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Chapter 1

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DEVELOPMENTS IN INTERNATIONAL SEABORNE TRADE

While the reorientation of global production and trade continues, with developing countries contributing larger shares to world economic output and trade, the performance of the global economy and merchandise trade in 2012 is a reminder of the high level of global economic integration and interdependence. In 2012, growth in world gross domestic product (GDP) decelerated to 2.2 per cent from 2.8 per cent recorded in the previous year. In tandem, and reflecting a simultaneous drop in import demand of both developed and developing economies, the growth of global merchandise trade volumes also decelerated to 1.8 per cent year-on-year. The knock-on effects of the problems in the European Union on developing economies are tangible, while the slowdown in larger developing economies, notably China and India, is resonating in other developing regions and low-income countries. Meanwhile, and driven in particular by a rise in China's domestic demand as well as increased intra-Asian and South–South trade, international seaborne trade performed relatively well, with volumes increasing by 4.3 per cent during the year. The performance of international seaborne trade remains, nevertheless, vulnerable to downside risks and uncertainty affecting the world economy and trade. It is also unfolding against a background of an evolving maritime transport operating landscape that entails some potentially game-changing trends and developments.

Chapter 1 covers developments from January 2012 to June 2013. Section A reviews the overall performance of the global economy and world merchandise trade. Section B considers developments in world seaborne trade, including by market segment. Section C highlights selected topical trends that are unfolding on the international shipping arena and are affecting international seaborne trade.

A. WORLD ECONOMIC SITUATION AND PROSPECTS

1. World economic growth

The world economy slowed down in 2012 with GDP increasing by 2.2 per cent, down from 2.8 per cent in 2011. As shown in table 1.1, figures for the world economy and country groupings conceal uneven individual performances. Growth in GDP decelerated in all three country groupings, namely to 1.2 per cent in developed countries, to 4.6 per cent in developing economies and to 3.0 per cent in economies in transition. For comparison, equivalent growth rates in 2011 were 1.5 per cent, 5.9 per cent and 4.5 per cent, respectively.

The United States of America GDP picked up speed in 2012, growing at a rate nearly double (2.2 per cent) the developed country group's average (1.2 per cent). Growth in the European Union came to a standstill (–0.3 per cent), while in Japan it accelerated to 1.9 per cent, reflecting, in particular, post-March 2011 reconstruction efforts.

While still growing at a reasonable rate, developing economies and the economies in transition are increasingly being affected by the problems in Europe and the fragile recovery in the United States. Spillover effects have filtered down through various channels, including through trade by depressing the demand for the exports of developing countries and the economies in transition. Countries such as the Russian Federation, Brazil and China are, in addition

Table 1.1. World economic growth, 2008–2013 (Annual percentage change)

Region/country	2008	2009	2010	2011	2012	2013 [a]
WORLD	1.5	-2.2	4.1	2.8	2.2	2.1
Developed economies	0.0	-3.8	2.6	1.5	1.2	1.0
of which:						
United States	-0.3	-3.1	2.4	1.8	2.2	1.7
Japan	-1.0	-5.5	4.7	-0.6	1.9	1.9
European Union (27)	0.3	-4.3	2.1	1.6	-0.3	-0.2
of which:						
Germany	1.1	-5.1	4.2	3.0	0.7	0.3
France	-0.1	-3.1	1.7	2.0	0.0	-0.2
Italy	-1.2	-5.5	1.7	0.4	-2.4	-1.8
United Kingdom	-1.0	-4.0	1.8	0.9	0.2	1.1
Developing economies	5.3	2.4	7.9	5.9	4.6	4.7
of which:						
Africa	5.2	2.8	4.9	1.0	5.4	4.0
South Africa	3.6	-1.5	3.1	3.5	2.5	1.7
Asia	5.8	3.9	8.9	7.1	5.0	5.4
China	9.6	9.2	10.4	9.3	7.8	7.6
India	6.2	5.0	11.2	7.7	3.8	5.2
Republic of Korea	2.3	0.3	6.3	3.7	2.0	2.3
Developing America	4.0	-1.9	5.9	4.3	3.0	3.1
Brazil	5.2	-0.3	7.5	2.7	0.9	2.5
Least developed countries (LDCs)	7.6	5.4	6.2	3.3	4.8	5.0
Transition economies	5.2	-6.6	4.5	4.5	3.0	2.7
of which:						
Russian Federation	5.2	-7.8	4.5	4.3	3.4	2.5

Source: UNCTAD, Trade and Development Report 2013, table 1.1.

[a] Forecast.

to falling export volumes, facing internal problems and some structural challenges.

Economic growth in China slowed from 9.3 per cent in 2011 to 7.8 per cent in 2012, the lowest rate in more than a decade. Weaker demand for Chinese exports, especially in Europe, and a sharp decline in investment growth in China dampened its overall output growth. The deceleration is also indicative of China's efforts to slow down the pace of its economic growth, mainly to reduce inflationary pressures. It also reflects its changing growth patterns involving moving away from an export-oriented and investment-driven path to a more balanced growth based on higher domestic demand and consumption. Growth in India was cut by more than half in 2012 (3.8 per cent) while growth in newly industrialized economies such as the Republic of Korea also decelerated, owing to a large extent to a reduced European demand for these countries' exports. In Western Asia, robust growth experienced in most oil-exporting countries was matched with weakened economic activity in oil-importing countries. Social unrest and political instability, notably in the Syrian Arab Republic, remain major concerns for the entire region and its economic growth prospects.

Underpinned by the performance of oil-exporting countries, continued fiscal spending on infrastructure projects and greater Africa–Asia investment and trade linkages, Africa recorded the fastest growth among all regions (5.4 per cent). Meanwhile, developing countries in America recorded slower growth (3.0 per cent) compared to the two preceding years as the stagnation in the advanced economies and the slowdown in China affected exports from the region, especially in South America. Some countries such as Brazil and Argentina have, in addition, faced domestic problems that undermine growth (United Nations Department of Economic and Social Affairs, 2013a).

Economies in transition continued to grow in 2012, albeit at a moderate pace of 3 per cent. Strong energy prices supported growth in the energy-exporting economies (for example, Kazakhstan and the Russian Federation), while the adverse effects of the crisis in Europe hampered economic expansion in countries and regions such as the Republic of Moldova, Ukraine and Eastern Europe.

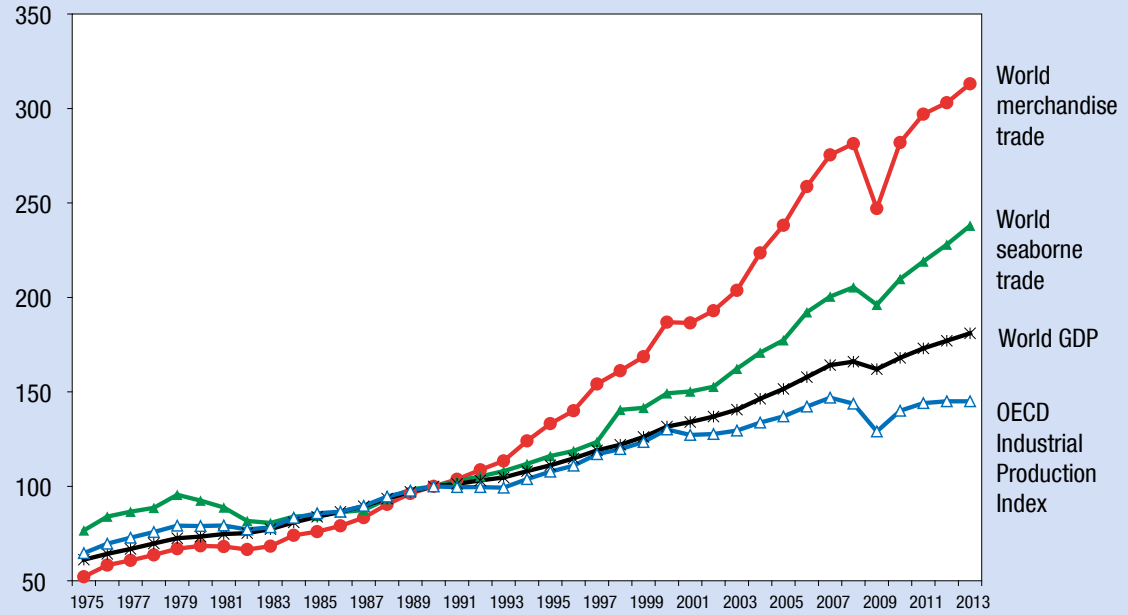
Growth in low income countries has generally been more resilient, but is now also being affected by the slowdown in both developed and developing economies. Least developed countries (LDCs) increased their GDP by 4.8 per cent in 2012, up from 3.3 per cent in 2011, albeit more slowly than the two previous years (2009 and 2010). This trend reflects, among other things, continued weakness in the world economy, lower commodity demand, including from large developing economies, and reduced levels of official development assistance (United Nations Department of Economic and Social Affairs, 2013b).

World industrial production – a measure of economic activity which includes two sectors that are highly sensitive to consumer demand, namely manufacturing and mining – increased by 3 per cent in 2012, despite remaining flat in the advanced economies, in particular the European Union and Japan (Danish Ship Finance, 2013). As shown in figure 1.1, industrial production as measured by the industrial production index of the Organization for Economic Cooperation and Development (OECD), world GDP, merchandise trade and seaborne shipments continue to move in tandem. With demand for shipping services being "derived", the performance of maritime transportation and seaborne trade is largely determined by developments in the world economy and international trade. However, it has been observed that over the years, the world merchandise trade has grown about twice as fast as the world GDP due to the multiplier effect resulting from, among others, the globalization of production processes, increased trade in intermediate goods and components, and the deepening and extension of global supply chains.

UNCTAD expects GDP growth to remain flat in 2013 with the global economy still struggling to return to a strong and sustained growth path. A number of factors are undermining a sustained global economic recovery, including the continued impacts of the financial and economic crises that started in 2008, as well as of the unsustainable financial processes and domestic and international imbalances that have led to the crises. In several countries weaker growth may also be partly due to macroeconomic policy choices (UNCTAD, 2013).

The attention-grabbing news about developing economies fuelling global growth does not lessen the continued interdependence among the world economies. As has been noted in previous editions of the *Review of Maritime Transport*, a reorientation of global production, economic expansion and trade has been unfolding over the years. Certainly, the 2008/2009 crisis deepened this trend, with developing countries increasingly gaining greater influence and contributing larger shares to global GDP and merchandise trade. And undoubtedly developing

Figure 1.1. The OECD industrial production index and indices for world gross domestic product, merchandise trade and seaborne shipments (1975–2013), (1990 = 100)



Sources: UNCTAD secretariat, on the basis of OECD *Main Economic Indicators*, May 2013; UNCTAD, The Trade and Development Report 2013; UNCTAD *Review of Maritime Transport*, various issues; World Trade Organization (WTO) (table A1a); the WTO press release 688, 10 April 2013, "World trade 2012, prospects for 2013". The value of the index measuring growth in world seaborne trade for 2013 is calculated on the basis of the growth rate forecast by Clarkson Research Services in *Shipping Review and Outlook*, spring 2013 (Clarkson Research Services, 2013a).

countries are playing a bigger role globally as well as regionally, with deeper South–South linkages and trade integration. However, the performance of the world economy in 2012 is a reminder of the high level of global integration and interdependence. For the foreseeable future, the United States is projected to remain the largest economy in the world (in monetary terms) and developments there and in Europe will continue to have knock-on effects on developing regions (United Nations Development Programme, 2013). In addition to the overspill effects of the problems facing advanced economies, other indicators, such as export flows of the United States, are also pointing to a continued global interconnectedness. Since 2007, exports from the United States to OECD country partners increased by 20 per cent, while its exports to developing America and China expanded by over 50 per cent.

2. World merchandise trade

For the second year in a row and in line with developments in the global economy and aggregate demand, growth in international trade slowed notably in 2012, averaging 1.8 per cent (table 1.2). This figure refers to merchandise trade in volume terms, that is, in value terms but adjusted to account for inflation and exchange-rate movements. However, trade flows in nominal terms display a similar trend. In 2012, the dollar value of world merchandise exports only increased by 0.2 per cent to reach $18.3 trillion, practically remaining unchanged due to falling prices of commodities such as coffee (–22 per cent), cotton (–42 per cent), iron ore (–23 per cent) and coal (–21 per cent) (WTO, 2013).

Slower global trade growth resulted from a simultaneous deceleration in import demand in both developed and large developing economies. Constrained, among other things, by austerity measures and rising unemployment, Europe's import demand contracted while demand in the United States and Japan remained subdued. Consequently, the global demand for exports of developing countries and economies in transition weakened while – with the exception of Africa – imports destined for developing countries and economies in transition declined markedly.

Exports from developed economies decelerated sharply from 4.9 per cent in 2011 to 0.4 per cent in 2012 due to a contraction in export volumes in the European Union (–0.2 per cent) and Japan (–1.0 per cent). In Japan, exports dropped 11 per cent in the last two quarters of the year, presumably owing to the territorial dispute with China and its adverse effect on the trade between the two countries (WTO, 2013). Exports from the United States fared better, with shipments increasing by 4.1 per cent, albeit at a slower pace than 2011.

After falling by 8.3 per cent in 2011 due to the civil war in Libya, Africa rebounded in 2012 to record the fastest export growth of all regions at 5.7 per cent. Despite export growth rates of 6.9 per cent in Western Asia and 7.2 per cent in China, developing Asia only managed a 3.7 per cent export growth due, in particular, to falling shipments from India (–2.5 per cent). In line with lower economic growth in the region, exports in developing America grew at the slowest rate (2.2 per cent), although the European Union continues to record the worst performance. On the import side, growth in world volumes slowed down significantly in 2012 (1.6 per cent) with imports into developed countries dropping by 0.5 per cent (3.4 per cent in 2011). Imports into developing countries and the economies in transition recorded a rapid deceleration estimated at 4.5 per cent and 3.9 per cent, respectively.

Reflecting expectations of a moderate pickup in import demand in developed economies and most developing regions, the WTO expects global merchandise trade to grow by 3.3 per cent in 2013, a rate below the average rate of the last 20 years (5.3 per cent) (WTO, 2013). Export and import volumes of developed economies are expected to increase at the same rate of 1.4 per cent. Together, exports of developing economies and the economies in transition are projected to increase by 5.3 per cent, while their imports are predicted to expand by 5.9 per cent.

