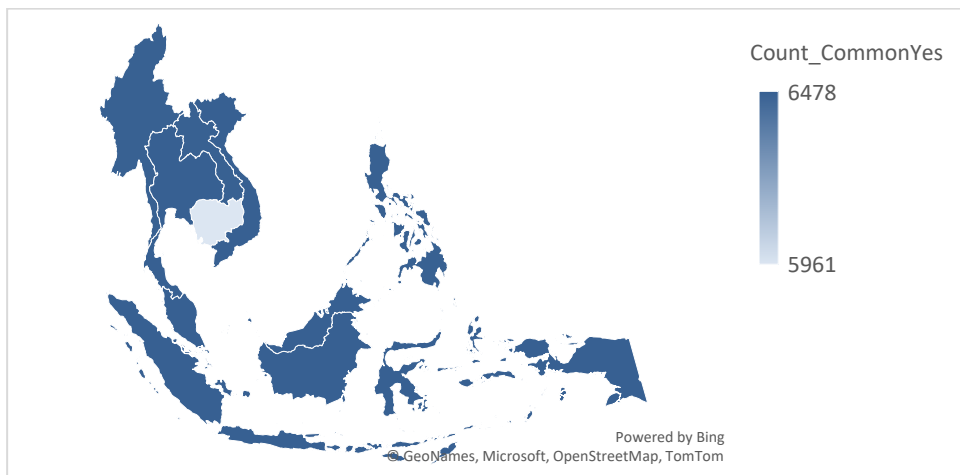
(c) 2011-2020



(d) 2021-2024



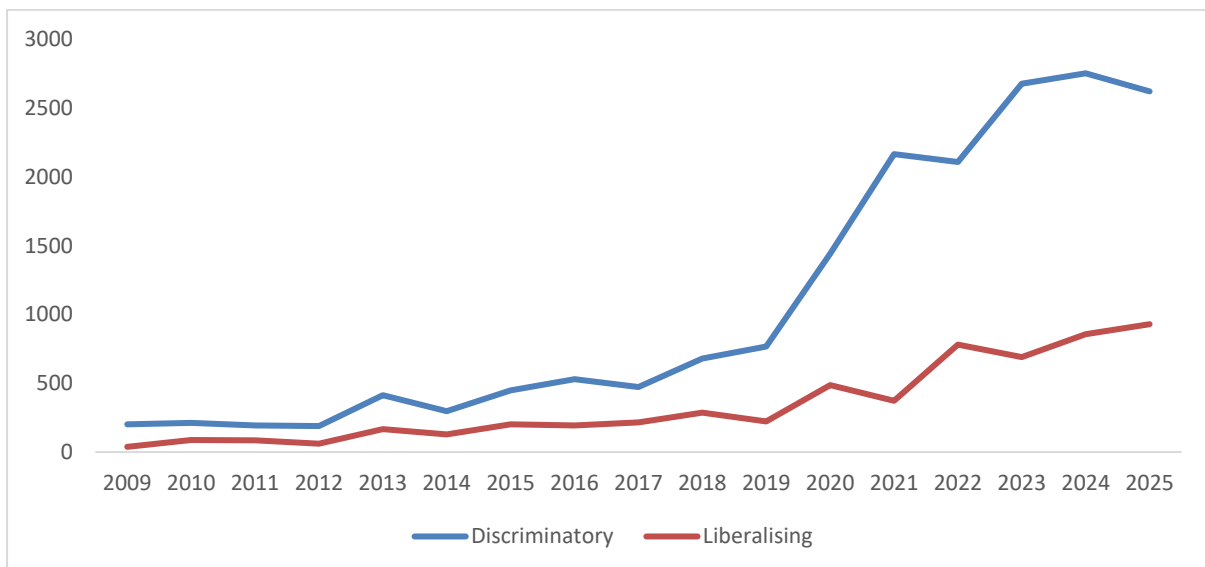
(e) Overall (1990-2024)



Source: Authors' Construct

From 2009 to 2012, the gap between discriminatory and liberalizing trade interventions remained stable, with discriminatory interventions 3 or 5 times higher (Figure 7). This period reflects post-global financial crisis where countries adopted protectionism measures to shield their domestic industries.

Figure 7. Discriminatory vs Liberalizing Interventions



Source: Authors' Construct

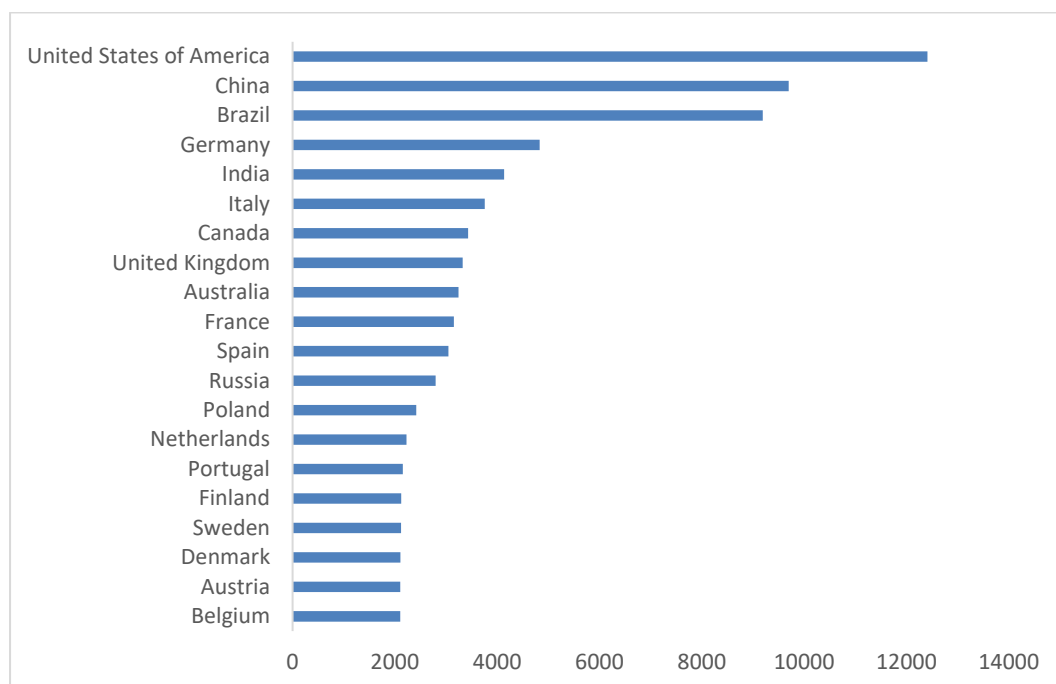
Between 2013 and 2019, however, intervention began rising, particularly more significant increases were observed in discriminatory ones, surging from 413 in 2013 to 767 in 2019, about 85 percent. This gap can be thought of as a representation of the onset of trade tensions and regional protectionist trends, particularly the US-China trade war and strategic industrial policies across Asia and Europe.

From 2020 onward, discriminatory measures jumped from 767 (2019) to 1,441 (2020), and then double to 2,676 (2023), reflecting the pandemic-driven disruptions, reshoring incentives, and export controls, especially on medical goods and semiconductors, and geoeconomic fragmentation trends. Liberalizing measures also rose sharply after 2020, peaking at 929 (2025), indicating simultaneous efforts to facilitate trade recovery and diversification.

By 2023 to 2025, the ratio of discriminatory to liberalizing interventions remains high, suggesting a structural shift toward managed globalization, where here states increasingly pursue strategic protectionism while selectively opening markets in digital, green, and regional domains.

In terms of having the most measures imposed, the US tops the list (12,407), followed by China (9,696), and Brazil (9,191) (Figure 8). US policies such as the Inflation Reduction Act (IRA), CHIPS and Science Act, and ongoing tariff regimes against Cina indicates a deliberate effort to protect its critical sectors, including semiconductors, clean energy, and defense), while promoting domestic reindustrialization. It’s trade actions also target allies and competitors through anti-dumping, subsidy investigations, and export controls, signaling a broader geoeconomic containment strategy aimed at maintaining technological leadership and supply-chain security.

Figure 8. Number of Interventions by Implementing Jurisdictions (Top 20)



Source: Constructed based on data from GAT (2025)

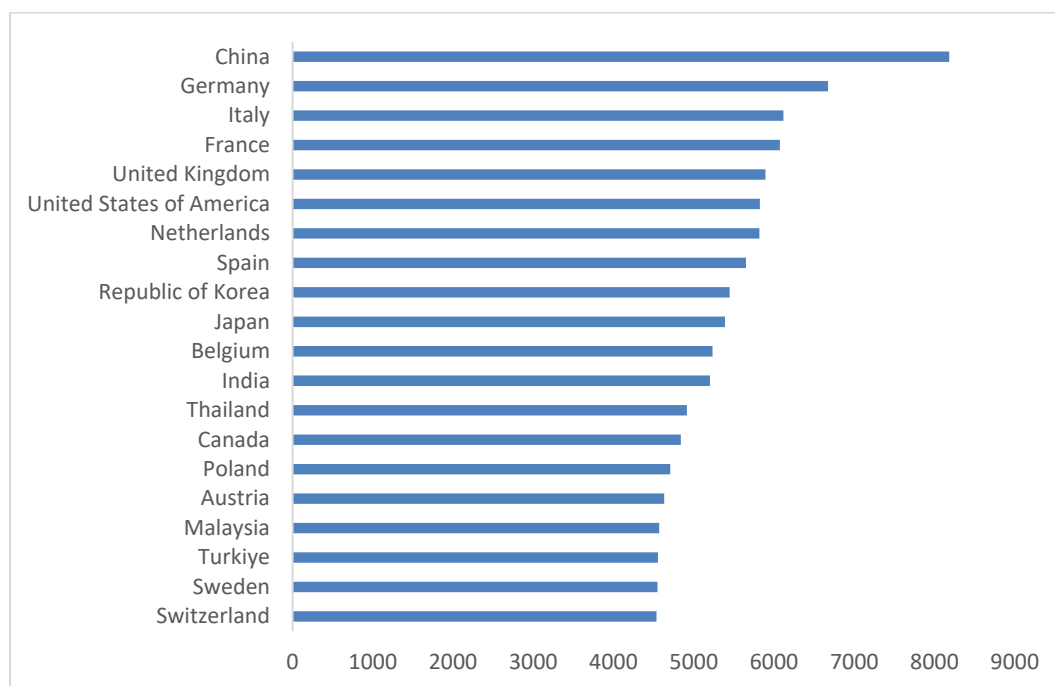
China, on the other hand, reveals an assertive approach to defend its manufacturing base and responding to Western trade measures. Many of these are reciprocal or retaliatory, including export controls on rare earths, technology licensing rules, and targeted tariff responses. China also uses state-led incentives and subsidies to strengthen domestic production and industrial upgrading under the Made in China 2025 program.

