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Partner Similarity and The Sectoral Evolution of China's Trade*

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Abstract

We study how the sectoral composition of exports and imports shapes bilateral trade flows. Building on earlier similarity indices, we introduce the *Partner Similarity Index* (PSI), which measures sectoral alignment between a country's export structure and its partner's import demand. Embedded in a gravity framework, PSI is a strong predictor of bilateral trade flows after accounting for standard gravity determinants, trade policy variables, and high-dimensional fixed effects. Applied to China and advanced economies, the index reveals growing asymmetries: China's export basket is increasingly aligned with advanced-economy import demand, while China's import demand has become progressively less aligned with advanced-economy exports.

Keywords: International Trade, Export Similarity, Sectoral composition, Gravity

JEL Classification: F12, F14, O33

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1 Introduction

Gravity models are the workhorse of empirical international trade.[1] Their success lies in their ability to explain bilateral trade flows with a small set of variables. Yet, despite this explanatory power, standard gravity specifications do not explicitly account for how the sectoral composition of one country's exports aligns with the sectoral composition of its partner's imports, an alignment that is necessary for bilateral trade to flourish. In other words, bilateral trade is shaped not only by geography or history, but also by whether countries' export and import baskets fit together. Capturing this dimension is critical for understanding trade complementarities, competitive pressures, and potential vulnerabilities in global supply chains, especially during periods of rapid industrial transformation or heightened geopolitical tensions.

The idea of measuring sectoral overlap between countries is not new. Finger and Kreinin (1979) introduced the Export Similarity Index (ESI) to quantify the extent to which two countries compete in the same export markets, and this measure has been widely used in the trade literature, notably to study China's growing presence in advanced economy markets (Schott, 2008; Riad et al., 2012; Wang and Liu, 2015; Caselli, 2019). While the ESI is informative about competitive pressure among exporters, it does not capture bilateral complementarity: it indicates whether two countries export similar goods, but not whether one country's export structure aligns with the sectoral composition of another country's imports. Building on this insight, we propose a new *Partner Similarity Index* (PSI), which compares a country's export structure with its partner's import structure at the sector level. The PSI provides a simple, composition-based measure of the constraint that sectoral specialization imposes on bilateral trade, capturing the extent to which exporter supply and importer absorption overlap across sectors. This overlap delivers a natural upper bound on bilateral trade flows that applies across a wide class of trade models. The index captures both competition and complementarity, can be related to modern quantitative trade models (Eaton and Kortum, 2002), and can be embedded directly into gravity-style empirical specifications.

Using bilateral trade data for 43 advanced and emerging economies between 2010 and 2023, we find that PSI is a strong and robust predictor of bilateral trade flows. A one standard deviation increase in PSI is associated with a 14.2 percent increase in bilateral trade, even after controlling for conventional gravity variables, tariffs, non-tariff measures, and exporter-year and importer-year fixed effects. This result highlights the economic importance of sectoral alignment

[1] See Anderson and van Wincoop (2003); Anderson and Yotov (2010); Head and Mayer (2014); Yotov et al. (2016); Larch et al. (2025) for seminal work and literature reviews of the empirical gravity literature.

and suggests that analyses that do not explicitly account for bilateral sectoral alignment may understate important forces shaping observed trade patterns. More broadly, the stability of this relationship across countries and time points to the PSI as a useful empirical regularity, which may help discipline theoretical approaches to modeling trade flows and trade dynamics in sectorally rich environments.

PSI also provides a new lens through which to study structural change in global trade. Applied to China and advanced economies, the index highlights three broad trends consistent with China's policy objectives documented in de Soyres and Moore (2024). First, China's export basket has increasingly overlapped with that of advanced economies, particularly in machinery and transport equipment. Second, China has reduced its reliance on imports from these economies, notably in automobiles, reflecting broader efforts toward self-reliance and industrial upgrading. Third, advanced economies have become more dependent on Chinese exports in high-value sectors, reinforcing China's role as a critical supplier in global markets. Taken together, these patterns illustrate how sectoral composition can reveal shifts in trade dependence and competition that are not apparent in aggregate bilateral flows.

By explicitly capturing bilateral sectoral alignment, PSI complements traditional gravity variables and existing measures of export competition. The index serves both as a robust predictor of bilateral trade volumes and as a tool to track the evolution of comparative advantage across sectors, shedding light on structural sources of trade tensions and offering insights relevant for researchers and policymakers.

2 Measuring Trade basket Similarity

This section introduces measures of trade basket similarity that capture different dimensions of how countries' production and demand structures relate to one another. We begin by reviewing the Export Similarity Index (ESI), a widely used measure that summarizes the overlap between the export structures of two countries and is commonly interpreted as capturing competitive pressure in third markets. We then introduce a new, complementary measure, the Partner Similarity Index (PSI), which focuses instead on bilateral alignment between exporters' supply and importers' demand at the sectoral level.

