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Mind the Gaps: Caribbean Trade Patterns and the Connectivity Constraint

JaeBin Ahn, Nalisa Marieatte, Philipp-Leo Mengel, David Moore, Josefine Quast, Qingyu Tao, and Hou Wang

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Prepared by JaeBin Ahn, Nalisa Marieatte, Philipp-Leo Mengel, David Moore, Josefine Quast, Qingyu Tao, and Hou Wang*

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ABSTRACT: This paper analyzes trade patterns across the Caribbean Community (CARICOM)—15 Caribbean countries—and makes three main contributions. First, it provides a unified empirical assessment of Caribbean external connectivity by jointly analyzing goods trade, tourism flows, and cross-border banking linkages within a consistent gravity-model framework. Second, it presents new evidence on the role of physical connectivity—shipping and air transport—in shaping both import source concentration and tourism inflows, drawing on granular bilateral trade, tourism, and flight capacity data. Third, it shows that, while financial connectivity matters in a global context, it is not the primary binding constraint for Caribbean economies; instead, limited physical connectivity emerges as the more decisive factor shaping trade patterns and external vulnerabilities.

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Introduction

Amid intensifying geoeconomic fragmentation and rising geopolitical tensions, Caribbean economies face heightened exposure to external shocks.¹ Evidence suggests a broad-based decline in potential growth in the Caribbean over the past two decades due to declining contributions of total factor productivity and human capital as well as to resource misallocation (Amundsen et al., 2025). Shifting global trade policies and uncertain geopolitical dynamics further pose risks to traditional sources of growth, including through goods and services trade. Against this backdrop, strengthening the economic resilience of Caribbean countries takes on increasing importance.

Understanding Caribbean goods and services trade patterns—and their implications for Caribbean countries' resilience to external shocks—is essential for designing strategies that can mitigate risks and sustain growth. On the one hand, goods exports account for only a small share of GDP in most Caribbean countries, with the important exception of oil exporters. But Caribbean countries rely heavily on goods imports—notably for food—implying vulnerability to external shocks, particularly those stemming from foreign exporter supply disruptions. On the services side, travel exports dominate foreign exchange earnings for many Caribbean countries.² Thus, it is highly relevant to explore the impact of supply-side constraints on tourism inflows, which could in turn inform potential efforts to diversify tourism sources and thereby reduce vulnerabilities to shocks originating in particular source countries.

Caribbean countries remain heavily concentrated in their sources of imported goods and tourism demand, which represents a source of vulnerability across these two critical channels.³ Stylized facts from the goods trade data reveal that Caribbean countries rely significantly on a narrow set of exporter partner countries. Likewise, the concentration of tourism source markets for the region ranks among the highest in the world. In both cases, the exposure to a limited set of countries implies elevated risks from potential spillovers. Identifying the drivers of these concentration patterns in both goods and services trade can help inform options for diversifying trading partners and strengthening resilience.

A gravity-model based analysis of the goods trade shows that Caribbean countries trade relatively less with countries outside the Caribbean region than predicted by fundamentals, while trading more within the region than the model suggests. Our estimation results indicate that this pattern is driven largely by the disproportionate effect of geographical distance, as well as by re-exports, which together account for most of the discrepancy between actual and model-predicted trade values.

The evidence underscores the role of weak connectivity—and the associated high shipping costs—in contributing to the high concentration of import sources in nearby countries. Bilateral-level shipping

¹ This paper's references to "Caribbean countries" are the 15 Caribbean Community (CARICOM) member countries: Antigua and Barbuda; The Bahamas; Barbados; Belize; Dominica; Grenada; Guyana; Haiti; Jamaica; Montserrat; St. Kitts and Nevis; St. Lucia; St. Vincent and the Grenadines; Suriname; Trinidad and Tobago. The regional integration movement in the Caribbean was formalized in 1973 with the Treaty of Chaguaramas, whose primary objective was to promote regional integration and development among its member countries through functional cooperation. The treaty was revised in 2002 to allow for the establishment of a CARICOM Single Market and Economy (CSME), facilitating the free movement of goods, services, skilled labor and capital in pursuit of a unified regional economic space.

² For this reason, we focus our analysis of services trade on tourism exports.

³ Efforts in the region to pursue trade diversification, to build economic resilience and to address the high cost of living are under way (for example, for The Bahamas, see Acalin (2026) and IMF (2025)).

connectivity data from UNCTAD show that, after controlling for pair-wise geographic fundamentals as well as origin-country specific factors, Caribbean countries as destinations have relatively weak shipping connectivity compared with other regions. This limited connectivity raises reliance on re-exports through central hubs within the region, resulting in greater intra-regional trade than would otherwise occur. Moreover, weak connectivity amplifies the trade barriers associated with geographical distance, particularly for countries located farther outside the region.

Turning to tourism exports, the lifeline of many Caribbean economies, this study investigates the extent to which tourist arrivals are sensitive to shocks in air connectivity—in particular, passenger flight capacity. The Caribbean region's relative geographic isolation and limited domestic markets make air connectivity a critical precondition for international stayover arrivals, as stayover tourists in the region depend almost exclusively on air travel. While tourist arrivals tend to be driven primarily by demand, the question remains whether supply-side factors—such as air connectivity, airport capacity, and carrier networks—also play a role. Consistent with the literature highlighting the critical role of connectivity in facilitating trade and travel, we find that air connectivity plays a quantitatively important role in shaping tourism flows.

We further examine a third dimension of connectivity: financial connectivity through cross-border banking relationships. While limited shipping and air connectivity represent physical constraints to trade, weaknesses in the supporting financial infrastructure itself may act as a binding constraint. However, while we find that banking relationships positively affect trade globally, the effect is substantially weaker for CARICOM goods trade and muted for tourism. This suggests that the region's primary trade constraints lie in physical rather than financial connectivity.

Overall, these findings suggest potentially important roles for policies aimed at strengthening shipping and air connectivity, which could play a key role in facilitating the diversification of goods and services trade partners.

Related Literature

Goods Trade

Recent studies show a marked decline in growth and a weakening of medium-term prospects in the Caribbean region. Amundsen et al. (2025) attribute this mainly to productivity slowdowns and resource misallocation, mirroring broader global trends (IMF, 2024). A growing literature seeks to identify the key constraints to goods and services trade in the region (Amundsen et al., 2025; Parente and Moreau, 2024; Hassan et al., 2020; Beaton et al., 2017; Bhattacharya and Pienknagura, 2024), noting that the openness of an economy can drive productivity by forcing firms to compete in world markets through “learning by exporting” (De Loecker, 2007) and “learning by importing” (Amiti and Konings, 2007; Goldberg et al., 2010; Halpern et al., 2015), while trade and FDI foster aggregate productivity through reallocation, firm upgrading, creative destruction, and structural transformation (Iacovone et al., 2025).

Using a standard gravity model, we contribute to the literature on intra-Caribbean trade integration by quantifying the extent to which CARICOM countries under-trade relative to fundamentals and how well

they are embedded in the wider regional trade network.⁴ The structure of our gravity model is similar to Bhattacharya and Pienknagura (2024) and Parente and Moreau (2024). But in contrast to these, we focus on the Caribbean and explicitly incorporate the growing role of re-exporting hubs in global value chains (Jones et al., 2020), highlighting how trade connectivity shapes observed trade patterns within and beyond the region.

We also contribute to the literature on how limited diversification and structural bottlenecks heighten exposure to external shocks (Ahn and Brandon, 2025). At a time of intensifying geoeconomic fragmentation (Aiyar et al., 2023), our systematic assessment of the geographical sources of goods imports and tourism exports in the Caribbean’s hub structure is, to our knowledge, the first of its type.

Tourism

A large body of literature documents the central role of tourism in the Caribbean and structural factors that affect the tourism sector in the region. Tourism has been found to support income growth and employment. Real income in source countries, relative prices, and competitor destination prices have been identified as the dominant determinants of tourism flows. Moreover, the number of airlines has a statistically positive impact on arrivals and expenditure, and airlift plays an important role in affecting U.S. tourist arrivals to the Caribbean (Laframboise et al., 2014; Acevedo et al., 2017).

The gravity framework has become the dominant empirical workhorse for analyzing bilateral tourism flows. Rosselló-Nadal and Santana-Gallego (2022) survey the literature, which consistently finds a geographical distance decay effect.⁵ Caribbean-specific applications confirm the role of economic mass, distance, source-country income, and prices, while also highlighting the relevance of marketing activity and high operating costs (Lorde et al., 2014; Martin and Abraham, 2017; Ghazanchyan et al., 2019).

Our paper contributes to the literature by explicitly integrating air connectivity into the gravity framework for Caribbean tourism demand. While existing studies have established the importance of income, prices, distance, and connectivity in shaping tourism flows, they treat accessibility only indirectly and rarely address potential endogeneity between flight connectivity and tourism demand. We combine bilateral tourism arrivals with granular flight-level data and adopt an instrumental variable approach to isolate exogenous “push” factors originating from source markets, which allows us to quantify the extent to which these translate into tourism flows. In doing so, our paper directly links the structural gravity perspective to ongoing policy debates on air connectivity, open skies agreements, and regional integration in the Caribbean.

⁴ Several closely related studies explore this topic. Beaton et al. (2017) find that trade liberalization in Latin America and the Caribbean (LAC) can promote growth but has heterogeneous effects on inequality, highlighting the importance of complementary policies to ensure inclusive benefits. Hassan et al. (2020) find that strengthening Caribbean regional integration could yield significant economic gains by improving trade, investment, and policy coordination, although these benefits depend on deeper cooperation across multiple policy areas. Bhattacharya and Pienknagura (2024) identify persistent trade constraints in LAC countries, including infrastructure, regulatory, and logistical bottlenecks, which limit the region’s ability to fully leverage global trade opportunities.

⁵ In subsequent work, Rosselló-Nadal and Santana-Gallego (2024) adopt a global bilateral gravity framework, finding that geographical distance remains a strong determinant of tourism flows.

Connectivity

Caribbean Small Island Developing States (SIDS) face structural connectivity challenges beyond geography.⁶ Liner shipping connectivity and port infrastructure quality are important determinants of freight rates, with poorly connected ports facing substantially higher costs (Limão and Venables, 2001; Clart et al., 2004; Wilmsmeier and Hoffmann, 2008). While regional hubs like the Dominican Republic or Jamaica are well connected, maritime connectivity for SIDS remains substantially lower and has declined further over the past decade (UNCTAD, 2024), with port handling charges and freight costs two to three times the global average (Figure 4). Elevated costs are driven by trade imbalances, limited shipping competition, inefficient customs and port administration processes, and dependence on transshipment through regional hubs (UNCTAD, 2024). Consistently, Shepherd, Briceno-Garmendia, Arroyo, Hoffmann, and Palsson (forthcoming) construct new data sets on maritime connectivity to find the causal impact of direct maritime connectivity on trade in the Caribbean, while documenting a widening connectivity gap in the region as recent transformations have not been equally shared across the region.

For Caribbean SIDS, these connectivity constraints impose binding constraints on trade competitiveness that compound the effects of limited access to trade finance. High transport costs and limited economic size reduce trade volumes, which could diminish the profitability of maintaining correspondent banking relationships, impeding the region's integration into global markets, production, and financial networks. We explore these potential interactions below.

Bank flows and trade–finance linkages

Banks mitigate trade risks through various financial instruments, and disruptions to these relationships can significantly reduce trade flows. The health of financial institutions affects firm-level exports during crises (Ahn et al., 2011; Amiti and Weinstein, 2011), with credit conditions particularly binding for sectors with extensive external financing needs (Chor and Manova, 2012). Small markets with few active banks, like those in the Caribbean, are particularly exposed as adverse shocks to the letters-of-credit supply reduce export growth in such markets (Niepmann and Schmidt-Eisenlohr, 2017).⁷

Beyond direct trade finance, deepening financial linkages through syndicated lending networks increases bilateral trade flows between countries, particularly in industries subject to export risk (Caballero et al. 2018). Exporters tend to rely on banks specializing in their export destinations (Paravisini et al., 2023), and exports are larger when a foreign bank from the destination is present (Claessens and van Horen, 2021). Our study complements the approach of Caballero et al. (2018), capturing the extensive margin through relationship formation and information transmission between financial institutions, by exploring the intensive margin of outstanding cross-border banking linkages using claims and liabilities data. By doing so we complement existing approaches by capturing the actual capacity to finance trade and settle payments.

Correspondent banking networks are integral to the global payment infrastructure, particularly for smaller states, through enabling importers and exporters to settle cross-border trade transactions.

⁶ See, for instance, Briceno-Garmendia, Bofinger, Cubas, and Millan-Placci (2014) for previous discussion.

⁷ Ahn and Sarmiento (2019) illustrate this for Colombian importer-exporter pairs.

Post-Global Financial Crisis (GFC) de-risking led to a withdrawal of correspondent banking relationships, with Caribbean economies disproportionately affected (World Bank, 2015; Erbenova, 2016; Alleyne et al., 2017). Borchert et al. (2024) show that this matters for trade: declining correspondent banking services reduce not only overall exports but also firm’s likelihood of continuing to export.⁸

Data

Goods Trade

For the goods-trade analysis, we assemble data from multiple standard sources. Our main dependent variable—bilateral merchandise exports—comes from CEPII’s BACI database, which provides information on bilateral annual trade flows measured on an FOB basis (i.e., net of transport costs) (Gaulier and Zignago, 2010). We assess robustness using export series from the IMF’s Direction of Trade Statistics (DOTS; IMF, 2024), as well as from UN Comtrade that separately reports re-exports (United Nations, 2024).⁹ Standard control variables at the dyad (i.e., country pair) level—great-circle distance, contiguity, common language, and colonial ties—are taken from CEPII’s Gravity database (Conte, Cotterlaz, and Mayer, 2022). The presence of preferential trade agreements is sourced from Mario Larch’s Regional Trade Agreements Database—updated from Egger and Larch (2008)—which covers all multilateral and bilateral regional trade agreements as notified to the World Trade Organization.¹⁰ We also control for effective bilateral tariff rates (Teti, 2024; Ahn and Tan, 2025). In additional robustness specifications, we incorporate various kinds of relevant measures, including geopolitical distance (Aiyar, Malacrino, and Presbitero, 2024; Bailey, Strezhnev, and Voeten, 2017), a common-currency indicator (de Sousa, 2012), and a bilateral export-similarity index computed based on Finger and Kreinin (1979).

Tourism

For the tourism analysis, we employ the bilateral country-level tourism dataset from the United Nations World Tourism Organization (UNWTO). The dataset provides detailed information on international tourism flows across countries, such as the number of arrivals and departures by origin–destination pair, allowing us to explore the direction and intensity of cross-country tourism linkages. Coverage spans more than 200 countries over multiple decades, offering a consistent basis for studying the evolution of global tourism patterns, the role of geopolitical barriers in tourism flows, and the sensitivity of tourism flows to economic shocks (UNWTO 2022).