In addition to the downside risks facing the world economy, projected growth in world merchandise trade could also be undermined by increased protectionism and greater shortage in trade finance. Reports by the WTO and the European Commission have highlighted an increase in protectionist measures

Table 1.2. Growth in the volume of merchandisea trade, by country groups and geographical region, 2009–2012 (Annual percentage change)

Exports				Countries/regions	Imports			
2009	2010	2011	2012		2009	2010	2011	2012
-13.3	13.9	5.2	1.8	**WORLD**	-13.6	13.8	5.3	1.6
-15.5	13.0	4.9	0.4	**Developed economies**	-14.6	10.8	3.4	-0.5
				of which:				
-24.8	27.5	-0.6	-1.0	Japan	-12.2	10.1	4.2	3.7
-14.0	15.4	7.2	4.1	United States	-16.4	14.8	3.8	2.8
-14.9	11.6	5.5	-0.2	European Union (27)	-14.5	9.6	2.8	-2.8
-9.7	16.0	6.0	3.6	**Developing economies**	-10.2	18.8	7.4	4.5
				of which:				
-9.5	8.8	-8.3	5.7	**Africa**	-6.2	8.4	2.8	8.0
-7.4	8.3	4.6	2.2	**Developing America**	-17.9	22.5	10.8	2.5
-9.9	18.3	7.8	3.7	**Asia**	-9.1	19.3	3.5	4.6
				of which:				
-14.1	29.1	13.0	7.2	China	-1.1	25.4	10.3	5.9
-6.8	14.0	14.2	-2.5	India	-0.9	13.8	9.1	5.8
3.2	14.7	9.7	1.5	Republic of Korea	-2.3	17.3	4.1	1.2
-4.8	5.7	6.5	6.9	Western Asia	-14.2	8.4	8.1	5.8
-14.4	11.3	4.2	1.0	**Transition economies**	-28.2	15.9	15.7	3.9

Sources: UNCTAD secretariat calculations, based on UNCTADstat.
Note: Data on trade volumes are derived from international merchandise trade values deflated by UNCTAD unit value indices.

since 2008 (Economist Intelligence Unit, 2013), with new trade restrictions continuously being implemented and with nearly 3.0 per cent of world trade estimated to be affected by trade restrictions introduced since the beginning of the crisis (United Nations, 2012). Meanwhile, shortage in trade finance continues to stir some debate, including in view of Basel III regulations and the associated potential restrictions to financing trade (Economist Intelligence Unit, 2013). Since 2011, trade finance originating from European banks and destined for developing economies declined. A survey in the fourth quarter of 2012 by the Asian Development Bank reveals that the trade finance gap in Asia, for example, amounted to $425 billion.

On the upside, some developments may help boost trade, including the expected positive impact of Japan's fiscal stimulus package and expansionary monetary policy; relatively strong GDP growth in China; increased shipments from China to the United States as the latter replaces the European Union as China's largest trading partner; and proliferating trade liberalization arrangements. In this regard, worth noting is the November 2011 commitment by nine countries, including the United States, Mexico, Canada and Japan to a broad agreement called the Trans-Pacific Partnership (TPP) (Economist Intelligence Unit, 2013). Other relevant initiatives include the proposed European Union–United States Free Trade Agreement; the USASEAN Expanded Economic Engagement to create further links between the ASEAN economies and the TPP; a new Regional Comprehensive Economic Partnership to be launched by the ASEAN Plus 6 group (Australia, China, India, Japan, New Zealand and the Republic of Korea); current negotiations on a trilateral trade agreement between China, Japan and the Republic of Korea; and current free-trade agreement negotiations between the European Union and Japan. Meanwhile, at the time of writing, negotiations of the European Union–India agreement were reported as being at the finalization stage. Although trade deals, if successful, can lift international trade flows, some concerns nevertheless remain as to their potential to also divert trade from countries that are not party to the deal, especially when a global trade agreement is not yet in place.

In conclusion, the knock-on effects of the crisis in the European Union on developing economies through reductions in trade, private capital flows, remittances and aid are tangible, while the slowdown in Chinese and Indian economies is resonating in other developing regions and low-income countries. Despite the current challenging market conditions and the weakened prospects in Europe in particular, global growth is expected to continue, driven mainly by developing countries, including China. Other countries in Asia, Africa and developing America are also expected to offer significant opportunities, not only in terms of economic growth and trade expansion but also as regards maritime business and seaborne shipments.

B. WORLD SEABORNE TRADE

1. General trends in seaborne trade

Driven in particular by a rise in China's domestic demand as well as increased intra-Asian and South–South trade, international seaborne trade performed better than the world economy, with volumes increasing at an estimated 4.3 per cent in 2012, nearly the same rate as 2011. About 9.2 billion tons of goods were loaded in ports worldwide, with tanker trade (crude oil, petroleum products and gas) accounting for less than one third of the total and dry cargo being responsible for the remaining lion's share (tables 1.3 and 1.4, figure 1.2 and Annex I).

Strong growth (5.7 per cent) in dry-cargo shipments remained the mainstay of the expansion in 2012, driven in particular by continued rapid growth in dry-bulk volumes. Fuelled by growing Asian demand for iron ore and coal and in line with the long-term trend, major dry-bulk shipments expanded at the rate of 7.2 per cent. China, which has contributed significantly to the growth of seaborne trade in recent years, continues to generate impressive import volumes. Although iron-ore import growth has moderated compared with high previous levels, coal has stepped in to fill the gap.

Growth in containerized trade measured in 20-foot equivalent units (TEUs) slowed significantly in 2012, with volumes increasing by 3.2 per cent, down from 13.1 per cent in 2010 and 7.1 per cent in 2011. The slump in Europe's import demand and the consequent ripple effect on global export volumes, in particular from Asia, have contributed significantly to the deceleration.

During the year, volumes of crude oil and refined petroleum products have grown marginally at 1.5 per cent in 2012. It should be noted, however, that while the economic slowdown, high oil price levels and new

Table 1.3. Development in international seaborne trade, selected years (Millions of tons loaded)

Year	Oil and gas	Main bulks [a]	Other dry cargo	Total (all cargoes)
1970	1 440	448	717	2 605
1980	1 871	608	1 225	3 704
1990	1 755	988	1 265	4 008
2000	2 163	1 295	2 526	5 984
2005	2 422	1 709	2 978	7 109
2006	2 698	1 814	3 188	7 700
2007	2 747	1 953	3 334	8 034
2008	2 742	2 065	3 422	8 229
2009	2 642	2 085	3 131	7 858
2010	2 772	2 335	3 302	8 409
2011	2 794	2 486	3 505	8 784
2012	2 836	2 665	3 664	9 165

Sources: Compiled by the UNCTAD secretariat on the basis of data supplied by reporting countries as well as data obtained from relevant government, port-industry and specialist sources. Data for 2006 onwards have been revised and updated to reflect improved reporting, including more recent figures and better information regarding the breakdown by cargo type. Figures for 2012 are estimated based on preliminary data or on the last year for which data were available.

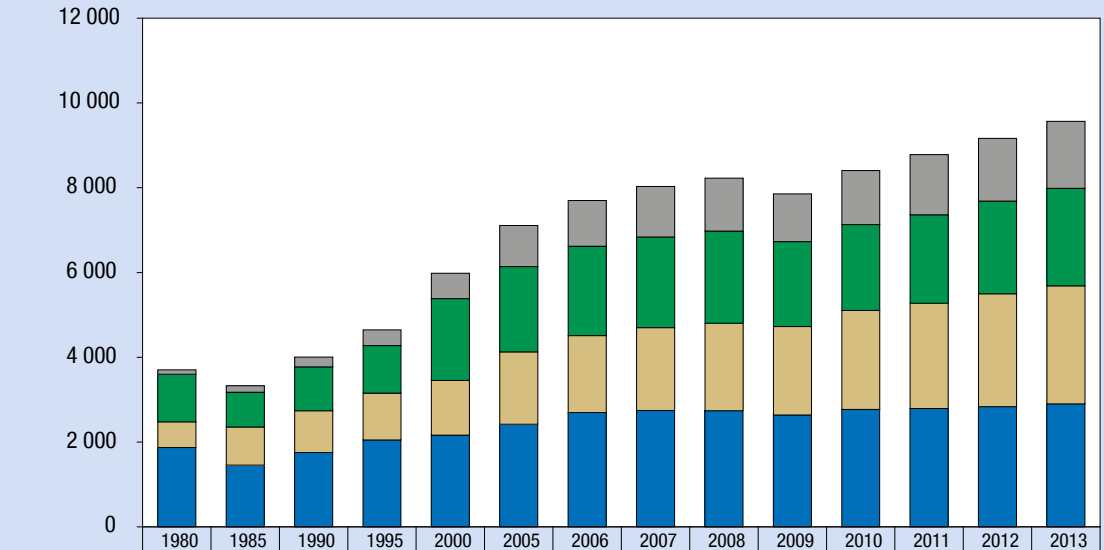
[a] Iron ore, grain, coal, bauxite/alumina and phosphate rock. Data from 2006 onwards are based on various issues of the *Dry Bulk Trade Outlook*, produced by Clarkson Research Services.

technologies have dampened demand for crude oil, petroleum-product trade fared better in comparison. As regards gas trade, minimal additions of liquefaction installations during the year have constrained volumes, which increased by a moderate 1.6 per cent.

Reflecting to a large extent their increased participation in the world trading system, developing countries continued to contribute larger shares to international seaborne trade. In 2012, they accounted for 60 per cent of global goods loaded and 58 per cent of goods unloaded in 2012 (figure 1.3(a)). However, while the group's share has been on the rise, contributions by individual countries have been uneven, reflecting their respective varying levels of integration into global trading networks and supply chains.

While, in line with previous trends, cargo volumes loaded in the ports of developing countries exceeded the volumes of goods unloaded (figure 1.3(b)), their shares have nevertheless evolved over the past four decades to reach near parity in 2012. Driven by the fast-growing import demand in developing regions – fuelled by their industrialization process and rapidly rising consumer demand – for the first time ever the share of goods unloaded in developing countries is likely soon to surpass their share of goods loaded.

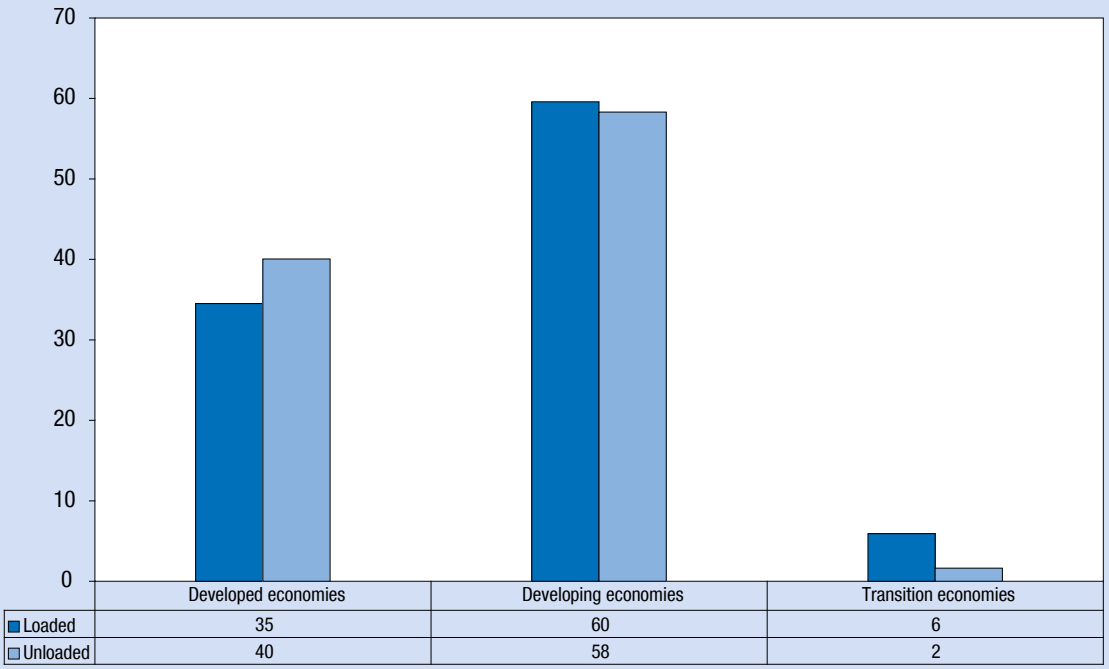
Figure 1.2. International seaborne trade, selected years (Millions of tons loaded)



	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Container	102	152	234	371	598	969	1 076	1 193	1 249	1 127	1 275	1 421	1 480	1 578
Other dry cargo	1 123	819	1 031	1 125	1 928	2 009	2 112	2 141	2 173	2 004	2 027	2 084	2 184	2 300
Five major bulks	608	900	988	1 105	1 295	1 709	1 814	1 953	2 065	2 085	2 335	2 486	2 665	2 786
Oil and gas	1 871	1 459	1 755	2 050	2 163	2 422	2 698	2 747	2 742	2 642	2 772	2 794	2 836	2 904

Sources: UNCTAD Review of Maritime Transport, various issues. For 2006–2013, the breakdown by type of dry cargo is based on Clarkson Research Services' Shipping Review and Outlook, various issues. Data for 2013 are based on a forecast by Clarkson Research Services (2013a).

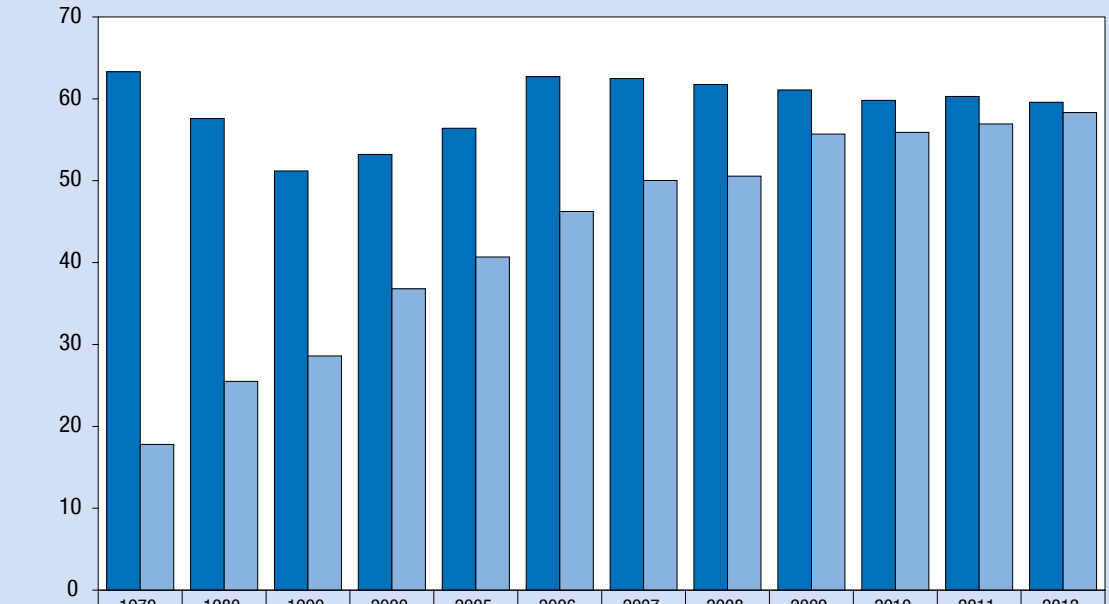
Figure 1.3 (a). World seaborne trade, by country group, 2012 (Percentage share in world tonnage)



	Developed economies	Developing economies	Transition economies
Loaded	35	60	6
Unloaded	40	58	2

Sources: Compiled by the UNCTAD secretariat on the basis of data supplied by reporting countries, as well as data obtained from relevant government, port industry and specialist sources. Estimated figures are based on preliminary data or on the last year for which data were available.

