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Chapter 3

PRODUCTIVITY OF THE WORLD FLEET AND SUPPLY AND DEMAND IN WORLD SHIPPING

This chapter provides information on the operational productivity of the world fleet and an analysis of the balance between supply and demand for tonnage and container carrying capacity. Key indicators are the comparison of cargo generation and fleet ownership, tons of cargo carried and ton-miles performed per deadweight ton, and the analysis of tonnage oversupply in the main shipping market sectors. The thousands of ton-miles per dwt of oil tankers decreased from 34.2 in 2006 to 32.5 in 2007, while the corresponding figure for dry bulk carriers increased slightly from 28.8 to 29.5. The productivity of the residual fleet, including container and general cargo ships, decreased from 36 to 33.1. In 2007, containership operators have tended to reduce the service speeds of their vessels, thus saving fuel in response to high oil prices, albeit reducing the fleet's productivity.

A. OPERATIONAL PRODUCTIVITY

The main indicators of operational productivity for the world fleet in tons and ton-miles per deadweight ton (dwt) are shown in tables 22, 23 and 24 and illustrated in figures 13, 14 and 15.⁷¹ As the growth in the supply of the fleet (8.6 per cent) outstripped the growth in total seaborne trade (estimated at 4.8 per cent), in 2007 the tons of cargo carried per deadweight ton (dwt) decreased slightly compared to the 2006 figures. The global average of tons of cargo carried per dwt of cargo carrying capacity was 7.7; in other words, the average ship was fully loaded 7.7 times during the year. During the same year, the ton-miles performed per deadweight reached 31.6; thus, the average dwt of cargo carrying capacity transported one ton of cargo over a distance of 31,600 nautical miles (60,375 km) in 2007, i.e. 87 miles per day.

Table 23 provides data on the operational productivity in terms of cargo carried per dwt by type of vessel. Productivity in terms of tons carried per dwt for oil tankers decreased slightly, from 7.3 in 2006 to 7.0 in

2007, while that for dry bulk remained practically constant at 5.4 tons per dwt. The cargo volumes carried per dwt of the residual fleet also decreased, from 12.2 to 11.5 tons per dwt. Apart from short-term fluctuations, the productivity of the residual fleet, which increasingly includes containerships, has seen a long-term positive trend since 1970, while oil tankers and dry bulk carriers had a higher productivity in 1970 than today; compared to 1980, however, oil tankers and dry bulk carriers have also seen their productivity increase.

Indicative data on ton-miles performed by oil tankers, dry bulk carriers and the residual fleet are provided in table 24. The thousands of ton-miles per dwt of oil tankers decreased slightly, from 34.2 in 2006 to 32.5 in 2007, while the corresponding figure for dry bulk carriers increased, from 28.8 to 29.5. The productivity of the residual fleet measured in ton-miles per dwt also decreased slightly, from 36 to 33.1.

In 2007, ship operators, especially in liner shipping, tended to reduce the service speeds of their vessels, thus saving fuel in response to high oil prices. With lower

Table 22

Cargo carried and ton-miles performed per deadweight ton (dwt) of the total world fleet, selected years

Year	World fleet (million dwt, beginning of year)	Total cargo (million tons)	Total ton-miles performed (billions of ton-miles)	Tons carried per dwt	Thousands of ton-miles performed per dwt
1970	326	2 566	10 654	7.9	32.7
1980	683	3 704	16 777	5.4	24.6
1990	658	4 008	17 121	6.1	26.0
2000	799	5 983	23 693	7.5	29.7
2006	960	7 652	31 447	8.0	32.8
2007	1 042	8 022	32 932	7.7	31.6

Sources: Calculated by the UNCTAD secretariat on the basis of UNCTAD data on seaborne trade (tons); Lloyd's Register – Fairplay (world fleet in dwt) and Fearnleys *Review*, various issues (ton-miles).