2.1 Export Similarity Index (ESI)

Over the past two decades, the sectoral composition of countries' trade baskets has undergone significant transformations. For instance, China's export structure has evolved from being predominantly labor-intensive to increasingly encompassing high-tech and capital-intensive goods, such as machinery and transport equipment (World Bank, 2025; Mathai et al., 2016). To gauge the evolution of trade basket similarity, the current literature relies on an Export Similarity Index (ESI), introduced by Finger and Kreinin (1979), which measures the degree of similarity between the export structures of two countries. Consider two countries, A and B. Let $X_{i,A}$ represent country A's total exports (to all countries globally) in sector i and let X_A represent country A's total exports. The Export Similarity Index (ESI) is defined as:

$$ESI_{AB} = 100 \times \sum_{i=1}^{N} \min\left(\frac{X_{i,A}}{X_A}, \frac{X_{i,B}}{X_B}\right) \tag{1}$$

Note that $\frac{X_{i,A}}{X_A}$ represents the share of sector i in country A's total exports. The index ranges from 0 (completely dissimilar export profiles) to 100 (when export profiles are identical), capturing how closely the sectoral composition of exported goods between both countries coincides. Intuitively, it is a measure of the overlap between two countries' export baskets. For instance, a given country A does not export any goods in sector i, but country B does, then the min operator returns a value of 0. On the other hand, if both countries have the same export bundles, then the min operator will return the export shares for each sector i, which then mechanically sums to 1 and country-pair AB would have an ESI value of 100. Tracking the ESI's evolution over time reveals important shifts in global trade patterns, indicating whether countries are becoming competitors or complementary partners in international markets. For instance, changes in the ESI between a developing country and Advanced Economies can reveal trends such as industrial upgrading or shifts in comparative advantage.

From the perspective of bilateral trade, however, similarity between two countries' export baskets is not sufficient for trade to occur. For trade to be feasible, the goods produced by one country must correspond to the goods demanded by its trading partner. Even if two countries export similar products, bilateral trade between them may be limited if their export profiles do not align with each other's import needs. Conversely, two countries with dissimilar export structures may trade intensively if one specializes in goods that the other imports. This basic feasibility condition suggests that bilateral trade depends not only on production-side similarity, but also on the alignment between exporters' supply and importers' demand at the sectoral level.

While the ESI is informative about competition in third markets, it does not capture whether a country's exports match the import structure of a particular trading partner. To address this gap, we introduce the *Partner Similarity Index* (PSI), which compares a country's export structure with a partner's import structure.

2.2 Partner Similarity Index (PSI)

Building on existing measures of export similarity, we define the *Partner Similarity Index* (PSI) as a measure of alignment between a country's *export* profile and a partner's *import* profile. The PSI captures how well the goods that a country exports align with the goods that another country imports. Denoting $M_{i,B}$ as total imports of country B in sector i, and M_B as total imports, we define the PSI as:

$$PSI_{AB} = 100 \times \sum_{i=1}^{N} \min\left(\frac{X_{i,A}}{X_A}, \frac{M_{i,B}}{M_B}\right) \tag{2}$$

Unlike the ESI, which is symmetric ($ESI_{AB} = ESI_{BA}$), the PSI is a directed index ($PSI_{AB} \neq PSI_{BA}$), An increase of PSI_{AB} indicates that the export basket of country A is becoming more aligned with the sectoral composition of the imports of country B. When investigating the drivers of international trade, the PSI metric enables us to capture the congruence between the sectoral specialization of an exporter and sectoral dependencies of an importer.

2.3 Sectoral Alignment and Bilateral Trade: A Feasibility Argument

We next provide a theoretical interpretation of the PSI, showing how sectoral composition can shape bilateral trade patterns. Differences between countries' export and import structures affect the scope for bilateral trade, even in the absence of changes in trade frictions. Rather than developing a fully micro-founded model, we formalize this idea using a simple feasibility argument and then relate the relevant export and import shares to economic fundamentals.

A composition-based feasibility bound

Consider N countries indexed by c and I sectors indexed by i. Let $X_{i,A}$ denote total exports of country A in sector i (to all destinations) and $M_{i,B}$ total imports of country B in sector i (from all origins), with totals $X_A = \sum_i X_{i,A}$ and $M_B = \sum_i M_{i,B}$. Let $X_{i,AB}$ denote bilateral exports from A to B in sector i.

