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Chapter 3

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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, the tons of cargo carried and ton-miles performed per deadweight ton, and the analysis of tonnage oversupply in the main shipping market sectors.

A. OPERATIONAL PRODUCTIVITY

As the positive growth in the supply of the fleet (+7.3 per cent in 2008 compared to 2007) was double the growth in total seaborne trade (which is estimated at +3.6 per cent), productivity in 2008 measured in tons of cargo carried per deadweight ton (dwt) decreased further compared to the 2007 figures (see tables 23, 24 and 25, and figures 17, 18 and 19).[1] The global average volume of cargo per carrying capacity decreased, and the average ship was fully loaded 7.3 times in 2008 compared to 7.6 times in 2007. During the same year, the ton-miles performed per deadweight ton decreased too: the average dwt of cargo-carrying capacity transported one ton of cargo over a distance of 29,300 nautical miles (54,264 km) in 2008, or 149 km per day.

Productivity in terms of tons carried per dwt of oil tankers decreased 4.7 per cent …

Based on the data for the world fleet for January 2009 and the forecasted ton-miles for the year, the productivity of the world fleet is expected to further decline to values below 28,000 ton-miles in 2009 (fig. 17). The fundamental reason for the decline in average productivity in recent years is the oversupply of tonnage available (see also chapter 2), which contrasts with the reduced growth in world seaborne trade. Some ships are being laid off, and even the active fleet may slow steam or take longer but less costly routes, thus reducing the tons carried per dwt. The negative productivity growth rates are thus the consequence of a fleet growth that resulted from vessel orders placed when trade was expected to grow at faster rates than it effectively did in 2008.

Productivity in terms of tons carried per dwt of oil tankers decreased 4.7 per cent from 7.06 in 2007 to 6.74 in 2008; for dry bulk it decreased 1.8 per cent from 5.48 to 5.38 tons, and the cargo volumes carried by the residual fleet decreased 4.2 per cent from 10.84 to 10.40 tons per dwt (table 23). The productivity of the residual fleet, which includes container ships and general cargo carriers, is in practice higher than that of liquid and dry bulk carriers, as the latter often have empty return voyages after the oil or iron ore is delivered at destination. Liner shipping companies, however, will usually carry at least some cargo in both directions of their route.

Indicative data on ton-miles performed by oil tankers, dry bulk carriers, and the residual fleet are provided

Table 23

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

Year	World fleet (millions of dwt, beginning of year)	Total cargo (millions of tons)	Total ton-miles performed (thousands of millions 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	16 440	6.1	25.0
2000	799	5 983	22 927	7.5	28.7
2006	960	7 545	30 058	8.0	31.3
2007	1 042	7 882	31 425	7.6	30.1
2008	1 118	8 168	32 746	7.3	29.3

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 24

Estimated productivity of tankers, bulk carriers and the residual fleet,[a] selected years

(tons carried per dwt)

Year	Oil cargo (millions of tons)	Tanker fleet (millions of dwt, beginning of year)	Tons carried per dwt of tankers	Main dry bulks (millions of tons)	Dry bulk fleet (millions of dwt, beginning of year)	Tons carried per dwt of bulk carriers	All other dry cargoes (millions of tons)	Residual fleet[a] (millions of 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	2 648	354	7.48	1 888	346	5.46	3 009	260	11.58
2007	2 705	383	7.06	2 013	368	5.48	3 164	292	10.84
2008	2 749	408	6.74	2 097	391	5.36	3 322	319	10.41

Source: Calculated by the UNCTAD secretariat, based on UNCTAD data on seaborne trade (tons), and Lloyd's Register – Fairplay (world fleet).

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

Table 25

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 (thousands of millions)	Tanker fleet (beginning of year) [b]	Ton-miles per dwt of tankers	Ton-miles of dry bulk cargo (thousands of millions)	Dry bulk fleet (beginning of year) [b]	Ton-miles per dwt of bulk carriers	Ton-miles of other dry cargo (thousands of millions)	Residual fleet (beginning of year) [b]	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	7 290	246	29.64	5 259	235	22.41	3 891	178	21.89
2000	9 499	282	33.63	6 638	276	24.04	6 790	240	28.24
2006	10 741	354	30.32	9 976	346	28.84	9 341	260	35.95
2007	11 084	383	28.94	10 676	368	29.05	9 665	292	33.12
2008	11 292	408	27.68	11 209	391	28.66	10 245	319	32.14

Source: 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 ships and other vessels included in annex IIIb.