⁸ Borchert et al. (2024) base their analysis on four emerging European economies: Bosnia and Herzegovina, Croatia, Hungary, and Turkey.

⁹ According to the UN definition of general trade flows (United Nations, 1998), re-exports take place when goods enter a customs territory from one country and are shipped to another country without being transformed. The presence of re-exports is most likely in those countries and regions with favorable geographical positions from a perspective of intercontinental transportation.

¹⁰ CARICOM’s preferential trade agreements include the CARICOM Single Market and Economy (CSME, 2002); the CARIFORUM-EU Economic Partnership Agreement (EPA, 2008); trade arrangements with the United States under the Caribbean Basin Initiative, including the Caribbean Basin Economic Recovery Act (1983) and the Caribbean Basin Trade Partnership Act (2000); the CARICOM–Canada CARIBCAN program (1986–1998; 2015–2023); and free trade agreements with the Dominican Republic (1998; entered into force 2000), Venezuela (signed 1992; ratified 2006), Colombia (signed 1994; ratified 2006), Cuba (signed 2000; Second Protocol signed 2017), and Costa Rica (signed 2004; ratified 2006), as well as the energy cooperation arrangement PetroCaribe (2005).

This dataset has been widely used in the tourism literature (e.g., Rosselló-Nadal and Santana-Gallego, 2024). It can be further disaggregated by tourist residency and nationality, distinguishing between different measures of international tourism, including arrivals of non-resident tourists at national borders, arrivals of non-resident tourists staying in all types of accommodation establishments, and arrivals of non-resident tourists staying in hotels and similar establishments. Each measure is further broken down by country of residence and by nationality. In this study, we use arrivals of non-resident tourists at national borders by country of residence as the baseline measure of international tourism. For destination countries with missing information, we instead rely on arrivals of non-resident tourists at national borders by nationality.

We complement the global annual frequency tourism analysis with the monthly regional analysis using the monthly information on tourism for 23 destinations in the region provided by the Caribbean Tourism Organization (CTO). The CTO primarily relies on member countries for reporting data, although it also uses non-resident hotel registrations or non-resident air arrivals as alternatives for a few countries when official source is unavailable. In this study, we use total tourist arrivals or equivalently stop-over arrivals as our dependent variable. The tourist arrivals data excludes cruise ship passengers, making it suitable for analyzing air travel. However, we cannot exclude other forms of sea travel that are presumed to be minor and unlikely to affect the results.

Connectivity

The Liner Shipping Connectivity Index (LSCI) from the United Nations Conference on Trade and Development (UNCTAD) provides a measure of a country's integration level into global liner shipping networks. The LSCI, ranging from 0 to 1, is constructed on a quarterly basis by taking simple averages of six normalized components deemed to reflect bilateral connectivity between a pair of countries.¹¹ The dataset covers over 150 countries for the past two decades.

The freight cost measures are drawn from the UNCTAD Experimental Transport and Trade Dataset and capture the average transport expenditure per kilogram of traded goods. Transport costs are defined as expenditures invoiced for services required to deliver internationally traded goods from the border of the exporting economy to the border of the importing economy and are measured as the difference between CIF and FOB values. It covers 237 economies of origin and 170 economies of destination over the period from 2016 to 2021 and was developed jointly by UNCTAD and the World Bank, using UN Comtrade data as the main source and applying a transport network model based on geographic information systems developed by Equitable Maritime Consulting (Halim et al., 2018).

Total flight-based passenger capacity data are constructed through two main steps. Our approach follows Sozzi and O'Hanlon (2021). First, we obtain global direct flight data from FlightRadar24, which provides real-time, unique information on aircraft type, airline operator, departure/arrival date, and origin/destination

¹¹ According to the UNCTAD, the LSCI is generated from the following six components: (1) the number of scheduled ship calls per week (i.e., weekly average of annual schedule) in the country; (2) total scheduled annual deployed capacity, in Twenty-foot-Equivalent Units (TEU), offered in the country; (3) the number of regular liner shipping services from and to the country; (4) the number of liner shipping companies that provide services from and to the country; (5) the size, in TEU, of the largest ship deployed on services from and to the country; and (6) the number of other countries that are connected to the country through direct liner shipping services (where a direct service is defined as a regular service between two countries – it may include other stops in between, but usually no transshipment, as this is not required in the transport of a container).

country. Commercial passenger flights are further differentiated in the database using a list of passenger airlines extracted online. Several other online databases also provide complementary information on aircraft characteristics, including the official seat capacity or payload of different aircraft models. In the next step, we use the information on seat capacity to derive an average total capacity for each flight model identified in the database. This measure of passenger capacity accounts for the different configurations of seat classes. We compute total passenger capacity by multiplying the number of flights by the average capacity per aircraft type and then aggregate the results bilaterally by month and year for each destination country. The final dataset is limited to global flights since November 2018 and covers 264 origin-destination country pairs.

Bank flows

Our analysis of banking-trade linkages uses the Bank of International Settlements' (BIS) Locational Banking Statistics (LBS). These data capture outstanding claims and liabilities of internationally active banks and cover around 95 percent of all cross-border banking activity.¹² To date, banking offices located in 44 countries, including many offshore financial centers, report the LBS vis-à-vis more than 200 countries. Using data on outstanding stocks, we construct our claims and liabilities variable from the borrower's perspective, measuring an import country's liabilities to an export country. Doing so suits our focus on Caribbean economies, which are predominantly importers. Specifically, we consider claims from the origin countries' perspective and liabilities from the destination countries' perspective. Compared to other data sources, the BIS LBS capture financial relationships that are relevant for smaller economies, such as correspondent banking relationships and reflect ongoing financing capacity, including for trade financing.

Despite the detailed information available on cross-border banking linkages, important gaps remain in understanding how trade is financed in the Caribbean. While banks intermediate some trade financing instruments such as letters-of-credit or documentary collection, which are covered in our study, large fractions of trade financing occurs on cash-in-advance or open-account terms that do not require bank intermediation (Antràs and Foley, 2015) and are, thus, not covered by the BIS LBS data.¹³ Due to a lack of systematic, bilateral data on cross-border cash-in-advance or open-account flows, the question of whether alternative financial mechanisms can substitute for interbank relationships remains unanswered. Addressing these data gaps will be critical for assessing the resilience of trade financing in the region and for identifying policy measures that could mitigate the effects of weak banking–trade linkages.

Goods Trade and Connectivity

Background

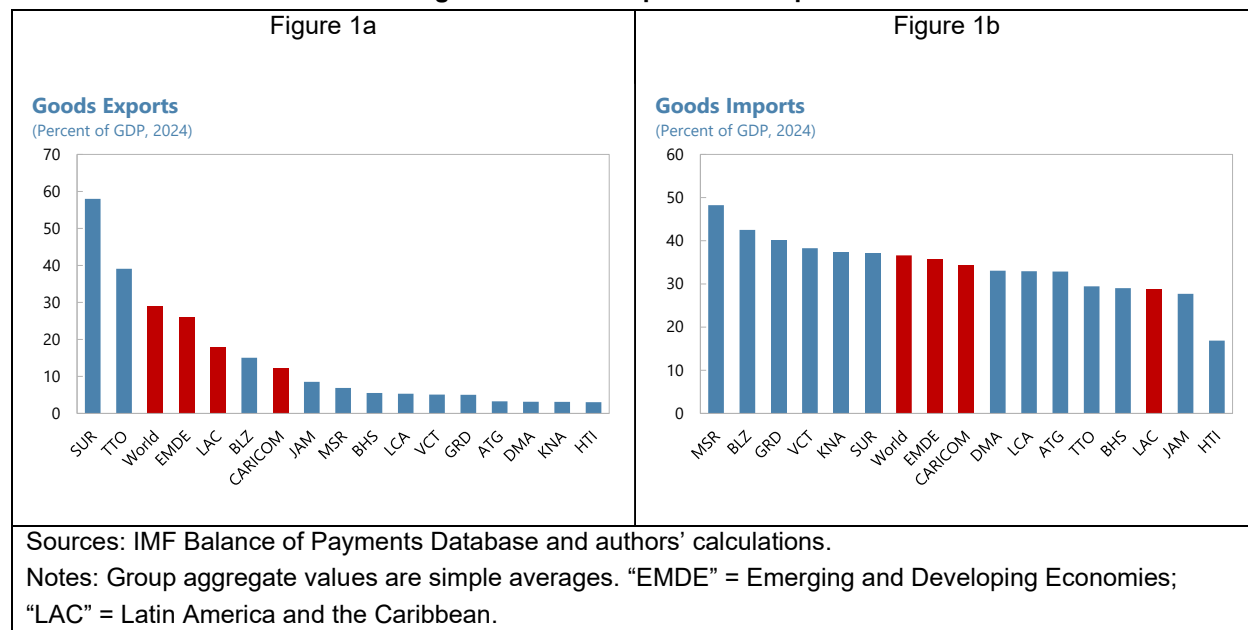
In many Caribbean economies, goods exports represent only a small share of GDP—with the notable exception of oil-exporting countries. Nevertheless, understanding goods trade patterns in the Caribbean is

¹² The LBS are compiled following principles that are consistent with balance of payments statistics. Changes in the LBS reflect movements in outstanding positions, capturing capital flows and valuation effects. Banking linkages are measured using changes in bilateral positions in the LBS.

¹³ Yet, as trade relationships solidify via repeated interaction, using cash-in-advance terms becomes less likely (Antràs and Foley, 2015).

crucial, not only to identify opportunities to expand exports and GDP, but also to assess economic resilience given the region’s heavy reliance on imports (Figure 1).

Figure 1. Goods Exports and Imports



Concentration

Caribbean countries’ imports are highly concentrated. We construct a measure of import source concentration by calculating the Herfindahl-Hirschman Index (HHI) for each importer country in each year:

$$HHI_{jt} = \sum_i^{N_{jt}} (S_{ijt})^2,$$

where S_{ijt} denotes the share of imports from country i in total imports of country j in year t and the total number of trading partners for country j in year t is denoted by N_{jt} . As such, this measure is bounded between 0 and 1, where 1 corresponds to complete concentration, with a single country occupying the entire market. Figure 2 illustrates relatively highly concentrated sources for the Caribbean imports, as 13 out of 14 CARICOM countries covered in the data rank well above the 50th percentile globally in terms of import source concentration. Table 1 further confirms that Caribbean countries stand out as importers with concentrated sources, even after controlling for importers’ income levels and geographic remoteness. Similar to Wei (1996), we measure remoteness as the GDP-weighted distance from a country to all its trading partners, so countries with no nearby large economies tend to have a higher remoteness index.

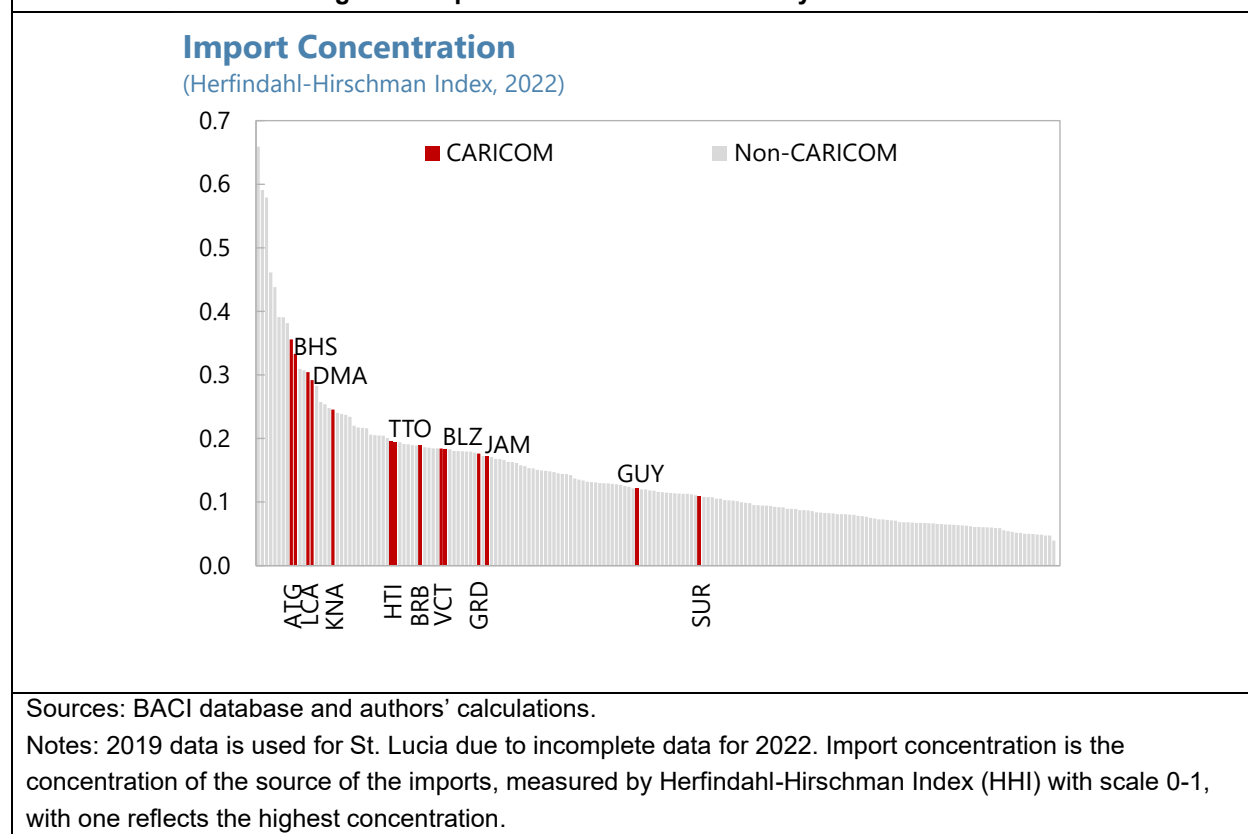
This high concentration may increase countries’ vulnerability to external shocks. As small open economies that rely on imported consumption and production inputs, high import concentration could make

them more vulnerable to external shocks. Borrowing concepts from portfolio theory, the variance of the exporter-supply shocks (i.e., risk measure) for each importer can be calculated as:

$$\sigma_j^2 = W \times C \times W',$$

where W is the row vector of country-level (time-average) market shares and C is the covariance matrix of country-level trade cost shocks that are measured as the exporter-year fixed effect term from the gravity-type estimation of the global bilateral country-level trade flows.¹⁴ Relating the concentration measure to the risk measure, Figure 3 illustrates a strong correlation between the two. In this context of highly concentrated import sources, shocks—such as idiosyncratic disturbances in source countries or shifts in global trade policies—can have amplified effects.

