2 Containerships – the engines of globalization and trade

Seaborne transport plays an important role in world trade, accounting for more than 80% of the volume of merchandise traded between countries, and more than 70% of the total value of trade (UNCTAD, 2019).[2] In 2018, world merchandise trade[3] grew by 3.0 per cent, just above the 2.9 per cent increase in world GDP over the same period. It totaled some USD 19.7 trillion (WTO, 2019), more than USD 13.8 trillion of which is estimated to have been shipped by sea, in one of five basic types of vessels (UNCTAD, 2019 and Rushton, Croucher and Baker, 2017):

- Oil tankers, which are designed to carry large volumes of crude oil;
- Dry bulk carriers, which are designed to carry loose, dry commodities such as iron ore, coal and grain;
- General cargo ships, which are multi-purpose vessels designed to carry general cargo, including roll-on-roll-off vessels that are commonly used to transport vehicles;
- Container ships, which are designed to carry standard shipping containers that are capable of transporting a wide range of products;
- Other ships, which include specialized tankers designed to transport liquified oil and natural gases and parcel (chemical) tankers.

In terms of weight, the principal products transported by sea are bulk commodities, which tend to have relatively low weight unit values, such as iron ore, coal, crude oil and grain (Table 1). Higher value container freight, while accounting for about 16% of total tonnage, is estimated to account for about 60% of the total value of seaborne trade, or more than USD 8 trillion in 2018 (Scerra, 2020).

Table 2.1. Seaborne trade in 2018

Item	Volume (Millions of tonnes)	Percent of total
Minor bulk	2,028	17.2
Crude oil	1,992	16.8
Containers	1,875	15.8
Iron ore	1,455	12.3
Coal	1,292	10.9
Oil products	1,023	8.6
Grain	477	4.0
Gas	461	3.9
Chemicals	325	2.7
Other dry cargo	928	12.3

Source: Clarksons Research, 2020.

Containers – multimodal revolution

This report focuses on container ships, which have evolved in recent decades to become a powerful, cost effective, efficient means for moving a vast range of non-bulk commodities internationally. Other types of seaborne vessels seem to have little potential for carrying counterfeit products.

Before containerization, goods were usually handled manually as break bulk cargo. Typically, goods would be loaded onto a vehicle from the factory and taken to a port warehouse where they would be offloaded and stored awaiting the next vessel. When the vessel arrived, they would be moved to the side of the ship along with other cargo to be lowered or carried into the hold and packed by dockworkers. The ship might call at several other ports before off-loading a given consignment of cargo. Each port visit would slow the delivery of other cargo. Delivered cargo might then have been offloaded into another warehouse before being picked up and delivered to its destination. Multiple handling and delays made transport costly, time consuming and unreliable.

Over the decades, efforts focused on the creation of a standard shipping system that could speed up the processes and introduce time and costs efficiencies. Notable improvements include development in 1952 of the Transporter into the CONtainer EXpress or CONEX box system by the US Army. In 1955, a twist lock mechanism was introduced atop each of the four corners of a container. This mechanism allowed the container to be easily secured, piled in stacks, and lifted using cranes.

During the first 20 years of containerization, many container sizes and corner fittings were used. Consequently, there were numerous incompatible container systems. The standards that refer to sizes and fitting have evolved out of a series of discussion among main international shipping, railroad and trucking companies in Europe and the US. The standards were formalized in a set of ISO (International Organization for Standardization) recommendations, published in late 1960s and early 1970s. Specifically ISO standard 668 defines the dimensions, R-790 establishes identification markings, R-1161 relates to corner fittings and R-1897 defines minimum internal dimensions of containers. In addition, each container is allocated a standardized ISO 6346 reporting mark (ownership code), that is issued by the International Container Bureau (Bureau International des Containers B.I.C.).

Today, there are still many types and a number of standardized sizes, but a vast majority of the containers in global trade are "general purpose" containers, made of durable steel, designed to be carried on ships, rail or trucks. Container capacity is expressed in twenty-foot equivalent units (TEU). One TEU represents containerized cargo capacity equal to one standard 20-foot container.[4] Over time, the size of containers has grown; port operators indicate that most cargo is now shipped in 40-foot containers.

