



2025 Review of maritime transport

Chapter III

Freight rates and maritime transport costs

Freight rate volatility is becoming the new normal across all shipping segments, driven by continued geopolitical tensions, shifting trade policy, regulatory developments, and persistent supply and demand imbalances. Considering trends discussed in chapters I and II, this chapter analyses freight rate developments in the container, dry bulk and tanker shipping segments from January 2024 to mid-2025.

In 2024, disruptions in the Red Sea significantly affected container shipping. Rerouting via the Cape of Good Hope extended voyage times, reduced effective capacity and increased operating costs, driving spot and charter rates to near COVID-19 peaks by mid-2024 before moderating by the end of the year. Volatility continued into 2025 amid tariff announcements by the United States of America and mounting geopolitical risks, including around the Strait of Hormuz.

Dry bulk markets recorded strong performance in 2024, supported by robust demand for coal, grain and fertilizers. Rates eased in early 2025, however, due to subdued industrial activity and fleet growth. Tanker markets remained highly sensitive to geopolitical developments, with rates surging in June 2025 amid intensifying risks in the Strait of Hormuz.

Meanwhile, environmental compliance costs continue to fundamentally reshape maritime transport economics. Emissions pricing, decarbonization targets and related regulations will directly influence transport costs for all segments.

The tariff measures announced in 2025 may have implications for maritime transport and trade costs. UNCTAD has initiated analytical work to assess potential effects on global trade and seaborne transport.



Key policy takeaways

- ▶ Increase technical assistance to developing countries, in particular the least developed countries, small island developing States and landlocked developing countries to strengthen their capacities to monitor, assess and manage the impacts of freight rate volatility on trade and supply chains.

- ▶ This support should focus on:

Institutional capacity-building: Equipping national authorities with the tools, data and expertise to systematically monitor freight and transport cost trends.

Data-driven analysis and impact assessment: Conducting and supporting data-driven research and insights, including impact assessments to evaluate how maritime freight rate fluctuations affect domestic prices, with particular attention to essential imports such as food and fuel.

Multilateral coordination: Leveraging platforms such as UNCTAD, the WTO, FAO and IMO to enhance international research collaboration and policy coherence between national and global objectives.

Evidence-based policymaking: Assisting governments in designing timely, evidence-based responses to mitigate impacts.



A. Trends in freight rates

1. The Red Sea crisis drove up spot container freight rates in 2024 with partial relief by year-end

Container freight rates recorded strong increases in 2024, with spot rates peaking around midyear at levels not seen since the COVID-19 disruptions of 2021–2022. The Red Sea disruptions primarily drove this surge, forcing carriers to reroute vessels around the Cape of Good Hope instead of transiting through the Suez Canal (UNCTAD, 2024). This rerouting increased voyage distances and demand for vessels, caused delays to shipping frequency and reliability, and increased overall operating costs. Extended voyage durations contributed to a substantial increase in global ton-miles, estimated at 17 per cent in 2024, along with a significant rise in operating costs, particularly time charter and fuel costs, despite reduced Suez Canal dues.

In addition to the impact of disrupted shipping operations in the Red Sea, global cargo volumes grew more than anticipated in 2024, further constricting vessel availability and maintaining high freight rates. This growth in demand was driven by trade between North America and other regions, particularly Asia, as well as by the continued expansion of South-South trade between Asia and developing economies in Africa, Latin America and the Middle East (chapter I).

An analysis of supply and demand dynamics in the container shipping market, measured in TEUs (figure III.1), shows overall growth in demand of 7.1 per cent in 2024. This growth contrasted with the contraction in 2022 (-1.5 per cent) and stagnation in 2023 (-0.1 per cent) (chapter I). On the supply side, global container shipping capacity grew by 10.1 per cent in 2024, equivalent to nearly 3 million TEUs (chapter II), the highest annual growth since 2008. Much of the new tonnage was absorbed by increased demand from longer voyages due to Red Sea rerouting and broader economic activity. Consequently, the additional capacity did not immediately drive rates lower; instead, it continued to support elevated spot freight rates.

By the end of 2024, spot container freight rates eased from midyear peaks but stayed well above levels observed prior to the onset of the Red Sea crisis in December 2023.

Container demand projections for 2025 remain uncertain amid growing geopolitical tensions and trade policy shifts. On the supply side, container fleet capacity is still growing as new ships ordered during the post-COVID-19 period of booming earnings continue to be delivered. These trends are explored in the following subsections and further considered in chapters I and II, which cover demand and supply trends.

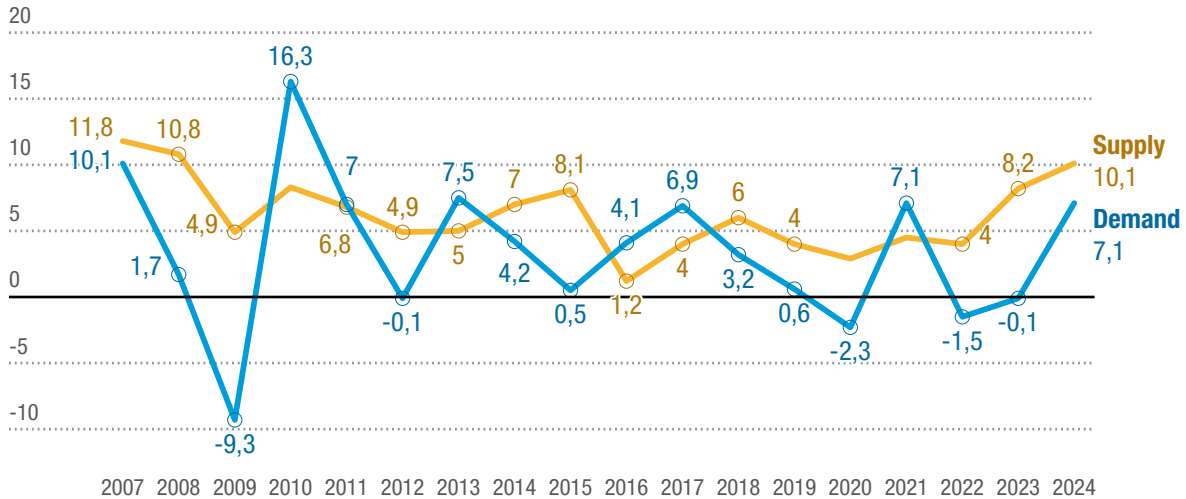




Figure III.1

Demand rebounded in the container market in 2024, after a two-year contraction, but remained below supply growth, which saw the highest annual increase since 2008

(Percentage change)



Source: UNCTAD calculations. Demand (TEU) is based on data from chapter I; supply is based on data from Clarksons Research, Container Intelligence Monthly, various issues.

Note: Supply data refer to the total capacity of the container-carrying fleet (TEU), including multipurpose and other vessels with some container-carrying capacity.

The Shanghai Containerized Freight Index reflects elevated rate levels, with a mid-2024 surge in freight rates followed by a year-end decline

The Shanghai Containerized Freight Index (SCFI), a key benchmark for spot rates on containerized shipments from Shanghai to major global destinations, averaged 2,496 points in 2024, an increase of approximately 149 per cent compared to the 2023 average (figure III.2).

The index peaked at 3,600 points in mid-2024, its highest level since the global

logistics crunch of 2021–2022 triggered by the COVID-19 pandemic. This increase was reflected across major trade routes.

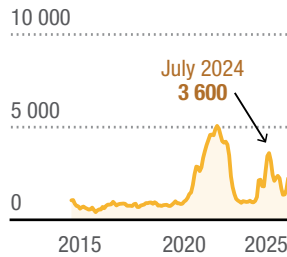
As the third quarter progressed, freight rates eased due to a decline in seasonal demand and new vessel deliveries. By December 2024, the index had fallen by 34.1 per cent from its July peak. Nevertheless, this figure remained around 93 per cent higher than the 1,230-point level recorded in December 2023. This further underscores the significant impact of the Red Sea crisis on global container shipping dynamics and the sustained upward pressure on transport costs in the 2024 container market.