For any sector i, bilateral exports are bounded by feasibility:

$$X_{i,AB} \leq \min\{X_{i,A},\, M_{i,B}\}. \tag{3}$$

This reflects the fact that trade in a sector cannot exceed either the exporter's total supply or the importer's total absorption in that sector.[2] Summing (3) across sectors yields an upper bound on total bilateral trade,

$$X_{AB} \equiv \sum_i X_{i,AB} \leq \sum_i \min\{X_{i,A},\, M_{i,B}\}. \tag{4}$$

Define export and import shares $s_{i,A} = X_{i,A}/X_A$ and $d_{i,B} = M_{i,B}/M_B$, and let $\lambda_{AB} \equiv M_B/X_A$ denote relative scale. The bound can then be written compactly as

$$X_{AB} \leq X_A \sum_i \min\{s_{i,A},\, \lambda_{AB} d_{i,B}\}.$$

In the scale-symmetric case ($\lambda_{AB} = 1$),

$$X_{AB} \leq X_A \sum_i \min\{s_{i,A},\, d_{i,B}\} = X_A \cdot \frac{\mathrm{PSI}_{AB}}{100}, \tag{5}$$

Equation (5) shows that the PSI summarizes a composition-based constraint on bilateral trade flows for two countries of similar size.

From feasible overlap to realized trade

To relate the feasibility bound to observed trade, suppose that a constant fraction $\phi_{AB} \in (0, 1)$ of the feasible overlap is realized as trade for each country pair:

$$X_{AB} = \phi_{AB} \sum_i \min\{X_{i,A},\, M_{i,B}\}. \tag{6}$$

Equivalently,

$$X_{AB} = \phi_{AB} X_A \sum_i \min\{s_{i,A},\, \lambda_{AB} d_{i,B}\}. \tag{7}$$

The parameter ϕ_{AB} summarizes bilateral trade frictions, such as trade costs and policy

[2]Minimum operators of this form are standard in assignment and matching environments, where aggregate outcomes are constrained by the overlap between supply and demand distributions; see, among others, Sattinger (1993), Acemoglu and Autor (2011), and the matching model in Shimer (2005). Related overlap measures also appear in the trade literature, starting with Finger and Kreinin (1979).

barriers, that govern how much of the feasible overlap is converted into actual trade. In empirical gravity specifications, exporter–year and importer–year fixed effects absorb aggregate size and openness, while country-pair fixed effects absorb time-invariant components of ϕ_{AB} and relative scale. Conditional on these controls, variations in PSI_{AB} captures the role of sectoral composition alone.

Example of link with existing theoretical environments

This subsection illustrates how the export and import shares entering the PSI can be mapped to economic fundamentals in standard trade models. The purpose is not to derive the PSI from a specific structural environment, but to show that the objects it aggregates naturally arise in widely used frameworks. We begin with a multi-sector Eaton–Kortum model, which provides a convenient benchmark for linking sectoral trade shares to productivity, trade costs, and comparative advantage.

Eaton and Kortum (2002) environment. To illustrate how the export and import shares entering the PSI can be related to fundamentals, consider a standard multi-sector Eaton-Kortum framework such as Caliendo and Parro (2014). Let productivity in country A and sector i be Fréchet with parameter $T_{i,A}$ and dispersion θ, and let τ^i_{AB} denote iceberg trade costs. Bilateral sectoral trade takes the familiar form:

$$X^i_{AB} = \pi^i_{AB} E^i_B, \qquad \pi^i_{AB} = \frac{T_{i,A}(c_A \tau^i_{AB})^{-\theta}}{\sum_m T_{i,m}(c_m \tau^i_{mB})^{-\theta}}, \tag{8}$$

where E^i_B denotes expenditure in sector i in country B. We can relate the export and import shares derived from our model to the PSI as follows[3]:

$$\begin{aligned} \text{PSI}_{AB} &= 100 \cdot \sum_i \min\left(\frac{X^i_A}{X_A}, \frac{M^i_B}{M_B}\right) = 100 - 50 \sum_i \left|\frac{X^i_A}{X_A} - \frac{M^i_B}{M_B}\right| \\ &= 100 - 50 \sum_i \left| \underbrace{\frac{\sum_d \pi^i_{Ad} E^i_d}{\sum_k \sum_d \pi^k_{Ad} E^k_d}}_{\text{A's export specialization}} - \underbrace{\frac{(1-\pi^i_{BB})E^i_B}{\sum_k (1-\pi^k_{BB})E^k_B}}_{\text{B's import specialization}} \right|. \end{aligned} \tag{9}$$

In this formulation, exporter A's specialization in sector i is high when it is relatively productive, faces low production costs, or experiences low trade barriers, increasing the likelihood

[3]Use the following mathematical identity to obtain equation 9: For any two nonnegative numbers a,b: $\min(a, b) = \frac{1}{2}(a + b - |a - b|)$.

of exporting that sector. Importer B's specialization is high when it is unlikely to source the good domestically—either due to low productivity or high costs—making imports in that sector more likely. The PSI is therefore high when A's comparative advantages align with the sectors that B tends to import. In other words, the PSI measures the alignment between exporter comparative advantage and importer sectoral dependence. This simple model does not impose a specific structure on the importer's demand system, so the PSI can map onto different patterns of sectoral expenditure.