Marking its leading role as emerging economy, Brazil practices developmental protectionism, imposing measures such as import restrictions, local content rules, and export taxes, aimed at nurturing domestic agriculture, manufacturing, and extractive industries – measures that mark its long-standing industrial autonomy and export diversification.

Meanwhile, EU members, such as Germany, France, Italy, and Spain, display moderate but rising intervention levels. EU’s collective approach centered on trade remedies, state aid controls, carbon border adjustment mechanisms (CBAM), and FDI screening. These measures reflect a shift from open-market liberalism toward strategic autonomy particularly as a response to energy insecurity, Chinese overcapacity, and US industrial subsidies.

How countries are affected by discriminatory measures vary. China, for instance, is the most affected, with 8,181 measures imposed against it (Figure 9). This reflects widespread restrictions targeting Chinese goods, investments, and technologies. The US and EU members, particularly Germany, Italy, France, the UK, and the Netherlands, also experience high counts, indicating intense reciprocal protectionism among leading economies, especially between the US-EU-China triad, where strategic competition and trade defense mechanisms dominate.

Figure 9. Number of Interventions by Affected Jurisdictions (Top 20)



Source: Constructed based on data from GAT (2025)

Figure 10 shows the different types of interventions, liberalizing and harmful, according to flow (inward or outward).

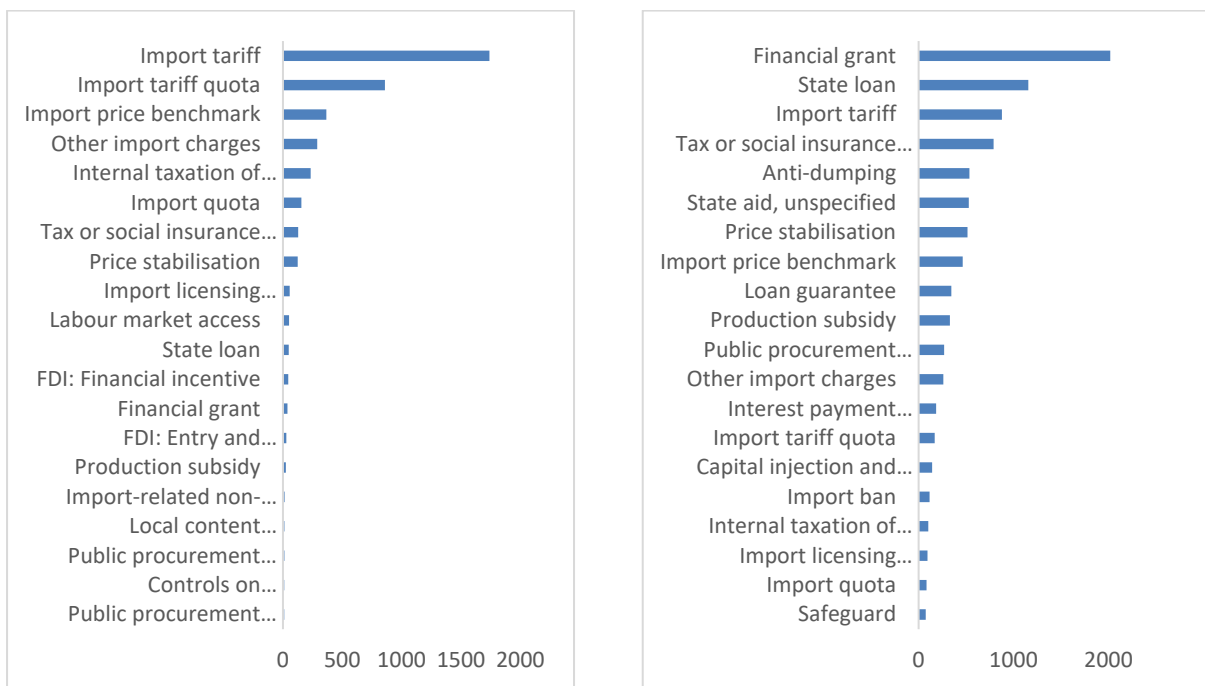
Liberalizing inward interventions are instruments that reduce cost, administrative burden, or imports or foreign investment barriers. Most common actions include reducing import tariffs (1,740 instances), adjusting tariff quotas, rationalizing import price benchmarks, and removing internal taxes on imported goods. These actions typically help lower domestic prices, enhance competition, improve supply-chain efficiency, and ensure access to intermediate goods and

raw materials. A notable subset includes FDI liberalization, such as financial incentives and entry-rule relaxations. These measures allow foreign firms to participate more freely in domestic markets, often to stimulate technology transfer, expand industrial capacity, or build infrastructure. Inward liberalization therefore reflects a strategy to deepen integration with global value chains and enhance domestic industrial resilience.

In contrast, harmful inward interventions are protectionist or distortionary measures that raise barriers for imports or artificially advantage domestic producers. Dominant among them are financial grants (2,018) and state loans, which constitute state aid that may distort market competition. High-frequency measures such as import tariffs, anti-dumping actions, import bans, and licensing requirements reinforce trade restrictions designed to defend domestic industries. These policies often emerge during crises – commodity shocks, pandemics, geopolitical conflicts – where states prioritize domestic stability over openness. However, they can raise consumer prices, reduce firm competitiveness, and encourage retaliation from trade partners.

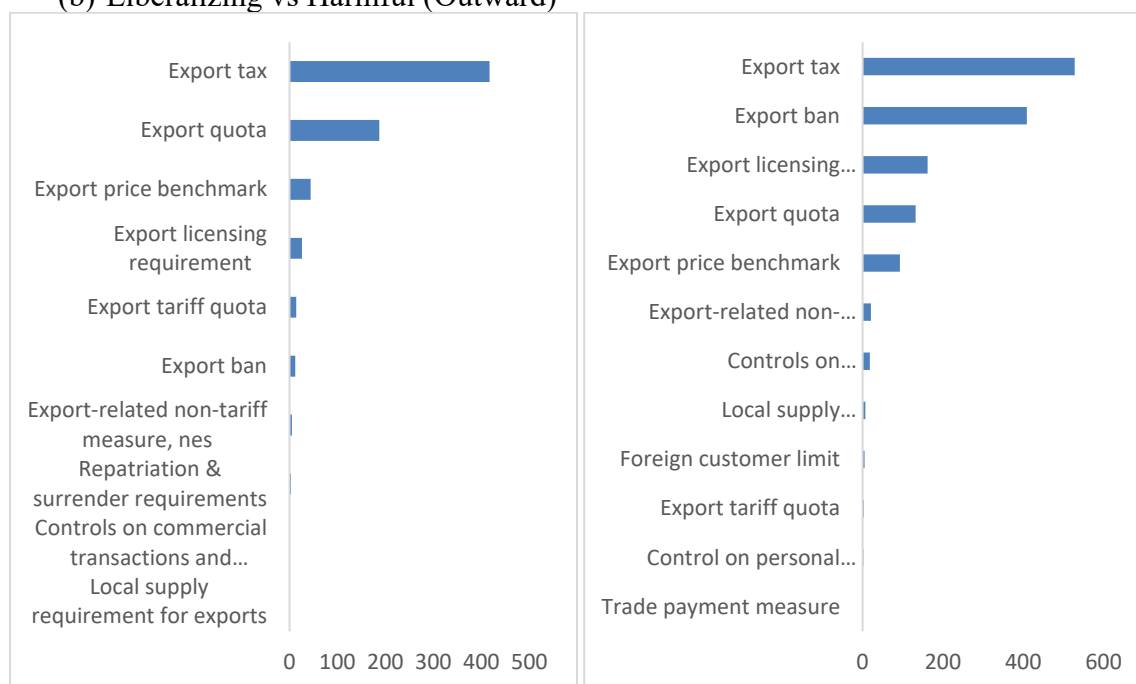
Figure 10. Top 20 Interventions by Type and Flow

(a) Liberalizing vs Harmful (Inward)



Source: Constructed based on data from GAT (2025)

(b) Liberalizing vs Harmful (Outward)



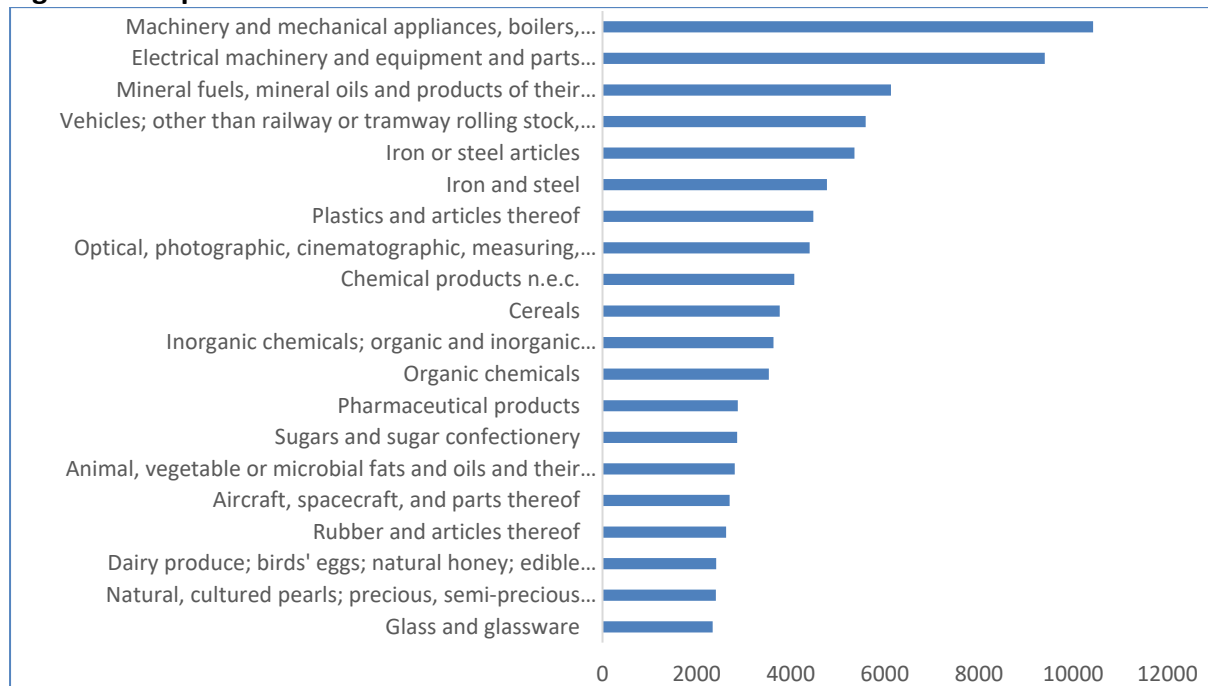
Source: Constructed based on data from GAT (2025)

Liberalizing outward interventions aim to encourage firms to expand into global markets. Reducing export taxes (417), adjusting export quotas, and lowering licensing requirements help exporters increase sales, diversify markets, and integrate into global supply chains. Such policies often align with industrial strategies that promote outward-looking sectors – manufacturing, agrifood processing, or digital services.

