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REVIEW OF MARITIME TRANSPORT 2008

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Chapter 1

DEVELOPMENTS IN INTERNATIONAL SEABORNE TRADE

This chapter provides an overview of the demand for global maritime transport services as well as a review and forecast of developments in world seaborne trade, against the background of the world economy and global trade. In 2007, the world economy and global merchandise exports grew at a firm rate, albeit more moderately than the previous year. Dynamic emerging developing and transition economies continued to set the pace. Driven by economic and trade growth, firm demand for maritime transport has lead to further growth in seaborne trade. However, rising oil prices due to supply-side constraints and increasing oil demand, the continuing repercussions of the global credit crunch, together with concerns about security and the environment impose a great challenge for maritime seaborne trade and transport in 2008.

A. WORLD ECONOMIC SITUATION AND PROSPECTS

1. World economic growth[1]

In 2007, the world's real GDP grew by 3.8 per cent. Although growth moderated compared to the previous year, the world economy appears, nevertheless, to have withstood some of the challenges facing the international economic environment (see table 1). These challenges include soaring oil and non-oil commodity prices, the sub-prime mortgage lending crisis in the United States and global credit crunch, a depreciation of the United States dollar vis-à-vis other currencies, and an unfolding food crisis as well as increasing environmental challenges such as climate change.

World economic growth was mainly driven by strong performances recorded by emerging developing economies including China.

Growth in developed economies was down from 2.8 per cent in 2006 to 2.5 per cent in 2007. The major drag on these economies was the slowdown in the United States and its effect on Europe and Japan. Developing economies growing at 7.3 per cent and transition economies at 8.4 per cent continued their robust growth in 2007. World economic growth was mainly driven by strong performances recorded by emerging developing economies including China (11.4 per cent) and India (9.7 per cent).

The resilience of developing and transition economies appears to be consistent with the "decoupling" argument whereby growth in developing regions is no longer entirely dependent on the economic performance of advanced economies. The argument proposes that decoupling is taking place due to robust and consistent growth in domestic economies of emerging economic giants such as China and India, and the growing South–South interdependence. It might be argued, however, that "divergence" rather than "decoupling" is taking place. Despite the resilience of

Table 1

World economic growth, 2005–2008[a]

Region/country [b]	2005	2006	2007	2008[c]
WORLD	3.4	3.9	3.8	2.9
Developed economies	2.4	2.8	2.5	1.6
of which:				
United States	3.1	2.9	2.2	1.4
Japan	1.9	2.4	2.1	1.4
European Union (27)	1.8	3.0	2.9	1.9
of which:				
Germany	0.9	2.9	2.5	2.0
France	1.9	2.2	2.1	1.6
Italy	0.0	1.7	1.5	0.5
United Kingdom	1.9	2.8	3.0	1.7
Developing economies	6.6	7.1	7.3	6.5
of which:				
China	10.4	11.1	11.4	10.0
India	8.8	9.2	9.7	7.6
Brazil	3.2	3.7	5.4	4.2
South Africa	5.1	5.4	5.1	4.1
Transition economies	6.6	7.5	8.4	7.4
of which:				
Russian Federation	6.4	6.7	8.1	7.5

Source: UNCTAD Trade and Development Report 2008 based on UNCTAD Handbook of Statistics database; and United Nations, Department of Economic and Social Affairs (UN/DESA), LINK Global Economic Outlook 2008 (May 2008).

[a] Calculations for country aggregates are based on GDP in dollars at base year 2000.

[b] Regions and country groups correspond to those defined in the *UNCTAD Handbook of Statistics 2004.* For 2008, the regions and country groups correspond to those defined in UNCTAD's *Trade Development Report, 2008*.

[c] Forecast.

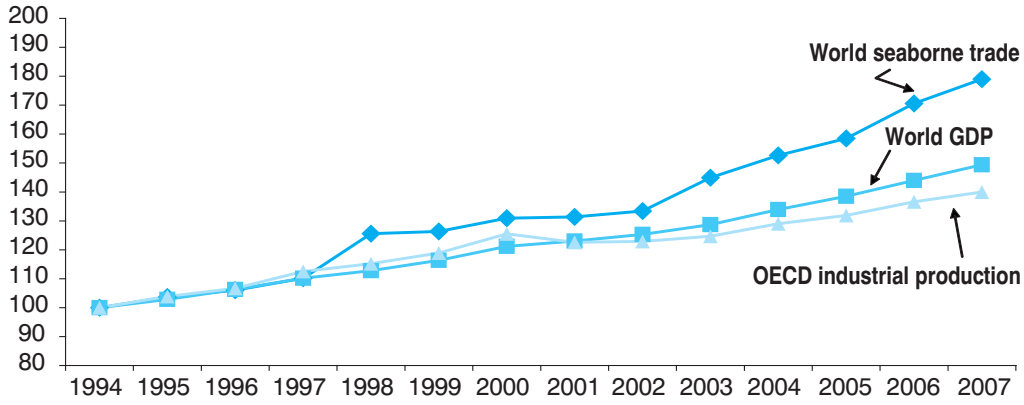
emerging developing economies, economic conditions in developed economies will likely continue to impact other parts of the world due to globalization and international integration. According to the International Monetary Fund (IMF), the turmoil in the credit markets could spread and involve spillover effects including for emerging developing economies. The IMF estimates the aggregate potential losses to nearly $1 trillion and maintains that "what began as a fairly contained deterioration in portions in the United States sub-prime market has metastasized into severe dislocations in broader credit and funding markets that now pose risks to the macroeconomic outlook in the United States and globally".[2]

Figure 1 illustrates the evolving relationship between the growth in world GDP, industrial production in advanced economies and seaborne trade. Since 2000, the world economy has been growing at a faster pace than both the industrial production index of the

Figure 1

Indices for world economic growth (GDP), OECD industrial production and world seaborne trade (volume), 1994–2007

(1994 = 100)



Source: UNCTAD secretariat on the basis of *OECD Main Economic Indicators*, April 2008; UNCTAD *Trade Development Report 2008* and UNCTAD *Review of Maritime Transport*, various issues.

Organisation for Economic Cooperation and Development (OECD) countries and world seaborne trade. This suggests that growth in OECD countries alone would not have been sufficient to sustain recorded growth in world GDP. Thus, growth in non-OECD countries, namely in developing and transition economies, has had a large impact. For comparison purposes, the industrial production index of selected developed and developing countries is presented in figure 2. As shown, between 2000 and 2007, industrial production in India, Brazil and the Russian Federation has been growing at a rapid pace compared with the United States, Japan and the European Union.[3] Industrial production indices in these countries remained practically flat and grew only marginally.

The outlook for 2008 appears to be unfavourable due to the carryover of uncertainties faced in 2007. As noted in table 1, the world economy is expected to slow down, with GDP growth of less than 3.0 per cent. Growth is expected to be moderate in all country groupings, including developing economies and China.

Reflecting the deceleration in world GDP growth and the weaker import demand in the United States, world merchandise exports grew at a slower pace in 2007.

2. Merchandise trade [4]

Recent developments in international trade

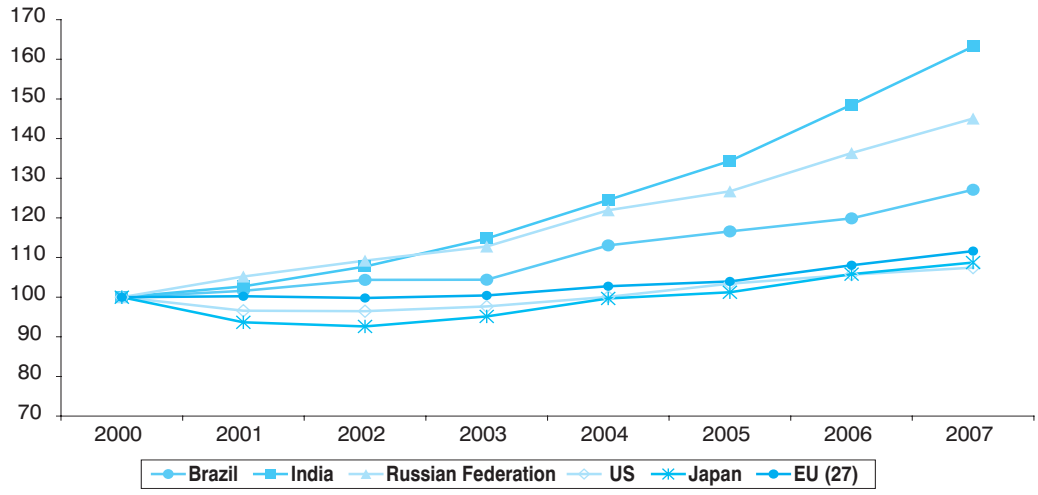
Reflecting the deceleration in world GDP growth and the weaker import demand in the United States, world merchandise exports grew at a slower pace in 2007. Down from 8.5 per cent recorded in 2006, the volume of world merchandise exports increased by 5.5 per cent in 2007 (see table 2). Large variations in trade performances prevailed both within and between regions. Developing and transition economies are driving the growth in world merchandise trade and are gaining a larger global market share. Their contribution to global merchandise exports by value increased from 34 per cent in 1997 to over 40 per cent in 2007. In 2007, 12 countries from both transition economies and developing regions were featured among the world's 30 leading importers and exporters.

Benefiting from improved terms of trade, exporters of fuel and minerals increased their overall import

Figure 2

Industrial Production Index, selected countries, 2000–2007

(2000 = 100)



Source: UNCTAD secretariat on the basis of *OECD Main Economic Indicators*, April 2008.

Table 2

Growth in the volume [a] of merchandise trade, by geographical region, 2005–2007

(Percentages)

Exports			Countries/Regions	Imports		
2005	2006	2007		2005	2006	2007
6.5	8.5	5.5	**WORLD**	6.5	8.0	5.5
6.0	8.5	5.5	**North America**	6.5	6.0	2.5
4.5	7.5	3.0	**European Union**	4.0	7.0	3.0
4.5	1.5	0.5	**Africa and Middle East**	14.5	6.5	12.5
8.0	4.0	5.0	**Latin America**	14.0	15.0	20.0
11.0	13.0	11.5	**Asia**	8.0	8.5	8.5
25.0	22.0	19.5	**China**	11.5	16.5	13.5
3.5	6.0	6.0	**Commonwealth of Independent States**	18.0	21.5	18.0

Source: World Trade Organization (WTO) Press Release, World Trade 2007, Prospects 2008, April 2008.

[a] Trade volumes data are derived from customs values deflated by standard unit values and adjusted price index for electronic goods.

volumes. Imports expanded at double-digit rates in Latin America (20 per cent), the CIS[5] (18 per cent), and Africa and the Middle East (12.5 per cent). Exports from these regions grew at a much slower pace than imports.

Asia, in particular China, continued to power world merchandise trade growth. China's exports and imports grew at 19.5 per cent and 13.5 per cent, respectively. Within Asia, Japan's performance was less impressive, with exports increasing at a slower pace than in 2006 and imports remaining practically unchanged.

North America's merchandise exports grew at the same rate as the world's average, and faster than imports. While United States exports benefited from the depreciation of the dollar, imports into Canada and Mexico were stimulated by the revenue gains generated from exports of fuels and mining products. Elsewhere, the European Union recorded a slowdown in its merchandise trade, with imports and exports, each expanding by 3.0 per cent.

Over recent years, the conjunction of several factors has contributed to the dynamism of the international merchandise trade and altered the landscape of international merchandise trade and maritime transport services. These include increased trade liberalization, advances in information and communication technologies (ICTs) and transport (e.g. larger ship sizes, tracking and tracing technologies), sophisticated logistics services (e.g. third-party and fourth-party logistics) and new global production processes. A new emerging pattern is the increased trade within and among developing regions. China, Brazil, India, Mexico, South Africa, the Republic of Korea and the Russian Federation are propelling South–South trade and cooperation. The share of these countries in world exports was 17 per cent in 1997, 18 per cent in 2000 and 23 per cent in 2007. Examples of concrete actions taken to promote South–South trade cooperation include the India–Brazil-South Africa developmental initiative launched by the Brasilia Declaration in June 2003 and the signature of over 40 trade agreements[6] between China and African countries in 2006.[7]

Although starting from a low base, South–South merchandise trade has assumed an increasingly important role in world trade. The contribution of South–South trade to the total value of world exports increased from 7.7 per cent in 1990 to 12.4 per cent in 2000, and 16.7 per cent in 2006. South–South merchandise trade expanded from $686 billion in 1997 to over $2 trillion in 2007, a three-fold increase in 10 years. The share of intra-developing countries' exports in terms of their total exports increased from 39.5 per cent in 2000 to 45.9 per cent in 2006. There is a great potential for South–South trade to develop further and avoid concentration by extending its geographical reach to areas outside Asia as well as to lower-income countries.