Armenter and Koren (2014) environment. The interpretation of the Partner Similarity Index shares the spirit of Armenter and Koren (2014)'s "balls-and-bins" approach to trade data, which models the assignment of trade shipments to countries and products as random draws into categories (bins) to account for the observed sparsity and zeros in disaggregated trade flows. In this benchmark, the prevalence of empty product-country combinations arises mechanically from the limited number of shipments relative to the many possible classifications, without imposing rich microstructure. Analogously, PSI can be viewed as a reduced-form measure of how well an exporter's sectoral supply aligns with an importer's sectoral demand: sectors are treated like bins, and realized trade depends on the extent of overlap in export and import shares.

Other examples. Outside international trade, simple min-type or max–min operators are also used to capture compatibility in matching problems. For example, in two-sided matching, researchers have studied "max–min" preferences, where an agent's ranking of possible matches depends on the smallest value shared across attributes (Hatfield et al. (2016)). While this is not the same as PSI's reduced-form overlap measure, it illustrates the same idea: a simple rule based on shared features can summarize how well two profiles fit together, even without a detailed structural model.

This discussion is intended as an illustration rather than tying PSI to any structural interpretation. The PSI is a reduced-form, composition-based measure whose primary appeal lies in its empirical performance, which is the topic of the next section.

3 Empirical Analysis

In this section, we show that sectoral alignment between exporters and importers is a strong and robust predictor of bilateral trade flows. Using data for 43 advanced and emerging market economies over the period 2010–2023, we find that countries trade significantly more with partners whose import demand closely matches their export supply across sectors, even after controlling for standard gravity variables, trade policy measures, and exporter–year, importer–year, and bilateral fixed effects. The magnitude of the effect is economically meaningful, and remains stable across demanding specifications, underscoring the importance of sectoral composition for understanding aggregate trade dynamics.

3.1 Empirical specification and data

We estimate gravity-style regressions using bilateral trade data from UN Comtrade. Sectoral trade flows at the 3-digit SITC level are used to construct the PSI. Our baseline specification relates bilateral exports from country A to country B to PSI and a standard set of gravity controls, while absorbing a rich set of fixed effects:

$$\text{Trade}_{AB,t} = \exp\left[\beta_1 PSI_{AB,t} + \beta_2 \mathbf{Z}_{AB,t} + +\mu_{AB} + \delta_{A,t} + \gamma_{B,t}\right] \cdot \epsilon_{AB,t} \tag{10}$$

where $\text{Trade}_{AB,t}$ is total exports from country A to country B in year t. The vector $\mathbf{Z}_{AB,t}$ includes time-varying bilateral controls such as free trade agreements and bilateral tariffs, and non-tariff measures. Exporter–year and importer–year fixed effects absorb time-varying country-level characteristics, including economic size, trade openness, and multilateral resistance, while bilateral fixed effects capture time-invariant pair-specific determinants of trade. The specification is intentionally demanding: conditional on exporter–year, importer–year, and bilateral fixed effects, identification comes from within-pair variation over time in sectoral alignment between an exporter's supply structure and an importer's demand structure.

Within our preferred specification, we control for a set of time-varying bilateral variables that could confound the relationship between PSI and trade flows. These include indicators for whether countries A and B are linked by a trade agreement in year t, bilateral tariff measures, and bilateral measures of non-tariff barriers. Data on bilateral free trade agreements are taken from the World Trade Organization's Regional Trade Agreement database (World Trade Organization, 2025). Bilateral tariff data come from the Global Tariff Database (Teti, 2024) and are constructed as trade-weighted averages, winsorized at the 95th percentile. Measures of non-tariff barriers are drawn from the United Nations Trade & Development (UNCTAD, 2025). Following Larch et al. (2025), we estimate all gravity specifications using Poisson Pseudo–Maximum Likelihood (PPML), include asymmetric bilateral fixed effects as well as exporter–year and importer–year fixed effects, and cluster standard errors at the bilateral level.

3.2 Addressing mechanical correlation: a leave-one-out PSI

Since the PSI is constructed using bilateral trade flows between countries A and B, regressing those same flows on PSI could create a mechanical correlation: strong trade between A and B directly feeds into PSI, producing a form of circularity in the regression. To address this concern, we construct a *leave-one-out* version of the index, denoted $\widehat{\mathrm{PSI}}_{AB}$, which excludes bilateral flows between A and B from both exporter and importer totals:

$$\widehat{PSI}_{AB} = 100 \times \sum_{i=1}^{N} \min\left(\frac{X_{i,A}^{-B}}{X_A^{-B}}, \frac{M_{i,B}^{-A}}{M_B^{-A}}\right) \tag{11}$$

In (11), $X_{i,A}^{-B}$ is defined as exports from country A in sector i to all destination *except* country B – and other variables are defined similarly. This adjustment removes the direct mechanical link between contemporaneous bilateral trade and the index, sharpening the interpretation of the estimated coefficient as capturing sectoral alignment rather than reverse causality. Importantly, this correction is conservative. When we estimate the same specifications using the original PSI (without excluding bilateral flows), the estimated coefficients are substantially larger. The persistence of strong results under the *leave-one-out* construction indicates that the relationship between PSI and trade flows is not driven by mechanical correlation.