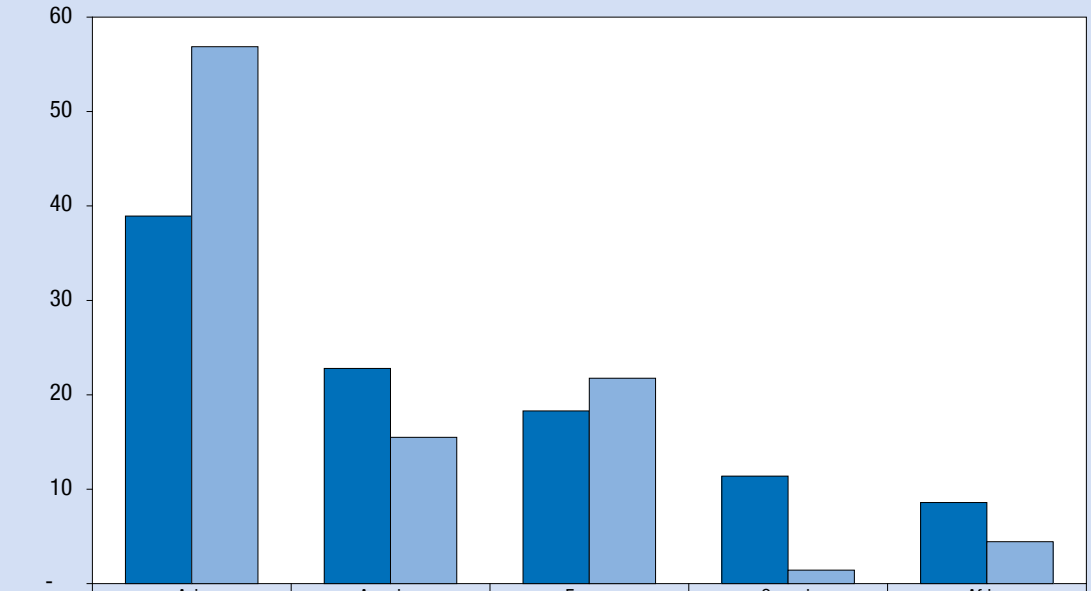
Figure 1.3 (b). Participation of developing countries in world seaborne trade, selected years (Percentage share in world tonnage)



	1970	1980	1990	2000	2005	2006	2007	2008	2009	2010	2011	2012
Loaded	63	58	51	53	56	63	62	62	61	60	60	60
Unloaded	18	26	29	37	41	46	50	51	56	56	57	58

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

Figure 1.3 (c). World seaborne trade, by geographical region, 2012 (Percentage share in world tonnage)



	Asia	Americas	Europe	Oceania	Africa
Loaded	39	23	18	11	9
Unloaded	57	16	22	1	4

Sources: Compiled by the UNCTAD secretariat on the basis of data supplied by reporting countries as well as data obtained from relevant government, port-industry and specialist sources. Figures are estimated based on preliminary data or on the last year for which data were available.

A regional breakdown indicates that in 2012, Asia still dominated as the main loading and unloading region. Other major loading and unloading areas included, in descending order, the Americas, Europe, Oceania and Africa on the loading side, and Europe, the Americas, Africa and Oceania on the unloading side (figure 1.3 (c)).

Africa is increasingly attracting attention as a region with significant potential for maritime transport and seaborne trade. Although Africa's impact on shipping is still comparatively small, it is poised to expand as the continent sets out to exploit its vast resources and as consumption demand increases in tandem with improved income levels. Africa is becoming increasingly attractive, in particular to Asia, with the value of trade between the regions steadily rising (*Fairplay*, 2013a). While the European Union remains Africa's biggest trading partner, China has now overtaken the United States as Africa's largest single trading partner. Trade flows between the United States and Africa were valued at about $123 billion in 2011, while China–Africa flows stood at about $133 billion (*Fairplay*, 2013a).

Recently, China and the United Republic of Tanzania have signed an agreement to build a major port and industrial zone in the country at an estimated cost of up to $10 billion (United Nations Department of Economic and Social Affairs, 2013c). Following another discovery of natural gas off the coast of the United Republic of Tanzania, an oil company is now planning the construction of a liquefied natural gas (LNG) facility worth $14 billion (United Nations Department of Economic and Social Affairs, 2013c). Maritime business in Africa could thrive on such developments, with Africa increasingly moving away from being a niche market for shipping operators to gaining mainstream status (*Fairplay*, 2013b). According to the African Development Bank, port throughput in Africa will rise from 265 million tons in 2009 to more than 2 billion tons in 2040, while transport volumes will increase six- to eightfold, with a particularly strong increase of up to 14 times for some landlocked countries (*Fairplay*, 2013a). Reflecting the expected growth, investments in the free zones of Nigeria are reported to have reached $9.4 billion, with six out of the total 25 free zones in the country said to be under construction and four at the design stage (*P.M. News Nigeria*, 2013).

The infrastructure gap remains a challenge that undermines maritime transportation and seaborne trade of many developing regions, including in Africa. Global

transport infrastructure needs have been estimated at $11 trillion over the 2009–2030 period (OECD, 2011). To close the gap on the large infrastructure deficit in developing countries, including in transportation, existing estimates indicate that spending must reach $1.8 trillion–$2.3 trillion per year by 2020 compared with the current levels of $0.8 trillion–$0.9 trillion a year (United Nations Development Programme, 2013). For Africa, scaling up investment in transport infrastructure is key, especially as the continent increasingly positions itself as an important area for maritime business and trade. In this context, an emerging "South" provides an opportunity for innovative new structures and partnerships to unfold, including with a view to financing transport infrastructure development and maintenance. Incidentally, at their annual summit held in March 2013, Brazil, the Russian Federation, India, China and South Africa (the BRICS countries) agreed to establish a BRICS Development Bank that would finance projects in developing countries, including those aimed at building infrastructure (*Voice of America News*, 2013).

Looking ahead, some analysts are predicting that the value of world merchandise trade will more than double between 2010 and 2020 and that China's exports to Europe will be valued at almost twice those of the United States' exports to Europe (Ernst and Young, 2011). They are also expecting that intraregional Asian trade will grow rapidly to reach $5 trillion and that Europe's exports to Africa and Western Asia will be around 50 per cent larger than its exports to the United States. In terms of sectoral contribution, trade in machinery, transport equipment, consumer electric products (for example, computers, televisions and washing machines) and industrial goods are expected to make the largest contribution to global merchandise trade over the next ten years (Ernst and Young, 2011). Some observers are projecting that by 2025, annual consumption in developing economies will rise to $30 trillion and that developing economies can be expected to contribute over half of the 1 billion households whose annual earnings surpass the $20,000 mark (United Nations Development Programme, 2013). If these projections do materialize, trade growth patterns and dynamics will likely be affected. For seaborne trade, existing forecasts are also pointing to continued growth, with one estimate for 2013 indicating a projected growth of 4.2 per cent (Clarkson Research Services, 2013a).

Against a background of booming business opportunities in emerging developing economies and projected growth in the world merchandise trade, and bearing in mind the prevailing risks and uncertainties, the maritime transport industry will need to adjust its business strategies to reflect changes in the world economy and patterns of trade, which are expected to intensify in the future.

2. Seaborne trade in ton-miles

Developments in the world economy and changes in trade growth and patterns are shaping the demand for commodities and determining the distances over which cargo travels. Final demand for shipping services, measured in ton–miles, offers better insight into maritime transport activity and demand for ship capacity.

In 2012, growth in ton–miles performed by maritime transportation increased by 4.2 per cent, down from 4.9 per cent in 2011. Bulk commodities, namely minerals and raw materials, accounted for nearly three quarters of the total ton–miles performed in 2012 (figure 1.4). The five major dry bulks (that is, coal, iron ore, grain, bauxite/alumina and phosphate rock) are the main engine of growth, with ton–miles increasing by 6.6 per cent, as compared with 6.1 per cent for minor bulks, 3.9 per cent for other dry cargo including containerized trade, 2.4 per cent for oil and petroleum products, and 0.7 per cent for gas. Much of the growth was driven by a rapid (11.8 per cent) increase in coal ton–miles, followed by growth generated by grain and iron-ore trades with ton–miles growing by 6.2 per cent and 4.1 per cent, respectively.

Interestingly, with much talk about the changing geography of world trade and the growing need to diversify sources of supply often involving shipments over longer journeys, average distances travelled by global seaborne trade appear to have remained steady over time. Between 1970 and 2008, the average distance travelled by cargo remained stable at an average of 4,100 nautical miles (Crowe, 2012). This trend reflects in particular the growing importance of intraregional trade and, to a lesser extent, some of the production moving closer to markets, although in the latter case, the debate on "nearsourcing" remains rather inconclusive.

Much of the increase in average distances travelled during 1970–2008 was generated by trade in the major five bulk commodities, with the average distance increasing from 4,600 to 5,400 nautical miles due to sharp increases in import demand in fast-growing developing regions, in particular China (Crowe, 2012). Robust coal and iron-ore import demand from Asia have contributed significantly to the growth in dry-bulk trade

Table 1.4. World seaborne trade in 2006–2012, by type of cargo, country group and region

Country group	Year	Goods loaded				Goods unloaded			
		Total	Crude	Petroleum products and gas	Dry cargo	Total	Crude	Petroleum products and gas	Dry cargo
		Millions of tons							
World	2006	7 700.3	1 783.4	914.8	5 002.1	7 878.3	1 931.2	893.7	5 053.4
	2007	8 034.1	1 813.4	933.5	5 287.1	8 140.2	1 995.7	903.8	5 240.8
	2008	8 229.5	1 785.2	957.0	5 487.2	8 286.3	1 942.3	934.9	5 409.2
	2009	7 858.0	1 710.5	931.1	5 216.4	7 832.0	1 874.1	921.3	5 036.6
	2010	8 408.9	1 787.7	983.8	5 637.5	8 443.8	1 933.2	979.2	5 531.4
	2011	8 784.3	1 759.5	1 034.2	5 990.5	8 797.7	1 896.5	1 037.7	5 863.5
	2012	9 165.3	1 785.4	1 050.9	6 329.0	9 183.7	1 928.7	1 054.9	6 200.1
Developed economies	2006	2 460.5	132.9	336.4	1 991.3	4 164.7	1 282.0	535.5	2 347.2
	2007	2 608.9	135.1	363.0	2 110.8	3 990.5	1 246.0	524.0	2 220.5
	2008	2 715.4	129.0	405.3	2 181.1	4 007.9	1 251.1	523.8	2 233.0
	2009	2 554.3	115.0	383.8	2 055.5	3 374.4	1 125.3	529.9	1 719.2
	2010	2 865.4	135.9	422.3	2 307.3	3 604.5	1 165.4	522.6	1 916.5
	2011	2 982.5	117.5	451.9	2 413.1	3 632.3	1 085.6	581.3	1 965.4
	2012	3 162.9	121.6	447.3	2 594.0	3 678.8	1 097.7	573.7	2 007.5
Transition economies	2006	410.3	123.1	41.3	245.9	70.6	5.6	3.1	61.9
	2007	407.9	124.4	39.9	243.7	76.8	7.3	3.5	66.0
	2008	431.5	138.2	36.7	256.6	89.3	6.3	3.8	79.2
	2009	505.3	142.1	44.4	318.8	93.3	3.5	4.6	85.3
	2010	515.7	150.2	45.9	319.7	122.1	3.5	4.6	114.0
	2011	505.0	132.6	42.0	330.5	156.7	4.2	4.4	148.1
	2012	542.1	136.6	41.1	364.4	149.2	3.8	4.0	141.4
Developing economies	2006	4 829.5	1 527.5	537.1	2 765.0	3 642.9	643.6	355.1	2 644.3
	2007	5 020.8	1 553.9	530.7	2 932.6	4 073.0	742.4	376.3	2 954.3
	2008	5 082.6	1 518.0	515.1	3 049.6	4 189.1	684.9	407.2	3 097.0
	2009	4 798.4	1 453.5	502.9	2 842.0	4 364.2	745.3	386.9	3 232.1
	2010	5 027.8	1 501.6	515.6	3 010.5	4 717.3	764.4	452.0	3 500.9
	2011	5 296.8	1 509.4	540.4	3 247.0	5 008.8	806.7	452.1	3 750.0
	2012	5 460.3	1 527.2	562.5	3 370.6	5 355.7	827.3	477.2	4 051.2
Africa	2006	721.9	353.8	86.0	282.2	349.8	41.3	39.4	269.1
	2007	732.0	362.5	81.8	287.6	380.0	45.7	44.5	289.8
	2008	766.7	379.2	83.3	304.2	376.6	45.0	43.5	288.1
	2009	708.0	354.0	83.0	271.0	386.8	44.6	39.7	302.5

Table 1.4. World seaborne trade in 2006–2012, by type of cargo, country group and region *(continued)*