Developments affecting the wider international economic environment have implications for freight transport, in particular maritime transport services. Economic growth, production processes and consumption patterns largely determine demand for these services. As shown in figure 1, growth in world GDP is positively correlated with growth in seaborne merchandise trade.

B. WORLD SEABORNE TRADE

1. Overall seaborne trade

In 2007, international seaborne trade was estimated at 8.02 billion tons of goods loaded, a volume increase of 4.8 per cent over the previous year (see tables 3 and 4, and figure 3). Dry cargo, including bulk, break-bulk and containerized cargo, accounted for the largest share of goods loaded (66.6 per cent) while oil made up the balance. Growth in dry bulk trade is estimated at 5.6 per cent with the five major bulks, fuelled mainly by the needs of China's metal industries, growing even faster at 6.4 per cent. Partly reflecting the limited impact of rising oil prices on oil demand, world shipments of crude and petroleum products are estimated to have grown by 3.3 per cent over the previous year.

In 2007, international seaborne trade was estimated at 8.02 billion tons of goods loaded, a volume increase of 4.8 per cent over the previous year.

Major loading areas were located in developing regions (63.2 per cent) followed by developed economies (33.3 per cent) and transition economies (3.5 per cent). A geographical breakdown of total goods loaded by region underscores Asia's continued predominance, with a share of 40 per cent, followed in descending order by the Americas, Europe, Africa and Oceania (see figure 4). A detailed breakdown by country groupings, regions and types of cargo is presented in table 4 and annex II.

Table 3

Development of international seaborne trade, selected years

(Millions of tons loaded)

Year	Oil	Main bulks[a]	Other dry cargo	Total (all cargoes)
1970	1 442	448	676	2 566
1980	1 871	796	1 037	3 704
1990	1 755	968	1 285	4 008
2000	2 163	1 288	2 533	5 984
2006	2 595	1 876	3 181	7 652
2007[b]	2 681	1 997	3 344	8 022

Source: Estimated by the UNCTAD secretariat on the basis of annex II and data supplied by reporting countries, ports and specialized sources.

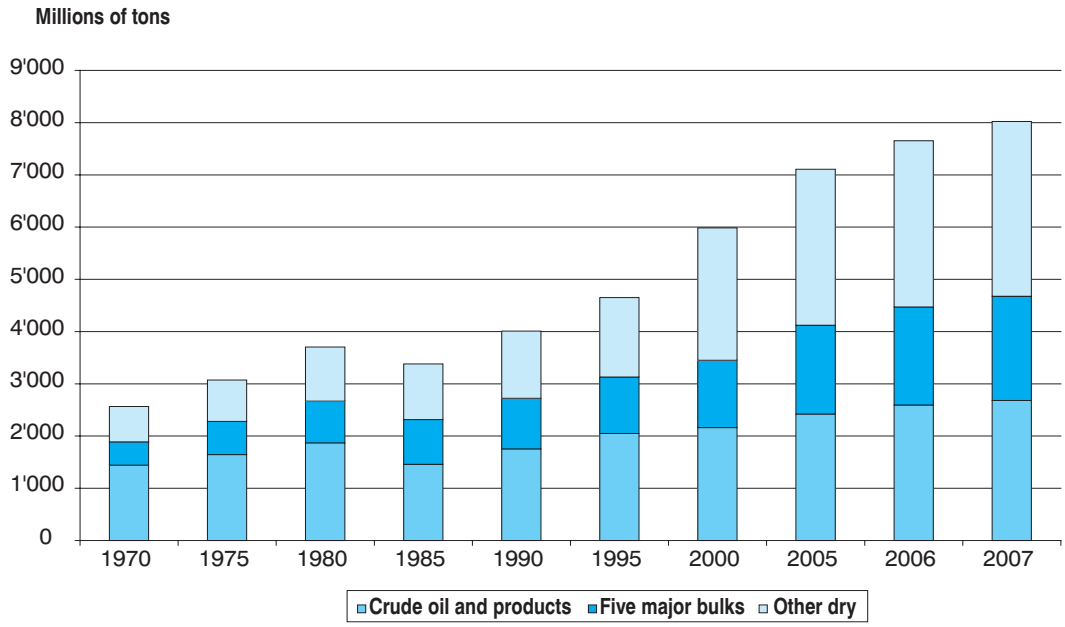
[a] Iron ore, grain, coal, bauxite/alumina and phosphate.

[b] Preliminary.

Figure 3

International seaborne trade for selected years

(Millions of tons loaded)



Source: UNCTAD *Review of Maritime Transport*, various issues.

Table 4

World seaborne trade in 2006 and 2007, by type of cargo and country group

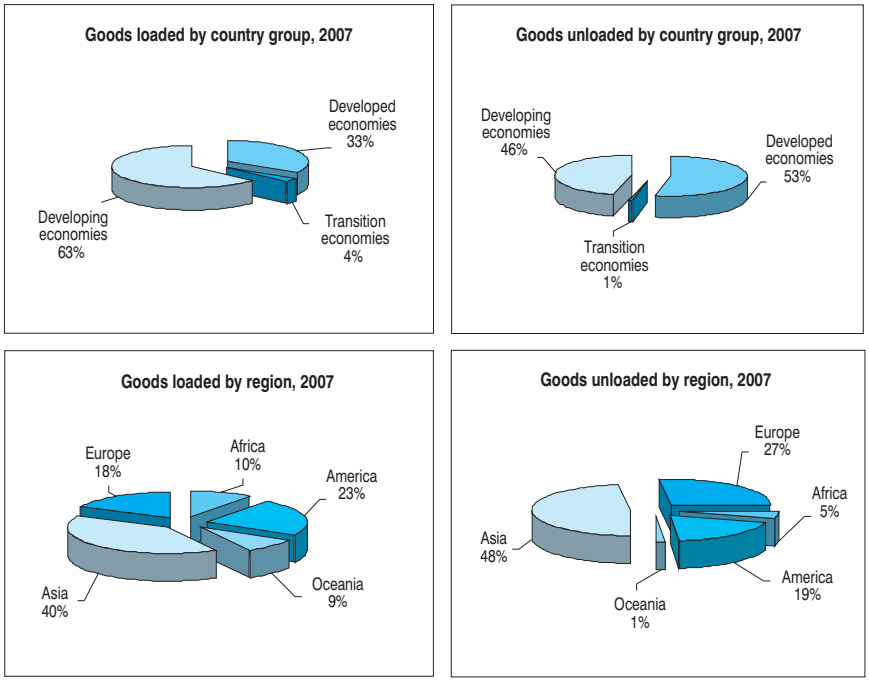
Country group	Year	Goods loaded				Goods unloaded			
		Total	Crude	Products	Dry cargo	Total	Crude	Products	Dry cargo
		Millions of tons							
World	2006	7 652	1 802	792	5 057	7 761	1 929	839	4 993
	2007	8 023	1 866	815	5 341	8 032	1 963	839	5 230
Developed economies	2006	2 621	135	365	2 121	4 174	1 294	509	2 370
	2007	2 672	136	371	2 165	4 263	1 302	507	2 454
Transition economies	2006	258	115	47	95	55	6	3	46
	2007	284	129	51	105	58	6	3	49
Developing economies	2006	4 773	1 552	380	2 841	3 532	629	327	2 576
	2007	5 069	1 602	393	3 074	3 712	655	329	2 728
Africa	2006	780	475	60	246	333	43	34	255
	2007	835	508	63	263	366	45	38	284
America	2006	1 090	272	70	748	341	49	51	241
	2007	1 176	271	73	833	351	52	55	244
Asia	2006	2 897	801	251	1 845	2 846	537	235	2 074
	2007	3 052	819	257	1 976	2 982	558	229	2 194
Oceania	2006	7	4	0	2	12	0	7	6
	2007	7	4	0	2	13	0	7	6
		Percentage share							
World	2006	100.0	23.6	10.3	66.1	100.0	24.9	10.8	64.3
	2007	100.0	23.3	10.1	66.6	100.0	24.4	10.4	65.4
Developed economies	2006	34.2	7.5	46.0	41.9	53.8	67.1	60.7	47.5
	2007	33.3	7.3	45.6	40.5	53.1	66.3	60.5	46.9
Transition economies	2006	3.4	6.4	6.0	1.9	0.7	0.3	0.3	0.9
	2007	3.5	6.9	6.2	2.0	0.7	0.3	0.3	0.9
Developing economies	2006	62.4	86.1	48.0	56.2	45.5	32.6	38.9	51.6
	2007	63.2	85.8	48.2	57.5	46.2	33.3	39.2	52.1
Africa	2006	10.2	26.4	7.5	4.9	4.3	2.2	4.1	5.1
	2007	10.5	27.2	7.7	4.9	4.6	2.3	4.6	5.1
America	2006	14.2	15.1	8.8	14.8	4.4	2.6	6.0	4.8
	2007	14.7	14.5	8.9	15.6	4.4	2.6	6.7	4.7
Asia	2006	37.9	44.4	31.7	36.5	36.7	27.8	28.0	41.5
	2007	38.0	43.9	31.6	37.0	37.1	28.4	27.3	41.9
Oceania	2006	0.1	0.2	0.0	0.0	0.2	0.0	0.8	0.1
	2007	0.1	0.2	0.0	0.0	0.2	0.0	0.8	0.1

Source: Compiled by the UNCTAD secretariat on the basis of data supplied by reporting countries, ports and specialized sources.

Figure 4

World seaborne trade, by country groups and region

(Percentage share in tonnage)



Source: Compiled by the UNCTAD secretariat on the basis of data supplied by reporting countries, ports and specialized sources.

Maritime transport remains the backbone of international trade with over 80 per cent of world merchandise trade by volume being carried by sea. During the past three decades, the annual average growth rate of world seaborne trade is estimated at 3.1 per cent. At this rate, global seaborne trade would be expected to increase by 44 per cent in 2020 and double by 2031, potentially reaching 11.5 billion tons and 16.04 billion tons, respectively.

> … maritime transport will likely be included in any future discussions on global emerging concerns such as security, air pollution and climate change.

Although maritime transport has generally been associated with the carriage of high-volume low-value goods (e.g. iron ore and coal), over recent years the share of low-volume, high-value goods (e.g. manufactured goods) carried by sea has been growing. According to WTO, manufactured goods account for over 70 per cent of world merchandise trade by value. Traded manufactured goods include consumption goods as well as intermediate goods, parts and semi-finished products that have expanded in tandem with intra-company trade, international outsourcing and globalization. As much of this trade is carried in containers, world containerized trade has grown significantly and is expected to grow over the coming years at a pace that will require a doubling of the container handling capacity. In addition to economies of scale associated with larger cargo volumes, the container shipping sector is increasingly investing in larger containerships to further capitalize on these economies and reduce costs. Traditional agricultural bulk cargo (e.g. grain) are increasingly being transported in containers, avoiding the higher freight rates in the bulk market and reflecting the greater economies of scale available to larger containerships. These considerations highlight the economic importance of maritime transport and the potential for further growth in this sector and the expansion of the maritime cargo base to include lower-volume, higher-value goods.

Given its economic importance and in view of its projected growth, maritime transport will likely be

increasingly included in any future discussions on global emerging concerns such as security, air pollution and climate change. In relation to security, maritime transport is already at the centre of attention given the flurry of national as well as international supply chain security initiatives adopted or planned (see chapter 6). Environmental considerations are also gaining momentum in view of sustainable development objectives, the climate change challenge and concerns over growing air pollution. Heavy oil burned in ships' bunkers contains a high level of sulphur. As a result, and fuelled by growth in seaborne trade, shipping is responsible for high levels of sulphur oxide and nitrogen oxide emissions. Environmentalists point to ships' emissions as a major source of air pollution that if unchecked could by 2012 cause over 80,000 premature deaths each year.[8] Work is underway at IMO to address emissions of air pollutants from shipping, including through annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL 1973/78/97). As work is ongoing, maritime transport and its contribution to air pollution are, therefore, expected to remain on the international agenda for years to come (see chapter 6 for additional information on environmental-related initiatives currently under consideration at IMO).

In contrast, greenhouse gas emissions from maritime transport and related climate change implications have so far received limited attention. IMO has recently estimated the total fuel consumption by ships at 369 million tons in 2007 and has projected that, by 2020, consumption will grow by over 30 per cent to reach 486 million tons. These consumption levels result in carbon dioxide (CO_2) emissions from ships totalling 1,120 million tons in 2007 and 1,475 million tons in 2020. These amounts are equivalent to 4 per cent of CO_2 emissions from global fuel combustion.[9] No mandatory instrument has been adopted yet to regulate greenhouse gas emissions from maritime transport. While work on greenhouse gas emissions under IMO is at its preliminary stage, greenhouse gas emissions from international ship bunkers have so far been excluded from the international regulatory instrument dealing with climate change, namely the Kyoto Protocol. With current negotiations of a Post-Kyoto agreement expected to be concluded in December 2009, maritime transport and related energy consumption and greenhouse gas emissions are likely to attract further international attention.