3.3 Main Results

Table 1 reports our main results. Across all specifications, the coefficient on $\widehat{\mathrm{PSI}}_{AB}$ is positive and statistically significant at the one-percent level. The magnitude is economically meaningful. In our preferred specification presented in column (6), a one–percentage-point increase in $\widehat{\mathrm{PSI}}_{AB}$ is associated with a 1.2 percent increase in bilateral trade. Given a standard deviation of 11.8, this implies that a one–standard-deviation increase in sectoral alignment raises bilateral trade by approximately 14.2 percent.

The estimated effect is robust to the inclusion of bilateral tariffs, free trade agreements, and non-tariff measures, and remains stable across alternative specifications. Notably, the coefficient on PSI is largely unaffected by the inclusion of exporter–year and importer–year fixed effects, indicating that PSI captures a dimension of bilateral trade variation that is not captured by aggregate trade openness and multilateral resistance.

Taken together, these results highlight the empirical importance of sectoral composition for understanding aggregate trade flows. Even after accounting for geography, policy barriers, and multilateral resistance, countries trade more with partners whose import demand aligns with their export supply across sectors. PSI provides a parsimonious way to incorporate explicit information on sectoral granularity—on both the exporter and importer sides—into gravity regressions, and its strong empirical performance suggests that sectoral alignment is tightly linked to bilateral trade flows.

Table. 1. PPML Gravity Results

	(1)	(2)	(3)	(4)	(5)	(6)
	Trade	Trade	Trade	Trade	Trade	Trade
$\widehat{PSI}$	0.031***	0.010***	0.012***	0.010***	0.010***	0.012***
	(0.006)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)
Bilateral Tariff			-0.124***			-0.113***
			(0.027)			(0.028)
Free-Trade dummy				0.069**		0.042
				(0.028)		(0.030)
Non-tariff barrier dummy					0.009	0.015
					(0.033)	(0.022)
Importer × Year FE	✓	✓	✓	✓	✓	✓
Exporter × Year FE	✓	✓	✓	✓	✓	✓
Bilateral FE		✓	✓	✓	✓	✓
Observations	21,749	22,867	19,670	22,867	22,867	19,670
Pseudo R^2	0.930	0.996	0.997	0.996	0.996	0.997

Note: All regressions use data from 2010–2023, except when including the Bilateral Tariff control, which only extends to 2021. All specifications include 43 AE and EME countries. Bilateral gravity controls used in the first specification are suppressed from the output. The constant is suppressed. Standard errors are clustered at the bilateral level. *** p<0.01, ** p<0.05, * p<0.1.

4 Case Study: The Sectoral Evolution of China's Trade

Similarity indices, such as the ESI and PSI, provide a concise way to track how changes in production and demand structures translate into evolving trade relationships. We use these indices to study the sectoral evolution of China's trade relative to major advanced economies (AEs).

Over the past decade, China has undergone a profound transformation in both the composition of its economy and the sectoral structure of trade. Manufacturing has shifted toward higher-value and more technologically sophisticated goods, alongside policies aimed at self-reliance and reduced dependence on advanced-economy imports in key sectors (de Soyres and Moore, 2024). The ESI and PSI allow us to systematically quantify these changes and assess their implications for bilateral trade flows, capturing shifts in both competitive pressure and complementarity.

In this section, we document four stylized facts describing China's sectoral repositioning relative to advanced economies. We combine observed similarity indices with counterfactual measures that hold China's import or export basket fixed at its 2010 composition, isolating the role of China's structural transformation from changes in advanced-economy trade patterns. We then place these patterns in historical perspective by comparing China's experience with that of earlier export-oriented Asian economies, notably Japan and South Korea.