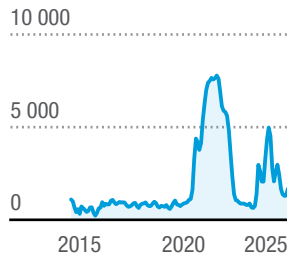


Figure III.2
Shanghai Containerized Freight Index spot rates
(Monthly averages, United States dollars per TEU)

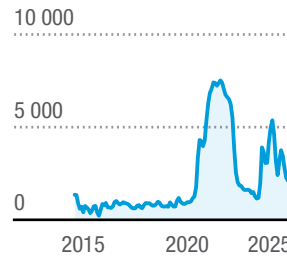
**SCFI Comprehensive
Container Freight Rate
Index**



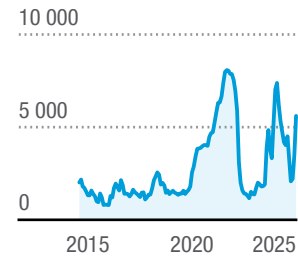
**SCFI Shanghai–Europe
(base port)**



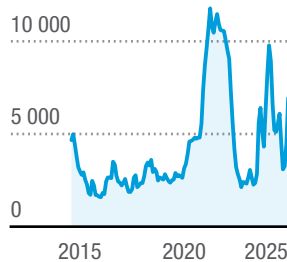
SCFI Shanghai–Mediterranean (base port)



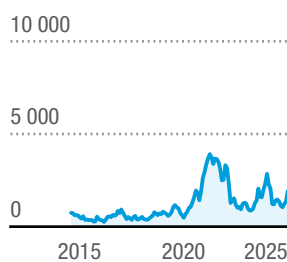
**SCFI Shanghai–west
coast United States (base
port)**



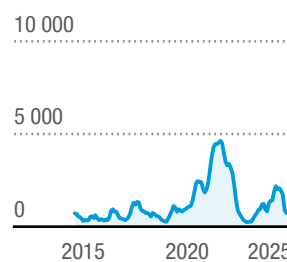
**SCFI Shanghai–east coast
United States (base port)**



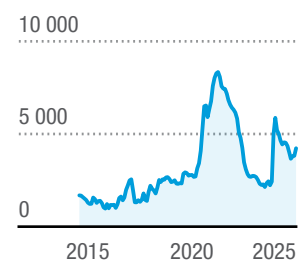
**SCFI Shanghai–Persian
Gulf (Dubai)**



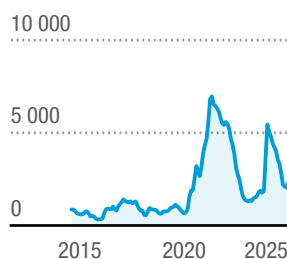
**SCFI Shanghai–ANZ
(Melbourne)**



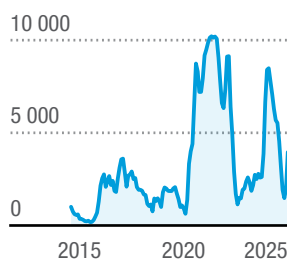
**SCFI Shanghai–West
Africa (Lagos)**



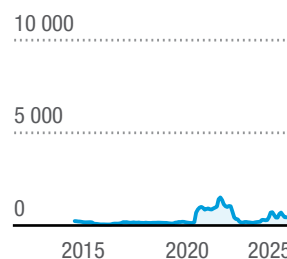
**SCFI Shanghai–South
Africa (Durban)**



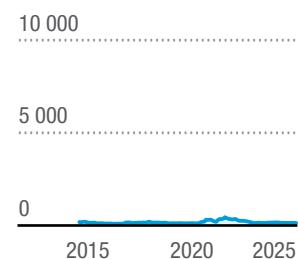
**SCFI Shanghai–South
America (Santos)**



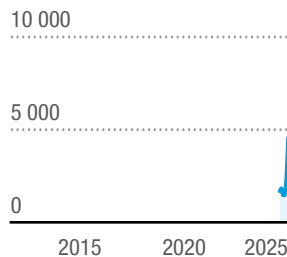
**SCFI Shanghai–South-
East Asia (Singapore)**



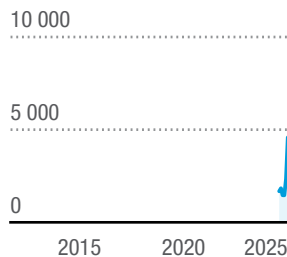
**SCFI Shanghai–Republic
of Korea (Pusan)**



**SCFI Shanghai–west
coast South America
(Manzanillo)**



**SCFI Shanghai–East
Africa (Mombasa)**



Source: UNCTAD, based on data from Clarksons Shipping Intelligence Network.

Notes: One 40-foot equivalent unit (FEU), equal to two TEUs, applies to the rates from Shanghai to the east and west coasts of the United States. ANZ indicates freight rates from Shanghai to Australia and New Zealand.



Port congestion as a persistent source of freight rate increases and volatility in 2024 and into 2025

In 2024, port congestion also contributed to high freight rates, driven by factors including the disruption to shipping operations in the Red Sea, weather-related challenges in Asia and the Caribbean, and labour issues in the United States and Europe. These elements were in addition to infrastructure bottlenecks and operational inefficiencies, and a general surge in container cargo volumes (Can Fidan, 2025). Such conditions placed significant strain on port operations, leading to increased turnaround times and delays (chapter IV). The resulting congestion reduced the effective supply and timely deployment of vessels, diminishing available shipping capacity and reliability. This, in turn, exerted upward pressure on freight rates.

2. Container freight rates fluctuated into 2025 amid shocks and fleet expansion, with strategic alliances and coordinated capacity management playing a growing role against an increasingly uncertain market outlook

Following a weaker start to the year, characterized mainly by low demand after the Chinese Lunar New Year, freight rate markets experienced heightened volatility as trade tensions amplified.

In April 2025, the United States Administration announced new tariffs, including base-level and more elevated country-specific tariffs on key trading partners (chapters I and II). Such measures would typically exert upward pressure on freight rates, as tariff announcements can trigger the front-loading of imports,

temporarily increasing demand for shipping and raising freight rates. Yet the impact on spot rates was limited, as importers in the United States had already accelerated shipments earlier in the year in anticipation of potential tariff impositions on Chinese goods (UNCTAD, 2025a).

However, by mid-May 2025, front-loading had caused a new surge in cargo demand from China to the United States, as the latter announced a 90-day tariff suspension period with its trading partners to allow bilateral negotiations to take place. Increased cargo flows promoted a significant rise in spot freight rates on the trans-Pacific route. Between April and May 2025, average rates from Shanghai to the western coast of the United States rose by 57.3 per cent, while those to the eastern coast increased by 37.3 per cent. Continued carrier capacity management strategies further supported these sharp increases.

In June 2025, tensions between the Islamic Republic of Iran and Israel added a further layer of risk to maritime chokepoints, particularly the Strait of Hormuz. Although the strait caters to a relatively small share of global seaborne container trade, around 3 per cent (Clarksons Research, 2025e), it remains relevant to containerized trade as regional hubs are in its vicinity. These include Jebel Ali Port and Khalifa Port in the United Arab Emirates. Any sustained disruption or closure could affect feeder services and transshipment operations in the Arabian Gulf or northern Indian Ocean, potentially leading to rerouting via South Asian ports (Container News, 2025). Such a shift may result in congestion and increases in freight rates, especially on the intra-gulf and Middle East to Asia and South Asia routes. While the impact on global container trade remains limited, further escalation could have wider implications for network reliability and transport costs. Indeed, average spot rates from Shanghai to Jebel Ali, the Arabian Gulf's largest port, surged by 55 per cent from May to June 2025 (Xeneta, 2025).



Container
freight rates
volatility is
expected to
persist

Looking ahead, the overall outlook for container freight rates remains clouded by uncertainty. Many risks tilt towards the downside, affecting demand (chapter I). It is unclear if or to what extent changing tariffs will be implemented and how markets will adapt. Uncertainty around China and United States tariff measures as well as capacity realignments, such as the reallocation of surplus trans-Pacific tonnage to other trade lanes (for example, exports to Europe and Latin America, and intra-Asia), are expected to affect market dynamics and exacerbate freight rate volatility. Sudden shifts in trade policy and shipping patterns would likely disrupt the balance between supply and demand (see also UNCTAD, 2025a). At the same time, overcapacity will probably remain a key factor. Global container fleet capacity is projected to expand by 6.7 per cent in 2025 and 4.0 per cent in 2026 (Clarksons Research, 2025e).

