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Container and Ship Movements Through Australian Ports

2004–05 to 2024–25

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CONTAINER AND SHIP MOVEMENTS THROUGH AUSTRALIAN PORTS

2004-05 TO 2024-25

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FOREWORD

This report presents the national and port level forecasts of container and ship movements through Australian ports over the next twenty years. The forecasts have been developed on the basis of the estimated econometric models of export and import demand and the most recent economic outlook for Australia and its major trading partners. Australia's five main city ports (Brisbane, Sydney, Melbourne, Adelaide and Fremantle) are included in the development of the port level forecasts.

Forecasts of ship movements are developed by ship type. Ships are categorised into four main types: container ships, non-container freight ships, cruise ships and other ships.

The study was undertaken by Dr Krishna Hamal (Team Leader), Benjamin James and Mark Cregan. Stephen Wheatstone helped to extract sea freight data from the Bureau of Transport and Regional Economics (BTRE) sea freight database. Phil Potterton and Dr David Gargett provided constructive comments on the draft report.

Phil Potterton Executive Director

Bureau of Transport and Regional Economics Canberra June 2006

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AT A GLANCE

International shipping has remained the main mode of transporting exports and imports in Australia. In 2003-04, Australia's total international trade in commodities was 623.1 million tonnes (worth \$248.5 billion) of which sea freight accounted for 99.9 per cent.

This study provides forecasts of container and ship movements through Australian ports over the next twenty years. The forecasts have been developed based on econometric models of commodity export and import demand, which are driven by real income, population and exchange rates.

Australia's sea trade will continue to grow positively over the next twenty years, largely due to a positive economic outlook for Australia and its trading partners.

Total containerised trade is forecast to increase by 5.4 per cent a year in the next twenty years, from 5.2 million Twenty-Foot Equivalent Units (teus) in 2004-05 to 14.9 million teus in 2024-25. It is projected to increase by 7.4 per cent in Brisbane, 5.0 per cent in Sydney, 4.9 per cent in Melbourne, 5.3 per cent in Adelaide, 5.4 per cent in Fremantle and 5.3 per cent in all other ports. International containerised trade accounts for 86.6 per cent of the total containerised trade.

Total non-containerised trade is dominated by exports. It is forecast to increase by 3.8 per cent a year over the next twenty years, from 0.6 billion tonnes in 2004-05 to 1.4 billion tonnes in 2024-25. It is forecast to increase by 2.7 per cent in Brisbane, 1.3 per cent in Sydney, 3.5 per cent in Melbourne and Adelaide, 1.3 per cent in Fremantle and 3.9 per cent in all other ports. International non-containerised trade accounts for 85.3 per cent of the total non-containerised trade.

The long-term outlook for the cruise shipping industry is positive, largely as a result of positive economic growth in the USA, the vaporising of the adverse effects of the September 11 terrorist attacks and the construction of new cruise ships with an increased passenger capacity. The total number of cruise passenger visits is projected to increase by 3.8 per cent a year over the forecast period, from 375 000 in 2004-05 to 795 000 in 2024-25.

About 30 000 visits were made by all ships at all Australian ports in 2004-05. The number of ship visits is forecast to increase to around 54 800 in 2024-25, including 13 100 container ship visits, 36 400 non-container ship visits, 1 300 cruise ship visits and 4 000 other ship visits.

EXECUTIVE SUMMARY

BACKGROUND

International shipping has remained the main mode of transporting exports and imports in Australia. In 2003-04, Australia's total international trade in commodities was 623.1 million tonnes (worth \$248.5 billion) of which sea freight accounted for 99.9 per cent of the total trade.

Following the September 11 terrorist attacks in the USA, the Bali bombings, the Madrid bombing and more recently, the London bombings, there are security concerns in relation to the movement of containers and ships on Australia's coastal and international shipping routes. Information on the movement of containers and ships is vital for the planning and implementation of security measures at the Australian ports. Hence, this study provides forecasts of container and ship movements through Australian ports over the next twenty years.

FREIGHT FORECASTING MODELS

Since the movement of containers and ships depends on the volume of exports and imports, econometric models of commodity export and import demand have been used to forecast the movement of containers and freight ships at the national and port level. The models are specified in terms of real income, population and exchange rates and are estimated using annual historical data. The port level forecasts are developed for Australia's five main city ports (Brisbane, Sydney, Melbourne, Adelaide and Fremantle) and, in aggregation, 'other ports' (that is, all Australian ports excluding these five main city ports). These five ports presently account for about 89.9 per cent of the total containerised trade.

Forecasts of ship movements are presented for container ships, non-container ships, cruise ships and 'other ships' which include ships such as survey ships, navy ships and tugs.

Forecasts of container and container ship movements are derived using a three-step forecasting procedure. In the first step, econometric models are used to forecast export and import of full and empty containers measured in teus. The export and import of full and empty containers are then added to derive total containerised trade in teus. In the second step, the total containerised trade measured in Twenty-Foot Equivalent Units (teus) is further converted into 40-foot and 20-foot container susing the proportion of 40-foot containers in the total number of containers exchanged. In the

third step, forecasts of port visits by container ships are developed on the basis of the total containerised trade measured in teus and the average teus exchanged per container ship.

Further, the total containerised trade and the three years average proportion of international containerised trade are used to derive Australia's international containerised trade in teus.

Similarly, forecasts of non-containerised exports and imports are derived using econometric models with real gross domestic product (GDP) and gross national expenditure (GNE), population and exchange rates as explanatory variables. Non-containerised export and import forecasts are then added to derive the forecasts of total non-containerised trade. Total non-containerised trade and the three years average proportion of international non-containerised trade are then used to derive the forecasts of international non-containerised trade are then used to derive the forecasts of international non-containerised trade. The average proportions are kept constant over the forecast period.

Total non-containerised trade is divided by the average tonnage of cargoes carried by non-container ships to forecast the number of non-container ship visits over the forecast period.

DATA AND THEIR SOURCES

Historical data on containerised and non-containerised exports and imports, empty containers, GNE, GDP, exchange rates, the trade weighted index and population used to estimate the econometric models were gathered from the Bureau of Transport and Regional Economics (BTRE), Port of Brisbane Corporation (PBC), Sydney Ports Corporation (SPC), Port of Melbourne Corporation (PMC), Flinders Ports Pty Ltd (FPPL), Fremantle Ports (FP), the Association of Australian Ports and Marine Authorities (AAPMA), the Australian Bureau of Statistics (ABS), Access Economics and the Organisation for Economic Co-operation and Development (OECD).

Long-term forecasts of population and macroeconomic variables, which are the basis for the shipping forecasts of this study, are obtained from the Australian Bureau of Statistics, Access Economics and the US Census Bureau.

ASSUMPTIONS

Proportion of 40-foot containers

There has been an increase in the number of 40-foot containers used to export and import commodities at Australian ports. Approximately 38 per cent of total containers exchanged in Australia are 40-foot containers. However, 40-foot and 20-foot containers are not perfect substitutes. Heavy export commodities are being exported in 20-foot containers, whereas 40-foot containers are used to import relatively light but voluminous commodities. In this study, the proportion is assumed to gradually increase

to 52 to 55 per cent in Brisbane, Sydney, Melbourne and Fremantle and to 35 per cent in Adelaide.

Container vessel size

Container vessels operating on Australia's international and coastal routes are of different size, ranging from 5 000 to 60 000 Gross Tonnage (GT). Presently, 81.8 per cent of port visits are made by ships with sizes ranging from 15 000 GT to 45 000 GT.

In 2004-05, a container ship exchanged an average of 979 teus in Australia. The average teus exchanged varies by port, ranging from 738 teus in Adelaide to 1 742 teus in Melbourne. The average teus exchanged has increased strongly in the past. However, such high growth is not expected to continue over the next twenty years, largely as a result of a time lag in expanding Australian ports' capacity to handle large ships, the flattening of the expected growth in trade volume and a long time lag in the construction of new ships with larger container carrying capacity. In this study, the average teus exchanged per container ship operating in Australian ports is assumed to increase by one per cent a year over the forecast period.

Non-container vessel size

The size of non-container vessels operating in Australia changes regularly as a result of changes in international shipping. Large ships are expected to be used on North shipping routes while ships used on North routes are likely to come to South routes including Australia. The size of a non-container vessel also depends upon the specific commodity carried by the vessel. Coal ships are generally small, whereas ships designed to carry grain, tanker fuel and bulk oil are large. On average, a non-container ship presently carries around 31 000 tonnes of cargo in Australia. The average tonnage of cargo carried per non-container ship varies by port and is assumed to increase by one per cent a year over the forecast period.

FREIGHT SHIPPING FORECASTS

Forecasts of container and ship movements, which are developed purely on the basis of the estimated model parameters, are unconstrained forecasts in the sense that they are based solely on demandside parameters. Supplyside parameters are not included because of the lack of long time-series data on variables influencing supply of port activities. However, the forecasts developed in this study have been adjusted qualitatively to take account of the influence of supplyside constraints. The port level forecasts for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and other ports, as well as the national level forecasts are summarised in Tables 1 and 2 and are discussed in the following subsections.

Port	Annual average growth rate			Trade	volume
	1994-95	1999-2000	2004-05		
	to 1999-2000	to 2004-05	to 2024-25	2004-05	2024-25
	(per cent)			('000	teus)
Brisbane	13.2	10.9	7.4	726	3 047
Sydney	16.1	6.2	5.0	1 376	3 625
Melbourne	7.9	8.1	4.9	1 910	4 971
Adelaide	11.7	8.1	5.3	171	475
Fremantle	9.5	9.5	5.4	467	1 338
Other ports	20.5	7.8	5.3	521	1 458
All ports	12.0	8.0	5.4	5 171	14 915

TABLE ES 1 CONTAINERISED TRADE BY PORT

*Numbers in bold are forecasts.

Port	Annual average growth rate			Trade v	volume
	1994-95	1999-2000	2004-05		
	to 1999-2000	to 2004-05	to 2024-25	2004-05	2024-25
	(per cent)			(million	tonnes)
Brisbane	5.6	1.4	2.7	19.8	33.8
Sydney	3.2	0.7	1.3	14.5	18.8
Melbourne	6.5	3.0	3.5	9.9	19.6
Adelaide	5.3	11.9	3.5	7.9	15.7
Fremantle	2.0	0.7	1.3	20.7	26.8
Other ports	4.2	4.6	3.9	576.7	1 249.7
All ports	4.2	4.3	3.8	649.6	1 364.4

TABLE ES 2 NON-CONTAINERISED TRADE BY PORT

*Numbers in bold are forecasts.

Brisbane Port

The Port of Brisbane which is managed by the Port of Brisbane Corporation (PBC) is Australia's third largest container port. It contributes \$770 million to the Queensland economy and generates 10 000 direct and indirect jobs. Its main traded commodities are coal, crude oil, refined oil, cement, iron and steel, cereal, building products and meat products, and its main overseas trading partners are North Asia and South East Asia.

Total containerised trade increased by 10.9 per cent a year in the last five years to 726 000 teus in 2004-05. The high growth in containerised trade is influenced by large number of movements of commodities between assembly plants, a high growth in international trade and an increase in building and construction activities in areas of Brisbane. Continuous positive economic growth in Australia and that of its major trading partners has stimulated international trade. Similarly, favourable economic conditions and a relatively high population growth have positively influenced building and construction activities in areas of Brisbane. Economic growth in Australia and its major trading partners is expected to slow somewhat over the forecast period. The total

containerised trade is forecast to increase by 7.4 per cent a year over the next two decades to 3.0 million teus in 2024-25. Full container exports and imports are forecast to increase respectively by 6.9 and 7.7 per cent a year over the same period. Asia will remain Brisbane's main export regional market in terms of tonnage.

International containerised trade presently accounts for 94.7 per cent of Brisbane's total containerised trade. It is expected to increase annually by 7.5 per cent over the next twenty years, from 0.7 million teus in 2004-05 to 2.9 million teus in 2024-25.

Brisbane Port's total non-containerised trade was 19.8 million tonnes in 2004-05, including 7.8 million tonnes of exports and 12.0 million tonnes of imports. It increased by 1.4 per cent a year in the last five years and is forecast to increase by 2.7 per cent a year over the forecast period to 33.8 million tonnes in 2024-25. Non-containerised exports and imports are forecast to increase respectively by 0.5 and 3.8 per cent a year during the forecast period.

International non-containerised trade accounts for 73.4 per cent of non-containerised exports and 71.0 per cent of non-containerised imports at Brisbane Port. It is forecast to increase by 2.7 per cent a year over the next twenty years to 24.2 million tonnes in 2024-25. The PBC is aiming at maintaining European shipping services through the port and improving shipping services with China. Four new shipping services have already started between Brisbane and Chinese ports. These will positively influence Brisbane's international trade.

In 2004-05, Brisbane Port recorded a total of 2 400 freight ship visits including 900 visits made by container ships and 1 500 visits made by non-container ships. With the positive growth in containerised and non-containerised trade, the total number of ship visits is expected to increase to 4 800 in 2024-25.

The current capacity of Brisbane Port is less likely to handle the expected high volume of containerised and non-containerised trade over the forecast period. The capacity needs to be increased to meet high demand for port facilities to facilitate the smooth movement of containers and ships through Brisbane Port. The PBC and the stevedoring companies operating at Brisbane Port have already taken many initiatives in this regard. A major expansion initiative currently being undertaken by the PBC is the reclamation of 230 hectares of land at Fisherman Islands. A total area of 10 hectares has already been reclaimed for the development to start. The remaining area will gradually be reclaimed over the next 20 to 25 years. The PBC is also developing an additional five to seven wharves to meet future high growth.

Patrick Corporation has relocated its stevedoring facilities from Hamilton to Fisherman Islands where it has established a semi-automated container terminal. The terminal, which is the world's first terminal to be operated by straddle carriers, is expected to increase efficiency in container handling.

Both Patrick Corporation and P&O Ports have also signed agreements with the PBC to relocate their motor-vehicle and break-bulk operations from Hamilton to Fisherman Islands. These stevedoring companies are also investing to increase their container

handling capacity at Brisbane Port. Patrick will be spending \$120 million and P&O around the same level.

Warehouse Group Queensland has established a distribution centre with 50 000 squaremeters of warehouse space under one roof. Since this is strategically located, it provides reliable and efficient access to the wharfs, container parks, and road and rail connections to transport the port's imports to retail outlets in Queensland, the ACT and most of New South Wales.

The PBC is also aiming to increase the rail share in freight movements to and from Brisbane Port.

Sydney Ports

The Sydney Ports Corporation (SPC) manages the Sydney ports - Port Botany and Sydney Harbour, which are the main gateway of exports and imports for 4.2 million people in Sydney. Port Botany remains the second largest container port in Australia.

Sydney Ports exports and imports containerised and non-containerised commodities worth \$45.5 billion each year, contributes \$2.5 billion to the NSW economy and generates more than 17 000 jobs.

The containerised trade of Sydney Ports increased annually by 6.2 per cent in the last five years to 1.4 million teus in 2004-05. It is forecast to increase by 5.0 per cent a year in the next twenty years to 3.6 million teus in 2024-25. Full container exports and imports are expected to increase by 4.5 and 4.9 per cent a year over the forecast period.

International containerised trade accounts for 95.6 per cent of Sydney Ports' total containerised trade. It is forecast to increase by 5.0 per cent a year over the next twenty years to 3.5 million teus in 2024-25. Asia, particularly China, will continue to be a main individual export destination over the forecast period. This is because economic growth in China and other major Asian countries is expected to remain relatively strong during the forecast period.

Sydney Ports' non-containerised trade was 14.5 million tonnes in 2004-05. Noncontainerised exports, which mostly consist of bulk liquids (oil included) and gases, are relatively small. It declined by 1.7 per cent in the last five years, largely because of a decline in fuel exports to overseas markets, mainly to Asia. The establishment of low cost oil refineries in Asia has adversely affected fuel exports to Asia. The downward trend in Sydney's non-containerised exports is expected to continue. Non-containerised exports are forecast to decline by 11.4 per cent a year over the next twenty years to 71 000 tonnes in 2024-25. On the other hand, Sydney's non-containerised imports will increase by 1.6 per cent a year during the same period to 18.8 million tonnes in 2024-25.

International non-containerised trade currently accounts for 66.5 per cent of Sydney Ports' total non-containerised trade. It declined by 7.2 per cent a year in the last five years. With a rise in imports, it is forecast to increase by 1.3 per cent a year over the

next twenty years to 12.6 million tonnes in 2024-25. International non-containerised exports will continue to decline during the period to 45 000 tonnes in 2024-25.

In 2004-05, a total of 2 700 visits were made by container and non-containerised ships at Sydney Ports. Following expected positive growth in containerised and non-containerised trade and marginal growth in ship size, the total number of freight ship visits will increase to 4 000 in 2024-25. Around 50.2 per cent of the visits will be made by container ships.

Following the expected high growth in containerised trade, demand for port facilities at Sydney Ports will rise significantly over the forecast period. The current capacity of Sydney Ports may not be enough to handle a substantial increase in containerised trade. Port Botany is expected to reach its full capacity in 2010. Hence, its capacity needs to be increased to facilitate the movement of containers and ships in the future. SPC is addressing this issue through its 'First Port Future Port' strategy. The successful implementation of the strategy will help to overcome the capacity problem at Sydney Ports. One of the major initiatives under the strategy is the proposed 60-hectare Port Botany expansion plan. On its completion the plan will increase container handling facilities at Port Botany over the forecast period.

SPC is also planning to build additional intermodal terminals to reduce the current congestion level on roads linking to Port Botany. These terminals, which will be linked with Port Botany by rail, are aimed at increasing the current rail share from 20 per cent to 40 per cent by 2025.

Higher expected imports than exports and the limited use of import containers for exports will put pressure on the existing empty containers storage facility. The pressure could be reduced if SPC gains approval from the NSW State Government to purchase the State Rail Authority's Cooks River rail yard to manage empty containers.

Melbourne Port

Melbourne Port is the largest container and general port in Australia. It is managed by the Port of Melbourne Corporation (PMC). Currently, the port handles a total trade worth \$70 billion, contributes over \$5.4 billion annually to the Victorian economy and employs around 80 000 people, both directly and indirectly.

Containerised trade dominates the total trade of Melbourne Port. It grew by 8.1 per cent a year in the last five years. However, such high growth is not expected over the next two decades, mainly because of lower import growth forecast resulting from the expected lower economic growth in Australia and the depreciation of the Australian dollar against the US dollar. Containerised trade is forecast to increase by 4.9 per cent a year over the next twenty years, from 1.9 million teus in 2004-05 to 5.0 million teus in 2024-25. Full container exports will rise at a rate slightly higher than the rate of growth in full container imports. The total containerised exports also include some South Australia exports which presently go through Melbourne Port. International trade accounts for 79.2 per cent of the total containerised trade of Melbourne Port. It increased by 7.5 per cent a year in the last five years and is forecast to increase by 4.9 per cent a year over the forecast period to 3.9 million teus in 2024-25. Main containerised export destination countries are China, New Zealand, Japan, the USA, South Korea, Hong Kong, Taiwan, and Indonesia. Main containerised import origin countries are China, the USA, New Zealand, Hong Kong, Japan, Germany, South Korea, Italy, Malaysia and Taiwan.