[b]   Million dwt.

Figure 17

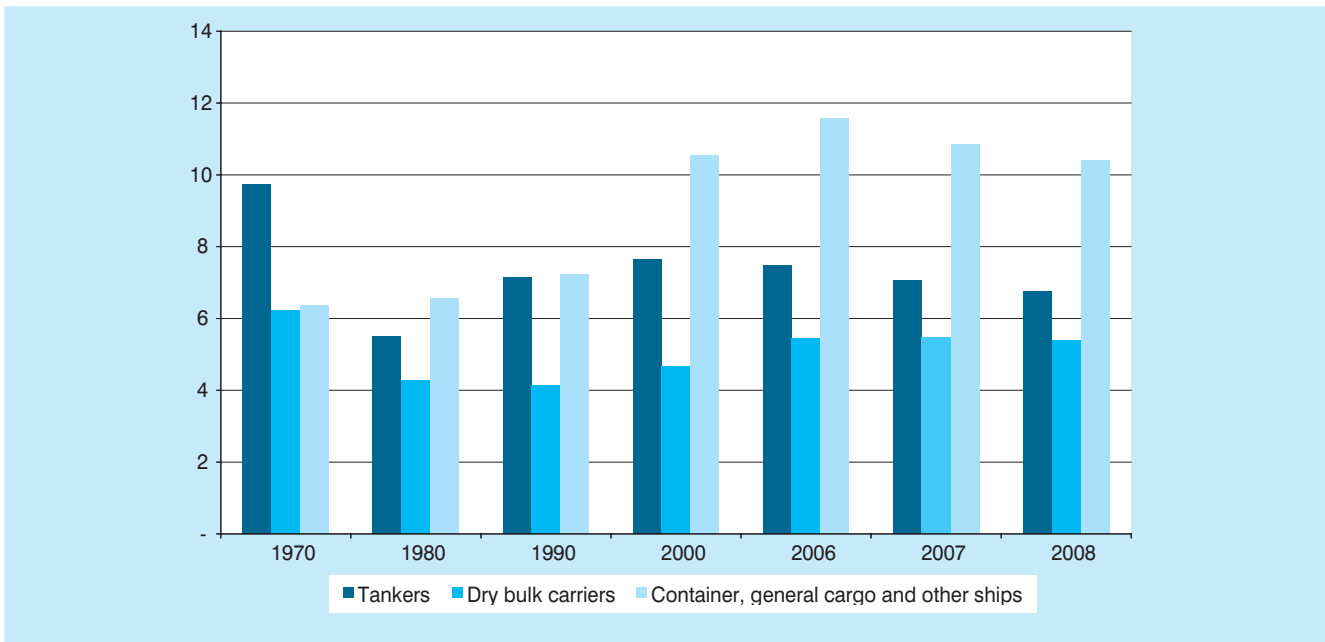**Ton-miles per deadweight ton (dwt) of the world fleet, selected years**
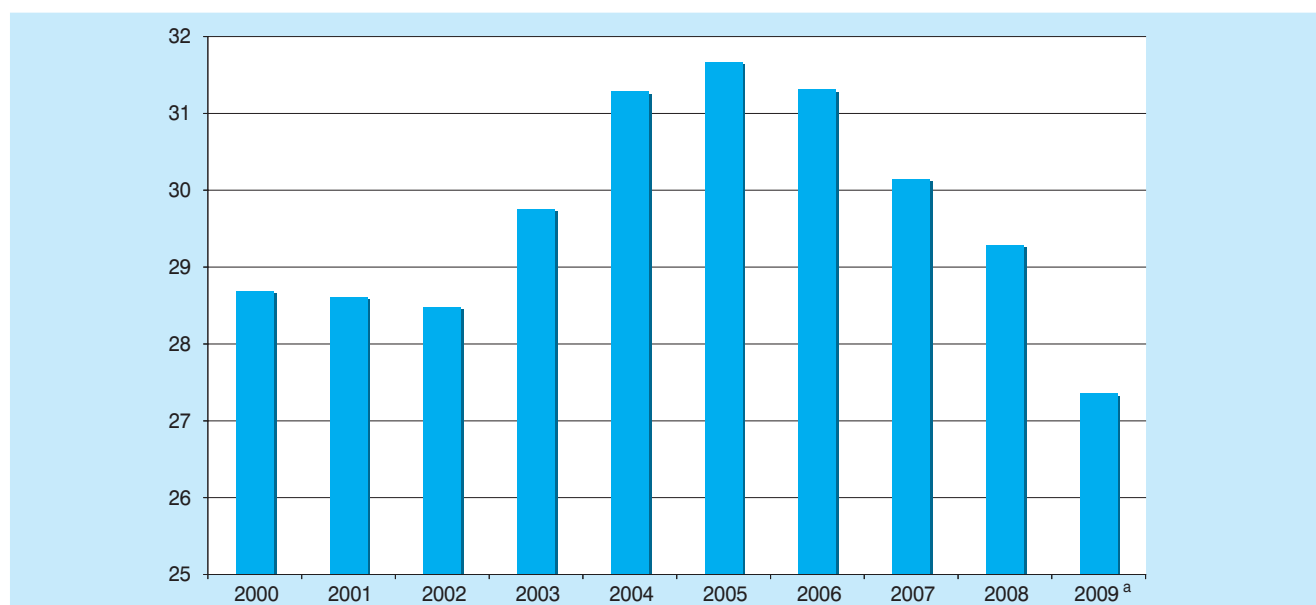
Source: UNCTAD calculations.