In this context, the projected increase in supply will exert downturn pressure on freight rates, particularly if not met with a corresponding rise in demand. Simultaneously, a full return of container shipping to the Red Sea and Suez Canal routes, should conditions allow, would increase capacity that had been absorbed by longer Cape of Good Hope rerouting. This would lead to a decline in global TEU-mile demand and a further drop in freight rates. Existing mitigation measures applied by carriers, such as blank sailing, slow steaming, vessel idling and controlled fleet deployment, may not be sufficient to absorb surplus capacity (Ship&Bunker, 2025). Strategic carrier alliances and continued coordinated capacity management are expected to play increasingly important roles in shaping freight rate dynamics.

As freight rates continue to adjust to evolving disruptions, risks and regulatory changes, including those related to environmental compliance (discussed below), rate volatility is expected to persist across most containerized trade routes.

3. Containership charter rates: Rebounding across segments in 2024 and into 2025

In 2024, global container charter rates were higher than in 2023. This stemmed particularly from increased TEU-mile demand from longer-voyage distances caused by ship rerouting and higher-than-expected growth in trade volumes.

Trends in the New ConTex index, a benchmark for assessing time charter rates for containerships across six key vessel classes, captured this dynamic. The index rose sharply to an average of 1,073 points in 2024, 50.3 per cent over the 2023 average of 714 points (figure III.3). It remains below the peak levels reached during the COVID-19 surge, however. The market's ability to respond more swiftly, supported by the availability of tonnage, has helped prevent spikes observed during the pandemic.

Charter markets remained strong throughout 2024, with rates increasing across vessel segments. Large vessels (3,400 TEU and above) saw daily rates rise by 18 to 25 per cent year-on-year, with charter periods often exceeding 22 months. Smaller ships also experienced robust demand, driven by Red Sea disruptions, as well as increased regional trade and the need for feeder capacity, leading to a 33 per cent increase in average rates for 1,600–1,999 TEU vessels, many fixed for 18–24 months.¹

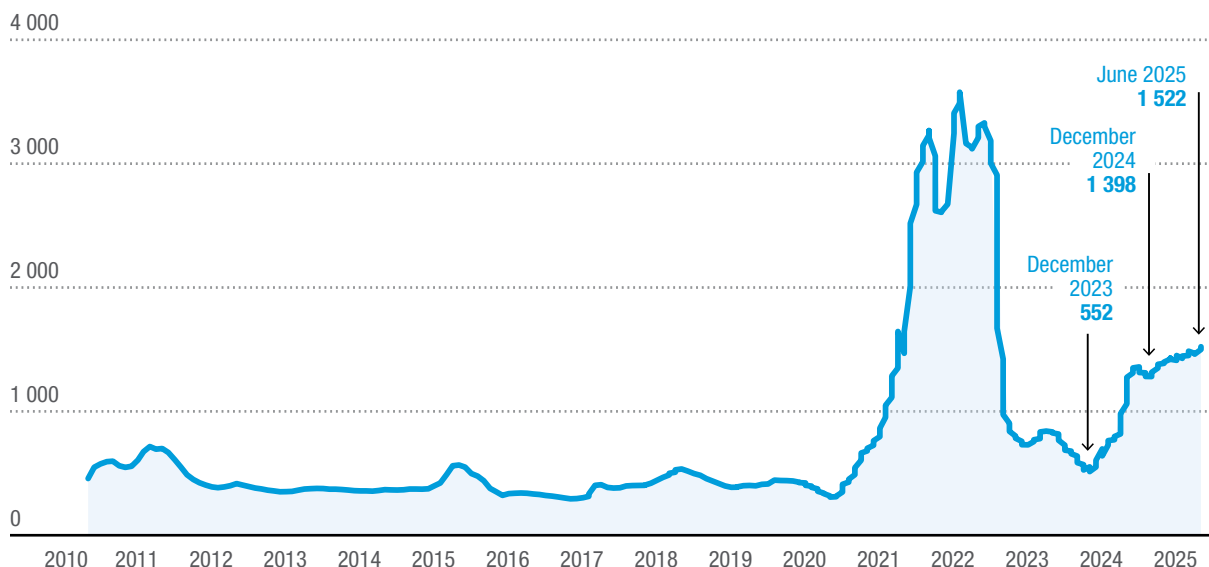
¹ See the HAX Hamburg Index (March 2025) of the Hamburg and Bremen Shipbrokers' Association (VHBS) and New ConTex Index. Available, respectively, at www.vhss.de/hax and www.vhss.de/new-context.





Figure III.3

The New ConTex index performed significantly better in 2024 and 2025 than in 2023



Source: UNCTAD calculations, based on data from the New ConTex Index for container ship chartering produced by the Hamburg and Bremer Shipbrokers Association, available at <http://www.vhss.de>.

Note: The New ConTex Index is based on assessments of the current day charter rates of six selected container ship types, which are representative of their size categories: Types 1,100 TEU and 1,700 TEU, with a charter period of one year; and Types 2,500, 2,700, 3,500 and 4,250 TEU, with a charter period of two years. The index base is 1,000 points (October 2007).

Container charter market momentum continued into 2025 despite freight rate moderation; the outlook remains uncertain

Charter markets remained firm in the first half of 2025, with the New ConTex index rising from 1,398 points in late December 2024 to 1,522 points by June 2025. An increase of nearly 9 per cent underscored persistent demand for charter tonnage across vessel classes.

Looking ahead, container charter market dynamics remain vulnerable to geopolitical disruptions, shifts in trade policy and an evolving fleet profile. The global active fleet and orderbook are increasingly driven by decarbonization targets and an expected pickup in ship scrapping activity as fleet renewal accelerates (chapter II). Persistent

uncertainty linked to new tariffs and geopolitical developments has prompted many cargo owners and charterers to avoid long-term contracts, opting instead for short-term agreements at higher rates to retain flexibility and adapt to shifting conditions (Container xChange, 2025).

4. Dry bulk shipping rates in 2024: Strong but variable demand and moderate fleet growth

The dry bulk shipping freight market experienced a rebound and sustained volatility in 2024, following weaker and fluctuating performance in 2023. The Baltic Dry Index, which tracks bulk commodity shipping costs, averaged 1,755 points in 2024, up 27.3 per cent from 2023.



A strong underlying demand for coal, grain and fertilizers limited new supply, while effective vessel utilization was in play across all segments. The rerouting of vessels from the Red Sea caused dry bulk trade in ton-miles to increase by an estimated 1.2 per cent (Clarksons Research, 2025a). The index began to decline towards the end of 2024, reflecting softening earnings (figure III.4).

Capesize vessels (over 100,000 dwt), which transport cargoes such as coal and iron ore, benefited from strong demand in Asia (particularly China, India and South-East Asia) for both thermal and metallurgical coal. Europe also maintained strategic imports of thermal coal amid high gas prices and energy security concerns. As a result, Capesize one-year time charter rates averaged \$22,953 per day in 2024, up from \$16,389 in 2023, and peaked at over \$35,000 per day during the year (BRS Group, 2025).

Panamax and Kamsarmax vessels (60,000–99,999 dwt), active in the coal, grain and fertilizer trades, also saw strong demand and steady growth in earnings and rates. Grain exports from Brazil, the Russian Federation and the United States remained robust, supporting demand across Africa, Asia and the Middle East. Ukraine continued to export through alternative Black Sea corridors and Danube ports (Polityuk, Saul and Balmforth, 2024), contributing to tonnage demand. Average freight rates for Panamax vessels, as reflected by time charter earnings, reached \$16,157 per day in 2024, a 10 per cent increase from the 2023 average (Clarksons Research, 2025b). The Kamsarmax segment averaged \$14,099 per day, up 9.7 per cent from 2023, with rates exceeding \$20,000 per day during peak periods.

Supramax and Handysize vessels (25,000–59,999 dwt) benefited from firm minor bulk demand, including grains, fertilizers and steel, driven by regional growth in Africa, South-East Asia and short-sea European trades. Supramax rates rose steadily, with the average one-year time charter reaching \$13,601 per day in 2024, a 21 per cent increase over 2023 (BRS Group, 2025).

On the supply side, the dry bulk fleet expanded by an estimated 3 per cent in 2024, similar to growth in previous years (chapter II). This moderate pace of fleet growth broadly aligned with market demand. Low scrapping activity also supported available capacity, as firm charter earnings provided shipowners with continued incentives to retain older vessels.