Melbourne's non-containerised trade increased by 3.0 per cent a year in the last five years to 9.9 million tonnes in 2004-05 and is forecast to increase by 3.5 per cent a year over the forecast period to 19.6 million tonnes in 2024-25. Non-containerised exports and imports are expected to rise by 2.7 and 3.6 per cent a year during the same period.

International trade accounts for 52.8 per cent of Melbourne's total non-containerised trade. It increased by 3.0 per cent a year in the last five years to 5.2 million tonnes in 2004-05. With the slowing of the import sector in Melbourne, it is forecast to increase by 3.4 per cent a year over the next twenty years to 10.3 million tonnes in 2024-25.

The total number of visits made by container and non-container ships to Melbourne Port in 2004-05 was 3 100 including 1 100 visits made by container ships. The total number of visits is forecast to increase to 5 600 in 2024-25.

With substantial increase in the number of container and ship movements following the expected high growth in containerised and non-containerised trade, demand for port facilities at Melbourne Port will rise significantly over the forecast period. It appears that the current capacity of Melbourne Port is not sufficient to handle such increase in the number of container and ship movements. The capacity needs to be increased to facilitate the movement of containers and ships in the future and thereby to realise the benefit of a high growth in trade volume. PMC is taking a number of initiatives to increase its port capacity, including the channel deepening project. Over 30 per cent of container ships are currently unable to load to full capacity because of the current channel depths at Melbourne Port. Hence, on its completion, the project will enable large ships to load to full capacity.

Improvement in rail access to the port area is also vital to maintain the smooth flow of containers to and from the port, especially given the expected high growth in containerised trade at Melbourne Port over the forecast period. At present, around 18 per cent of containers are moved by rail at Melbourne Port. The Victorian Government has a target to increase the rail share to 30 per cent by 2010. The Australia Government has allocated \$110 million under the AusLink program to improve rail access to the port area.

Adelaide Port

The Port of Adelaide is the main service point for shipping in South Australia. It is managed by Flinders Ports Pty Ltd (FPPL) and has over 20 wharfs providing regular shipping services on coastal and international routes.

The total containerised trade of Port Adelaide increased by 8.1 per cent a year in the last five years to 171 000 teus in 2004-05. It is forecast to increase by 5.3 per cent a year over the next twenty years to 475 000 teus in 2024-25. The lower growth rate during the forecast period is largely due to the expected slow growth in export and import of empty containers. Full container exports and imports are expected to increase respectively by 5.7 and 5.1 per cent a year during the forecast period.

International containerised trade accounts for 86.9 per cent of Adelaide's total containerised trade. It is forecast to increase by 5.3 per cent a year over the next twenty years to 420 000 teus in 2024-25. The main export destination countries are New Zealand, Saudi Arabia, Egypt, the United Kingdom, Canada, Indonesia, United Arab Emirates, China, Malaysia, Japan, Bangladesh, South Korea, Pakistan, Thailand and Kuwait; whereas the main import origin countries are Singapore, the USA – West Coast, Japan, Canada – West Coast, Malaysia, China, New Zealand, Qatar, South Korea, Bahrain, Belgium, Germany, Indonesia, India and France.

Port Adelaide's total non-containerised trade increased by 11.9 per cent a year in the last five years to 7.9 million tonnes in 2004-05, mainly because of a 55.3 per cent surge in imports in 2003-04 following Mobile closing its oil import at Port Stanvac. Oil is now imported through Port Adelaide. Non-containerised trade is forecast to increase by 3.5 per cent a year over the next twenty years to 15.7 million tonnes in 2024-25. Non-containerised exports and imports are projected to increase respectively by 3.6 and 3.3 per cent a year over the same period.

International non-containerised trade accounts for 69.8 per cent of the total non-containerised exports and 17.6 per cent of the total non-containerised imports. It is forecast to increase by 3.6 per cent a year over the next twenty years, from 3.0 million tonnes in 2004-05 to 6.1 million tonnes in 2024-25.

In 2004-05, a total of 1 200 visits were made by commercial ships at Port Adelaide. Around 81.1 per cent of the total visits were made by non-container ships. The total number of ship visits will increase to 2 100 in 2024-25.

Like other city port authorities, FPPL is taking a number of initiatives to increase the capacity of Port Adelaide. One of the initiatives is to deepen Adelaide Port's outer harbour channel, from 12.2 to 14.2 metres. The current depth cannot handle larger vessels, which are expected to replace smaller vessels following the channel deepening at Melbourne Port. The deepening of the channel is required to receive larger container vessels to meet future high growth in export and import demand as well as to ensure larger ships do not bypass Adelaide Port. It allows large vessels to enter and leave the harbour with a full load irrespective of tides.

Further, a new grain wharf, which is expected to commence its operation in 2006, will facilitate grain exports from Port Adelaide.

Fremantle Port

Fremantle Port, fully owned by the State Government of Western Australia, is Western Australia's principal general cargo port. It is managed by Fremantle Ports (FP), which contributed \$15.5 million to the State Government in 2003-04 as taxes, tax equivalent payments and dividends.

The containerised trade of Fremantle Port increased by 9.5 per cent a year in the last five years to 467 000 teus in 2004-05. However, such high growth in the containerised trade is not likely to continue in future. This is largely due to the maturing of Fremantle's trade, the slowing of economic growth in Australia and its major trading partners and the decline in port accessibility. Containerised trade appears to be gradually maturing. As a result, the high income elasticity of containerised export demand is expected to gradually decline to the level of Australia's matured ports such as Melbourne and Sydney. Economic growth is expected to slow somewhat in Australia and its major trading partners. Containerised trade is forecast to increase by 5.4 per cent a year over the next twenty years to 1.3 million teus in 2024-25. Full container exports and imports are forecast to increase respectively by 5.6 and 5.7 per cent a year during the forecast period to 482 000 and 640 000 teus in 2024-25.

International containerised trade accounts for 80.5 per cent of Fremantle Port's total containerised trade. It increased by 8.5 per cent a year in the last five years and is forecast to increase by 5.4 per cent a year over the next twenty years to 1.1 million teus in 2024-25. Asia, particularly China, Japan and Indonesia, will remain the main destinations for Fremantle's exports.

The non-containerised trade of Fremantle Port was 20.7 million tonnes in 2004-05. Exports and imports accounted for 55.7 and 44.3 per cent of the trade respectively. Non-containerised trade which increased by 0.7 per cent a year in the last five years is forecast to increase by 1.3 per cent a year over the next twenty years to 26.8 million tonnes in 2024-25. Non-containerised exports and imports will rise by 0.9 and 1.7 per cent a year during the forecast period. International non-containerised trade which accounts for 74.1 per cent of total non-containerised trade is forecast to increase by 1.3 per cent a years to 19.8 million tonnes in 2024-25.

Altogether a total of 1 100 visits were made by container and non-container ships at Fremantle Port. With the expected positive growth in trade, the total number of ship visits will increase to 1 800 in 2024-25.

Fremantle Port is also likely to face capacity constraints with the expected high growth in export and import demand over the next twenty years. Hence, it is planning to deepen the Inner Harbour from 12.2 metres to 14.2 metres to facilitate the movement of large container ships in the future. It also plans to develop new port facilities at the Outer Harbour to facilitate future containerised and non-containerised trade.

Private jetties are in operation in the Kwinana area for oil exports and imports. A number of new jetties are expected to be constructed to facilitate non-containerised trade.

Other ports

'Other ports' in this study includes all Australian ports excluding the five major city ports (Brisbane, Sydney, Melbourne, Adelaide and Fremantle). The main ports are located in Cairns, Devonport, Burnie, Launceston, Townsville, Newcastle, Gladstone, Hobart, Rockhampton and Darwin.

The total containerised trade of other ports increased by 7.8 per cent a year in the last five years to 521 000 teus in 2004-05. It is forecast to increase by 5.3 per cent a year over the next twenty years to 1.5 million teus in 2024-25. Full container exports and imports account for 35.4 and 38.6 per cent of the total containerised trade of other ports. Full container exports will increase by 5.3 per cent a year during the forecast period to 521 000 teus in 2024-25, whereas full container imports will increase by 5.4 per cent a year to 574 000 teus in 2024-25.

International containerised trade accounts for 85.1 per cent of other ports' total containerised trade. It is forecast to increase by 5.3 per cent over the next twenty years from 0.4 million teus in 2004-05 to 1.3 million teus in 2024-25.

Non-containerised trade increased by 4.6 per cent a year in the last five years and it is forecast to increase by 3.9 per cent a year over the forecast period from 0.6 billion tonnes in 2004-05 to 1.2 billion tonnes in 2024-25. Non-containerised exports account for 91.1 per cent of the total non-containerised trade. It is expected to increase by 4.2 per cent a year in the next twenty years to 1.2 billion tonnes in 2024-25. On the other hand, non-containerised imports increased by 0.5 per cent a year in the last five years and will continue to increase at the same rate over the forecast period to 56.6 million tonnes in 2024-25.

International non-containerised trade accounts for 88.0 per cent of total non-containerised trade. It is forecast to increase by 4.0 per cent a year over the forecast period to 1.1 billion tonnes in 2024-25.

A total of 15 900 visits were made by container and non-container ships at other ports in 2004-05. With expected positive growth in the containerised and non-containerised trade and a relatively small growth in ship size, the number of ship visits at other ports is expected to increase to 31 200 in 2024-25. Around 87.7 per cent of these visits will be made by non-container ships.

All ports

'All ports' includes all container and non-container ports of Australia. Australia's containerised trade increased by 8.0 per cent a year in the last five years. However, such strong growth is not expected over the next twenty years, largely due to the maturing of Australia's export and import markets, increasing pressure on port facilities, expected slow economic growth in Australia and in the USA and the depreciation of the Australian dollar against the US dollar. The growth rates of full container exports and imports have remained positive but have been gradually declining in the last five years. Full container exports increased by 11.1 per cent a year during 1994-95 to 1999-2000 and by 4.5 per cent a year during 1999-2000 to 2004-05. Similarly, full container

imports increased by 12.8 per cent a year during 1994-95 to 1999-2000 and by 8.3 per cent a year during 1999-2000 to 2004-05. Slowing growth rates suggest that containerised trade is maturing over the years. The total containerised trade is forecast to increase by 5.4 per cent a year in the next twenty years, from 5.2 million teus in 2004-05 to 14.9 million teus in 2024-25. Full container exports which account for 31.4 per cent of the total containerised trade will increase by 5.3 per cent a year to 4.6 million teus in 2024-25. On the other hand, full container imports which account for 44.2 per cent of the total containerised trade are expected to increase by 5.4 per cent a year over the forecast period to 6.5 million teus in 2024-25.

International containerised trade accounts for 86.7 per cent of the total containerised trade. A total of 4.5 million teus was traded internationally in 2004-05. Around half of the trade was exports; the other half was imports. The total international containerised trade is expected to increase by 5.5 per cent a year over the next twenty years to 13.1 million teus in 2024-25. International full container exports will increase by 5.4 per cent a year to 4.0 million teus in 2024-25, whereas international full container imports will rise by 5.4 per cent a year to 5.9 million teus in 2024-25.

Australia's non-containerised trade includes the trade of tanker fuel, dry bulk, bulk oil, gases and other non-containerised commodities. Exports account for 84.8 per cent of the total non-containerised trade. In 2004-05, the total non-containerised trade for Australia was 649.6 million tonnes including 550.6 million tonnes of exports and 99.0 million tonnes of imports. Total trade increased by 4.3 per cent a year in the last five years. Given all the assumptions on macroeconomic variables and population, it is forecast to increase by 3.8 per cent a year over the next twenty years to 1.4 billion tonnes in 2024-25. Non-containerised exports and 0.1 billion tonnes in 2024-25. Relatively to nearly 1.2 and 0.1 billion tonnes in 2024-25. Relatively slow growth in non-containerised imports is expected because of the slowing of the Australian economy and the weakening of the Australian dollar against the US dollar over the forecast period.

International non-containerised trade accounts for 85.5 per cent of the total noncontainerised trade. It is forecast to increase by 3.9 per cent a year over the forecast period to 1.2 billion tonnes in 2024-25. International non-containerised exports will increase by 4.1 per cent a year to 1.1 billion tonnes in 2024-25, whereas international non-containerised imports will increase by 1.7 per cent a year to 0.1 billion tonnes in 2024-25.

The Free Trade Agreement (FTA) with the USA is likely to have a positive impact on Australia's containerised and non-containerised trade over the forecast period.

In 2004-05, a total of 26 400 visits were made by all container and non-container ships at all Australian ports. Following an expected positive growth in containerised and non-containerised trade and a relatively small growth in ship size, the number of ship visits is forecast to increase to 49 500 in 2024-25.

CRUISE SHIPPING FORECASTS

Australia is not currently recognised as a cruise destination in its own right. It is regarded by cruise destination planners as part of the Asia-Pacific region. Hence, Australia attracts relatively few cruise ships. The majority of cruise ships coming to Australia are headed towards New South Wales and Queensland at around 30 per cent each. Victoria and Tasmania attract a little over 10 per cent each with the Northern Territory, Western Australia and South Australia accounting for the remaining visits.

In this study, forecasts of cruise ship passenger demand have been developed on the basis of econometric demand models of inbound and outbound sea passenger numbers. The models are specified in terms of population, real income and exchange rates and are estimated using historical data from the last twenty years.

In the last three years, the number of inbound passenger cruise ships was adversely influenced by non-economic factors such as the September 11 terrorism attacks, the Severe Acute Respiratory Syndrome (SARS) and ship size (capacity). The number of passengers willing to fly to join a cruise decreased, and the number passengers from the USA willing to take a holiday outside of the USA also fell. The SARS outbreak caused a decrease in the number of cruises being undertaken by the Asian market. Similarly, ship capacity on the Australian routes has been acting as a constraint to the growth of Australia's cruise shipping industry.

The long-term outlook for the industry is positive, largely due to an expected positive economic growth in the USA which is the main source of international cruise passengers, the vaporising of the adverse effects of the September 11 terrorist attacks and the construction of new cruise ships with an increased passenger capacity. The number of Australia's inbound sea passengers, which decreased by 9.9 per cent a year in the last five years, is forecast to increase by an average annual rate of 3.1 per cent during the forecast period, from 14 900 in 2004-05 to 27 500 in 2024-25. On the other hand, the number of Australia's outbound sea passengers which decreased by 8.4 per cent a year in the last five years, is expected to increase by 4.9 per cent a year over the next twenty years, from 8 300 in 2004-05 to 21 800 in 2024-25. The total number of international and domestic passenger visits is projected to increase by 3.8 per cent a year to 795 000 in 2024-25. Similarly, the total number of cruise ship visits at Australian ports will increase by 2.8 per cent a year during the same period, from 780 in 2004-05 to 1 400 in 2024-25.

There is no capacity problem for cruise ships at Australian ports. Sydney's Darling Harbour Port has already shown it has the capability to handle large cruise ships at its passenger terminal. Super Star Leo, weighing 75 000 GT, is the largest passenger vessel ever to visit Sydney. The vessel, which is operated by Star Cruises, did not have difficulty in passing under the Sydney Harbour Bridge.

CHAPTER 1 INTRODUCTION

INTRODUCTION

International shipping has remained the main mode of transporting exports and imports in Australia. This is because Australia is an island nation and its exports and imports are dominated by heavy and low-value bulk commodities which cannot be transported by air at the current level of technology. In 2003-04, Australia's total international trade in commodities was 623.1 million tonnes (worth \$248.5 billion) including 558.6 million tonnes of exports and 64.5 million tonnes of imports. Sea trade accounted for 99.9 per cent of the total trade.

Heavy and low-value commodities are exported and imported in bulk vessels, whereas lighter and high-value commodities are exported and imported in container ships (Figure 1.1). Non-containerised cargo currently accounts for 96 per cent of outbound and 72 per cent of inbound sea freight volume. However, the shares markedly decline when exports and imports are measured in value terms. Non-containerised cargo accounts for only 51 per cent of outbound and 18 per cent of inbound sea freight value.



FIGURE 1.1 CARGO SHARES IN OUTBOUND AND INBOUND SEA FREIGHT VOLUME AND VALUE, 2003-04

Following the September 11 terrorist attacks in the USA, the Bali bombings, the Madrid bombing and more recently, the London bombings, there are security concerns in

relation to the movement of containers and ships through Australian ports. Information on the movement of containers and ships is vital for the planning and implementation of security measures at Australian ports. Hence, this study attempts to develop the national and port level forecasts of container and ship movements through Australian ports over the next twenty years. The port level forecasts are developed for Australia's five main city ports (Brisbane, Sydney, Melbourne, Adelaide and Fremantle) and, in aggregation, 'other ports' (that is, all Australian ports excluding these five main city ports).

In this study, forecasts of ship visits are developed and presented by ship type. Ships are grouped into four categories for forecasting purposes. These are: container ships, non-container ships, cruise ships and 'other ships'. A container ship is defined as a ship designed to carry containers only. The category of non-container ships includes ships carrying refined and crude oil, chemicals, gas, bulk dry, livestock and general commodities. Cruise ships are used for carrying passengers only. The category of other ships includes ships and tugs are included in the other ships category.

Econometric models of export and import demand are used to forecast the number of container and ship movements. These models are specified in terms of population, real income and exchange rates and are estimated using historical data.

OBJECTIVES

The main objectives of the study are as follows:

- to forecast the volume of containerised and non-containerised trade at the port and national level
- to forecast the movement of containers by container type at the port and national level
- to forecast the movement of freight ships at the port and national level
- to forecast the short-term movement of cruise passengers at the national level
- to forecast the movement of cruise and other ships at the national level only.

OUTLINE OF THE REPORT

The background and objectives of the report are presented in Chapter 1.

Chapter 2 deals with freight forecasting models. A detailed discussion on the econometric models and their estimated parameters is also provided in this chapter.

Data and their sources, as well as assumptions on macroeconomic and population variables, are discussed in Chapter 3.

Chapter 4 presents the national and port level forecasts of container and ship movements over the next twenty years to 2024-25.

In Chapter 5, forecasts of cruise passenger and ship movements are presented.

CHAPTER 2 FREIGHT FORECASTING MODELS

INTRODUCTION

In this study, forecasts of containerised and non-containerised trade, cruise passenger numbers, and the movement of freight, cruise and other ships are developed using econometric models. A detailed discussion on the models and their estimated parameters is presented in the later sections of this chapter.

As mentioned in Chapter 1, the forecasts of containerised and non-containerised trade and freight ship movements are developed at the national and port level. However, the forecasts of cruise passenger numbers and the movement of cruise and other ships could not be developed at the port level, mainly due to the lack of long time-series port level data on cruise passenger numbers and the movement of cruise and other ships. The forecasts are` developed at the national level only.

Since the five main city ports (i.e. Brisbane, Sydney, Melbourne, Adelaide and Fremantle) dominate Australia's containerised trade, accounting for 89.9 per cent of the total containerised trade, their growth rate forecasts are used to derive forecasts of container and container ship movements at the national level. This approach has been used following the predictive-accuracy of the port level models relative to the national level models, and to maintain consistency in port and national level forecasts. The approach was not found appropriate to forecast non-containerised trade and non-container ship movements at the national level. This is because the five main city ports account for only 11.2 per cent of the total non-containerised trade and, hence, do not dominate Australia's non-containerised trade. The national level forecasts of non-containerised trade and the movement of non-container ships are developed using the national level econometric models.