Figure 2. Import Source Concentration by Destination



¹⁴ A similar approach from the U.S. perspective is employed at the product level in Ahn and Brandon (2025).

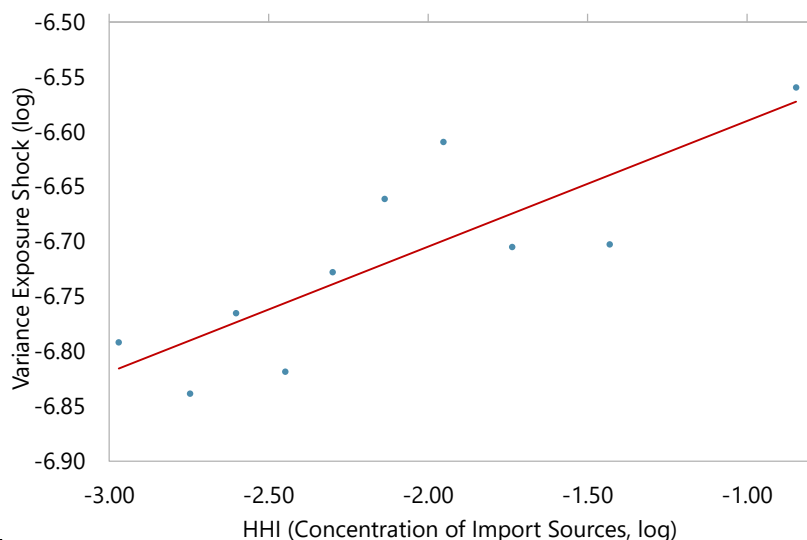
Table 1. OLS Regression of Import Concentration Index

Dependent variable: country-level HHI	(1)	(2)	(3)
GDP per capita	0.011 (0.008)	-0.006 *** (0.001)	-0.004 *** (0.002)
Remoteness index	0.114 *** (0.038)	0.109 *** (0.007)	0.062 *** (0.007)
CARICOM dummy		0.047 *** (0.008)	0.059 *** (0.009)
Latin America dummy			0.012 *** (0.004)
Sub-Saharan Africa dummy			0.011 *** (0.004)
Middle East and North Africa dummy			-0.028 *** (0.004)
Emerging and Developing Asia dummy			0.049 *** (0.002)
Emerging and Developing Europe dummy			-0.007 *** (0.002)
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	No	No
Observations	3,078	3,078	3,078
Adj. R-squared	0.795	0.180	0.206

Note: This table reports the OLS estimation results from the importer country-level panel regression of Herfindahl-Hirschman Index of import sources. Robust standard errors clustered at origin-destination country pair level are reported in parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent.

Figure 3. Correlation between Import Source Concentration and External Shock Volatility

Import Concentration and Exposure to External Shocks, 2007-22



Sources: BACI database and authors' calculations.

Notes: This figure plots binned scatter plots for the relationship between geographic concentration of import sources and exporter supply shock risk at the importer level. The degree of geographic concentration of import sources is measured using the Herfindahl-Hirschman Index (HHI), based on the share of imports from each source country. Exporter supply shock risk is measured as the import-share-weighted variance-covariance of supply shocks across exporters.

Connectivity

Connectivity constraints may contribute to the high concentration of import sources in the Caribbean.

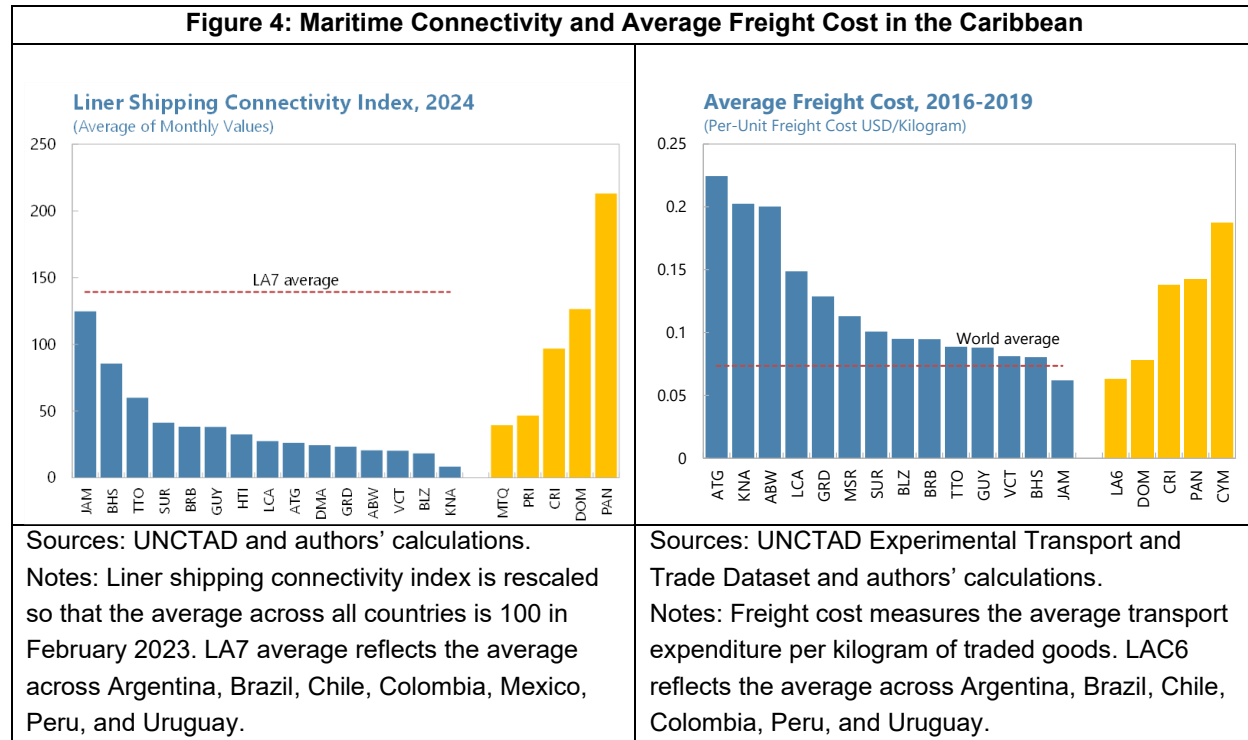
Limited shipping connectivity restricts direct links with a broad set of trading partners, forcing countries to rely on a smaller number of accessible suppliers (Fugazza and Hoffmann, 2017). Even along existing routes, weak connectivity raises freight costs and transit times, reinforcing incentives to source imports from fewer origins. Infrequent or unreliable services further increase supply chain uncertainty, strengthening reliance on established trading relationships and entrenching existing trade patterns.

Cross-country connectivity data suggests that Caribbean countries face particularly high maritime connectivity constraints. UNCTAD's Liner Shipping Connectivity Index, which measures a country's integration into global liner shipping networks, highlights that connectivity is a significant challenge for CARICOM countries compared to peer countries (Panel A in Figure 4). This is consistent with country-level aggregate average freight cost measures, indicating that Caribbean countries face some of the highest shipping costs in the world (Panel B in Figure 4). All CARICOM countries, except for Jamaica, incur shipping costs above the global average, with Antigua and Barbuda notably experiencing rates that are three times higher than the world average. These elevated costs likely stem from multiple factors, including geographic location, small market size, reliance on transshipment hubs, among others.

Simple OLS regressions using time-varying bilateral-level connectivity analysis corroborate these patterns.¹⁵ Even after controlling for key economic fundamentals such as geographic distance, CARICOM countries as destinations exhibit significantly lower shipping connectivity than other regions (Table 2). Similarly, bilateral shipping costs remain systematically higher for CARICOM destinations (Table 3). Together, these conditional differences point to persistent challenges in the region's integration into global shipping networks.

¹⁵ While both are constructed at the bilateral level, the connectivity index is non-directional and symmetric between country pairs, whereas shipping costs are directional and asymmetric.

Figure 4: Maritime Connectivity and Average Freight Cost in the Caribbean



Sources: UNCTAD and authors' calculations.
 Notes: Liner shipping connectivity index is rescaled so that the average across all countries is 100 in February 2023. LA7 average reflects the average across Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay.

Sources: UNCTAD Experimental Transport and Trade Dataset and authors' calculations.
 Notes: Freight cost measures the average transport expenditure per kilogram of traded goods. LAC6 reflects the average across Argentina, Brazil, Chile, Colombia, Peru, and Uruguay.

Table 2. OLS Regression of Connectivity Index

Dependent variable: bilateral connectivity index	(1)	(2)	(3)
Regional Trade Agreement	-0.009 *** (0.003)	0.049 *** (0.003)	0.027 *** (0.003)
Distance	-0.118 *** (0.002)	-0.093 *** (0.002)	-0.094 *** (0.002)
Border	-0.026 *** (0.009)	0.0119 (0.013)	0.022 (0.013)
Language	0.004 (0.003)	0.040 *** (0.004)	0.040 *** (0.004)
Colonial ties	0.011 *** (0.004)	-0.032 *** (0.005)	-0.005 *** (0.005)
CARICOM destination dummy		-0.103 *** (0.004)	-0.178 *** (0.052)
Latin America destination dummy			-0.027 *** (0.005)
Sub-Saharan Africa destination dummy			-0.114 *** (0.004)
Middle East and North Africa destination dummy			-0.100 *** (0.005)
Emerging and Developing Asia destination dummy			-0.110 *** (0.005)
Emerging and Developing Europe destination dummy			-0.116 *** (0.007)
Origin-year fixed effects	Yes	Yes	Yes
Destination-year fixed effects	Yes	No	No
Observations	330,795	291,900	291,900
Adj. R-squared	0.626	0.366	0.390

Note: This table reports the OLS estimation results from the bilateral country panel regression of connectivity index on gravity-type variables. Robust standard errors clustered at origin-destination country pair level are reported in parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent.

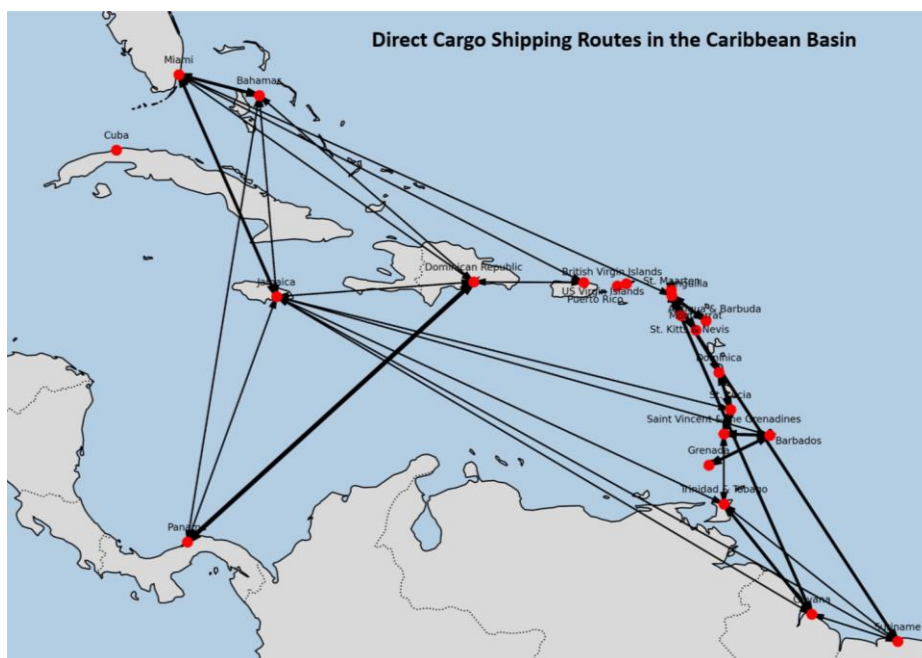
Table 3. OLS Regression of Shipping Cost

Dependent variable: bilateral shipping cost	(1)	(2)	(3)
Regional Trade Agreement	-0.094 *** (0.019)	-0.241 *** (0.018)	-0.237 *** (0.019)
Distance	0.530 *** (0.012)	0.454 *** (0.011)	0.449 *** (0.012)
Border	-0.178 *** (0.048)	-0.227 *** (0.046)	-0.257 *** (0.047)
Language	-0.065 *** (0.025)	-0.091 *** (0.025)	-0.109 *** (0.025)
Colonial ties	-0.179 *** (0.030)	-0.102 *** (0.030)	-0.079 *** (0.030)
CARICOM destination dummy		0.296 *** (0.030)	0.340 *** (0.032)
Latin America destination dummy			0.191 *** (0.026)
Sub-Saharan Africa destination dummy			0.178 *** (0.022)
Middle East and North Africa destination dummy			-0.128 *** (0.027)
Emerging and Developing Asia destination dummy			-0.118 *** (0.029)
Emerging and Developing Europe destination dummy			0.146 *** (0.028)
Origin-year fixed effects	Yes	Yes	Yes
Destination-year fixed effects	Yes	No	No
Observations	136,762	136,762	136,762
Adj. R-squared	0.317	0.222	0.227

Note: This table reports the OLS estimation results from the bilateral country panel regression of shipping cost on gravity-type variables. Robust standard errors clustered at origin-destination country pair level are reported in parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent.

A closer examination of shipping routes highlights the limited availability of direct cargo connections in the Caribbean and the region's heavy reliance on hub ports. Figure 5 maps direct cargo shipping routes in the Caribbean basin based on data from major logistics providers. A striking feature is the prominence of distribution hubs—most notably Jamaica and The Bahamas for the wider CARICOM region, and Antigua and Barbuda for the ECCU—through which cargo is consolidated and re-exported to other CARICOM island states. This hub-and-spoke structure is consistent with weak connectivity at the level of individual CARICOM countries, which often lack sufficient scale to sustain direct links with source countries and instead rely on regional hubs for consolidation and onward distribution. As a result, a significant share of CARICOM exports likely reflects transshipment or light processing rather than domestically generated value added. Consistent with this interpretation, Figure 6 shows that three CARICOM members rank among the world's top 15 re-exporting hubs, measured as re-exports relative to total exports using UN Comtrade (2025) data.