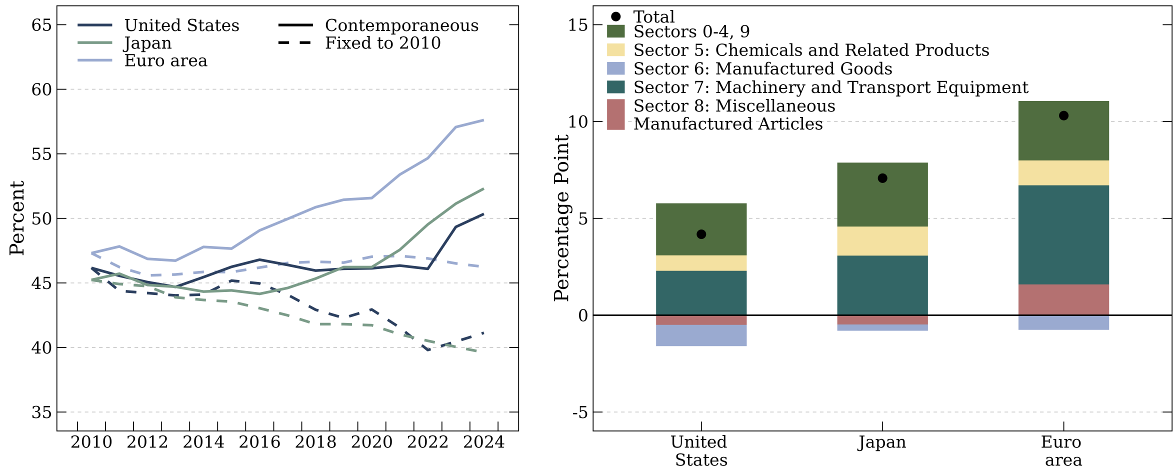
Fact 1: China and AE's export baskets are increasingly similar.

We first document the evolution of China's export similarity relative to major advanced economies using the ESI (Figure 1). The ESI between China and the Euro area, Japan, and the United States rises markedly over the sample period, as China's export basket has increasingly overlapped with those of advanced economies. Between 2010-2024, the similarity between China and Euro area exports increased the most, rising by 10.3 percentage points. This increase is particularly pronounced after the mid-2010s and is driven by growing Chinese exports in machinery, electrical equipment, and transport-related sectors. In fact, the share of SITC sector 78 (Road Vehicles, which includes parts and accessories) in China's total exports increased notably from 2.8 percent in 2010 to 6.4 percent in 2024. During the same period, the Euro area export share of Road Vehicles plateaued, marginally increasing from 13.2 percent in 2010 to 13.6 percent in 2024.

To isolate the role of China's own structural transformation, we compare the observed ESI to a counterfactual index that holds China' export basket fixed at its 2010 composition. Under this counterfactual, export similarity with the Euro area would have remained roughly flat, while similarity with Japan and the United States would have declined. The divergence between the observed and counterfactual paths shows that the rise in export similarity is primarily driven by changes in China's export structure rather than by shifts in advanced-economy exports. This pattern is consistent with China's move up the value chain and its increasing presence in sectors traditionally dominated by advanced economies.

Figure 1. Evolution of Export Similarity Index between China and Select AEs

(a) Export Similarity Index (b) Change in ESI Between 2010 and 2024



Note: The left panel depicts the ESI between AE's, respectively, and China. The dotted lines correspond to a counterfactual index that holds China' export basket fixed at its 2010 composition. The right panel takes the long difference between 2010-2024 in each PSI series and breaks down the sectoral contribution. The Euro area is a GDP weighted aggregate of the following European countries using 2024 weights: Austria, Belgium, France, Germany, Italy, the Netherlands, Portugal, and Spain.
Source: UN-Comtrade and authors' calculations.

Fact 2: China's import basket is increasingly dissimilar to AEs exports

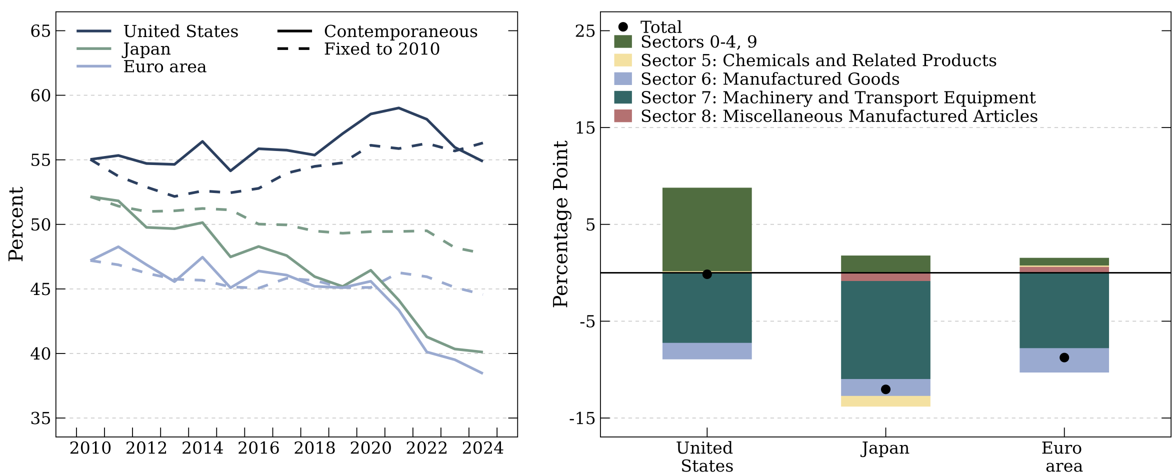
In Figure 2, we turn to the PSI computed over advanced-economy exports and Chinese imports. For the Euro area and Japan, the PSI declines steadily over time (solid lines), indicating a growing mismatch between the sectoral composition of these countries' exports and China's import demand. In contrast, the counterfactual indices that hold China's import basket fixed at its 2010 composition (dotted lines) remain broadly flat. The divergence between the solid and dotted lines shows that the increasing mismatch is driven primarily by changes in China's import structure, rather than by shifts in advanced-economy export patterns.