2. World shipments by country groups

Strong consumer demand and rapid industrial expansion in emerging developing economies continue to drive growth in world seaborne trade. The majority of developing and transition economies are dependent on the commodity sector, including fuels, as their largest source of revenue, employment and foreign exchange. Over 100 developing economies, including least developed countries and transition economies, derive more than 40 per cent of their export earnings from the export of primary commodities. This reliance on the commodity sector is reflected in the composition of their seaborne trade.

The structure of developing economies' seaborne imports highlights the growing energy needs in these countries and the expansion of South–South trade. Rapid economic growth and industrial production (e.g. China and India) have spurred growth in oil imports by developing countries. Africa and Latin America are increasingly becoming suppliers of China's primary commodity needs, while China's consumer goods are increasingly exported to Africa and Latin America. In 2006, over 70 per cent of China's exports to Africa were manufactured goods, while around 60 per cent of Africa's exports to China consisted of fuels. During the same year, fuels and other minerals made up 40 per cent of Latin America's exports to China, while over 60 per cent of China's exports to Latin America were manufactured goods. It is expected that both developed and developing economies will continue to be heavily dependent on fossil fuel sources of energy. Coal is already emerging as a supplement and, potentially, an alternative to oil and gas. By far one of the most polluting fossil fuel sources, growth in coal use raises some environmental concerns. Addressing environmental implications of coal-fired power plants, while meeting energy demands of growing developing economies, remains a challenge.

Developed economies

In 2007, developed economies accounted for 33.3 per cent of global goods loaded. Within this grouping, Europe was the major player and dry cargo the main cargo flow, followed by petroleum products (exports) and crude oil (imports). Europe's share of world goods loaded amounted to 14.8 per cent, followed by Australia and New Zealand (8.5 per cent combined), North America (7.9 per cent) and Japan and Israel (2.2 per

cent combined). Europe is the destination of 26.9 per cent of world crude oil shipments, 32.8 per cent of petroleum products and 24.9 per cent of dry cargo. North America accounted for 14.8 per cent of world goods unloaded, followed by Japan and Israel (10.8 per cent), and Australia and New Zealand (1.2 per cent).

Developing economies

In contrast with developed nations, developing economies contribute a larger share of global exports than imports. In 2007, 63.2 per cent of goods loaded in the world originated in developing regions, while 46.2 per cent of world's shipments were unloaded at ports in developing countries. Reflecting their trade structure, ports in developing countries loaded 85.8 per cent of total world crude oil exports and 48.2 per cent of total world exports of petroleum products. In terms of goods unloaded, ports in developing economies accounted for 52.1 per cent of world dry cargo imports, 39.2 per cent of world petroleum products and 33.3 per cent of crude oil. Developing Asia's dominance both as a loading and unloading area is maintained with a share of 38 per cent with respect to goods loaded and 37.1 per cent of goods unloaded. Transition economies accounted for 3.5 per cent of world goods loaded and 0.7 per cent of world goods unloaded. Oil shipments loaded at their ports are estimated to have reached 6.9 per cent of total world oil loaded, reflecting in particular oil shipped from the Black and Baltic Seas.

3. Demand for shipping services

Table 5 provides data on total demand for shipping services measured in ton-miles. In 2007, world seaborne trade was estimated at 32,932 billion ton-miles. This represents an increase of 4.7 per cent over the previous year. With China and others seeking to diversify their energy suppliers by tapping into distant markets, ton-miles for crude oil and oil products increased by 2.5 per cent. The share of crude oil imports into China from sources other than the Middle East and the Russian Federation is growing. For example, China's oil imports from Angola rose from 14 per cent in 2004 to 17 per cent in 2007.

Table 5

World seaborne trade in ton-miles, selected years

(Billions of ton-miles)

Year	Oil			Iron ore	Coal	Grain[a]	Five main dry bulks[b]	Other dry cargoes	World total
	Crude	Products	Crude plus products						
1970	5 597	890	6 487	1 093	481	475	2 049	2 118	10 654
1980	8 385	1 020	9 405	1 613	952	1 087	3 652	3 720	16 777
1990	6 261	1 560	7 821	1 978	1 849	1 073	5 259	4 041	17 121
2000	8 180	2 085	10 265	2 545	2 509	1 244	6 638	6 790	23 693
2001	8 074	2 105	10 179	2 575	2 552	1 322	6 782	6 930	23 891
2002	7 848	2 050	9 898	2 731	2 549	1 241	6 879	7 395	24 172
2003	8 390	2 190	10 580	3 035	2 810	1 273	7 464	7 810	25 854
2004	8 795	2 305	11 100	3 444	2 960	1 350	8 139	8 335	27 574
2005	9 239	2 510	11 749	3 918	3 113	1 686	9 119	8 730	29 598
2006	9 495	2 635	12 130	4 192	3 540	1 822	9 976	9 341	31 447
2007	9 685	2 755	12 440	4 790	3 750	1 857	10 827	9 665	32 932

Source: Fearnleys *Review*, various issues.

[a] Includes wheat, maize, barley, oats, rye, sorghum and soya beans.

[b] Includes iron ore, coal, grain, bauxite/alumina and phosphate.

For all dry cargoes, ton-miles increased by 6.1 per cent with ton-miles for the five major dry bulks growing even faster (8.5 per cent). For the remaining dry cargoes (minor bulks and liner cargoes), ton-miles expanded by 3.5 per cent. Ton-miles for dry bulk cargoes may be expected to continue to grow with China's iron ore needs being increasingly met by new suppliers such as Latin America.

Energy and primary commodity needs of emerging developing economies are on the rise. Some emerging countries have even evolved from being net exporters to net importers of certain primary commodities. For many of these countries, it may be necessary to find new suppliers in distant locations, thus increasing the ton-miles. Additionally, policies aimed at enhancing energy security and combating climate change may contribute to reshaping global trade patterns, suppliers' distribution and distances travelled. Examples of measures that might have a bearing on shipping include:

Some emerging countries have even evolved from being net exporters to net importers of certain primary commodities.

the United States Energy Independence and Security Act of 2007, which aims at helping reduce America's dependence on oil by increasing the supply of alternative fuel sources and reducing the demand for oil; and

the European Commission proposal for Climate Action, which includes a directive that sets, by 2020, an overall binding target for the European Union of 20 per cent renewable energy and a 10 per cent minimum target for the market share of biofuels.

Such policies may lead to increased trade in non-conventional fossil fuels as well as biofuels and their production inputs (e.g. corn). Trade in biofuels and non-conventional fossil fuels could also have implications for the composition of the world fleet, in particular the tanker and handymax market segments. It could also impact on routes as new infrastructure is developed to handle the potential growth in non-traditional fuel sources.

C. SECTORS OF WORLD SEABORNE TRADE

In addition to the supply-side factors (e.g. fleet, transport infrastructure and cargo availability), the performance of seaborne trade is dictated by demand-side considerations such as the level of development (e.g. mature, emerging or growing economies), the structure of the economy (e.g. services economy, industrial or agricultural-based economies), the political and regulatory framework (e.g. trade liberalization and regional integration) as well as unforeseen events (e.g. weather, strikes and political unrest). The following section reviews some developments affecting seaborne trade in 2007.

1. Seaborne trade in crude oil and petroleum products[10]

General developments affecting oil seaborne trade

A number of developments affected the oil sector in 2007. These included the depreciation of the United States dollar, geopolitical risks in production and exporting areas, extreme weather events, refinery capacity limitations as well as rigid OPEC production quotas.[11] A major development, however, has been the relentless rise of oil prices, which continued into 2008. For example, the spot price of a barrel of Brent averaged $72.54 per barrel (pb) during the year but reached $96.68 pb in November. By the end of 2007, prices had increased by more than 60 per cent as compared with the start of the year. In 2008, prices hit the $100 pb mark, increased over $145 pb in July before falling to $95.47 in September.[12] Rising oil prices in 2007 and 2008 have been driven by a combination of factors, including fluctuating strategic oil stock levels, geopolitical tensions and adverse weather conditions. The "speculation effect" has also been referred to by some observers as a contributing factor to the record high oil prices. The weakness of the United States dollar and the volatility in international financial markets have generated interest in commodities, including oil, which is primarily priced in dollars and is perceived as an effective protection against dollar weakness.

A more fundamental reason explaining the steady rise in oil prices observed over the past few years relates to supply and demand pressures. Fuelled by population expansion and economic growth in emerging developing economies, growth in oil demand has been matched by slower growth in supply. Oil supply is constrained by the availability of the oil reserves, investment requirements, the affordability of oil production and the lag between the time an oil field is discovered and the time oil is actually produced. Another structural

constraint is the finite amount of non-renewable fossil fuels and the prospect of production growth reaching a peak and declining thereafter. The proposition that global oil production has already reached its peak or is about to do so within few years ("peak oil") is increasingly gaining ground, and similar propositions are emerging regarding other fossil fuel sources, such as "peak gas" and "peak coal", in recognition of the finite nature of all fossil fuels.[13] The most common measure of the adequacy of proved reserves relative to annual production is the reserve-to-production ratio, which describes the number of years of remaining production from current proved reserves at current production rates. For the past 25 years, the United States ratio has been between 9 and 12 years, while the major oil-producing countries of OPEC have maintained ratios of 20 to 100 years.[14] Based on data on world energy, proved reserves and production levels at the end of 2007,[15] and assuming that the world's oil production recorded in 2007 continues at the same level into the future, oil is expected to last 41.6 years, while natural gas and coal will respectively last 60.3 years and 133 years. Many geologists and oil experts are of the view that oil production has already reached its maximum and has therefore started to decline.[16]

In 2007, OECD and OPEC accounted for 66.1 per cent of world crude oil production.

The International Energy Agency (IEA) *World Energy Outlook 2007* (WEO), projects the world's primary energy needs in the reference scenario (i.e. assuming that no new policies are adopted), to grow by 55 per cent between 2005 and 2030. China and India are expected to account for 45 per cent of this growth, with much of the additional demand likely to be met by increased imports. To meet the projected global demand in 2030, about $22 trillion of infrastructure-related investments (e.g. offshore rigs, pipelines, refineries and pump units) are needed. While rising prices could lead to substituting oil by coal and non-convention fossil fuels, they also have the potential to provide an incentive to undertake the requisite investments in energy-related infrastructure, technology and alternative energy. Investing in alternative energy sources including biofuels can have ripple effects for other sectors such as agricultural products and their trade.

To sum up, rising oil prices, supply-side constraints and increasing demand pose a great challenge for global trade, as well as maritime seaborne trade and transport. Section D (see page 25) of the present chapter takes up the issue of the potential impact of rising fuel costs on maritime transport and assesses some of the possible ramifications for trade and its geography.

Oil production and consumption

In 2007, global oil production[17] measured in million barrels per day (mbpd) decreased by 0.2 per cent to reach 81.5 mbpd. Despite supply-side constraints and rising oil prices, oil consumption[18] did not contract but instead outstripped oil production. Firm oil demand partly reflects, with respect to OECD, the high price inelasticity of transportation fuels, especially in North America, as well as the heating needs and electricity requirements of other OECD members. In non-OECD regions, especially in emerging developing economies, oil demand is mainly driven by economic growth.

Oil supply is concentrated in Western Asia, transition economies, North America and Africa. In 2007, OECD and OPEC accounted for 66.1 per cent of world crude oil production. Production in OPEC countries fell by 1.2 per cent, leading to a slight drop in the group's market share (43 per cent in 2007 against 43.5 per cent in 2006). During the same year, production in OECD countries also declined by 1.4 per cent, while market share fell from 23.8 per cent in 2006 to 23 per cent in 2007 (see figure 5).