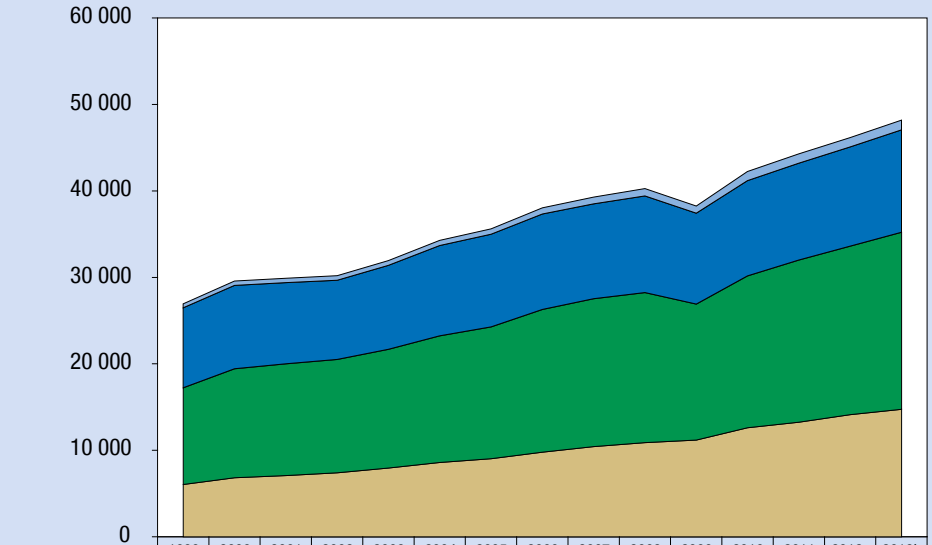
Country group	Year	Goods loaded				Goods unloaded			
		Total	Crude	Petroleum products and gas	Dry cargo	Total	Crude	Petroleum products and gas	Dry cargo
	2010	754.0	351.1	92.0	310.9	416.9	42.7	40.5	333.7
	2011	723.7	338.0	68.5	317.2	378.2	37.8	46.3	294.1
	2012	787.3	370.1	72.6	344.6	407.7	35.9	51.7	320.1
America	2006	1 030.7	251.3	93.9	685.5	373.4	49.6	60.1	263.7
	2007	1 067.1	252.3	90.7	724.2	415.9	76.0	64.0	275.9
	2008	1 108.2	234.6	93.0	780.6	436.8	74.2	69.9	292.7
	2009	1 029.8	225.7	74.0	730.1	371.9	64.4	73.6	234.0
	2010	1 172.6	241.6	85.1	846.0	448.7	69.9	74.7	304.2
	2011	1 239.2	253.8	83.5	901.9	508.3	71.1	73.9	363.4
	2012	1 287.2	250.7	91.6	944.9	538.5	77.5	79.4	381.6
Asia	2006	3 073.1	921.2	357.0	1 794.8	2 906.8	552.7	248.8	2 105.3
	2007	3 214.6	938.2	358.1	1 918.3	3 263.6	620.7	260.8	2 382.1
	2008	3 203.6	902.7	338.6	1 962.2	3 361.9	565.6	286.8	2 509.5
	2009	3 054.3	872.3	345.8	1 836.3	3 592.4	636.3	269.9	2 686.2
	2010	3 094.6	907.5	338.3	1 848.8	3 838.2	651.8	333.1	2 853.4
	2011	3 326.7	916.0	388.2	2 022.6	4 108.8	697.8	328.0	3 082.9
	2012	3 376.7	904.7	397.5	2 074.5	4 396.2	713.8	341.5	3 340.9
Oceania	2006	3.8	1.2	0.1	2.5	12.9	0.0	6.7	6.2
	2007	7.1	0.9	0.1	2.5	13.5	0.0	7.0	6.5
	2008	4.2	1.5	0.1	2.6	13.8	0.0	7.1	6.7
	2009	6.3	1.5	0.2	4.6	13.1	0.0	3.6	9.5
	2010	6.5	1.5	0.2	4.8	13.4	0.0	3.7	9.7
	2011	7.1	1.6	0.2	5.3	13.5	0.0	3.9	9.6
	2012	9.0	1.6	0.8	6.6	13.3	0.0	4.6	8.6
		Percentage share							
World	2006	100.0	23.2	11.9	65.0	100.0	24.5	11.3	64.1
	2007	100.0	22.6	11.6	65.8	100.0	24.5	11.1	64.4
	2008	100.0	21.7	11.6	66.7	100.0	23.4	11.3	65.3
	2009	100.0	21.8	11.8	66.4	100.0	23.9	11.8	64.3
	2010	100.0	21.3	11.7	67.0	100.0	22.9	11.6	65.5
	2011	100.0	20.0	11.8	68.2	100.0	21.6	11.8	66.6
	2012	100.0	19.5	11.5	69.1	100.0	21.0	11.5	67.5
Developed economies	2006	32.0	7.4	36.8	39.8	52.9	66.4	59.9	46.4
	2007	32.5	7.5	38.9	39.9	49.0	62.4	58.0	42.4
	2008	33.0	7.2	42.3	39.7	48.4	64.4	56.0	41.3
	2009	32.5	6.7	41.2	39.4	43.1	60.0	57.5	34.1
	2010	34.1	7.6	42.9	40.9	42.7	60.3	53.4	34.6
	2011	34.0	6.7	43.7	40.3	41.3	57.2	56.0	33.5
	2012	34.5	6.8	42.6	41.0	40.1	56.9	54.4	32.4
Transition economies	2006	5.3	6.9	4.5	4.9	0.9	0.3	0.3	1.2
	2007	5.1	6.9	4.3	4.6	0.9	0.4	0.4	1.3
	2008	5.2	7.7	3.8	4.7	1.1	0.3	0.4	1.5

Table 1.4. World seaborne trade in 2006–2012, by type of cargo, country group and region *(continued)*

Country group	Year	Goods loaded				Goods unloaded			
		Total	Crude	Petroleum products and gas	Dry cargo	Total	Crude	Petroleum products and gas	Dry cargo
	2009	6.4	8.3	4.8	6.1	1.2	0.2	0.5	1.7
	2010	6.1	8.4	4.7	5.7	1.4	0.2	0.5	2.1
	2011	5.7	7.5	4.1	5.5	1.8	0.2	0.4	2.5
	2012	5.9	7.7	3.9	5.8	1.6	0.2	0.4	2.3
Developing economies	2006	62.7	85.6	58.7	55.3	46.2	33.3	39.7	52.3
	2007	62.5	85.7	56.9	55.5	50.0	37.2	41.6	56.4
	2008	61.8	85.0	53.8	55.6	50.6	35.3	43.6	57.3
	2009	61.1	85.0	54.0	54.5	55.7	39.8	42.0	64.2
	2010	59.8	84.0	52.4	53.4	55.9	39.5	46.2	63.3
	2011	60.3	85.8	52.2	54.2	56.9	42.5	43.6	64.0
	2012	59.6	85.5	53.5	53.3	58.3	42.9	45.2	65.3
Africa	2006	9.4	19.8	9.4	5.6	4.4	2.1	4.4	5.3
	2007	9.1	20.0	8.8	5.4	4.7	2.3	4.9	5.5
	2008	9.3	21.2	8.7	5.5	4.5	2.3	4.7	5.3
	2009	9.0	20.7	8.9	5.2	4.9	2.4	4.3	6.0
	2010	9.0	19.6	9.4	5.5	4.9	2.2	4.1	6.0
	2011	8.2	19.2	6.6	5.3	4.3	2.0	4.5	5.0
	2012	8.6	20.7	6.9	5.4	4.4	1.9	4.9	5.2
America	2006	13.4	14.1	10.3	13.7	4.7	2.6	6.7	5.2
	2007	13.3	13.9	9.7	13.7	5.1	3.8	7.1	5.3
	2008	13.5	13.1	9.7	14.2	5.3	3.8	7.5	5.4
	2009	13.1	13.2	7.9	14.0	4.7	3.4	8.0	4.6
	2010	13.9	13.5	8.7	15.0	5.3	3.6	7.6	5.5
	2011	14.1	14.4	8.1	15.1	5.8	3.7	7.1	6.2
	2012	14.0	14.0	8.7	14.9	5.9	4.0	7.5	6.2
Asia	2006	39.9	51.7	39.0	35.9	36.9	28.6	27.8	41.7
	2007	40.0	51.7	38.4	36.3	40.1	31.1	28.9	45.5
	2008	38.9	50.6	35.4	35.8	40.6	29.1	30.7	46.4
	2009	38.9	51.0	37.1	35.2	45.9	34.0	29.3	53.3
	2010	36.8	50.8	34.4	32.8	45.5	33.7	34.0	51.6
	2011	37.9	52.1	37.5	33.8	46.7	36.8	31.6	52.6
	2012	36.8	50.7	37.8	32.8	47.9	37.0	32.4	53.9
Oceania	2006	0.0	0.1	0.01	0.0	0.2	–	0.7	0.1
	2007	0.1	0.1	0.01	0.0	0.2	–	0.8	0.1
	2008	0.1	0.1	0.01	0.0	0.2	–	0.8	0.1
	2009	0.1	0.1	0.02	0.1	0.2	–	0.4	0.2
	2010	0.1	0.1	0.02	0.1	0.2	–	0.4	0.2
	2011	0.1	0.1	0.02	0.1	0.2	–	0.4	0.2
	2012	0.1	0.1	0.08	0.1	0.1	–	0.4	0.1

Sources: Compiled by the UNCTAD secretariat on the basis of data supplied by reporting countries as well as data obtained from government, port-industry and specialist sources. Data from 2006 onwards have been revised and updated to reflect improved reporting, including more recent figures and better information regarding the breakdown by cargo type. Figures for 2012 are estimated on the basis of preliminary data or on the last year for which data were available.

Figure 1.4. World seaborne trade in cargo ton–miles by cargo type, 1999–2013 (Billions of ton–miles)



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012a	2013b
Gas	456	490	498	527	559	596	608	706	790	846	840	1 041	1 069	1 076	1 133
Oil	9 249	9 652	9 390	9 144	9 714	10 430	10 727	11 033	10 967	11 166	10 501	11 018	11 207	11 471	11 832
Other dry cargo	11 191	12 580	12 903	13 098	13 721	14 641	15 236	16 491	17 077	17 359	15 705	17 564	18 744	19 476	20476
Five main dry bulks	6 046	6 845	7 100	7 416	7 955	8 601	9 035	9 804	10 449	10 895	11 207	12 609	13 264	14 137	14 749

Source: UNCTAD secretariat based on data from Clarkson Research Services (2013a).

[a] Estimated.

[b] Forecast.

volumes. Apart from China, iron-ore and coal demand from other fast-growing economies, in particular India and the Republic of Korea, have also been significant. Iron-ore shipments from Brazil contributed the most ton–miles growth given distances involved on the Brazil–China trade. The average distance travelled by iron-ore trade has risen by 6.7 per cent between 2000 and 2012 while, during the same period, the average distance travelled by coal trade fell by 13.1 per cent to 4,002 miles, reflecting, in particular, the shorter distances between China, Australia and Indonesia (Crowe, 2012). More recently, the shale revolution in the United States has meant that there is now more coal available to be exported, including to Europe and Asia. As a result, coal ton–mile exports from the United States are trending upwards. In 2011, its coal exports were 127 per cent higher than in 2007, while in ton–miles the growth averaged 152 per cent (Clarkson Research Services, 2012a). In a separate development affecting dry-bulk trade, some observers are predicting that if new regulation in Indonesia – a major supplier of minerals such as coal, bauxite and nickel destined for China – effectively constrains exports from the country, China will likely look for substitute sources, including from relatively distant locations such as Australia. As a result, dry-bulk shipments and mileage are likely to increase. As regards grain trade, its share in the total ton–miles increased from 4.2 per cent in 2000 to 5.4 per cent in 2012, with the sharp drop in exports from the United States being, in ton–mile terms, offset by a surge in Brazilian exports. Over 2000–2012, the average distance travelled by grain cargo increased by 17.8 per cent and reached 6,807 miles, owing to fast-growing flows originating in developing America and destined for China (Crowe, 2012).

In 2012, containerized trade ton–miles increased by 3.0 per cent, compared with 8.8 per cent in 2011. Between 2000 and 2012, the average distance travelled by containerized trade dropped by 1.2 per cent, with the drop in long-haul Asia–Europe and trans-Pacific trade being offset by rapid growth in shorter-distance intra-Asian flows. The continued rise in the longer-haul North–South trade volumes is however likely to increase the average container haul (Crowe, 2012).

Tanker cargo, including crude oil, petroleum products and gas accounted for over one quarter of total ton–miles in 2012, down from over one third in 2000. Within tanker trade, crude oil held the lion's share (19.1 per cent), followed by petroleum products (5.7 per cent)

and gas (2.3 per cent). The average distance travelled by crude oil declined marginally (–1.2 per cent) between 2000 and 2012. In contrast, and reflecting growing long-haul imports into Asia and flows from the United States to developing America, average distances travelled by petroleum products increased by 6.4 per cent.[1] This growth will likely continue in view of, inter alia, the following elements: (a) refinery closures in Europe which will create a shortage of middle distillates that will require increasing imports, including long-haul shipments from Western Asia, India and the United States; (b) the need to meet growing demand for distillates in Asia, in particular through increased imports from Western Asia; (c) the intensified exports from the United States to developing America and potentially to other regions, including Africa where demand for middle distillates is on the rise.

Another factor that will influence the ton–miles generated by oil trade is the structure of oil production in the United States, which is such that crude oil ton–miles will not necessarily drop with the evolving energy profile of the country. Refineries in the United States will continue to import heavy crude oil from Western Asia as well as from developing America in view of the fact that the light crude oil produced in West Africa is similar in its structure to the crude oil produced in the United States. Therefore, imports from West Africa to the United States are already declining, with much of the new surplus cargo now being shipped to Asia and with associated crude oil ton–miles increasing (*Financial Times*, 2013). Finally, as pricing differentials also affect demand between regions, additional trade in the direction of higher-priced Asia could also likely to boost tanker ton–miles. Meanwhile, with pipelines extending from Kazakhstan, the Russian Federation and soon Myanmar to China, crude oil ton–miles could be constrained in the future, which would entail some implications for tanker demand, the global tanker fleet and tanker trade patterns

3. Seaborne trade by cargo type

(a) Tanker trade

Tanker trade is greatly determined by global energy production and aggregate demand, the world economy, demographics, urbanization, industrialization and, more importantly, by the "geography" of global energy surpluses and deficits. To put in perspective some of the key developments affecting tanker trade, it is important to highlight at the outset the profound structural transformation that is currently underway.

The global energy map is being redrawn amid, in particular, a rise in oil and gas production in the United States, reports of new finds of mineral resources in various regions (for example, East Africa and the Mediterranean), as well as advances in extraction technology. The recent surge in the shale oil and gas production in the United States – the largest world oil consumer – is probably the single most game-changing trend, with implications extending beyond national borders and having a strong bearing on tanker trade. The International Energy Agency expects the United States to become a net exporter of natural gas by 2020 and to overtake Saudi Arabia as the largest global oil producer by the same year, before becoming nearly self-sufficient in energy by 2035 (International Energy Agency, 2012). Looking ahead, this may result in a new world energy map, with fewer crude volumes traded internationally, more refined products exported from the United States, and China and India potentially emerging as large importers of crude oil and exporters of refined petroleum products. Demand by type of petroleum product will also evolve, with middle distillates such as diesel used in transport growing rapidly (*Lloyd's List*, 2012a).