Table 23

Estimated productivity of tankers, bulk carriers and the residual fleet,^a selected years
(Tons carried per dwt)

Year	Oil cargo (million tons)	Tanker fleet (million dwt, beginning of year)	Tons carried per dwt of tankers	Main dry bulks (million tons)	Dry bulk fleet (million dwt, beginning of year)	Tons carried per dwt of bulk carriers	All other dry cargoes (million tons)	Residual fleet ^a (million dwt, beginning of year)	Tons carried per dwt of the residual fleet ^a
1970	1 442	148	9.74	448	72	6.21	676	106	6.38
1980	1 871	339	5.51	796	186	4.29	1 037	158	6.57
1990	1 755	246	7.14	968	235	4.13	1 285	178	7.23
2000	2 163	282	7.66	1 288	276	4.67	2 532	240	10.53
2006	2 595	354	7.33	1 876	346	5.42	3 181	260	12.24
2007	2 681	383	7.00	1 997	368	5.43	3 344	292	11.46

Sources: Calculated by the UNCTAD secretariat on the basis of UNCTAD data on seaborne trade (tons); and Lloyd's Register – Fairplay (world fleet).

^a The residual fleet refers to general cargo, container and other vessels included in annex III(b).

Table 24

Estimated productivity of tankers, bulk carriers, and the residual fleet,^a selected years
(Thousands of ton-miles performed per dwt)

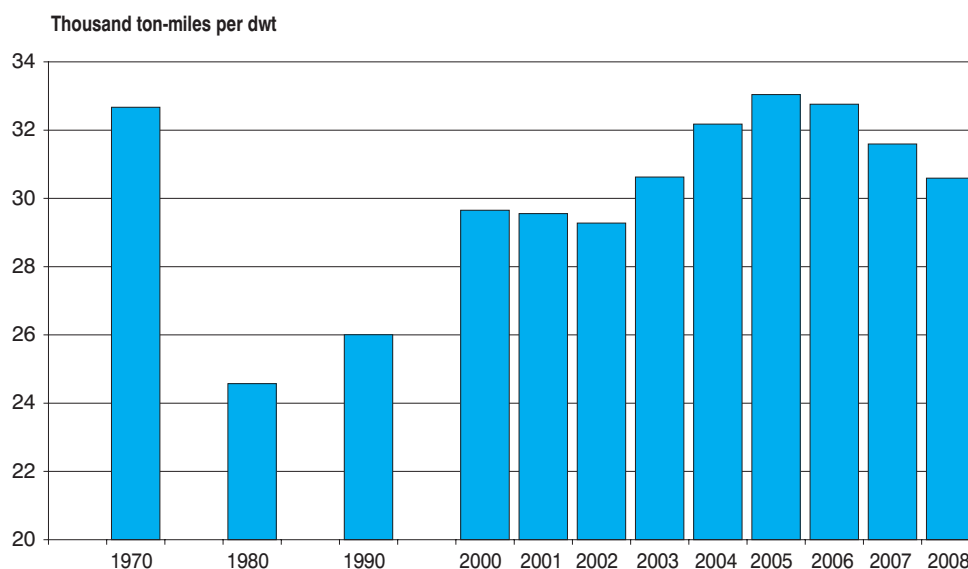
Year	Ton-miles of oil (billions)	Tanker fleet (beginning of year)	Ton-miles per dwt of tankers	Ton-miles of dry bulk cargo (billions)	Dry bulk fleet (beginning of year)	Ton-miles per dwt of bulk carriers	Ton-miles of other dry cargo (billions)	Residual fleet (beginning of year)	Ton-miles per dwt of the residual fleet
1970	6 487	148	43.83	2 049	72	28.42	2 118	106	19.98
1980	9 405	339	27.72	3 652	186	19.67	3 720	158	23.58
1990	7 821	246	31.80	5 259	235	22.41	4 041	178	22.73
2000	10 265	282	36.34	6 638	276	24.04	6 790	240	28.24
2006	12 130	354	34.24	9 976	346	28.84	9 341	260	35.95
2007	12 440	383	32.48	10 827	368	29.46	9 665	292	33.12

Sources: Calculated by the UNCTAD secretariat on the basis of data from Fearnleys *Review*, various issues; *World Bulk Trades* and *World Bulk Fleet*, various issues (ton-miles); and Lloyd's Register – Fairplay (world fleet).