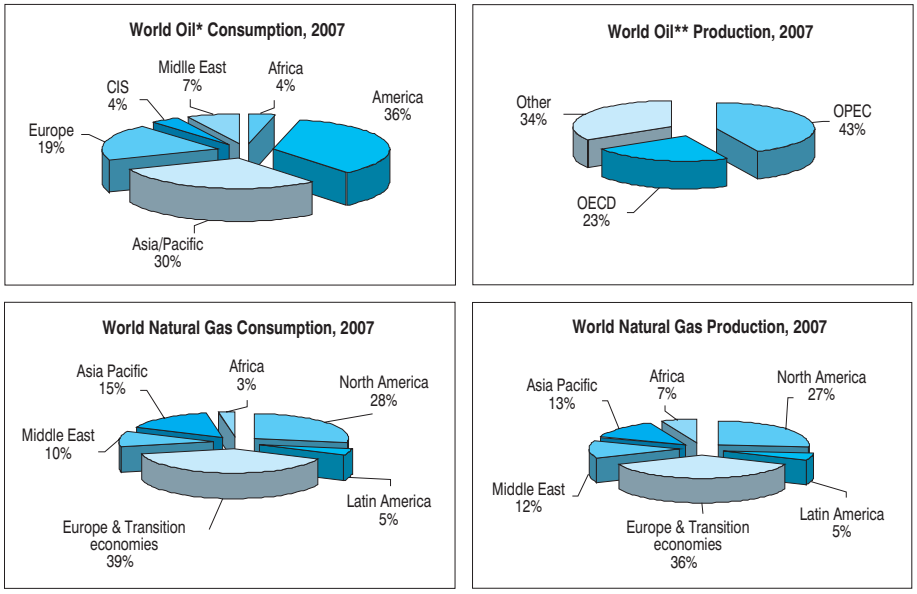
OPEC members

In 2007, Angola, Iraq, the Islamic Republic of Iran, Qatar and the Libyan Arab Jamahiriya increased production, while the remaining OPEC members recorded a drop. Production was constrained by, among other things, OPEC's implementation of the 500,000 bpd cut in February 2007. The world's largest oil producer, Saudi Arabia, accounted for 12.8 per cent of total world production in 2007 and remained the main producer within OPEC, with a share of 29.3 per cent. Other major producers within the group included the Islamic Republic of Iran (12.6 per cent) and the United Arab Emirates (8.1 per cent). The share of OPEC members outside Western Asia and Africa (Indonesia and the Bolivarian Republic of Venezuela) dropped from 11.4 per cent in 2006 to 10.8 per cent in 2007. African members increased their share from 17.1 per cent in 2007

Figure 5

Oil and natural gas: major producers and consumers, 2007

(Percentages)



Source: UNCTAD secretariat on the basis of data published in BP *Statistical Review of World Energy*, June 2008.

* Includes inland demand, international aviation, marine bunkers, refinery fuel and loss, as well as fuel ethanol and biodiesel.

** Includes crude oil, shale oil, oil sands and NGLs (the liquid content of natural gas where this is recovered separately). Excludes liquid fuels from other sources such as biomass and coal derivatives.

to 22 per cent in 2007, reflecting, in part, the contribution of Angola, who joined OPEC in December 2006, the first addition to OPEC's membership since the 1970s.

OECD members

In 2007, North America remained the main crude oil producer among OECD members, with a share of 71.3 per cent. The United States, which accounted for more than one third OECD's oil production, increased its output. In 2007, production in the 27 European Union countries decreased by 1.1 per cent, reflecting the unchanged production level in the United Kingdom and the 7.7 per cent drop in Norway's production. Such reduction could be attributed, among other factors, to the maintenance-related temporary production shutdown at the Kvitebjoern condensate field in the North Sea. Elsewhere, the 2007 cyclones off the coast of north-west Australia, which caused a production shutdown of about 175,000 bpd of offshore crude oil, seemed to have had limited impact on Australia's production, which increased by 1.8 per cent.

Other producers

In 2007, the total production of non-OPEC and non-OECD countries, including the Russian Federation, China and Brazil, increased by 1.9 per cent over the previous year. With a total of 27.1 mbpd, the market share of these countries increased from 32.6 per cent in 2006 to 33.3 per cent in 2007. The Russian Federation, the world's second-largest producer, increased production by 2.2 per cent to reach about 10 mbpd. Other producers are reported to have either decreased (e.g. China and Argentina) or only marginally increased (Brazil and India) their production levels.

Refinery developments

Total throughput of world refineries reached about 75.5 mbpd in 2007. Over half of the world's output is produced in OECD countries' refineries**.** This share marginally decreased over the past few years, reflecting the challenge facing refinery capacity expansion in these regions due to, inter alia, environmental restrictions and the general public's resistance to refinery expansion.

In 2007, Europe and transition economies were the largest producers, with a combined production of 20.8 mbpd. The next largest contributor to world refineries' output was North America, with a production of 18.4 mbpd. These amounted to world refinery market shares of 27.6 per cent for Europe and the transition economies, and 24.4 per cent for North America. Emerging developing economies are increasingly investing in new refinery capacity. In the Middle East, plans to upgrade existing refineries and build new units are being drawn. At the start of 2008, 180 projects for increasing refinery capacity and 50 projects for new refineries were being considered.[19] Elsewhere, refinery capacities are also expanding. Worth noting is the excess refinery capacity of India, which includes a number of terminals dedicated to handling exports.

Crude oil shipments

In 2007, the share of tanker trade in the total world seaborne trade amounted to 33.4 per cent. World shipments of tanker cargoes reached 2.68 billion tons, of which more than two thirds were crude oil. During the same year, crude oil seaborne shipments increased by an estimated 3.5 per cent, to reach 1.86 billion tons (see table 4). Major loading areas are mainly located in developing regions, with Western Asia topping the list (726.7 million tons). Other loading areas include Western Africa (238.6 million tons), Northern Africa (139.6 million tons), the Caribbean and Central America (119.8 million tons), South America's northern and eastern seaboards and Central Africa (117.4 million tons each). Major unloading areas are located in developed regions, including Europe (528.4 million tons loaded), North America (534.4 million tons) and Japan (211.5 million tons). Major unloading developing regions included Southern and Eastern Asia, with 424.8 million tons and South-Eastern Asia, with 95.8 million tons, reflecting growing energy requirements in developing Asia, and an evolving intraregional South–South trade.

World shipments of tanker cargoes reached 2.68 billion tons, of which more than two thirds were crude oil.

Shipments of petroleum products

In 2007, world shipments of petroleum products are estimated to have increased by 2.8 per cent to reach 814.7 million tons. In general, shipments of products are affected by the global refinery capacity, the driving season in the United States (i.e. an increase in motor vehicle use between May and September) as well as the weather conditions, which impact on seasonal fuel consumption. In 2007, developed regions accounted for 60.4 per cent of world product imports, while developing and transition economies made up the balance. In addition to seasonal factors (i.e. heating and driving season), as well as structural (i.e. a decision to specialize in producing particular products and importing others, maintenance requirements) and strategic factors (stock building), demand for petroleum products is dictated by the wider international environment, including the performance of the world economy. Nevertheless, demand for petroleum products remains subject to unforeseen events, including natural disasters and weather-related incidents. For example, the earthquake in Japan at the end of summer 2007 disrupted the activities of a large nuclear reactor, leading to an increased demand for oil and gas imports.

Natural gas production and consumption

In 2007, world production of natural gas expanded by 2.4 per cent over the previous year, taking the total to 2,940 billion cubic metres (bcm). Expressed in million tons oil equivalent (mtoe), total production amounted to 2,654. The Russian Federation remained the world's largest producer, with a market share of 20.6 per cent, followed by the United States, with a world share of 18.6 per cent. Other producers included Canada (6.2 per cent), the Islamic Republic of Iran (3.8 per cent), Norway (3 per cent), Algeria (2.8 per cent), China (2.3 per cent), Indonesia (2.2 per cent) and Malaysia (2 per cent) (see figure 5).

In 2007, world natural gas consumption increased by 3.1 per cent to reach 2,922 bcm or 2,638 mtoe. The

United States and the Russian Federation were the main natural gas consumers, with their shares in world total consumption amounting to 22.3 per cent and 15 per cent, respectively. Other major consumers included the Islamic Republic of Iran (3.8 per cent), Canada (3.2 per cent), Japan and the United Kingdom (3.1 per cent each).

Liquefied natural gas shipments

Liquefied natural gas (LNG) shipments are estimated to have increased by 7.3 per cent between 2006 and 2007 to reach 226.4 bcm, with growth being mainly driven by the additional capacity provided by liquefaction and purification facilities that started up in 2006 as well as those that were completed in 2007 (e.g. Nigeria and Equatorial Guinea). Major LNG importers included a mix of developed and developing countries, namely Japan, the Republic of Korea, the United States, Spain, France and India. Main LNG exporters are located in developing regions, with Qatar – the world largest exporter – accounting for 17 per cent of world natural gas exports. Other exporters included Malaysia (13.1 per cent), Indonesia (12.2 per cent), Algeria (10.9 per cent), Nigeria (9.3 per cent), Australia (9 per cent), and Trinidad and Tobago (8 per cent). Other smaller players were Egypt, Oman and Brunei Darussalam. Together, Japan and the Republic of Korea accounted for over half the world natural gas imports. Other major natural gas importers in 2007 included Spain, the United States, France, and Taiwan Province of China.

Liquefied natural gas (LNG) shipments are estimated to have increased by 7.3 per cent between 2006 and 2007.

LNG trade is set to grow. Capacity expansion plans are proliferating, with projects spanning Qatar, Nigeria, Australia, Trinidad, the Russian Federation, Yemen and Peru. In preparation for the additional supply resulting from these projects, many countries and regions – including the United States, Canada, Europe, South America and Asia – have taken steps to boost investments in the development of import terminals. A separate development worth noting is the recently concluded agreement between the Russian Federation natural gas monopoly Gazprom and the French group Total. The agreement gives Total a share of 25 per cent in the project involving the Russian Federation's Shtokman natural gas field in the Barents Sea. The Shtokman field is reported to be one of the world's largest undeveloped natural gas fields, and is estimated to hold 130 trillion cubic feet. Phase 1 of the Shtokman project is expected to become operational in 2013, supplying 835 billion cubic feet of natural gas per year. The intent is to export LNG to Europe via pipeline and to North America via tanker, suggesting a scope for further growth in the LNG trade and demand for specialized LNG carrying capacity. Over the past few years, LNG carriers have almost doubled in size, with the Marshall Islands-registered *Al Gattara* being the largest LNG carrier in the world.

Metal industries are key to the development of emerging and maturing economies.

2. Dry cargo shipments[20]

General developments

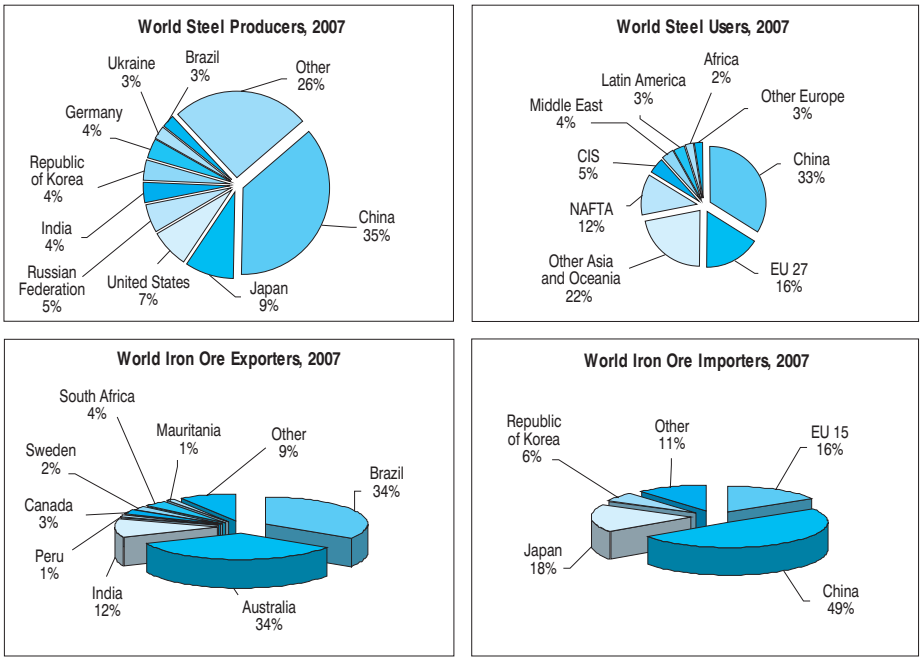
In 2007, dry cargo shipments continued to grow at a firm rate (5.6 per cent over the previous year) to reach 5.34 billion tons. These shipments accounted for 66.6 per cent of total world goods loaded. Trade in the major dry bulks (iron ore, coal, grains, bauxite/alumina and rock phosphate) was estimated at 2.0 billion tons. The difference was made up of minor bulks and liner cargoes, which together were estimated at 3.34 billion tons. Figures 6 (a) and (b) present an overview of major players involved in the production, consumption and trade of some major dry bulks.

Demand for dry bulk commodities is driven, inter alia, by industrial production and growth requirements. Metal industries are key to the development of emerging and maturing economies, whose economic growth rests heavily on the availability of steel, iron ore, coal and other minerals. Containerized traffic is also a major driver of growth in the dry bulk trade. Strong growth in container trade is fuelled by increased demand for consumer goods in developing regions, growth in intra-company trade and production inputs (parts and semi-finished goods) and increasing containerization of some traditional agricultural bulks. Against this background, the following section presents some of the main developments that affected the maritime dry cargo segment in 2007.