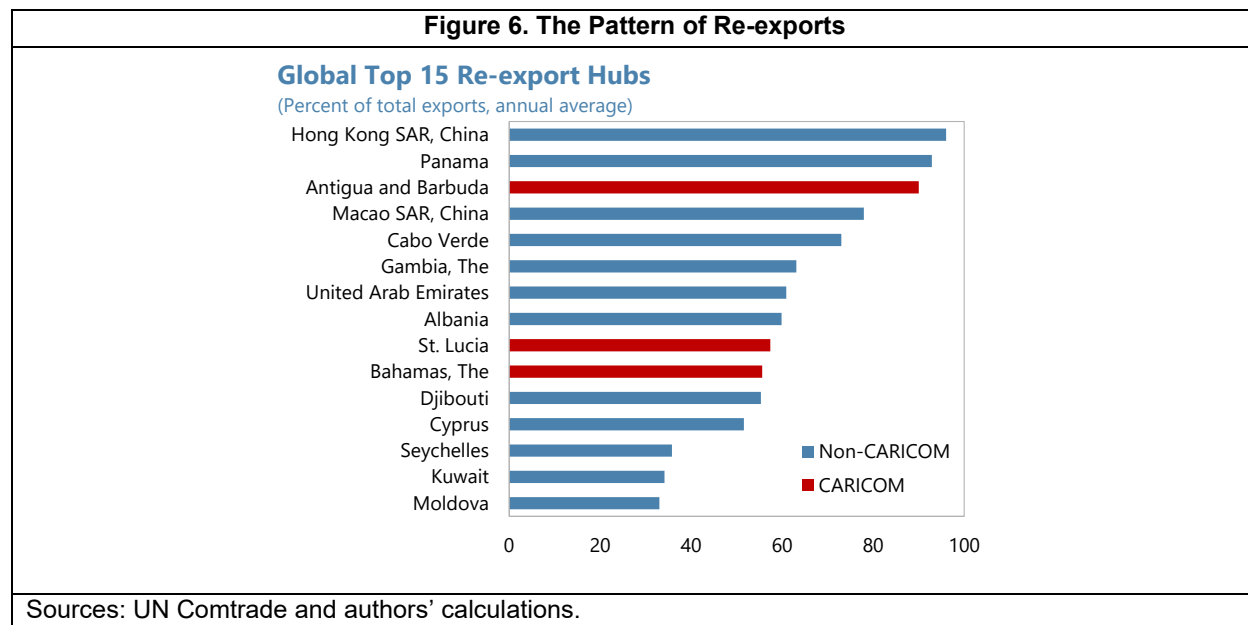
Figure 5. Direct Cargo Shipping Routes in the Caribbean Basin



Source: ECCB staff.

Note: The routes provided are as advertised by shipping companies operating in the region namely - MSC, Maersk, Tropical Shipping, King Ocean and Zim Integrated. These are scheduled routes which operate either weekly or biweekly or other as of August 2025. Companies also offer chartered routes and rates upon request.

Figure 6. The Pattern of Re-exports



Gravity-based approach

A gravity-type model provides a useful framework for assessing how connectivity constraints shape trade patterns. Such constraints are expected to have disproportionately large adverse effects on trade between more distant country pairs relative to nearby ones. If connectivity is not adequately accounted for, the model will result in biased predictions: overestimating trade with distant partners and underestimating trade with closer ones.

We estimate the gravity model using a standard Poisson Pseudo Maximum Likelihood (PPML) specification. This approach has the advantage that the PPML estimator accommodates zero trade flows without *ad hoc* transformations and delivers consistent estimates under heteroskedasticity (Silva and Tenreyro, 2006). To proxy for multilateral resistance, we include two-way fixed effects—exporter–year and importer–year—and cluster standard errors at the country-pair level.¹⁶ With this specification, only bilaterally varying covariates are identified, while all country-specific factors are absorbed by the fixed effects. Using coefficients estimated on the global sample, we then plug country-pair characteristics into the model to predict what country *i* would export to country *j* if country *i* were in line with the sample countries' overall trend. Any gap between predicted and actual exports indicates whether country *i* is exporting above or below this benchmark to partner *j*.

We begin by estimating the following specification, using bilateral goods trade data from the BACI (CEPII) database:

$$Export_{ijt} = \exp(\beta X_{ijt}) \eta_{ijt} ,$$

where $Export_{ijt}$ stands for exports of country *i* to *j* in year *t*. The set of control variables can be expressed as:

$$X_{ijt} = FE_{it}, FE_{jt}, \ln Dist_{ijt}, Geo_{ij}, RTA_{ijt}, \ln Tariff_{ijt},$$

which includes exporter-year fixed effects (FE_{it}); importer-year fixed effects (FE_{jt}); geographical distance in log ($\ln Dist_{ijt}$); other geographical dummy variables (e.g., common language, common continent, common colony, etc.); a regional trade agreement dummy variable (RTA_{ijt}); and applied average bilateral tariff rates in log ($\ln Tariff_{ijt}$). The estimation is done in a pooled panel at the country-aggregate level.

¹⁶ Inward and outward multilateral resistance terms are unobservable, theoretical artifacts capturing the extent to which bilateral trade is influenced by each country's relative trade costs with all other trading partners. At least since Olivero and Yotov (2012), they have been accounted for by exporter-time and importer-time fixed effects in a dynamic gravity estimation framework with panel data. Moreover, in addition to accounting for the unobservable multilateral resistance terms, the exporter-time and importer-time fixed effects also effectively absorb all other observable and unobservable country-specific characteristics, including various national policies, institutions, and exchange rates (Yotov, Piermartini, Monteiro, and Larch, 2016).

The model allows analysis of relative under- or over-trading for a given country or region vis-à-vis its trading partners.¹⁷ Specifically, the predicted bilateral trade flow from country i to country j at time t is computed as:

$$\widehat{Export}_{ijt} = \exp(\beta X_{ijt}),$$

while the excess/missing bilateral trade flow is captured as:

$$Excess_{ijt} = Export_{ijt} - \widehat{Export}_{ijt},$$

where $Excess_{ijt} > 0$ implies trade flows in excess of those predicted by the model and $Excess_{ijt} < 0$ corresponds to missing trade flows relative to predicted flows.

With all the *bilateral* excess/missing trade flows, we can then aggregate them in various ways to study trade patterns both between countries/regions and within a region itself. For instance, one can aggregate up the excess/missing exports of all the exporting countries i 's within a region R (i.e., $i \in R$) to a given destination country j and obtain the excess/missing export of region R as a whole to country j as:

$$Excess_t^R = \sum_{i \in R} (Export_{ijt} - \widehat{Export}_{ijt}).$$

Similarly, one can also aggregate the excess/missing exports of a given exporting country i to all the countries j 's in a region S (i.e., $j \in S$) and obtain the excess/missing export of country i to region S as:

$$Excess_{it}^S = \sum_{j \in S} (Export_{ijt} - \widehat{Export}_{ijt}).$$

The degree of trade integration within a region, relative to the level implied by the model, can be assessed by imposing R equal to S and aggregating it up all excess/missing exports within all the bilateral pairs with the region:

$$Excess_t^R = \sum_{j \in R} \sum_{i \in R} (Export_{ijt} - \widehat{Export}_{ijt}).$$

Our baseline gravity model estimates confirm key factors influencing global trade. Column (1) in Table 4 reports PPML estimates for our baseline model with the full sample over 2007-2022. The estimated coefficients line up with the gravity literature in sign and order of magnitude: having a regional trade agreement, sharing a border, speaking a common language, or having colonial ties are all associated with higher trade, while geographic distance and higher bilateral tariffs are associated with lower trade flows. We note that gross exports in regional hubs may primarily reflect transshipment rather than domestic value added, which could bias the gravity estimates. In Column (2), we therefore account for the fact that several CARICOM economies are among the most re-export-oriented countries in the world by re-estimating the gravity model using our

¹⁷ For any country or region, the “adding-up” constraint ensures that the under- or over-trading with all its trading partners will sum to zero. Specifically, a well-known implication of PPML with exporter–year and importer–year fixed effects is: for each exporter–year (and analogously for each importer–year), the sum of predicted bilateral flows exactly matches the observed total (e.g., Fally 2015). Hence, by construction of the model, any overprediction for some partners must be offset by underprediction for others. While this prevents identifying aggregate over- or under-exporting for a country in a given year, the framework is well suited to pinpoint partner markets with untapped export potential.

measure of domestic exports (that is, excluding re-exports) as the dependent variable¹⁸. The main results are essentially unchanged.

The estimates suggest that distance has a stronger adverse effect on trade for Caribbean destination countries. To assess whether trade determinants differ systematically for CARICOM destination countries relative to the rest of the world, Column (3) introduces interaction terms between the CARICOM destination dummy and the key gravity variables. The negative and statistically significant coefficient on the distance interaction indicates that trade involving CARICOM destination countries declines more sharply with distance than the global average. Tariffs and common language also show larger effects in the region, while regional trade agreements appear to be less trade-enhancing for CARICOM. By contrast, the interaction terms for colonial ties and shared borders are not statistically significant. Results are broadly similar when using domestic exports as the dependent variable (Column (4)).

Table 4. PPML Estimation of the Gravity Model

Dependent variable:	(1) Gross Exports	(2) Dom. Exports	(3) Gross Exports	(4) Dom. Exports
Regional Trade Agreement	0.625 *** (0.072)	0.621 *** (0.074)	0.631 *** (0.073)	0.627 *** (0.074)
Distance	-0.304 *** (0.062)	-0.306 *** (0.062)	-0.301 *** (0.063)	-0.303 *** (0.062)
Border	0.797 *** (0.103)	0.788 *** (0.103)	0.799 *** (0.103)	0.790 *** (0.103)
Language	0.387 *** (0.110)	0.362 *** (0.107)	0.385 *** (0.110)	0.360 *** (0.107)
Colonial ties	0.915 *** (0.130)	0.897 *** (0.133)	0.922 *** (0.131)	0.902 *** (0.134)
Bilateral tariff rate	-1.944 * (1.147)	-2.032 * (1.168)	-1.850 (1.133)	-1.937 * (1.154)
Regional Trade Agreement x CARICOM destination dummy			-0.884 *** (0.183)	-0.910 *** (0.185)
Distance x CARICOM destination dummy			-0.583 *** (0.114)	-0.571 *** (0.114)
Border x CARICOM destination dummy			0.950 (0.762)	0.988 (0.773)
Language x CARICOM destination dummy			0.365 ** (0.183)	0.419 (0.187)
Colonial ties x CARICOM destination dummy			-0.159 (0.247)	-0.158 (0.253)
Bilateral tariff rate X CARICOM destination dummy			-9.330 *** (2.439)	-9.181 *** (2.490)
Exporter-Year FE	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes
Observations	663,821	663,821	663,821	663,821
Pseudo R-squared	0.914	0.914	0.914	0.914

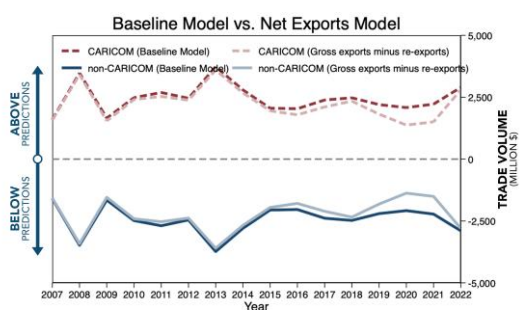
Note: This table reports the PPML estimation results from the bilateral country panel regression of trade flows on gravity-type variables. Robust standard errors clustered at exporter-importer country pair level are reported in parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent.

¹⁸ Examples of such CARICOM economies include Antigua and Barbuda, St. Lucia, and The Bahamas, where re-exports account for more than half of total exports. We measure domestic exports by taking out re-exports from total exports.

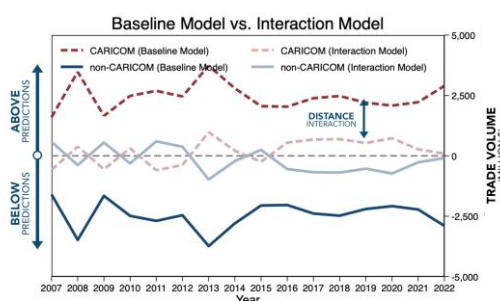
The model predicts that CARICOM countries engage in less trade with regions outside the Caribbean than fundamental factors would suggest. As explained earlier, aggregating the predicted exports of all CARICOM countries across intra-regional partners and extra-regional partners offers insights into their relative under- or over-trading patterns.¹⁹ Panel A in Figure 7 presents the results derived from the baseline Model, which are shown in dark lines indicating that CARICOM countries trade relatively less with partners outside of the region, and thus relatively more with partners within the region, than the gravity model predicts. The estimated degree of over- and under-trading is on the order of US\$2.5 billion annually. This is equivalent to around 10 percent of total goods traded with those partners outside the region. The estimation results from excluding re-exports offer a similar pattern but could reduce the extent of over- and under-trading in recent periods, shown in light lines. In both cases, the trade gap in nominal terms has been relatively stable over time.

Figure 7. Deviations Between Actual and Predicted Trade Patterns in CARICOM

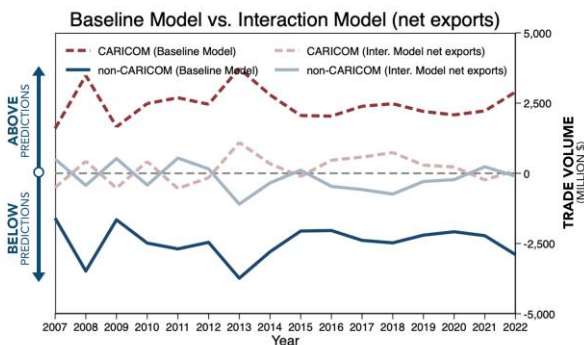
Panel A. Baseline Model vs. Model w/o Re-exports
(in millions of \$US)



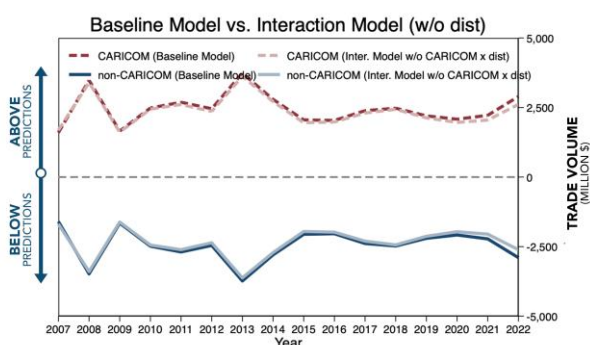
Panel B. Baseline Model vs. Interaction Model
(in millions of \$US)



Panel C. Baseline Model vs Interaction Model w/o Re-exports (in millions of \$US)



Panel D. Baseline Model vs Interaction Model w/o Distance Interaction (in millions of \$US)



¹⁹ Given the adding-up constraint and the nature of intra-regional trade where total intra-regional exports equal total intra-regional imports, whether exports or imports are used, we can interpret them as excess/missing trade.