[a]   Estimate based on forecast of ton-miles for 2009 and fleet as per 1 January 2009.
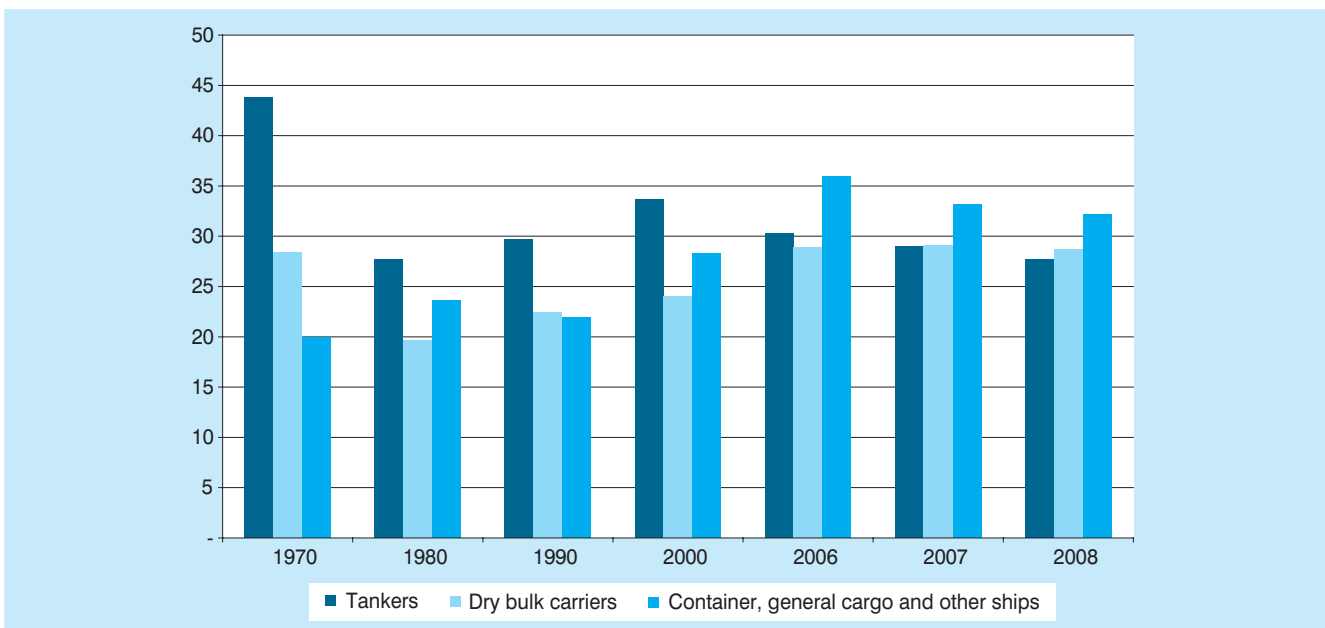
Figure 18

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

Source: UNCTAD calculations.

Figure 19

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

Source: UNCTAD calculations.

in table 26. The thousands of ton-miles per dwt of oil tankers decreased by 4.3 per cent from 28.9 in 2007 to 27.7 in 2008, while the corresponding figure for dry bulk carriers decreased by 1.3 per cent from 29.1 to 28.7. The productivity of the residual fleet measured in ton-miles per dwt decreased 3 per cent from 33.1 to 32.1.