Lastly, harmful outward interventions restrict exports to ensure domestic supply or stabilize prices, often during shortages or inflationary periods. The data shows frequent use of export taxes (528) and export bans (409). These are typically imposed on essential commodities – energy, minerals – when governments prioritize local consumers over external markets. Though politically popular, these measures can harm exporters, damage a country’s reputation, and disrupt international supply chains.

Moreover, looking at the product list, among the most affected products are related to machinery, electronics, and technology. Machinery and mechanical appliances are affected by 10,421 interventions, while electrical machinery and equipment are affected by 9,394 interventions (Figure 11). Being the backbone of modern industrial economies that forms the core of global manufacturing value chains, together they account for nearly a third of all measures. These sectors are also the most geopolitically contested, involving high-value exports from countries like China, Germany, Japan, South Korea, and the US.

Figure 11. Top 20 Affected Products



Source: Constructed based on data from GAT (2025)

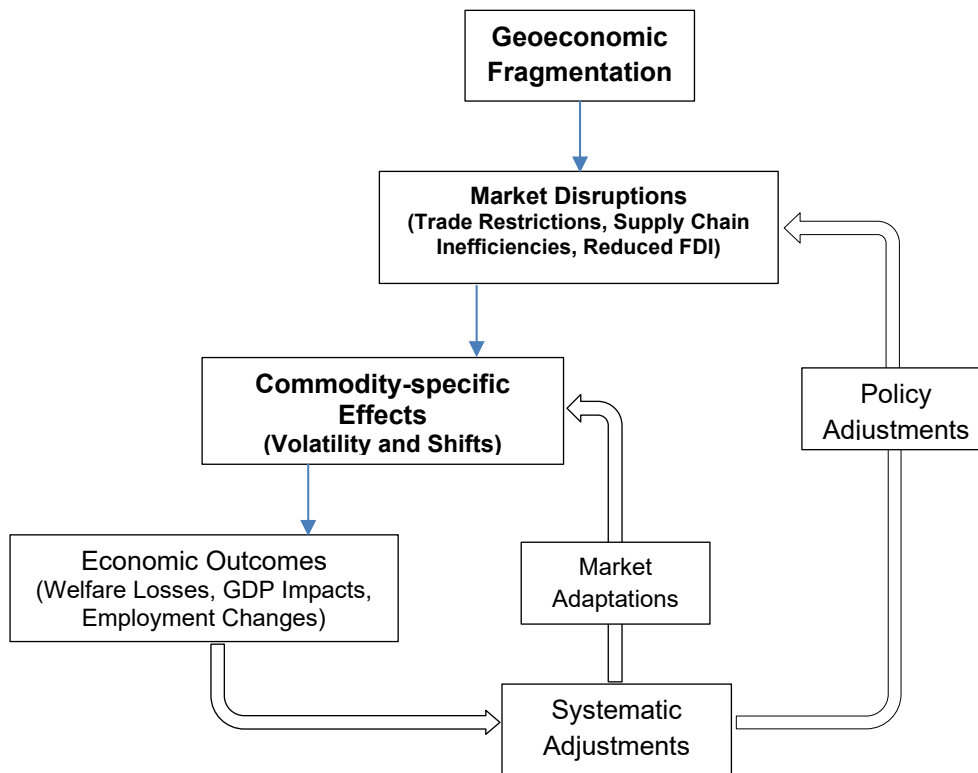
Other most affected products are energy and raw materials such as mineral fuels and oils, iron and steel, along with iron or steel articles, which indicate how energy security and infrastructure materials have become central to trade policy. Meanwhile, vehicles and parts face frequent interventions, driven by green transition policies between major producers like the US, EU, Japan, and China.

3. Methodology

3.1. Conceptual Framework

The paper focuses on understanding the effects of geoeconomic fragmentation on the trade of commodities and is guided by a framework that reflects the multi-layered transmission channels through which geoeconomic fragmentation (GEF) affects trade patterns, commodity markets, and broader macroeconomic outcomes (Figure 12).

Figure 12. Conceptual Framework



Source: Authors' Construct

At the top of the framework, goeconomic fragmentation, arising from geopolitical tensions, protectionist policies, and weakened global cooperation, disrupts trade and investment, leading to market disruptions in the form of trade restrictions, supply chain inefficiencies, and reduced investments. GEF represents overarching political and geopolitical shocks, which are measured through political distance (UN voting similarity)², sanctions intensity, tariff pressures, trade exposure, and rolling trade volatility. These political and economic frictions are combined through a composite index to create GEF score that represents the degree of fragmentation. GEF is treated as a structural shift in the global system that introduces uncertainty, raises trade costs, and alters the incentives and firms.

The second stage shows market disruptions that correspond to the actual frictions introduced through policy-driven restrictions, such as sanctions, export control, tariff spikes, and supply-chain disturbances. The model used in the estimation procedures incorporate these disruptions through direct measures (i.e. sanctions, tariffs, volatility) and through event dummies representing major disruptions (i.e. US-China trade war, COVID-19, Russia-Ukraine war, shipping crisis, and semiconductor shortage). These disruptions alter the functionality of market by raising trade costs, increasing uncertainty, and realigning production networks.

² Voting similarity in this paper pertains not only to political alignment in terms of similar “Yes” votes in favor of a UN resolution but includes similar votes to “No”, “Abstain”, and “Non-voting”. This paper, therefore, utilizes total similarity to represent political alignment in terms of the UN votes.

The third layer focuses on the commodity-specific effects, reflecting the way fragmentation impacts economies and markets unevenly depending on their GVC position, supply concentration, and exposure to sanctions and geopolitical blocs.

When fragmentation disrupts markets, this triggers commodity-specific effects, including increased price volatility due to unpredictable supply-demand dynamics and shifts in production as countries and firms adjust to new trade realities. These effects are particularly acute in commodity-dependent economies, affecting essential markets like energy, agriculture, and critical minerals. The ripple effects extend to economic outcomes, manifesting as welfare losses (reduced producer and consumer surplus), GDP impacts, and employment changes in affected sectors. These outcomes are especially detrimental to developing economies reliant on commodity exports.

Fragmentation then induces trade response (e.g., “sticky” trade rerouting) as economies respond and adapt to disruptions. Overtime, these adaptations accumulate into systemic adjustments, forming new stable equilibria, which include supply-chain diversification, substitution across partners, reshoring, and policy-led hedging strategies.

Lastly, the framework recognizes bidirectional feedback – government responds to disruptions by implementing new policies, either corrective, protective, or strategic – which then influence subsequent market behavior. These include friend-shoring, industrial policies, FDI screening, and pursuit of deeper regional integration.

3.1.1 Empirical Evidence and Cross-Regional Experience Supporting the Conceptual Chain

The conceptual framework presents a conceptual chain of geoeconomic fragmentation – market disruptions – commodity-specific effects. IMF (2023) shows that geopolitical tensions and policy actions, in the form of sanctions, export restrictions, countersanctions, strategic trade measures, among others, can fragment commodity trade networks. This increases exposure to supply shocks, as well as risks to price stability and economic activity. Alvarez et al. 2023 complement this by modeling production and bilateral flows for 48 major energy, mineral, and agricultural commodities, and developed a framework that directly links trade fragmentation to commodity-market vulnerabilities and price risks by identifying most susceptible markets.

Other commodity-specific studies reinforce these links. For instance, analyzing Indonesia’s nickel export ban demonstrates how a policy-driven trade restriction affects global mineral flows and industrial outcomes, directly illustrating the translation of fragmentation in market reconfiguration and commodity-specific impacts (Guberman, Schreiber, and Perry 2024; and Kee and Xie 2025). On energy, evidence from the euro area suggests that gas price supply shocks transmit into macroeconomic outcomes, i.e. headline inflation, demonstrating the macro consequence of commodity disruptions triggered by geopolitical events and market segmentation (Lopez et al. 2024).

Taken together, these studies support the causal narrative that fragmentation policies and geopolitical alignments alter trade routes and access. These disruptions shift commodity prices, wedges, and volatility, and the resulting input-cost and terms-of-trade shocks propagate to inflation, production costs, and GDP performance.

3.2. Measurement Framework

This study investigates how geoeconomic fragmentation (GEF) affects trade flows in ASEAN and the Philippines by developing (a) a GEF index, (b) estimating its causal relationship with trade using Poisson Pseudo-Maximum Likelihood (PPML) structural gravity models, and (c) constructing commodity- and country-level vulnerability indices to identify the most exposed ASEAN member states and sectors. The methodology combines political, economic, and market-based indicators of fragmentation, incorporates global disruptions such as the U.S.–China trade war and the Russia–Ukraine conflict, and applies bloc-interaction models to detect trade diversion patterns.

3.2.1 Constructing GEF Index

Because Geoeconomic fragmentation is a multidimensional phenomenon characterized by political tensions, coercive economic measures, reduced cross-border integration, market disruptions, and the reconfiguration of supply chains, this study builds a composite index across five fragmentation dimensions:

1. Political distance
2. Sanctions exposure
3. Trade-intensity fragility
4. Tariff burden
5. Market instability (volatility)

Component 1, political distance represents political alignment based on economies' voting behavior in UN General Assembly Voting, denoted by *TOTALSIM*.