^a The residual fleet refers to general cargo, container and other vessels included in annex III(b).

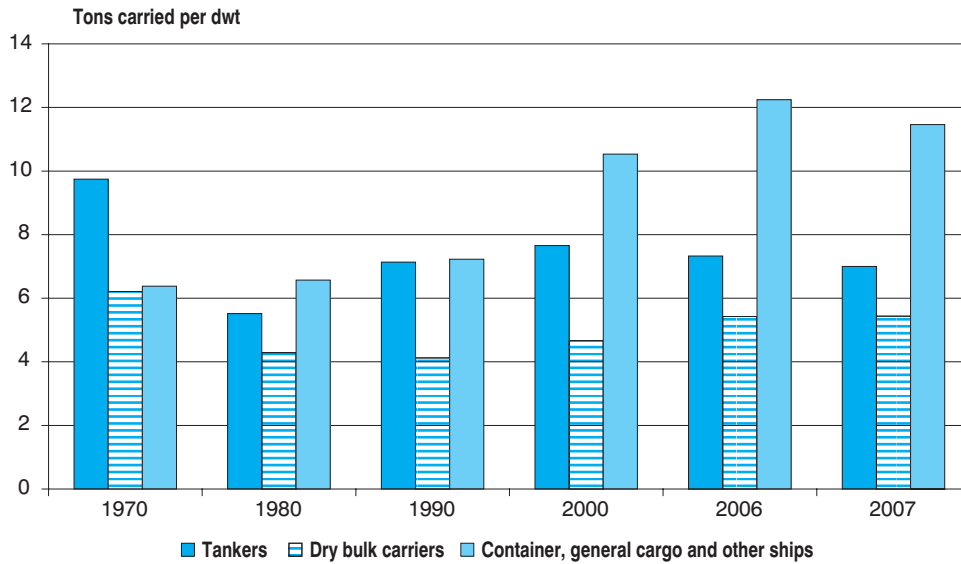
Figure 13

Ton-miles per deadweight ton (dwt) of the world fleet, selected years



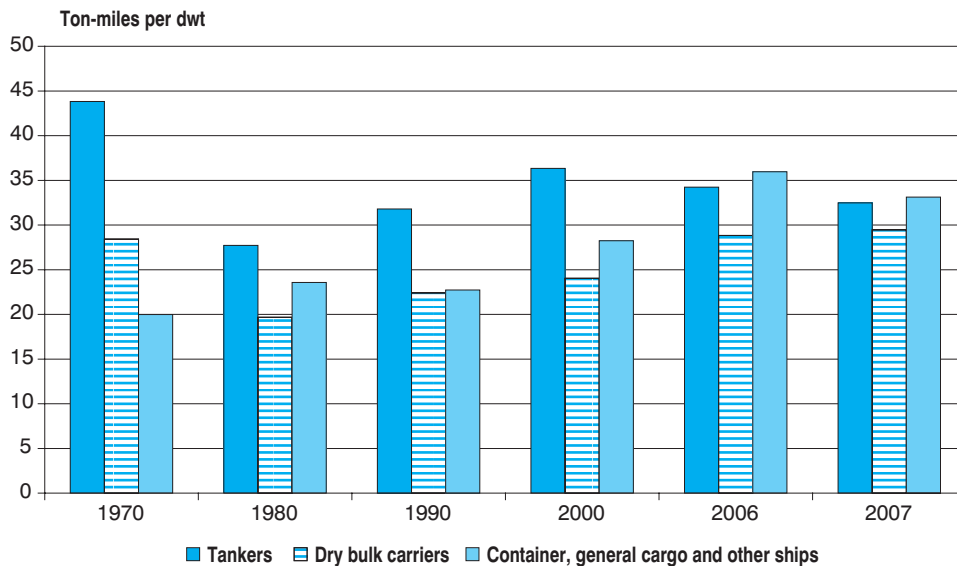
Source: UNCTAD calculations.