Figure 6 (a)

Major bulks (steel and iron ore): producers, consumers and traders in 2007

(World market share in percentages)



Source: UNCTAD secretariat on the basis of data supplied in Clarkson Research Services, *Shipping Review & Outlook*, spring 2008, *Dry Bulk Trade Outlook*, May 2008, International Iron and Steel Institute (IISI), IISI Short Range Outlook, April 2008.

World crude steel production

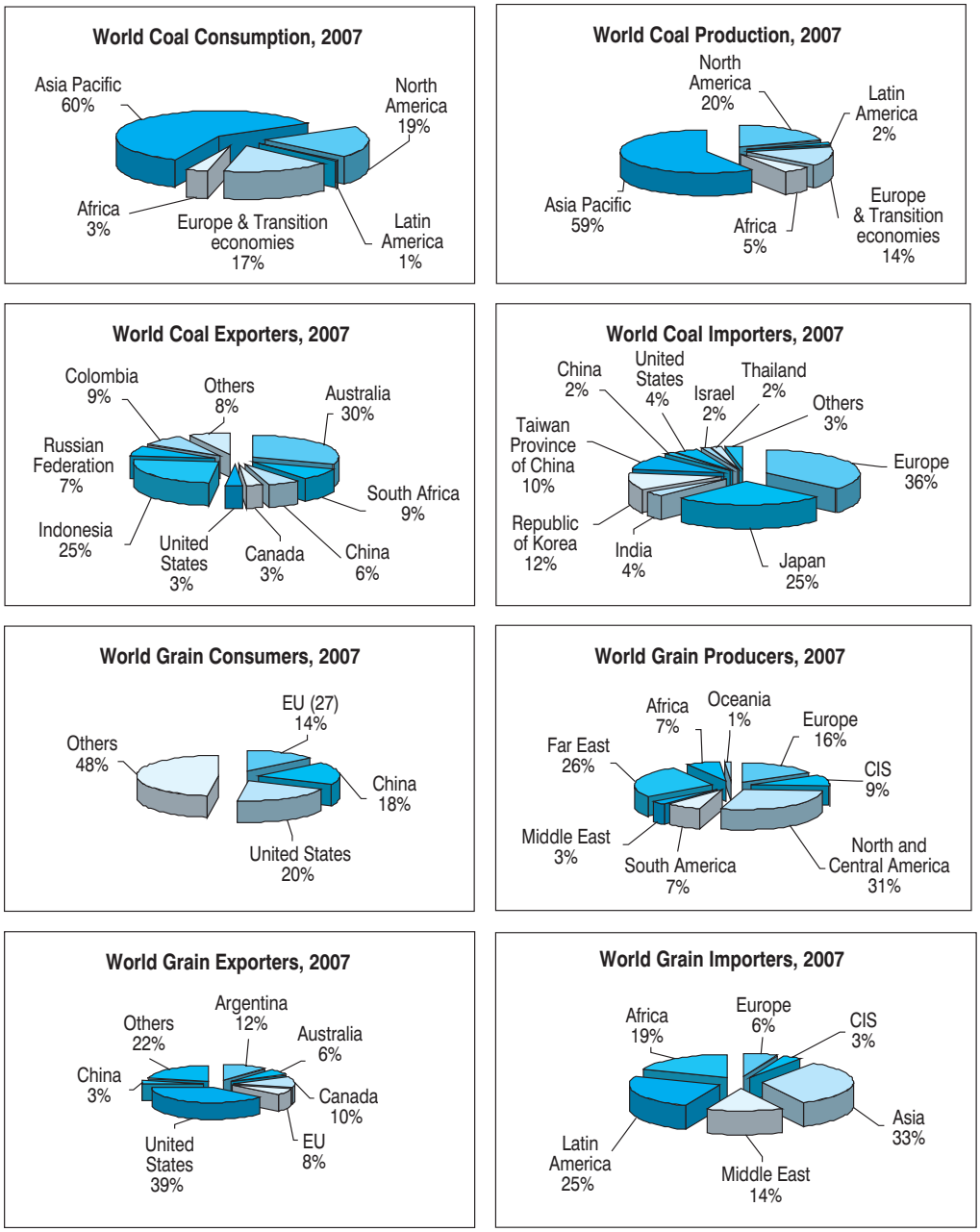
For the fourth consecutive year, world crude steel production passed the 1 billion tons mark in 2007. An annual increase of 7.5 per cent carried production to 1.3 billion tons. Asia accounted for more than half of the world's total production. Excluding China, the world crude steel production would have only grown by 3.3 per cent. However, with an output of 489 million tons in 2007, China remained the world's largest producer, with a world market share of 35 per cent in 2007 (33.8 per cent in 2006). Japan, the second-largest crude steel producer, increased its output by 3.4 per cent to reach 120.2 million tons. While crude steel production increased only marginally in Africa and North America, growth in the Middle East (6.7 per cent), South America (6.5 per cent) and Europe (2.8 per cent) benefited global crude steel production. Positive performances included those by Turkey (10.7 per cent), Brazil (9.4 per cent), India (7.3 per cent), the Republic of Korea (6 per cent), Ukraine (4.6 per cent), the Russian Federation (3.1 per cent) and, to a lesser extent, other producers such as Italy, Spain, the Islamic Republic of Iran, Germany, Canada, Mexico, the United Kingdom and Poland. In contrast with 2006, crude steel production in the United States declined by 1.4 per cent to 97.2 million tons.

Environmental sustainability and corporate social responsibility are increasingly gaining ground among companies, including those in the steel industry. During the United Nations Conference on Climate Change held in Bali in December 2007, the global steel industry, through the International Iron and Steel Institute (IISI), challenged Governments to cooperate with the industry to find new methods for combating climate change. More specifically, IISI members called on Governments to replace cap and trade emission regimes with innovative approaches that would reconcile climate change mitigation objectives with industry growth and efficiency.[21] This development is relevant to the extent that the concept of green and sustainable logistics could

Figure 6 (b)

Major bulks (coal and grain): producers, consumers and traders in 2007

(World market share in percentages)



Source: UNCTAD secretariat on the basis of data supplied in Clarkson Research Services, *Shipping Review & Outlook*, Spring 2008; *Dry Bulk Trade Outlook*, May 2008; The Economist Intelligent Unit, *World commodity forecasts: food, feedstuffs and beverages*, May 2008, International Grains Council and BP *Statistical Review of World Energy*, June 2008.

be further advanced. With end users increasingly examining the level of "greening" by companies along the supply chain, and shippers demanding environmentally sound transportation, joining efforts with maritime transport users like the steel industry could result in co-benefits accruing to both industries. Shipping companies are increasingly incorporating a "triple bottom line" approach in their reporting by quantifying and reporting environmental and human impacts alongside profits. For example, preferential contracting between environmentally sound shipping companies and environmentally conscious users is already emerging. Outside the steel industry, preferential contracting is being used, for example, by IKEA and Wal-Mart, who have developed initiatives to ensure that ocean carriers that handle their business have a satisfactory environmental record.[22]

Shipping companies are increasingly incorporating a "triple bottom line" approach in their reporting by quantifying and reporting environmental and human impacts alongside profits.

World steel consumption

World steel consumption grew by 6.6 per cent in 2007, bringing the total to 1.2 billion tons. While Asia, driven by China, remains the largest world consumer. Consumption growth was also strong in the Middle East and Latin America (12.7 per cent each), CIS countries (13.7 per cent) and non-EU European countries (9.4 per cent). Consumption grew by 10 per cent in Asia and Oceania, with China growing at 14.6 per cent. Steel consumption increased by 3.4 per cent in the 27 European Union countries, 9.4 per cent per cent in other European countries and 8.5 per cent in Africa. The North American Free Trade Agreement NAFTA is the only regional group that recorded a negative growth rate (-9.1 per cent), due to a slowdown in their economies, and in particular that of the United States. As a result, growth in world steel consumption and related trade and transport, have mainly been fuelled by the BRIC countries (Brazil, Russian Federation, India and China).

Iron ore shipments

An increase in steel production stimulates the growth of iron ore shipments, which were estimated at 792 million tons in 2007. All exporters increased their volumes in 2007, albeit at different rates. Together, Australia and Brazil accounted for over two thirds of world iron ore exports. Brazil overtook Australia as the world's largest iron ore exporter and increased its volumes by 11.1 per cent, to reach 269.4 million tons. Exports from Australia amounted to 266.8 million tons, an increase of 7.4 per cent over 2006. The balance of world iron ore exports originated in India (90.1 million tons), South Africa (30.3 million tons), Canada (22.9 million tons), Sweden (19 million tons) and, to a lesser extent, Mauritania and Peru.

With 383.6 million tons unloaded in Chinese ports in 2007, China remained the main destination for world iron ore shipments, reflecting its booming steel production sector. Its imports grew by 17.6 per cent over 2006, and its world market share increased to 48.9 per cent. Other major importers included Japan, with 135.3 million tons (2.3 per cent increase) and Western Europe, with 138.9 6 million tons (2.7 per cent). Lesser importers in Asia – such as the Republic of Korea and Malaysia – recorded increases of respectively, 2.2 and 0.6 million tons. Imports into Taiwan Province of China, Pakistan and Indonesia remained steady, while the Philippines recorded a drop in import volumes (2.2 million tons). Worth noting is the sharp decline in import volumes of the United States (-25 per cent) as well as Latin America (-17.6 per cent). Europe and the Middle East both recorded some growth in iron ore imports, while Africa showed a marginal increase.

To sum up, iron ore trade grew at a healthy rate in 2007, which provided further fuel to global dry cargo trade and demand for dry bulk fleet (see chapter 2). The physical distance between supply and demand (i.e. from Brazil to the Far East and from Australia to the European Union and regions other than Asia) contributed to the 8.5 per cent increase in the ton-miles of the five major dry bulks. While India is also a sizeable exporter, the drop in its exports in 2006 and a newly imposed export tax may limit its presence in the market. In view of the firm global demand for iron ore driven by Asian economies, iron ore shipments are likely to continue to be largely sourced from Brazil, which would increase the ton-miles of major dry bulks.

Coal production and consumption

Against a background of increasing global energy needs, heavy reliance on fossil fuel sources, rising oil prices and growing concerns over energy security, coal is

increasingly being used as a major source of power generation as well as a raw material for steel production. Large and widely dispersed world coal reserves, the reliability of supply routes in comparison with global oil supplies, and the increasing cost of oil and gas are increasingly making coal a safe, easy-to-transport, readily stored and, most importantly, affordable source of energy.

In 2007, world coal production increased by 3.3 per cent to reach 3,135.6 mtoe. China remained the world's largest producer, with a share of 41.1 per cent, followed by the United States (18.7 per cent), Australia (6.9 per cent), South Africa (4.8 per cent), the Russian Federation (4.7 per cent), India (5.8 per cent) and Indonesia (3.4 per cent). In 2007 – reflecting growing energy needs, including power generation requirements in developing economies – coal consumption was the fastest-growing fuel consumption. Growing by 4.5 per cent over 2006, the total world consumption reached 3,177.5 mtoe in 2007, representing 28.6 per cent of the world's primary energy consumption. Major coal consumers included China (41.3 per cent), the United States (18 per cent), India (6.5 per cent), Japan (3.9 per cent) and the Russian Federation (3 per cent).

Together, Indonesia and Australia accounted for over half the world's thermal coal shipments.

According to the IEA's *WEO 2007*, demand for coal is expected to grow by 73 per cent between 2005 and 2030. The main source of growth is the emerging developing economies, particularly China and India. In contrast, coal use in OECD countries grows marginally, with most of the increase coming from the United States. As previously noted, the concern with increased use of coal is the related significant carbon footprint. Coal is a big polluter and contributor to greenhouse gas emissions. Although emissions per capita remain lower, by 2010 China is expected to overtake the United States as the world's largest polluter. The question that remains is how climate change mitigation objectives could be reconciled with growing energy needs and use of coal as a supplement and alternative to oil and gas. In this context, the efficient and rapid deployment of relevant technologies (e.g. clean coal and carbon capture and storage) is necessary to ensure a sustainable use of coal that contributes to ensuring global energy security as well as improving the environmental performance of coal.

… how climate change mitigation objectives could be reconciled with growing energy needs …

World coal shipments

Reflecting a clear trend of increased reliance on coal, coal shipments are estimated to have reached 789.5 million tons in 2007, a volume increase of 6.2 per cent. Thermal coal is estimated at 574 million tons, representing 72.7 per cent of world coal shipments. Coking coal shipments increased for the sixth consecutive year, reaching 215.5 million tons. Thus, despite the infrastructure problems, including congestion and extreme weather conditions that affected Australia, Indonesia and South Africa, trade in coal continued to expand. With current plans for capacity expansion at mines and major ports, including in Australia, the coal trade is set to grow.