In this study, the term 'all ports' is used to refer to the total of all Australian ports (that is, national level).

Forecasts for other ports are derived by subtracting the total forecasts for the five main city ports from the national level forecasts.

The econometric models have been chosen to forecast container and ship movements at the port level, because they are relatively better than time trend or univariate time-series models in the sense that the models can accommodate several explanatory variables to analyse their influence on container and ship movements. Since the models are specified in a double logarithmic linear functional form, they are easy to estimate, provide superior fit and the estimated parameters can be directly interpreted as elasticities. The models have been widely used in many tourism and transport demand forecasting studies, such as Loeb (1982), Witt and Witt (1992), Hamal (1997a, 1997b and 2004) and BTRE (2002a and 2002b).

The econometric models include population, income and exchange rates as explanatory variables. The models were estimated using annual data instead of quarterly data, for two reasons. Firstly, the models are intended to derive long-run forecasts, not short-run forecasts. Monthly and quarterly data are desirable to develop short-run forecasts. Secondly, the long-run forecasts of most macroeconomic variables are available only on an annual basis rather than on a monthly or quarterly basis.

In this report, ships operating at the Australian ports are grouped into four categories for modelling purposes. These are: container ships, non-container ships, cruise ships and other ships. A container ship is defined as a ship designed to carry containers only. The category of non-container ships includes ships carrying refined and crude oil, chemicals, gas, bulk dry, livestock and general commodities. Cruise ships are defined as those ships which carry passengers for cruising purposes only. The category of other ships includes survey ships, navy ships, tugs and all other ships which are not included under container, non-container and cruise ship categories.

CONTAINER AND FREIGHT SHIP FORECASTING MODELS

Since the export and import of full and empty containers are linked, a system of simultaneous equations underlying the demand and supply structure of container movements is likely to present a better set of container forecasts. However, such a system of simultaneous equations is found to be complex to estimate, especially when long time-series data on supplyside variables are not readily available and the length of time-series data is not the same for all demandside model variables. In this study, the single equation modelling technique which is doable and simple to use is applied to forecast container numbers.

Although it is more meaningful to forecast shipping activities by commodity, port of origin and final destination, it could not be done for two reasons. Firstly, long timeseries data on exports and imports by commodity, port of origin and final destination are not readily available for forecasting purposes. Secondly, it is resource intensive to collect, analyse and forecast shipping activities by commodity, port of origin and final destination.

Forecasts of container and freight ship movements are separately developed using the forecasting frameworks presented in Figures 2.1, 2.2 and 2.3. Since the volume of exports and imports directly influences the number of container and ship movements, econometric models of export and import volumes are specified to forecast the number of container and ship movements. The models include export and import volumes as dependent variables and population, income and exchange rates as explanatory variables.



FIGURE 2.1 CONTAINERISED TRADE AND SHIP VISIT FORECASTING FRAMEWORK

The forecasts of container and container ship movements are derived using a three-step forecasting procedure (Figure 2.1). In the first step, the econometric models are estimated and used to forecast the full and empty containerised export and import volumes measured in Twenty-Foot Equivalent Units (teus). The volumes are then added to derive total containerised trade in teus.

In the second step, the total containerised trade is further converted into container numbers using the proportion of 40-foot containers in the total number of containers exchanged. The proportion is projected on the basis of their past values and the degree of substitutability between 40-foot and 20-foot containers. Moreover, the total container numbers are disaggregated into 40-foot and 20-foot container numbers by applying the projected proportion of 40-foot containers.

In the third step, forecasts of container ship visits are derived on the basis of the total containerised trade measured in teus and the average teus exchanged per container ship visit.


FIGURE 2.2 INTERNATIONAL CONTAINERISED TRADE FORECASTING FRAMEWORK

Further, the total containerised trade forecasts and the three years average proportions of international containerised trade from 2001-02 to 2003-04 are used to derive forecasts of international containerised trade (Figure 2.2). The average proportions are assumed to remain constant over the forecast period. This constant proportional method of converting total containerised trade into international containerised trade is simple to use and statistically valid on the grounds that the proportions of international containerised trade are relatively high (Table 2.1). This means that the growth rate forecasts of the total trade reflect the expected growth rate of international trade.



FIGURE 2.3 NON-CONTAINERISED SEA FREIGHT AND SHIP VISIT FORECASTING FRAMEWORK

Econometric models of non-containerised exports and imports are specified, estimated and used to forecast non-containerised export and import volumes at the port and national level. These volumes are then combined to derive forecasts of total noncontainerised trade from (Figure 2.3). The total non-containerised trade forecasts and the three years average proportions of international non-containerised trade from 2001-02 to 2003-04 (Table 2.2) are used to forecast international non-containerised trade. The average proportions are kept constant over the forecast period. Since total noncontainerised trade is dominated by international non-containerised trade in all of the main five city ports except for non-containerised imports in Adelaide, the constant proportion method of converting total non-containerised trade into international noncontainerised trade appears to be a reasonable and simple method to use.

Port	Full export	Empty export	Full import	Empty import	Total
			(per cent)		
Brisbane	97.9	93.5	96.3	80.3	94.6
Sydney	94.6	88.8	99.5	94.5	95.9
Melbourne	77.8	74.9	84.0	62.0	79.2
Adelaide	99.2	94.8	94.7	48.3	88.8
Fremantle	88.9	94.4	72.5	59.9	80.1
All ports	87.3	85.2	89.9	67.0	86.6

TABLE 2.1 THREE YEARS AVERAGE PROPORTIONS OF INTERNATIONAL CONTAINERISED TRADE IN TOTAL CONTAINERISED TRADE*

* 2001-02 to 2003-04

Furthermore, the total non-containerised trade and average tonnage carried per noncontainer ship visit are used to forecast the number of non-container ship visits over the forecast period.

The econometric models that are used to forecast the export and import volumes of containerised and non-containerised trade are discussed in the following sections.

Port	Export	Import	Total
-		(per cent)	
Brisbane	73.4	71.0	72.0
Sydney	63.3	66.7	66.6
Melbourne	64.1	50.0	54.2
Adelaide	69.8	17.6	45.2
Fremantle	76.6	70.9	73.9
All ports	91.1	54.1	85.3

TABLE 2.2	THREE YEARS AVERAGE PROPORTIONS OF INTERNATIONAL NON-
	CONTAINERISED TRADE IN TOTAL NON-CONTAINERISED TRADE*

* 2001-02 to 2003-04

Full container exports

An econometric model of full container exports is specified in terms of population, real income, exchange rates and the number of empty import containers. The model is presented in equation (2.1).

$$\ln PFUX_{it} = \alpha_{i0} + \alpha_{i1} \ln PGDP_{it} + \alpha_{i2} \ln EXUSAU_t + \alpha_{i3} \ln EIC_{it} + u_{it}$$
(2.1)

where,

PFUX_i = Per capita full container exports from the ith port of Australia in teus;

 $PGDP_j = Per capita real Gross Domestic Product (GDP) in the jth export destination country in billion US dollars;$

EXUSAU = Exchange rate of the US dollar per Australian dollar;

EIC_i = Number of empty containers imported to the ith port;

u = Error term;

 α 's = Regression coefficients;

i = ith port and varies from 1 to 6 (1 = Brisbane, 2 = Sydney, 3 = Melbourne, 4 = Adelaide and 5 = Fremantle);

j = jth export destination country and it varies from 1 to 2 (1 = Japan and 2 = the Organisation for Economic Co-operation and Development (OECD) countries); and t is a time subscript; and

t = Time subscript.

The exchange rate variable is substituted by the Trade Weighted Index (TWI) in the full container export model for Adelaide and Fremantle ports in order to increase the predictive power of the model.

Since most containerised exports from Brisbane and Fremantle are destined for Japan, the Japanese population and real income are used as proxy for the population and real income of all export markets of Brisbane and Fremantle. Similarly, the population and real income of the OECD countries are used as proxy for the population and real income of the export markets of Sydney, Melbourne and Adelaide ports. This is because the OECD countries currently account for 59.2 per cent of Australia's total merchandise export value.

Although the OECD and non-OECD countries account for more or less equal share in Sydney's total containerised exports, the population and real income of the OECD countries are used in the containerised export model of Sydney Ports. This is because the OECD countries are relatively matured export markets compared with the non-OECD countries. In other words, the export demand elasticities that are estimated using data from the OECD countries are relatively stable and likely to reflect long-run elasticities. Nonetheless, the influence of high economic growth in the emerging markets, such as China and other Asian countries, on Sydney's containerised exports is included by adjusting the model based forecasts qualitatively based on the magnitude of the growth and the market share of emerging markets.

In Australia, shippers, to some extent, use empty import containers (i.e. containers emptied after unloading imported cargo) to load their export cargo. In 2001, the volume of containerised exports was adversely affected by a shortage of import containers to be used for loading export cargo (Daily Commercial News 2001). Therefore, the number of empty import containers is included as one of the explanatory variables in the model. The volume of containers for the best fit of the model.

In the model, population is included on a per capita basis to avoid the consequences of a possible collinearity between population and other exogenous variables such as real income and empty import containers.

The model is empirically estimated using historical data from 1993-94 to 2003-04. The estimated regression results are presented in Table I.1 (Appendix I) and the estimated elasticities are summarised in Table 2.3. According to the results, the estimated models are a good fit with an adjusted R-square value ranging from 0.93 to 0.96. In other words, the models have a high predictive power, and hence, they are expected to provide reliable forecasts of full container exports.

Income	Exchange rate	Import containers
elasticity	elasticity	elasticity
5.573	-0.939	NS
1.734	-0.232	NS
1.736	-0.136	0.228
3.583	-0.096	0.284
4.816	-1.456	0.514
-	Income elasticity 5.573 1.734 1.736 3.583 4.816	Income Exchange rate elasticity elasticity 5.573 -0.939 1.734 -0.232 1.736 -0.136 3.583 -0.096 4.816 -1.456

TABLE 2.3 ESTIMATED ELASTICITY OF PER CAPITA FULL CONTAINER EXPORT DEMAND

NS = Not statistically significant.

All of the estimated elasticities, except for the exchange rate elasticity in the Adelaide Port model, are found to be statistically significant and have expected signs. They indicate that full container exports are positively influenced by per capita real income in Australia's export markets and the number of empty import containers, and negatively by the exchange rate. The number of empty containers was not found to be a driver of full container exports in Brisbane and Sydney.

The estimated elasticities clearly indicate that the per capita real income is the main factor influencing full container exports. The elasticity of per capita real income varies from 1.7 to 5.6 and implies that a one per cent increase (decrease) in per capita real income in Australia's main export markets will result in an increase (decrease) in per capita full container exports by 5.6 per cent in Brisbane, 1.7 per cent in Sydney and Melbourne, 3.6 per cent in Adelaide and 4.8 per cent in Fremantle.

The low income elasticity in Sydney and Melbourne suggests that the Sydney and Melbourne ports are relatively matured ports in comparison to the other three ports. In this study, Brisbane, Adelaide and Fremantle ports are assumed to gradually mature by the middle of the forecast period. In other words, the value of income elasticity in Brisbane, Adelaide and Fremantle will gradually decline to the level of Sydney and Melbourne by 2013-14.

The estimated exchange rate elasticity suggests that a decrease (increase) in the value of the Australian dollar will increase (decrease) per capita full container exports.

Similarly, an increase (decrease) in the number of empty import containers will increase (decrease) the volume of containerised exports in Melbourne, Adelaide and Fremantle ports.

Empty container exports

The export of empty containers largely depends on the degree of substitution between export and import containers and the volume of containerised imports. At current technology, export and import containers are not perfect substitutes. Export commodities are generally heavy, and hence they are mostly shipped in twenty-foot containers. On the other hand, most import commodities are relatively light (higher cargo volume related to weight) and therefore they mostly arrive in 40-foot containers. In such a situation, the number of empty containers will increase with an increase in the volume of containerised imports. Moreover, a higher percentage of containerised imports has a destination close to port. In the case of Sydney, 85 per cent of containerised trade has an origin/destination within 40 kilometres of Port Botany. As a result, empty containers remain close to port and are exported when container ships are available.

An econometric model of empty container exports presented in equation (2.2) is specified in terms of containerised import volumes.

$$\ln EMX_{it} = \gamma_{i0} + \gamma_{i1} \ln CM_{it} + \gamma_{i2}D_{it} + v_{it}$$
(2.2)

where,

 $EMX_i = Empty$ container exports from the ith port in teus;

CM_i = Containerised imports to the ith port in thousand tonnes;

 D_i = Dummy variable to capture a large variation in empty container exports in the ith port;

v = Error term;

 γ 's = Regression parameters; and

i and t have the same meaning as mentioned in equation (2.1).

The model is estimated using historical data from 1993-94 to 2003-04. The estimated regression results, which are presented in Table I.2 (Appendix I), show that the model is a good fit with an adjusted R-square value ranging from 0.87 to 0.98 and the estimated coefficients are highly significant. The estimated import volume elasticities of empty container exports are shown in Table 2.4. They suggest that a one per cent increase (decrease) in the volume of containerised imports will make the export of empty containers increase (decrease) by 1.5 per cent in Brisbane, 2.6 per cent in Sydney, 1.4 per cent in Melbourne, 1.9 per cent in Adelaide and all ports and 0.7 per cent in Fremantle.

Import volume elasticity	Export volume elasticity
of empty container exports	of empty container imports
1.531	0.357
2.617	0.510
1.416	0.617
1.903	0.618
0.674	0.804
	Import volume elasticity of empty container exports 1.531 2.617 1.416 1.903 0.674

TABLE 2.4 ESTIMATED ELASTICITY OF EMPTY CONTAINER EXPORT AND IMPORT DEMAND

Full container imports

An econometric model of full container imports presented in equation (2.3) is specified in terms of population, real GNE and exchange rates.

 $\ln FUM_{it} = \beta_{i0} + \beta_{i1} \ln PGNEAU_t + \beta_2 \ln EXUSAU_t + e_{it}$ (2.3)

where,

FUM_i = Per capita full container imports to the ith port in teus;

PGNEAU = Per capita real Gross National Expenditure (GNE) of Australia in million dollars;

e = Error term;

 β 's = Regression parameters; and

EXUSAU, i and t have the same meaning as in earlier equations.

The exchange rate variable is substituted by the TWI variable in the case of Sydney Ports.

Since each city port has its own catchment area of consumers, it is more meaningful to include the income of people residing in the catchment area. However, both historical and forecast data on real income by catchment area is not readily available. Hence, GNE at the national level is used to reflect the real income level of consumers residing in the catchment area of the five main city ports.

The econometric model of full container imports is estimated using historical data from 1993-94 to 2003-04. The estimated regression statistics of the model are shown in Table I.3 (Appendix I) and the estimated elasticities are summarised in Table 2.5. The model is a good fit with the adjusted R-square value ranging from 0.90 to 0.99. The estimated coefficients of the per capita real GNE are highly significant and have expected signs.

Port	Income elasticity	Exchange rate elasticity
Brisbane	3.780	NS
Sydney	2.055	0.047
Melbourne	2.157	0.026
Adelaide	2.744	NS
Fremantle	2.883	NS

TABLE 2.5 ESTIMATED ELASTICITY OF PER CAPITA FULL CONTAINER IMPORT DEMAND

NS = Not statistically significant.

According to the estimated elasticities, the per capita real GNE appears to be the main factor influencing full container imports. A one per cent increase (decrease) in per capita real GNE leads per capita full container imports to increase (decrease) by 3.8 per cent in Brisbane, 2.1 per cent in Sydney, 2.2 per cent in Melbourne, 2.7 per cent in Adelaide and 2.9 per cent in Fremantle.

Although the coefficient of exchange rate variable is not found statistically significant, the variable is included in the model of Sydney and Melbourne ports. This is because the coefficient has an expected sign and the predictive power of the model increases significantly with its inclusion. The estimated elasticity of the exchange rate is positive. This implies that the volume of full container imports increases (decreases) with the

appreciation (depreciation) of the Australian dollar against the US dollar. However, the magnitude of such increase (decrease) appears to be relatively small.

Empty container imports

Since empty containers are imported to ship export commodities, the number of imported empty containers depends on the volume of containerised exports. Therefore, the model of empty container imports is specified in terms of the volume of containerised exports. The model is shown in equation (2.4).

$$\ln EMM_{it} = \lambda_{i0} + \lambda_{i1} \ln CX_{it} + \lambda_{i2} \ln D_{it} + w_{it}$$
(2.4)

where,

EMM_i = Empty container imports to the ith port in teus;

CX_i = Containerised exports from the ith port in thousand tonnes;

 D_i = Dummy variable to capture a large variation in empty container imports to the ith port;

w = Error term;

 λ 's = Regression parameters; and

i and t have the same meaning as in earlier equations.

The model is estimated using historical data from 1993-94 to 2003-04. Regression results of the model are shown in Table I.4 (Appendix I) and the export volume elasticity of empty container imports are given in Table 2.4.

The estimated model is observed to be a good fit with adjusted R-square value ranging from 0.51 to 0.96. The estimated coefficients are highly significant and show that the volume of containerised exports positively influences the empty container imports.

Non-containerised exports

An econometric model of non-containerised exports is specified in terms of population, real income and exchange rates. The model is presented in equation (2.5).

$$\ln PBX_{it} = \delta_{i0} + \delta_{i1}T + \delta_{i2}\ln PGDP_{it} + \delta_{i3}\ln EXUSAU_t + m_{it}$$
(2.5)

where,

PBX_i = Per capita non-containerised exports from the ith port in thousand tonnes;

T = Time trend variable;

m = Error term;

 δ 's = Regression parameters; and

PGDP, EXUSAU, i, j and t have the same meaning as those in earlier equations.

The OECD countries remain the main markets for Australia's non-containerised exports. In 2002-03, Australia exported 343 million tonnes of non-containerised commodities (or 67 per cent of Australia's total non-containerised exports) to the OECD countries. In other words, the economy of the OECD has a significant influence on Australia's overall non-containerised exports. However, this may or may not be true at the port level. This is because main export commodities and destination countries are likely to differ by port.

In the case of Melbourne and Adelaide ports, the OECD countries are found to be the main destinations. Hence, the real GDP of the OECD countries is used as proxy for the income variable in the model of Melbourne and Adelaide ports. On the other hand, Japan is observed to be the main destination for non-containerised exports from Brisbane and Fremantle ports. Nearly 65.8 per cent of Brisbane's total non-containerised exports and 21.4 per cent of Fremantle's total non-containerised exports went to Japan in 2002-03. Hence, the real GDP of Japan is used as proxy for the income variable in the model of Brisbane and Fremantle ports.

The volume of non-containerised exports from Sydney Ports is relatively small and has been declining since 1997-98. As a result, a positive relationship between real income level and the volume of Sydney's non-containerised exports could not be observed through the estimated model parameters. Therefore, the income variable is dropped in the model of Sydney Ports.

The non-containerised export model is estimated using eleven years of historical data, from 1993-94 to 2003-04. The estimated regression results are presented in Table I.5 (Appendix I) and the estimated demand elasticities are summarised in Table 2.6. The results indicate that the model is a relatively good fit with the adjusted-R-square value varying from 0.51 to 0.97. The income variable is observed to be significant in the case of Melbourne, Adelaide, Fremantle and all ports; and the exchange rate variable is found to be highly significant in the case of Brisbane, Melbourne and Adelaide ports.