The distance variable explains most of the gap between actual and model-predicted trade for CARICOM countries. To identify the key drivers of this gap, we introduce interaction terms between the CARICOM dummy and the baseline explanatory variables and assess which interaction term best accounts for the discrepancy. We find that the distance interaction term is the primary contributor to the gap, while the inclusion of other interaction terms has little effect on the results. This is illustrated in Panels B-D of Figure 7: once a set of interaction terms is included, the gap shown by the light lines shrinks substantially toward zero, implying a significant improvement in model fit (Panel B). The effect is even more pronounced when re-exports are excluded from the dependent variable (Panel C). Notably, including all other interaction terms while excluding the distance interaction term leaves the results largely unchanged relative to the baseline model (Panel D).

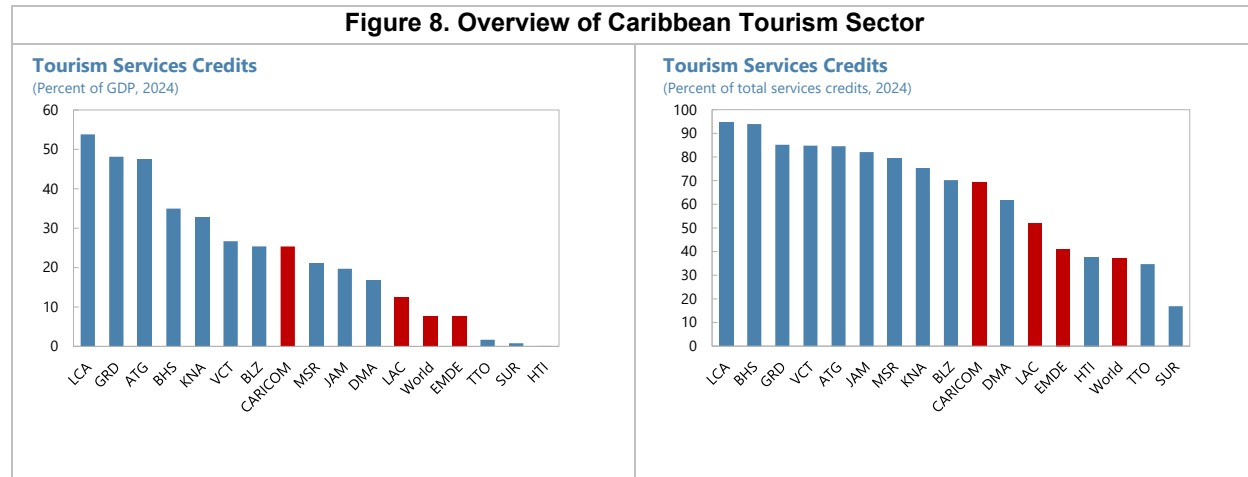
Overall, this exercise highlights the central role of geographic distance in shaping Caribbean trade patterns. Imposing a common distance coefficient leads to systematic overprediction of Caribbean trade with distant partners outside the region and an underprediction of trade with nearby countries within the region, resulting in substantial excess and missing trade outside and within the region, respectively. Allowing for a disproportionately large adverse effect of distance on CARICOM trade substantially improves model fit and largely eliminates these discrepancies. This pattern is consistent with the presence of elevated trade costs associated with connectivity constraints affecting Caribbean economies.

Tourism and Connectivity

Background

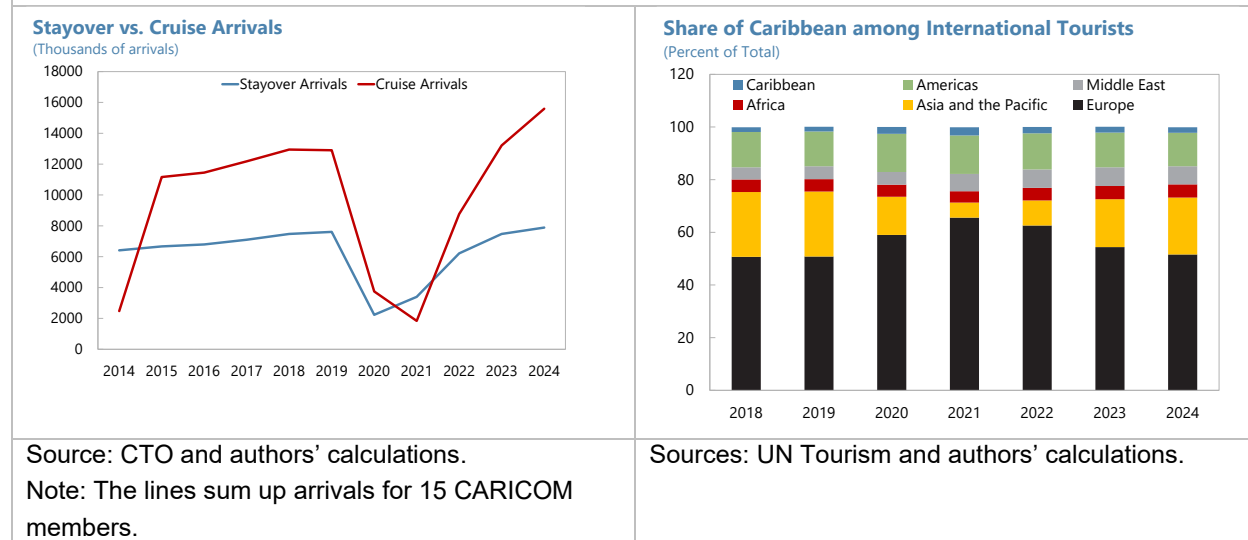
For many Caribbean economies, tourism is the primary source of income, employment, and foreign exchange. The sector accounts for over 20 percent of GDP and about 70 percent of service exports across CARICOM countries (Figure 8), with significant spillovers to agriculture, transportation, and construction. Although cruise passengers comprised nearly two-thirds of total arrivals in 2024, stayover tourists generate substantially higher revenue and economic multipliers due to longer stays and broader spending across the economy. For instance, tourism receipts per cruise passenger in Dominica were estimated at under \$US 200 in 2023, compared with roughly \$US 2,000 per stayover visitor (BREA, 2024; authors' calculation). From a global perspective, the Caribbean accounts for a small but relatively stable share of international tourism, reflecting both the region's economic scale and relatively limited access and higher costs compared to other destinations.

Figure 8. Overview of Caribbean Tourism Sector



Note: Group aggregate values are simple averages. “EMDE” = Emerging and Developing Economies; “LAC” = Latin America and the Caribbean. Guyana is excluded due to unavailability of services trade data.

Sources: IMF Balance of Payment database and authors’ calculations.



Source: CTO and authors’ calculations.
Note: The lines sum up arrivals for 15 CARICOM members.

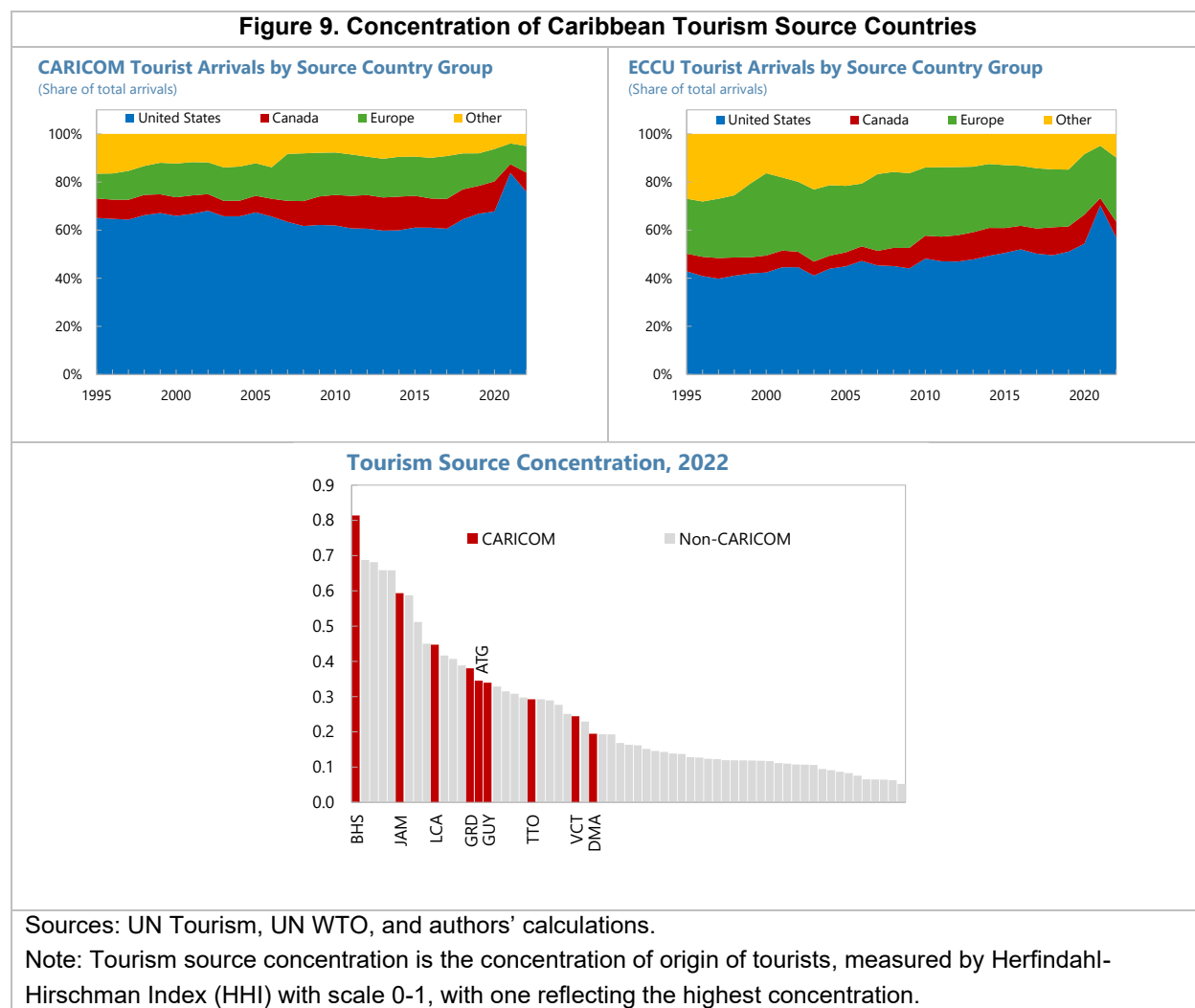
Sources: UN Tourism and authors’ calculations.

Concentration and Vulnerability

Tourism inflows to the Caribbean are highly concentrated across a narrow set of source markets. Since the mid-1990s, stayover arrivals from the United States have accounted for roughly 60 percent of total arrivals to CARICOM countries, with a further 30 percent originating from Europe and Canada, and the rest from all other countries combined (Figure 9). A similar pattern holds for ECCU countries, although concentration is somewhat lower, reflecting a modestly larger share from Europe relative to the United States.²⁰ Concentration

²⁰ The ECCU is a sub-grouping of eight (8) CARICOM countries that share the Eastern Caribbean dollar as a common currency. These eight countries also share one Central Bank, the Eastern Caribbean Central Bank (ECCB), which manages the ECCU’s monetary policy and currency. The ECCU comprises Anguilla, Antigua and Barbuda, Commonwealth of Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines.

has intensified since the COVID-19 pandemic, as the U.S. share of arrivals increased further, partly reflecting pandemic-related travel restrictions and higher travel costs elsewhere. In global comparison, tourism source market concentration in the Caribbean is elevated, with most CARICOM countries ranking above the 50th percentile of the Herfindahl-Hirschman Index (HHI) distribution.



Tourism source markets in the Caribbean are more highly concentrated than in other regions, even after accounting for income levels and geographic remoteness. Table 5 reports OLS regressions of the HHI on GDP per capita, remoteness, and regional dummies. Greater remoteness is associated with higher concentration, while higher income is associated with lower concentration, consistent with more remote destinations drawing from fewer markets and richer destinations attracting a more diversified visitor base. Across specifications, the CARICOM dummy is positive and highly significant, indicating that CARICOM countries exhibit substantially higher source-market concentration than the global average, even after controlling for income and remoteness. By contrast, most other regional dummies—Latin America, Sub-Saharan Africa, the Middle East and North Africa, and Emerging and Developing Asia—are associated with lower concentration. Overall, these results point to unusually high tourism source market concentration in small Caribbean economies that cannot be explained by income or geography alone.

Table 5. OLS Estimation of Tourism Source Market Concentration

Dependent variable: country-level HHI	(1)	(2)	(3)
GDP per capita	0.012 (0.020)	-0.014 *** (0.002)	-0.034 *** (0.002)
Remoteness index	-0.176 ** (0.060)	0.111 *** 0.005	0.216 *** (0.027)
CARICOM dummy		0.195 *** (0.011)	0.118 *** (0.017)
Latin America dummy			-0.086 *** (0.020)
Sub-Saharan Africa dummy			-0.130 *** (0.015)
Middle East and North Africa dummy			-0.104 *** (0.003)
Emerging and Developing Asia dummy			-0.100 *** (0.018)
Emerging and Developing Europe dummy			0.012 *** (0.014)
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	No	No
Observations	1,401	1,401	1,401
Adj. R-squared	0.897	0.171	0.194

Note: This table reports the OLS estimation results from the destination country-level panel regression of Herfindahl-Hirschman Index of tourist sources. Robust standard errors clustered at source-destination country pair level are reported in parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent.

This high degree of concentration implies that fluctuations in economic conditions in key source markets can have sizable effects on tourism flows. Table 6 reports estimates of the elasticity of tourist arrivals with respect to source market GDP. The average elasticity is around 0.8, implying a 1 percent increase in source country GDP leads to a 0.8 percent increase in arrivals. For tourism flows from the U.S. to CARICOM, however, the estimated elasticity sharply increases to around 2, indicating substantially higher sensitivity to U.S. economic conditions.²¹ Given the dominant role of the U.S. market, this heightened responsiveness contributes to increased volatility in aggregate tourist arrivals and amplifies downside risks during U.S. slowdowns. This finding highlights the potential benefit of diversifying source markets.

²¹ The high income elasticity of U.S. outbound tourism likely reflects the strongly discretionary and pro-cyclical nature of international travel for U.S. households.