Whereas in 2007 ship operators tended to reduce service speeds in order to lessen fuel costs, towards the end of 2008 and in early 2009 fuel prices had gone down, and the oversupply of tonnage made several liner companies take longer routes, e.g. around the Cape of Good Hope instead of through the Suez Canal. This helped reduce expenditures on canal dues while at the same time avoiding the risks of piracy in the surroundings of the Gulf of Aden.

The combined surplus tonnage of oil tankers, dry bulk carriers and general cargo ships at the end of 2008 … stood at 19.0 million dwt … corresponding to a 57 per cent increase over the previous year.

B.   SUPPLY AND DEMAND IN WORLD SHIPPING

The combined surplus tonnage of oil tankers, dry bulk carriers and general cargo ships at the end of 2008 (data is for 1 December 2008) stood at 19.0 million dwt, 2.2 per cent of the total world merchant fleet, corresponding to a 57 per cent increase over the previous year (table 26). During the first months of 2009 the situation continued to worsen, reaching 25.9 million dwt on 1 April 2009, corresponding to a 2.9 per cent surplus.

The tonnage supply of large oil tankers (10,000 dwt and above) increased in 2008 by 30 million dwt to 414 million dwt, as newbuildings delivered outweighed tonnage scrapped, laid up or lost (see table 27 and fig. 20).

Table 26

Tonnage oversupply in the world merchant fleet, selected years

(end-of-year figures)

	1990	2000	2004	2005	2006	2007	2008	1 Apr. 09
				Million dwt				
Merchant fleet, three main vessel types[a]	558.5	586.4	667.0	697.9	773.9	830.7	876.2	896.2
Surplus tonnage[b]	62.4	18.4	6.2	7.2	10.1	12.1	19.0	25.9
Active fleet	496.1	568.0	660.8	690.7	763.7	818.6	857.2	870.4
				Percentages				
Surplus tonnage as percentage of merchant fleet	11.2	3.1	0.9	1.0	1.3	1.5	2.2	2.9

Source: Compiled by the UNCTAD secretariat, on the basis of data supplied by *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.

[b]   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.

Table 27

**Analysis of tonnage surplus by main type of vessel, selected years**[a]

(In millions of dwt or m³)	1990	2000	2004	2005	2006	2007	2008	1 April 2009
World tanker fleet (dwt)	**266.2**	**279.4**	**298.3**	**312.9**	**367.4**	**393.5**	**414.0**	**426.4**
Tanker fleet surplus (dwt)	40.9	13.5	3.4	4.5	6.1	7.8	14.4	17.2
Share of surplus fleet in tanker fleet (%)	15.4	4.8	1.1	1.4	1.7	2.0	3.5	4.0
World dry bulk fleet (dwt)	**228.7**	**247.7**	**325.1**	**340.0**	**361.8**	**393.5**	**417.6**	**425.8**
Dry bulk fleet surplus (dwt)	19.4	3.8	2.1	2.0	3.4	3.6	3.7	7.4
Share of surplus fleet in dry bulk fleet (%)	8.5	1.5	0.6	0.6	0.9	0.9	0.9	1.7
World conventional general cargo fleet (dwt)	**63.6**	**59.3**	**43.6**	**45.0**	**44.7**	**43.8**	**44.5**	**44.0**
Conventional general cargo fleet surplus (dwt)	2.1	1.1	0.7	0.7	0.6	0.7	1.0	1.3
Share of surplus fleet in general cargo fleet (%)	3.3	1.9	1.6	1.6	1.4	1.6	2.2	2.8
World reefer fleet (dwt)	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**5.6**	**5.6**
Reefer fleet surplus (dwt)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1	0.1
Share of surplus fleet in reefer fleet (%)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.9	1.1
World ro-ro fleet (dwt)	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**11.4**	**11.5**
Ro-ro fleet surplus (dwt)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.9	1.0
Share of surplus fleet in ro-ro fleet (%)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7.8	8.7
World vehicle carrier fleet (dwt)	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**11.3**	**11.4**
Vehicle carrier fleet surplus (dwt)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.2	0.4
Share of surplus fleet in vehicle carrier fleet (%)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.1	3.5
World LNG carrier fleet (m³)	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**44.4**	**48.0**
LNG carrier fleet surplus (m³)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.9	5.2
Share of surplus fleet in LNG fleet (%)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	13.2	10.8
World LPG carrier fleet (m³)	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**11.6**	**11.8**
LPG carrier fleet surplus (m³)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.9	0.5
Share of surplus fleet in LNG fleet (%)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	8.1	3.8

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.