Port	Income	Exchange rate	Time trend
	elasticity	elasticity	elasticity
Brisbane	0.142	-0.152	NS
Sydney	NS	-0.216	-0.124
Melbourne	0.581	-0.684	NS
Adelaide	1.481	-0.752	NS
Fremantle	1.544	NS	-0.015
All ports	1.934	-0.068	NS

TABLE 2.6 ESTIMATED ELASTICITY OF NON-CONTAINERISED EXPORT DEMAND

NS = Not statistically significant.

The estimated values of income elasticity imply that a one per cent increase (decrease) in per capita real income will result in a 0.1 per cent increase (decrease) in the volume of non-containerised exports in Brisbane, 0.6 per cent in Melbourne, 1.5 per cent in Adelaide and Fremantle and 1.9 per cent in all ports. Similarly, a one per cent depreciation of the Australian dollar will lead to an increase in non-containerised

exports by 0.2 per cent in Brisbane and Sydney, 0.7 per cent in Melbourne, 0.8 per cent in Adelaide and 0.1 per cent in all ports.

The coefficient of the time trend variable is found to be statistically significant in the model for Sydney and Fremantle ports only. It shows that the volume of non-containerised exports has been declining in the last five years.

Non-containerised imports

An econometric model of non-containerised imports is specified in terms of population, real GNE and exchange rates. The model is given in equation (2.6).

$$\ln PBM_{it} = \theta_{i0} + \theta_{i1} \ln PGNEAU_t + \theta_{i2}EXUSAU_t + n_{it}$$
(2.6)

where,

PBM_i = Per capita non-containerised imports to the ith port in thousand tonnes;

n = Error term;

 $\hat{\theta s} =$ Regression parameters; and

PGNEAU, EXUSAU, i and t have the same meaning as those in earlier equations.

EXUSAU variable is replaced by TWI variable in the non-containerised import model of Port Adelaide based on statistical significance level.

Like the non-containerised export model, the non-containerised import model is also estimated using eleven years of historical data, from 1993-94 to 2003-04. The estimated model results are presented in Table I.6 (Appendix I) and the estimated elasticities are summarised in Table 2.7. The model is observed to be a good fit in the case of Brisbane, Sydney, Melbourne and Adelaide ports, with the adjusted R-square value ranging from 0.56 to 0.93, and an average fit in the case of Port Adelaide.

Port	Income elasticity	Exchange rate elasticity
Brisbane	1.214	NS
Sydney	1.578	NS
Melbourne	1.969	0.575
Adelaide	1.061	1.066
Fremantle	0.348	0.117
All ports	1.247	0.122

TABLE 2.7 ESTIMATED ELASTICITY OF NON-CONTAINERISED IMPORT DEMAND

NS = Not statistically significant.

Income variable is found to be the main driver of non-containerised imports in Brisbane, Sydney, Melbourne, Fremantle and all ports, whereas both income and exchange rate variables have equal influence on Adelaide's non-containerised exports. The exchange rate variable is not found statistically significant in the model for Brisbane and Sydney ports. The estimated income elasticity of non-containerised imports implies that a one per cent increase (decrease) in per capita real income will increase (decrease) the per capita volume of non-containerised imports by 1.2 per cent in Brisbane, 1.6 per cent in Sydney, 2.0 per cent in Melbourne, 1.1 per cent in Adelaide, 0.3 per cent in Fremantle and 1.2 per cent in all ports. A one per cent appreciation (depreciation) of the Australian dollar against the US dollar will lead to an increase (decrease) in the volume of non-containerised imports by 0.6 per cent in Melbourne, 1.1 per cent in Adelaide and 0.1 per cent in Fremantle and all ports.

CRUISE PASSENGER AND SHIP FORECASTING MODELS

Multivariate econometric models of inbound and outbound sea passengers are estimated and used to forecast Australia's inbound and outbound sea passenger numbers at the national level. These models could not be estimated at the port level because of the lack of port level long time-series data on passenger numbers. The models are discussed below.

Inbound sea passengers

The econometric model of inbound sea passenger demand is specified in terms of population, real income, exchange rates and some dummy variables in equation (2.7).

$$\log PISP_{t} = \psi_{1} + \psi_{2} \ln PGDPUS_{t-1} + \psi_{3} \ln EXUSAU_{t} + \psi_{4}D9899_{t} + \psi_{5}D9900_{t} + \psi_{6}D2001_{t} + \omega_{t}$$

$$(2.7)$$

where,

PISP = Per capita inbound sea passenger numbers;

PGDPUS = Per capita real GDP of the USA;

D9899 = Dummy variable used to capture variation in inbound sea passenger numbers in 1998-99;

D9900 = Dummy variable used to capture variation in inbound sea passenger numbers in 1999-2000;

D2001 = Dummy variable used to capture variation in inbound sea passenger numbers in 2000-01;

 $\omega =$ Error term of the regression model;

 Ψ 's = Regression parameters; and

EXUSAU and t have the same meaning as those in earlier equations.

As in the freight forecasting models, population is included in the inbound sea passenger model on a per capita basis, mainly to avoid the collinearity problems between population and income variables. Since most sea passengers arriving in Australia are from the USA, the GDP of the USA is used as a proxy for the income of sea passengers. A price variable could not included in the model as long time-series data on the price of sea travel is not available. However, the competitiveness of Australia as a cruise destination is reflected through the exchange rate variable.

The inbound sea passenger model was estimated using twenty-one years of historical data, from 1983-84 to 2003-04. The estimated regression statistics are shown in Table I.7 (Appendix I) and the estimated elasticities are summarised in Table 2.8.

TABLE 2.8 ESTIMATED ELASTICITIES OF INBOUND AND OUTBOUND SEA PASSENGER DEMAND

Elasticity	Inbound	Outbound
	passenger demand	passenger demand
Income	0.673	NS
Exchange rate	-0.819	0.874
Exchange rate	-0.819	

NS = Not statistically significant.

The estimated statistics suggest that the model is a good fit with an adjusted-R-square value of 0.68. The estimated coefficients are statistically significant and imply that inbound sea passenger demand is positively influenced by the per capita real income of passengers and negatively by the exchange rate of the Australian dollar measured in terms of the US dollar.

The estimated income elasticity implies that a one per cent increase (decrease) in real income will increase (decrease) the number of inbound sea passengers by 0.7 per cent. Similarly, the estimated exchange rate elasticity suggests that a one per cent depreciation (appreciation) of the Australian dollar against the US dollar will lead to a 0.8 per cent increase (decrease) in the number of inbound sea passengers.

Outbound sea passengers

The econometric model of outbound sea passenger demand is specified in terms of population, exchange rates and dummy variables in equation (2.8). A real income variable was included in the initial run of the model. However, it was not found to be statistically significant. Hence, the variable was dropped from the model in its final run.

$$\ln POSP_{t} = \mu_{1} + \mu_{2} \ln EXUSAU_{t} + \mu_{3}D9899_{t} + \mu_{4}D9900_{t} + \mu_{5}D2001_{t} + k_{t}$$
(2.8)

where,

POSP = Per capita outbound sea passenger numbers;

K = Error term of the regression model;

 μ 's = Regression parameters; and

EXUSAU, D9899, D9900, D2001 and t have the same meaning as those in earlier equations.

The model was estimated using twenty-one years of historical data, from 1983-84 to 2003-04. The estimated regression statistics are shown in Table I.7 (Appendix I) and the estimated elasticities are summarised in Table 2.8.

The estimated statistics suggest that the model is a good fit with an adjusted-R-square value of 0.57. The estimated coefficients, which are statistically significant, suggest that outbound sea passenger demand is positively influenced by the exchange rate. A one per cent appreciation (depreciation) of the Australian dollar against the US dollar will lead to a 0.9 per cent increase (decrease) in the number of outbound sea passengers.

Cruise ship visits

Forecasts of inbound and outbound sea passengers are combined to derive forecasts of total international passenger numbers. The growth rate forecasts of total international passenger visits, as an individual cruise passenger is likely to visit many cruise destinations during its trip to Australia. Since international cruise passenger visits dominate Australia's total cruise passenger visits, the growth rate forecasts of international cruise passenger visits are used to derive forecasts of total (domestic plus international) cruise passenger visits. Further, the forecasts of total cruise passenger visits and expected average number of passengers per cruise ship visit are used to forecast the number of cruise ship visits over the next twenty years.

OTHER SHIPS FORECASTING MODEL

As mentioned in Chapter 1, other ships includes survey ships, navy ships, tugs and all other ships which are not included under container, non-container and cruise ship categories. Since the movement of other ships is found to be largely influenced by noneconomic factors, an econometric model of other ship movements could not be specified and estimated for forecasting purposes. Instead, the average growth rate of other ship visits from previous years is used to forecast the number of other ship visits over the forecast period. The forecasts are developed at the national level only. The port level forecasts of other ships could not be developed because of the lack of long timeseries data on the number of other ship visits at the port level.

CHAPTER 3 FREIGHT MODELLING DATA AND ASSUMPTIONS

DATA

Historical data on containerised and non-containerised exports and imports, empty containers, GNE, GDP, exchange rates, the trade weighted index and population, which were used to estimate the econometric forecasting models, were gathered from the Port of Brisbane Corporation (PBC 2004 and 2005), Sydney Ports Corporation (SPC 2004 and 2005), Port of Melbourne Corporation (PMC 2004 and 2005), Flinders Ports Pty Ltd (FPPL 2004 and 2005), Fremantle Ports (FP 2004 and 2005), the Association of Australian Ports and Marine Authorities (AAPMA 2006), BTRE's international cargo statistics database, BTRE's Waterline (BTRE 2005 and earlier issues), the Australian Bureau of Statistics (ABS 2004a and 2004b), Access Economics (2006) and OECD (2003).

Data on international sea passenger movements were obtained from the Australian Bureau of Statistics (2004a), whereas data on cruise ship and passengers visits are taken from Cruise Down Under (CDU 2004a, 2004b and 2004c). The data on international sea passenger movements represent passenger movements for the first point of entry and exit only, and they simply indicate the total number of passengers arriving in and departing from Australia. They do not indicate the number of port visits, or passengers by port.

ASSUMPTIONS

In this study, long-run assumptions on macroeconomic variables, population, the proportion of 40-foot containers and vessel size are used to develop the forecasts of container and ship movements. The assumptions are presented in the following sections.

Macroeconomic and population

Population and macroeconomic assumptions are obtained from the ABS (2004b), Access Economics (2006) and the US Census Bureau (USCB 2004). Since the macroeconomic assumptions are available for the next ten years only, the assumptions for the rest of the forecast period are considered to be the same as those in year 2014-15. The assumptions are shown in Tables 3.1 to 3.4.

Year	Real GNE	Real GDP	Real GDP	Real GDP
	Australia	USA	Japan	OECD
	(per cent)			
1999-00	4.6	4.5	1.2	3.9
2000-01	0.0	2.0	2.8	2.5
2001-02	4.4	0.8	-1.6	0.1
2002-03	6.3	2.3	1.8	1.2
2003-04	6.0	4.2	3.4	4.7
2004-05	4.1	3.5	2.8	3.5
2005-06	4.1	3.0	1.6	3.0
2006-07	3.1	3.1	1.8	3.1
2007-08	2.8	3.7	2.0	3.7
2008-09	3.2	3.9	1.8	3.8
2009-10	2.5	3.5	1.6	3.3
2010-11	2.5	3.1	1.6	3.0
2011-12	2.3	2.9	1.6	2.8
2012-13	2.3	2.7	1.6	2.6
2013-14	2.6	2.5	1.6	2.5
2014-15	2.6	2.5	1.6	2.5
2015-16	2.6	2.5	1.6	2.5
2016-17	2.6	2.5	1.6	2.5
2017-18	2.6	2.5	1.6	2.5
2018-19	2.6	2.5	1.6	2.5
2019-20	2.6	2.5	1.6	2.5
2020-21	2.6	2.5	1.6	2.5
2021-22	2.6	2.5	1.6	2.5
2022-23	2.6	2.5	1.6	2.5
2023-24	2.6	2.5	1.6	2.5
2024-25	2.6	2.5	1.6	2.5
Annual average				
1999-00 to 2004-05	4.2	2.9	1.7	2.6
2004-05 to 2024-25	2.7	2.8	1.6	2.8

TABLE 3.1 ECONOMIC GROWTH RATES

* Numbers in bold are forecasts.

Australia's real GNE grew annually by 4.2 per cent in the last five years (Table 3.1). However, such high growth is not expected to continue over the next twenty years. It is forecast to increase by 2.7 per cent a year over the forecast period. The slowing of economic growth will make Australia's containerised and non-containerised imports grow at a rate lower than the rate observed during the last five years.

The strength of the Australian dollar against the US dollar is expected to weaken over the forecast period, from US\$0.74 per Australian dollar in 2004-05 to US\$0.59 per Australian dollar in 2024-25 (Table 3.2). This will have an adverse impact on containerised imports, but will have a positive impact on containerised exports through an increase in the Australia's export competitiveness.

Year	Trade Weighted	Exchange
	Index (TWI)	Rate (US\$/AU\$)
1999-00	56.2	0.64
2000-01	50.5	0.55
2001-02	49.8	0.51
2002-03	52.4	0.57
2003-04	61.5	0.71
2004-05	61.8	0.74
2005-06	63.3	0.75
2006-07	57.3	0.69
2007-08	49.9	0.60
2008-09	49.8	0.62
2009-10	52.8	0.65
2010-11	52.8	0.61
2011-12	52.8	0.61
2012-13	52.8	0.60
2013-14	52.8	0.59
2014-15	52.8	0.59
2015-16	52.8	0.59
2016-17	52.8	0.59
2017-18	52.8	0.59
2018-19	52.8	0.59
2019-20	52.8	0.59
2020-21	52.8	0.59
2021-22	52.8	0.59
2022-23	52.8	0.59
2023-24	52.8	0.59
2024-25	52.8	0.59
Annual average		
1999-00 to 2004-05	55.4	0.62
2004-05 to 2024-25	53.3	0.61

TABLE 3.2 EXCHANGE RATES

* Numbers in bold are forecasts

Population growth will remain relatively low but positive in Australia and its major trading partner countries over the next twenty years (Table 3.3). Queensland is expected to have a relatively higher population growth than any other State in Australia (Table 3.4). The expected positive population growth in Australia and overseas will have a positive influence on Australia's imports and exports respectively.

Year	Australia	USA	OECD	Japan
-		(per ce	nt)	
1999-00	1.2	1.2	0.7	0.2
2000-01	1.3	0.9	1.4	0.2
2001-02	1.3	0.9	0.7	0.2
2002-03	1.2	0.9	0.8	0.1
2003-04	1.2	0.9	0.8	0.1
2004-05	1.2	0.9	0.8	0.1
2005-06	1.1	0.9	0.8	0.1
2006-07	1.0	0.9	0.8	0.1
2007-08	1.0	0.9	0.8	0.1
2008-09	1.0	0.9	0.8	0.1
2009-10	0.9	0.9	0.8	0.1
2010-11	0.9	0.8	0.8	0.1
2011-12	0.9	0.8	0.8	0.1
2012-13	0.9	0.8	0.8	0.1
2013-14	0.9	0.8	0.8	0.1
2014-15	0.9	0.8	0.8	0.1
2015-16	0.9	0.8	0.8	0.1
2016-17	0.9	0.8	0.8	0.1
2017-18	0.9	0.8	0.8	0.1
2018-19	0.9	0.8	0.8	0.1
2019-20	0.9	0.8	0.8	0.1
2020-21	0.9	0.8	0.8	0.1
2021-22	0.9	0.8	0.8	0.1
2022-23	0.9	0.8	0.8	0.1
2023-24	0.9	0.8	0.8	0.1
2024-25	0.9	0.8	0.8	0.1
Annual average				
1999-00 to 2004-05	1.2	1.1	0.9	0.2
2004-05 to 2024-25	0.9	0.9	0.8	0.1

TABLE 3.3 P	OPULATION GROWTH RATES
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* Numbers in bold are forecasts.

Proportion of 40-foot containers

The total containers exchanged measured in teus is converted into container numbers based on the proportion of 40-foot containers in the total number of containers exchanged. In recent years, shippers have been using more and more 40-foot containers to import and export commodities. The proportion has increased annually by 9.3 per cent in Brisbane, 5.3 per cent in Sydney, 4.7 per cent in Melbourne, 4.6 per cent in Adelaide and 6.1 per cent in Fremantle in the last five years. However, such strong growth in the proportion is not expected in the future. This is because 40-foot and 20-foot containers are not perfect substitutes. As mentioned in Chapter 2, export commodities are more likely to be heavier than import commodities. Hence, 20-foot

containers which are suitable to carry heavy commodities are preferred by exporters. On the other hand, most import commodities are relatively light. Therefore, importers prefer 40-foot containers for efficiency gains. Manufactured and refrigerated items are mostly shipped in 40-foot containers.

Year	Qld	NSW	Vic	SA	WA
_			(per cent)		
1999-00	1.7	1.2	1.1	0.5	1.4
2000-01	1.8	1.3	1.3	0.4	1.4
2001-02	2.1	1.1	1.2	0.5	1.3
2002-03	2.4	0.8	1.1	0.5	1.2
2003-04	2.3	0.7	1.2	0.5	1.6
2004-05	2.3	0.7	1.2	0.5	1.4
2005-06	2.0	0.8	0.9	0.3	1.4
2006-07	1.8	0.8	0.8	0.3	1.4
2007-08	1.7	0.8	0.8	0.3	1.3
2008-09	1.7	0.8	0.8	0.2	1.3
2009-10	1.6	0.8	0.8	0.2	1.3
2010-11	1.6	0.7	0.7	0.2	1.2
2011-12	1.5	0.7	0.7	0.2	1.2
2012-13	1.5	0.7	0.7	0.2	1.2
2013-14	1.5	0.7	0.7	0.2	1.2
2014-15	1.5	0.7	0.7	0.2	1.2
2015-16	1.5	0.7	0.7	0.2	1.2
2016-17	1.5	0.7	0.7	0.2	1.2
2017-18	1.5	0.7	0.7	0.2	1.2
2018-19	1.5	0.7	0.7	0.2	1.2
2019-20	1.5	0.7	0.7	0.2	1.2
2020-21	1.5	0.7	0.7	0.2	1.2
2021-22	1.5	0.7	0.7	0.2	1.2
2022-23	1.5	0.7	0.7	0.2	1.2
2023-24	1.5	0.7	0.7	0.2	1.2
2024-25	1.5	0.7	0.7	0.2	1.2
Annual average					
1999-00 to 2004-05	2.1	1.0	1.2	0.5	1.4
2004-05 to 2024-25	1.6	0.7	0.7	0.2	1.2

TABLE 3.4 STATE POPULATION GROWTH RATES IN AUSTRALIA

*Numbers in bold are forecasts.

It is difficult to develop an econometric model to predict the proportion over the forecast period in the absence of long time-series data on factors influencing the proportion, such as substitutability between 40-foot and 20-foot containers, freight cost, and the safety, durability and transferability of containers. In this study, the proportion is predicted by taking into account the above factors qualitatively. The predicted proportions are given in Chapter 4 along with container forecasts.

The proportion is assumed to gradually increase over the forecast period to 55.0 per cent in Brisbane, 54.0 per cent in Sydney and Fremantle, 52.0 per cent in Melbourne, 35.0 per cent in Adelaide and 53.0 per cent in other ports in 2024-25.