Table 6. OLS Estimation of Tourism Elasticity

Dependent variable: bilateral tourist arrivals	(1)	(2)	(3)	(4)
Distance	-1.433 *** (0.050)	-1.437 *** (0.050)	-1.438 *** (0.053)	-1.429 *** (0.050)
Border	0.647 *** (0.104)	0.629 *** (0.106)	0.628 *** (0.106)	0.619 *** (0.110)
Language	0.670 *** (0.120)	0.670 *** (0.120)	0.667 *** (0.120)	0.739 *** (0.105)
Colonial Ties	0.447 *** (0.163)	0.462 *** (0.171)	0.468 *** (0.171)	0.457 *** (0.173)
Real Exchange Rate		-0.273 *** (0.085)	-0.272 *** (0.084)	-0.280 *** (0.090)
Source Country Real GDP (log)		0.807 *** (0.116)	0.808 *** (0.116)	0.821 *** (0.117)
Source Country Real GDP (log) X ECCU destination dummy			-0.180 ** (0.059)	-0.059 (0.037)
Source Country Real GDP (log) X US source dummy				1.139 ** (0.563)
Destination-year fixed effects	Yes	Yes	Yes	Yes
Origin-year fixed effects	Yes	No	No	No
Origin country fixed effects	No	Yes	Yes	Yes
Observations	124,083	119,872	119,872	119,872
Pseudo R-squared	0.942	0.939	0.939	0.939

Note: This table reports the PPML estimation results from the bilateral country panel regression of tourist arrivals on gravity-type variables. A complete set of interaction terms are included in the regression (columns (3) and (4)) but not reported in the table. Robust standard errors clustered at origin-destination country pair level are reported in parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent.

Connectivity

The Caribbean's air transport system is characterized by small-scale airports, high route concentration, and pronounced seasonality (IDB, 2015). Given the region's geographic isolation, travelers depend almost entirely on air transportation. Passenger volumes per international airport are generally small, runway capacity is limited in several countries, and most destinations rely on a handful of airlines and external hubs. More than 80 percent of flights and passengers from the U.S. originate from the ten largest cities, with Miami serving as the primary gateway (Acevedo et al., 2016). The seasonality of air transport demand due to the tourism cycle also makes it challenging for airline operations. Recent and ongoing airport expansion and modernization projects across the region²² reflect capacity pressures, particularly during peak tourism periods.

Air connectivity in the Caribbean appears weaker compared with other regions when measured by total flight capacity. Air connectivity can be characterized along multiple dimensions, for instance, number of airports and flights, airfare levels, schedule convenience, and service stability. For our analysis, we focus on

²² This includes the construction of a new international airport in Dominica, runway upgrade in Antigua's V.C. Bird International Airport, the opening of Barbuda International Airport, the opening of Argyle International Airport in St. Vincent and the Grenadines, and new terminal construction at The Bahamas Long Island International Airport, among others. Additionally, airport improvement efforts are ongoing in St. Lucia and Haiti.

total inbound passenger seat capacity for each destination country, which implicitly combines information on the number of airports, flight frequency, and aircraft size, although it does not account for occupancy rates which are unavailable to us. Although studies have shown that some Caribbean countries are above the world average in terms of air passenger volume per capita (Reeves and others, 2018; IATA, 2020), our model results indicate that after controlling for destination-country income levels and geographic remoteness, Caribbean destinations have substantially lower air connectivity than other regions (Table 7).

Table 7. OLS Estimation of Flight Capacity

Dependent variable: country-level flight capacity	(1)	(2)	(3)
GDP per capita	0.006 (0.027)	1.143 *** (0.006)	1.073 *** (0.011)
Remoteness index	18.230 (7.672)	-1.091 ** (0.136)	-1.797 *** (0.098)
Land area		0.353 *** (0.005)	0.356 *** (0.004)
CARICOM dummy		-0.340 ** (0.058)	-0.248 * 0.070
Latin America dummy			0.338 ** (0.048)
Sub-Saharan Africa dummy			-0.220 ** (0.049)
Middle East and North Africa dummy			-0.005 (0.012)
Emerging and Developing Asia dummy			0.370 *** (0.017)
Emerging and Developing Europe dummy			-0.605 *** (0.042)
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	No	No
Observations	554	554	554
Adj. R-squared	0.997	0.720	0.730

Note: This table reports the OLS estimation results from the destination country-level panel regression of flight passenger capacity. Robust standard errors clustered at origin-destination country pair level are reported in parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent.

Cross-country variation in total flight-based passenger capacity is driven mainly by the extensive margin. By construction, total capacity can be decomposed into an extensive margin (capturing the number of origin countries with direct flight routes and average flight frequency per origin country) and an intensive margin (reflecting average seats per flight). Using a regression-based decomposition, we find that extensive margins account for around 94 percent of the variation in total capacity, with the number of origin countries and flight frequency contributing roughly 40 and 54 percent, respectively (Table 8). This indicates that differences in air connectivity are driven mainly by route availability and flight frequency, rather than by systematic variation in aircraft size once routes are established.

$$TotalCapacity_{it} = \overbrace{(\# \text{ countries})_{it}}^{\text{extensive margin}} \times \overbrace{\frac{(\# \text{ flights})_{it}}{(\# \text{ countries})_{it}} \times \frac{(\# \text{ passenger seats})_{it}}{(\# \text{ flights})_{it}}}_{\text{intensive margin}}$$

Table 8. OLS Regression on Flight Capacity Decomposition

	(1)	(2)	(3)
Dependent variable:	# countries	avg # flights	avg # passenger seats
Total # passengers	0.396 *** (0.015)	0.538 *** (0.018)	0.066 *** (0.005)
Year fixed effects	Yes	Yes	Yes
Observations	554	554	554
Adj. R-squared	0.815	0.888	0.201

Note: This table reports the OLS estimation results from the regression decomposition of total annual passenger capacity. Robust standard errors clustered at origin-destination country pair level are reported in parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent.

We conduct a quantitative assessment of the relationship between tourism flows and air connectivity.

Specifically, we estimate the elasticity of tourist arrivals with respect to passenger flight capacity within a gravity framework. The analysis combines bilateral origin-destination tourism data from the United Nations World Tourism Organization (UNWTO) with flight capacity data constructed from FlightRadar24, defined as the total number of seats available on all inbound passenger flights.²³ The resulting panel covers more than 200 countries over the period of 2019-2024.

We adopt a gravity-type model, similar to the specification for goods, where tourist arrivals are explained by flight capacity, as well as several control variables including distance. The baseline gravity model specification is:

$$Visitor_{ijt} = \exp(\beta X_{ijt}) \eta_{ijt},$$

where $Visitor_{ijt}$ stands for the number of visitors from country i to j at time t . The set of control variables including the main variable of interest, flight capacity, can be expressed as:

$$X_{i,j,t} = \{FE_i, FE_{jt}, \ln(Dist)_{ij}, Geo_{ij}, flight_{ijt}\},$$

These include origin fixed effects, destination-time fixed effects, geographical distance (in logs), and standard geographical dummy variables (e.g., common language, continent, colonial ties). The Pseudo Poisson Maximum Likelihood (PPML) estimation, used here, addresses adding up constraints and heteroskedasticity (Silva and Tenreiro, 2006; Fally 2015).

²³ As FlightRadar24 measures seat capacity rather than realized passenger volumes, variation in load factors could affect the estimated elasticities, especially in markets with pronounced seasonality or structurally low occupancy. However, the use of annual data or the inclusion of time fixed effects in monthly data would reduce this potential bias by averaging out or controlling seasonal fluctuations in load factors.

The empirical analysis focuses on assessing how supply shocks to passenger flight capacity affect tourist arrivals.²⁴ A key econometric challenge is the endogeneity between flight capacity and tourist arrivals, as both may respond to common destination-specific “pull factors,” leading to biased OLS estimates. To address this, we employ an instrumental variable (IV) approach designed to isolate exogenous shocks to flight capacity driven by source country “push factors,” rather than by demand conditions in destination countries.

We follow the shift-share (Bartik-style) IV approach common in the literature. We use variation in flights driven by supply-side shocks at the origin market level, rather than destination-specific factors, to construct the IV. Specifically, for each origin-destination pair i - j at time t , we construct the IV:

$$Z_{i,j,t} = w_{i,j,0} \times \ln(\text{flight}_{i,k! = j,t}),$$

where $w_{i,j,0} = \frac{\text{flight}_{i,j,0}}{\text{flight}_{i,0}}$ is the share of flight capacity from origin i to destination j out of all the flight capacity from origin i in the base year ($t=0$). This design captures origin-wide supply shocks—such as airline fleet reallocations, airport disruptions, or common fuel cost shocks—that affect all outbound flights from an origin and are not related to destination-specific demand. Implicitly, it is embedded in the origin shift-share IV that an origin-wide capacity shock reallocates scarce seats across that origin’s routes according to pre-existing route shares. The inclusion of origin fixed effects and destination-time fixed effects helps further isolate origin outbound shocks that affect tourism *via capacity* rather than directly through destination-specific time-varying factors (such as attractiveness, hotel room capacity²⁵).

This shift-share design compares origin-destination pairs with similar historical connectivity but varying exposure to origin-level supply shocks. When an origin country’s flight capacity drops, the impact is not uniform: destinations that historically rely more on that origin see a sharper decline in inbound flights. This allows us to isolate the effect of reduced accessibility on tourism, independent of changes in bilateral demand.

The use of pre-determined baseline shares strengthens the exclusion restriction required for causal identification. By fixing these shares at a base period, we ensure that instrument variation is driven by origin-level supply shocks rather than evolving bilateral fundamentals. Following Goldsmith-Pinkham et al. (2020), our base-period route shares reflect historical connectivity that predates the estimation sample. This ensures that the instrument is moved by origin-wide capacity shocks rather than destination-specific demand. Our identification assumes that these shocks are orthogonal to bilateral tourism demand, conditional on a comprehensive set of fixed effects that absorb origin-specific traits, destination-specific shocks, and global trends. This same Bartik-style framework applies to our financial connectivity analysis, where creditor-country banking shocks serve as the origin-level supply shifts.

²⁴ Like the analysis on goods trade in the previous section, the gravity model approach also allows to predict bilateral tourism flow as $\widehat{Visitor}_{ijt} = \exp(\hat{\beta}X_{ijt})$, while the excess/missing bilateral tourism flow is captured as $Excess_{ijt} = Visitor_{ijt} - \widehat{Visitor}_{ijt}$, where $Excess_{ijt} > 0$ implies excess flows and $Excess_{ijt} < 0$ corresponds to missing flows. However, unlike goods which are relatively more homogeneous in gravity terms, tourism flows are highly differentiated and destination-specific, which may make it more difficult to interpret the residuals from the gravity model. In addition, passenger flight capacity can be more inelastic than cargo shipping capacity, and thus missing tourism flow may indicate a *capacity shortfall*, not missing demand.

²⁵ The fast-growing Airbnb sector appears to have lessened the hotel room constraints in many Caribbean countries.

Table 9. Gravity Regressions of Global Bilateral Tourism Flows

Dependent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Nationality Tourist Arrival	Residence Tourist Arrival	Adjusted Tourist Arrival	Nationality Tourist Arrival	Residence Tourist Arrival	Adjusted Tourist Arrival
Flight Capacity	0.554*** (0.118)	0.607*** (0.0725)	0.519*** (0.0566)	0.533** (0.182)	0.662*** (0.105)	0.539*** (0.0808)
Distance	-0.405* (0.179)	-0.272* (0.133)	-0.482*** (0.0940)	-0.455 (0.302)	-0.218 (0.204)	-0.470** (0.155)
Border	1.192*** (0.138)	1.195*** (0.148)	1.190*** (0.102)	1.197*** (0.169)	1.190*** (0.195)	1.191*** (0.121)
Language	0.350* (0.150)	0.435*** (0.114)	0.512*** (0.0823)	0.322 (0.187)	0.370* (0.151)	0.473*** (0.100)
Colonial Ties	-0.0113 (0.197)	-0.162 (0.153)	-0.0495 (0.115)	-0.0131 (0.253)	-0.274 (0.230)	-0.0979 (0.174)
Real Exchange Rate	0.116 (0.209)	-0.336 (0.271)	-0.0524 (0.156)	0.127 (0.159)	-0.281 (0.292)	-0.0365 (0.155)
Flight Capacity x CARICOM				-1.905 (3.121)	-0.358** (0.120)	-0.169 (0.124)
Distance x CARICOM				1.877 (2.370)	0.0395 (0.228)	0.171 (0.142)
Border x CARICOM				-2.516 (3.118)	0.112 (0.685)	-0.373 (0.633)
Language x CARICOM				3.427 (4.950)	0.990 (0.577)	0.625 (0.402)
Colonial Ties x CARICOM				-1.219 (3.947)	-0.192 (0.779)	0.198 (0.518)
Real Exchange Rate x CARICOM				-12.13 (19.47)	-1.704 (0.906)	-0.784 (0.782)
Observations	2797	3823	6296	2797	3823	6296
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin-Destination Cluster	Yes	Yes	Yes	Yes	Yes	Yes
R-square	0.553	0.486	0.553	0.522	0.462	0.549

Note: This table reports Two-Stage Least Squares (2SLS) regression results for various measures of tourist arrivals with different regressors. Robust standard errors clustered at origin-destination country pair level are reported in the parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent. The first-stage results of the 2SLS regressions are not reported for brevity.

Overall, the estimates indicate air connectivity and geographic frictions as key determinants of bilateral tourist arrivals. Across all six model specifications (Table 9), the coefficient on flight capacity remains large (around 0.52-0.66) and highly statistically significant ($p < 0.01$). This implies an elasticity of around 0.5 to 0.6: a 10 percent increase in flight capacity is associated with roughly a 5-6 percent increase in tourist arrivals. This result is robust to using different definitions of tourists—nationality-based, residence-based, or a harmonized measure based on both (“adjusted”)—after controlling for multiple bilateral and macro variables. Geography also matters, as distance and common border are statistically significant in most specifications with signs as expected. Common cultural factors such as language matter to some extent, while colonial ties do not appear significant. Once controlled for flight capacity and bilateral factors, real exchange rates alone do not seem to affect tourism. CARICOM interaction terms are generally insignificant, suggesting determinants of tourism flows work similarly for CARICOM and non-CARICOM pairs.

To complement the global analysis, we repeat a similar exercise on a monthly dataset exclusively focused on the ECCU region. While the global analysis on annual bilateral data provides broad evidence that air connectivity is an important driver of tourism flows, the monthly ECCU data offer two advantages. First, infrastructure constraints (such as runway length, limited carriers and/or airports, high reliance on regional hubs) are likely to be more binding in small states, potentially amplifying the impact of supply shocks. Second, connectivity shocks especially relevant for small state economies (such as hurricanes and airport disruptions) usually operate at short horizons and are better captured at monthly frequency. At the same time, because adjustments in capacity utilization and travel demand unfold gradually, short-run elasticities may differ from long-run responses.

The empirical specification mirrors the global framework, with log arrivals regressed on log flight capacity using a leave-out shift-share instrument covering the period of 2018M11-2024M12. Destination-month fixed effects are included to absorb destination-specific demand shocks. The regressions also control for real exchange rates, oil prices, and standard geographic variables (including common borders, common language, and historical colonial ties).