In the process, containers have become the universal means to ship a vast array of goods. This cargo can be easily handled, transported using various modes, and stored. Introduction of containers was in fact a revolutionary change for transport that offered new logistical possibilities, boosted efficiency and greatly reduced the overall cost of international trade (Levinson, 2016). Ironically, the technique was initially thought to represent a minor innovation, which was not suitable for moving most types of cargo, and not practical for long-haul international shipments from North America to Asia and Europe.

The backbone of globalization

Over time, the innovation revolutionized international trade, driving improvements in handling, storage and distribution techniques. Dedicated container ports have been developed worldwide, providing a platform for economies to enhance global operations. During the 2000-2018 period alone, container trade rose by more than three-fold, from 224.8 to 792.7 million TEUs, led by China's impressive growth (Table 2.2). On a regional basis, Asia accounted for almost two-thirds of container trade in 2018, followed distantly by Europe and North America (Table 2.3). The rise in container trade has been supported by marked growth in the size of dedicated ports: the largest in 1990 handled 5.2 million TEUs of cargo; in 2018, six ports handled more than 20 million TEUs, led by Shanghai's 42.0 million TEUs (Table 2.4).

Table 2.2. Container trade in 2000 and 2018, by economy (Millions of TEUs)

Economy	2000	2018	Percent change	Share of world total (Percent)	
				2000	2018
China	41.0	225.8	450.8	18.2	28.5
United States	28.3	54.7	93.2	12.6	6.9
Singapore	17.1	36.6	114.0	7.6	4.6
Korea	9.0	28.9	220.5	4.0	3.7
Malaysia	4.6	25.0	437.6	2.1	3.1
Japan	13.1	22.4	71.3	5.8	2.8
Hong Kong, China	22.6[1]	19.6	(13.1)	10.1	2.5
Germany	7.7	19.6	154.7	3.4	2.5
United Arab Emirates	5.1	19.1	276.9	2.2	2.4
Spain	5.8	17.2	196.9	2.6	2.2
India	2.5	16.4	568.5	1.1	2.1
Viet Nam	1.2	16.4	1,276.2	0.5	2.1
Netherlands	6.4	14.8	131.4	2.9	1.9
Indonesia	3.8	12.9	238.4	1.7	1.6
Belgium	5.1	12.7	150.8	2.3	1.6
United Kingdom	6.4	11.7	81.8	2.9	1.5
Thailand	3.2	11.2	251.9	1.4	1.4
Italy	6.9	10.5	52.4	3.1	1.3
Brazil	2.4	10.3	327.4	1.1	1.3
Turkey	1.6	9.9	524.7	0.7	1.3
Australia	3.5	8.7	146.9	1.6	1.1
Saudi Arabia	1.5	8.7	476.9	0.7	1.1
Philippines	3.0	8.6	184.9	1.3	1.1
Sri Lanka	1.7	7.0	304.0	0.8	0.9
Mexico	1.3	7.0	430.5	0.6	0.9
Panama	2.4	6.9	190.0	1.1	0.9
Canada	2.9	6.7	127.6	1.3	0.8
France	2.9	6.4	117.9	1.3	0.8
Russian Federation	0.3	6.3	1,903.1	0.1	0.8
Egypt	1.6	6.2	278.4	0.7	0.8
Other	9.7	124.5	1,179.4	4.3	15.7
World	224.8	792.7	252.6	100.0	100.0

1 Data are for 2005.
Note: Aggregated container port traffic by economy.
Source: World Bank, 2020.

Table 2.3. World container throughput, by region, 2018 (Millions of TEUs)

Region	Volume of trade	Percent of total
Asia	510.5	64.4
Europe	125.9	15.9
North America	61.4	7.7
Latin America and Caribbean	51.7	6.5
Africa	30.9	3.9
Oceana	12.9	1.6
World total	793.3	100.0

Source: UNCTAD, 2019.