Together, Indonesia and Australia accounted for over half the world's thermal coal shipments. Since 2005, Australia has been overtaken by Indonesia as the largest thermal coal exporter. In 2007, Indonesia increased its thermal coal exports by 11.7 per cent to reach 196.1 million tons, while Australia recorded a 2.6 per cent fall. Other major thermal coal exporters in 2007 included South Africa (68.7 million tons), Colombia (66.5 million tons), China (45.3 million tons), the Russian Federation (52.8 million tons) and the Bolivarian Republic of Venezuela (8.3 million tons). With the exception of Australia (-2.6 per cent) and China (-15.6 per cent), all other countries increased their exports, with growth rates ranging from a low of 1.4 per cent in South Africa to a high of 11.4 per cent in Colombia.

In 2007, Australia remained the world's largest coking coal exporter, with a total of 132.4 million tons, an increase of 9.9 per cent over 2006. Other lesser exporters, such as Canada, have also expanded their export volumes. A marked growth was achieved by the United States, with an increase of 24.5 per cent. At the same time, China stood out, recording a drop in export volumes of more than 40 per cent. With increasing domestic demand, China is becoming a net importer of coal. With most of China's coal resources being located in inland provinces and the biggest increase in demand occurring in coastal regions, increased pressure on domestic transportation systems makes imports by sea more competitive and therefore benefit shipping and seaborne trade.

The main destinations of both types of coal shipments (thermal and coking) are Japan and the European Union, which together accounted for more than half the world's coal imports in 2007. In both cases, coal imports are dominated by thermal coal, with a share of 62.9 per cent for Japan and 76.7 per cent for the European Union. In 2007, thermal coal imports surged for the second consecutive year in China (65.6 per cent), Thailand (41.7 per cent), Chile (34.1 per cent) and India (24.3 per cent). Other thermal importers included the Republic of Korea, Taiwan Province of China, the United States and Israel.

The main destination of Australia's coal exports is Asia, where Australia has been competing with China and Indonesia and – more recently – with Viet Nam. With China gradually emerging as a net importer of coal, competition from the region will be limited to Indonesia and Viet Nam. Outside the region, Brazil, South Africa, Colombia, the United States and the Russian Federation compete mainly in the European market. However, demand for South African coal in India and the Asia-Pacific, including Japan and Korea, has been growing. Thus, coal from South Africa could compete with Australia's coal, especially when infrastructural constraints and logistical bottlenecks have been limiting Australia's supply. Ton-miles could also be expected to increase, as South Africa to Asia is a long haul.

Grain market

According to the International Grains Council, grain production, especially wheat, dropped from 1,604 million tons in 2006 to 1,575 million tons in 2007. The tight supply and the increased industrial demand contributed to higher world grain prices in 2007, which accelerated in 2008. Between May 2006 and May 2007, the price of United States wheat exports increased by 63 per cent. During the same period, the prices of maize, soybeans and rice grew by 48 per cent, 71 per cent and over 200 per cent, respectively.

World grain shipments are estimated to have grown at a modest rate of 2.4 per cent reaching 302 million tons in 2007.

The combined effect of weather conditions, increased biofuel production, increased demand for food items that depend on grains (e.g. meat) and rising oil prices (e.g. fertilizers) have contributed to current hikes in food prices. Weather conditions have caused poor harvests in some grain exporting regions, such as the European Union and Ukraine, while droughts have damaged crops in Australia. Biofuel production is competing with food consumption needs since, in addition to being the main food staple in many countries, grains are used as inputs in the production of biofuels. Similarly, increased demand for animal-based products such as meat and dairy leads to increased demand for grain-based animal feeds. Furthermore, rising oil prices increase agricultural production costs (e.g. energy and fertilizers), which ultimately lead to increased food prices. Finally, mirroring the trend in the oil market, the speculation factor has also been blamed for the surge in food staples, including rice and wheat. Increased cost of food is a social and political concern, especially for countries where governmental subsidy systems seemed insufficient to fully address the crisis. Protests in Morocco, Côte d'Ivoire, Mauritania, Senegal, Egypt and India are cases in point.[23]

World grain shipments are estimated to have grown at a modest rate of 2.4 per cent reaching 302 million tons in 2007. Wheat totalled about 103 million tons, while coarse grains such as corn, barley, soybeans, sorghum, oats, rye and millet totalled 199 million tons. In 2007, Canada and the United States accounted for 49 per cent of world grain exports (not including soybeans). Export growth in North America was driven by wheat in Canada and coarse grains in the United States. Argentina increased its share to 11.4 per cent, while Australia and the European Union recorded declines in their export volumes.

In 2007, Asia remained the main unloading area for grain (excluding soybean) with 72.8 million tons, followed by Latin America (54 million tons), Africa (42.4 million tons), the Middle East (31 million tons), Europe (13.6 million tons) and the CIS countries (7 million tons). Japan, by far the largest importer (10.8 per cent share in 2007), reduced its grain imports by 1.2 per cent. China recorded another year of negative growth, with grain imports falling by nearly half. Nevertheless, imports into Asia continued to grow (2.8 per cent), owing to moderate increases recorded by Indonesia, Malaysia and Viet Nam. Imports fell by 4.5 per cent in the Middle East and 10.3 per cent in Africa, while imports into Latin America and Europe recorded positive growth rates of 10.7 per cent and 15.6 per cent, respectively. Growth in import demand from Latin America partly reflects the increasing export revenues of net exporters of fuels and mining products.

Other bulk shipments

Bauxite and alumina are used in the production of aluminium. Bauxite ore is first refined to produce aluminium oxide or alumina, which is then turned into aluminium metal through a smelting process. Together, China, Guinea, Australia, Jamaica, Brazil and India account for more than 80 per cent of the world's bauxite production.

In 2007, world trade of bauxite and alumina is estimated to have reached 82 million tons, almost equally split between the two minerals. During the same year, major loading areas of bauxite included Africa, with a 37.9 per cent market share, followed by the Americas (25.9 per cent). Other exporting regions included Asia (11 per cent) and Australia (24.2 per cent). Main importing areas are Europe and North America, with their respective market shares amounting to 42.6 per cent and 33 per cent. Since 2001, the boom in bauxite trade has been driven by import demand from China, which used to meet nearly its entire bauxite requirements by importing from Indonesia. More recently, however, given the closure of some illegal mines by the Indonesian Government, China has shifted suppliers and imports larger bauxite volumes from India. A booming bauxite trade in China has led to large gains in the handysize market segment and increased bauxite trade ton-miles.

With respect to alumina, Australia is the major exporter, accounting for about half of world exports, while Jamaica contributes more than 12 per cent. Other loading areas span the Mediterranean, Africa and Asia. Europe remains the largest alumina importer, followed by other developed regions, namely North America and Japan.

As noted above, the trade of bauxite and alumina is essential to aluminium production. Demand for aluminium is driven by, inter alia, the home construction, container and packaging, healthcare, aerospace and defence and transport industries. In 2007, production of world consolidated primary aluminium increased by 12.6 per cent, to reach 37.4 million tons. Except for Africa, which recorded a slight fall in production, all regions have posted positive growth. China, however, outpaced other producers, with an impressive expansion rate of 34.8 per cent (14 times the rates of some other producers) to reach 12.6 million tons. Major smelters can be found in various countries, including Australia, Canada, China, India, Jamaica, the United States and Ukraine. Aluminium scrap is recyclable, with high value and low energy needs during the recycling process. Demand for scrap aluminium is likely to increase in the future, in view of growing global concerns about environment sustainability and corporate responsibility. This will potentially open new opportunities for maritime transport of aluminium including scrap aluminium.

Another bulk commodity shipped by sea is phosphate rock, which is mainly used to manufacture phosphate fertilizers and industrial products. The world's largest miners of phosphate rock are China, the United States and Morocco. Lesser producers include Brazil, the Russian Federation, Jordan and Tunisia. In 2007, world trade of rock phosphate totalled 31.5 million tons. Morocco remained the major exporter and the United States the major importer. In 2007, Morocco's exports accounted for almost half of world shipments, of which over two thirds were supplied to the European and American markets. Shipments by lesser exporters in other African countries and the Middle East accounted for 40 per cent of world exports.

The minor dry bulks (manufactures, agribulks, metals and minerals) are estimated to have reached 1.053 billion tons in 2007. The big increase came from some metals and minerals (e.g. scrap), agricultural products (soy meal and oilseed) as well as manufactures (steel products).

Shipments of manufactures, namely steel and forest products, are estimated to have increased by 4 per cent, reaching 446 million tons. Trade in steel products accounted for 60.5 per cent of this total and grew at a faster rate than forest products. Shipments of various metals and minerals (e.g. coke, pig iron, scrap, iron, manganese ore, salt and cement) have also grown, and were estimated at 334 million tons. Increasing global demand for steel and iron ore with resulting higher prices have fuelled the demand for some minor bulks such as ferrous scrap, which is recycled as steel. With new steel production capacity starting up in Turkey, scrap shipments from the United States on the transatlantic route increased. It is estimated that, since 2002, Turkey has imported an average of 12.9 million tons per year of scrap. Other minor dry bulk trades involved agricultural products such as sugar, rice, tapioca and meals (oilseeds, soy and oil-cakes) as well as fertilizers (phosphates, potash, sulphur and urea). Volumes traded in 2007 are estimated at 273 million tons, an increase of 5.4 per cent compared with the previous year.

3. Liner shipments of containerized cargoes[24]

The balance of 2.29 billion tons of dry cargoes is increasingly being carried in containers along three major liner trade routes. The majority of containerized cargo is made up of manufactured goods and high value bulk commodities (e.g. time- and temperature-sensitive cargo).

Since 1990, container trade (in TEUs) is estimated to have increased by a factor of five, which is equivalent to an average annual growth rate of 9.8 per cent.[25] In 2007, global container trade was estimated at 143 million TEUs, a 10.8 per cent increase over 2006. In tonnage terms, container trade is estimated at 1.24 billion tons, accounting for about one quarter of total dry cargo loaded (figure 7).

Since 1990, container trade (in TEUs) is estimated to have increased by a factor of five.

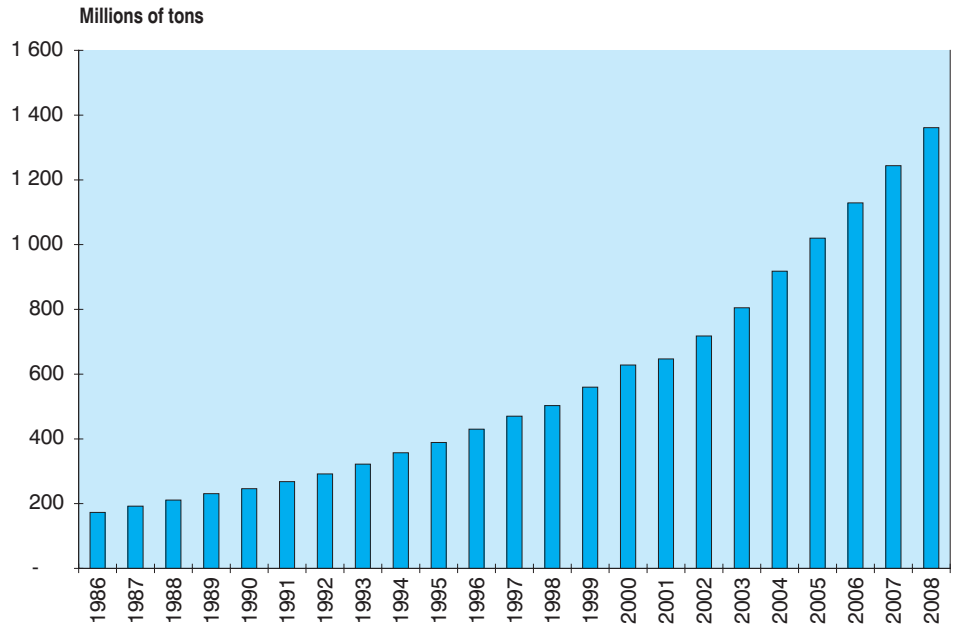
With globalization, increased trade in intermediate goods, growth in consumption and production levels and expanding "containerizable" cargo base (e.g. agricultural cargoes are increasingly transferring to containers given higher freight rates in the bulk sector and economies of scale in the container market), containerized trade is posed to grow significantly and account for an increasingly larger share of world dry cargo. According to Drewry Shipping Consultants, container trade is forecast to double by 2016 to reach 287 million TEUs, and more than double by 2020 to exceed 371 million TEUs. Increased trade volumes would have implications for world container fleet and global port handling capacity, as well as intermodal and hinterland connections.