5. Dry bulk markets in the first half of 2025: Weaker demand and lower earnings as fleet growth moderates

The dry bulk shipping market experienced slower and fluctuating demand during the first half of 2025 compared to 2024. Average freight rates, as reflected in daily earnings across the sector, declined to approximately \$10,750 per day, around a 30 per cent drop compared to the same period last year. This downturn was primarily driven by weaker demand for key commodities, particularly iron ore and coal, amid reduced industrial output and changing global trade dynamics (Clarksons Research, 2025b; see also chapter I).

A notable but temporary increase in the Baltic Dry Index occurred in June 2025. It saw an average of 1,685.95, supported by rising Capesize rates due to increased bauxite shipments from Guinea to China and a rebound in Chinese coal imports, before easing again in July. The Strait of Hormuz caused concern. Although only around 3 per cent of global dry bulk trade passes through it (Clarksons Research, 2025b), any disruption could put additional pressure on an already fragile and uncertain outlook for the dry bulk trade.

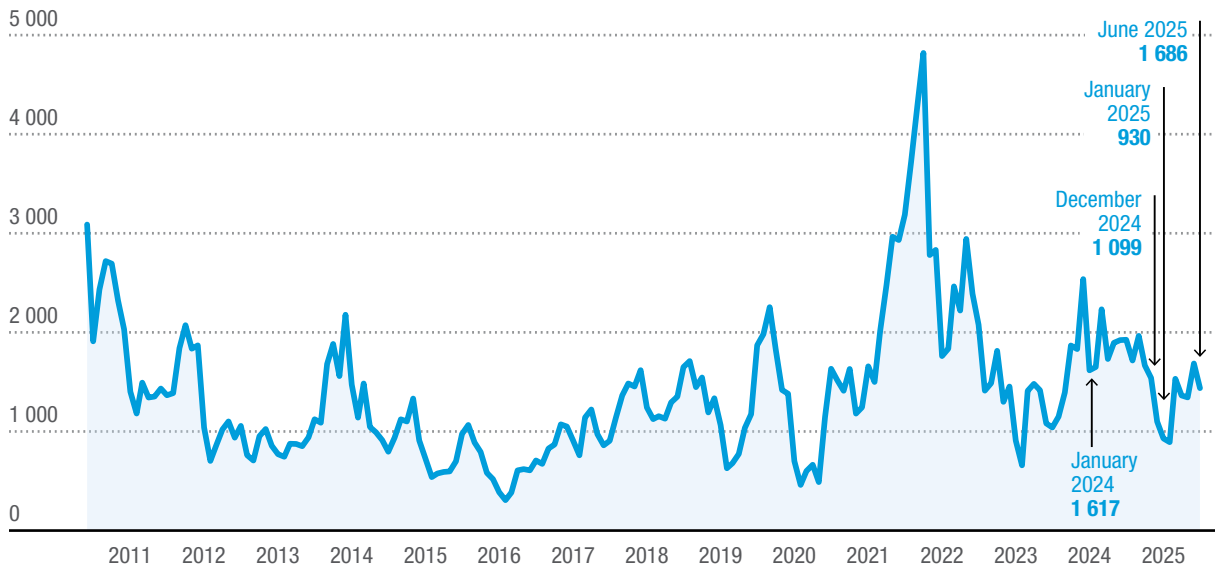
Meanwhile, the dry bulk fleet is projected to expand by approximately 3 per cent in 2025, in line with average annual growth over 2022–2024 (Clarksons Research, 2025b). Without a rebound in demand, projected growth in bulker capacity could keep vessel use low and put downward pressure on freight earnings through 2025.





Figure III.4

The Baltic Dry Index was strong in 2024 but softened in 2025



Source: UNCTAD calculations, based on data from Clarksons Shipping Intelligence Network.

Looking ahead, the dry bulk freight rates are expected to remain under pressure due to a combination of economic uncertainty, the global energy transition, shifting national strategies on energy and food security, geopolitical tensions and trade policy shifts. These factors are reshaping commodity flows, route preferences and vessel deployment capacity, thereby influencing dry bulk freight rates.

6. Tanker freight rates and earnings in 2024: Elevated but volatile

Tanker freight markets remained firm in 2024, although marked by elevated volatility. Freight rates stayed above historical averages but below the exceptional peaks of 2022 and 2023. The Baltic Dirty Tanker Index, which tracks crude oil tanker spot rates, averaged 1,092, reaching a high of 1,399 in January and a low of 877 in September 2024. The Baltic Clean Tanker Index, covering product tankers, such as those transporting refined fuels including diesel, jet fuel and gasoline, averaged 818,

peaking at 1,104 in March before declining to 540 in October 2024 (figure III.5).

Freight rates, as reflected in average tanker earnings, declined by 13 per cent to \$35,498 per day in 2024 but remained high by historical standards (figure III.6). The first half of the year saw elevated rates and earnings driven by increased ton-mile demand as ships rerouted around the Cape of Good Hope, causing the average haul to increase. The redirection of Russian crude oil and petroleum products to Africa and Asia as well as increased United States and West African crude shipments to Asia and Europe also significantly extended voyage distances and tightened vessel availability (Somasekhar, 2025). Together, these factors and limited fleet capacity growth (0.7 per cent, see chapter II) have pushed tanker freight rates up.

In the second half of 2024, crude tanker earnings declined, particularly for very large crude carriers, due to weakening Chinese crude imports, continued OPEC+ production cuts and the broader global economic slowdown (Clarksons Research, 2025c).



Product tanker rates also fell, impacted by reduced Russian Federation exports, weaker refining margins and increased competition from crude tankers shifting into the clean product segment to capture higher earnings (Lin, 2024; Coyne, 2024).

7. Tanker market freight rates and earnings by mid-2025 and beyond: Decline amid market volatility

As of June 2025, the average Baltic Dirty Tanker Index and Baltic Clean Tanker Index levels stood at approximately 938 and 684 points, respectively (figure III.5). Average tanker earnings had moderated to around \$26,333 per day. This reflects a decline from the high levels observed during 2022–2024. Even so, earnings remained historically high and volatile, indicating continued market strength amid ongoing uncertainties.

In the crude tanker segment, average earnings jumped to \$52,013 per day in April, supported by increased demand for shipments from alternative suppliers outside markets affected by economic measures. By June, earnings dropped to \$33,393 per day, despite an increase in OPEC+ production (figure III.6). Despite this decline, the market remained firm, supported by moderate fleet growth projected at 0.6 per cent in 2025 and steady global seaborne crude trade volumes (Clarksons Research, 2025d).

In the product tanker segment, average earnings reached \$25,916 per day in March 2025, a decline of nearly 30 per cent compared to \$44,555 per day in March 2024. By June 2025, average earnings had eased further to \$21,694 per day, although they remained elevated by historical

standards. This reflects weakening ton-mile demand due to reduced long-haul product trades alongside an anticipated product tanker fleet expansion of approximately 5 per cent in 2025, which is expected to exert further downward pressure on rates (Clarksons Research, 2025d).

As the Strait of Hormuz is critical for oil transport, accounting for approximately 34 per cent of global seaborne oil trade in 2024 (Clarksons Research, 2025d), tensions in June 2025 were associated with a surge in tanker freight rates amid increased costs and escalating war risk premiums.² Prices to charter very large crude carriers sailing from the Middle East to East Asia via the Strait of Hormuz more than doubled to nearly \$50,000 per day following the outbreak of conflict. Product tanker earnings surged by 150 to 200 per cent within a week in June 2025 (Wright, 2025). Such developments can create ripple effects in broader tanker markets, intensifying cost pressures that may influence energy prices and shipping costs globally.

Looking ahead, the tanker market faces a more complex and challenging environment. While geopolitical tensions and rerouting spark intermittent surges in demand, global oil demand growth is slowing, fleet utilization is weakening and vessel supply is expanding, especially in the product segment. In parallel, tanker freight rates, much like other fleet segments, will be increasingly shaped by demands for ships running on low- and zero-carbon fuels. This shift is expected to tighten vessel supply and increase operating costs, particularly for older, less efficient ships, thereby exerting upward pressure on freight rates. All these factors will influence how rates evolve.