Table 2.4. World's largest container ports in 2018, and their size in 1990, (Millions of TEUs)

Port	Economy	1990	2018
Shanghai	China	0.5	42.0
Singapore	Singapore	5.2	36.6
Ningbo-Zhoushan	China	0.0	26.4
Shenzhen	China	0.0	25.7
Guangzhou	China	0.1	21.9
Busan	Korea	2.3	21.7
Hong Kong	Hong Kong, China	5.1	19.6
Qingdao	China	0.1	19.3
Tianjin	China	0.3	16.0
Jebel Ali	United Arab Emirates	1.1	15.0
Rotterdam	Netherlands	3.7	14.5
Port Klang	Malaysia	0.5	12.3
Antwerp	Belgium	1.6	11.1
Xiamen	China	0.0	10.7
Kaohsiung	Chinese Taipei	3.5	10.5
Dalian	China	0.0	9.8
Los Angeles	United States	2.6	9.5
Tanjung Pelepas	Malaysia	0.0	9.0
Hamburg	Germany	2.0	8.8
Keihin ports	Japan	1.5	8.1
Long Beach	United States	(1)	8.1
Laem Chabang	Thailand	(1)	8.1
Tanjung Priok	Indonesia	(1)	7.8
New York and New Jersey	United States	(1)	7.2
Colombo	Sri Lanka	(1)	7.1

1 Not available.
Sources: Journal of Commerce Staff, 2019 and Levinson, 2016.

In addition to the above indicators, the relative importance of countries in maritime container transport can be examined using a liner connectivity index development by UNCTAD (presented in the next table).

The index shows that China enhanced its leadership in connectivity during 2006-20, with its index rising by 52% during this period (Table 2.5). Singapore, Korea and Malaysia also strengthened their positions significantly, rising to the second, third and four positions, respectively, as the United States and several European countries slipped in the overall ranking.

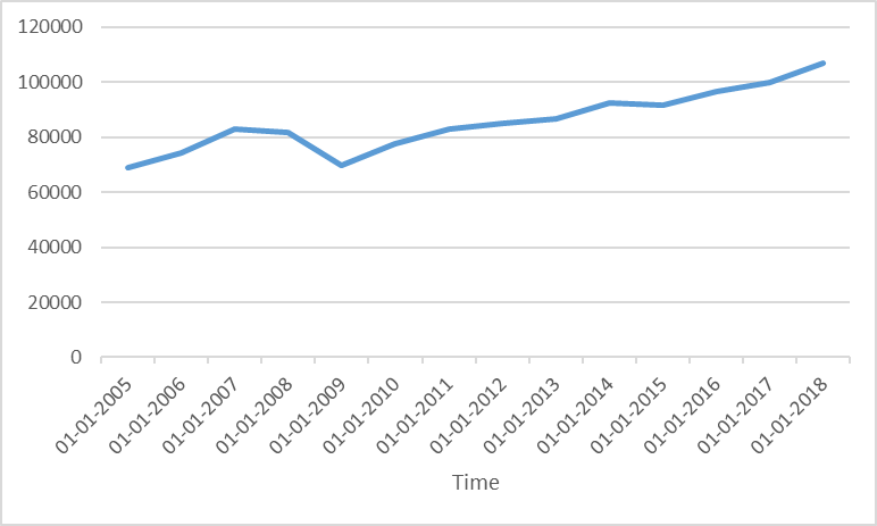
Table 2.5. Liner shipping connectivity index in 2006 and 2019[1]

Economy	2006	2019	Percent change
China	100	152	52
Singapore	80	108	35
Korea	68	105	54
Malaysia	65	94	45
United States	83	90	9
Hong Kong, China	84	89	7
Belgium	76	88	16
Netherlands	73	88	21
United Kingdom	79	85	7
Spain	70	84	20
Germany	77	83	7
Chinese Taipei	60	79	31
Italy	60	73	20
France	58	73	25
United Arab Emirates	49	71	46
Japan	75	71	-6
Egypt	47	67	43
Viet Nam	21	67	213
Saudi Arabia	41	63	53
Sri Lanka	34	62	83
Greece	33	61	86
Morocco	12	58	383
Turkey	31	57	88
India	41	56	36
Thailand	38	53	40

1 The index uses China, the most connected country, as the basis for comparison, setting its 2006 performance at 100.
Source: UNCTAD, 2020.

Ports in the EU have also reported strong growth rates over the past years. Except for the brief period related to financial crisis. European ports registered steady growth exceeding 50% over this period. Figure 2.1 illustrates the raising volume of containers handled in the European Union ports between 2005 and 2018.

Figure 2.1 The volume of containers (thousand of TEUs) handled in the European Union ports between 2005 and 2018



Note: Data source: Eurostat table *mar_mg_am_cvh*- Country level volume (in TEUs) of containers handed in main ports by loading status.
Source: Eurostat.