Container vessel size

Container vessels operating on Australia's international and coastal routes are of different size, ranging from 5 000 to 60 000 Gross Tonnes (GT). At the present time, 81.8 per cent of port visits are made by ships with sizes ranging from 15,000 GT to 45,000 GT (Figure 3.1). Large ships with sizes ranging from 55 000 to 60 000 GT made 14 visits at Australia ports in 2004-05.



FIGURE 3.1 CONTAINER SHIP VISITS BY SHIP SIZE IN FIVE MAIN CITY PORTS, 2004-05

In 2004-05, a container ship exchanged an average of 832 teus in Brisbane, 1,274 teus in Sydney, 1,742 teus in Melbourne, 738 teus in Adelaide and 1,001 teus in Fremantle. The average teus exchanged increased annually by 10.4 per cent in Brisbane, 5.9 per cent in Sydney, 7.3 per cent in Melbourne, 6.7 per cent in Adelaide and 11.8 per cent in Fremantle in the last five years, largely due to an increase in ship size. However, this historical strong growth is not expected to continue in the next twenty years because of a time lag in increasing the Australian ports' capacity to handle large ships, the flattening of the expected growth in trade volume and a long time lag in the construction of new ships with larger container carrying capacity. Although old container ships are being replaced by large (wider and deeper) new generation ships on the major international shipping routes, Australia is less likely to get the new generation ships. This is because the volume of Australia's international containerised trade is relatively small and Australia does not fall on the world's main international shipping routes.

In this study, the average teus exchanged per container ship is assumed to increase by 1.0 per cent a year over the forecast period. The assumptions on container vessel size are presented in Chapter 4 along with forecasts of container numbers.

Non-container vessel size

The size of non-container vessels operating in Australia changes regularly as a result of changes in international shipping. Large ships are expected to be used on North shipping routes while ships used on North shipping routes are likely to come to South shipping routes including Australia. The size of a non-container vessel also depends upon the specific commodity to be carried by the vessel. Coal ships are small, whereas ships designed to carry grain, tanker fuel and bulk oil are large. However, an aggregate tonnage carried per ship visit has been used to forecast the number of ship visits in this study. This is done mainly to keep the forecasting exercise at the aggregate level and simple. It is complicated and resource intensive to model and forecast the number of non-container ship visits by commodity and port.

On average, a non-container ship presently carries around 16 000 tonnes of exports and imports in Brisbane, 9 000 tonnes in Sydney, 5 000 tonnes in Melbourne, 8 000 tonnes in Adelaide and 33 000 tonnes in Fremantle. In the last five years, the average tonnage carried per non-container ship increased annually by 3.6 per cent in Brisbane, 0.7 per cent in Melbourne, 5.2 per cent in Adelaide and 0.8 per cent in Fremantle, and declined by 0.4 per cent in Sydney.

The size of vessels carrying dry bulk, tanker fuel and bulk oil is less likely to get significantly bigger in the next twenty years. The average aggregate tonnage will rise marginally to account for the positive influence of expected channel deepening in Melbourne, Adelaide and Fremantle ports. In this study, the average tonnage carried per non-container ship is assumed to increase by 1.0 per cent a year over the forecast period. The assumptions on non-container vessel size are shown in Chapter 4 along with forecasts of non-containerised trade.

Cruise vessel size

Cruise ships of different size visit Australian ports every year. Generally, large cruise ships operate on international routes and between Australia's major city ports, whereas small cruise ships operate on short trips, especially intra-state routes. In this study, the average number of passengers carried per cruise ship at the aggregate level is assumed to increase by one per cent a year, from 476 in 2003-04 to 586 in 2024-25. The assumptions on cruise vessel size are presented in Chapter 5 along with forecasts of cruise passenger and ship visits.

CHAPTER 4 FORECASTS OF CONTAINER AND SHIP MOVEMENTS

INTRODUCTION

Forecasts of container and ship movements presented in this study are based on demandside parameters only. Supplyside parameters are not included because of the difficulty in estimating them as a result of the lack of long time-series data on supplyside variables influencing port activities. However, the forecasts have been adjusted qualitatively to take into account the influence of supplyside variables. The port and national level forecasts are presented below.

BRISBANE PORT

The Port of Brisbane is Australia's third largest container port. It is managed by the Port of Brisbane Corporation (PBC) which was established on 1 July 1994 under the *Government Owned Corporation Act 1993*.

The Port of Brisbane contributes \$770 million to the Queensland economy and generates 10 000 direct and indirect jobs (PBC 2004). The value of its international trade was over \$19.4 billion in 2002-03 (PBC 2004).

In 2004-05, the total trade of Brisbane Port increased by 3.7 per cent to 26.0 million tonnes with containerised trade increasing by 13.5 per cent to 726 000 teus (PBC 2005). Containerised trade accounts for a large proportion of the trade revenue, whereas non-containerised cargoes, such as oil and coal, play a crucial role in the movement of ships in Brisbane Port.

Exports and imports account for 43.1 and 56.9 per cent of the total trade volume respectively. The main export commodities of this port are coal (33.1 per cent), refined oil (19.4 per cent), cereals (8.5 per cent), meat products (6.1 per cent) and iron and steel (2.6 per cent). The main import commodities are crude oil (51.9 per cent), cement (11.1 per cent), refined oil (6.0 per cent), iron and steel (3.1 per cent) and building products (2.9 per cent) (PBC 2005).

The performance of the export sector was not encouraging in 2003-04. It increased by merely 0.02 per cent in terms of volume. This largely resulted from a decline in coal and agricultural exports. Coal exports declined by 12.9 per cent possibly owing to the appreciation of the Australian dollar against overseas currencies. The export of

agricultural commodities fell because of the nationwide drought. However, the export sector performed well in 2004-05 with export volume increasing by 3.7 per cent to 11.2 million tonnes.

On the other hand, commodity imports to Brisbane Port increased by 3.3 per cent in 2003-04 and 3.8 per cent in 2004-05, mainly as a result of an increase in the import of refined oil, cement, building products, and iron and steel increased following a continuous growth in the housing and building industries.

North Asia and South East Asia accounted for 25.4 and 22.3 per cent of the total trade of Brisbane Port respectively followed by Australian coasts (20.4 per cent), East Asia (7.0 per cent), South Pacific Islands (6.0 per cent), Gulf and Middle East (6.7 per cent), New Zealand (3.8 per cent), North America (2.0 per cent), Europe (2.0 per cent), Mediterranean (1.1 per cent), South Asia (0.8 per cent) and other regions (2.5 per cent) (PBC 2005).

Non-containerised trade consists of heavy and low-value commodities, whereas containerised trade consists of lighter and high-value commodities (Figure 4.1). In 2003-04, although non-containerised trade accounted for 64 per cent of outbound sea trade volume and 74 per cent of inbound sea trade volume, it was only 14 per cent of outbound sea trade value and 25 per cent of inbound sea trade value.

FIGURE 4.1 CARGO SHARES IN OUTBOUND AND INBOUND SEA TRADE VOLUME AND VALUE, 2003-04: BRISBANE PORT



Containerised trade and ship visits

Total containerised trade increased by 10.9 per cent a year in the last five years to 726 000 teus in 2004-05. The high growth in containerised trade is influenced by an increase in movements of commodities between assembly plants, growing development activities in South East Queensland and high growth in international trade (8.5 per cent in trade with China). The high import growth is largely due to high growth in building and

construction activities which resulted from favourable economic conditions and a relatively high population growth in Brisbane areas.

A total of 362 000 teus of containerised exports was shipped out of Brisbane port in 2004-05 (Figure 4.2 and Table 4.1). Of the total containerised exports, 62.7 per cent were full container exports and the remaining 37.3 per cent were empty container exports.



FIGURE 4.2 CONTAINERISED TRADE, 1993-94 TO 2024-25: BRISBANE PORT

Full container exports from Brisbane port increased by 4.9 per cent over the last five years and are forecast to increase by 6.9 per cent a year over the next twenty years, from 227 000 teus in 2004-05 to 856 000 teus in 2024-25. This is largely because of an increase in demand for export commodities in overseas markets, mainly Japan. The outlook for the Japanese economy is positive, and is expected to grow by 1.6 per cent a year over the next twenty years.

Asia, particularly Japan and China, will continue to remain major export destinations in terms of total shipped tonnage. Although Brisbane Port presently accounts for only 3.4 per cent of Australia's total trade with the USA, the share is likely to increase with the implementation of the Free Trade Agreement (FTA) with USA in future.

About 80.3 per cent of the total containerised imports to Brisbane Port are full container imports and the remaining 19.7 per cent are empty container imports. The total containerised imports to Brisbane Port increased by 10.7 per cent a year over the last five years to 364 000 teus in 2004-05, including full container imports increasing by 13.0 per cent a year to 292 000 teus in 2004-05 and the empty container imports increasing by 3.5 per cent a year to 72 000 in 2004-05.

The outlook for the Australian economy and exchange rates suggests that the total containerised imports will increase annually by 7.0 per cent during the forecast period to 1.4 million teus in 2024-25. This includes an annual increase of 7.7 per cent in full

container imports and 2.5 per cent in empty container imports. Full and empty container imports will rise to 1.3 and 0.1 million teus respectively in 2024-25.

Year		Exports			Imports		
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	179	35	214	159	60	219	433
2000-01	194	31	225	153	75	228	453
2001-02	199	39	238	174	70	244	482
2002-03	193	90	283	223	64	287	570
2003-04	205	109	314	262	63	326	640
2004-05	227	135	362	292	72	364	726
2005-06	242	144	386	308	75	382	768
2006-07	283	156	438	329	78	406	845
2007-08	304	178	482	377	81	457	939
2008-09	328	192	519	413	83	496	1 015
2009-10	355	202	557	432	85	517	1 074
2010-11	379	222	601	466	87	553	1 153
2011-12	400	247	647	506	89	595	1 242
2012-13	428	266	694	537	91	628	1 322
2013-14	463	291	754	578	93	671	1 425
2014-15	489	319	808	621	95	717	1 525
2015-16	517	349	867	668	98	766	1 632
2016-17	547	382	930	718	100	818	1 747
2017-18	579	419	997	772	102	874	1 871
2018-19	612	458	1 070	830	104	934	2 005
2019-20	647	502	1 149	893	106	999	2 148
2020-21	684	550	1 234	960	108	1 068	2 302
2021-22	724	602	1 326	1 032	111	1 143	2 469
2022-23	765	659	1 425	1 109	113	1 223	2 647
2023-24	809	722	1 531	1 193	116	1 309	2 840
2024-25	856	791	1 647	1 283	118	1 401	3 047
Annual average growt	h rate (pe	er cent)					
1994-95 to 1999-00	12.6	13.5	12.8	14.8	10.9	13.6	13.2
1999-00 to 2004-05	4.9	31.1	11.1	13.0	3.5	10.7	10.9
2004-05 to 2024-25	6.9	9.2	7.9	7.7	2.5	7.0	7.4

TABLE 4.1CONTAINERISED EXPORTS AND IMPORTS: BRISBANE PORT

*Numbers in bold are forecasts.

Brisbane's total containerised trade, which is the sum of containerised exports and imports, is forecast to increase by 7.4 per cent a year over the next twenty years to 3.0 million teus in 2024-25. The imports will remain strong over the next twenty years because of relatively strong growth in retail and property sectors. These sectors are expected to perform positively in Queensland over the forecast period, particularly in Brisbane, following an expected high population growth (1.6 per cent) in Queensland,

compared with 0.7 per cent in NSW and Victoria, 0.2 per cent in South Australia and 1.2 per cent in Western Australia.

As mentioned in Chapter 2, forecasts of international containerised trade are derived on the basis of total containerised trade and three years average proportions of international containerised trade in total containerised trade. The three years average proportions indicate that international containerised trade accounts for 97.9 per cent of full container exports, 93.5 per cent of empty container exports, 96.3 per cent of full container imports and 80.3 per cent of empty container imports. International containerised trade increased by 10.2 per cent a year in the last five years and is expected to increase annually by 7.5 per cent over the next twenty years, from 688 000 teus in 2004-05 to 2.9 million teus in 2024-25 (Table 4.2).

Shippers are using more and more 40-foot containers for exports and imports. The number of 40-foot containers will rise more rapidly (8.5 per cent) than the number of 20-foot containers (5.5 per cent) over the forecast period (Table 4.3). This is a reflection of higher expected growth in full container imports than in full container exports.

In 2004-05, Brisbane Port recorded a total of 873 container ship visits. With expected high growth in containerised trade and relatively small increase in ship sizes, the number of container ship visits is expected to increase by 6.4 per cent a year over the next twenty years to around 3 000 visits in 2024-25 (Table 4.3).

Non-containerised trade and ship visits

Brisbane Port's total non-containerised trade was 19.8 million tonnes in 2004-05, including 7.8 million tonnes of exports and 12.0 million tonnes of imports (Figure 4.3 and Table 4.4).

Non-containerised exports declined by 0.1 per cent a year in the last five years, whereas non-containerised imports increased by 2.4 per cent a year during the same period. As a result, the total non-containerised trade increased by 1.4 per cent a year during the same period. The decline in the non-containerised exports resulted from a decline in export of grains, cotton seeds, silica sand and woodchips, and an increased usage of containers to ship grains to overseas markets. Trade in silica sand has declined from 500 to 200 tonnes per year.

Non-containerised exports are forecast to increase by 0.5 per cent a year during the forecast period to 8.6 million tonnes in 2024-25. On the other hand, non-containerised imports are expected to increase by 3.8 per cent a year during the same period to 25.2 million tonnes in 2024-25.

Year		Exports			Imports		Total
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	176	33	209	156	57	213	422
2000-01	189	30	219	150	64	214	432
2001-02	195	36	231	170	58	228	459
2002-03	189	85	274	216	54	270	545
2003-04	200	102	302	247	47	294	596
2004-05	222	126	349	282	57	339	688
2005-06	237	134	371	296	60	356	727
2006-07	277	146	422	317	62	379	801
2007-08	297	167	464	363	65	427	891
2008-09	321	179	500	397	67	464	964
2009-10	347	189	536	416	68	484	1 020
2010-11	371	208	578	448	70	518	1 096
2011-12	391	231	622	488	72	559	1 181
2012-13	419	248	668	517	73	590	1 258
2013-14	453	272	725	556	75	631	1 357
2014-15	479	298	777	598	77	675	1 452
2015-16	506	326	833	643	78	722	1 554
2016-17	536	357	893	692	80	772	1 665
2017-18	566	391	958	744	82	825	1 783
2018-19	599	429	1 028	799	83	883	1 911
2019-20	633	469	1 103	860	85	945	2 048
2020-21	670	514	1 184	924	87	1 011	2 195
2021-22	708	563	1 271	994	89	1 083	2 354
2022-23	749	617	1 366	1 068	91	1 159	2 525
2023-24	792	675	1 467	1 149	93	1 242	2 709
2024-25	838	739	1 577	1 235	95	1 330	2 907
Annual average growt	h rate (pe	er cent)					
1994-95 to 1999-00	NA	NA	NA	NA	NA	NA	NA
1999-00 to 2004-05	4.8	30.4	10.8	12.5	0.1	9.7	10.2
2004-05 to 2024-25	6.9	9.2	7.8	7.7	2.5	7.1	7.5

TABLE 4.2	INTERNATIONAL CONTAINERISED EXPORTS AND IMPORTS: BRISBANE
	PORT

NA = Not available.

*Numbers in Italic and bold are estimates and forecasts.

Ye	ar	Proportion of	Conta	ainer numbe	ers	Average teus	Ship
		40-foot	20-foot	40-foot	Total	per ship	visits
		(per cent)		('000)			
1999	9-00	26	253	90	343	507	853
2000	0-01	29	248	103	351	629	721
2001	1-02	28	270	106	376	613	786
2002	2-03	33	287	141	429	694	822
2003	3-04	37	292	174	466	864	740
2004	1-05	41	304	211	515	832	873
2005	5-06	42	317	226	542	840	914
2006	6-07	42	343	251	594	849	996
2007	7-08	43	376	282	657	857	1,096
2008	3-09	44	399	308	707	866	1,173
2009) -10	44	416	329	745	874	1,228
2010)-11	45	439	357	796	883	1,306
2011	I-12	46	465	388	854	892	1,393
2012	2-13	46	487	418	904	901	1,468
2013	3-14	47	515	455	970	910	1 567
2014	4-15	48	542	492	1 033	919	1 660
2015	5-16	48	569	532	1 101	928	1 759
2016	6-17	49	598	575	1 173	937	1 864
2017	7-18	50	628	622	1 250	947	1 977
2018	3-19	51	659	673	1 332	956	2 097
2019	9-20	51	692	728	1 420	966	2 224
2020)-21	52	727	788	1 514	975	2 361
2021	-22	53	762	853	1 615	985	2 506
2022	2-23	54	800	924	1 724	995	2 661
2023	3-24	54	839	1 001	1 839	1 005	2 826
2024	1-25	55	879	1 084	1 963	1 015	3 002
Annual aver	age growth r	ate (per cent)					
1994-95 to	b 1999-00	NA	NA	NA	NA	NA	NA
1999-00 to	0 2004-05	9.3	3.8	18.6	8.5	10.4	0.5
2004-05 to	o 2024-25	1.5	5.5	8.5	6.9	1.0	6.4

TABLE 4.3 PROPORTION OF 40-FOOT CONTAINERS, CONTAINER NUMBERS, AVERAGE TEUS PER SHIP AND CONTAINER SHIP VISITS: BRISBANE PORT

NA = Data are not available.

*Numbers in bold are forecasts.



FIGURE 4.3 NON-CONTAINERISED TRADE, 1993-94 TO 2024-25: BRISBANE PORT

International non-containerised trade accounts for 73.4 per cent of non-containerised exports and 71.0 per cent of total non-containerised imports. It is forecast to increase by 2.7 per cent a year over the next twenty years to 24.2 million tonnes in 2024-25 (Table 4.5). International non-containerised exports and imports will increase respectively by 0.5 and 3.8 per cent a year over the forecast period. The expected positive growth in total trade is also contributed to by the introduction of four new shipping services between Brisbane and Chinese ports and PBC's aim to maintain European shipping services through Brisbane Port.

Around 1 500 visits were made by non-container ships at Brisbane Port in 2004-05. Following an expected positive growth in non-containerised trade and a relatively small increase in the average tonnage carried per ship visit, the number of non-container ship visits is expected to increase by 0.9 per cent a year over the forecast period to around 1 800 in 2024-25 (Table 4.4).

Port capacity

Shipping forecasts presented in this study are unconstrained, based on demandside factors only. Therefore, these forecasts need to be evaluated in light of supplyside variables, mainly port capacity and efficiency (freight rates). The current capacity of Brisbane Port is less likely to handle the expected high volume of containerised and non-containerised trade over the forecast period. The capacity needs to be increased to meet high demand for port facilities to facilitate the smooth movement of containers and ships through Brisbane Port. The PBC and the stevedoring companies operating at Brisbane Port have already taken many initiatives in this regard.