Table 10. Gravity Regressions of Monthly Tourism Flows to the ECCU

Dependent Variable	Model 1	Model 2
	Full Sample Tourist Arrival	ex. Caribbean Tourist Arrival
Flight Capacity	0.204*** (0.0543)	0.221*** (0.0537)
Oil Price x Distance	-0.121* (0.0529)	-0.172* (0.0675)
Border	<i>dropped</i>	<i>dropped</i>
Language	-0.144 (0.502)	-0.479 (0.589)
Colonial Ties	1.321 (0.721)	<i>dropped</i>
Real Exchange Rate	5.451** (1.593)	7.165** (1.928)
Observations	1784	1423
Destination-Month FE	Yes	Yes
Origin-Destination Cluster	Yes	Yes
R-square	0.511	0.565

Note: This table reports Two-Stage Least Squares (2SLS) regression results for monthly tourist arrivals to the ECCU, with or without intra-Caribbean destinations. Robust standard errors clustered at origin-destination country pair level are reported in the parenthesis. Significance: *** 1 percent; ** 5 percent; * 10 percent. The first-stage results of the 2SLS regressions are not reported for brevity.

The estimates confirm the role of flight capacity in driving tourist arrivals at the monthly level (Table 10). The regression finds a statistically significant coefficient on flight capacity of around 0.20, smaller than that from the annual model. This reflects the fact that the market (both travelers and tour operators) has time to adjust to higher capacity, leading to a greater elasticity in arrivals. When excluding intra-Caribbean tourist flows, the elasticity becomes slightly higher at around 0.22, pointing to a larger role played by air connectivity in enabling tourism flows from outside of the region. The coefficients on the real exchange rate and

the interaction between oil price and distance are both significant and with expected signs. Both coefficients are larger when excluding intra-Caribbean tourist flows, suggesting bigger price sensitivities for longer-haul routes.

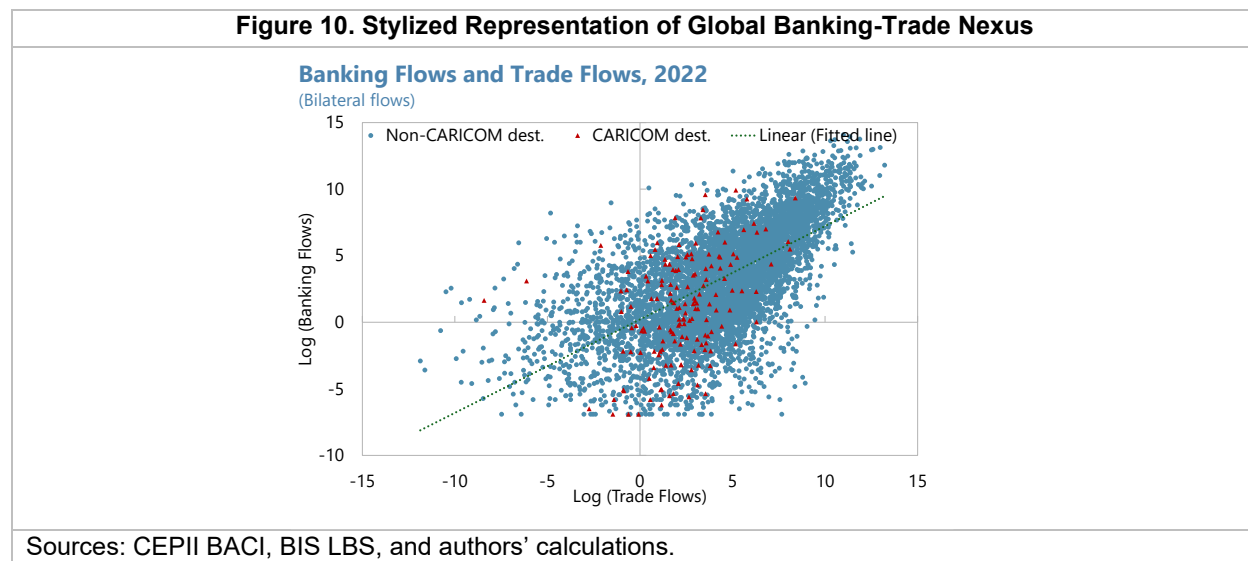
The analysis on monthly ECCU data reinforces the global findings, confirming that air connectivity is a key determinant of tourism flows. The results indicate that the relationships identified in the global regressions also hold in small island states, where infrastructure constraints are more pronounced.

Finance and Connectivity

Background

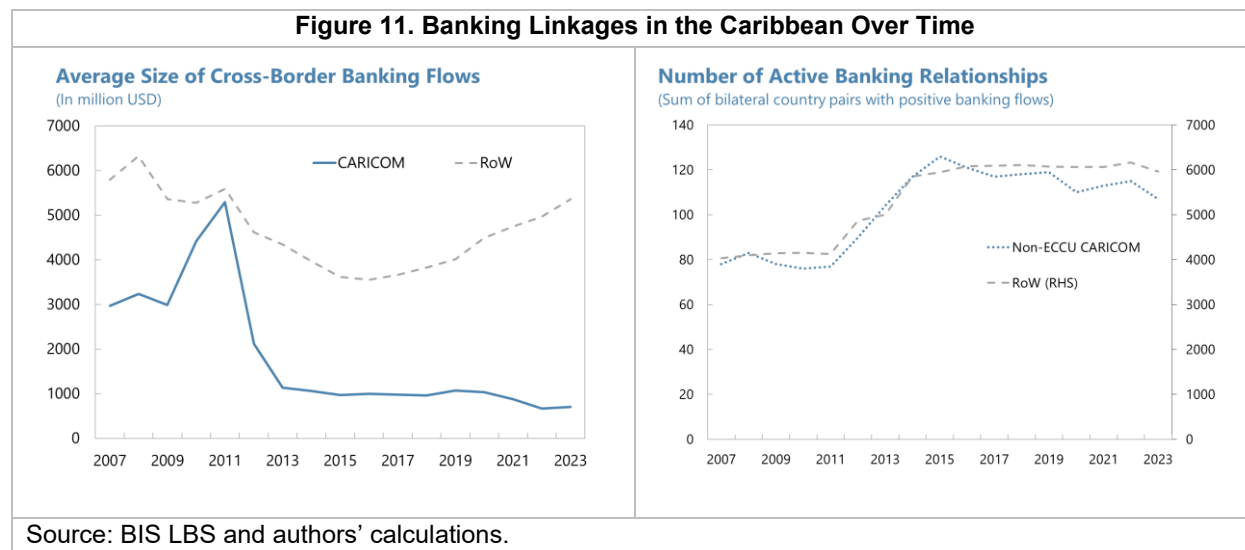
Does weak financial connectivity also constrain Caribbean trade? The post-GFC withdrawal of correspondent banking relationships disproportionately affected the Caribbean (Erbenova et al., 2016; Alleyne et al., 2017), raising the question of whether financial frictions may operate alongside the physical connectivity constraints documented above. A simple scatter plot of bilateral banking positions and trade flows shows a positive association between financial linkages and trade. Financial institutions facilitate trade through various channels, motivating an examination whether stronger banking connections, measured by larger bilateral banking flows, are associated with higher trade flows. The scatter suggests that this relationship may be weaker for Caribbean economies (red dots). Building on this observation, our analysis moves beyond global averages to shed light on potential heterogeneity in the banking-trade nexus for the Caribbean.

Figure 10. Stylized Representation of Global Banking-Trade Nexus



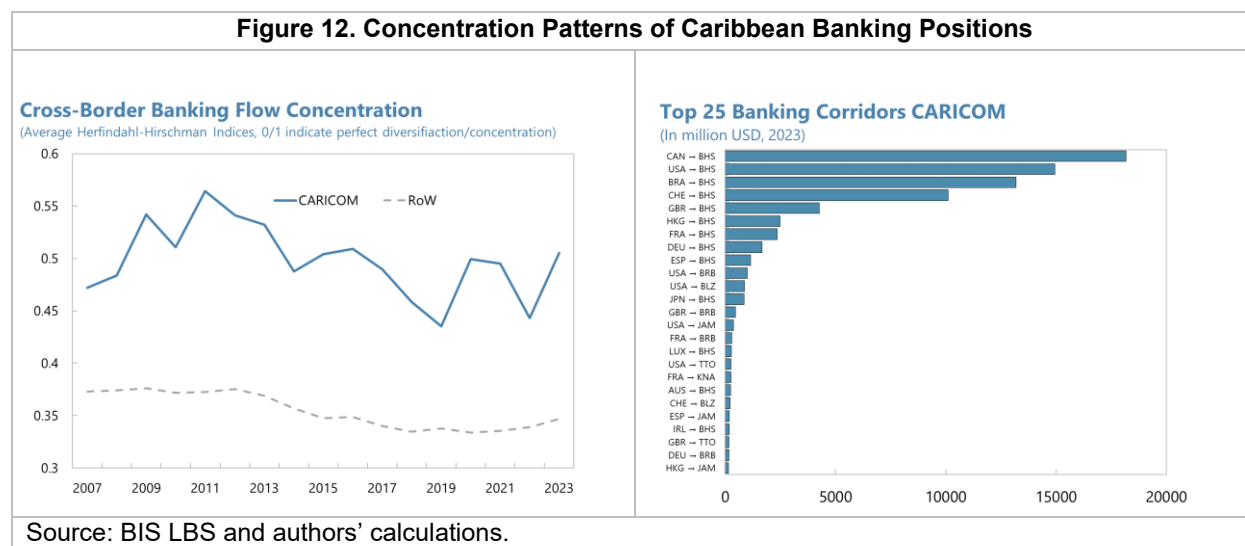
The share of global banking linkages involving CARICOM economies has decreased over time, indicating weakening financial connectivity with international interbank networks. While the number of active bilateral banking relationships increased worldwide following the GFC, reflecting a recovery in interbank activity, the average size of banking positions vis-à-vis CARICOM economies fell noticeably. This divergence relative to other regions accounts for much of the decline in CARICOM's share of cross-border banking flows. Moreover, CARICOM countries saw a downward tendency in active banking relationships after 2015, likely

reflecting that they were disproportionately affected by the retrenchment of correspondent banking relationships (World Bank, 2015; Erbenova, 2016; Alleyne et al., 2017; Rice et al., 2020).



Concentration and Vulnerability

Banking linkages in the Caribbean are highly concentrated among a few creditor countries, with most CARICOM economies relying on a limited number of external partners—at levels well above those observed elsewhere. Although sources for banking flows to CARICOM economies diversified in the aftermath of the GFC, in line with global trends, this pattern largely reversed during the pandemic, with concentration increasing more sharply than in other regions. Within CARICOM, The Bahamas and Jamaica stand out as relatively more diversified. At the same time, cross-border banking activity is dominated by a handful of bilateral corridors, linking CARICOM members to major global financial centers for correspondent banking, wealth management, and investment services.



Connectivity: Financial Linkages and Goods Trade

We investigate whether stronger interbank relationships causally increase bilateral goods trade flows, with particular attention to CARICOM-specific patterns. As highlighted above, the literature establishes that banking relationships support bilateral goods trade. While the literature largely considers average effects, a key contribution of our study lies in exploring heterogeneous banking-trade relationships across regions, with a focus on Caribbean economies, where structural characteristics may limit the trade-facilitating benefits of banking relationships. To address simultaneity between banking and trade flows—which could bias OLS estimates—we employ a Bartik-type shift-share instrumental variable approach, analogous to that used in the tourism analysis above.²⁶

We construct an instrument that exploits exogenous variation in the banking capacity of creditor countries. Specifically, for each country pair ij at time t :

$$Z_{ijt} = \sum_c s_{ij,c}^{2008} \cdot \Delta Shock_{ct},$$

where $s_{ij,c}^{2008}$ represents the frozen shares of creditor country c in country-pair ij 's banking relationship in 2008 and $\Delta Shock_{ct}$, computed as $\ln(OutwardClaims_{c,t}) - \ln(OutwardClaims_{c,t-1})$ where $OutwardClaims_{c,t}$ is the total outward claim of credit country c in year t , excluding bilateral relationships ij , and $\Delta Shock_{ct}$ reflects creditor-country banking shocks. The origin-level supply shocks in this context take the form of banking distress in creditor countries—such as domestic bank recapitalization, sovereign downgrades, or deposit flight—which reduce the creditor's ability to supply international banking services. Country pairs with historically higher exposure to a distressed creditor thus experience larger contractions in banking capacity, affecting trade through reduced access to trade finance and increased transaction costs.

In the first stage, we estimate how our instrument predicts bilateral banking positions with the following regression:

$$\ln(BankingFlows_{ijt}) = \eta Z_{ijt} + X_{ijt}'\Pi + \alpha_{ij} + \lambda_{it} + \delta_{jt} + v_{ijt},$$

where $X_{ijt}'\Pi$ represent the effects of the controls—distance, common border, common language, and historical colonial ties—on bilateral interbank flows. α_{ij} are country-pair fixed effects, λ_{it} origin-year effects, δ_{jt} destination-year effects, and v_{ijt} captures unexplained variation in bilateral banking positions.

In the second stage, we estimate the causal effect of instrumented banking linkages on goods trade:

$$\ln(TradeFlows_{ijt}) = \beta \ln(BankingFlows_{ijt}) + X_{ijt}'\Upsilon + \alpha_{ij} + \lambda_{it} + \delta_{jt} + \varepsilon_{ijt},$$

where β quantifies the causal effect of bilateral interbank flows on bilateral trade flows, controlling for structural effects through $X_{ijt}'\Upsilon$, with $\alpha_{ij}, \lambda_{it}, \delta_{jt}$ representing fixed effects as before and ε_{ijt} capturing the unexplained variation in bilateral trade flows.

²⁶ While Baier and Bergstrand (2007) show that country-pair fixed effects effectively address endogeneity concerns for time-invariant bilateral determinants, the simultaneity between time-varying financial and trade flows remains a potential concern. We employ our Bartik-type shift-share IV to address this.

To identify whether CARICOM economies experience different banking-trade relationships, we estimate the following interaction specification:

$$\begin{aligned} \ln(\text{TradeFlows}_{ijt}) &= \beta_1 \ln(\text{BankingFlows}_{ijt}) + \beta_2 \ln(\text{BankingFlows}_{ijt}) \cdot \text{CARICOM}_j + \beta_3 \text{CARICOM}_j \\ &+ X_{ijt}'\gamma + \alpha_{ij} + \lambda_{it} + \delta_{jt} + \varepsilon_{ijt}, \end{aligned}$$

where CARICOM_j indicates whether the destination country is part of CARICOM. β_1 quantifies the baseline effect for non-CARICOM countries, the main global effect. β_2 measures the difference for CARICOM destinations, so that $(\beta_1 + \beta_2)$ captures the total effect for CARICOM destinations and β_3 reflects systematic differences in trade levels independent of banking relationships.