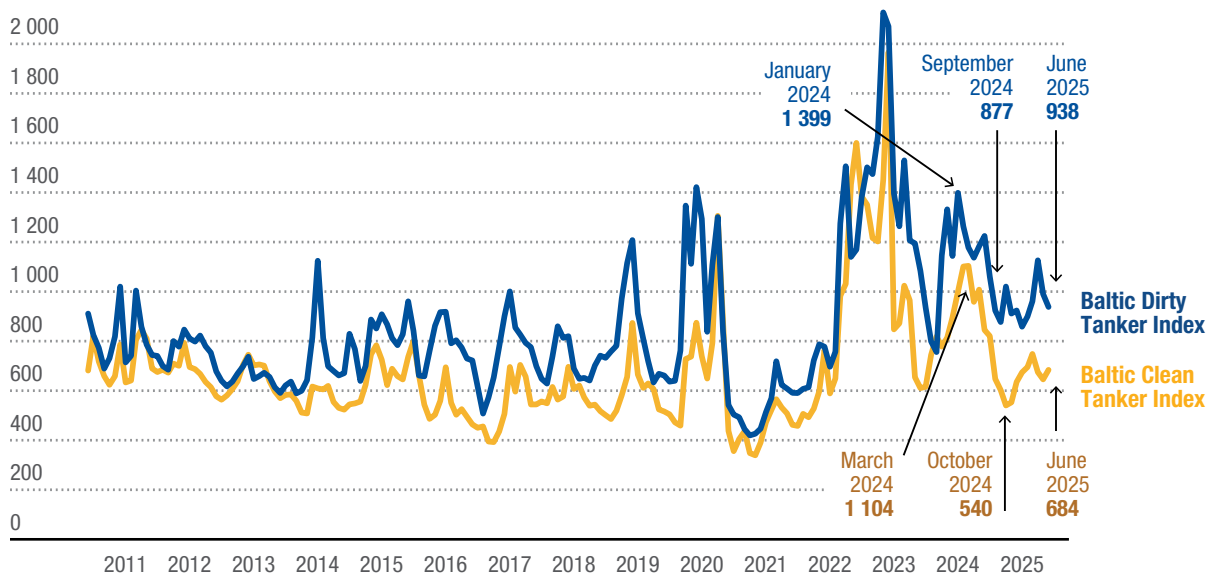
The tanker market faces a more complex and challenging environment

² War risk insurance premiums have reportedly surged from 0.07 to 2 per cent of a ship's value (Newsroom Panama, 2025).



Figure III.5

The Baltic Dirty Tanker Index and Baltic Clean Tanker Index show volatility in 2024 and 2025

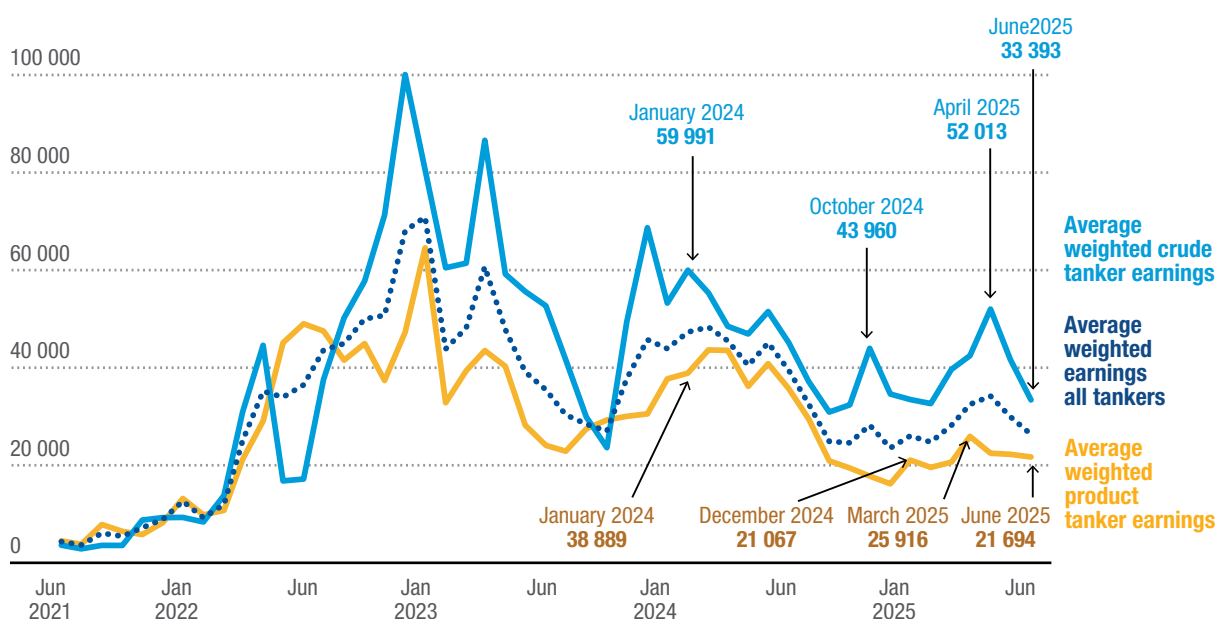


Source: UNCTAD calculations, based on data from Clarksons Shipping Intelligence Network.

Figure III.6

Average earnings, crude and product tankers, 2024 to mid-2025: Highly volatile but elevated by historical standards

(United States dollars per day)



Source: UNCTAD, based on data from Clarksons Shipping Intelligence Network.

8. Maritime transport costs in a context of environmental regulations

Transport costs, specifically maritime transport costs, refer to total costs borne by the shipper or cargo owner. They include freight rates and additional expenses such as bunker fuel costs, variable surcharges, port and terminal handling fees, and insurance premiums.

Overall maritime transport costs are increasingly shaped by additional charges, especially due to environmental regulations. These encompass the growing costs of regulatory compliance, including those related to decarbonization and emissions controls. Evolving environmental cost components impact both shipping companies and cargo owners, ultimately affecting the final landed prices of goods.³

With the inclusion of maritime transport in the EU-ETS from 2024,⁴ the entry into force of the FuelEU Maritime Regulation in 2025⁵ and the agreement in April 2025 on draft IMO midterm greenhouse gas reduction measures⁶ (chapters II and V), emissions-related costs are moving into sharper focus. The costs of compliance with existing legal requirements are now a central element of total maritime transport cost calculations.

Together, relevant regulatory measures are expected to reshape freight rate formation and transport cost structures across all major shipping segments, with more pronounced effects expected in the years ahead (table III.1). While their impact may not yet be apparent, relevant costs are

expected to rise progressively in the coming years in line with regulatory obligations and compliance requirements.

Final remarks: Freight rate volatility and trade policy uncertainty heighten risks to global seaborne trade

Freight market developments in 2024–2025 underscored the vulnerability of global trade to persistent disruptions, supply and demand mismatches, and regulatory shifts. Freight rates surged in 2024 across all segments, container, dry bulk and tanker, driven by the Red Sea crisis, longer voyage distances, stronger-than-expected cargo demand and extensive port congestion. Although rates came down by year-end, they remained historically high. Until the middle of 2025, freight rates continued to fluctuate, influenced by increased geopolitical tensions, trade policy uncertainty, and persistent imbalances in global supply and demand.

In addition to the increased volatility in freight rates, evolving trade policies have introduced significant uncertainty into transport and trade costs. In 2025, the United States and several other economies announced additional tariffs and reaction measures.⁷ UNCTAD has initiated an assessment of the potential impacts on global trade, including seaborne trade.

The following technical annex presents some preliminary findings from the ongoing analytical work with a focus on seaborne exports.

³ See also chapter III of UNCTAD, 2023.

⁴ Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02023L0959-20230516>. See also UNCTAD, 2023.

⁵ Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1805>. See also UNCTAD, 2023.

⁶ The draft IMO measures include a global fuel standard and an economic measure (a carbon pricing mechanism). They will be considered for formal adoption in October 2025 and would enter into force in 2027, with implementation beginning in 2028.

⁷ United States of America, The White House, 2025a–i; United States of America, Department of Commerce, 2025a–e; United States of America, Department of Homeland Security 2025a and 2025b; Canada, Department of Finance, 2025a, 2025b and 2025c.