Figure 14
Tons carried per deadweight ton (dwt) of the world fleet, selected years



Sources: Calculated by the UNCTAD secretariat on the basis of UNCTAD data on seaborne trade (tons); and Lloyd's Register – Fairplay (world fleet).

Figure 15
Ton-miles per deadweight ton (dwt) of the world fleet, by vessel types, selected years



Sources: Calculated by the UNCTAD secretariat on the basis of data from Fearnleys *Review*, various issues; *World Bulk Trades* and *World Bulk Fleet*, various issues (ton-miles); and Lloyd's Register – Fairplay (world fleet).

Table 25
Tonnage oversupply in the world merchant fleet, selected years
(End of year figures)

	1990	2000	2004	2005	2006	2007
Million dwt						
World merchant fleet	658.4	808.4	895.8	960.0	1 042.3	1 117.8
Surplus tonnage ^a	63.7	18.4	6.2	7.2	10.1	12.1
Active fleet ^b	594.7	790.0	889.6	952.8	1 032.2	1 105.7
Percentages						
Surplus tonnage as percentage of world merchant fleet	9.7	2.3	0.7	0.7	1.0	1.1

Sources: Compiled by the UNCTAD secretariat on the basis of data supplied by Lloyd's Register – Fairplay and *Lloyd's Shipping Economist*, various issues.

^a Tankers and dry bulk carriers of 10,000 dwt and above, and conventional general cargo vessels of 5,000 dwt and above. Surplus tonnage is defined as tonnage that is not fully utilized because of slow steaming or lay-up status, or because it is lying idle for other reasons.

^b World fleet minus surplus tonnage.

Table 26
Analysis of tonnage surplus by main type of vessel, selected years ^a
(Millions of dwt)

	1990	2000	2004	2005	2006	2007
World tanker fleet	266.2	279.4	298.3	312.9	367.37	393.53
Total tanker fleet surplus	40.9	13.5	3.4	4.5	6.08	7.80
Share of surplus fleet in world tanker fleet (%)	15.4	4.8	1.1	1.4	1.66	1.98
World dry bulk fleet	228.7	247.7	325.1	340.0	361.81	393.45
Dry bulk fleet surplus	19.4	3.8	2.1	2.0	3.40	3.61
Share of surplus fleet in world dry bulk fleet (%)	8.2	1.5	0.6	0.6	0.94	0.92
World conventional general cargo fleet	63.6	59.3	43.6	45.0	44.68	43.75
Conventional general cargo fleet surplus	2.1	1.1	0.7	0.7	0.65	0.70
Share of surplus fleet in world conventional general cargo fleet (%)	3.3	1.8	1.6	1.6	1.44	1.60

Source: Compiled by the UNCTAD secretariat on the basis of data from *Lloyd's Shipping Economist*, various issues.

^a End of year figures, except for 1990 and 2000, which are annual averages. This table excludes tankers and dry bulk carriers of less than 10,000 dwt and conventional general cargo/unitized vessels of less than 5,000 dwt.

service speeds, more vessels are required on a given route, which helps to reduce overcapacity, while at the same time leading to a reduced productivity. Capacity constraints and congestion at ports also have a negative impact on the fleet's productivity, as ship capacity is tied up while queuing.

B. SUPPLY AND DEMAND IN WORLD SHIPPING

A summary of the balance of tonnage supply and demand for selected years appears in table 25. The surplus tonnage of oil tankers, dry bulk carriers and general cargo ships in 2007 stood at 12.1 million dwt, slightly above that of the previous year. The share of surplus tonnage as a percentage of the total world merchant fleet stood at 1.1 per cent.