This decline is concentrated in machinery and transport equipment, reflecting a sharp reduction in Chinese imports in sectors where the Euro area and Japan traditionally export. In particular, decreasing imports in the automotive sector play a central role. SITC sector 78 (road vehicles, including parts and accessories) accounted for around 4 percent of Chinese imports between 2010 and 2017, but its share declined steadily thereafter, reaching only 2.4 percent by 2024. This pattern is consistent with China's increasing self-reliance in automobile production and the substitution of domestic vehicles for foreign-made cars.

The United States exhibits a flatter PSI trajectory. Rising U.S. exports of commodities and energy products partially offset declining alignment in manufacturing sectors, resulting in a more stable aggregate index. Overall, the comparison between observed and counterfactual PSI paths highlights that the declining alignment with the Euro area and Japan reflects China's active reorientation of its import basket, consistent with broader policies aimed at import substitution in strategic manufacturing sectors.

Figure 2. Evolution of Partner Similarity Index between AE Exports and China's Imports

(a) Partner Similarity Index (China Imports) (b) Change in PSI Between 2010 and 2024



Note: The left panel depicts the PSI where the exporting countries are AE's, respectively, and the importing country is China. The dotted lines correspond to a counterfactual index that holds China' import basket fixed at its 2010 composition. The right panel takes the long difference in each PSI series between 2010-2024 and breaks down the sectoral contribution. The Euro area is a GDP weighted aggregate of the following European countries using 2024 weights: Austria, Belgium, France, Germany, Italy, the Netherlands, Portugal, and Spain.
Source: UN-Comtrade and authors' calculations.

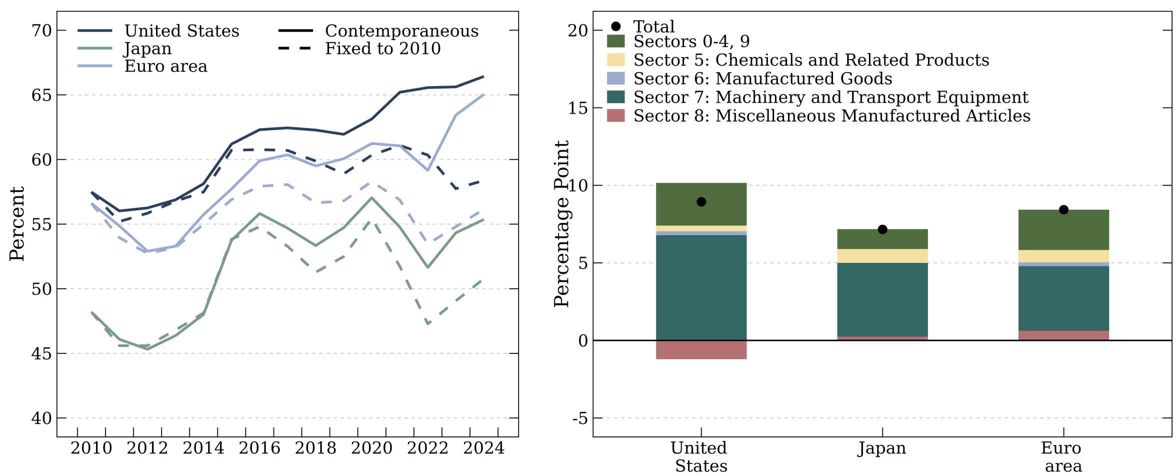
Fact 3: China's export basket is increasingly similar to AE imports

Figure 3 shows a notable increase in the similarity between the composition of Chinese exports and the composition of AEs imports. Between 2010 and 2024, the similarity increased by approximately 9 percentage points for the US, 7.2 percentage points for Japan, and 8.4 percentage points for the Euro area. As seen on the right panel, the surge in sectoral similarity is again mostly accounted for by SITC sector 7 (Machinery and Transport Equipment) as China gradually increased its export share in that sector while AEs maintained a high import share. Yet, energy sectors, as well as the chemicals sectors, also increased reflecting China's broad-based sectoral expansion into various AE import markets during this time period.

The divergence between the counterfactual and actual series is particularly pronounced. If China had not altered the composition of its exports, similarity with AE imports would have increased only moderately. Instead, the large increase in the actual series demonstrates that China's evolving export structure – not changes in AE trade – has been the key driver of alignment with advanced-economy import patterns. This simple observation underscores the central role of China's structural transformation in shaping the trade landscape.