Industry structure

The container industry has flourished, as ports have been modified to accommodate increasingly large vessels. In 2001, container ships by and large did not carry more than 3,000 containers (Levinson, 2016). During the ensuing decades, container ships became the workhorse for transporting consumer goods (ITF, 2015). In 2010 the largest container ships had a capacity of 13,800 TEUs (Sand, 2020). By 2019, the largest ships had capacities of 23,700 TEUs. Upscaling vessels was attractive to ship-owners in the past, as the cost per box of shipping 10,000 containers was one-half that of shipping 3,000 containers (Levinson, 2020). The economics of container shipping are attractive, as shipping times and costs are advantageous. A container loaded onto a ship in Asia, can arrive in Los Angeles in 23 days; inland rail transportation to Chicago, and then truck transport to Cincinnati, could take an additional 5 days. The cost of the 28-day voyage could be lower than a single business class airline ticket. Whether vessel size will continue to grow remains to be seen, as the cost savings that can be achieved are slowing and significant investment may have to be made by ports to accommodate larger vessels; the point has been reached where societal costs of larger ships are exceeding the private benefits to shipping companies of larger ships (ITF, 2015).

Container freight has also benefited from a number of logistic advantages (Levinson, 2016). The time required to load a large container vessel is a fraction of the time required to load older conventional ships. Reduced storage time and quicker handling has resulted in shorter shipping times from manufacturer to final customer, and enhanced just-in-time manufacturing, which, in turn, has reduced inventory costs. For manufacturers, container shipping was key to supporting growth in global supply chains, thereby resulting in significant increases in trade in intermediate, component products that manufacturers use to make finished goods. Retailers have also benefitted from the higher efficiency of using container shipping, resulting in billions of dollars in cost savings. Moreover, container transport has resulted in spillover cost savings for shippers: packing containers at factories has reduced the need for special packaging to protect cargos from damage or theft; moreover, with containers serving in effect as mobile warehouses, traditional storage costs associated with shipping, have declined. Lower theft had implications for insurance costs, which fell by up to 30%. At the same time, increased vessel size has had an upward effect on shippers' storage costs and insurance costs (ITF, 2015).

While Asia predominates with respect to container trade volumes, the industry itself is more diverse, with APM-Maersk, a company headquartered in Denmark, commanding the top spot with respect to the number of ships being managed, and the share of world capacity. As shown in Table 6, the industry is highly concentrated, with the top 10 firms accounting for 81.2% of capacity in July 2020, and the top 5 accounting for 63.1 %. Consolidation has been occurring in the industry for a number of years. As recently as 2014, the top 10 firms accounted for some 68% of total capacity (ITF, 2018a). Container shipping firms are active in three global alliances that control the large majority of the most important East-West routes, constituting market power with both oligopolistic and oligopsonistic characteristic. In addition, the largest container shipping companies have formed dozens of vessel sharing agreements with each other on many other trade lanes (ITF, 2019b).

Table 2.6. Top 20 container companies, as of 7 July 2020

Company	Country(ies)/economy(ies) of headquarters	Number of ships	Capacity (in TEU)	
			Total (thousand TEU)	Market share (%)
APM-Maersk	Denmark	685	4 090	17.1
Mediterranean Shg Co	Switzerland, Italy	573	3 820	15.9
COSCO Group	China	494	3 001	12.5
CMA CGM Group	France	534	2 847	11.9
Hapag-Lloyd	Germany	234	1 706	7.1
ONE (Ocean Network Express)	Japan	213	1 552	6.5
Evergreen Line	Chinese Taipei	200	1 291	5.4
HMM Co Ltd	Korea	69	686	2.9
Yang Ming Marine Transport Corp.	Chinese Taipei	92	614	2.6
PIL (Pacific Int. Line)	Singapore	105	332	1.4
Zim	Israel	65	306	1.3
Wan Hai Lines	Chinese Taipei	105	292	1.2
Zhonggu Logistics Corp.	China	115	168	0.7
KMTC	Korea	69	168	0.7
IRISL Group	Iran	47	151	0.6
Antong Holdings (QASC)	China	110	141	0.6
SITC	Hong Kong, China	88	129	0.5
UniFeeder	Denmark	73	110	0.5
X-Press Feeders Group	Singapore	75	106	0.4
TS Lines	Hong Kong, China	44	97	0.4