(i) Crude oil: Production and consumption

In 2012 and for the third year in a row, oil recorded the slowest growth among fossil fuels. In line with weaker global economic growth, in particular in Europe, global oil consumption increased by less than 1.0 per cent, a rate below the historical average (British Petroleum, 2013). As consumption in OECD countries fell by 1.3 per cent in 2012, the marginal growth in the global oil demand, which reached 89.8 million barrels per day (bpd) during the year, was driven by non-OECD countries. On the supply side, global production expanded by 2.2 per cent, with total volumes reaching 86.2 bpd and with members of the Organization of the Petroleum Exporting Countries (OPEC) accounting for most of the growth. An overview of global consumers and producers of crude oil is presented in table 1.5.

(ii) Crude oil: Shipments

Reflecting oil supply and demand dynamics, global crude-oil shipments grew by 1.3 per cent in 2012 with total volumes reaching 55.3 million bpd. Crude oil carried on board tankers accounted for two thirds of this total and increased by an estimated 1.5 per cent taking the total volume to 1.78 billion tons. Growth was particularly boosted by increased global production and inventory-building ahead of the embargo involving

Table 1.5. Major producers and consumers of oil and natural gas, 2012 (World market share in percentage)

World oil production		*World oil consumption*	
Western Asia	33	Asia Pacific	33
Transition economies	16	North America	23
North America	15	Europe	15
Developing America	12	Developing America	10
Africa	11	Western Asia	9
Asia Pacific	10	Transition economies	6
Europe	4	Africa	4
World natural gas production		***World natural gas consumption***	
North America	25	North America	25
Transition economies	23	Asia Pacific	19
Western Asia	16	Transition economies	18
Asia Pacific	15	Europe	14
Europe	8	Western Asia	12
Developing America	7	Developing America	8
Africa	6	Africa	4

Source: UNCTAD secretariat on the basis of data published in the British Petroleum Statistical Review of World Energy 2013.

Note: Oil includes crude oil, shale oil, oil sands and natural gas liquids (the liquid content of natural gas where this is recovered separately). The term excludes liquid fuels from other sources, such as biomass and coal derivatives.

oil trade with the Islamic Republic of Iran. Major crude-oil loading areas included Western Asia, Africa, developing America and transition economies, while main unloading ports were located in Japan, North America, Europe and developing Asia.

Crude oil imports into the United States declined by 4.3 per cent in 2012, reflecting in particular increased domestic production and pipeline shipments from Canada (British Petroleum, 2013). While in 2007, crude oil imports into the United States stood at 10.1 million bpd, volumes declined to 9.2 million bpd in 2010 and to 8.5 million bpd in 2012. As its production ramps up and imports fall, oil from traditional suppliers such as Angola, Nigeria and the Bolivarian Republic of Venezuela is being directed towards new markets and customers. India is expected to soon overtake the United States as the main destination for Nigerian crude exports, while its imports from the Bolivarian Republic of Venezuela have increased threefold since 2011 (*Financial Times*, 2013). Meanwhile, and pending requisite regulatory approvals, the United States can be expected to export its light sweet crude oil and potentially emerge as a crude oil exporter (*Lloyd's List*, 2012b). This development may further redefine the tanker trade map and, as tanker demand increases in the United States, will probably entail some implications for the application of the Merchant Marine Act of 1920 (the Jones Act).

In Europe, as production in the North Sea declined, crude oil was mainly sourced from Libya. Europe's imports are expected to eventually shift away from the long-haul Western Asian exports to short-haul African shipments. As weak economic conditions continue to affect European refineries, a shift away from imports of crude oil towards imports of petroleum products can also be expected (Danish Ship Finance, 2013).

In 2012, crude oil import volumes increased by 7.4 per cent in China and over 4.0 per cent in India (British Petroleum, 2013). As these countries continue to build local refineries, their crude oil imports will also increase, including from sources in West Africa and Latin America. This trend is likely to alter the direction of cargo flows, raise demand for tankers and increase ton–miles. However, a potentially offsetting pattern is that a growing proportion of imports into China are likely to be delivered through pipelines from Kazakhstan, the Russian Federation and Myanmar.

As international sanctions prohibit imports of crude oil from the Islamic Republic of Iran, top importers such as China, India and the Republic of Korea are forced to reduce their import volumes to qualify for the 180-day waiver which allows these countries to continue importing Iranian crude oil (United States Institute of Peace, 2012). Consequently, the routing of tanker trade has shifted as more Iranian cargo travels eastward to Asia and as Europe replaces Iranian exports by shipments from the Russian Federation and West Africa (Danish Ship Finance, 2013). This trend is likely to intensify with the duration of the sanctions.

(iii) Refined petroleum products: Supply and refinery developments

Global refinery capacities increased by 0.4 per cent in 2012 and reached a total of 92.5 million bpd. Over 50 per cent of this capacity is located in non-OECD countries driven primarily by expansion in China, India and Western Asia (British Petroleum, 2013). Global capacity is expected to further increase with worldwide refining investments required by 2035 estimated at around $1.3 trillion. Of this total around $230 billion will be needed for existing projects, while $300 billion will be required for additions and around $750 billion will be dedicated for maintenance and replacement (OPEC, 2012). In line with capacity developments, global refinery throughput increased by 0.6 per cent in 2012 with much of the growth being

generated by refineries in Africa, Canada, China, India and Mexico. Refineries are increasingly being closed down in Europe and Japan in view of the growing environmental constraints in the OECD region and the heightened competition from refineries in Western Asia and the Far East (Danish Ship Finance, 2013).

(iv) Refined petroleum products: Demand and shipments

Demand for refined petroleum products is closely tied to industrial production, driving and power generation. Thus, reflecting weak industrial production and reduced naphtha demand during the year, growth in petroleum product shipments decelerated to 2.1 per cent in 2012 (Clarkson Research Services, 2013a). UNCTAD estimates this growth at 1.6 per cent; a rate that also includes the performance of gas trade. Global shipments of petroleum products and gas totalled 1.05 billion tons in 2012 (Clarkson Research Services, 2013a), with rising import volumes into Asia, in particular China, Japan and the Republic of Korea offsetting the drop in shipments destined for North America. Strong demand from Asia, in particular for light (for example, gasoline and naphtha) and middle distillates (for example, diesel and kerosene) was met by supply from Europe, India and Western Asia. Meanwhile, demand has been weakening in North America – the second largest importing region of refined oil products.

As gasoline imports into the United States were traditionally met by European supply, the drop in demand and falling imports into the United States are likely to affect the transatlantic product trade. In contrast, exports from the United States have increased – a relatively new phenomenon – driven by the surplus created by declining oil demand internally as well as by the growing demand from developing America induced by the region's industrialization and infrastructure development process. In the meantime, gasoline will increasingly be shipped from Western Asia to the Far East and from Africa to Europe (Danish Ship Finance, 2013).

In 2012, demand for increasingly popular middle distillates was subdued as jet fuel and diesel requirements weakened in line with the global economic situation. However, demand is expected to resume growth as the world economy recovers. Driven mainly by transportation needs (expansion of car fleets) and to a lesser extent industrial requirements, growth in future demand for middle distillates is expected to outpace that of light distillates, with Asia and, in particular, China being in the lead, followed by developing America.

Looking ahead, oil will likely continue to move closer to markets, with the marginal barrel of production moving west to North America and the refining capacity moving to Asia (*Financial Times*, 2013). Demand for refined petroleum products is expected to continue to grow driven by increasing requirements in non-OECD economies from Asia and South America, in particular as they continue to industrialize and as existing refining capacity remains insufficient (Clarkson Research Services, 2012b). Growth in petroleum product trade is expected to be firm on long-haul routes from India and Western Asia in the direction of the Far East (that is, the Republic of Korea, and Asia other than China and Japan). As regards China, its growing domestic production is likely to result in lesser import volumes of petroleum products (Clarkson Research Services, 2013a). Imports into the European Union are expected to remain weak, in line with the current challenging economic situation, while in the United States lower demand for petroleum products and growing refinery capacity are likely to boost exports of petroleum products, particularly in the direction of developing America (Clarkson Research Services, 2013a).

To sum up, new trading lanes both for refined petroleum products and crude oil are emerging in tandem with changes in production, volume and structure of demand as well as the location of global refineries. These changes are likely to be further influenced by other developments, including, for example, the "60/66 programme" of the Russian Federation, which cuts taxes on exports of crude oil and raises them for refined products as a way to help expand and modernize capacity, and the loan agreement between the Bolivarian Republic of Venezuela and China, which will raise oil exports destined for China.

(v) Natural gas: Liquefied gas shipments

Global natural gas consumption increased by 2.2 per cent in 2012 – a rate below the historical average of 2.7 per cent (British Petroleum, 2013). During the same year, production grew by 1.9 per cent, with the United States remaining the world's largest producer (British Petroleum, 2013). An overview of global consumers and producers of natural gas is presented in table 1.5.

In line with supply and demand developments, growth in global gas trade, including land-based and seaborne shipments, remained flat in 2012, growing at an annual rate of less than 1 per cent. Growth in liquefied petroleum gas (LPG) and LNG came to a standstill in 2012. Together, LNG and LPG volumes totalled 289 million tons, the same level as 2011, with

a drop in LNG shipments being offset by a rise in LPG cargo.[2] Accounting for some 85 per cent of total gas trade carried by sea, LNG shipments fell at an annual rate of 1.2 per cent in 2012, due to falling imports in Europe and the limited global liquefaction capacity expansion recorded during the year (Clarkson Research Services, 2013a). Falling import demand in the United States is having ripple effects both within and beyond national borders. Lower import volumes are making the highly capital-intensive regasification facilities in the United States obsolete. Meanwhile, the relatively cheaper gas is displacing coal as a source of power generation. In 2012, Europe, where more expensive gas has been used for power generation, increased its coal import volumes sourced from the United States (Clarkson Research Services, 2013a). Qatar remained the largest world exporter with a share of over 32.1 per cent of global LNG exports (British Petroleum, 2013). Increased export volumes were recorded not only in Qatar but also in Australia, Malaysia, Nigeria and the United Arab Emirates, while shipments from Algeria, Egypt and Indonesia contracted (British Petroleum, 2013).

The outlook for LNG trade is positive as global consumption is set to increase in view of:

(a) Surging production and exports in the United States;

(b) New gas finds worldwide (for example, Cyprus, Israel, Mozambique and the United Republic of Tanzania);

(c) The projected growth in Asian LNG imports sustained, in particular, by China's strategic commitment to promote gas use;

(d) The decline in nuclear power use;

(e) The attractiveness of gas as a "greener" alternative to other fossil fuels.

Investments in building supporting infrastructure for LNG trade continue unabated and provide a further positive outlook for gas trade and carriers, operators and builders. As of November 2012 there were 94 liquefaction installations in 19 countries (Clarkson Research Services, 2012c). While there has been little expansion in terms of liquefaction capacity in 2012, some 12 liquefaction projects are reported to be under construction globally, including five in Australia. Papua New Guinea and Colombia are likely to become exporters after the completion of some 20 projects that are reported to be at the design or final investment decision stage (Clarkson Research Services, 2012c). On the import front, there are around 93 import facilities at locations in 26 countries and these numbers are expected to continue to increase with many countries lining up for their first cargoes (Clarkson Research Services, 2012c). Given recent gas discoveries in Africa, and assuming all projects currently being pursued come on line according to schedule, the region could emerge as the fourth major supplier of LNG, after Australia, Western Asia and the United States (Drewry Shipping Consultants, 2013).

Unlike LNG trade, and accounting for only 16 per cent of global gas trade carried by sea, LPG demand continued to grow in 2012, with total LPG volumes increasing by 7.1 per cent and reaching 45 million tons (Clarkson Research Services, 2013a). During the year, large quantities were shipped from Western Asia in the direction of India and the Far East as part of stock building motivated by relatively lower prices and ample supply. The use of LPG for cooking purposes, car gas consumption and as an input into the petrochemical industry is driving demand in developing regions. With growing production, the United States is projected to emerge as a key supplier of LPG with more and more of its exports currently heading in the direction of developing America.

(b) Dry-cargo trades: Major and minor dry bulks and other dry cargo

Despite the weakness of the global economy, dry-cargo trade volumes continued to grow at a healthy rate of 5.7 per cent in 2012, taking total volumes above the 6 billion tons mark. Judging by historic standards and bearing in mind the global economic situation, this performance is rather impressive (Clarkson Research Services, 2013a).

The volume of dry-bulk cargo including the five major bulk commodities (iron ore, coal, grain, bauxite/alumina and phosphate rock) and minor bulks (agribulks, fertilizers, metals, minerals, steel and forest products) increased by 6.7 per cent in 2012 (Clarkson Research Services, 2013a). A breakdown of this total indicates that much of the growth was generated by the expansion in the five major bulk commodities (7.2 per cent) and to a lesser extent by growth in the minor bulks (4.6 per cent), which in volume terms have added nearly 500 million tons to world seaborne trade between 2002 and 2012 (Clarkson Research Services, 2013a). During the year the five major bulk commodities totalled about 2.7 billion tons while the volume of minor dry bulks reached 1.4 billion tons. Together, major and minor dry bulks accounted for nearly two thirds of global dry-cargo volumes.

On the import side, Asia, and in particular China, is the leading source of import demand for dry bulks, while on the export side the landscape is less clear cut as market shares continue to evolve. Indonesia, for example, is increasingly emerging as an important player with respect to more than one commodity, including coal, bauxite and metals. Its strategic geographical position, as well as its abundance in several raw materials, most notably coal, is now making Indonesia the fastest-growing exporter to Asian countries (Danish Ship Finance, 2013). Other smaller actors are also expanding their shares including, for example, Liberia, Peru and Sierra Leone. Table 1.6 provides an overview of major players in the dry-bulk commodities market.

The main caution, however, to growth in dry-bulk trade is the continued high dependence on the Asian demand and on only two key commodities, namely iron ore and coal. While growth is still strong in China, the recent moderated growth in the country and a shift away from an infrastructure-based investment growth pattern, entail, nevertheless, some implications as to the strength of future demand.

On the positive side however, some projections indicate that the dry-bulk sector is set to emerge as a winner from growth in the world population and urbanization. Some observers maintain that by 2025 urban consumers are likely to inject around $20 trillion annually in additional spending into the world economy, which in turn will trigger a boom in commodity trade (*Shipping and Finance*, 2013). With 1 billion people due to enter the consuming category, rapid growth in urbanization and infrastructure development will entail an increased demand for resources and raw materials. The requisite infrastructure needs in the port sector alone are estimated to be over 2.5 times the current port infrastructure level.