Figure 3. Evolution of Partner Similarity Index between China's Exports and AEs Imports

(a) Partner Similarity Index (China Exports) (b) Change in PSI Between 2010 and 2024



Note: The left panel depicts the PSI where the importing countries are AE's, respectively, and the exporting country is China. The dotted lines correspond to a counterfactual index that holds China' export basket fixed at its 2010 composition. The right panel takes the long difference between 2010-2024 in each PSI series and breaks down the sectoral contribution. The Euro area is a GDP weighted aggregate of the following European countries using 2024 weights: Austria, Belgium, France, Germany, Italy, the Netherlands, Portugal, and Spain.
Source: UN-Comtrade and authors' calculations.

Fact 4: China's export congruence with the US import basket is a historical outlier.

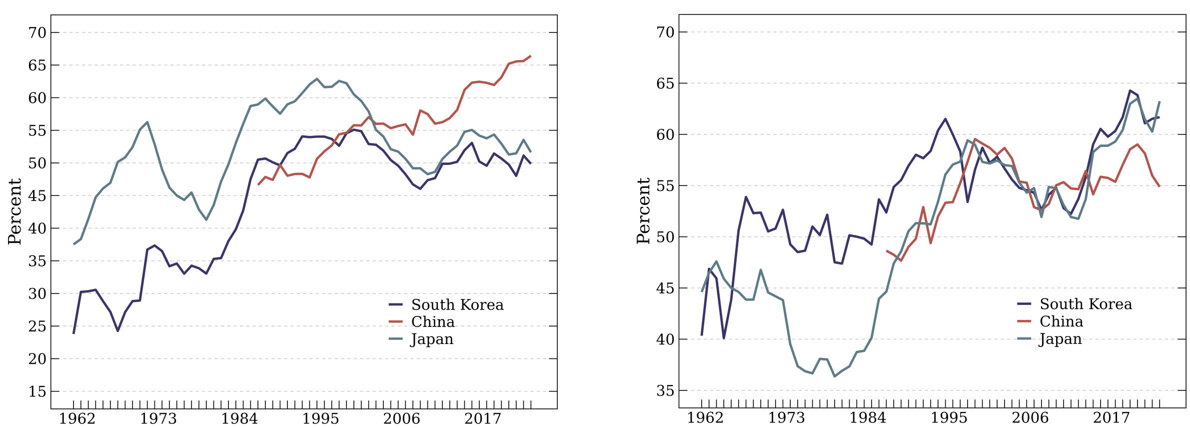
Figure 4 places China's evolution in historical context by comparing to Japan and South Korea. The left panel illustrates the exceptional degree to which China's export basket has converged with the sectoral composition of US imports. The overlap between the sectoral composition of China's exports and US import sectors has increased steadily since the mid-1980s, reaching 66.4 in 2024. In comparison, Japan and South Korea, during their export-oriented industrialization phases in the 1960s–1980s, never exceeded a PSI of 65, and their alignment with US import patterns declined after the initial phase of industrial expansion.

The historical experiences of Japan and South Korea provide important context for interpreting these patterns. Both countries rapidly expanded their industrial and export base in the 1970s–1980s, which increased their sectoral similarity with US imports and contributed to heightened trade tensions. For example, the US government imposed high tariffs on Japanese semiconductors in the mid-1980s, and the Senate formally criticized Japan's trade practices (Irwin, 1996, 2017). Subsequently, from the late 1990s, the similarity between Japan and Korea's exports and US imports gradually declined, and their earlier alignment was not sustained over time.

The right panel shows the PSI between China's imports from the world and US exports to the world. Up until the early 2010s, China's import basket exhibited a level of similarity with US exports broadly comparable to that of Japan and Korea. From the early 2010s onward, however, China diverges sharply: its PSI falls well below the historical levels observed for Japan and Korea, marking a clear break from the previous pattern. This divergence underscores the peculiarity of China's trade structure: while its exports have become increasingly aligned with US import needs, its imports have evolved differently, revealing a unique asymmetry and highlighting the exceptional nature of China's structural transformation.

Figure 4. Export and partner similarity between the US and Asian industrialized economies

(a) PSI: similarity with US imports (b) PSI: similarity with US exports



Note: South Korea and Japan PSI and ESI series begin in 1962 while the China series begin in 1987.
Source: UN-Comtrade and authors' calculations.

5 Conclusion

We introduce the PSI, a measure of bilateral sectoral alignment between exporters' supply and importers' demand, and demonstrate that it strongly predicts bilateral trade flows. Applied to China and major advanced economies, the PSI reveals rising competition in export markets alongside growing asymmetries in trade dependence: advanced economies have become more reliant on Chinese high-value exports, while China has reduced its reliance on goods exported by advanced economies. These patterns may help interpret some trade tensions in strategic sectors, though other economic and geopolitical factors also play a role. Overall, the PSI provides a framework to quantify structural changes in trade and to better understand the evolving nature of interdependence in global markets.

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