To convert similarity into fragmentation:

$$PoliticalFrag_{ij} = 1 - TOTALSIM_{ij} \quad (1)$$

Where, high values imply lower strategic alignment, higher geopolitical distance, and greater susceptibility to geoeconomic rifts. This component reflects the political foundations upon which trade networks sit.

Component 2, sanctions, is a central geopolitical tool influencing commodities, shipping, finance, and cross-border investments. Using *TOTALSANCTIONS* from the Global Sanctions Database:

$$Sanctions_{ij} = rescale01(TOTALSANCTIONS_{ij}) \quad (2)$$

Rescaling ensures that sanctions applied to dyads with large or small markets are comparable. Similarly, higher values imply stronger fragmentation pressures.

Stable trading partners exhibit consistent, strong volumes of trade. Declining or weak trade indicates fragility. Using import intensity as a proxy for dyadic strength:

$$TradeFrag_{ijpt} = 1 - rescale01(IMPORTSVLUE_{ijpt}) \quad (3)$$

Where, low imports indicate high fragmentation and vulnerable relationship, while high imports indicate low fragmentation and resilient ties. This reflects the economic interdependence that fragmentation disrupts.

Component 4, tariff burden, Tariffs directly impede market access, act as structural barriers, and propagate fragmentation.

$$TariffFrag_{ij} = rescale01(WEIGHTEDAVERAGE_{ij}) \quad (4)$$

This component accounts for trade-policy frictions independent of political distance.

Lastly, component 5, rolling volatility, represents the vulnerability due to sudden changes in logistics, supply constraints, price, and other factors. Using a 3-year rolling standard deviation of log imports:

$$vol_3yr_{ijpt} = \sigma(\log(1 + imports_{ijpt}) \text{ over } t - 2, t) \quad (5)$$

This is normalized:

$$VolatilityFrag_{ijpt} = rescale01(vol_3yr_{ijpt})$$

High volatility implies uncertainty, thin markets, and vulnerability to shocks.

The standardized (to 0-1) components are then aggregated to form the index:

$$GEF_{ijpt} = \frac{PoliticalFrag_{ij} + Sanctions_{ij} + TradeFrag_{ijpt} + TariffFrag_{ij} + VolatilityFrag_{ijpt}}{5} \quad (6)$$

The components are weighted equally to avoid overfitting and ensure transparent interpretation, where 0 indicates a fully integrated and stable geopolitical and economic environment, while 1 indicates a highly fragmented, politically distant, and unstable environment. The resulting panel index is granular and dynamic, varying by country-pair, product, and year.

The definition of geoeconomic fragmentation has three essential elements:

- Reversal (undoing integration, pulling away from partners)
- Policy-driven (sanctions, tariffs, controls, reallocation)
- Strategic motivations (security, autonomy, geopolitical alignment)

The GEF index constructed and adopted in the paper is a dyadic fragmentation risk score between two countries i and j , for each product k . This means that the index measures the risk or intensity of fragmentation in a bilateral relationship, not fragmentation of a single country in isolation. It captures the likelihood that trade between two countries becomes disrupted, constrained, or strategically reconfigured, which is consistent with IMF and World Bank conceptualizations that fragmentation is fundamentally relational, occurring between partners, not just within one country.

The components of GEF index directly reflect the mechanisms of fragmentation through the following:

- Political distance (UN voting similarity)
 - Lower similarity → higher geopolitical distance → higher fragmentation probability (aligns with “strategic considerations” in definition)
- Sanctions pressure
 - More sanctions → more coercion, more policy-driven disintegration (aligns with “policy-driven reversal” in definition)
- Tariff burden (weighted average tariff)
 - Higher tariff → more deliberate economic separation (aligns with “policy-driven reversal of integration”)
- Exposure/dependence (import value)
 - High dependency → higher vulnerability to fragmentation shocks (aligns with “autonomy” and “sovereignty” motivation)
- Market instability (rolling volatility)
 - Higher volatility → unstable supply chains → higher fragmentation tendency (aligns with “reallocation and rerouting of economic relations”)

Thus, the GEF index captures both policy actions and strategic motivations, exactly matching the definition. It captures the likelihood of fragmentation in the economic relationship between Country A and Country B for Product k. That is:

- the tendency of A and B to diverge
- the probability of disruptions in exchange
- the intensity of political + economic + sanctions frictions between them
- the fragility of their commodity trade relationship

The GEF measure is then incorporated into Poisson pseudo-maximum likelihood (PPML) gravity models with high-dimensional fixed effects.

3.2.2 Estimating the Gravity Model

The study estimates the impact of GEF on trade using Poisson Pseudo-Maximum Likelihood (PPML), which this paper prefers for this study for the following reasons:

- Correctly handles zero trade flows
- Robust to heteroskedasticity
- Fits the multiplicative structure of gravity equations
- Permits high-dimensional fixed effects

Trade specification:

$$E[\text{Trade}_{ijpt}] = \exp(X_{ijpt}\beta) \tag{7}$$

The baseline model is given by:

$$Trade_{ijpt} = \beta_1 GEF_{ijpt} + \sum_{b \neq Rest} \beta_{1b} (Bloc_{jb} \times GEF_{ijpt}) + \sum_e \gamma_e Event_{et} + \delta' X_{ijpt} + FE_i + FE_j + FE_p + FE_t + u_{ijpt} \quad (8)$$

Where:

- GEF_{ijpt} = geoeconomic fragmentation index
- $Bloc_{jb} \in \{\text{China, US, EU, RoW (reference)}\}$
- $Event_t = \{\text{TradeWar}_t, \text{COVID}_t, \text{RU} - \text{UKR}_t, \text{ShippingCrisis}_t, \text{ChipCrisis}_t\}$
- X_{ijpt} = bilateral controls: $\{\text{DIST}_{ij}, \text{CONTIG}_{ij}, \text{COMLANGOFF}_{ij}, \text{FTA}_{ij}, \log GDP_i, \log GDP_j, \log POP_i, \log POP_j\}$
- Fixed effects:
 - FE_i = exporter
 - FE_j = partner
 - FE_p = product
 - FE_t = year

The baseline model establishes the overall average effect of GED on trade. It uses standard PPML gravity with reporter partner, product, and year fixed effects, and estimates a single coefficient for GEF across all trading partners and all periods, providing information of the average effect of GEF on trade, whether trade increases or decreases. This model provides a clean and interpretable benchmark to identify whether fragmentation has a statistically meaningful effect, forming the foundation upon which more detailed models can build. This model, however, cannot detect heterogeneous effects across trading blocs (e.g., China vs. EU), and event dummies may drop due to collinearity under strong FE structures.

A complete structural model is also considered, strengthens identification by including structural gravity fixed effects, reporter-year FE and partner-year FE. These FE absorb multilateral resistance terms and macroeconomic changes more fully. The model controls for time-varying country characteristics and is more theoretically aligned with Anderson–van Wincoop structural gravity. This may allow the estimation, and interpretation, of the direct effect of disruptions on trade by avoiding perfect collinearity between event dummies and FE. The model is given by the following:

$$Trade_{ijpt} = \beta_1 GEF_{ijpt} + \sum_{b \neq Rest} \beta_{1b} (Bloc_{jb} \times GEF_{ijpt}) + \sum_e \gamma_e Event_{et} + \delta' X_{ij} + FE_{i,t} + FE_{j,t} + FE_{p,t} + u_{ijpt} \quad (9)$$

Moreover, the model I further modified to allow for bloc-event interactions, given by the following:

$$Trade_{ijpt} = \beta_1 GEF_{ijpt} + \sum_{b \neq Rest} \beta_{1b} (Bloc_{jb} \times GEF_{ijpt}) + \sum_e \gamma_e Event_{et} + \sum_e \sum_{b \neq Rest} \gamma_{eb} (Bloc_{jb} \times Event_{et}) + \delta' X_{ijpt} + FE_{i,t} + FE_{j,t} + FE_{p,t} + u_{ijpt} \quad (10)$$

3.2.3 Variables and Data

The analysis combines multiple datasets covering trade flows, partner characteristics, political alignment, logistics conditions, and sanctions. The core dataset is monthly HS2 bilateral trade data from UN Comtrade. The essential variables and data considered in the study are the following:

Table 1. Data and Variables

Category	Variable	Definition / Measurement	Data Type	Source
Trade	TRADEVALUE	Bilateral trade value (exports or imports), USD	Continuous	UN Comtrade (API / bulk)
	TRADE	Monthly import values in thousands of USD	Continuous	UN Comtrade
	FLOW	Trade direction: Export or Import	Categorical	UN Comtrade
	PRODUCT	Product classification (HS2)	Categorical	UN Comtrade
Geography & Dyad Identifiers	REPORTERISO	ISO3 reporter country code	Categorical	UN Comtrade
	PARTNERISO	ISO3 partner country code	Categorical	UN Comtrade
Bloc Classification	BLOC	Partner's geopolitical group: China, US, EU, Rest	Categorical	Author's coding based on ISO lists
Gravity Variables	DIST	Bilateral geographic distance between capital cities	Continuous	CEPII Gravity Dataset
	CONTIG	1 if countries share a land border	Binary	CEPII Gravity Dataset
	COMLANGOFF	1 if countries share an official language	Binary	CEPII Gravity Dataset
	FTA	1 if an FTA or RTA is in force for the dyad	Binary	WTO RTA Database / DESTA
Political Alignment	TOTALSIM	UN General Assembly voting similarity index (0–1)	Continuous	UN Voting Data
	POLFRAG	Political fragmentation = 1 – TOTALSIM (scaled 0–1)	Continuous (scaled)	Author's computation
Sanctions Measures	TOTALSANCTIONS	Count of sanction episodes (trade, financial, travel, arms, etc.)	Continuous (count)	Global Sanctions Database
	TOTALSANCTIONS	Scaled sanction intensity (0–1)	Continuous (scaled)	Author's computation
Tariff Costs	WEIGHTEDAVERAGE	Weighted average applied tariff (simple or trade-weighted)	Continuous	UNCTAD TRAINS / WTO Tariff Database
	TARIFF	Scaled tariff burden (0–1)	Continuous (scaled)	Author's computation
Trade Intensity / Exposure	IMPORTSVALUE	Level of imports as proxy for exposure	Continuous	UN Comtrade
	trade_frag_01	1 – normalized import intensity	Continuous (scaled)	Author's computation
Market Instability	IMPORTSLOG	log(1 + imports), used for volatility	Continuous	Derived from Comtrade