Table III.1

An illustration of compliance costs by shipping segment under the EU-ETS and FuelEU, 2024–2025

Segment	Legal instrument	Compliance associated with cost	Illustrative impact
Container	EU-ETS (effective 1 January 2024) Applies to vessels from 5,000 gross tonnage on voyages within/to/from European Union ports. Covers 100 per cent of emissions on intraunion voyages and 50 per cent on voyages between union and non-union ports. Phase-in: 40 per cent in 2024, 70 per cent in 2025, 100 per cent from 2026 onwards.	Purchase of European Union Allowances (EUAs). Each EUA = right to emit 1 ton of carbon dioxide. The EUA price averaged 66–70 euros per ton of carbon dioxide in 2024; it is projected to rise to 75–85 euros per ton of carbon dioxide by 2025–2026.	ETS surcharges applied to European Union-related routes, varying by carrier, voyage distance and vessel efficiency (e.g., Maersk Far East to northern Europe: 70 euros/FEU or 31 euros/TEU in Q1 2024 and 61 euros/FEU in Q1 2025)
	FuelEU Maritime (effective 1 January 2025) Applies to vessels from 5,000 gross tonnage calling at European Union ports. Covers 100 per cent of energy used on intraunion voyages and 50 per cent on extraunion voyages.	Greenhouse gas intensity targets: 2 per cent reduction in intensity per unit of energy in 2025 over a 2020 baseline (91.16 grams of carbon dioxide equivalent per megajoule) 6 per cent reduction by 2030 Increasing gradually to an 80 per cent reduction by 2050	Non-compliance penalty: 2,400 euros/ton very low sulphur fuel oil equivalent in 2025 (rising to 2,640 euros/ton in 2026 and 2,904 euros/ton in 2027) or alternative compliance via use of biofuels or pooling surplus compliance credits from other vessels
	Regulation EU 2023/1804 on the deployment of alternative fuels infrastructure repealing Directive 2014/94/EU, Article 9 ^a Requires an onshore power supply by 31 December 2029 for the Trans-European Network for Transport (TEN-T) maritime ports and inland waterway ports.	Onshore power retrofit requirement	Estimated retrofit cost of \$1 million to \$2 million per vessel
Dry bulk	EU-ETS	Carbon dioxide surcharge per voyage. Lower-value cargoes make ETS a bigger share of freight.	For example, the EU-ETS added an estimated cost of \$0.40 per ton of coal transported by a Capesize vessel (131,000 dwt, built in 2010, non-scrubber) from Baltimore to Rotterdam in 2024, rising to \$0.69 per ton in 2025. ^b
	FuelEU Maritime	Greenhouse gas intensity compliance	Penalties apply to high-emission older vessels
Tanker	EU-ETS	Carbon dioxide cost per voyage	For example, the EU-ETS costs approximately \$0.64 per ton for crude oil from Bonny Offshore (Nigeria) to the Port of Marseille/Fos (France) for an Aframax of 80,000 tons in 2024 and \$1.12 per ton in 2025 ^b
	FuelEU Maritime	Greenhouse gas intensity compliance	Complexity due to varied fuel mix and voyage patterns

Source: Container segment: DNV (available at <https://www.dnv.com/maritime/insights/topics/eu-emissions-trading-system/eu-ets-compliance/> and at <https://www.dnv.com/expert-story/maritime-impact/strategies-for-navigating-fueleu-maritime-compliance/>); S&P Global (available at <https://www.spglobal.com/commodity-insights/en/news-research/latest-news/energy-transition/030425-european-carbon-allowances-trade-at-lowest-2025-value-driven-by-gas-geopolitics>); Clarksons Research EU-ETS voyage costs (available at <https://www.clarksons.net/>); Maersk 24 (available at <https://www.maersk.com/news/articles/2023/09/15/eu-emissions-trading-system-ets>); Maersk 25 (available at <https://www.maersk.com/news/articles/2024/12/02/emissions-surge-ems-ess>); Bettersea.tech (available at <https://www.bettersea.tech/post/case-study-iv-penalty-vs-biofuel-vs-fueleu-pooling-what-s-the-best-compliance-option>); Virtue Marine 9 (available at <https://www.virtuemarine.nl/post/fueleu-maritime-a-new-era-for-sustainable-shipping>); European Commission Regulation 2023/1805 (available at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1805>); World Ports Sustainability Program (available at <https://sustainableworldports.org/ops/costs/investments/>). Dry bulk segment: Clarksons Research EU-ETS voyage costs (available at <https://www.clarksons.net/>). Tanker segment: Clarksons Research EU-ETS Voyage Costs (available at <https://www.clarksons.net/>).

Note: ^a More information on Regulation EU 2023/1804 is available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02023R1804-20250414&qid=1753708349028>. ^b EUA carbon dioxide price of \$71.3/ton as of December 2024.



Technical annex

Potential implications of additional tariffs on seaborne trade

1. Preliminary overview

This technical annex presents some preliminary findings from ongoing analytical work assessing the potential implications for seaborne trade of additional tariffs announced and implemented in 2025. The preliminary assessment draws on UNCTAD's new World Seaborne Trade Database (UNCTAD, 2025b) and employs a quantitative trade model featuring a modal choice between maritime and non-maritime transport.⁸

By 7 August 2025, the United States and other economies had announced a series of additional tariffs and reaction measures. To address uncertainty about the future trajectory of tariff rates, two simulation scenarios were developed (table A.III.1).

The simulations presented in this technical annex provide some insights into the potential medium-term impacts of the additional tariff measures, defined as effects that could materialize within one to four years of their implementation, assuming the measures remain in place over that period.

Figure A.III.1 displays preliminary simulation results, focusing on the estimated impacts of the additional tariffs on total real seaborne exports (seaborne exports to the world, adjusted for price changes) from selected economies and groups. World seaborne trade is simulated to decline by 6 to 10 per cent, depending on the scenario.^{9,10} The estimated reduction under the escalation scenario (S2) is approximately twice as large as that under the first scenario (S1), reflecting the widespread use of reaction tariffs by multiple countries.

The negative impact on seaborne trade would be slightly more marked than the overall impact on total trade (all transport modes combined). This is because the modelled contraction stems largely from reduced exports to the United States market. These exports, including those of major exporters such as China, are predominantly seaborne. The simulation suggests that these economies could attempt to offset such losses by redirecting exports to other markets, involving both maritime and non-maritime transportation.

Notably, developing economies are projected to experience more significant reductions in seaborne exports compared to developed economies (excluding the United States) under both scenarios.

⁸ Given that one key data source, version 11 of the Global Trade Analysis Project (GTAP) Data Base (Aguilar et al., 2023), covers data up to 2017, baseline data inputs to the model are benchmarked to that year.

⁹ The simulation results represent projected changes in seaborne trade from levels that would be expected in the absence of the additional tariffs. These changes are calculated directly by using the widely recognized "exact-hat algebra" methodology.

¹⁰ This result is broadly consistent with other simulation studies by IMF (2025) and Conteduca, Mancini and Borin (2025). The IMF study projected a global trade decline ranging from 3.1 to 5.1 per cent depending on the model used. Similarly, Conteduca, Mancini and Borin (2025) estimated a decline between 5.5 and 8.5 per cent depending on the scenario. Furthermore, a WTO (2025) simulation estimated a 3.5 per cent short-term decline in global trade from reciprocal tariffs, a figure derived by reducing trade's responsiveness to trade cost changes by 40 per cent from long-term elasticities. If adjusted to reflect long-term effects, the WTO's findings are also broadly consistent with the analysis in this report. It is important to note a key methodological distinction: The aforementioned studies analysed impacts on total trade (all transport modes combined) whereas the simulation in this report focuses specifically on seaborne trade. This likely accounts for the slightly more significant impacts estimated in this report.





Table A.III.1
Simulation scenarios for additional tariffs

Additional tariff scenario (S1)	Escalation scenario (S2)
• 10 per cent tariff on all goods^a imported by the United States from all countries • All country-specific reciprocal tariffs^a by the United States, announced on 2 April 2025, amended on 31 July and implemented on 7 August^b • Higher tariffs on Canada, China and Mexico by the United States^c • 50 per cent tariff on steel, aluminium and copper products, and 25 per cent tariff on automobiles and automobile parts imported by the United States from all countries^d • 25 and 10 per cent reaction tariffs by Canada and China, respectively, on goods from the United States^e	• All measures in S1 • 34 per cent country-specific reciprocal tariff by the United States on all goods^a from China (total additional tariff rates are 54 per cent)^b • 25 per cent additional tariff by the United States on all goods from India (total additional tariff rates are 50 per cent)^f • 200 per cent tariff on pharmaceuticals and 25 per cent on lumber products^g imported by the United States from all countries • Reaction tariffs by all countries to the United States, at the same tariff rates imposed by the United States

Source: Compiled by UNCTAD, based on information as of 7 August 2025: United States of America, The White House, 2025a–i; United States of America, Department of Commerce, 2025a–e; United States of America, Department of Homeland Security 2025a and 2025b; Canada, Department of Finance, 2025a, 2025b and 2025c; European Union, 2025; Trade Compliance Resource Hub, 2025; and Baker McKenzie, 2025.