Year	Trade			Average	Ship visits
-				tonnes per	
_	Export	Import	Total	ship	
	('0	00 tonnes)			
1999-00	7 858	10 661	18 519	13 116	1 412
2000-01	7 937	10 723	18 660	13 761	1 356
2001-02	8 037	10 364	18 400	14 673	1 254
2002-03	7 913	11 535	19 448	15 447	1 259
2003-04	7 671	11 671	19 341	15 498	1 248
2004-05	7 808	11 998	19 806	15 653	1 489
2005-06	7 856	12 364	20 220	15 809	1 279
2006-07	8 007	12 779	20 786	15 967	1 302
2007-08	8 040	13 581	21 621	16 127	1 341
2008-09	8 090	14 222	22 313	16 288	1 370
2009-10	8 157	14 591	22 748	16 451	1 383
2010-11	8 207	15 152	23 358	16 616	1 406
2011-12	8 230	15 774	24 004	16 782	1 430
2012-13	8 273	16 291	24 563	16 950	1 449
2013-14	8 326	16 898	25 224	17 119	1 473
2014-15	8 352	17 490	25 842	17 290	1 495
2015-16	8 378	18 137	26 515	17 463	1 518
2016-17	8 404	18 808	27 213	17 638	1 543
2017-18	8 430	19 505	27 935	17 814	1 568
2018-19	8 457	20 227	28 683	17 992	1 594
2019-20	8 483	20 976	29 459	18 172	1 621
2020-21	8 510	21 752	30 262	18 354	1 649
2021-22	8 536	22 557	31 093	18 538	1 677
2022-23	8 563	23 392	31 955	18 723	1 707
2023-24	8 590	24 258	32 848	18 910	1 737
2024-25	8 616	25 156	33 773	19 099	1 768
Annual average growth	n rate (per cent)				
1994-95 to 1999-00	2.1	8.6	5.6	NA	NA
1999-00 to 2004-05	-0.1	2.4	1.4	3.6	1.1
2004-05 to 2024-25	0.5	3.8	2.7	1.0	0.9

TABLE 4.4NON-CONTAINERISED SEA TRADE, AVERAGE TONNES PER SHIP AND SHIP
VISITS: BRISBANE PORT

NA = Not available.

*Numbers in bold are forecasts.

A major expansion initiative currently being undertaken by the PBC is the reclamation of 230 hectares of land at Fisherman Islands. The construction of a 4.6 kilometre sea wall commenced in mid August 2003 and was expected to be completed in early 2005. A total area of 10 hectares has already been reclaimed for the development to start. The remaining area will gradually be reclaimed over the next 20 to 25 years. This reclamation project will provide 1.8 kilometres of quay line which will help PBC to develop an additional five to seven wharves for future port expansion purposes. The

PBC is also developing an additional 5 to 7 wharfs in the existing port area to handle future high growth in its trade volume.

Year	Export	Import	Total
	('	000 tonnes)	
1999-00	5 597	7 706	13 303
2000-01	5 620	7 795	13 414
2001-02	6 099	7 123	13 222
2002-03	5 864	7 912	13 776
2003-04	5 385	8 817	14 202
2004-05	5 731	8 513	14 244
2005-06	5 766	8 773	14 539
2006-07	5 877	9 068	14 945
2007-08	5 901	9 636	15 538
2008-09	5 938	10 092	16 030
2009-10	5 987	10 353	16 340
2010-11	6 023	10 751	16 774
2011-12	6 041	11 193	17 234
2012-13	6 072	11 559	17 631
2013-14	6 111	11 990	18 101
2014-15	6 130	12 410	18 540
2015-16	6 149	12 869	19 019
2016-17	6 169	13 346	19 514
2017-18	6 188	13 840	20 028
2018-19	6 207	14 352	20 559
2019-20	6 226	14 883	21 110
2020-21	6 246	15 434	21 680
2021-22	6 265	16 006	22 271
2022-23	6 285	16 598	22 883
2023-24	6 305	17 213	23 517
2024-25	6 324	17 850	24 174
Annual average growth rate (p	per cent)		
1994-95 to 1999-00	2.0	8.3	5.4
1999-00 to 2004-05	0.5	2.0	1.4
2004-05 to 2024-25	0.5	3.8	2.7

TABLE 4.5 INTERNATIONAL NON-CONTAINERISED SEA TRADE: BRISBANE PORT

*Numbers in Italic and bold are estimates and forecasts.

Patrick Corporation has relocated its stevedoring facilities from Hamilton to Fisherman Islands and has also established a semi-automated container terminal at a cost of \$135 million, including \$35 million for the wharf and \$100 million for terminal infrastructure and equipment (PBC 2004). The terminal is the world's first to be operated by straddle carriers and is expected to increase efficiency in container handling. Its annual capacity is 800 000 teus.

Both Patrick Corporation and P&O Ports have signed agreements with PBC to relocate their motor-vehicle and break-bulk operations from Hamilton to Fisherman Islands. These stevedoring companies are also investing to increase their container handling capacity at Brisbane Port. Both Patrick and P&O will be spending around \$120 million each.

Warehouse Group Queensland has established a strategically located distribution centre with 50 000 square-meters of warehouse space under one roof. The centre is expected to provide reliable and efficient access to the wharfs and container parks, and road and rail connections to retail outlets in Queensland, the Australian Capital Territory and most of New South Wales.

Queensland Rail is the main rail service provider at Brisbane Port. Rail is used to move containers to and from the port and to bring coal to the port. Presently, rail accounts for 13 per cent of the port's container movements. The PBC is aiming to increase the rail share in the future.

SYDNEY PORTS

There are two ports in Sydney, Port Botany and Sydney Harbour, which are managed by the Sydney Ports Corporation (SPC). These two ports are the main gateway of exports and imports for the 4.2 million people of Sydney. About 85 per cent of the containerised freight has an origin/destination within 40 kilometres of Port Botany.

Sydney Ports, which is largely a container port, annually exports and imports containerised and non-containerised commodities worth \$45.5 billion, contributes \$2.5 billion to the NSW economy and generates more than 17 000 jobs (SPC 2004).

In 2004-05, the total trade of Sydney Ports increased by 3.1 per cent to 25.9 million tonnes with containerised trade increasing by 8.4 per cent to 1.4 million teus (SPC 2005).

Non-containerised cargoes are relatively heavy but less costly, whereas containerised cargoes are relatively lighter but more costly (Figure 4.4). About 94 per cent of its total export volumes were containerised exports, which accounted for nearly 100 per cent in the export value. On the other hand, 55 per cent of the port's import volumes were non-containerised imports, but it contributed only 11 per cent to the port's total import value.

Containerised trade and ship visits

The main containerised export commodities are chemicals (11.3 per cent), non-ferrous metals (11.2 per cent), cereals (10.1 per cent), iron & steel (7.0 per cent), paper products (6.8 per cent), animal foods (5.4 per cent), meat (4.8 per cent), machinery (4.5 per cent), manufactures (4.0 per cent), cotton (3.6 per cent), food preparations (2.8 per cent), beverages and tobacco (2.8 per cent) and wool (2.5 per cent) (SPC 2005).



FIGURE 4.4 CARGO SHARES IN OUTBOUND AND INBOUND SEA TRADE VOLUME AND

The main destinations of containerised exports are China, including Hong Kong (25.8 per cent), New Zealand (13.0 per cent), Australian coasts (10.9 per cent), Singapore (8.4 per cent), South Korea (7.9 per cent), Japan (6.4 per cent), the USA (3.7 per cent), Indonesia (3.2 per cent), Malaysia (2.6 per cent) and Thailand (2.1 per cent) (SPC 2005).

The main containerised import commodities are chemicals (16.1 per cent), machinery (14.4 per cent), manufactures (14.4 per cent), paper products (12.8 per cent), nonmetallic minerals (5.3 per cent), food preparations (4.6 per cent), beverages and tobacco (3.4 per cent), iron and steel (3.1 per cent), textiles (2.8 per cent), fruit and vegetables (2.4 per cent), timber (2.3 per cent) and rubber products (1.5 per cent) (SPC 2005).

The main origins of containerised imports are China, including Hong Kong (31.9 per cent), the USA (10.3 per cent), New Zealand (6.9 per cent), Malaysia (4.2 per cent), South Korea (4.1 per cent), Japan (3.8 per cent), Thailand (3.8 per cent), Singapore (3.3 per cent), Indonesia (2.8 per cent), and Australian coasts (0.7 per cent) (SPC 2005).

Total containerised trade increased by 6.2 per cent a year in the last five years to 1.4 million teus in 2004-05 (Figure 4.5 and Table 4.6). It is forecast to increase by 5.0 per cent a year in the next twenty years to 3.6 million teus in 2024-25. The FTA with the USA is likely to have a positive impact on Sydney's total containerised trade.

Exports and imports presently account for 49.1 and 50.9 per cent of the total containerised trade respectively.



FIGURE 4.5 CONTAINERISED TRADE, 1993-94 TO 2024-25: SYDNEY PORTS

Containerised exports from Sydney Ports increased by 7.3 per cent a year in the last five years to 676 000 teus in 2004-05. Full and empty container exports presently account for 47.3 and 52.7 per cent of the containerised exports respectively. Full container exports increased by 1.6 per cent to 320 000 teus in 2004-05 and empty container exports increased by 14.5 per cent to 356 000 teus in the same year.

Following the income and exchange rate assumptions presented in Chapter 3, containerised exports from Sydney Ports are forecast to increase by 5.0 per cent a year over the next twenty years to 1.8 million teus in 2024-25 (Table 4.6). Both full and empty container exports are expected to increase respectively by 4.5 and 5.4 per cent a year to 0.8 and 1.0 million teus in 2024-25. Asia, particularly China, will continue to remain Sydney's main export destination over the forecast period. This is because the strong economic growth in China is expected to continue over the forecast period.

Containerised imports to Sydney Ports increased by 5.3 per cent a year in the last five years to 700 000 teus in 2004-05. This includes a 5.7 per cent increase in full container imports to 687 000 teus and a decline of 8.2 per cent in empty container imports to 13 000 teus. At present, 98.2 per cent of the containerised imports to Sydney are full container imports, and the remaining 1.8 per cent are empty container imports.

The outlook for the Australian economy and exchange rates, and the expected population growth in NSW suggest that containerised imports to Sydney Ports will increase by 4.9 per cent per annum during the forecast period to 1.8 million teus in 2024-25. Both full and empty container imports will increase respectively by 4.9 and 3.0 per cent a year during the forecast period (Table 4.6).

Year		Exports			Imports		Total
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	296	181	476	520	20	540	1 016
2000-01	306	172	478	493	20	513	990
2001-02	307	173	480	507	22	529	1 009
2002-03	294	267	561	586	14	601	1 161
2003-04	303	312	615	643	12	655	1 270
2004-05	320	356	676	687	13	700	1 376
2005-06	336	366	702	707	14	721	1 423
2006-07	361	373	734	733	14	747	1 481
2007-08	383	421	803	800	15	815	1 618
2008-09	408	456	863	852	16	868	1 731
2009-10	432	461	893	876	16	892	1 786
2010-11	454	483	938	920	17	936	1 874
2011-12	474	520	993	971	17	989	1 982
2012-13	494	538	1 033	1 012	18	1 029	2 062
2013-14	515	560	1 075	1 061	18	1 079	2 155
2014-15	535	592	1 126	1 113	19	1 132	2 258
2015-16	555	625	1 180	1 168	19	1 187	2 367
2016-17	576	661	1 236	1 226	20	1 245	2 482
2017-18	597	698	1 295	1 286	20	1 306	2 602
2018-19	620	737	1 357	1 350	20	1 370	2 727
2019-20	643	779	1 422	1 416	21	1 437	2 860
2020-21	667	823	1 491	1 486	21	1 508	2 998
2021-22	693	870	1 562	1 559	22	1 581	3 144
2022-23	719	919	1 638	1 636	22	1 659	3 296
2023-24	746	971	1 717	1 717	23	1 740	3 456
2024-25	774	1 026	1 799	1 802	23	1 825	3 625
Annual average growt	h rate (pe	er cent)					
1994-95 to 1999-00	16.7	11.5	14.6	18.1	5.8	17.5	16.1
1999-00 to 2004-05	1.6	14.5	7.3	5.7	-8.2	5.3	6.2
2004-05 to 2024-25	4.5	5.4	5.0	4.9	3.0	4.9	5.0

TABLE 4.6 CONTAINERISED EXPORTS AND IMPORTS: SYDNEY PORTS

*Numbers in bold are forecasts.

International containerised trade, which accounts for 95.6 per cent of the total containerised trade, will increase by 5.0 per cent a year over the next twenty years, from 1.3 million teus in 2004-05 to 3.5 million teus in 2024-25 (Table 4.7).

With an expected increase in the proportion of 40-foot containers, from 44 per cent in 2004-05 to 54 per cent in 2024-25, the number of 40-foot containers will rise by 5.7 per cent a year over the forecast period, from 419 000 in 2004-05 to 1.3 million in 2024-25 (Table 4.8).

Year		Exports		Imports			Total
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	296	181	476	520	20	540	1 016
2000-01	306	172	478	493	20	513	990
2001-02	304	160	464	506	22	528	993
2002-03	272	231	504	584	13	596	1 100
2003-04	280	270	551	638	11	649	1 200
2004-05	303	316	619	684	12	696	1 315
2005-06	318	325	643	703	13	717	1 360
2006-07	342	331	673	729	14	743	1 416
2007-08	362	373	735	796	14	811	1 546
2008-09	386	405	790	848	15	863	1 653
2009-10	409	410	818	872	15	887	1 706
2010-11	430	429	859	915	16	931	1 790
2011-12	448	461	910	967	16	983	1 893
2012-13	468	478	946	1 007	17	1 024	1 969
2013-14	488	497	985	1 056	17	1 073	2 058
2014-15	506	525	1 031	1 108	18	1 126	2 157
2015-16	525	555	1 080	1 163	18	1 181	2 261
2016-17	545	586	1 131	1 220	18	1 239	2 370
2017-18	565	619	1 185	1 280	19	1 299	2 484
2018-19	587	655	1 241	1 343	19	1 363	2 604
2019-20	609	692	1 300	1 410	20	1 429	2 730
2020-21	632	731	1 362	1 479	20	1 499	2 862
2021-22	655	772	1 427	1 552	21	1 573	3 000
2022-23	680	816	1 496	1 629	21	1 650	3 146
2023-24	706	862	1 567	1 709	22	1 731	3 298
2024-25	732	910	1 643	1 793	22	1 816	3 458
Annual average growt	h rate (pe	er cent)					
1994-95 to 1999-00	16.7	11.5	14.6	18.1	5.8	17.5	16.1
1999-00 to 2004-05	0.5	11.8	5.4	5.6	-9.2	5.2	5.3
2004-05 to 2024-25	4.5	5.4	5.0	4.9	3.0	4.9	5.0

TABLE 4.7 INTERNATIONAL CONTAINERISED EXPORTS AND IMPORTS: SYDNEY PORTS

*Numbers in Italic and bold are estimates and forecasts.

There were around 1 100 container ship visits at Sydney Ports in 2004-05. Following the expected high growth in container movements and the marginal increase in ship size, the number of ship visits is forecast to increase by 3.9 per cent a year in the next twenty years to around 2 300 visits in 2024-25 (Table 4.8).
Year Proportion of		Container numbers			Average teus	Ship
	40-foot	20-foot	40-foot	Total	per ship	visits
	(per cent)		('000)			
1999-00	34	503	256	760	977	1 040
2000-01	36	463	264	727	877	1 129
2001-02	37	470	270	739	949	1 064
2002-03	39	510	326	835	1 077	1 078
2003-04	42	525	373	898	1 164	1 091
2004-05	44	539	419	957	1 303	1 056
2005-06	44	551	436	987	1 316	1 081
2006-07	45	567	457	1 024	1 329	1 114
2007-08	45	612	503	1 115	1 343	1 205
2008-09	46	647	542	1 189	1 356	1 277
2009-10	46	659	563	1 222	1 370	1 304
2010-11	47	683	596	1 279	1 383	1 355
2011-12	47	713	634	1 348	1 397	1 418
2012-13	48	733	665	1 397	1 411	1 461
2013-14	48	756	699	1 455	1 425	1 512
2014-15	49	782	738	1 520	1 440	1 569
2015-16	49	809	779	1 588	1 454	1 628
2016-17	50	836	823	1 659	1 468	1 690
2017-18	50	865	868	1 733	1 483	1 754
2018-19	51	894	917	1 811	1 498	1 821
2019-20	51	924	968	1 892	1 513	1 890
2020-21	52	954	1 022	1 976	1 528	1 962
2021-22	52	986	1 079	2 065	1 543	2 037
2022-23	53	1 018	1 139	2 157	1 559	2 115
2023-24	53	1 051	1 203	2 254	1 574	2 195
2024-25	54	1 085	1 270	2 355	1 590	2 279
Annual average growth	rate (per cent)					
1994-95 to 1999-00	NA	NA	NA	NA	NA	NA
1999-00 to 2004-05	5.3	1.4	10.3	4.7	5.9	0.3
2004-05 to 2024-25	1.1	3.6	5.7	4.6	1.0	3.9

TABLE 4.8PROPORTION OF 40-FOOT CONTAINERS, CONTAINER NUMBERS, AVERAGE
TEUS PER SHIP AND CONTAINER SHIP VISITS: SYDNEY PORTS

NA = Data are not available.

*Numbers in bold are forecasts.

Non-containerised trade and ship visits

The volume of Sydney's non-containerised exports is relatively small. Bulk liquids (oil included) and gases account for around 96.0 per cent of the total non-containerised exports. Half of the non-containerised exports are destined for overseas and the remainder to other Australian ports.

Non-containerised exports declined by 1.7 per cent in the last five years, from 886 000 tonnes in 1999-2000 to 813 000 tonnes in 2004-05 (Figure 4.6 and Table 4.9). This is largely due to a decline in fuel exports to overseas markets, mainly to Asia.



FIGURE 4.6 NON-CONTAINERISED TRADE, 1993-94 TO 2024-25: SYDNEY PORTS

The establishment of low cost oil refineries in Asia has adversely affected fuel exports to Asia. Also, the practice of exporting grains in containers has a negative influence on non-containerised exports. Containerised export of cereals has increased by 50 per cent in recent years.

Sydney Ports' total non-containerised trade increased by 0.7 per cent a year in the last five years to 14.5 million tonnes in 2004-05. Imports dominate the total non-containerised trade with 94.4 per cent share. The main non-containerised export commodities are animal feeds (53.0 per cent), iron and steel (13.0 per cent), petroleum and petroleum products (7.0 per cent), metalliferous ores and metal scrap (7.0 per cent), and crude fertilizers and crude minerals (5.0 per cent). The main non-containerised import commodities are petroleum and petroleum products (89.0 per cent) and gases natural and manufactured (2.0 per cent).

The downward trend in Sydney's non-containerised exports is expected to continue in the future. The volume of non-containerised exports is forecast to decline by 11.4 per cent a year over the next twenty years to 71 000 tonnes in 2024-25.