	VOLATILITY_3	Rolling 3-year standard deviation of log imports	Continuous	Author's computation
	VOLATILITY	Scaled volatility (0–1)	Continuous (scaled)	Author's computation
GEF Composite Index	GEF	Average of 5 normalized components: political distance, sanctions, low trade intensity, tariff burden, and market volatility	0–1 composite index	Author's computation
Macro Controls	GDP_REPORTER	GDP of exporting/importing country (constant USD)	Continuous	World Bank WDI
	GDP_PARTNER	GDP of partner country (constant USD)	Continuous	World Bank WDI
	POP_REPORTER	Population of reporter country	Continuous	World Bank WDI
	POP_PARTNER	Population of partner country	Continuous	World Bank WDI
Event Dummies	US-CH	1 for 2018–2019 (US–China trade war period)	Binary	Author's coding based on trade policy timeline
	COVID19	1 for 2020–2021 (pandemic disruption)	Binary	WHO / IMF COVID timeline
	RU-UK	1 for 2022–2024 (Russia–Ukraine war period)	Binary	Author's coding
	SHIPPING	1 for 2021 (global freight, port, container crisis)	Binary	UNCTAD Maritime Logistics Report
	CHIP	1 for 2020–2022 (semiconductor supply chain crisis)	Binary	SIA 2021–2022 reports
Vulnerability Analysis	share	Share of product in country's total exports/imports	Continuous	Computed from Comtrade data
	GEF_mean	Average GEF exposure for a product across partners	Continuous	Author's computation
	vuln_idx	Composite vulnerability index: $0.5 \times \text{GEF_01} + 0.5 \times \text{share_01}$	Continuous	Author's computation

Source: Authors' compilation

The dataset is a dyad–product–year/month panel covering 2000–2024. The unit of observation is:

$$(\text{Reporter Country } i) \times (\text{Partner Country } j) \times (\text{HS2 Product } p) \times (\text{Year } t) \quad (11)$$

This allows the study to capture the following:

- Country-pair political and economic relationships
- Product-level trade patterns
- Time-varying effects of global shocks
- Heterogeneity across commodity groups

4. Results and Discussion

4.1. Results of the Regression Estimation

4.4.1 Results for ASEAN

The baseline model (1) (Table 2) shows that GEF significantly reduces trade, with a large negative average effect (-1.87), meaning fragmentation depresses bilateral flows. However, bloc interactions reverse this effect. Trade with China, EU, and especially the US becomes less negatively affected, or even partially insulated, when fragmentation rises. This indicates bloc-based reorientation, economies trade more with major blocs when geopolitical tensions increase. Traditional gravity controls behave as expected: contiguity strongly boosts trade, while partner and reporter GDP and reporter population increase export capacity. Distance and FTA are insignificant, likely absorbed by extensive fixed effects. Overall, fragmentation shifts trade patterns toward major strategic blocs.

With structural fixed effects (2) controlling for all time-varying multilateral resistance, the negative impact of GEF becomes much stronger (-3.13), confirming large disruption to world trade. Bloc interactions now show that only EU and US trade relations significantly counteract fragmentation, while China's insulation effect disappears. This suggests that when controlling for deeper supply-chain structures, reorientation toward China weakens, while alignment with the US strengthens. The large US×GEF coefficient (4.23) implies deepening US-centered trade ties during fragmentation. Contiguity remains strongly positive. Overall, fragmentation leads to polarization mainly toward Western blocs.

Model (2) is improved, model (3) and (4), by shifting from global structural patterns to ASEAN-specific, event-level dynamics, capturing how fragmentation and major shocks differently affect ASEAN exports and imports. They add crisis interactions and bloc-specific effects, producing more policy-relevant, ASEAN-focused insights.

Table 2. Results of the PPMP Gravity Estimation for ASEAN

Variable	(1)		(2)		(3)		(4)	
	Coef	p-value	Coef	p-value	Coef	p-value	Coef	p-value
GEF	-1.8738	0.0002***	-3.1349	1.73E-06***	-0.2520	0.6740	-2.6967	1.55E-05 ***
China × GEF	1.8957	0.0323*	1.0134	0.4250	-0.9223	0.4820	2.9891	1.10E-02 *
EU × GEF	2.3236	0.0013**	1.7296	0.0415*	0.0005	1.0000	5.4487	6.87E-07 ***
US × GEF	3.6850	4.50E-05***	4.2317	2.73E-07***	3.0232	1.84E-02 *	3.2022	2.13E-04 ***
DIST	-0.0001	0.2170	-0.0001	0.1750	-0.0003	2.28E-04 ***	0.0000	4.94E-01
CONTIG	1.2164	2.76E-09***	1.1590	4.48E-08***	0.9178	3.56E-04 ***	1.3861	1.16E-05 ***
COMLANGOFF	-0.1903	0.2270	-0.2743	0.0688	0.2618	0.1950	-0.3546	1.67E-02 *
FTA	0.1071	0.1410	0.1430	0.1040	-0.0981	0.2010	0.2849	1.88E-03 **
log(GDP Reporter)	2.6305	1.87E-09***			2.5778	7.98E-07 ***	2.7623	2.27E-09 ***
log(GDP Partner)	0.9628	7.47E-06***			1.0658	3.83E-11 ***	0.6727	2.26E-03 **
log(POP Reporter)	2.8650	0.0001***			3.0306	8.50E-04 ***	1.6090	5.12E-02
log(POP Partner)	-0.5380	0.0801			0.1315	0.5650	-0.7554	2.07E-02 *
China × Trade War					0.1079	0.7630	-0.0714	8.02E-01
EU × Trade War					0.2731	3.61E-02 *	-0.0279	7.88E-01
US × Trade War					0.0051	0.9870	-0.1990	4.55E-01
China × COVID					0.7044	2.24E-02 *	0.8939	6.44E-02
EU × COVID					0.5876	0.0792	0.0762	7.76E-01
US × COVID					0.2631	0.3540	0.8390	1.55E-01
China × RU-UKR					0.5912	0.1370	0.1019	5.92E-01
EU × RU-UKR					0.3352	1.68E-02 *	-0.4372	1.78E-03 **
US × RU-UKR					0.0318	0.8770	0.1761	1.10E-01
China × Shipping Crisis					0.1851	1.98E-02 *	-0.0375	7.23E-01
EU × Shipping Crisis					-0.1226	0.2350	-0.0024	9.75E-01
US × Shipping Crisis					-0.0517	0.8000	-0.0137	8.50E-01
China × Chip Crisis					-0.3253	0.4160	-0.6561	2.20E-01
EU × Chip Crisis					0.0013	0.9960	-0.0359	8.61E-01
US × Chip Crisis					0.1813	0.6270	-0.5364	3.43E-01

Note: '****' = $p \leq 0.001$, '***' = $p \leq 0.01$, '**' = $p \leq 0.05$. (1) Baseline Model. (2) Structural Model with FE. (3) Structural Model with Blocs-Events

interactions (exports). (4) Structural Model with Blocs-Events interactions

Source: Authors' calculations

Model 3 shows that GEF does not significantly reduce ASEAN's overall export performance, but it reshapes where ASEAN exports go. The only significant structural shift is toward the United States, where exports rise under higher fragmentation, suggesting friend-shoring and US diversification away from China create new space for ASEAN. Crisis-specific effects show ASEAN exports increasing to China during COVID and the shipping crisis, and to the EU during the trade war and the RU–UKR conflict, reflecting ASEAN's role as a flexible substitute supplier. Gravity effects remain strong, reinforcing the importance of proximity and economic size.

4.4.2 Results for the Philippines

Philippine exports respond very differently to GEF and shocks, as shown in the modified model (3) (Table 3). The main GEF effect is weakly positive, but bloc interactions reveal sharp divergence: exports to China fall under fragmentation, while exports to EU and US are not significantly affected. Events have strong bloc-specific effects: exports to China increase during the trade war, COVID, RU-UKR, and shipping crisis, reflecting diversion toward China when Western markets are disrupted. In contrast, exports to the US consistently fall during these same shocks. EU effects lie in between. This indicates a triangular adjustment, where shocks push exporters away from the US and toward China.

Based on the modified model (4), imports, on the other hand, experience an overwhelmingly positive GEF effect (7.86) because fragmentation pushes countries to secure alternative suppliers, increasing import diversification. However, bloc patterns diverge sharply: imports from the EU surge under GEF, while imports from the US decline, and China shows weak negative sensitivity. Event interactions indicate strong substitution: during trade war, COVID, and RU–UKR, imports from the US rise, reflecting US supply-chain centrality for critical goods. The chip crisis sharply reduces imports from China and the US, highlighting semiconductor dependence. Overall, fragmentation increases import volumes but reallocates sourcing across blocs depending on the nature of the shock.

Table 3. Results of the PPMP Gravity Estimation for the Philippines

Variable	(3) (Exports)		(4) (Imports)	
	Coef	p-value	Coef	p-value
GEF	2.0475	0.0818	7.8584	2.68E-05***
China × GEF	-2.4958	1.01E-05***	-1.8623	0.1400
EU × GEF	1.1355	0.2680	6.5081	0.0001***
US × GEF	-0.8860	0.3230	-4.2408	0.0004***
DIST				
CONTIG				
COMLANGOFF				
FTA	0.4669	0.0034**	0.0253	0.7550
log(GDP Reporter)				
log(GDP Partner)	0.7468	0.0053**	1.4088	0.0020**
log(POP Reporter)				
log(POP Partner)	-0.5053	0.3320	-1.8719	0.0044**
China × Trade War	0.6000	0.0005***	0.1221	0.6790
US × Trade War	-0.2976	0.0011**	0.5298	0.0023**
China × COVID	0.6968	0.0003***	0.5614	0.1030
US × COVID	-0.4427	1.88E-05***	1.1118	6.65E-08***
China × RU-UKR	0.7738	0.0009***	0.1362	0.7490
US × RU-UKR	-0.3532	0.0056**	0.5940	0.0267*
China × Shipping Crisis	0.3080	7.68E-06***	-0.0261	0.7690
EU × Shipping Crisis	0.2909	0.0335*	-0.3414	0.0188*
US × Shipping Crisis	0.2995	3.05E-05***	-0.1103	0.3070
China × Chip Crisis	0.0767	0.2090	-0.3953	2.06E-12***
EU × Chip Crisis	0.2664	0.0143*	0.2410	0.0582
US × Chip Crisis	0.0341	0.6300	-0.2685	0.0002***