Source: Alphaliner (2020), Alphaliner Top 100, https://alphaliner.axsmarine.com/PublicTop100/ (accessed on 10 September 2020)

Container companies are seeking to enhance operations by expanding digitization (ITF, 2018b). As noted above, consolidation in the industry is also taking place, as are efforts to expand vertical integration. Many container shipping companies also operate port terminals and logistics operations; the share of carrier-controlled has increased to 35% of all global terminal operations (ITF 2018a). The vertical integration also covers inland logistics, which is a marked departure from previous efforts that relied on outsourcing. Maersk and COSCO, for example, have plans to expand activities to include inland terminals, warehouses and customs brokerage. It has been estimated that up to 80% of Maersk's earnings are tied directly to container shipping, and that the company's plan is to reduce this to 50% in the next few years[5] (UNCTAD, 2019).

Market developments

Volumes of seaborne trade increased annually during 2013 to 2019, with a slight decline expected in 2020 (Table 2.7) (Clarksons Research, 2020). During the period, container trade increased by 27.2% while other modes increased by 15.5%. In 2018 and 2019, the market situation was mixed as weaking trade growth, combined with the delivery of new mega ships, put downward pressure on freight rates in the early months; capacity increased by 6 percent during the year, compared to a 2.6% increase in trade volumes (UNCTAD, 2019). Much of the container trade volume in these two years was carried out on Asia-Europe, Trans-Pacific and Transatlantic routes, with some 60% nevertheless occurring on other, non-mainline routes involving developing countries.

Table 2.7. World seaborne trade, 2013-19, (Millions of tonnes)

Item	2013	2014	2015	2016	2017	2018	2019
Container	1,474	1,557	1,592	1,667	1,763	1,839	1,875
Other modes	8,641	8,932	9,125	9,375	9,734	9,967	9,981
Total	10,115	10,489	10,717	11,042	11,497	11,806	11,856

Source: Clarksons Research, 2020.

The effects of containerization

Containerization greatly reduced the expense of international trade and increased its speed, especially of consumer goods and commodities. It also dramatically changed the character of port cities worldwide. Prior to highly mechanized container transfers, crews of 20–22 dock workers would pack individual cargoes into the hold of a ship. After containerization, large crews of dock workers were no longer necessary at port facilities, and the work force changed drastically.

Containerization does not only refer to the shipping industry, as containers are widely used by trucking and rail transport industries for cargo transport not involving sea transport. Manufacturing also evolved to adapt to take advantage of containers. Companies that once sent small consignments began grouping them into containers. Many cargoes are now designed to fit precisely into containers. The reliability of containers also made just in time manufacturing possible as component suppliers could deliver specific components on regular fixed schedules, although in practice, 50% of the container ships in September 2020 arrived one or more days later than scheduled.

Meanwhile, the port facilities needed to support containerization changed. One effect was the decline of some ports and the rise of others. At the Port of San Francisco, the former piers used for loading and unloading were no longer required, but there was little room to build the vast holding lots needed for container transport. As a result, the Port of San Francisco virtually ceased to function as a major commercial port, but the neighboring port of Oakland emerged as the second largest on the US West Coast. A similar fate met the ports of Manhattan and New Jersey. In the United Kingdom, the Port of London and Port of Liverpool declined in importance. Meanwhile, Britain's Port of Felixstowe and Port of Rotterdam in the Netherlands emerged as major ports. In general, inland ports on waterways incapable of deep-draft ship traffic also declined from containerization in favor of seaports. With intermodal containers, the job of sorting and packing containers could be performed far from the point of embarkation.

Improved cargo security is also an important benefit of containerization. Once the cargo is loaded into a container, it stays there until it reaches its destination. Cargo is securely locked in the container and the doors of the containers are usually sealed. Consequently, cargo is less likely to be stolen or damaged. Recent developments have focused on the use of intelligent logistics optimization to further enhance security (Levinson, 2016).