(i) Coal shipments

Coal is the fastest-growing fossil fuel, accounting for 30 per cent of global primary energy consumption in 2012. Driven by non-OECD countries, global consumption expanded by 2.5 per cent in 2012 while production increased by 2 per cent (British Petroleum, 2013). During the year, the total volume of coal shipments (thermal and coking) increased at an annual rate of 12.3 per cent and surpassed the 1.06 billion tons mark for the first time. Thermal-coal trade, which accounted for 78 per cent of the total, increased at a strong rate of 14.2 per cent in 2012, partly driven by the relative recovery in European imports (following the downturn) and the continued growth in Asian import demand as well as the availability

Table 1.6. Some major dry bulks and steel: main producers, users, exporters and importers, 2012 (World market shares in percentages)

Steel producers		*Steel users*	
China	46	China	46
Japan	7	European Union	10
United States	6	North America	9
India	5	Transition economies	4
Russian Federation	5	Western Asia	3
Republic of Korea	5	Developing America	3
Germany	3	Africa	2
Turkey	2	Others	22
Brazil	2		
Ukrain	2		
Others	18		
Iron ore exporters		***Iron ore importers***	
Australia	45	China	65
Brazil	29	Japan	12
South Africa	5	European Union	10
India	3	Republic of Korea	6
Canada	3	Others	7
Sweden	2		
Others	13		
Coal exporters		***Coal importers***	
Indonesia	33	European Union	18
Australia	30	Japan	17
United States	10	China	17
Colombia	8	India	15
South Africa	7	Republic of Korea	12
Russian Federation	7	China, Taiwan Province of	5
Canada	3	Malaysia	2
Others	4	Thailand	2
		Others	13
Grain exporters		***Grain importers***	
United States	20	Asia Pacific	31
Argentina	12	Developing America	21
European Union	10	Africa	20
Australia	10	Western Asia	18
Canada	9	Europe	7
Ukraine	8	Transition economies	3
Others	31		

Sources: UNCTAD secretariat on the basis of data from the World Steel Association (2013a), Clarkson Research Services (2013b) and the International Grains Council (2013).

of cargo from the Atlantic. Unlike iron-ore trade and to a lesser extent coking coal, demand for thermal coal is more diversified, with the European Union accounting for about 18 per cent of imports, followed by Japan, China, India and other smaller importers such as Hong Kong (China), the Republic of Korea, Malaysia, the Philippines and Taiwan Province of China. Coking-coal trade grew 5.4 per cent in 2012 driven by increases in import volumes of 43.7 per cent and 8 per cent in China and India, respectively. Elsewhere, imports into Europe and the Republic of Korea were constrained by limited growth in steel production.

In 2012, increased coal exports from the United States due to the shale-gas production dampened coal prices and boosted imports into Europe, India and also China, which overtook Japan as the largest thermal-coal importer during the year. China's coal imports absorbed the equivalent of around 430 Supramaxes in 2012 (Clarkson Research Services, 2013c).

Coal trade is set to grow in tandem with growing import demand from China and as Indian installations of coal-fired power stations expand. However, growing environmental regulation, including in Europe, together with the upside potential of China given its large domestic coal resources, may have an offsetting effect and result in a much moderated growth (Clarkson Research Services, 2013a). There remains uncertainty as to whether the Chinese imports, which have surged since 2008, can continue to grow at the strong rate observed so far. In a separate development, it should be noted that new coal power plants are expected to come on stream between 2012 and 2020 in Europe. These plants should reach a capacity nearly double the existing capacity during the preceding eight-year period and result in approximately 80 power plant units being newly built or replaced (Research and Markets, 2012). These developments are likely to affect demand for coal and further shape the flows and patterns of coal trade.

(ii) Iron ore shipments and steel production and consumption

As iron ore is a key ingredient used in steel production, its trade is largely determined by developments in the steel sector. According to data from the World Steel Association, global apparent steel use and steel production each increased by 1.2 per cent during 2012 (World Steel Association, 2013a, 2013b). China continued to increase its production with its market share rising from 45.4 per cent in 2011 to 46.3 per cent in 2012. Against this background, iron-ore trade expanded by 5.4 per cent in 2012, taking the total volumes to 1.11 billion tons. Major iron-ore exporters were Australia, Brazil, Canada, India, South Africa and Sweden. Together, Australia and Brazil account for 73.5 per cent of global exports. Australia, the largest world exporter (44.5 per cent share), increased its shipments by 12.8 per cent. Similarly, other exporters such as Canada, South Africa and Sweden have also increased their shipments, while in India, mining bans and taxes on iron-ore exports have significantly constrained the country's export volumes (–52.8 per cent). As a result, India's market share declined and a structural shift unfolded, whereby India has moved from being a major exporter to a net importer and its import demand is likely to increase over the next few years. Australia has been increasing its market share, while Brazil recorded a decline due to the mine- and infrastructure-expansion projects being completed in Australia and expansion projects in Brazil being delayed. Output from South Africa and smaller suppliers such as Liberia, Peru and Sierra Leone has also been growing.

In 2012, China remained the main destination for iron ore shipped out of Australia and Brazil, driven by large investments in construction and infrastructure. China's economic development, infrastructure investment and increasing per-capita steel consumption are crucial for iron-ore trade. Apart from China, there seems to be no other significant contributors to iron-ore trade growth, as imports into Europe and Japan are stagnating or declining and the import-demand growth in the Republic of Korea is still relatively small scale. The remaining concern is the over-excessive concentration and dependency on the economy of one country (Clarkson Research Services, 2012d). That said and while any cut in China's steel output remains a downside risk, some factors could contribute to further support growth in China's iron-ore imports, at least in the short term. These include low iron-ore stocks and the need for restocking, low prices and higher Australian supply (Clarksons Shipping Services, 2013).

(iii) Grain shipments

Economic growth and population expansion have generated new grain trade patterns, with the share of developing regions in world imports increasing over time. While supply-side factors (for example, weather conditions and arable land) are clearly fundamental for grain markets and trade, demand-side considerations (demographics, consumption patterns and food/feed/industrial usage) are also important factors shaping the structure, size and direction of trade flows.

Total grain production in the crop year 2012/2013 fell by 3.5 per cent to 1.78 billion tons, while for the crop year 2013/2014 the production is forecast to grow by 7.4 per cent and take the total volume to 1.92 billion (International Grains Council, 2013). On the demand side, global grain consumption dropped by 1.7 per cent in 2012/2013 to 1.82 billion tons, but is expected to recover and grow again by 3.6 per cent in 2013/2014 to reach 1.88 billion tons. The significant drop in global grain consumption is the first since 1995, caused by high prices and their dampening effect on ethanol production and livestock feed (Larsen, 2013).

The year 2012 was a negative year for grain trade as the record harvest of 2011 was followed by a significant contraction in output due to severe droughts affecting crops in major producing and exporting countries, namely the United States, the Russian Federation, Kazakhstan, Ukraine and Australia (Larsen, 2013). World grain shipments by sea (wheat, coarse grain and soybean) fell by 1.1 per cent and totalled 357 million tons for the crop year 2012/2013. Volumes are forecast to increase by 2.8 per cent in the crop year 2013/2014. Wheat and coarse grains continue to account for over two thirds of the overall grain trade, with the remaining share being accounted for by soybean.

Global wheat exports fell by 4.4 per cent in the crop year 2012/2013 while coarse grains dropped by 1.9 per cent and soybean trade was the main area of growth (5.5 per cent) (Clarksons Shipping Services, 2013). Japan remained the world's largest importer of wheat and coarse grains with a total of 23.8 million tons, followed by Egypt (14.2 million tons), the Republic of Korea (12.5 million tons), Mexico (12.1 million tons), Saudi Arabia (11.7 million tons) and China (9.1 million tons) (Clarksons Shipping Services, 2013). After achieving self-sufficiency for many years, China is increasingly emerging as an important source of grain import demand.

Although the United States is by far the world's largest grain exporter, its share of the world market is shrinking. The 52 million tons of grain exported in 2012/2013 (down from 72.6 million tons shipped out in 2011/2012) was the smallest volume since 1971 (Larsen, 2013). Export volumes dropped from Australia but increased from Canada, Ukraine and the European Union, while they remained unchanged from Argentina.

One concern facing grain production and entailing implications for seaborne trade is the levelling off of returns for some key crops (for example, rice in Japan and wheat in Europe) in addition to the potentially devastating effect of climate change-induced weather extremes (for example, drought and flooding). In view of these risks, the traditional 70-days worth of grain stocks is now considered inadequate to ensure food security and a larger buffer is said to be required to avoid food price shocks (Larsen, 2013). While food prices have eased from recent highs, grain markets remain tight due to historically low stock levels and the pressure on food prices resulting from more expensive inputs (fuel and fertilizer) (International Monetary Fund, 2013).

(iv) Bauxite/alumina and phosphate rock

Over the years, growth in bauxite trade has been boosted by higher Indonesian exports, with China accounting for most of global bauxite trade growth between 2002 and 2012. Bauxite trade grew from 30 million tons in 2002 to 82 million tons in 2011 (Clarkson Research Services, 2012e). However, in 2012, bauxite and alumina total volumes fell by 5.3 per cent from the 2011 levels and volumes totalled 107 million tons. The contraction reflected the new export rules introduced in May 2012 by the Indonesian government, which dampened export volumes from the country. There are now concerns about the future of bauxite trade as Indonesia is a crucial supplier of bauxite in addition to other key commodities, including coal and nickel ore – a metal used in many industrial and consumer products such as stainless steel. A measure that would limit exports could in the long term induce a shift in trade patterns as China might be able to source more bauxite from other locations such as Australia or Guinea. The latter country accounted for 25 per cent of world exports in 2011 and has the largest bauxite reserves in the world (Clarkson Research Services, 2012e). The effect on ton–miles is likely to be positive.

As to phosphate rock, global production capacity is projected to increase from 220 million tons per year in 2012 to 256 million tons (United States Geological Survey, 2013). Over half of the growth is expected to originate in North Africa, with Morocco the largest producer. Phosphate rock mines and expansions are underway in a number of other countries, including Angola, Australia, Brazil, Canada, China, the Congo, Egypt, Ethiopia, Guinea-Bissau, Kazakhstan, Namibia, Mali, Mauritania, Mozambique, New Zealand, Senegal, South Africa, Togo, Tunisia, Uganda, and Zambia. A growing world population and rising food, feed and industrial requirements require extensive use of phosphate fertilizer as part of the planting

and agricultural production process. As there are no substitutes for phosphorous, its global use in fertilizer is projected to increase from 41.9 million tons in 2012 to 45.3 million tons in 2016. Reflecting continued demand for fertilizers, phosphate rock shipments increased by 3.4 per cent in 2012, up from 29 million to 30 million tons.

(v) Dry cargo: Minor bulks

In 2012, minor-bulks trade increased at a slower annual rate than in the previous year, growing by 4.6 per cent and taking the total volumes to 1.4 billion tons. Metals and minerals accounted for 45.6 per cent of this total followed by manufactures (33.0 per cent) and agribulks (21.3 per cent). The largest growth was recorded in the metals and minerals segment (for example, cement, nickel ore, anthracite) with volumes growing by 6.0 per cent year-on-year. Expansion in nickel-ore exports mainly destined for China (33.8 per cent) fuelled the growth. This robust increase occurred while the new export restrictions introduced in May 2012 (until November 2012) in Indonesia were still in force. This is because nickel-ore shipments from the Philippines helped offset the lower Indonesian availability (Clarkson Research Services, 2013a). The next largest contributor to growth was the manufactures sector (for example, steel and forest products) with 3.6 per cent annual growth. Recently, trade patterns have been shifting in the manufactures sector owing to the surge in Chinese exports with flows destined mainly for other Asian countries, Africa and developing America. Ample supply of the more affordable Chinese steel, supported by a strong global demand, has boosted trade in steel products. Finally, agribulks (soymeal, oilseed/meal and rice) also expanded at 3.5 per cent, despite a drop in sugar and potash volume.

To sum up, dry-bulk commodities, including in particular major bulks such as iron and coal, are the backbone of international seaborne trade and have been the major engine of growth reflecting in particular the fast-growing demand from emerging developing regions. Exporters of dry-bulk commodities are rather diversified, with suppliers spanning different regions and with smaller new players increasingly emerging on the market. On the import side however, there seems to be a greater concentration, with demand emanating mainly from emerging developing regions, namely in Asia, in particular China. Another feature is the high concentration in the structure of the global import demand, as much of global growth is being entirely driven by iron-ore and coal shipments. Dependence on one market, in particular China and to a lesser extent India, as well as on two single commodities can be problematic in the long run, as growth patterns in these countries change and their import demand moderates or slackens. In this context, and in the absence of significant growth in import demand from other markets that could offset the decline in China and India, the futur of the dry-bulk shipping market remains uncertain. For now however, existing indicators are pointing to continued growth in dry-bulk commodity trade, including in that of minor bulks in tandem with current growth patterns, urbanization trends and population expansion in developing regions.

(vi) Other dry cargo: Containerized trade

For many decades, containerized trade has been the fastest-growing market segment accounting for over 16 per cent of global seaborne trade by volume in 2012 and more than half by value (in 2007). With containerization being closely associated with globalization and fragmentation of global production, a recent study considering 157 countries over the 1962–1990 period provided empirical evidence that containerization is the driver of the twentieth century economic globalization (Bernhofen et al., 2013). In the 22 industrialized countries examined, containerization explains a 320 per cent rise in bilateral trade over the first five years after adoption and 790 per cent over 20 years. By comparison, and over a 20-year period, a bilateral free-trade agreement raises trade by 45 per cent while membership of the General Agreement on Tariffs and Trade adds 285 per cent. Over the period 1962–1990, containerization appears to have had a lesser effect on North–South and South–South trade, probably reflecting the role of port and transport infrastructure availability and efficiency (Bernhofen et al., 2013).