Year	Trade			Average	Ship visits
-	_			tonnes per	
_	Export	Import	Total	ship	
	('O	00 tonnes)			
1999-00	886	13 138	14 024	8 964	1 564
2000-01	1 082	13 412	14 494	9 542	1 519
2001-02	839	12 793	13 632	9 337	1 460
2002-03	534	12 879	13 413	9 087	1 476
2003-04	728	13 520	14 248	8 693	1 639
2004-05	813	13 686	14 500	8 780	1 651
2005-06	721	13 705	14 426	8 868	1 627
2006-07	652	13 825	14 477	8 956	1 616
2007-08	576	14 479	15 055	9 046	1 664
2008-09	511	14 877	15 388	9 136	1 684
2009-10	454	14 880	15 334	9 228	1 662
2010-11	403	15 129	15 532	9 320	1 666
2011-12	356	15 439	15 795	9 413	1 678
2012-13	315	15 591	15 907	9 507	1 673
2013-14	280	15 839	16 119	9 602	1 679
2014-15	247	16 085	16 333	9 699	1 684
2015-16	218	16 336	16 554	9 795	1 690
2016-17	193	16 590	16 783	9 893	1 696
2017-18	170	16 848	17 018	9 992	1 703
2018-19	150	17 110	17 260	10 092	1 710
2019-20	133	17 376	17 509	10 193	1 718
2020-21	117	17 646	17 764	10 295	1 725
2021-22	104	17 921	18 025	10 398	1 733
2022-23	92	18 200	18 291	10 502	1 742
2023-24	81	18 483	18 564	10 607	1 750
2024-25	71	18 770	18 842	10 713	1 759
Annual average growth	n rate (per cent)				
1994-95 to 1999-00	-3.7	3.8	3.2	NA	20.1
1999-00 to 2004-05	-1.7	0.8	0.7	-0.4	1.1
2004-05 to 2024-25	-11.4	1.6	1.3	1.0	0.3

TABLE 4.9 NON-CONTAINERISED SEA TRADE, AVERAGE TONNES PER SHIP AND SHIP VISITS: SYDNEY PORTS

NA = Data are not available.

*Numbers in bold are forecasts.

Unlike the non-containerised exports, Sydney's non-containerised imports will continue to rise over the next twenty years, largely due to the expected positive outlook for the Australian economy. They are forecast to increase by 1.6 per cent a year during the period, from 13.7 million tonnes in 2004-05 to 18.8 million tonnes in 2024-25.

International non-containerised trade accounts for 63.3 per cent of the non-containerised exports and 66.7 per cent of the non-containerised imports. It declined by 7.2 per cent a year in the last five years, from 14.0 million tonnes in 1999-2000 to 9.6 million tonnes in 2004-05 (Table 4.10). However, it is forecast to

Year	Export	Import	Total
		('000 tonnes)	
1999-00	886	13 138	14 024
2000-01	1 082	13 412	14 494
2001-02	775	11 450	12 224
2002-03	251	6 981	7 232
2003-04	367	7 627	7 994
2004-05	515	9 129	9 644
2005-06	457	9 142	9 598
2006-07	412	9 222	9 634
2007-08	364	9 658	10 023
2008-09	323	9 924	10 247
2009-10	288	9 925	10 213
2010-11	255	10 091	10 346
2011-12	225	10 299	10 524
2012-13	200	10 400	10 600
2013-14	177	10 565	10 742
2014-15	156	10 730	10 886
2015-16	138	10 897	11 035
2016-17	122	11 066	11 188
2017-18	108	11 238	11 346
2018-19	95	11 413	11 508
2019-20	84	11 591	11 675
2020-21	74	11 771	11 845
2021-22	66	11 954	12 020
2022-23	58	12 140	12 198
2023-24	51	12 329	12 380
2024-25	45	12 521	12 566
Annual average growth rate (per cent)		
1994-95 to 1999-00	-3.7	3.8	3.2
1999-00 to 2004-05	-10.3	-7.0	-7.2
2004-05 to 2024-25	-11.4	1.6	1.3

TABLE 4.10 INTERNATIONAL NON-CONTAINERISED SEA TRADE: SYDNEY PORTS

*Numbers in Italic and bold are estimates and forecasts.

increase by 1.3 per cent a year over the next twenty years to 12.6 million tonnes in 2024-25 because of expected annual growth of 1.6 per cent in non-containerised imports. Non-containerised exports will continue to decline by 11.4 per cent a year during the period to 45 000 tonnes in 2024-25.

In 2004-05, around 1 700 visits were made by non-container ships at Sydney Ports. The number of non-container ship visits increased by 1.1 per cent a year in the last five years and it is forecast to increase by 0.3 per cent a year in the next twenty years to around 1 800 visits in 2024-25 (Table 4.9).

Port capacity

Following the expected high growth in containerised trade, demand for port facilities at Sydney Ports will rise significantly over the forecast period. The current capacity of Sydney Ports may not be enough to handle substantial increase in containerised trade. Port Botany is expected to reach its full capacity in 2010. Hence, its capacity needs to be increased to facilitate the movement of containers and ships in the future. SPC is addressing this issue through its 'First Port Future Port' strategy. The successful implementation of the strategy will help to overcome the capacity problem at Sydney Ports. One of the major initiatives under the strategy is the proposed 60-hectare Port Botany expansion plan. On its completion the plan will increase container handling facilities at Port Botany over the forecast period.

In Sydney, there are four small intermodal terminals in operation. SPC is planning to build large intermodal terminals in Enfield, Macarthur and Western Sydney to reduce the current congestion level on roads linking to Port Botany. Since these terminals will be linked to Port Botany by rail, they are expected to increase the current rail share in container movements to and from Port Botany. These new terminals are expected to commence their operation after 2010 when Port Botany is likely to reach its full capacity.

Around 20 per cent of all containers are currently moved by rail. SPC is aiming to increase the rail share to around 40 per cent by 2025. For this, it is planning to operate rail services on the existing rail lines that go through Villawood and connect to main linkages. It is also planning to move containers to Campbelltown by train.

Higher imports than exports and the limited use of import containers for exports have resulted in many empty containers being stored at and nearby Sydney Ports prior to their export. Full container imports are forecast to be higher than full container exports at Sydney Ports over the next twenty years. This is likely to put pressure on the existing empty containers storage facility. SPC is seeking an approval from the NSW State Government to purchase the State Rail Authority's Cooks River rail yard to manage empty containers. This will help SPC to reduce the number of empty containers stored at Botany Bay and increase space for full containers.

The introduction of a weekly service of the P&O Nedlloyd and Contship Containerlines' 4 100 teus class vessels on Australia's international routes to New Zealand, East Coast USA and Europe in 2002-03 is expected to increase Sydney Ports'

capacity to handle the expected high growth in containerised trade. These vessels can be handled without deepening the existing channel at Port Botany.

Furthermore, the establishment of a new X-Ray facility by the Australian Customs Service, and the construction of depot and warehouse facilities by P&O Trans Australia Holdings Ltd and Patrick Port Services are likely to bring efficiency in container movements at Sydney Ports.

MELBOURNE PORT

Melbourne Port is the largest container and general port in Australia. It is managed by the Port of Melbourne Corporation (PMC). PMC is a State Government owned business enterprise which was established on 1 July 2003 by amalgamating Melbourne Port Corporation and Victoria Channels Authority.

Melbourne Port currently handles a total trade worth \$70 billion, contributes annually over \$5.4 billion to the Victorian economy and employs directly and indirectly around 80 000 people (PMC 2004). It currently accounts for 36.9 per cent of Australia's total containerised trade and hosts over 40 shipping lines linking 300 ports all around the world. It also handles Tasmania's overseas trade. Hence, the Bass Strait component plays a significant role in Melbourne's exports and imports.

In 2004-05, the total trade of Melbourne Port increased by 8.4 per cent to 28.3 million tonnes with containerised trade increasing by 11.0 per cent to 1.9 million teus. The increase in containerised trade is contributed to by an increase of 5.6 per cent in containerised exports and 9.9 per cent in containerised imports.

Melbourne's non-containerised trade consists of heavy and low-value commodities, whereas its containerised trade consists of lighter and high-value commodities (Figure 4.7). In 2003-04, non-containerised trade accounted for 24 per cent of outbound sea trade volume and 33 per cent of inbound sea trade volume. However, it was only five per cent of outbound sea trade value and seven per cent of inbound sea trade value.

Containerised trade and ship visits

Containerised trade dominates the total trade of Melbourne Port. It increased by 8.1 per cent a year in the last five years, from 1.3 million teus in 1999-2000 to 1.9 million teus in 2004-05 (Figure 4.8 and Table 4.11). Containerised exports increased by 8.4 per cent a year during the period to 946 000 teus in 2004-05, whereas containerised imports increased by 7.8 per cent a year during the same period to 964 000 teus in 2004-05. Melbourne's containerised exports also include around 80 000 teus of containerised exports from South Australia. In other words, some exports of South Australia presently go through Melbourne Port.



FIGURE 4.7 CARGO SHARES IN OUTBOUND AND INBOUND SEA TRADE VOLUME AND VALUE, 2003-04: MELBOURNE PORT





The main containerised commodity exports are miscellaneous manufactures (13.9 per cent), dairy products (7.2 per cent), cereal grains (7.1 per cent), beverages (6.5 per cent), stock feed (4.8 per cent), paper and newsprint (4.6 per cent), meat (4.2 per cent), fruits and vegetables (3.7 per cent), pulp and wastepaper (3.3 per cent) and miscellaneous food preparations (2.9 per cent) (PMC 2005).

Year		Exports			Imports		Total
	Full	Empty	Total	Full	Empty	Total	trade
				('000 teus)			
1999-00	502	130	632	575	87	662	1 294
2000-01	525	125	650	575	99	674	1 324
2001-02	555	143	698	606	119	726	1 424
2002-03	569	224	794	698	105	803	1 597
2003-04	592	246	838	777	106	883	1 721
2004-05	653	293	946	854	110	964	1 910
2005-06	685	302	987	877	115	991	1 979
2006-07	728	310	1 038	906	122	1 028	2 066
2007-08	781	348	1 128	988	130	1 118	2 246
2008-09	838	381	1 219	1 049	138	1 187	2 406
2009-10	886	396	1 282	1 074	145	1 218	2 501
2010-11	935	425	1 360	1 124	152	1 276	2 636
2011-12	983	455	1 438	1 184	159	1 343	2 781
2012-13	1 028	474	1 502	1 229	165	1 394	2 896
2013-14	1 075	496	1 572	1 285	172	1 457	3 029
2014-15	1 123	525	1 648	1 345	178	1 523	3 171
2015-16	1 172	553	1 725	1 407	185	1 592	3 317
2016-17	1 223	582	1 805	1 472	192	1 664	3 469
2017-18	1 276	613	1 889	1 540	199	1 739	3 628
2018-19	1 332	646	1 978	1 611	207	1 818	3 795
2019-20	1 390	680	2 070	1 685	214	1 900	3 970
2020-21	1 451	716	2 167	1 763	223	1 985	4 152
2021-22	1 514	754	2 268	1 844	231	2 075	4 343
2022-23	1 580	794	2 374	1 929	239	2 169	4 543
2023-24	1 649	837	2 485	2 019	248	2 267	4 752
2024-25	1 720	881	2 602	2 112	258	2 369	4 971
Annual average grow	th rate (pe	er cent)					
1994-95 to 1999-00	7.2	10.0	7.7	7.9	8.5	8.0	7.9
1999-00 to 2004-05	5.4	17.7	8.4	8.2	4.9	7.8	8.1
2004-05 to 2024-25	5.0	5.7	5.2	4.6	4.3	4.6	4.9

TABLE 4.11 CONTAINERISED EXPORTS AND IMPORTS: MELBOURNE PORT

*Numbers in bold are forecasts.

The main containerised export destination countries are China (14.9 per cent), New Zealand (14.2 per cent), Japan (12.4 per cent), the USA (9.7 per cent), South Korea (4.7

per cent), Hong Kong (4.4 per cent), Taiwan (3.6 per cent) and Indonesia (3.1 per cent) (PMC 2004).

The main containerised imports are miscellaneous manufactures (11.5 per cent), paper and newsprint (8.1 per cent), electric equipment (6.7 per cent), furniture (5.3 per cent), fruits and vegetables (5.3 per cent), machinery (4.1 per cent), vehicle parts (3.8 per cent), clothing (3.5 per cent), metal manufactures (3.4 per cent), and toys and sporting goods (3.4 per cent) (PMC 2005).

The main containerised import origin countries are China (25.6 per cent), the USA (9.9 per cent), New Zealand (7.9 per cent), Hong Kong (5.9 per cent), Japan (4.8 per cent), Germany (4.3 per cent), South Korea (3.8 per cent), Italy (3.6 per cent), Malaysia (3.4 per cent) and Taiwan (3.0 per cent) (PMC 2005).

The total containerised trade of Melbourne Port is forecast to increase by 4.9 per cent a year over the next twenty years to 5.0 million teus in 2024-25. Containerised exports will increase by 5.2 per cent a year to 2.6 million teus in 2024-25 (Table 4.11). About 69.0 per cent of the total containerised exports shipped out through Melbourne Port were full container exports and the remaining 31.0 per cent were empty container exports. Full container exports will increase by 5.0 per cent a year over the forecast period, from 653 000 teus in 2004-05 to 1.7 million teus in 2024-25, largely as a result of a positive economic outlook for the export destination markets and the weakening of the Australian dollar against the US dollar over the next twenty years. Empty container exports are expected to increase by 5.7 per cent a year in the next two decades, from 293 000 teus in 2004-05 to 881 000 teus in 2024-25.

Melbourne's containerised imports are forecast to increase by 4.6 per cent per annum during the forecast period to 2.4 million teus in 2024-25. Both full and empty container imports, which account for about 88.5 and 11.5 per cent of the containerised imports respectively, will increase by 4.6 and 4.3 per cent a year to 2.1 and 0.3 million teus in 2024-25.

Of the total containerised trade handled by Melbourne Port in 2004-05, 79.2 per cent was international trade and the remaining 20.8 per cent was coastal trade. International containerised trade increased by 7.5 per cent a year in the last five years and is forecast to increase by 4.9 per cent a year over the forecast period, from 1.5 million teus in 2004-05 to 3.9 million teus in 2024-25 (Table 4.12). New Zealand, China, Japan and the USA will continue to remain major containerised export destinations. Moreover, the FTA with the USA is likely to have a positive impact on Melbourne's containerised exports to the USA over the next twenty years.

The proportion of 40-foot containers in total container numbers is expected to increase from 40.0 per cent in 2004-05 to 52.0 per cent in 2024-25 (Table 4.13). As a result, the number of 40-foot containers will rise more rapidly (5.8 per cent a year) than the number of 20-foot containers (3.4 per cent a year) over the forecast period.

The total number of container ship visits to Melbourne Port was around 1 100 in 2004-05. It is expected to increase by 3.9 per cent a year during the forecast period to 2 300 in

2024-25, largely as a result of a strong containerised trade growth in Melbourne (Table 4.13).

Year		Exports			Imports		Total
	Full	Empty	Total	Full	Empty	Total	trade
				('000 teus)			
1999-00	403	108	511	482	62	544	1 055
2000-01	426	98	525	483	70	553	1 077
2001-02	447	102	549	506	86	593	1 142
2002-03	441	172	614	585	65	650	1 264
2003-04	445	189	634	659	55	713	1 347
2004-05	508	220	727	717	68	786	1 513
2005-06	533	226	759	737	71	808	1 567
2006-07	566	232	798	762	76	837	1 635
2007-08	607	260	867	830	81	911	1 778
2008-09	652	285	937	881	86	967	1 904
2009-10	689	297	986	903	90	992	1 978
2010-11	727	318	1 045	945	94	1 039	2 084
2011-12	765	341	1 105	995	98	1 093	2 199
2012-13	800	355	1 155	1 033	102	1 135	2 290
2013-14	836	372	1 208	1 080	107	1 187	2 395
2014-15	873	393	1 266	1 130	111	1 241	2 507
2015-16	911	414	1 325	1 182	115	1 297	2 622
2016-17	951	436	1 387	1 237	119	1 356	2 743
2017-18	992	459	1 452	1 294	124	1 418	2 869
2018-19	1 036	483	1 519	1 354	128	1 482	3 001
2019-20	1 081	509	1 590	1 416	133	1 549	3 139
2020-21	1 128	536	1 664	1 482	138	1 620	3 284
2021-22	1 177	565	1 742	1 550	143	1 693	3 435
2022-23	1 228	595	1 823	1 622	149	1 770	3 593
2023-24	1 282	626	1 908	1 696	154	1 850	3 759
2024-25	1 338	660	1 998	1 775	160	1 935	3 932
Annual average grow	th rate (pe	er cent)					
1994-95 to 1999-00	6.9	10.3	7.6	8.3	6.8	8.1	7.9
1999-00 to 2004-05	4.7	15.2	7.3	8.3	2.0	7.6	7.5
2004-05 to 2024-25	5.0	5.7	5.2	4.6	4.3	4.6	4.9

TABLE 4.12 INTERNATIONAL CONTAINERISED EXPORTS AND IMPORTS: MELBOURNE PORT

*Numbers in Italic and bold are estimates and forecasts.

Year	Proportion of	Conta	ainer numbe	ers	Average teus	Ship
	40-foot (%)	20-foot	40-foot	Total	per ship	visits
	(per cent)		('000)			
1999-00	32	666	314	980	1 223	1 058
2000-01	33	663	330	994	1 266	1 046
2001-02	33	717	353	1 071	1 341	1 062
2002-03	37	743	427	1 170	1 465	1 090
2003-04	39	760	481	1 240	1 598	1 077
2004-05	40	814	548	1 362	1 742	1 097
2005-06	41	833	573	1 406	1 759	1 125
2006-07	41	859	604	1 463	1 777	1 163
2007-08	42	922	662	1 584	1 794	1 252
2008-09	42	976	715	1 691	1 812	1 328
2009-10	43	1 001	750	1 751	1 830	1 366
2010-11	43	1 041	797	1 838	1 849	1 426
2011-12	44	1 084	848	1 932	1 867	1 489
2012-13	44	1 114	891	2 005	1 886	1 536
2013-14	45	1 149	940	2 089	1 905	1 590
2014-15	46	1 186	993	2 178	1 924	1 648
2015-16	46	1 222	1 047	2 269	1 943	1 707
2016-17	47	1 260	1 105	2 364	1 962	1 768
2017-18	47	1 298	1 165	2 463	1 982	1 831
2018-19	48	1 337	1 229	2 566	2 002	1 896
2019-20	48	1 377	1 296	2 673	2 022	1 963
2020-21	49	1 417	1 367	2 785	2 042	2 033
2021-22	50	1 459	1 442	2 901	2 062	2 106
2022-23	50	1 501	1 521	3 022	2 083	2 181
2023-24	51	1 544	1 604	3 148	2 104	2 259
2024-25	52	1 587	1 692	3 279	2 125	2 339
Annual average growth	rate (per cent)					
1994-95 to 1999-00	NA	NA	NA	NA	4.5	3.2
1999-00 to 2004-05	4.7	4.1	11.8	6.8	7.3	0.7
2004-05 to 2024-25	1.3	3.4	5.8	4.5	1.0	3.9

TABLE 4.13 PROPORTION OF 40-FOOT CONTAINERS, CONTAINER NUMBERS, AVERAGE TEUS PER SHIP AND CONTAINER SHIP VISITS: MELBOURNE PORT

NA = Not available.

*Numbers in bold are forecasts.

Non-containerised trade and ship visits

Non-containerised trade at Melbourne Port currently stands at 9.9 million tonnes. Imports account for 80.2 per cent of the total non-containerised trade.