Risk and Security issues

While the use of containers has enhanced security, limiting opportunities for theft and damage, concerns have been raised over the potential use of containers to facilitate illicit trade. Smugglers have found appealing the ease and low risk of stowing not only counterfeit products, but also drugs and undocumented migrants in the containers. Today smugglers tend to misuse containerized maritime transport in various ways (Box 2.1). Further advantages to smugglers have included the high reliability of container shipping and the anonymity this type of shipping offers.

Box 2.1. Counterfeit trade deception techniques

As mentioned earlier, counterfeiters can use a variety of techniques to avoid detection when shipping products to foreign destinations in container ships. The techniques are adapted to best suit the nature and value of the products involved.

One popular technique involves document falsification. In December 2019, for example, an operation involving the smuggling of counterfeit products from China through the ports of New York and New Jersey was broken up. The operation involved 22 containers of counterfeit sneakers which would have sold for USD 472 million, if they had been genuine. The ship manifests bore false information, describing the merchandise as ventilation fans, vases and plastic hangers. Moreover, the container importers falsely used the identities of legitimate import companies on customs forms, in order to deceive customs brokers and customs officials. While the names of the import companies were legitimate, the phone numbers and email addresses provided were those of the counterfeit importers, who used burner phones and email accounts obtained using false identifiers to conceal their operations. Once cleared by customs, the containers holding counterfeit items were shipped to self-storage facilities, where their contents were broken down, for sale and delivery to wholesalers and retailers. Analysis of customs declarations linked 107 other container shipments to the counterfeit importers, suggesting that a significant volume of counterfeit trade likely passed through the US border undetected.

Another technique involves the physical manipulation of products with a view towards deceiving detection. In 2018, for example, US authorities broke up a New York-based counterfeiting ring which allegedly smuggled nearly 400 000 pairs of counterfeit Air Jordans into the country, potentially costing Nike more than USD 70 million in lost revenue (Rohrlich, 2020). In October 2019, federal agents arrested an individual who purportedly shipped more than USD 5 million worth of fake Timberland and Ugg boots from China into the New York area. In the case of the Air Jordans, the counterfeits were manufactured without any identifying marks; fake logos were added once the shoes cleared customs (Ferrill and Liu, 2020). In the case of the Timberland footwear, counterfeiters attempted to avoid detection by gluing a shoe insert over a fake Timberland logo on the bottom of the boots.

Finally, in some instances, smugglers attempt to avoid detection by concealing illicit goods in a bigger consignment of legitimate items. Not only counterfeiters use this technique. In July 2020, for example, Italian police announced the seizure of 14-tons of the amphetamine drug Captagon made by the Daesh terrorist group in Syria; the USD 1.1 billion seizure was one of the biggest of such drugs in the world (French Press Agency – AFP, 2020). Some 84 million tablets, an amount sufficient to supply the entire European market, were concealed inside industrial goods within containers. Police were required to use chainsaws to cut open the industrial rolling stock and metal gearwheels that the pills were concealed in.

Moreover, customs officials have limited ability to adequately monitor and inspect thousands or more containers that might enter a port on a single ship. With a very large number of containers, and extremely efficient procedures resulting in short turnovers, it becomes in some instances difficult to locate specific containers for further investigation.

In addition, existing enforcement processes rely on a limited number of available techniques and procedures. In fact, available inspection methods that can be applied to screen containers for counterfeits include:

- risk profiling,
- nonintrusive imaging, and
- physical searches.

Importantly, risk profiling and screening are just preliminary checks to determine whether a container needs to be physically inspected or not. The physical search is the only way of effective determining if a container is misused for smuggling of counterfeits.

Risk profiling is based on cargo documents presented in advance to enforcement authorities. Unfortunately, the volume and quality of information presented in these documents is limited, and in many cases can be unreliable. In addition, traffickers are well aware of potential ways of preparing documents in ways that would improve their chances of being highlighted in risk profiling operations, thereby lowering the risk of inspection. This includes for example use of intermediary transit points, in particular free trade zones.

Moreover, the ease of falsifying manifests largely impedes the efficiency of risk profiling of enforcement officials. As noted in the following chapter, key information is still shipped in unsecured way, and there is little progress in adopting modern technologies to address this issue (see Box 3.1. in the following Chapter).