For a long time, containerized trade flows could be predicted by looking at the performance of world GDP with the multiplier effect of the container volume growth ranging between three to four times the GDP growth. This ratio is currently being questioned with some observers arguing that it is no longer a precise predictor of container-demand growth since other factors are also at play (*Containerisation International*, 2013a). These factors include the rate of offshoring of manufacturing, the extent of containerization of bulk cargoes, the goods-versus-services composition and the manufactured-versus-commodities share

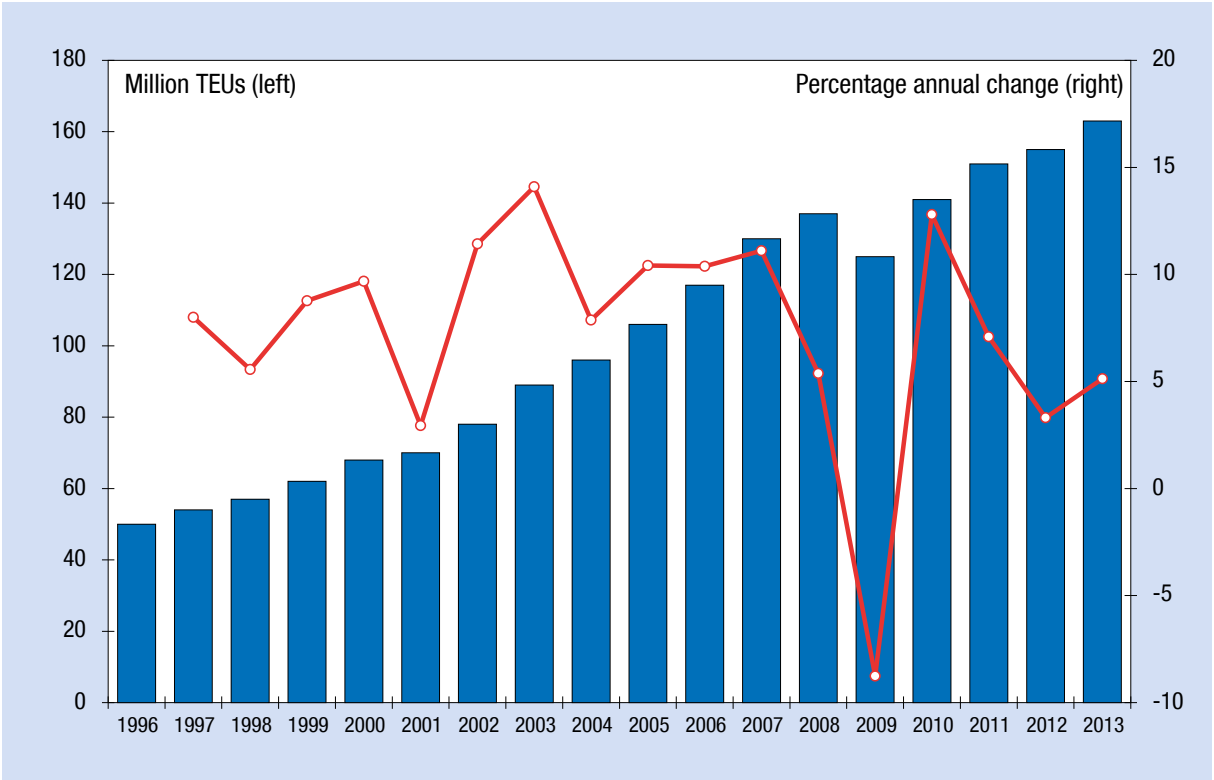
of countries. Some analysts maintain that the GDP multiplier has fallen from an average of 3.4 times over 1990–2005 to only 1.5 times in 2012. The reduced value of the multiplier has implications for future growth in demand and for containerized trade, a fact that is being increasingly acknowledged at the industry level. According to a large container carrier, current growth rates should be seen as the "new normal" for the container industry and the 2008/2009 crisis has moved the industry away from the 9–10 per cent growth recorded over the past three decades (*Containerisation International*, 2013a).

Against this background, and while growth decelerated significantly, containerized trade volumes expanded in 2012 to reach 155 million TEUs (figure 1.5(a)) (Clarkson Research Services, 2013b). Containerized trade, which accounted for 65 per cent of "other dry cargo" in 2012 (that is, nearly two thirds of the 2.28 billion tons of dry cargo that remain after removing dry-bulk commodities), increased by 3.2 per cent in 2012, down from 13.1 per cent in 2010 and 7.1 per cent in 2011. The sharp deceleration resulted from the depressed volumes on the mainlane East–West trade, in particular, the Asia–Europe trade route.

Data from *Containerisation International* indicate that European import volumes have once again fallen back below the pre-crisis level with volumes on the head-haul route from Asia to Europe dropping by 2.6 per cent in 2012, compared with a 6 per cent positive growth in 2011 (table 1.7 and figure 1.5(b)). Falling volumes affected almost all goods, including electrical machinery, metal manufactures, travel goods and handbags, telecom and recording equipment, textiles and miscellaneous manufacture (*Containerisation International*, 2013b).

The contraction is indicative of the severe pressure weighing down on European economies, especially in the Mediterranean. In addition to lower demand, overcapacity is another challenge facing operators on the Asia–Europe lane. In 2012, a number of measures have been taken to manage the demand and supply imbalance and control capacity, including among others suspending or cancelling services, dropping voyages, slow steaming and idling of ships (Clarkson Research Services, 2013a).

Figure 1.5 (a). Global container trade, 1996–2013 (Millions of TEUs and percentage annual change)



Source: Based on Drewry Shipping Consultants, *Container Market Review and Forecast* 2008/2009, and Clarkson Research Services, *Container Intelligence Monthly*, various issues.

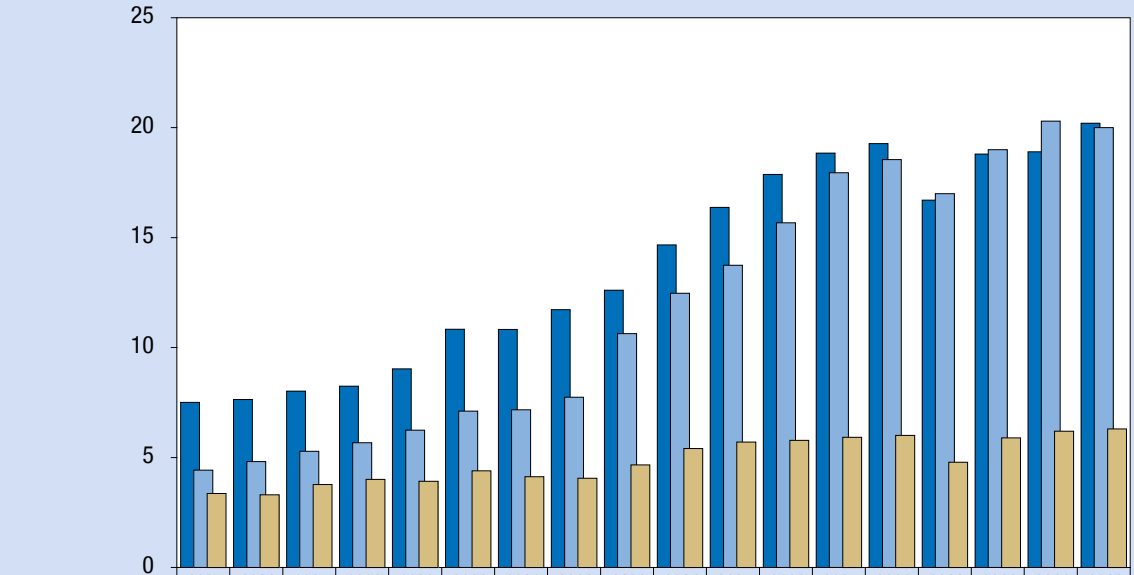
Table 1.7. Estimated containerized cargo flows on major East–West container trade routes, 2009–2012 (Millions of TEUs and percentage annual change)

Year	Transpacific		Europe Asia		Transatlantic	
	Asia–North America	North America–Asia	Asia–Europe	Europe–Asia	Europe–North America	North America–Europe
2009	10.6	6.1	11.5	5.5	2.8	2.5
2010	12.3	6.5	13.3	5.7	3.2	2.7
2011	12.4	6.6	14.1	6.2	3.4	2.8
2012	13.3	6.9	13.7	6.3	3.6	2.7
Percentage change 2011–2012	**7.4**	**5.2**	**-2.6**	**0.4**	**5.9**	**-6.9**

Sources: MDS Transmodal data as published in Data Hub Trade Statistics, *Containerisation International*, www.containershipping.com, April, May and June 2013.

The North America–Asia trade showed more resilience and performed better than the previous year as North American imports were relatively more robust. In 2012, trade on the head-haul route from Asia to North America expanded by 7.4 per cent while traffic in the opposite direction expanded by 5.2 per cent. On the transatlantic route, depressed European import demand caused a 6.9 per cent contraction on the North America–Europe leg, while flows into North America increased by 5.9 per cent, sustained by relatively stronger demand in the United States.

Figure 1.5 (b). Estimated containerized cargo flows on major East–West container trade routes (Millions of TEUs)



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Trans-Pacific	8	8	8	8	9	11	11	12	13	15	16	18	19	19	17	19	19	20
Europe–Asia–Europe	4	5	5	6	6	7	7	8	11	12	14	16	18	19	17	19	20	20
Transatlantic	3	3	4	4	4	4	4	4	5	5	6	6	6	6	5	6	6	6

Source: Based on the Global Insight Database as published in *Bulletin FAL*, issue number 288, number 8/2010 ("International maritime transport in Latin America and the Caribbean in 2009 and projections for 2010"), United Nations Economic Commission for Latin America and the Caribbean (ECLAC). Data for 2009, 2010, 2011 and 2012 are based on table 1.7.

Away from the mainlanes, containerized trade flows continued to grow at a rapid pace, albeit slower than in 2011. North–South trade expanded by 3.9 per cent in 2012, while intra-Asian and trade on non-mainlane East–West routes grew by 6.2 per cent and 3.7 per cent respectively (Clarkson Research Services, 2013b). Containerized trade linking Asia, developing America, Africa and Oceania has been growing over the past few years, highlighting the deepening of South–South ties. Reflecting intensified interregional trade volumes the average size of ships deployed on these routes increased markedly. With consumer demand in developing regions set to grow, markets in the "South" will continue to drive global container trade growth (Clarkson Research Services, 2013b). While as noted above the impact of containerization on North–South and South–South trade during the 1962–1990 period appeared to have been relatively smaller than that on the advanced regions, the rapid growth in non-mainlane containerized trade observed over recent years highlights to some extent the growing importance of containerization in promoting trade within and among developing regions.

The weak market fundamentals and the growing deployment of increasingly larger ships have forced operators to continue cascading their ships to secondary and regional routes. Nevertheless, during the year the market saw the arrival of the largest ships to date (+16,000 TEU and Triple-E container ships of 18,300 TEU). In addition to the arrival of these megaships, 2012 saw some operational restructuring with the decision by the largest world carriers Maersk Line, Mediterranean Shipping Company (MSC) and CMA CGM to form the P3 alliance, a large vessel-sharing alliance affecting the three major East–West trade routes (*Lloyd's List*, 2013a). If approved, the initiative will likely affect not only carriers and their bottom line but also ports, shippers, and smaller operators (*Lloyd's List*, 2013b).

Another trend that is unfolding is the continued penetration of containerization into the bulk trade, in particular on the backhaul routes of imbalanced trades. Regulatory developments in the commodity sector are supporting this trend as shown in the case of Australian grain. Since 2008, when grain trading was deregulated in Australia, the country's containerized wheat shipments increased tenfold. Similarly, recent deregulation in Canada's grain market is likely to result in greater containerization of grain trade (Dynamar B.V., 2013).

Finally, an issue that is being increasingly mentioned relates to the "nearsourcing" whereby a number of firms are reported to be relocating closer to home markets given production cost increases in China. Some observers argue, however, that nearsourcing affects limited areas of business and is therefore overrated (*Lloyd's List*, 2013c). In addition, it was observed that there was more than one factor to take into account when making decisions about where to locate production and that there was no one-size-fits-all solution, as in some cases – depending on the product – nearsourcing can generate significant savings while in others it could prove to be expensive (*Lloyd's List*, 2013c).

C. SELECTED EMERGING TRENDS AFFECTING INTERNATIONAL SHIPPING

Despite the positive growth in 2012, international seaborne trade remains vulnerable to many downside risks and exposed to some potentially game-changing trends that could redefine the maritime transport operating landscape. International shipping is facing a new and complex environment that involves both challenges and opportunities, including as noted above the demand and supply mismatch, continued global economic uncertainty and geopolitical tensions. Of all the prevailing challenges however, the interconnected issues of energy security and costs, climate change and environmental sustainability are perhaps the most unsettling. Climate change in particular continues to rank high on the international policy agenda, including of shipping and port business. Despite positive developments on a number of fronts, the world is not yet on track to limit the average global temperature rise to 2°C (above pre-industrial levels) that would ensure that climate change remains manageable (International Energy Agency, 2013). With climate change effects already being felt globally and in the absence of adequate climate change mitigation and adaption action, shipping and ports and therefore international seaborne trade are likely to be severely affected by the potentially devastating impacts of this change (for example, extreme weather events and rising sea levels). For a more detailed discussion on the climate change challenge and maritime transport, see previous first chapters of the *Review of Maritime Transport*, 2009–2012.

Opportunities are, on the other hand, also arising in connection with some of the following trends:

(a) Deeper regional integration and South–South cooperation;

(b) Growing diversification of sources of supply enabled by technology and efficient transportation;

(c) Emergence of new trading partners and access to new markets facilitated by growing trade and cooperation agreements;

(d) The expansion/opening of new sea routes (for example, Panama Canal expansion and arctic routes);

(e) Structural change in the world energy map and consequent ripple effects on tanker trade;

(f) Moving-up of economies' value chains from labour intensive manufacturing to higher skilled production (for example, China) and related implications for other developing regions (Viet Nam, Bangladesh, Africa);

(g) Growth in global demand induced by a growing world population and a rise in the middle-class consuming category;

(h) The emergence of developing-country banks (for example, BRICS) with the potential to raise funding to meet the significant transport infrastructure investment needs.

Against this background, the following section focuses on developments affecting three closely interrelated topics, namely:

(a) Fuel costs and slow steaming;

(b) Lower-sulphur fuels and air emissions;

(c) Innovative ship design (eco-ships).

While these issues have been considered to different extents in the previous editions of the *Review of Maritime Transport*, providing an update on how they are further unfolding is important, especially as related debates are in some cases polarizing the industry (for example, concerning eco-ships). Together, these issues have one element in common, namely fossil fuels, a strategic factor that can significantly determine the competitiveness of shipping and its long term sustainability.

A fourth issue addressed in this section is the expansion of the Panama Canal and some related potential implications. Dealing with this issue at this juncture is particularly topical given, in particular the fast-approaching 2015 deadline set for the completion of the expansion work.

1. Fuel costs and slow steaming

Higher oil prices impact on trade and maritime transport through both their dampening effect on growth and the upward pressure on the cost of fuel used to propel ships. From 2005, oil prices started to rise with some acceleration observed since 2007, and with 2008 recording a historic high of $150 per barrel. For comparison, the spot price of European Brent averaged around $29 in 2000, $55 in 2005, $73 in 2007 and $112 in 2012 (2013 data from the United States Energy Information Administration). This means that oil prices more than doubled between 2005 and 2012 and have increased by more than half since 2007. Marine fuel prices (bunkers) as illustrated by the Rotterdam 380 centistoke increased by nearly threefold between 2005 and 2012. The Rotterdam 380 centistoke averaged $138.4 per ton in 2000, $234 per ton in 2005, $345.1 per ton in 2007 and $639.6 per ton in 2012 (Clarkson Research Services, 2012d). While oil prices and bunkers are correlated, their relationship has evolved over recent years indicating that bunker fuel prices not only depend on oil price movements but are also determined by other factors, such as growing demand for bunkers resulting from an expanding world fleet and the tendency of refineries to produce more distillates (Clarkson Research Services, 2012f).