Spurred by container trade growth, port container handling activity has also expanded (see chapter 5). As shown in figure 8, a given trade movement (import or export) involves more than two port moves. The share of trans-shipments in total port throughput has grown from 10 per cent in 1980 to 27 per cent in 2007. As a result, container port throughput is more than three-fold the volume of trade. An important consideration for liner carriers is to address the imbalances and their implications for empty containers. The larger the imbalance, the greater the empty container incidence and the more significant the

Figure 7

International containerized trade growth, 1986–2008

(Million tons)

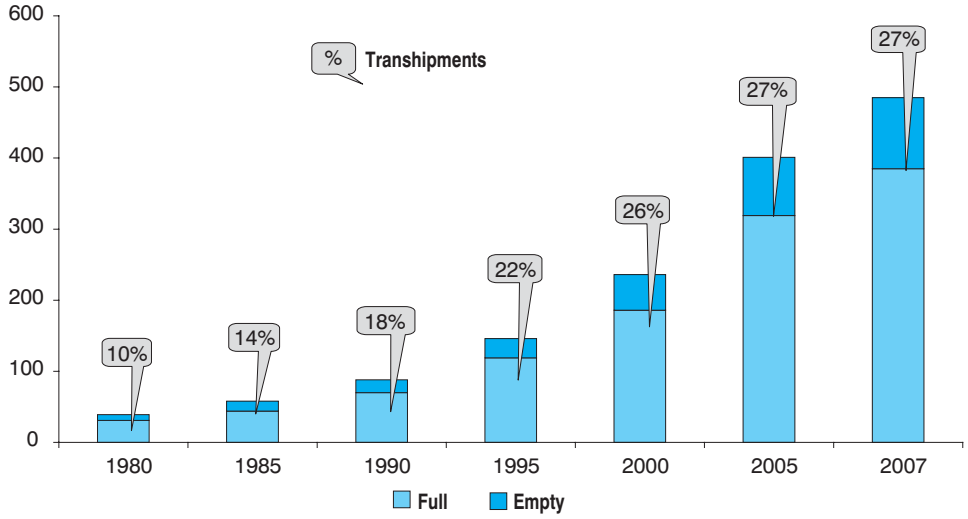


Source: Clarkson Research Services, Shipping Review Database, Spring 2008: 101.

Figure 8

International container port traffic, 1980–2008

(Million TEUs)



Source: UNCTAD based on data provided by Drewry Shipping Consultants in the *Drewry Annual Container Market Review and Forecast 2006/2007*, September 2006.

costs resulting from related operational challenges (e.g. repositioning empty containers, cabotage restrictions and empty mileage).[26]

Containerized trade is carried across three major sea lanes along the East–West axis (see figure 9). These lanes include the transpacific, which links Asia and North America; the transatlantic, between Europe and North America; and the Asia–Europe lane.

In 2007, the Asia–Europe route overtook the transpacific route as the largest containerized trading lane. The Asia–Europe lane totaled 27.7 million TEUs. Cargo flows on the dominant leg from Asia to Europe are estimated at 17.7 million TEUs, representing an increase of 15.5 per cent over 2006. Traffic moving eastward grew by 9.0 per cent, reaching about 10 million TEUs. The drop in United States imports from Asia has been offset by exports to Europe, driven partly by increased demand and a weaker United States dollar. European demand increased not only in the traditional industrial economies of Northern Europe, but also in fast-growing Eastern European countries and transition economies such as the Russian Federation. To cater to this emerging market, the New World Alliance, Hanjin and the United Arab Shipping Company have combined to provide a weekly service to connect Asia and the Black Sea.

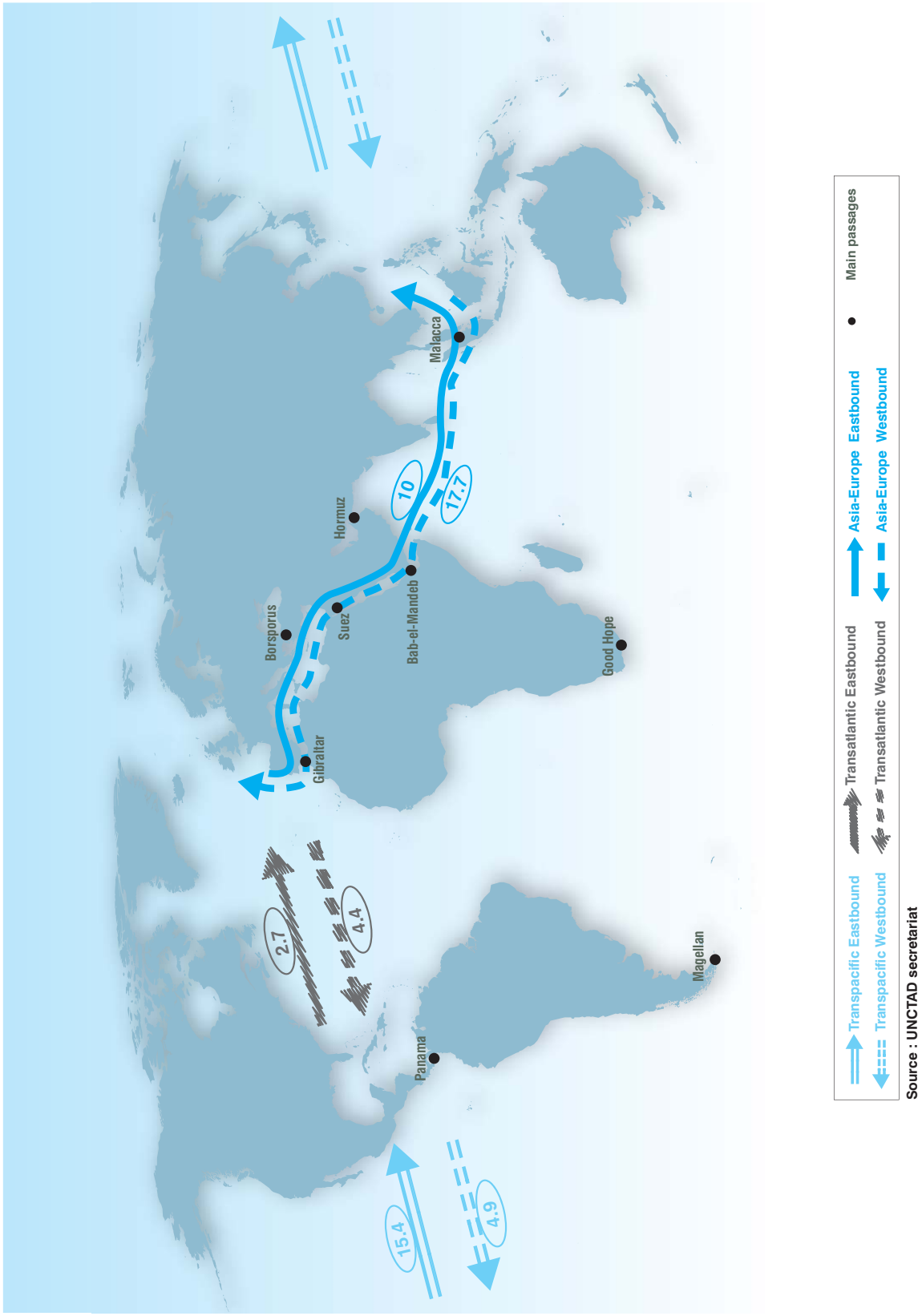
In 2007, the Asia–Europe route overtook the transpacific route as the largest containerized trading lane.

In 2007, container cargo flows in the transpacific route slowed, due to the deceleration of the United States economy and the effect of capacity constraints experienced over recent years on the United States West Coast ports. Congestion on the West Coast led shippers to increasingly seek alternative routes and shift volumes to East Coat ports. Total container traffic on the transpacific route is estimated to have reached 20.23 million TEUs, an increase of 2.7 per cent over the previous year. The dominant leg from Asia to the United States was estimated at 15.4 million TEUs, up 2.8 per cent. Although positive, this growth is dwarfed by the rate achieved in 2006 (up by 12.1 per cent over 2005). The main reason for the decline is the fall in United States import demand, in particular for housing market inputs such as furniture, sanitary, plumbing, heating equipment and mineral manufactures. Despite the economic slowdown in the United States, trade on the backhaul segment from the United States to Asia, grew, albeit at a slightly lower rate (3.05 per cent)

Figure 9

Major maritime trade routes: container traffic, 2007

(Millions of TEUs)



than the previous year, reaching 4.8 million TEUs. This growth involved in particular pulp and waste paper, electrical machinery, meat and beverages.

The transatlantic route linking Europe and North America is estimated to have increased by 7.3 per cent, to reach 7.1 million TEUs in 2007. Trade on the dominant westbound leg from Europe to North America increased by 1.6 per cent, taking the total to 4.4 million TEUs. Fueled by a falling United States dollar, exports from the United States increased, resulting in containerized volumes' growth on the eastbound leg. In 2007, a total of 2.7 million TEUs was shipped from North American ports to destinations in Europe, representing an increase of 7.3 per cent.

The transatlantic route linking Europe and North America is estimated to have increased by 7.3 per cent in 2007.

The effects of globalization and changes in global consumption and production patterns are giving rise to new shipping flows and trade patterns. Intra- and interregional connections spanning North–South and South–South trajectories are increasingly on the rise. In 2007, total containerized trade between Africa[27] and Europe, the United States and the Far East, is estimated to have increased by 10.7 per cent, to reach 5.1 million TEUs. Exports from the Far East to Africa were dominated by metal manufacturers, plastics, specialized machinery, paper and textile fibers. During the same year, the Middle East containerized trade flows with the United States, the Far East and Europe totaled 8.7 million TEUs, an increase of 7.1 per cent over 2006. Latin America's container trade with Europe, the Far East and the United States increased by 6.1 per cent, with shipments to the Far East including meat, dairy products and coffee. Containerized flows between Oceania and the Far East, Europe and the United States, increased by 6.9 per cent in 2007 to reach 2.9 million TEUs.

These examples of emerging trade routes highlight the rise in the North–South and South–South trade and underscore the potential for further expansion, both in terms of geographical scope and composition of trade. South–South trade, in particular, warrants further attention, especially with the potential for some conventional bulk commodities and raw materials, the mainstay of developing countries' trade, to become "containerizable".

The fuel cost burden for the shipping sector and therefore for trade, could be significant given the share of fuel costs in a ship's overall costs.

D. RISING OIL PRICES, MARITIME TRANSPORT COSTS AND GEOGRAPHY OF TRADE

The energy mix used in fuelling transportation is dominated by oil. As a result, the recent steep rise in oil prices is raising concerns about the potential implications for transport costs and trade. Some trade observers are calling into question the sustainability of current trade patterns, global production networks and related transportation strategies. It is argued that increased transport costs may reverse globalization and bring to an end the comparative advantage of low cost remote production locations such as China.[28] Others have observed that rising energy prices have yet to affect demand for logistics services.[29]

Diverging views about the potential transport and trade implications of rising energy prices highlight the importance of refraining from drawing premature conclusions and the need for a considered analysis of this important issue, which is global and multidimensional in nature, and is linked to factors with amplifying as well as offsetting effects. Such relevant factors include the availability and access to energy supplies, particularly in the long term, as well as the climate change debate and developments relating to mitigation and adaptation options (e.g. energy efficient technology, use of alternative energy and operational adjustments).

1. Maritime fuel costs and cost-cutting strategies

With over 80 per cent of world merchandise trade by volume[30] estimated to be carried by sea, the impact of ring fuel costs on maritime transport costs is of great relevance. Like other modes, maritime transport relies on oil for its propulsion. Rising oil prices have an immediate effect on ship bunker cost levels as well as carriers' operating costs and management strategies. Reflecting the rising oil prices, by the end of 2007, prices for bunker fuel oil (380 cst) had increased by 73 per cent in Rotterdam, 76 per cent in Singapore and 79 per cent in Los Angeles

compared to the same period during the previous year.[31] According to Germanischer Lloyd, by November 2007, fuel accounted for 63 per cent of the operating costs of an 8,000-TEU containership.[32] According to UNCTAD's estimates, during the same period the share of fuel costs in the total operating costs for a small 3,000 deadweight (dwt) general cargo ship amounted to 40 per cent.[33] The fuel cost burden for the shipping sector and therefore for trade, could be significant given the share of fuel costs in a ship's overall costs.

Governments have no fiscal mechanism in place to help reduce the effect of rising oil prices on shipping companies and on end-users as taxes on fuel used in international maritime transport are almost non-existent.[34] Nevertheless, the maritime industry itself seems to be already responding to rising fuel costs by adopting certain measures. These include in particular operational changes (e.g. redeploying ships, consolidating services, reducing sailing speed, discontinuing less profitable services and improving sailing conditions), an increased emphasis on technological improvements, as well as the introduction of bunker surcharges.

The maritime industry itself seems to be already responding to rising fuel costs by adopting certain measures.