One method for screening imports involved nonintrusive imaging machines, which are used for preselecting of containers for physical searches. These machines use either X-rays or gamma rays to penetrate the container. They provide customs officers with images of the content of a container, which then could lead to a physical inspection. Nonintrusive imaging is very quick and does not require very time-consuming and labor-intensive process of unpacking containers. Unfortunately, the equipment used is expensive, as are operating and maintaining costs (CBO, 2016). Consequently, nonintrusive imaging is not applied widely. Interviews with enforcement official reveal that even in those EU ports where such facilities are the most frequently used, only up to 10% of incoming containers to the EU are scanned. Following these scans, up to 2% of incoming containers are physically searched.

However, as the external features of counterfeit goods barely differ from their legitimate counterparts, scanning of containers is not as effective in detecting counterfeit goods as other types of illegal cargo, such as arms, narcotics or wildlife cargo. Physical searches are the only effective way of concluding if a container contains counterfeits. However, they are also numerous issues related to physical checks.

First, these searches are extremely labor intensive. Inspecting one container can take many hours and require specialized staff, with specialized training. Second, searches require dedicated facilities that are designed for those purposes. The logistics of customs inspection are difficult, as containers are hard to unload, and there is no easy way to inspect a container without unloading it fully.

Physical searches, however, are employed sparingly. Interviews with enforcement officials point that on average less than 2% of containers incoming to the EU are inspected. Importantly, raising of this share seems virtually impossible. A physical inspection of all containers that arrive on a single ship would require tens of thousands of customs inspectors at port (CBO, 2016).

The industry in 2020 (COVID-19)

Industry performance is also being affected by COVID-19, as containment policies have significantly affected the operation of vessels (Heiland and Ulltveit-Moe, 2020). By April 2020, many countries had tightened the rules governing the mobility of sailors arriving in ports. The policies have included restrictions on vessel and crews, such as prohibitions that have curtailed crew changes. With respect to the latter, crew changes are governed by work contracts and labour regulations. Typically, some 100,000 changes take place every month. As of April, some 120 out of 126 economies had implemented restrictions; in 92 countries, changes were prohibited, while in 28 countries such changes were subject to review and approval by authorities. Vessels have in some respects become floating quarantines, as entry into ports is often refused until crews are declared virus-free. The effects are greatest for trips shorter than 14 days, which is the typical quarantine period. In April, about one-third of voyages were 14 days, or longer.

As a result, maritime traffic has slowed. Satellite observation for ships sailing to destinations with restrictions have been down by almost 20% (Heiland and Ulltveit-Moe, 2020). Such disruptions in freight are affecting global supply chains, which have aggravated the challenges facing manufacturers.

Governments have responded by developing specific guidelines for maritime operations. For example, on 27 March 2020, the International Maritime Organization (IMO) provided a series of recommendations to assist governments in managing COVID-19 related issues (IMO, 2020). The 19 recommendations cover four areas:

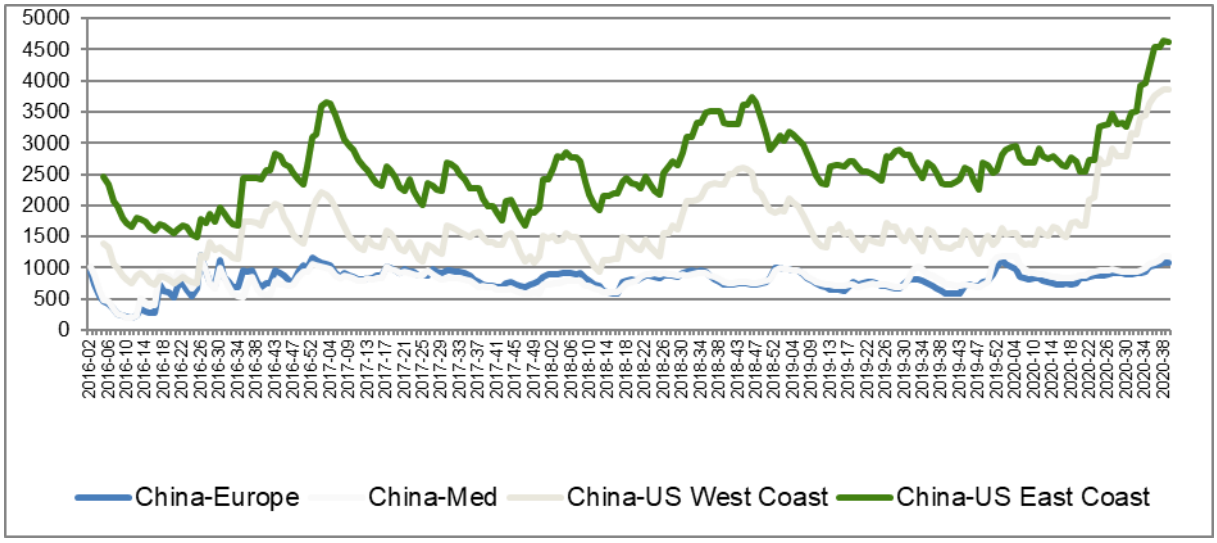
- *Providing access to berths.* Authorities are encouraged to ensure that vessels have access to berths and that the loading and unloading of cargos is not impeded.
- *Measures to ensure crews changes in ports.* Recommendations include i) designating maritime personnel as essential services and ii) providing such personnel with exemptions from national travel or movement restrictions in order to facilitate crew members from joining or leaving ships.
- *Measures to facilitate port (and related) operations*. Recommendations include i) designating port workers as key workers who provide essential services, ii) ensuring that port personnel have sufficient resources to clear and process cargos, ships and crews and iii) using electronic solutions to minimize risks posed by the interaction or exchange of documents.
- *Measures to ensure health protection in ports.* Recommendations include: i) requesting ships to report COVID-19 infections before arrival in ports; ii) limiting crew departures form ships to those related to crew changes and for medical attention not available on the ship; iii) limiting physical interaction between port and ship personnel and iv) providing seafarer with access to emergency medical services, when needed.

The IMO recommendations have been supplemented by countries, with additional guidelines. In the European Union, *Guidelines on protection of health, repatriation and travel arrangements for seafarers, passengers and other persons on board ships* were issued in a communication published in April 2020 (EC, 2020). In addition to general guidance, the communication covers i) repatriation issues, ii) crew changeovers, iii) designated ports for crew changes, iv) health protection measures and v) ship reporting requirements. Other jurisdictions have, similarly, provided guidance. In the United States, the Center for Disease Control, has provided specific recommendations for preventing the spread of COVID-19 during and after a voyage, including i) personal protective measures, ii) management of sick or exposed persons on board, iii) reporting suspected or confirmed cases and iv) cleaning and disinfection recommendations for common areas on the ship and areas previously occupied by individuals with suspected or confirmed COVID-19 cases (CDC, 2020). In addition, the US Coast Guard has released a series of marine safety information bulletins that provide COVID-19 guidance for the shipping industry.[6]

The Covid-19 crisis has also seen the emergence of “shadow subsidies” in container shipping, that is: transfers from consumers to producers that result from constraints on competition contained in shipping regulation. Confronted with reduction in demand for containerized trade, the main container carriers withdrew ship capacity by cancelling scheduled voyages, so called “blank sailings”. Between February and June 2020, approximately 20 to 30% of the container ship capacity on the main trade lanes was idled [7]. The artificially created scarcity pushed up the price to ship a container. Freight rates rose particularly strongly on the Trans-Pacific trade lane, but many other trade routes also saw significant increases despite the drop in containerised trade volumes (Figure 2.2).

As a result of these remarkable shifts in the freight rates, container carriers made large profits in the first half of 2020. The profit margin of ten main container carriers over the second quarter of 2020 was 8.5%, the highest since the third quarter of 2010, according to Alphaliner. [8]

Figure 2.2. Containerised ocean freight rates developments per week in selected trade lanes



Note: Shanghai Containerised Freight Index: spot rate (USD) to ship a container from Shanghai to North Europe, Med, US West Coast and US East Coast. Source: International Transport Forum based on data from Shanghai Shipping Exchange

These profits could be viewed as a shadow subsidy paid for by consumers. This shadow subsidy comes on top of state support in some cases: at least four of the main container carriers have also benefited from the Covid-19 aid for the shipping sector. This development raises concern for competition authorities. Chinese authorities have recently asked carriers for explanations and requested that they re-instate cancelled services on the Trans-Pacific trade lane. [9] In the United States, the Federal Maritime Commission has also announced to investigate the blank sailing strategy of carriers. [10] At the time of writing, the European Commission had not (yet) taken action. [11] (ITF, 2020b).

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