Figure 20

Trends in surplus capacity by main vessel types, selected years
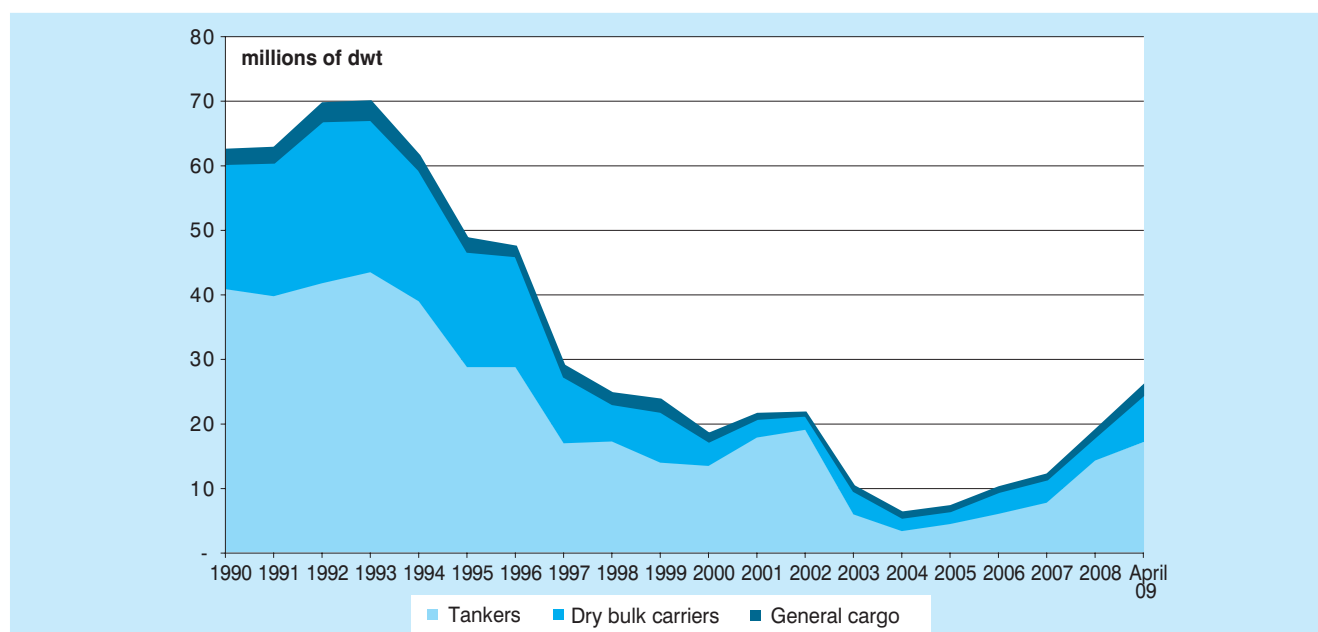
Source: Compiled by the UNCTAD secretariat, on the basis of data from *Lloyd's Shipping Economist*, various issues.

Overcapacity in this sector increased significantly, to 14.4 million dwt or 3.5 per cent of the total world tanker fleet in December 2008, and to 4.0 per cent in April 2009. Older single-hulled tankers are particularly difficult to employ, as environmental regulations increasingly require the use of double-hulled tankers.

In 2008, the supply of large dry bulk vessels increased by 34 million dwt to 418 million dwt in December, reaching 426 million dwt in April 2009. Overtonnage for this type of vessel was 7.4 million dwt in April 2009, equivalent to 1.7 per cent of the dry bulk fleet.