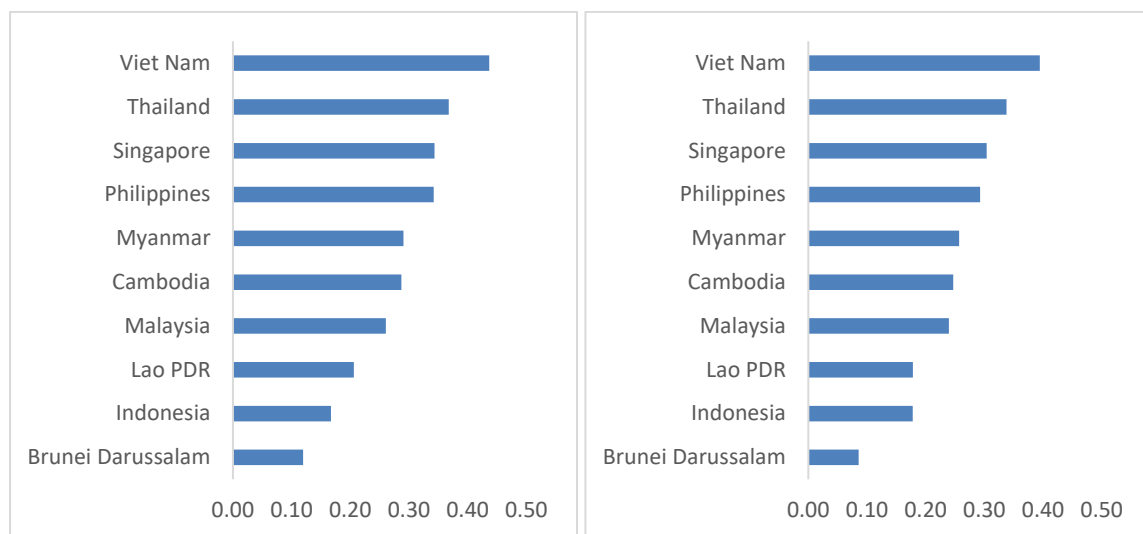
Note: '***' = $p \leq 0.001$, '**' = $p \leq 0.01$, '*' = $p \leq 0.05$. (1) Baseline Model. (2) Structural Model with FE. (3) Structural Model with Blocs-Events interactions (exports). (4) Structural Model with Blocs-Events interactions
Source: Authors' calculations

4.2. Trade Volatility of AMS

Export vulnerability across ASEAN Member States reflects differing levels of integration into global value chains and exposure to external demand shocks. Vietnam shows the highest vulnerability as a reflection of its strong dependence on electronics, garments, and foreign-led manufacturing networks that react quickly to shifts in global markets (Figure 13). Thailand, Singapore, and the Philippines also exhibit high vulnerability as their export structures rely heavily on electronics, automotive components, and services tied to global cycles. Middle-tier vulnerability in Myanmar, Cambodia, and Malaysia reflects partial participation in GVCs with concentrated product baskets. Lao PDR, Indonesia, and Brunei display lower export vulnerability due to narrower export portfolios and lower trade openness, though this also signals limited diversification.

Import vulnerability is similarly uneven across ASEAN, with Vietnam, Thailand, Singapore, and the Philippines again showing the highest exposure. These economies rely heavily on imported intermediate goods (e.g. electronics components, machinery, fuel, and chemicals), making them sensitive to global supply-chain disruptions, shipping delays, and price shocks. Myanmar, Cambodia, and Malaysia follow with moderate import vulnerability driven by reliance on imported energy, capital goods, and raw materials. Lao PDR and Indonesia show somewhat lower vulnerability potentially due to larger domestic resource bases, while Brunei’s minimal vulnerability stems from limited import needs relative to its small population and abundant hydrocarbons. However, lower vulnerability often reflects underdeveloped industry rather than resilience.

Figure 13. Vulnerability of ASEAN Member States, Exports vs Imports

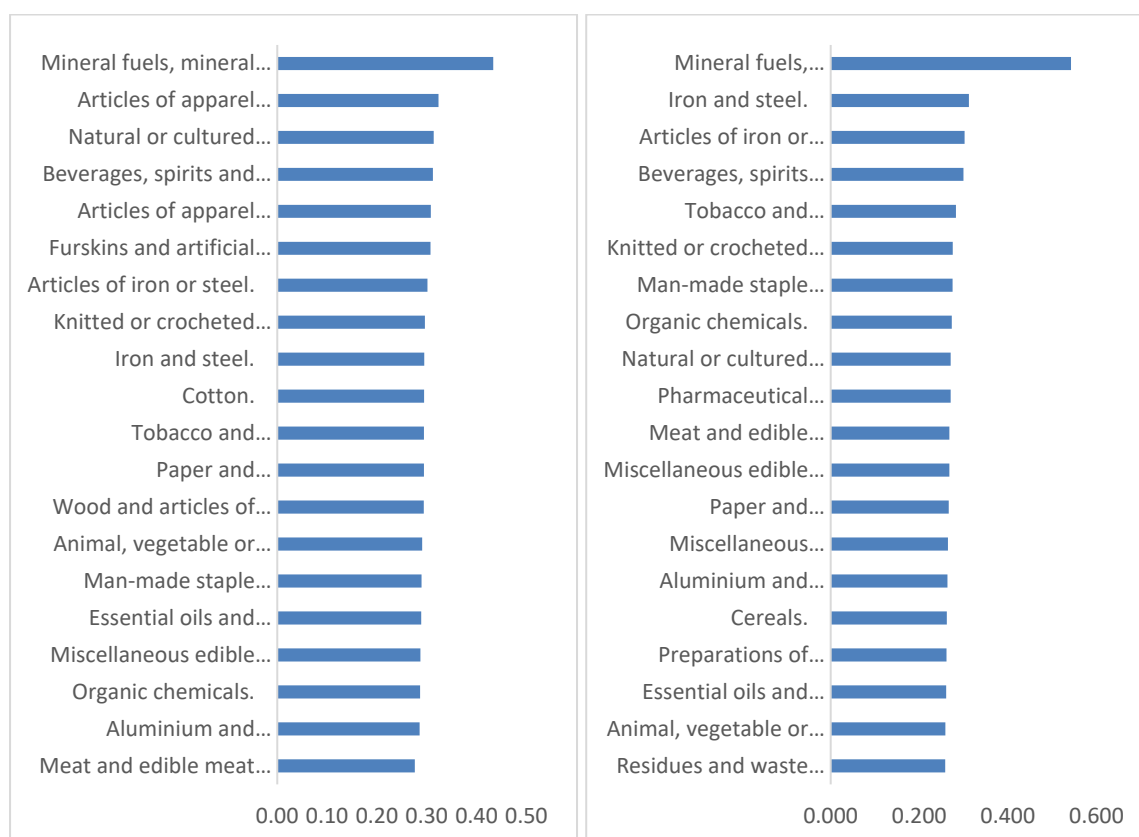


Source: Authors’ calculations

4.3. Commodity Trade Vulnerability

ASEAN’s most vulnerable export commodities reveal heavy dependence on resource-based goods, textiles, and intermediate industrial inputs. Mineral fuels dominate, followed by apparel, pearls and precious stones, ores, iron and steel, fabrics, and agricultural fibers such as cotton and wool. On the import side, vulnerabilities center on fuels, iron and steel products, essential chemicals, pharmaceuticals, fabrics, cereals and food preparations, aluminum, and fats and oils (Figure 14). These patterns expose ASEAN’s sensitivity to commodity cycles, global supply disruptions, and upstream concentration.

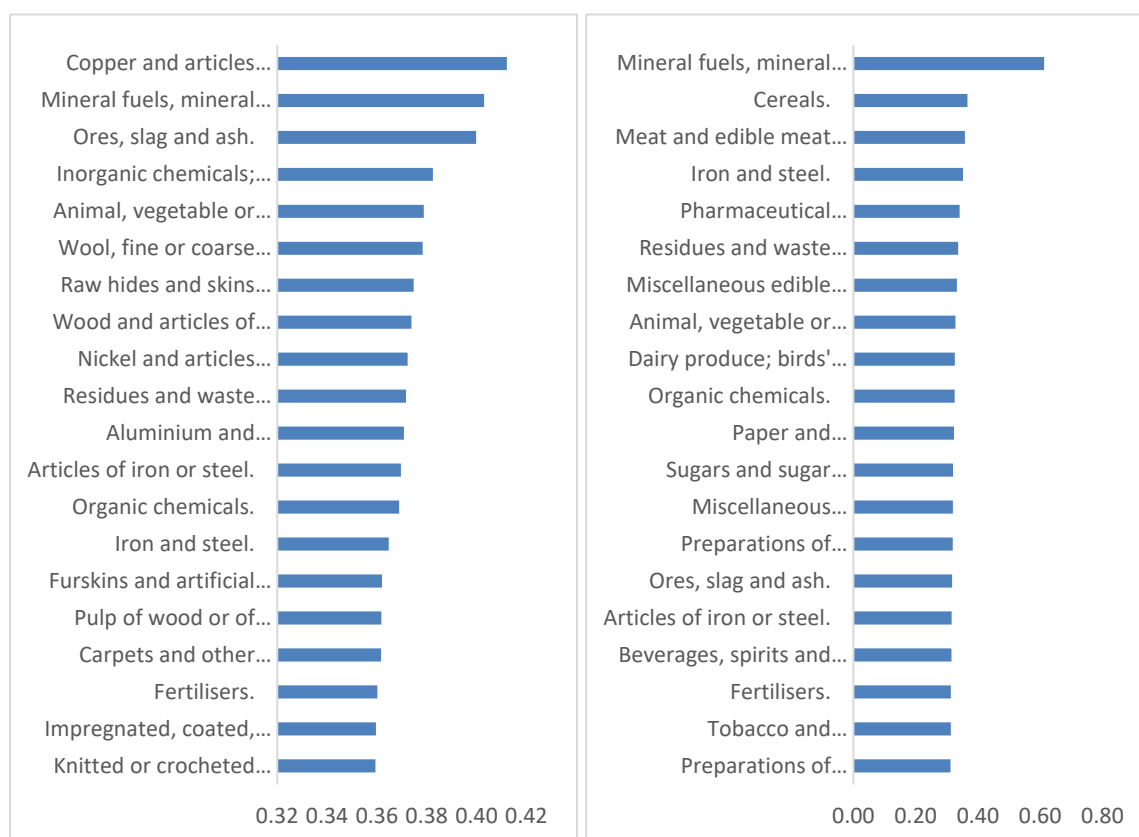
Figure 14. Vulnerability of ASEAN Commodities, Exports vs Imports



Source: Authors' calculations

Meanwhile, the Philippines' most vulnerable export commodities include copper and articles thereof, ores and slag, fats and oils, raw hides and skins, nickel, aluminum, organic chemicals, and selected textile-related goods (Figure 15). Their vulnerability stems from high exposure to global commodity prices, dependence on foreign buyers, and concentration in unprocessed or low-value segments. On the import side, the country is highly vulnerable to mineral fuels, meat products, pharmaceuticals, processed foods, dairy, paper, chemicals, ores, beverages, and tobacco. These categories reveal heavy reliance on imported energy, essential food items, medical goods, and industrial inputs – making the Philippines susceptible to global supply shocks, price fluctuations, and geopolitical disruptions.