Note: ^a Several goods are exempt, including pharmaceuticals, semiconductors, certain critical minerals, and energy and energy products.

^b A country-specific reciprocal tariff on China (34 per cent) is included only in the S2 scenario because it was paused until 10 November 2025 (as of 7 August 2025).

^c For Canada and Mexico, goods compliant under the United States-Mexico-Canada Agreement (USMCA) are exempt from additional tariffs. USMCA-compliance rates were about 50 per cent both in Mexico in 2024 (Graham, 2025) and Canada in March 2025 (Janzen, 2025).

^d For USMCA-compliant automobiles, additional tariffs are applied to non-United States content. USMCA-compliant automobile parts are initially exempt.

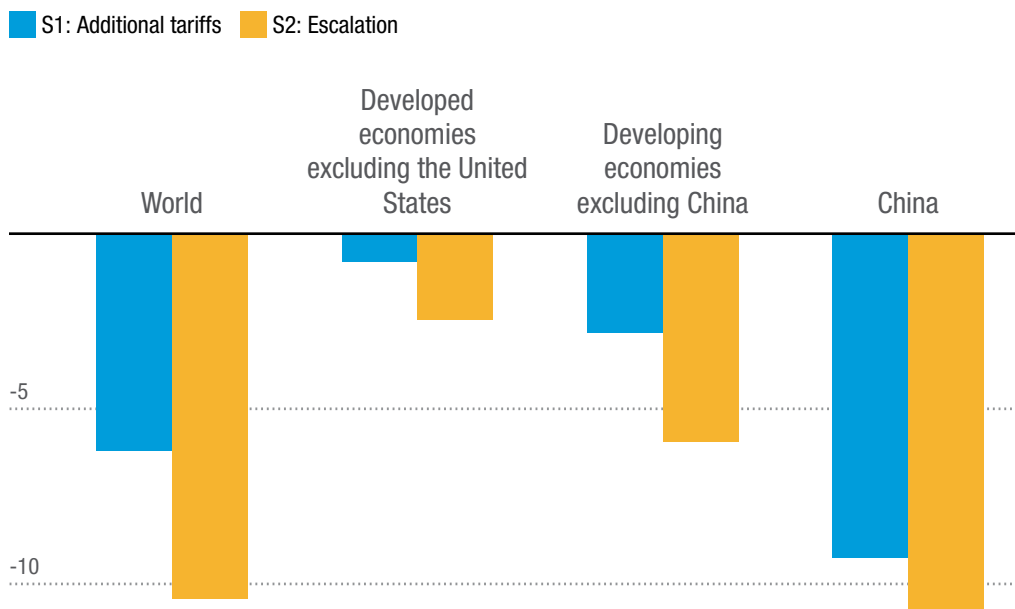
^e Canada's reaction tariffs are imposed on selected goods. For USMCA-compliant fully assembled vehicles, Canada's reaction tariffs are applied to the non-Canadian and non-Mexican content.

^f The additional 25 per cent tariff on India was scheduled to be implemented on 27 August 2025 (as of 7 August).

^g As of 7 August 2025, these commodities are under investigation by the United States under Section 232 of the Trade Expansion Act of 1962 (United States of America, Department of Commerce, 2025c and 2025d). Some other goods are also under investigation, including certain critical minerals and semiconductors (United States of America, Department of Commerce, 2025e). But their tariff increases are not included in the scenario as these types of goods are too granular compared to the industrial classification of the trade model.



Figure A.III.1
Estimated changes in total real seaborne exports due to additional tariffs
(Percentage)



Source: UNCTAD calculations, based on the UNCTAD World Seaborne Trade Database (unpublished granular version), version 11 of the GTAP Data Base (Aguiar et al., 2023) and a new quantitative trade model developed by UNCTAD.

Note: See table A.III.1 for tariff scenario details and technical annex 2 for more on the simulations.



2. Methodology to simulate the impacts of additional tariff measures on seaborne trade

The preliminary simulations presented here were carried out using input data from the UNCTAD World Seaborne Trade Database (UNCTAD, 2025b) and a new UNCTAD quantitative trade model that incorporates transport mode choices.

1. New quantitative trade model incorporating seaborne trade

The new quantitative trade model is based on a widely used trade model, the Eaton-Kortum model (Eaton and Kortum, 2002), and its multisector extension, the Caliendo-Parro model (Caliendo and Parro, 2015). UNCTAD added transport mode choice to the model to separate maritime and non-maritime transport modes in international trade. This enables the simulation of impacts on seaborne trade as well as the simulation of impacts from changes in maritime transport costs. A key difference in the UNCTAD model is that the formula for the bilateral trade share (i.e., the gravity equation) involves transport costs for each transport mode:

$$\lambda_{ij}^s = \frac{T_i^s \left[c_i^s \tau_{ij}^s \left(\sum_t T_{ij}^{st} \tau_{ij}^{st} \right)^{-\frac{1}{\theta^s}} \right]^{-\theta^s}}{\sum_l T_l^s \left[c_l^s \tau_{ij}^s \left(\sum_t T_{lj}^{st} \tau_{lj}^{st} \right)^{-\frac{1}{\theta^s}} \right]^{-\theta^s}}$$

where λ_{ij}^s is the share in sector s of expenditure in destination country j on goods from origin country i (i.e., $\sum_i \lambda_{ij}^s = 1$, for all j and s),^{11,12} T_i^s is the average production technology level in sector s in country i , θ^s is the inverse of the variability of production technology (i.e., lower values imply a stronger force of comparative advantage), c_i^s is the cost of an input bundle (i.e., the combination of labour and intermediate goods) in sector s in country i , τ_{ij}^s is trade costs (combining iceberg trade costs and tariffs but excluding transport costs) in ad valorem terms in sector s from country i to country j , T_{ij}^{st} is the average transport efficiency of transport mode t for transporting goods in sector s from country i to country j , $\bar{\theta}^s$ is the inverse of the variability of transport efficiency for transporting goods in sector s , and τ_{ij}^{st} is the transport costs of transport mode t for transporting goods in sector s from country i to country j .

If the average transport cost across all transport modes is defined as $\bar{\tau}_{ij}^s = \left(\sum_t T_{ij}^{st} \tau_{ij}^{st} \right)^{-\frac{1}{\bar{\theta}^s}}$ and the total trade cost is given by $\kappa_{ij}^s = \tau_{ij}^s \bar{\tau}_{ij}^s$ the formula for the bilateral trade share is identical to the Eaton-Kortum and Caliendo-Parro models (except for notational differences).

Furthermore, in the new seaborne trade model, the share of transport mode t in trade in sector s from country i to country j is given by:

$$\lambda_{ij}^{st} = \frac{T_{ij}^{st} \tau_{ij}^{st} \bar{\tau}_{ij}^{-\bar{\theta}^s}}{\sum_u T_{ij}^{su} \tau_{ij}^{su} \bar{\tau}_{ij}^{-\bar{\theta}^s}}$$

Note that $\sum_t \lambda_{ij}^{st} = 1$ for any combination of i, j, s .

¹¹ Note that λ_{jj}^s represents the country j 's domestic expenditure share in sector s .

¹² Sector s corresponds to an industry in input-output tables. In this report, there are 65 sectors because the analysis used version 11 of the GTAP Data Base. Note that sectors include both tradable and non-tradable sectors. For non-tradable sectors, all goods and services are supplied domestically: $\lambda_{jj}^s = 1$ and $\lambda_{ij}^s = 0$ for $i \neq j$, which implies that trade costs are infinity ($\tau_{ij}^s = \infty$ for $i \neq j$).



These new formulations enable two distinct types of analysis: first, quantifying the impacts stemming from changes in maritime transport costs, and second, isolating the specific effects of shocks (such as additional tariffs) on seaborne trade.¹³ Critically, this is accomplished without altering the model's outcomes for total trade (all transport modes combined), thereby preserving consistency with the Caliendo-Parro framework.

The simulations used “exact hat algebra”, a widely applied methodology for conducting counterfactual analyses in quantitative trade models, as in the Caliendo-Parro model.