Globally, bilateral banking relationships have a positive effect on trade flows. We estimate an elasticity of 0.580, indicating that a one percent increase in bilateral bank flows increases bilateral trade by 0.58 percent.²⁷ This finding aligns with the literature establishing the importance of banking relationships for facilitating global trade. Our IV estimate is statistically significant at the one percent level and 31 percent larger than the corresponding OLS estimate of 0.443, confirming the importance of addressing simultaneity concerns.²⁸

But compared to the rest of the world, CARICOM economies exhibit weaker trade responses to banking relationships, suggesting unrealized benefits from such. The negative and highly significant CARICOM interaction coefficient yields the effect of bank flows on trade flows for CARICOM countries to equal $0.580 - 0.437 = 0.143$, about 75 percent weaker than for non-CARICOM economies. This result is robust to excluding The Bahamas from the CARICOM group, whose large banking sector positions rather reflect its role as an offshore center rather than pure trade-related banking activity²⁹, as well as to excluding the oil exporting CARICOM members.³⁰ This suggests that CARICOM economies do not realize the trade-facilitating benefits of banking relationships to the same extent as other regions. Notably, the CARICOM trade level coefficient remains statistically insignificant, indicating that while CARICOM trade responds differently to banking relationships, overall trade levels do not systematically differ from other regions.

²⁷ Similar to Caballero et al. (2018), we find economically meaningful trade-facilitating effects of banking relationships. They find that a one standard deviation increase in bank linkages, i.e. from forming new banking connections, raises exports by 3.5 percent, and we find that a one percent increase in bilateral banking flows raises trade by 0.58 percent. Converting to comparable units would require accounting for the different distributions of the independent variables.

²⁸ By employing a Bartik-style instrument based on creditor banking shocks, we aim to address reverse causality and endogeneity concerns. The first-stage F-statistic in the baseline specification is close to conventional thresholds for instrument strength. Instrument strength decreases for the CARICOM interactions and especially when financial centers are entirely excluded. While this warrants some caution in interpreting precise magnitudes, the qualitative finding—that the banking-trade relationship is weaker for the Caribbean—is consistent across specifications. Future work could apply the methodology of Coppola et al. (2021) to address bilateral capital flow distortions created by financial centers more rigorously.

²⁹ Excluding The Bahamas from the CARICOM group yields a more negative interaction coefficient than for the baseline CARICOM specification, so that the total banking-trade elasticity for the remaining CARICOM members amounts to 0.05. Rather than driving the muted CARICOM result, The Bahamas increase the CARICOM interaction coefficient, which is consistent with The Bahamas aligning more closely with global patterns given their offshore banking sector.

³⁰ In this specification, Guyana, Suriname, and Trinidad and Tobago are excluded. As a result, the CARICOM elasticity increases slightly, to about 65 percent of the global elasticity, indicating that trade-banking relationships are weaker for the oil exporting members. This is consistent with commodity exports requiring less traditional trade finance amid being homogenous goods that are associated with lower payment risks and transparent pricing and, therefore, less need for bank intermediation to authenticate transactions (Hoefele et al. 2016; Im 2021).

Table 11: Estimation Results for Effects of Banking Relationships on Goods Trade

	Specification 1 (Baseline)	Specification 2 (CARICOM)	Specification 3 (Excluding Crises)	Specification 4 (Financial Centers)	Specification 5 (Lagged Banking Shocks)
Dependent Variable/ Explanatory Variable:	Bilateral Goods Trade Flows				
Bilateral Bank Flows	0.580*** (0.076)	0.580*** (0.076)	0.604*** (0.091)	0.583*** (0.078)	0.554*** (0.099)
Distance	-0.086 (0.115)	-0.066 (0.112)	-0.047 (0.136)	0.118 (0.094)	-0.114 (0.146)
Border	1.042*** (0.153)	1.020*** (0.154)	1.016*** (0.159)	1.128*** (0.152)	1.069*** (0.158)
Language	0.274*** (0.084)	0.328*** (0.086)	0.288*** (0.090)	0.273*** (0.085)	0.283*** (0.096)
Colonial Ties	-0.751*** (0.216)	-0.676*** (0.212)	-0.728*** (0.213)	-0.775*** (0.220)	-0.722*** (0.217)
Bilateral Bank Flows x CARICOM		-0.437*** (0.093)			
Bilateral Bank Flows x Financial Centers				-0.111 (0.085)	
Unconditional difference in bilateral trade levels		-0.559 (-0.349)			
Observations	76,441	76,441	56,817	76,441	69,818
Origin FE	Yes	Yes	Yes	Yes	Yes
Destination-Year FE	Yes	Yes	Yes	Yes	Yes
Origin-Destination Clustered SEs	Yes	Yes	Yes	Yes	Yes
R-squared	0.368	0.380	0.356	0.373	0.379

Note: This table reports 2SLS regression results for bilateral bank flows with different regressors. Robust standard errors clustered at origin-destination country pair level are reported in parentheses. The first-stage results of the 2SLS regressions are not reported for brevity. Significance: *** 1 percent; ** 5 percent; * 10 percent.

Several structural features of CARICOM economies likely explain their muted banking-trade relationship. First, the withdrawal of correspondent banking relationships by large international banks post-GFC, driven by de-risking and anti-money laundering strategies, particularly affected the Caribbean (World Bank, 2015; Erbenova, 2016; Alleyne et al., 2017; Rice et al., 2020). Second, most CARICOM countries either export commodities or rely heavily on services trade (particularly tourism), both of which may depend less on traditional bank-related trade finance compared to merchandise goods trade. Third, connectivity constraints and limited integration into global banking networks, stemming from remote locations and accessibility as well as small-scale economies, create binding constraints that likely worsened post-GFC. Fourth, the relatively small trade volumes characteristic for CARICOM economies may exhibit different sensitivity to banking constraints due to scale effects and alternative financing mechanisms and may rely on alternative financing mechanisms such as cash-in-advance terms.

Credit crunches and interbank market frictions during the GFC disproportionately affected Caribbean economies, with a persistent structural gap in the banking-trade nexus emerging. Estimating our model

separately for the GFC years reveals that the banking-trade elasticity for CARICOM economies collapsed to just 0.01, essentially zero, which indicates that bilateral banking relationships ceased to facilitate trade in the Caribbean during the crisis. The worldwide elasticity also declined but remained substantial at 0.50 (compared to 0.58 for the full sample), which indicates some resilience even during the crisis. In recent years and post-GFC, CARICOM's elasticity recovered to 0.23, substantially higher than during the crisis but still far below the worldwide elasticity, which suggests a rather persistent impact on the region's financial connectivity.³¹ Not least, the post-GFC withdrawal of correspondent banking relationships, which provides a structural explanation of the results, reveals that CARICOM economies depend on fragile financial channels that are vulnerable to global banking shocks. Despite post-crisis recovery, a structural gap persists in how effectively banking relationships facilitate trade in the region compared to elsewhere.

Geographic and linguistic proximity remain important determinants of goods trade even after controlling for banking relationships, while distance effects are muted. Compared to the goods and service results discussed above, distance loses significance in our banking-trade specifications, which likely reflects the global banking system's ability to overcome physical barriers more easily. Sharing a common border or language, on the other hand, is still associated with higher bilateral trade, indicating that information transmission and communication costs remain relevant channels.

Our main findings remain robust across alternative specifications and sample restrictions. When we exclude crisis-related observations (GFC and COVID-19 periods), the banking-trade elasticity increases slightly, though differences remain small. While this suggests that trade flows decrease during times of (financial) crises partly due to tightening financial constraints, it also suggests banking-trade relationships to be generally resilient. The financial center specification³² reveals no material differences in how banking relationships affect trade for financial centers compared to other countries.

Using lagged banking shocks as an alternative instrument strengthens causal interpretation and reveals persistent effects. Considering the impact of creditor shocks of the previous year as an alternative instrument on current banking and trade flows further reduces reverse causality and simultaneity concerns since banking shocks of the previous year are even less likely to cause current bilateral trade patterns. It also sheds light on how persistent the effects of banking disruptions are. Our results indicate that banking shocks have lasting rather than temporary effects on trade flows. Maintaining banking connectivity is, thus, likely associated with lasting benefits.

Connectivity: Financial Linkages and Tourism

Given the central role of tourism in the Caribbean, we extend our analytical framework to investigate a potential nexus between banking relationships and tourism flows. We replicate the analysis using bilateral tourism flows instead of goods trade flows to explore channels beyond the well-established banking-trade nexus. To our knowledge, this is the first study to assess whether systematic linkages exist between cross-

³¹ In this exercise, we include observations for the years between 2015 and 2023 and anchor our shift-share instrumental variable in 2015. The worldwide banking-trade elasticity increases sharply to 0.92 percent, indicating that a one percent increase in cross-border banking linkages increases bilateral trade almost one to one.

³² We consider the United States, the United Kingdom, Switzerland, Germany, France, Japan, Singapore, the People's Republic of China—Hong Kong Special Administrative Region, Luxembourg, and the Netherlands as financial centers.

border banking relationships and tourism flows. Unlike in the goods trade context, the theoretical foundation for such a relationship is less straightforward.

Table 12: Estimation Results for Effects of Banking Relationships on Tourism Flows

	Specification 1 (Baseline)	Specification 2 (CARICOM)	Specification 3 (CARICOM excl. commodity exporters)
Dependent Variable/ Explanatory Variable:	Bilateral Tourism Flows		
Bilateral Bank Flows	0.486*** (0.042)	0.487*** (0.044)	0.488*** (0.044)
Distance	-0.701*** (0.077)	-0.645*** (0.076)	-0.655*** (0.078)
Border	1.478*** (0.180)	1.499*** (0.179)	1.495*** (0.179)
Language	0.248* (0.097)	0.309** (0.100)	0.308** (0.098)
Colonial Ties	-1.976*** (0.394)	-1.969*** (0.421)	-1.946*** (0.413)
Bilateral Bank Flows x CARICOM		-0.563*** (0.104)	-0.558*** (0.109)
Observations	24,327	22,507	22,507
Origin FE	Yes	Yes	Yes
Destination-Year FE	Yes	Yes	Yes
Origin-Destination Clustered SEs	Yes	Yes	Yes
R-squared	0.522	0.537	0.536

Note: This table reports 2SLS regression results for bilateral tourism flows with different regressors. Robust standard errors clustered at origin-destination country pair level are reported in parentheses. Significance: *** 1 percent; ** 5 percent; * 10 percent. The first-stage results of the 2SLS regressions are not reported for brevity.

We employ the same econometric approach to identify causal effects using Bartik-type shift-share instruments and find a positive worldwide effect alongside a muted channel for CARICOM economies, suggesting that banking relationships do not necessarily translate into increased tourist arrivals in the region. While the worldwide elasticity is positive and economically meaningful—a one percent increase in cross-border banking flows increases tourism linkages by 0.486 percent—the combined effect for CARICOM economies is slightly negative at -0.076 percent and essentially zero.³³

The positive worldwide effect of cross-border bank flows on tourism likely reflects a base effect of banking relationships supporting tourism by providing financial infrastructure and facilitating business-oriented travel. The BIS LBS data employed in this study reflects formal interbank relationships supporting activities such as trade finance for merchandise exports, corporate lending, government borrowing,

³³ Excluding commodity exporters (Guyana, Suriname, and Trinidad and Tobago) does not materially change the results. If only the subset of ECCU economies is considered, we do not find the interaction coefficient to be significantly negative, but to remain indistinguishable from zero. In this exercise, the ECCU interaction coefficient on bank flows is estimated imprecisely with a large standard error.

and FDI flows. Our baseline estimates, thus, indicate that cross-border bank flows primarily facilitate business-related travel (e.g., corporate conferences or trade shows), which are more likely financed through bilateral banking channels than leisure tourism. Additionally, bilateral banking relationships may indirectly support tourism by providing financial infrastructure, reducing transaction costs, and signaling economic integration, though Caribbean leisure tourism does not seem to be driven by these mechanisms. The elasticity magnitude we observe remains smaller in absolute terms than typically found for income, population, or distance elasticities, confirming that while cross-border financial flows matter, they are not primary determinants of tourism flows (Rosselló-Nadal and Santana-Gallego, 2022).

Our results indicate that banking linkages do not play a significant role in driving Caribbean tourism flows, consistent with the structure of international tourism transactions. Several factors help explain this finding. A large share of tourism expenditures is pre-paid through intermediaries in origin countries and retained by foreign airlines, tour operators, and hotel chains before reaching destination economies (UNCTAD, 2010). All-inclusive packages and cruise transactions are typically processed through international operators, while in-destination spending often occurs in cash or via international credit cards settled through major financial centers. Cash transactions, for example for local transport or tours, continue to play a more prominent role in the Caribbean compared to other regions (see recent data from the Survey of International Air Travelers and IDB, 2022). Furthermore, diaspora-related travel and remittance flows in the Caribbean are also less reliant on formal interbank channels. Taken together, these features help explain why cross-border banking relationships appear less closely linked to tourism flows in the Caribbean than to goods trade.

Conclusion

Econometric evidence points to connectivity constraints as a central feature shaping trade and tourism outcomes in Caribbean economies. This paper examines goods trade, tourism flows, and cross-border banking linkages to assess how physical and financial connectivity shape outcomes across the region.

Gravity model results suggest that Caribbean goods trade is disproportionately sensitive to geographic distance. Caribbean countries trade less with partners outside the region and more within the region than predicted by economic fundamentals alone. Our estimation results indicate that this pattern is driven largely by the disproportionate effect of geographic distance—which suggests connectivity is a constraint for Caribbean countries. This is consistent with limited direct shipping routes and high freight costs. High import dependence from concentrated source markets further amplifies exposure to external shocks and shifts in global trade policies.

Tourism flows in the Caribbean also appear sensitive to physical connectivity. Controlling for standard demand factors, the analysis finds that inbound flight capacity plays a quantitatively significant role in determining arrivals. These results suggest that supply-side constraints—stemming from small airports, limited carrier networks, and dependence on a few connection hubs—materially affect tourism outcomes, reinforcing the important role of air connectivity in services trade.

By contrast, financial connectivity appears to play a more limited role. While banking relationships can play an important role in facilitating trade globally, this link is weaker for Caribbean economies, consistent with the region's export structure. Similarly, although banking relationships tend to support tourism flows, this channel is muted for CARICOM economies. The region's tourism model—characterized by pre-paid packages,

international credit card transactions, and local cash transactions—largely bypasses bilateral banking channels. Taken together, these findings suggest that, relative to financial linkages, physical connectivity plays a more prominent role in shaping Caribbean trade patterns and external vulnerabilities.

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