Figure 15. Vulnerability of Philippine Commodities, Exports vs Imports



Source: Authors' calculations

5. Conclusion

The results reinforce the IMF's argument that geoeconomic fragmentation does not affect all countries equally; instead, its impacts are asymmetric and highly heterogeneous across partners. Fragmentation shocks, such as trade wars, COVID-19, Russia-Ukraine conflict, shipping and chip crises, generate fat-tailed losses that disproportionately affect peripheral economies, smaller exporters, and states heavily dependent on imported inputs. Meanwhile, major blocs such as the US, EU, and China experience more stable or counter-cyclical gains, reflecting their structural dominance in global value chains. Tail risks thus amplify existing inequalities, with the Philippines and ASEAN face deep import disruptions even when export routes temporarily expand during crises.

5.1. For ASEAN

The results from the ASEAN export and import regression models reveal a nuanced and asymmetric trade patterns in response to geoeconomic fragmentation (GEF) and global disruptions. For exports, the insignificance of the overall GEF coefficient suggests that ASEAN's outward trade is not systematically weakened by fragmentation at the aggregate level. This reflects ASEAN's structural advantage as a flexible, substitutable supplier within global value chains (GVCs), that is capable of reallocating exports toward alternative markets when major economies reconfigure supply networks. Notably, ASEAN exports toward the United States increase significantly under GEF, underscoring the region's role as a diversification destination for firms shifting operations away from China. The EU also emerges

as a consistent beneficiary, with ASEAN exports rising during the trade war and the Russia–Ukraine conflict. These shifts point to ASEAN’s increasing importance as a stabilizing and “friend-shored” node in restructured GVCs.

Meanwhile, crisis-specific effects show varied but meaningful patterns. Exports to China rise during the pandemic and the shipping crisis – events that deepened China’s temporary supply shortages and elevated ASEAN’s attractiveness as an alternative source. Conversely, exports to China do not increase during geopolitical-driven events (trade war, RU–UKR), highlighting a bifurcation between economic shocks and political shocks. Similarly, ASEAN’s exports to the US and EU are selectively boosted during geopolitical disruptions, reinforcing ASEAN’s role in bridging between political blocs.

Imports, however, tell a different story as it exhibits a far more fragile pattern. The strongly negative GEF coefficient indicates that fragmentation systematically reduces ASEAN’s total import capacity, reflecting heightened supply-side constraints, logistical disruptions, supplier concentration risks, and rising input costs. Yet, this contraction is not distributed evenly. ASEAN increasingly imports more from China, the US, and especially the EU under rising fragmentation. This suggests that despite total import suppression, ASEAN becomes more dependent on major advanced economies for critical inputs – technology goods, machinery, chemicals, pharmaceuticals, and intermediate goods crucial for GVC participation.

Crisis-specific import patterns reveal heightened vulnerability. COVID-19 raises ASEAN’s import dependence on China and, somewhat unexpectedly, on the US, consistent with medical supply surges and emergency procurement. The Russia–Ukraine war significantly reduces ASEAN’s imports from the EU, reflecting energy-metal price volatility, logistics rerouting, and supply uncertainties in European industrial chains. The chip crisis strongly depresses ASEAN’s imports from China and the US, highlighting the region’s structural dependence on semiconductor supply chains. Unlike exports, imports have far fewer positive and significant shock responses, illustrating ASEAN’s weaker resilience on the inward side.

Gravity variables confirm structural truths: geographic contiguity and economic size remain strong determinants of trade, while distance matters more for exports than imports. FTAs significantly increase imports but not exports, suggesting ASEAN uses FTAs primarily for securing access to inputs rather than enhancing outward competitiveness.

In general, ASEAN emerges as a region with export adaptability but import vulnerability. This asymmetry highlights notable risks – while ASEAN can reroute exports in crises, its manufacturing and food systems remain exposed to upstream disruptions. The region’s long-term resilience hinges on reducing import dependence, upgrading domestic capabilities, and strengthening intra-ASEAN production networks.

5.2. For the Philippines

The regression results for the Philippines reveal a distinctive and asymmetric trade response to geoeconomic fragmentation (GEF) and major global shocks. Unlike the aggregate ASEAN pattern, the Philippines exhibits a positive but marginally significant export response to GEF, suggesting that fragmentation opens selective opportunities for Filipino exporters as global supply chains reconfigure. However, this effect is not uniform across partners. The Philippines’ exports to China decline significantly under GEF, while exports to the United States and EU

do not show systematic increases. This indicates that while the Philippines benefits from global realignments, it does so in an uneven and partner-specific manner.

In contrast, imports react sharply and significantly to GEF, with a large positive coefficient. This implies that Philippine import dependence deepens under fragmentation, particularly in critical sectors where the economy relies heavily on foreign supplies. The Philippines imports significantly more from the EU and US under GEF, while imports from China do not show systematic increases. This pattern reflects upstream dependency, where pharmaceuticals, electronics inputs, machinery, chemicals, and high-technology components largely originate from Europe and the United States. The Philippine economy cannot fully substitute these, making GEF a force that increases vulnerability through higher input costs and greater reliance on politically exposed suppliers.

The crisis-specific coefficients further illustrate the Philippines' sensitivity to global disruptions. Export responses indicate that the Philippines experiences surges in export flows to China during the trade war, COVID-19, the RU-UKR conflict, and the shipping crisis. These positive shocks likely reflect China's supply shortfalls and increased dependence on Southeast Asian intermediates during crises. Meanwhile, the United States consistently decreases its imports from the Philippines during crises, including COVID-19, the RU-UKR war, and the shipping crisis. This suggests that Filipino exports lose ground in markets where competition tightens during supply chain disruptions.

Import responses are more alarming. Imports from the US surge significantly during COVID-19, the trade war, and the RU-UKR conflict, revealing deep dependency on American pharmaceuticals, electronics, and food items during emergencies. Imports from China spike during COVID-19, although insignificantly, but fall dramatically during the chip crisis, underscoring dependency on semiconductor flows. European imports decline significantly during the shipping crisis and the RU-UKR conflict – two events that disrupted EU outbound shipments of chemicals, metals, pharmaceuticals, and food products.

Sectorally, these patterns mirror the Philippines' structural weaknesses: a manufacturing sector reliant on imported intermediate goods, an industrial base short on upstream materials, and chronic dependence on foreign food, energy, and medical supplies. The divergence between export and import responses, where exports moderately adaptive while imports structurally vulnerable, exposes a fragility within the Philippine economy. The country can capture opportunities during external disruptions, but its ability to sustain production hinges on a fragile supply chain.

Finally, the results point to a Philippine trade structure that is opportunity-responsive but vulnerability-constrained. Fragmentation opens short-term export windows, but long-term resilience is threatened by deep and widening import dependence on geopolitically sensitive partners. Without structural transformation, GEF and crisis-intensive global environments could magnify Philippine exposure rather than strengthen its participation in global trade.

6. Policy Recommendations

6.1. For ASEAN

Addressing ASEAN's asymmetric vulnerability requires coordinated structural interventions at the regional and national levels. Policy must target three intertwined challenges: (a) dependence on extra-regional inputs, (a) the fragility of supply chains under fragmentation, and (c) limited upgrading of export structures.

First, ASEAN should strengthen internal production capacity for critical imports, including fuel, chemicals, pharmaceuticals, semiconductors, metals, and key agrifood items. Regional industrial cooperation can reduce dependency on a small set of external suppliers. ASEAN could develop a shared strategy for petrochemicals, green minerals processing, pharmaceutical manufacturing hubs, and food security. Stronger investment incentives, streamlined regulations, and tax credits for strategic industries can help build foundational capabilities across AMS. The ASEAN Semiconductors Strategic Framework should be leveraged to develop regional chip clusters, harmonized incentives, and shared packaging and testing facilities. Likewise, the ASEAN Critical Minerals Strategy should be integrated to advance sustainable mining standards, regional smelting capacity, EV battery material processing, and long-term coordinated offtake agreements.

Second, supply-chain resilience must be institutionalized. ASEAN should establish a regional supply chain risk platform to monitor input dependencies, chokepoints, shipping disruptions, and exposure to export controls or sanctions. This early-warning system could help AMS anticipate shortages and coordinate emergency procurement or stockpiles. Complementary logistics reforms, in the forms of port modernization, digital customs corridors, cross-border trucking harmonization, would reduce dependency on external shipping flows, especially during crises like COVID-19 or the Suez/shipping bottlenecks. The ASEAN Declaration on Strategic Trade Management should be operationalized by harmonizing export controls, monitoring dual-use goods, and developing shared crisis-response protocols. Strategic trade alerts must be integrated into the risk platform to anticipate sanctions, chokepoint disruptions, and bloc-related restrictions. ASEAN should also establish regional rules that guarantee the protected movement of essential goods during emergencies.

Third, ASEAN must reposition itself within shifting GVCs. The export model shows that ASEAN gains opportunities when major powers diversify away from each other. Policymakers should capitalize by promoting ASEAN as a "neutral hub" through investment promotion, stable regulatory regimes, green industrial parks, and labor upskilling. Sectors such as electronics, electric vehicle components, agrifood processing, renewable technologies, and digital services are strategic entry points. ASEAN should deepen cooperation under the ASEAN Investment Area (AIA), strengthen regional mutual recognition of standards, and streamline rules of origin across existing FTAs. The DEFA should be utilized to harmonize digital trade standards, facilitate cross-border data flows, and reinforce e-logistics systems to support rapid rerouting during disruptions. The Digital Workers Pass can enhance mobility of tech talent, enabling firms to scale and meet evolving GVC demands. Accelerating customs digitalization and expanding cross-border e-commerce will further bolster ASEAN's emerging role as a flexible "swing producer" in global supply chains.