Ship operation: it has been estimated that slowing down a ship's speed by 10 per cent can lead to a 25 per cent reduction in fuel consumption.[35] According to Hapag-Lloyd, one of the top 10 global container companies, although lower speed implies "longer voyages, extra operating costs, charter costs, interest costs and other monetary losses, slowing down still paid off handsomely"[36] Maersk Line, the world largest container carrier, is reported to have suspended its service linking China and Taiwan Province of China with Eastern Mediterranean ports, citing soaring bunker costs.[37] Clearly, this type of response to rising fuel costs is of potential concern, especially for smaller developing economies, that are in any event experiencing relatively higher transport costs, lower liner shipping connectivity and some degree of marginalization in global transportation networks.[38]

Bunker Adjustment Factor charges: while the shipping industry may in some cases be able to absorb rising costs without passing them on to shippers, cost-recovery measures in the form of Bunker Adjustment Factor charges (BAFs) may be introduced, increasing the costs of transportation. In January 2008, Maersk Line announced the introduction of a floating BAF formula arguing that traditional methods of BAF surcharging helped recover only 55 per cent of the extra bunker costs.[39]

Technological solutions: a number of technological solutions which are already available are increasingly being considered to save on fuel costs. These include improved hull design, propulsion and ship engines technologies, alternative energy sources (e.g. wind, electricity) as well as computer-based technology (e.g. weather routing systems).[40] Wind energy is increasingly attracting attention with giant kites being tested on some freighters (e.g. *M.V Beluga SkySails*). It has been reported that by using the SkySails System, a ship's fuel costs may be reduced by 10 per cent to 35 per cent on annual average, depending on wind conditions; under optimal wind conditions, fuel consumption may temporarily be reduced by up to 50 per cent.[41] Some saving on fuel costs could also be achieved by cutting on fuel consumption while at berth. This involves using shore-side electrical power while the ship's main and auxiliary engines are turned off.[42]

Similarly, the logistics sector is responding to rising oil prices by adopting policies based on network optimization and intense re-evaluation of supply-chains. "*Companies are pooling equipment and loads, moving full container and truckloads, and going to alternative transportation modes - especially rail - while trying to optimize inventory by finding the right mix of warehouse and distribution locations. Shippers are trying to ensure that containers are fully loaded, and they're using more cross-docking and intermodal rail.*"[43]

2. Maritime freight rates

In addition to the impact on carriers' operating costs, rising oil prices have potential implications for shippers. Nevertheless, while rising oil prices have immediately translated into higher fuel costs, it is interesting to note that an equivalent rise in ocean freight rates has not yet materialized.[44] Based on data provided by Containerisation International,[45] average freight rates on the three major East-West container shipping routes and bunker prices appear not to always move in tandem or at the same rate. The rise in bunker

prices observed since the first quarter of 2007 is much more pronounced than the rise in average freight rates. Between the first quarter of 2007 and the first quarter of 2008, average bunker prices in Rotterdam rose by 79 per cent, whereas, during the same period, the average freight rates increased by 9 per cent on the Transpacific route, 6 per cent on the Transatlantic and 30 per cent on the Asia-Europe route.[46] For dry bulk trades, freight rate increases have been fuelled by tonnage capacity shortages, infrastructure constraints and logistical bottlenecks (e.g. coal in Australia). Surges in dry bulk freight rates have also been driven by a booming trade of growing dynamic emerging developing countries like China and India.

Nevertheless, while rising oil prices have immediately translated into higher fuel costs, it is interesting to note that an equivalent rise in ocean freight rates has not yet materialized.

The divergent trends observed in the movement of oil prices and transport costs are largely due to non-fuel related factors that determine maritime transport costs. These include geography, time, trade volumes and imbalances, as well as economies of scale, the type and value of the goods traded, insurance and crewing costs, quality of infrastructure, levels of competition, and private sector participation in port operations.[47]

3. Trade and global production networks

Transport costs contribute significantly to shaping the volume, structure and patterns of trade as well countries' comparative advantages and trade competitiveness.[48] However, the long term implications of sustained higher oil prices on transport and trade are not yet fully understood. Future developments in production and trade patterns will depend on whether oil prices continue to rise and the extent to which higher levels are short-lived or sustained (it is suggested that the latter is likely). Other relevant factors include, *inter alia*: (a) the potential for substitution of oil by more affordable alternative sources of energy; (b) the share of transport costs in the overall production costs; (c) whether shifting production closer to the market is cost efficient, i.e. whether transport cost savings outweigh the potential rise in production costs (wage differentials, cost of energy used in production, environmental regulation) and, importantly, (d) the type of goods traded/ transported (e.g. bulk or manufactured), their value, weight, handling requirements.[49]

The differentiated impact of rising transport costs

While bulk trade, including tanker and dry cargo dominates world seaborne trade, containerized trade, a fast growing market segment (growing by a factor of 5 since 1990, at an average annual rate of about 10 per cent), is at the heart of globalized production and trade. Containerized goods are mostly manufactured goods, which tend to have higher value per volume ratios than bulk cargoes - like oil and other commodities - and travel longer distances, as they are sourced more globally. In 2006, the share of manufactured goods exported globally amounted to over 70 per cent of the value of world exports ($8.2 trillion out of a total of $11.5 trillion).[50] Given their higher value, on average, transport costs on ad valorem basis matter less for high value goods than low value raw materials. Therefore, if higher transport cost were to lead to regionalization, lower value manufactured goods (clothing, textile) would likely be much more affected than higher value goods or goods, the production of which involves significant capital or start up costs.

Higher transport costs are of more relevance for bulk cargo.[51] To minimize the incidence of transport costs on low-value/high-volume goods, importers of bulk cargo are more likely to source from nearby providers. For example, oil requirements in the Americas are more likely to be sourced from locations such as South America or Mexico or, in Asia, from neighbouring Asian oil exporting countries.

Cost of shifting production location

While a direct causal link between rising oil prices and a decision to relocate is yet to be established, it is interesting to note that some changes in global production patterns may be taking place. For example, the Swedish manufacturer IKEA is reported to have opened its first factory in the United States in May 2008 to avoid transportation costs.[52] However, some of the reported recent decisions to relocate to neighbouring locations like in the textile sector appear not to be motivated entirely by transport cost considerations. It is often suggested that, in many cases, decision to move production plants to neighbouring locations was the result of more favourable duty treatment (e.g. Mexico

and Central America/United States and Eastern Europe/European Union) and retailers' need to cut inventories in view of uncertain economic times.[53]

Reiterating this argument, a recent study by Drewry using a modeling approach found that labour and production cost differentials, differences in tariff regimes and supply chain responsiveness and agility appear to play a more important role in outsourcing decisions than do transport costs.[54] Short production cycles requiring rapid delivery times and "agile" supply chains are particularly relevant in the context of the growing luxury (fashion) apparel segment; since 2003 this market segment is estimated to have grown globally at about 15 per cent per year.[55] Some reports about offshore production locations losing their competitive edge as a result of rising transport costs remain questionable in view of the emerging new low cost offshore locations like Viet Nam and Bangladesh in the apparel and textile manufacturing sector. In the first quarter of 2008, sales of Vietnamese apparel in the United States market are reported to have increased by 30 per cent compared with the corresponding period of the previous year.[56]

It has also been argued that an outright regionalization in response to sustained higher levels of oil prices may not necessarily be feasible or economically viable. "*It would be difficult to reverse the geographical concentration of production given the magnitude of the scale economies that firms achieve. When a manufacturing plant is relocated to another country or its output is replaced by imports, many of the upper links in the supply chain also transfer to the foreign country as new overseas vendors are found*".[57] Thus moving a production plant would involve moving the related business partnerships (sources of raw materials, producers, carriers, assembly, etc). The booming intra-Asia trade estimated at potentially over 40 million containers (measure in twenty-foot-equivalent units, TEUs) in 2007[58] illustrates the clustering within the region of the various production and supply chain links supporting the Asian manufacturing business. The cost implications of relocating production plants and related clusters could potentially erode any comparative advantages sought in the new locations. A decline in globalization may, however, not be excluded, if rising oil prices result in very large increases in transport costs especially for higher value goods.[59]

… outright regionalization in response to sustained higher level of oil prices may not necessarily be feasible or economically viable.

It is likely that as long as long rising transport costs do no significantly and permanently upset the balance of trade-offs between the various cost headings on the one hand (e.g. transportation, production, distribution, inventory, etc), and reliability, speed and service quality on the other, less radical and more cost effective transport cost mitigation strategies will be considered first. Such strategies would include for example, measures to reduce the handling factor.[60]

Other considerations

In a carbon constrained world, comparative advantages will probably be determined not only by lower production and transportation costs, but also energy intensity, efficiency and CO_2 emissions. Efforts aiming at de-carbonizing include a potential carbon tariff to be applied to imports as a counter-measure against energy subsidies and carbon emissions embedded in exports, including from China. For example, a hypothetical carbon price of $45 per tonne in the United States has been estimated to be equivalent to a 17 per cent tariff on Chinese exports.[61] In this context, the unfolding of current negotiations on a post-Kyoto agreement and the potential binding commitments for CO_2 emission reduction that may arise for both developed and developing countries will likely have a role to play.

Distance alone does not determine the extent to which transport is fuel or carbon efficient. Economies of scale derived from the deployment of larger and more fuel efficient ships on longer trade routes contribute to achieving greater fuel efficiency and related fuel cost savings as well as CO_2 emissions reduction. Reflecting, the economies of size and the fuel efficiency of larger ships trading on longer routes a cargo ship, over 8,000 dwt is estimated to emit 40 per cent less CO_2 than smaller ships (2,000-8,000 dwt).[62] In addition to differences in fuel efficiencies within the shipping sector, there are significant differences between shipping and other modes of transport. It is argued that "*sending a container load of shirts 10,000 miles around the world on a ship with 8,000 other containers uses a great deal less fuel than trucking the same container by road the 2,000 miles from Istanbul to London*".[63] On a per tonne-kilometre basis, shipping remains the most energy efficient and climate friendly mode of transport. For example, it is estimated that, on average, a container ship (3,700 TEU) consumes 77 times less energy than a freight aircraft

(Boeing 747-400), about 7 times less than a heavy truck and about 3 times less than rail. Equally, a ship (3,700 TEU ship) is reported to emit over 40 times less CO_2 than a freight aircraft (Boeing 747-400) and about 4 times and 31 per cent less CO_2 than a heavy truck and rail, respectively.[64] Shipping's fuel and carbon efficiency per unit of weight and distance means that any increase in fuel costs and any cost pressure resulting from climate-led initiatives will likely have less impact on the cost of moving trade by sea compared to other modes of transport. This is particularly relevant when considering the critical nature of shipping for international trade, in particular long haul.

Shipping's fuel and carbon efficiency per unit of weight and distance means that any increase in fuel costs and any cost pressure resulting from climate-led initiatives will likely have less impact on the cost of moving trade by sea compared to other modes of transport.

For some trades, the effect of rising oil prices and transport costs may be somewhat offset by savings that could be derived from a potential global warming induced full year operation of the Northern Sea Route (NSR) and the opening for navigation of the Northwest Passage (NWP). Although no thorough assessment of the feasibility and viability of the NWP as an alternative shipping route is yet available, the shortcuts offered by these new shipping lanes would cut transport costs and create competition with existing routes, such as the Panama Canal.[65]

… rising transport costs are likely to change relative prices between exporters, redefine comparative advantages and reshape the geography of trade.

With oil at $120 a barrel for a full year, the world's oil bill (based on current annual production) will be around 7 per cent of the world's GDP in 2007;[66] at $200 a barrel, this would be equivalent to 11 per cent of global GDP. To put things in perspective, these shares are larger than the potential global economic costs of inaction against the climate change challenge as predicted in 2006 in the Stern Review (estimated at 5 per cent of world GDP, each year).[67] In fact, oil prices at $120 a barrel for a full year would be seven times the costs of mitigating climate change as envisaged in the Stern Review (around 1 per cent of global GDP, each year).[68]

In this context, factoring the notion of depleting fossil fuel sources into relevant policy and regulatory processes is therefore key. Oil-based economies need to address their fossil fuel dependency by taking decisive action; in this context, capitalizing on synergies that may prevail between energy security and climate change mitigation objectives appears to be imperative. Climate-led policies including investment in alternative energy sources, efficiency standards and carbon pricing, are but a few measures which, in addition to climate change mitigation, could lead to a major co-benefit: energy security through reasonable, stable and predictable energy prices and markets.

To sum up, rising oil prices affect carriers' operating costs and have implications for transport services including shipping, freight rate levels and the geography of trade. A shift to local sourcing or neighbouring locations is probably neither automatic nor necessarily cost efficient, fuel saving or climate friendly. Nevertheless, higher transport costs are likely to change relative prices between exporters, redefine comparative advantages and reshape the geography of trade. That being said, further research and analysis is needed to thoroughly investigate the actual implications of higher oil prices on transport, comparative advantages, growth and development. In this context, future work by UNCTAD will focus on obtaining data to measure the impact of oil prices on maritime freight rates, to be able to better assess the impact of increased rates on transport strategies, trade and its geography as well as modal and inter-country trade competitiveness.