2. Baseline data

Simulations based on the “exact hat algebra” of the new seaborne trade model require baseline data for bilateral trade shares (λ_{ij}^s), transport mode shares (λ_{ij}^{st}), trade deficits by country, tariff rates by bilateral country pair and sector, shares of intermediate consumption (i.e., shares of intermediate goods produced in sector k used in sector s in country j), share of value added in production by sector and country, value added by country and sectoral share of final demand by country. These data requirements are similar to those of the Caliendo-Parro model but transport mode shares are additionally required. The simulations also require estimates of productivity dispersion parameters θ^s and $\tilde{\theta}^s$.

Most baseline data, including baseline tariff rates, are drawn from version 11 of the GTAP Data Base (Aguilar et al., 2023). Transport mode shares (λ_{ij}^{st}), however, are obtained from unpublished granular version of the UNCTAD World Seaborne Trade Database (UNCTAD, 2025b). Given that the underlying data in the World Seaborne Trade Database are generally more detailed than those in the GTAP Data Base, the former are aggregated to align with the sectoral and regional classification used in the latter.¹⁴ As the most recent year covered by the GTAP Data Base is 2017, all data inputs to the model are benchmarked to that year.

Productivity dispersion parameter θ^s is sourced from the Caliendo-Parro model. As sectoral classification of the Caliendo-Parro model is broader than the GTAP sectors, the same numbers are used across several GTAP sectors considered to belong to the same sectoral classification of the Caliendo-Parro model. Furthermore, the parameter $\tilde{\theta}^s$ is assumed to be equal to θ^s .

3. Relative changes in trade costs in tariff simulation scenarios

To apply the “exact hat algebra” solution technique for the tariff simulations, the model requires the relative changes in trade costs, denoted as $\widehat{\tau}_{ij}^s$.

Trade costs, τ_{ij}^s , are modelled as a combination of iceberg trade costs (d_{ij}^s) and tariffs (t_{ij}^s), such that $\tau_{ij}^s = d_{ij}^s(1 + t_{ij}^s)$. The term t_{ij}^s represents the baseline tariff rate for goods from origin economy i to destination economy j in sector s . Assuming that iceberg trade costs (d_{ij}^s) remain constant between the baseline and the simulation scenarios, the relative change in trade costs ($\widehat{\tau}_{ij}^s$) is equivalent to the relative change in the tariff rate. This is derived as follows:

¹³ Additional tariffs would affect all transport modes uniformly at the sectoral and bilateral levels, implying no direct substitution between transport modes (i.e., modal shares, λ_{ij}^{st} , remain constant for each specific trade flow). However, modal shares can shift at an aggregated country level. These changes are not due to direct substitution but are a result of compositional effects, where the overall mix of traded goods sectors and partner countries is altered by the additional tariffs.

¹⁴ An exception is the treatment of Puerto Rico. In the World Seaborne Trade Database, Puerto Rico is included in the United States (i.e., the same treatment as in UN Comtrade), while the GTAP Data Base separates them. Therefore, for the simulations, Puerto Rico in the GTAP Data Base is added to the United States, and they are treated as one economy. Additionally, each of the following economy/region pairs are integrated into one region to ensure the convergence of model solutions: the rest of North America (such as Greenland) and the rest of the world (such as Antarctica), and the Czech Republic and the rest of the European Free Trade Association (Iceland and Liechtenstein).



$$\widehat{\tau}_{ij}^s \equiv \tau_{ij}^{s'}/\tau_{ij}^s = \frac{d_{ij}^s(1+t_{ij}^{s'})}{d_{ij}^s(1+t_{ij}^s)} = (1+t_{ij}^{s'})/(1+t_{ij}^s)$$

where $t_{ij}^{s'}$ is the new tariff rate under a given simulation scenario.

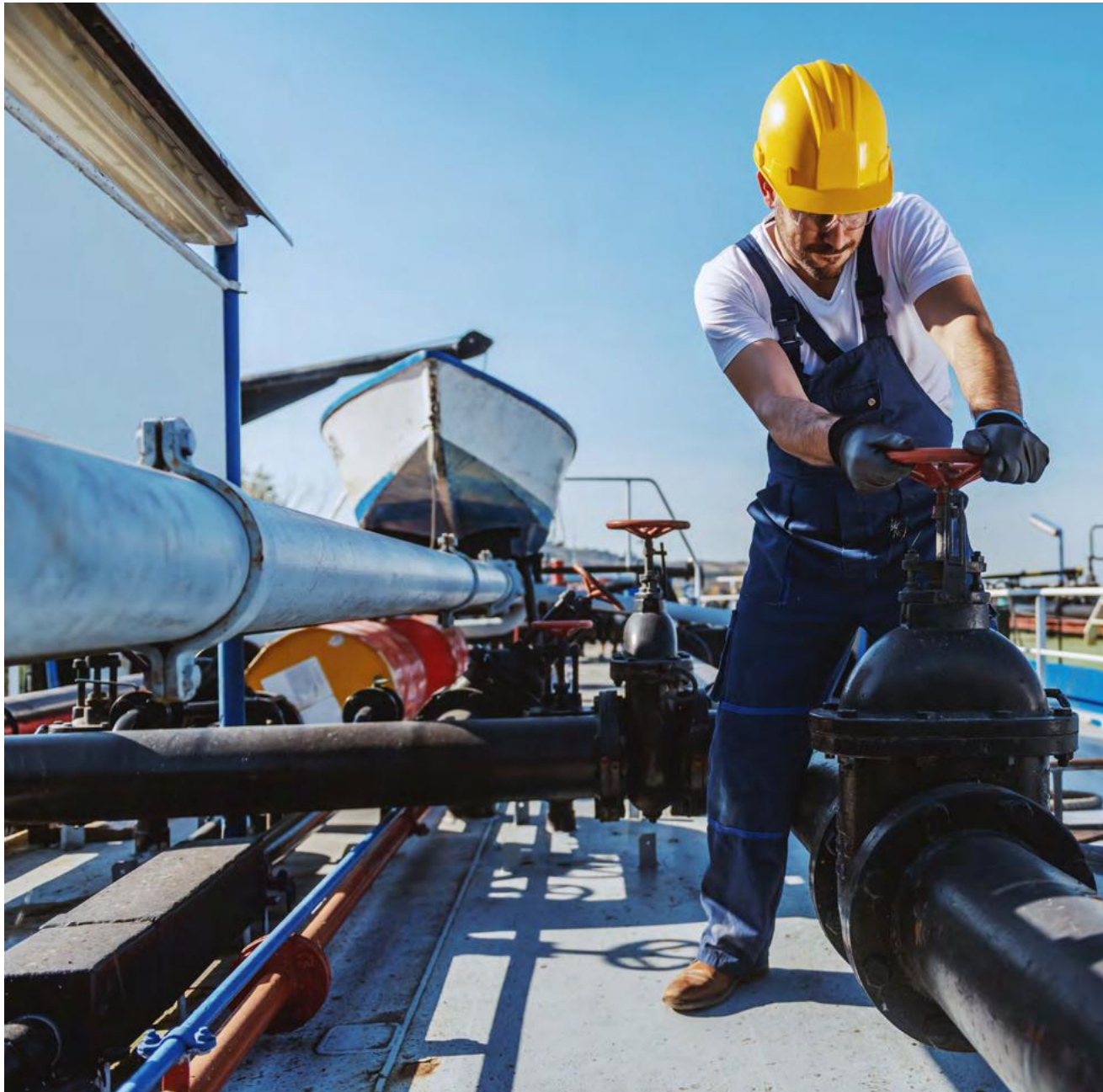
The new tariff rates ($t_{ij}^{s'}$) are calculated by adding the additional tariff rate (Δt_{ij}^s) to the baseline tariff (t_{ij}^s).¹⁵ Substituting this into the equation above gives the final formula used for the simulation:

$$\widehat{\tau}_{ij}^s = (1 + \Delta t_{ij}^s + t_{ij}^s)/(1 + t_{ij}^s)$$

For example, if a destination economy implements a 10 per cent additional tariff on all products from all economies, Δt_{ij}^s would be 0.1 for all origin economies (where $i \neq j$) and all sectors s .

The relative changes in trade costs, $\widehat{\tau}_{ij}^s$, were calculated using this formula for the two tariff simulation scenarios and served as the primary inputs for the “exact hat algebra” solution method.

¹⁵ Tariff rates under additional tariff scenarios (S1: additional tariff scenario, and S2: escalation scenario) are calculated by adding respective additional tariff rates (as summarized in table A.III.1) to the baseline tariff rates sourced from version 11 of the GTAP Data Base.



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