Fourth, deeper integration is essential. Because FTAs significantly increase imports but not exports, ASEAN must work to close the competitiveness gap. Harmonizing non-tariff measures, improving logistics performance, and accelerating implementation of the ASEAN Single Window can lower trade costs and improve export responsiveness. Intra-ASEAN trade should be promoted through targeted corridors linking maritime and landlocked AMS.

Fifth, ASEAN must diversify trade relationships. Overdependence on China, the EU, and the US exposes the region to geopolitical swings. Diversification toward India, the Middle East, Africa, and Latin America would reduce concentration risk. ASEAN should pursue new digital, green, and comprehensive FTAs and strengthen ties under RCEP.

Sixth, upgrading SMEs is crucial. Many AMS remain locked in low-value export structures (apparel, raw minerals, basic agriculture). Regional SME upgrading programs, technology extension services, and access to ASEAN-wide e-commerce platforms can help firms climb the value ladder.

Finally, ASEAN must embed resiliency into long-term development. Energy transition strategies can reduce dependence on imported fuels. Investment in circular-economy metals, mineral recycling, and local manufacturing of strategic goods can mitigate future fragmentation shocks.

6.2. For the Philippines

To address the vulnerabilities revealed by the regression results, the Philippines must adopt a multi-pronged resilience strategy targeting export upgrading, import substitution, supply-chain diversification, and strategic autonomy. Because imports are significantly more fragile than exports under GEF, policy must prioritize reducing upstream dependencies while enhancing domestic productive capacity.

First, strengthen domestic production of critical inputs. The Philippines should prioritize building capacity in pharmaceuticals, chemicals, semiconductors, electronics components, food processing, fertilizers, and basic metals – sectors where import shocks were most severe. An industrial deepening strategy is essential. This should include incentivizing domestic petrochemical clusters, supporting API (active pharmaceutical ingredient) manufacturing, and developing localized electronics parts and testing facilities. Public-private partnerships should support local production of medical goods and inputs, ensuring supply stability during crises.

Second, develop strategic reserves and safety nets. Fuel, pharmaceuticals, and food show extreme import sensitivity during shocks. The Philippines should build strategic reserves of petroleum products, medicine, and essential food items. A national food resilience strategy that could expand cold storage, mechanizing agriculture, and strengthening logistics, would reduce reliance on imported meat, dairy, and processed foods.

Third, diversify import sources and reduce supplier concentration. Since GEF increases reliance on the US and EU, the Philippines must diversify sources to India, the Middle East, ASEAN, and Africa. For electronics inputs and semiconductors, diversification toward Taiwan, South Korea, and Vietnam can reduce risks linked to US-China technology tensions. Government procurement rules should encourage multisource contracting to prevent overdependence on a single geopolitical bloc.

Fourth, capitalize on export opportunities from supply-chain realignments. Positive export responses to GEF and crises, especially toward China, signal opportunities. The Philippines should position itself as a reliable manufacturing partner in electronics, BPO, agrifood, and minerals-based industries. Export promotion efforts must target markets showing counter-cyclical demand during disruptions.

Fifth, upgrade value chains through domestic mineral processing. The Philippines exports significant quantities of nickel, copper, and ores during crises. Instead of exporting raw minerals, the country should invest in smelting, refining, and battery precursor manufacturing. This would convert crisis-driven export spikes into long-term value-added revenue streams.

Sixth, build a national supply chain risk monitoring system. Government must track global price shocks, semiconductor flows, shipping delays, export controls, and geopolitical risks. A Supply Chain Intelligence Unit under DepDev or DTI can guide firms on diversification strategies and coordinate crisis responses.

Seventh, strengthen FTAs and regional cooperation. Because FTAs significantly improve exports, the Philippines should deepen participation in RCEP, upgrade e-commerce and digital provisions in existing FTAs, and pursue new agreements with India, Canada, and the Middle East.

Last, accelerate the energy transition. Import reliance for fuels increases vulnerability. Investing in domestic renewable energy—solar, wind, geothermal, and green hydrogen—will reduce exposure to global price spikes and energy bottlenecks.

7. References

- Abdullahi, A., A. S. Ibrahim, and M. A. Mahmud. 2025. The weaponization of economic interdependence: Sanctions, financial statecraft, and the fragmentation of the global economic order. *International Journal of Social Sciences and Management Review*, 8(4).
https://ijssmr.org/uploads2025/ijssmr08_98.pdf (accessed on September 22, 2025).
- Aiyar, S, J. Chen, C. Ebeke, R. Garcia-Saltos, T. Gudmundsson, A. Ilyina, A. Kangur, T. Kunaratskul, S. Rodriguez, M. Ruta, T. Schulze, G. Soderberg, and J. P. Trevino. 2023. *Geoeconomic Fragmentation and the Future of Multilateralism*. IMF Staff Discussion Note, January 2023.
<https://www.imf.org/-/media/files/publications/sdn/2023/english/sdnea2023001.pdf> (accessed on January 6, 2025).
- Aiyar, S., D. Malacrino, and A. Presbitero. 2024. Investing in friends: The Role of Geopolitical Alignment in FDI Flows. *European Journal of Political Economy*, Vol. 83(C).
https://davmalacrino.github.io/papers/FDI_and_geopolitics.pdf (accessed on September 23, 2025).
- Alvarerz, J. A., M. B. Andaloussi, C. Maggi, A. Sollaci, M. Stuermer, and P. Topalova. 2023. *Geoeconomic Fragmentation and Commodity Markets*. IMF Working Paper, WP/23/201.

- <https://www.imf.org/-/media/files/publications/wp/2023/english/wpiea2023201-print-pdf.pdf> (accessed on December 12, 2025).
- Azim, S., S. Rooh, M. F. Malik, and S. M. A. Shah. 2025. The Fragmentation of Global Trade: From Protectionism to Gated Globalization. *Social Sciences and Humanity Research Review*. January-March 2025.
https://www.researchgate.net/publication/392875900_THE_FRAGMENTATION_OF_GLOBAL_TRADE_FROM_PROTECTIONISM_TO_GATED_GLOBALIZATION (accessed on September 22, 2025).
- Baldwin, R. and M. Ruta (eds.). 2025. *The State of Globalisation*. CEPR Press International Monetary Fund. Centre for Economic Policy Research (CEPR), Paris, France.
https://cepr.org/system/files/publication-files/255049-the_state_of_globalisation.pdf (accessed on September 22, 2025).
- Bolhuis, M. A., J. Chen, and B. R. Kett. 2023. *Fragmentation in Global Trade: Accounting for Commodities*. IMF Working Paper WP/23/73.
<https://www.imf.org/en/Publications/WP/Issues/2023/03/24/Fragmentation-in-Global-Trade-Accounting-for-Commodities-531327> (accessed on September 23, 2025).
- Cerdeiro, D., J. Eugster, R. Mano, D. Muir, and S. Peiris. 2021. *Sizing Up the Effects of Technological Decoupling*. IMF Working Paper WP/21/69.
<https://www.imf.org/en/Publications/WP/Issues/2021/03/12/Sizing-Up-the-Effects-of-Technological-Decoupling-50125> (accessed on September 23, 2025).
- Goes, C., and E Bekker. 2022. *The Impact of Geopolitical Conflicts on Trade, Growth and Innovation*. WTO Staff Working Paper ERSD-2022-09.
https://www.wto.org/english/res_e/reser_e/ersd202209_e.htm (accessed on September 23, 2025).
- Guberman, D., S. Schreiber, and A. Perry. 2024. *Export Restrictions on Minerals and Metals: Indonesia's Export Ban of Nickel*. Office of Industry and Competitiveness Analysis, Working Paper ICA-104.
https://www.usitc.gov/publications/332/working_papers/ermm_indonesia_export_ban_of_nickel.pdf (accessed on December 12, 2025).
- IMF. 2023. *Global Financial Stability Report: Safeguarding Financial Stability amid High Inflation and Geopolitical Risks*. Washington, DC: International Monetary Fund.
<https://www.imf.org/en/Publications/GFSR/Issues/2023/04/11/global-financial-stability-report-april-2023> (accessed on September 22, 2025).
- IMF Research Dept. 2023. *World Economic Outlook 2023*.
<https://www.elibrary.imf.org/display/book/9798400235801/9798400235801.xml> (accessed on December 12, 2025).
- Javorcik, B., L. Kitzmueller, H. Schweiger, and M. Yildirim. 2022. *Economic Costs of Friend-Shoring*. EBRD Working Paper No. 274.
<https://www.ebrd.com/home/news-and-events/publications/economics/working-papers/economic-costs-of-friend-shoring.html#> (accessed on September 23, 2025).

- Kee, H.L. and E. Xie. 2025. Nickel, Steel and Cars: Export Ban and Domestic Value-Added in Indonesia. World Bank, Policy Research Working Paper 11249.
<https://documents1.worldbank.org/curated/en/099457511102525232/pdf/IDU-dd5457e6-f5fe-419c-b0ef-ae05bd244854.pdf> (accessed on December 12, 2025).
- Lopez, L., F. Odendahl, S. Parraga, and E. Silgado-Gomez. 2024. The Pass-Through to Inflation of Gas Price Shocks. European Central Bank, Working Paper Series No. 2968.
<https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2968~e514c92723.en.pdf> (accessed on December 12, 2025).
- OECD. 2025. OECD Inventory of Export Restrictions on Industrial Raw Materials 2025: Monitoring the Use of Export Restrictions Amid Growing Market and Policy Tensions. OECD Publishing, Paris. <https://doi.org/10.1787/facc714b-en>.
https://www.oecd.org/en/publications/oecd-inventory-of-export-restrictions-on-industrial-raw-materials-2025_fac714b-en.html (accessed on December 12, 2025).
- Rozenov, R. and Z. Zhang. 2025. Geoeconomic Fragmentation: Implications for Ireland. IMF Selected Issues Paper (SIP/2025/089). Washington, DC, International Monetary Fund.
<https://www.imf.org/en/Publications/selected-issues-papers/Issues/2025/07/07/Geoeconomic-Fragmentation-Implications-for-Ireland-568367> (accessed on September 22, 2025).