With fuel costs reported to account for larger shares of operating costs (as much as 50–60 per cent) (World Shipping Council, 2008), a rise in bunker fuel costs cuts significantly into the earnings of shipowners, especially when freight markets are depressed. As container ships operate at relatively higher speeds than bulkers and tankers, rising bunker prices have a special resonance among liner operators. It has been estimated, for example, that the daily cost of bunker fuel averaged 85 per cent of the daily ship cost between 2003 and 2006, while since 2008 bunker fuel cost has increased significantly and represents over three times the daily cost of chartering a ship (Clarkson Research Services, 2012f). A recent industry survey revealed that fuel efficiency is a top priority for shipping with 69 per cent of businesses indicating that efforts should focus on developing more cost-effective means of fuel consumption (*Lloyd's List*, 2013d).

Since 2007, and while it started on the Asia–Europe trade, slow steaming as a fuel-saving measure is being implemented across shipping sectors and routes, including on the North–South trajectory (Clarkson Research Services, 2013b). While rising fuel costs

remain the main driver of slow steaming, sailing at lower speed, especially at the worst of the economic downturn, also helped absorb some of the prevailing excess container ship carrying capacity.

However, views about the long-term sustainability of slow steaming vary. Some expect the practice to be transitional and therefore disappear with economic recovery and less volatile oil prices, while others maintain that slow steaming is here to stay. In this regard, trend setters such as Maersk Line are reported to be retrofitting ships to allow for slow steaming and looking to extend the practice further into all trades as well as introducing extra-slow steaming (15–18 knots) into selected trade (*Lloyd's List*, 2013e). For large container carriers, slow steaming at 18–20 knots would bring fuel consumption from 125–175 tons per day to less than 100 tons per day. With bunker pricing approaching $700 per ton, these reductions would generate significant daily overall fuel-cost savings (*Lloyd's List*, 2013e).

One recent study concludes that mandatory slow steaming is legally feasible either under a global agreement or unilaterally as a condition of entry to a port and that it entails both benefits and costs (Faber et al., 2012). Another study analysing four maritime routes finds that the cost of slow steaming for shippers and consignees (inventory costs, waiting time, interest, insurance and depreciation) does not make slow steaming viable at the supply chain level (*Lloyd's List*, 2013f). For shippers, the long-term acceptability and sustainability of slow steaming rest on their ability to adapt their global supply chains, production and distribution to longer transit times while preserving reliability and predictability of services. Adapting to slow steaming can be more challenging for shippers that are operating lean and just-in-time techniques and who may need to reconfigure their production and distribution (*Lloyd's List*, 2013g). Another concern relates to the technical requirements associated with slow steaming and the need to retrofit engines on existing ships which generates additional costs (Wiesmann, 2010).

2. Lower-sulphur fuels and air emissions

Fuel costs are also being affected by the requirement of the International Maritime Organization (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI, governing air pollution and Emission Control Areas (ECAs) in the European Union and North America (for additional information see chapter 5). In 2020, the amount of sulphur allowed in marine fuels will be lowered from 3.5 per cent to 0.5 per cent globally and from a current 1.0 per cent to 0.1 per cent in 2015 for ships sailing though ECAs.

Restricting sulphur content in marine fuels and requiring less-polluting fuels, namely distillate grade, is crucial to reducing air pollution and its adverse effects on human health and the environment. In this respect, it is worth noting that the 7 per cent (or €58.4 billion) contribution of shipping emissions to the total health costs in Europe in 2000 is likely to increase to 12 per cent (€64.1 billion) in 2020, while in the ECAs of the Baltic Sea and North Sea, a drop in the sulphur dioxide emissions will likely cause a 36 per cent reduction in Europe's public health costs arising from international shipping. In value terms this implies a cost reduction from €22 billion in 2000 to €14.1 billion in 2020 (European Commission, 2013).

While the benefits of using less-polluting fuels are not called into question, by affecting the quality and the cost of fuel, the requirement to reduce air emissions entails, nevertheless, some implications for the future of residual fuel, oil refineries, technologies such as exhaust cleaning systems and alternative fuels. Switching fuels could also raise transport costs as shown by a study commissioned by the European Community Shipowners' Association (Dynaliners, 2013). The study forecasts that a switch in fuel types would result in a 11.5 per cent to 20 per cent increase in the average freight rates along 16 Baltic trade routes. One concern facing the industry is whether lower-sulphur fuels will be available at sufficient levels and at affordable rates. While some argue that fuels will be produced to meet the demand, the costs are expected to be significant with the price differential with residual fuels currently estimated at 50 per cent (*Lloyd's List*, 2013h). Bearing in mind the varied concerns, the IMO proposed to conduct a fuel-availability study for 2018 that may suggest postponing the 2020 global reduction by four years. In Europe however, the requirement will be mandatory by 2020 with no fuel-availability study being envisaged; in the meantime, it would appear that the shipping industry remains somewhat hesitant to invest heavily in scrubbers given outstanding concerns over their cost-efficiency and their fitness for use on ocean-going ships (*Lloyd's List*, 2013h).

A potential side effect of lower-sulphur regulations in shipping is the rise in road-transport fuel prices as ships, trucks and cars compete for distillates (*Lloyd's*

List, 2013h). Another factor that could potentially affect bunker demand is the use of natural gas as fuel. Although limited so far, recent contracting includes two gas-powered container ships for use in the United States ECAs (Clarkson Research Services, 2012f). The availability of gas at relatively lower prices makes natural gas an economically and environmentally attractive proposition (*Seatrade*, 2013). However, it may take time for gas-powered ships to be widely used, especially on the mainlane container trade. As far as containerized trade is concerned, gas-powered ships are not thought to be viable for the next two or three decades (*Seatrade*, 2013). At present there seems to be a "chicken and egg" situation whereby carriers are reluctant to invest in gas-powered ships as requisite bunkering infrastructure is yet to be made available, while ports remain uncertain about the benefits of developing bunkering facilities when there is no global gas-powered fleet (*Ports & Harbors*, 2013).

3. Innovative ship designs and eco-ships

By all standards the era of cheap oil is probably over and combined with depressed market fundamentals, high fuel costs and rising environmental regulation, demands for more fuel-efficient and eco-friendly maritime transportation systems are set to intensify. In this context, innovative ship designs are increasingly being sought by industry as the answer to the fuel costs/revenue/environmental sustainability conundrum.

The term "eco-ship" is currently a buzzword in the shipping industry. While an established definition of the concept is yet to emerge, eco-ships can be described as ships that, through the process of hull, engine design and new technologies, make significant savings on costs, with the main savings being on the engine fuel consumption (Roussanoglou, 2013). An additional feature of these ships is their environmental friendliness as reduced fuel consumption generates lower air emissions, including greenhouse gas (GHG) emissions and air pollutants. Many experimental designs and concepts for eco-friendly ships (for example, wind and solar power) are being reported, but their application in the near future remains doubtful (Haider et al., 2013). The standards provided by the Energy Efficiency Design Index (EEDI) adopted in July 2011 under the auspices of IMO – which became mandatory on 1 January 2013 for all newbuildings of 400 gross tonnage (GT) and above – will no doubt significantly influence the design of the first generation of eco-ships (Haider et al., 2013).

The emergence of eco-ships is causing a serious dilemma for shipowners, especially in the context of depressed freight markets, lower earnings, excess ship capacity, finance shortage, stricter environmental regulation and expanding slow-steaming practice. Shipowners are struggling to determine whether to invest in new eco-ships or make the requisite adjustments and improvements to a relatively young large existing fleet to ensure its optimization (Haider et al., 2013). These considerations are dividing the industry and raising many questions which amplify the prevailing uncertainties and financial risks. What heightens this dilemma is the potential market segmentation that may result depending on decisions made today. With the arrival of eco-ships it is possible that a gap between eco-ships and existing ships – considered less efficient – will further deepen and split the shipping market into tiers (Haider et al., 2013). Eco-ships are expected to be almost 30 per cent more fuel-efficient than the current generation of ships (Haider et al., 2013). For example, the new Triple-E ships are reported to consume approximately 35 per cent less fuel per container than the 13,100-TEU ships being delivered to other container shipping lines. The E-class ships are also expected to reduce CO_2 emissions by more than 50 per cent per container moved, compared to the industry average CO_2 performance on the Asia–Europe trade (Building the world's biggest ship, 2013). The division in the industry is tangible with proponents of eco-ships promising significant improvements in relation to the existing fleet (Roussanoglou, 2013) and with sceptics arguing that the claimed benefits of these new ships are yet to be verified (Haider et al., 2013).

Although the importance of cutting the cost of fuel and reducing emissions of all kinds is never called into question, there remains the need to bring more clarity about some outstanding issues including, for example, whether eco-ships constitute a good investment for the future and whether they will provide a more competitive solution in the market. This being said, the deciding factor will be fuel costs, which are set to remain elevated (BIMCO, 2013).

4. Panama Canal expansion

Operational for nearly one century, the Panama Canal is a critical node in international trade and a key asset which connects the East Coast of the United States and Gulf ports with Asia, Oceania, and developing America. The Panama Canal serves more than 144 maritime routes connecting 160 countries and

reaching some 1,700 ports in the world (Maritime Services - PanCanal.com, 2013). Total crossings in the Panama Canal reached 12,862 in 2012. Of this total, 3,331 crossings were attributed to container ships (*Bloomberg*, 2013). During the year, more than 300 million tons (Panama Canal/Universal Measurement System (PC/UMS)) of cargo were handled at the canal.

Large-sized ships are increasingly dominating the international shipping networks and the limitations of the Panama Canal's lock system prevent the waterway from accommodating the operation of ships surpassing the Panamax standard, that is, of a capacity of up to 5,100 TEUs. In view of this, and of the rapidly growing international trade flows causing severe capacity constraints, a major expansion project worth $5.25 billion was launched in 2006 to expand the capacity of the canal. The expansion project, which is set to conclude in 2015, will add a third set of locks to the canal system as well as deepen and widen existing channels.

In addition to allowing the passage of an ever-growing number of "post-Panamax" ships with an estimated cut-off point of around 13,500 TEUs, the expansion aims to reduce delays and costs. The Panama Canal Authority estimates the cost savings that will accrue to shippers from economies of scale to range between 7 per cent and 17 per cent (Mid-America Freight Coalition, 2011). Probably the first direct impact of the upgraded canal will be felt by the West Coast ports of the United States and the intermodal land bridge (rail connections using double-stacked rail transport) linking the Pacific and the Atlantic coasts. As the land bridge provides a slightly faster connection, the competition with the Panama Canal is an important consideration and the way in which the West Coast ports and railroads prepare to respond to the canal expansion will determine the extent of the competition. Rail companies in the United States are already engaged in corridor development and inland terminal initiatives (Lower, 2013).

Another overall likely impact is a change in the shipping dynamics of various traded goods induced by a change in not only the economies of scale, but also the toll structure and reduced transit times. While the expansion initially aimed to attract shipments from Asia to the East Coast of the United States, other goods and regions are emerging as potentially important users of the new canal. By allowing larger tonnage to pass, a number of markets, commodities and goods can be expected to benefit. Examples include the following: (a) grain moving from the United States East Coast/Gulf ports to Asia (Mid-America Freight Coalition, 2011); (b) soybean moving from developing America to Asia; (c) coal and iron-ore shipments from Colombia, the Bolivarian Republic of Venezuela and Brazil with destinations in Asia; (d) coal shipments from the East Coast of the United States to Asia, in particular China; (e) oil flowing from Ecuador to the East Coast of the United States; (f) gas cargo originating from Trinidad and destined for consumption in Chile; (g) gas exports from the United States to Asia. Other important potential impacts of the canal modifications include the development of large trans-shipment capacity and points for relay services in the Caribbean area (Rodrigue and Notteboom, 2012), and the reduction of carbon emissions from shipping, a side effect that remains largely unacknowledged (Stott and Wright, 2012).

In addition to the physical expansion, a number of considerations could affect the ability of the expanded Panama Canal to position itself as a key strategic maritime route and international trade asset. These include, among others:

- Developments in fuel prices;
- Sourcing decisions;
- Delivery times;
- The redistribution of manufacturing base to other locations;
- Shifts in the source of global demand towards developing regions and away from traditional locations and partners (Rodrigue and Notteboom, 2012);
- The extent to which ports will be able to handle efficiently the loading and unloading operations involving the larger post-Panamax ships;
- The effect of port investments on both coasts of the United States and the underlying competition;
- The canal fees and how they will affect its competitiveness (*Bloomberg*, 2013).

How other routes such as the Suez Canal respond to the Panama Canal expansion will also be important. It should be noted, however, that while these two passages are considered to be competitors to some extent, they also share complementarity given a renewed development of round-the-world equatorial liner services which benefit both canals (*Bloomberg*, 2013).

While the expansion of the Panama Canal entails numerous implications, these remain nevertheless, difficult to assess with any great degree of certainty. An expansion project of the scale of the Panama Canal involves multiple players and is subject to many unknowns given, in particular, global economic uncertainties and rapid advances in technology, including in ship size and design.

In conclusion and as noted in the present chapter and reiterated in previous editions of this *Review*, a number of trends are unfolding globally and are likely to shape the future of maritime transportation and deeply redefine its operating landscape. By way of recapitulation and while not intended as an exhaustive list, key trends currently at play and requiring further monitoring and assessment include the following:

(a) Continued negative effect of the 2008/2009 crisis on global demand, finance and trade;

(b) Structural shifts in global production patterns;

(c) Changes in comparative advantages and mineral resource endowments;

(d) Rise of the South and shift of economic influence away from traditional centres of growth;

(e) Demographics, with ageing populations in advanced economies and fast-growing populations in developing regions, with related implications for global production and consumption patterns;

(f) The arrival of container megaships and other transport-related technological advances;

(g) Climate change and natural hazards;

(h) Energy costs and environmental sustainability.

By redefining production, consumption, growth and trade patterns and dynamics, and by altering shipping networks and configurations, these trends are likely to also deeply transform international shipping and ports that, respectively, carries and handle 80 per cent of the volume of global merchandise trade and a significant share of its value.

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ENDNOTES

1 Average distances and rates of change are calculated on the basis of more recent data published in Clarkson Research Services (2013a).

2 Based on data from Clarkson Research Services. Data on LPG trade covers OECD only.