Tonnage supply of large oil tankers (10,000 dwt and above) increased in 2007 by 26 million dwt to 394 million dwt as newbuildings delivered outweighed tonnage scrapped, laid up or lost (see table 26 and

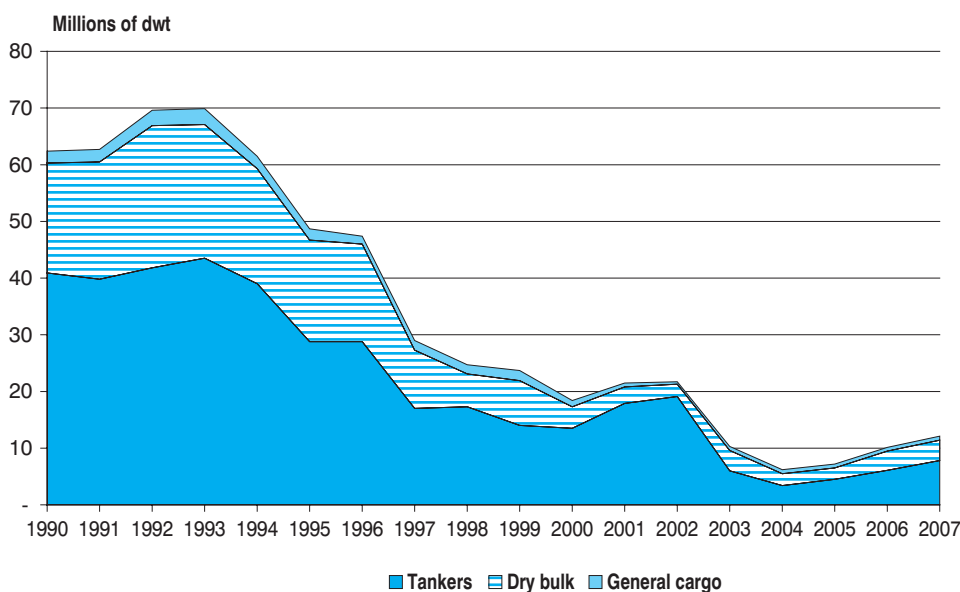
Ship operators, especially in liner shipping, reduced the service speeds of their vessels, thus saving fuel in response to high oil prices.

figure 16). Overcapacity in this sector increased somewhat, to 7.8 million dwt or 2 per cent of the total world tanker fleet. In 2007, the supply in the large dry bulk fleet increased by 32 million dwt to 393 million dwt. Surplus tonnage for this type of vessel was 3.6 million dwt, equivalent to 0.9 per cent of the dry bulk fleet. For the conventional general cargo fleet of vessels of 5,000 dwt and above, overcapacity stood at about the same level as the previous year, with supply exceeding demand by only 0.7 million dwt, or 1.6 per cent of the world fleet of this sector.

As regards the growth of supply and demand in container shipping, table 27 provides a comparison of the annual change of containerized trade (TEU) and the year-on-year growth of the container carrying capacity of the world fleet (TEU). In 2007, growth of the fleet outstripped growth of containerized trade. The increase of the fleet by 11.8 per cent was 1.8 percentage points higher than the 10 per cent growth in demand, leading to a downward pressure on container shipping freight rates.

Figure 16

Trends in surplus capacity by main vessel types, selected years



Source: Compiled by the UNCTAD secretariat on the basis of data from *Lloyd's Shipping Economist*, various issues.

C. COMPARISON OF NATIONAL TRADE AND FLEETS

Information on the trade, fleet ownership and nationally flagged fleets of the major trading nations appears in table 28. In 2007 the United States generated 11.4 per cent of world trade (United States dollars, imports plus exports) while owning 3.8 per cent of world tonnage; 1.1 per cent of the world's cargo carrying tonnage used the flag of the United States. Germany, China and Japan are among the top four trading nations, accounting for 8.5, 7.8 and 4.8 per cent of world trade, respectively; all three countries also have important shares in the controlled fleet, while only a minor proportion of its controlled fleet flies the national flag. France and the United Kingdom account for 4.2 and 3.8 per cent of world trade, respectively, and the United Kingdom has a 2.5 per cent share in the nationally controlled fleet, while France, with a similar share in world trade, has a much smaller share in the controlled fleet (0.6 per cent).