For the conventional general cargo fleet of vessels of 5,000 dwt and above, overcapacity also increased over the previous year, reaching 2.8 per cent of the world fleet of this sector in April 2009. The surplus fleet of ro-ro vessels stood at 8.7 per cent, and that of vehicle carriers at 3.5 per cent. Gas carriers (of LNG and LPG) have seen the surplus fleet situation improve over the last months, albeit starting from a relatively high basis; as per 1 April 2009, the share of the LNG surplus fleet stood at 10.8 per cent.
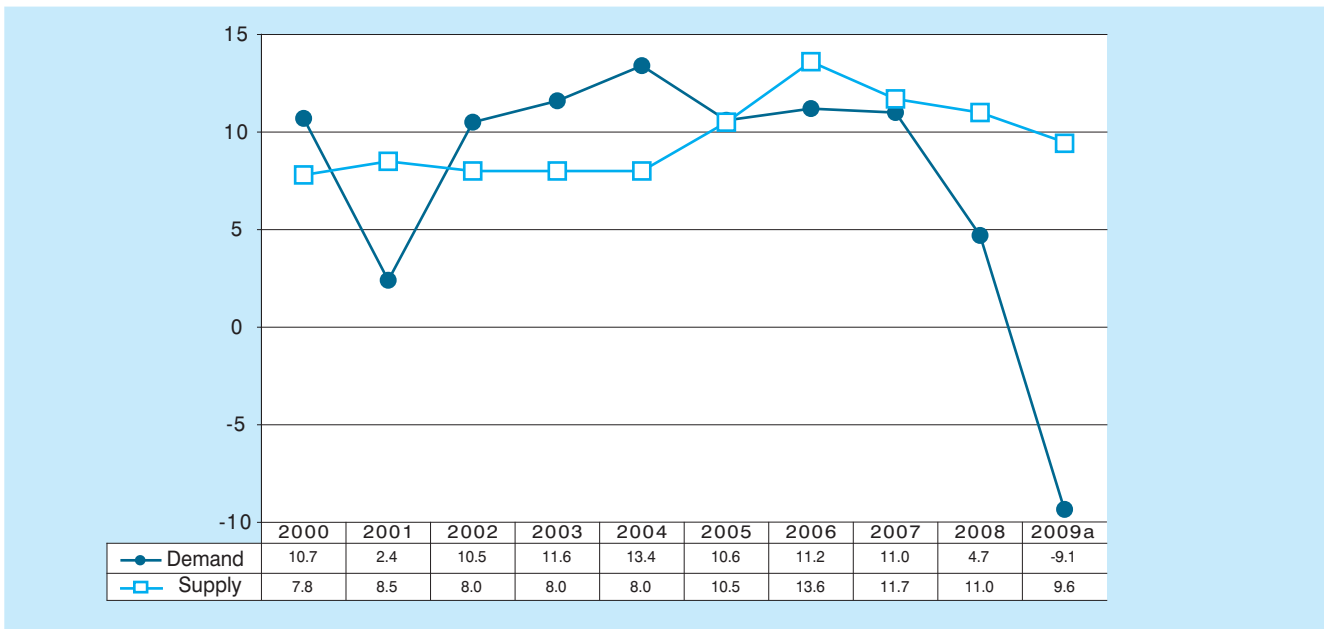
As regards the growth of supply and demand in container shipping, based on the scheduled vessel deliveries, the fleet is expected to grow in 2009 by 9.6 per cent – the second-highest growth rate over a 10-year period. This contrasts with an expected downturn of demand by 9.1 per cent. Figure 21 illustrates how supply seems to follow demand – albeit with a delay of two to three years. The recent boom – especially in container shipping (see also the age profile of the container ship fleet in fig. 10 of chapter 2) – is now bound to be followed by a historical bust.

C.   COMPARISON OF CARGO TURNOVER AND FLEETS

In 2008, the United States generated 10.68 per cent of world trade (in United States dollars, imports plus exports) while owning 3.62 per cent of world tonnage; 1.0 per cent of the world's cargo-carrying tonnage used the flag of the United States. Germany,

Figure 21

Growth of demand and supply in container shipping, 2000–2009[a]

(annual growth rates)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009a
Demand	10.7	2.4	10.5	11.6	13.4	10.6	11.2	11.0	4.7	-9.1
Supply	7.8	8.5	8.0	8.0	8.0	10.5	13.6	11.7	11.0	9.6

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. Data for 2009: forecast.

China and Japan are among the top four trading nations, accounting for 8.22, 7.91 and 4.78 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, the Netherlands, Italy and the United Kingdom each account for a similar share of world trade (between 3.4 and 4 per cent each, approximately), however their shares in the control or registration of ships vary widely: 1.52 per cent of the world's tonnage is registered in the United Kingdom, compared to only 0.57 per cent registered in the Netherlands; owners from the United Kingdom control 2.8 per cent of the world's tonnage, compared to only 0.59 per cent controlled by owners from France (table 28).

> **… China, the Asian developing economies with the highest share in world trade include the Republic of Korea, Hong Kong (China), and Singapore …**

Along with China, the Asian developing economies with the highest share in world trade include the Republic of Korea, Hong Kong (China) and Singapore, accounting for 2.6, 2.3 and 2.0 per cent respectively. The Republic of Korea controls 4.2 per cent of the fleet as regards ownership, Hong Kong (China) controls 3.1 per cent, and Singapore controls 2.6 per cent. Two Latin American countries are among the major trading nations, namely Mexico and Brazil, with a 1.8 and 1.1 per cent share of world trade respectively. Out of these two countries, Brazil has a far higher share in vessel registration (0.3 per cent) and ownership (0.4 per cent) than Mexico, which registers only 0.1 per cent of the world's tonnage.

Table 28

Maritime engagement of 25 major trading nations

2007 data (trade) and beginning of 2008 data (fleet)

Country/territory	Percentage share of world merchandise 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		
	2007	**2008**	**Change, in percentage points**	**1.1.2008**	**1.1.2009**	**Change, in percentage points**	**1.1.2008**	**1.1.2009**	**Change, in percentage points**
United States	11.38	10.68	-0.70	1.09	1.00	-0.08	3.84	3.62	-0.22
Germany	8.51	8.22	-0.28	1.34	1.51	0.16	9.07	9.50	0.42
China	7.81	7.91	0.10	3.32	3.35	0.03	8.18	8.40	0.22
Japan	4.77	4.78	0.01	1.32	1.29	-0.03	15.58	15.68	0.10
France	4.16	4.04	-0.12	0.71	0.66	-0.04	0.63	0.59	-0.03
Netherlands	3.72	3.72	0.01	0.56	0.57	0.02	0.83	0.76	-0.07
Italy	3.55	3.37	-0.18	1.19	1.21	0.02	1.71	1.79	0.08
United Kingdom	3.76	3.36	-0.40	1.42	1.52	0.10	2.50	2.80	0.29
Belgium	3.01	2.91	-0.09	0.58	0.56	-0.02	1.17	1.22	0.05
Canada	2.88	2.70	-0.18	0.28	0.29	0.00	1.81	1.55	-0.25
Republic of Korea	2.62	2.64	0.03	1.89	1.90	0.00	3.63	4.22	0.59
Russian Federation	2.16	2.61	0.45	0.64	0.60	-0.04	1.74	1.66	-0.08
Hong Kong (China)	2.56	2.32	-0.24	5.30	5.38	0.09	3.22	3.05	-0.17
Spain	2.18	2.06	-0.12	0.25	0.23	-0.02	0.43	0.40	-0.03
Singapore	2.02	2.03	0.02	4.97	5.10	0.13	2.76	2.55	-0.20
Mexico	2.04	1.85	-0.19	0.14	0.14	0.00	0.00	0.00	0.00
Taiwan Province of China	1.67	1.53	-0.14	0.39	0.36	-0.03	2.52	2.70	0.18
India	1.29	1.45	0.16	1.35	1.28	-0.06	1.55	1.56	0.01
Saudi Arabia	1.15	1.27	0.12	0.10	0.14	0.04	1.25	1.35	0.10
Australia	1.10	1.19	0.09	0.19	0.18	-0.01	0.00	0.00	0.00
Switzerland	1.19	1.19	0.00	0.08	0.08	0.01	0.34	0.35	0.00
Malaysia	1.16	1.15	0.00	0.85	0.79	-0.06	1.08	1.05	-0.03
Poland	1.08	1.15	0.07	0.01	0.01	0.00	0.00	0.00	0.00
Brazil	1.03	1.14	0.11	0.29	0.29	-0.01	0.43	0.43	0.00
Austria	1.16	1.12	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
Total	77.91	76.41	-1.49	28.24	28.43	0.19	64.25	65.21	0.97

Source: Compiled by the UNCTAD secretariat, on the basis of data supplied by the *UNCTAD Handbook of Statistics* (trade) and *Lloyd's Register – Fairplay* (fleet registration and ownership).

ENDNOTES

[1]   Note: The figures on the operational productivity of the world fleet are indicative estimates only. While the data on the world fleet includes ships that are employed in cabotage trades, the UNCTAD estimates of seaborne trade do not include cabotage, and not all vessels of 100 GT and above are included in the calculation of the ton-miles.