Together with China, the Republic of Korea, Hong Kong (China) and Singapore are among the Asian developing economies with the highest share in world trade, accounting for 2.6, 2.6 and 2.0 per cent, respectively. The Republic of Korea controls 3.6 per cent of the fleet as regards ownership, Hong Kong (China) 3.2 per cent and Singapore 2.8 per cent. The only Latin American country among the major trading nations is Mexico, with

... the majority of the world fleet is registered in open and international registries, most of which do not belong to any of the top 25 trading nations ...

a 2.0 per cent share of world trade, albeit with only a very minor interest in vessel owning or registration.

Among the countries covered in table 28, there exists a positive correlation between the controlled fleet and its foreign trade, especially as regards oil and dry bulk trade and the ownership of oil tankers and dry bulk carriers, respectively (see also chapter 2). However, some of the largest ship owners, notably Greece, which controls the world's largest tonnage, are not among the top 25 trading countries. Overall, the statistical correlation coefficient between the shares of world trade and the shares in fleet ownership of the countries covered in table 28 is +0.57.

As regards the relationship between national trade and a nationally flagged fleet, the correlation is much weaker (+0.23), since the majority of the world fleet is registered in open

and international registries, most of which do not belong to any of the top 25 trading nations covered in table 28.

Only France, Hong Kong (China) and Singapore have a higher share of the nationally flagged fleet than of the controlled tonnage, reflecting a high proportion of foreign controlled tonnage among the nationally flagged fleet. In addition to Hong Kong (China) and Singapore, India also has a slightly higher share of the nationally flagged fleet than of the world merchandise trade, as a part of the national fleet is employed in cabotage traffic.

Table 27

Growth of demand and supply in container shipping, 2000–2008 ^a (Annual growth rates)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Growth in containerized trade (TEU)	11.0	2.0	11.0	11.0	13.0	11.0	11.0	10.0	9.0
Growth in container carrying fleet (TEU)	7.8	7.8	8.5	8.0	8.0	8.0	13.6	11.8	13.1
Balance	3.2	-5.8	2.5	3.0	5.0	3.0	-2.6	-1.8	-4.1

Source: Compiled by the UNCTAD secretariat on the basis of data from *Clarkson Container Intelligence Monthly*, various issues.

^a Total container carrying fleet, including multi-purpose and other vessels with some container carrying capacity. 2008 data: forecast.

Table 28
Maritime engagement of 25 major trading nations
2007 data (trade) and beginning of 2008 data (fleet)

Country/territory	Percentage share of world trade generated, in terms of value	Percentage share of world fleet (flag) in terms of dwt	Percentage share of world fleet (ownership) in terms of dwt
United States	11.38	1.09	3.84
Germany	8.51	1.34	9.07
China	7.81	3.32	8.18
Japan	4.77	1.32	15.58
France	4.16	0.71	0.63
United Kingdom	3.76	1.42	2.50
Netherlands	3.72	0.56	0.83
Italy	3.55	1.19	1.71
Belgium	3.01	0.58	1.17
Canada	2.88	0.28	1.81
Republic of Korea	2.62	1.89	3.63
Hong Kong (China)	2.56	5.30	3.22
Spain	2.18	0.25	0.43
Russian Federation	2.16	0.64	1.74
Mexico	2.04	0.14	n.a.
Singapore	2.02	4.97	2.76
Taiwan Province of China	1.67	0.39	2.52
India	1.29	1.35	1.55
Switzerland	1.19	0.08	0.34
Austria	1.16	0.00	n.a.
Malaysia	1.16	0.85	1.08
Saudi Arabia	1.15	0.10	1.25
Sweden	1.14	0.22	0.67
Australia	1.10	0.19	n.a.
Poland	1.08	0.01	n.a.
Total	78.02	28.16	64.93

Source: Compiled by the UNCTAD secretariat on the basis of data supplied by UNCTAD *Handbook of Statistics* (trade) and Lloyds Register-Fairplay (fleet registration and ownership).