The main non-containerised export commodities are motor vehicles (27.6 per cent), cereal grains (21.1 per cent) and accompanied passenger vehicles (16.9 per cent) (PMC 2005). The main non-containerised export destinations are Saudi Arabia (20.1 per cent), New Zealand (13.3 per cent), Pakistan (8.8 per cent), Egypt (6.3 per cent), Singapore (6.2 per cent), Indonesia (5.9 per cent) and United Arab Emirates (5.2 per cent) (PMC 2005).

The main non-containerised import commodities are crude oil (24.4 per cent), motor vehicles (18.9 per cent), cement (9.2 per cent), petroleum products (7.6 per cent) and accompanied passenger vehicles (6.6 per cent) (PMC 2005).

The main non-containerised import origin countries are Vietnam (24.3 per cent), Japan (22.6 per cent), Singapore (15.0 per cent), the USA (5.5 per cent), South Korea (4.7 per cent) and Belgium (4.4 per cent) (PMC 2005).

Non-containerised trade increased by 3.0 per cent a year in the last five years and is expected to increase by 3.5 per cent a year during the next twenty years to 19.6 million tonnes in 2024-25 (Figure 4.9 and Table 4.14). Non-containerised



FIGURE 4.9 NON-CONTAINERISED TRADE, 1993-94 TO 2024-25: MELBOURNE PORTS

imports, which increased by 5.1 per cent annually in the last five years, are forecast to increase by 3.6 per cent a year to 16.2 million tonnes in 2024-25. On the other hand, non-containerised exports, which declined by 3.7 per cent a year in the last five years, are expected to increase by 2.7 per cent a year over the next twenty years to 3.4 million tonnes in 2024-25. The low import growth forecast is mainly because of the slowing of

the Australian economy and the depreciation of the Australian dollar against the US dollar during the forecast period.

Year		Trade	Average	Ship visits	
			tonnes per		
	Export	Import	Total	ship	
	('0	00 tonnes)			
1999-00	2 382	6 201	8 584	4 714	1 821
2000-01	2 874	5 670	8 544	4 838	1 766
2001-02	3 192	5 988	9 180	4 917	1 867
2002-03	1 884	7 398	9 281	4 479	2 072
2003-04	2 239	7 910	10 149	4 822	2 105
2004-05	1 971	7 960	9 931	4 870	2 039
2005-06	2 040	8 072	10 111	4 918	2 056
2006-07	2 236	7 865	10 101	4 968	2 033
2007-08	2 295	8 499	10 794	5 017	2 151
2008-09	2 383	8 893	11 275	5 067	2 225
2009-10	2 492	8 927	11 419	5 118	2 231
2010-11	2 578	9 215	11 793	5 169	2 281
2011-12	2 625	9 675	12 300	5 221	2 356
2012-13	2 697	9 942	12 639	5 273	2 397
2013-14	2 787	10 240	13 027	5 326	2 446
2014-15	2 837	10 677	13 514	5 379	2 512
2015-16	2 887	11 133	14 020	5 433	2 581
2016-17	2 939	11 608	14 547	5 487	2 651
2017-18	2 991	12 104	15 095	5 542	2 724
2018-19	3 044	12 620	15 665	5 598	2 798
2019-20	3 099	13 159	16 258	5 654	2 876
2020-21	3 154	13 720	16 874	5 710	2 955
2021-22	3 210	14 306	17 516	5 767	3 037
2022-23	3 267	14 917	18 184	5 825	3 122
2023-24	3 326	15 553	18 879	5 883	3 209
2024-25	3 385	16 217	19 602	5 942	3 299
Annual average growth	rate (per cent)				
1994-95 to 1999-00	6.6	6.5	6.5	56	0.8
1999-00 to 2004-05	-3.7	5.1	3.0	0.7	2.3
2004-05 to 2024-25	2.7	3.6	3.5	1.0	2.4

TABLE 4.14 NON-CONTAINERISED SEA TRADE, AVERAGE TONNES PER SHIP AND SHIP VISITS: MELBOURNE PORT

*Numbers in bold are forecasts.

International non-containerised trade presently accounts for 52.8 per cent of noncontainerised trade at Melbourne Port. It increased by 3.0 per cent a year in the last five years to 5.2 million tonnes in 2004-05. It is forecast to increase by 3.4 per cent a year over the next twenty years to 10.3 million tonnes in 2024-25 (Table 4.15).

Year	Export	Import	Total
	('	000 tonnes)	
1999-00	1 166	3 354	4 521
2000-01	1 986	2 673	4 659
2001-02	2 231	2 621	4 852
2002-03	1 062	4 012	5 074
2003-04	1 476	4 104	5 580
2004-05	1 263	3 977	5 240
2005-06	1 307	4 033	5 340
2006-07	1 432	3 930	5 362
2007-08	1 470	4 246	5 717
2008-09	1 527	4 443	5 970
2009-10	1 597	4 460	6 057
2010-11	1 652	4 604	6 256
2011-12	1 682	4 834	6 516
2012-13	1 728	4 967	6 695
2013-14	1 786	5 116	6 902
2014-15	1 817	5 335	7 152
2015-16	1 850	5 562	7 412
2016-17	1 883	5 800	7 683
2017-18	1 916	6 047	7 964
2018-19	1 951	6 305	8 256
2019-20	1 985	6 574	8 560
2020-21	2 021	6 855	8 876
2021-22	2 057	7 148	9 204
2022-23	2 094	7 453	9 546
2023-24	2 131	7 771	9 902
2024-25	2 169	8 102	10 271
Annual average growth rate	(per cent)		
1994-95 to 1999-00	10.3	10.8	10.6
1999-00 to 2004-05	1.6	3.5	3.0
2004-05 to 2024-25	2.7	3.6	3.4

TABLE 4.15 INTERNATIONAL NON-CONTAINERISED SEA TRADE: MELBOURNE PORT

*Numbers in Italic and bold are estimates and forecasts.

In 2004-05, non-containerised ships made 2 000 visits at Melbourne Port (Table 4.14). The number of non-container ship visits is forecast to increase by 2.4 per cent a year in the next twenty years to over 3 300 in 2024-25.

Port capacity

With substantial increase in the number of container and ship movements following the expected high growth in containerised and non-containerised trade, demand for port facilities at Melbourne Port will rise significantly over the forecast period. It appears that the current capacity of Melbourne Port is not sufficient to handle such increase in the number of container and ship movements. The capacity needs to be increased to

facilitate the movement of containers and ships in the future and thereby to realise the benefit of high growth in trade volume. PMC is taking a number of initiatives under its short-term and long-term plans and strategies to increase its port capacity. One of the major initiatives is the channel deepening project. Over 30 per cent of container ships are currently unable to load to full capacity because of the current channel depths at Melbourne Port. Hence, on its completion the project will enable large ships to load to full capacity. This could bring economies of scale resulting in lower freight rates and, thus, lower export and import prices.

Both rail and road are used to move containers to and from Melbourne Port. In general, interstate containers are moved by rail whereas intrastate containers are moved by road. Improvement in rail access to the port area is vital to maintain the smooth flow of containers to and from the port, especially given the expected high growth in containerised trade at Melbourne Port over the forecast period. At present, around 18 per cent of containers are moved by rail at Melbourne Port. The Victorian Government has a target to increase the rail share to 30 per cent by 2010. The Australian Government has allocated \$110 million under the AusLink program to improve rail access to the port area. This initiative is aimed at reducing congestion on roads linking to the port, achieving higher efficiency in container flow and increasing the rail share in freight movements.

Ongoing investments by PMC, governments and the private sector are expected to have a positive influence on the freight handling capacity of Melbourne Port. In 2004-05, the PMC invested \$28.2 million in new and existing port infrastructure, land and facilities, whereas the private sector invested over \$72 million in container, general and bulk cargo facilities.

PMC is also redeveloping the 17.5 hectares Victoria dock site to make it a world class general cargo terminal. It is also planning to make Webb Dock an all container dock. The Eastside of the dock will be used for bulk break and cars, whereas the Westside will be used for coastal shipping.

ADELAIDE PORT

Port Adelaide is situated 14 kilometres northwest of Adelaide and remains the main service point for shipping in South Australia. Port Adelaide and six other ports of South Australia are managed by Flinders Ports Pty Ltd (FPPL), which is a private port operator. These ports were privatised by the South Australia Government in 2000.

Port Adelaide has facilities to export and import containerised, bulk and break bulk cargoes. It has over 20 wharfs and provides regular shipping services on international routes to Northern Europe and the United Kingdom (UK), the Mediterranean, Africa, the USA, Japan, Korea, South East Asia and the Middle East.

In 2004-05, Port Adelaide's total trade increased by 5.7 per cent to 9.9 million tonnes. This includes an increase of 13.2 per cent in containerised trade to 170 000 teus.

The main export commodities are grain, general cargo, gypsum, vegetables, legumes, oilseeds, scrap metal, concentrates, lead, zinc, copper, uranium, salt, fruit, cars, stock feed, timber, soda ash and iron and steel; whereas the main import commodities are petroleum, gas, general cargo, fertilisers, iron and steel, sulphur, chemicals and cars.

The main fifteen export destination countries are New Zealand, Saudi Arabia, Egypt, the United Kingdom, Canada, Indonesia, United Arab Emirates, China, Malaysia, Japan, Bangladesh, South Korea, Pakistan, Thailand and Kuwait; whereas the main fifteen import origin countries are Singapore, the USA – West Coast, Japan, Canada – West Coast, Malaysia, China, New Zealand, Qatar, South Korea, Bahrain, Belgium, Germany, Indonesia, India and France.

Around 45 per cent of Adelaide's total exports are presently shipped through Melbourne Port, as Adelaide does not have direct shipping services to North America and North Asia. This also adversely influences Adelaide's imports.

Non-containerised trade consists of heavy and low-value commodities, whereas containerised trade consists of lighter and high-value commodities. In 2003-04, non-containerised trade presently accounted for 55 per cent of outbound sea trade volume and 71 per cent of inbound sea trade volume. However, it accounted for 15 per cent of outbound sea trade value and 26 per cent of inbound sea trade value (Figure 4.10).





Containerised trade and ship visits

Total containerised trade of Adelaide Port increased by 8.1 per cent a year in the last five years to 171 000 teus in 2004-05 (Figure 4.11 and Table 4.16). Exports account for 55.0 per cent of total containerised trade and the remaining 45.0 per cent are imports.



FIGURE 4.11 CONTAINERISED TRADE, 1993-94 TO 2024-25: PORT ADELAIDE

Total containerised trade of Adelaide Port is forecast to increase by 5.3 per cent a year over the next twenty years to 475 000 teus in 2024-25.

Adelaide Port's total containerised exports increased by 8.0 per cent a year in the last five years, from 64 000 teus in 1999-2000 to 94 000 teus in 2004-05. They are forecast to increase by 5.6 per cent a year in the next twenty years to 278 000 teus in 2024-25. At present, 84.8 per cent of the total containerised exports are full container exports, whereas the remaining 15.2 per cent are empty container exports. Full container exports increased by 7.6 per cent a year in the last five years and are expected to increase by only 5.7 per cent a year over the next twenty years to 241 000 teus in 2024-25.

The lower growth rate during the forecast period is a result of the expectation that the economy of Australia's main export destination countries will grow at a rate slightly lower than the rate of growth observed during the last decade. It is also a result of few shipping services with overseas markets.

Adelaide's empty container export was 14 000 teus in 2004-05. In Australia, Southbound (import) ships passing through Adelaide are completely filled with cargoes. There is no space to export empty containers on these ships. Hence, empty containers are generally moved to Melbourne by rail.

The empty container exports will increase by 4.9 per cent a year in the next twenty years to 37 000 teus in 2024-25.

Containerised imports through Adelaide Port increased by 8.3 per cent a year in the last five years, from 52 000 teus in 1999-2000 to 77 000 teus in 2004-05. They are forecast to increase by 4.8 per cent per annum during the forecast period to 197 000 teus in 2024-25. Both full and empty container imports which account for 52.5 and 47.5 per cent of the containerised imports respectively will increase by 5.1 and 4.5 per cent a year during the same period.

Year		Exports			Imports		Total
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	55	9	64	35	16	52	116
2000-01	63	11	74	38	21	59	133
2001-02	70	7	78	41	27	67	145
2002-03	72	12	84	41	25	66	150
2003-04	86	12	98	42	30	71	170
2004-05	80	14	94	40	36	77	171
2005-06	85	16	100	41	39	80	181
2006-07	91	16	107	43	41	84	191
2007-08	100	16	116	47	44	91	207
2008-09	110	18	128	50	47	98	226
2009-10	119	19	138	51	51	102	240
2010-11	127	20	146	54	54	108	254
2011-12	134	21	155	57	57	114	269
2012-13	141	22	162	60	59	119	281
2013-14	147	22	170	63	61	124	294
2014-15	154	24	178	66	64	130	307
2015-16	161	25	186	69	66	135	321
2016-17	168	26	194	73	68	141	335
2017-18	176	27	203	77	70	147	350
2018-19	184	28	212	81	72	153	366
2019-20	193	30	222	85	75	160	382
2020-21	201	31	232	89	77	167	399
2021-22	211	32	243	94	80	174	417
2022-23	220	34	254	99	82	181	435
2023-24	230	36	266	104	85	189	455
2024-25	241	37	278	109	88	197	475
Annual average growt	h rate (pe	er cent)					
1994-95 to 1999-00	10.9	24.4	12.3	13.4	6.4	10.9	11.7
1999-00 to 2004-05	7.6	10.2	8.0	2.6	17.6	8.3	8.1
2004-05 to 2024-25	5.7	4.9	5.6	5.1	4.5	4.8	5.3

TABLE 4.16	CONTAINERISED EXPORTS AND IMPORTS: PORT ADELAIDE

* Numbers in bold are forecasts.

International containerised trade currently accounts for 86.9 per cent of the total containerised imports. It increased by 7.7 per cent a year in the last five years to 148 000 teus in 2004-05 and it is forecast to increase by 5.3 per cent a year over the next twenty years to 420 000 teus in 2024-25 (Table 4.17).

Around 26.0 per cent of the total container numbers used in importing and exporting commodities to and from the Port of Adelaide are 40-foot containers. With strong growth in the containerised trade, the proportion is expected to increase to 35.0 per cent in 2024-25 (Table 4.18).

Year		Exports			Imports		Total
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	54	8	62	32	8	40	102
2000-01	61	10	72	34	9	43	114
2001-02	69	7	76	38	11	49	124
2002-03	72	12	84	39	12	51	135
2003-04	86	11	97	40	17	56	153
2004-05	79	14	92	38	18	56	148
2005-06	84	15	99	39	19	58	157
2006-07	90	15	105	41	20	61	166
2007-08	99	15	115	44	21	66	180
2008-09	110	17	127	48	23	70	197
2009-10	118	18	136	49	25	73	209
2010-11	126	19	144	51	26	77	221
2011-12	133	19	152	54	27	82	234
2012-13	139	21	160	57	29	85	245
2013-14	146	21	167	60	30	89	256
2014-15	153	22	175	63	31	93	268
2015-16	160	23	183	66	32	98	281
2016-17	167	24	192	69	33	102	294
2017-18	175	26	200	73	34	107	307
2018-19	183	27	209	77	35	112	321
2019-20	191	28	219	80	36	117	336
2020-21	200	29	229	85	37	122	351
2021-22	209	31	240	89	39	128	367
2022-23	218	32	251	94	40	133	384
2023-24	228	34	262	98	41	140	402
2024-25	239	35	274	103	42	146	420
Annual average growt	h rate (pe	er cent)					
1994-95 to 1999-00	10.8	22.5	12.0	11.5	-7.6	5.6	9.2
1999-00 to 2004-05	7.9	11.0	8.3	3.3	17.1	6.7	7.7
2004-05 to 2024-25	5.7	4.9	5.6	5.1	4.5	4.9	5.3

TABLE 4.17 INTERNATIONAL CONTAINERISED EXPORTS AND IMPORTS: PORT ADELAIDE

*Numbers in bold are forecasts.

The total number of container ship visits to Adelaide Port was 231 in 2004-05. With high expected growth in containerised trade and relatively low growth in container ship size, this number is forecast to increase by 4.2 per cent a year over the forecast period to 527 visits in 2024-25 (Table 4.18).

Year F	r Proportion of		Container numbers ("000)			Ship
	40-foot (%)	20-foot	40-foot	Total	per ship	visits
	(per cent)		('000)			
1999-00	21	76	20	96	535	216
2000-01	25	80	26	107	572	233
2001-02	27	83	31	114	640	227
2002-03	28	84	33	117	663	226
2003-04	27	99	36	134	716	237
2004-05	26	100	35	135	738	231
2005-06	26	105	38	143	746	242
2006-07	27	110	40	151	753	253
2007-08	27	119	44	163	761	272
2008-09	28	128	49	177	768	294
2009-10	28	135	53	188	776	310
2010-11	28	142	56	198	784	324
2011-12	29	148	60	208	792	339
2012-13	29	154	64	217	800	352
2013-14	30	159	67	227	808	364
2014-15	30	165	71	236	816	377
2015-16	31	170	75	246	824	390
2016-17	31	176	79	256	832	403
2017-18	32	182	84	266	840	417
2018-19	32	188	89	277	849	431
2019-20	33	195	94	288	857	446
2020-21	33	201	99	300	866	461
2021-22	33	208	105	312	875	477
2022-23	34	214	110	325	883	493
2023-24	35	222	117	338	892	510
2024-25	35	229	123	352	901	527
Annual average growth rate	e (per cent)					
1994-95 to 1999-00	NA	NA	NA	NA	NA	NA
1999-00 to 2004-05	4.6	5.7	12.1	7.2	6.7	1.4
2004-05 to 2024-25	1.5	4.2	6.5	4.9	1.0	4.2

TABLE 4.18PROPORTION OF 40-FOOT CONTAINERS, CONTAINER NUMBERS,AVERAGE TEUS PER SHIP AND CONTAINER SHIP VISITS: PORT ADELAIDE

NA = Not available.

*Numbers in bold are forecasts.

Non-containerised trade and ship visits

Port Adelaide handled 7.9 million tonnes of non-containerised trade in 2004-05 (Figure 4.12 and Table 4.19). About 60.3 per cent of the trade were imports which surged by

55.3 per cent in 2003-04 largely due to Mobil closing its oil import facility at Port Stanvac. Oil is now imported through Port Adelaide. Otherwise, oil imported at Port Adelaide has always remained flat.



FIGURE 4.12 NON-CONTAINERISED TRADE, 1993-94 TO 2024-25: PORT ADELAIDE

Non-containerised exports increased by 7.9 per cent a year in the last five years to 3.2 million tonnes in 2004-05 (Table 4.19). They are forecast to increase by 3.6 per cent a year over the next twenty years to 6.4 million tonnes in 2024-25, mainly due to an expected increase in Australia's export competitiveness resulting from the depreciation of the Australian dollar against the US dollar over the forecast period. The annual average exchange rate is forecast to depreciate from US\$0.74 per Australian dollar in 2004-05 to US\$0.59 per Australian dollar in 2024-25.

Non-containerised imports increased more rapidly than non-containerised exports in the last five years. Imports increased by 15.1 per cent a year to 4.8 million tonnes in 2004-05, largely due increase in oil import following to Mobil closing its oil import facility at Port Stanvac. Hence, such strong growth will not be expected during the next twenty years. Moreover, expected slow down in Australia's economic growth and depreciation of the Australian dollar will dampen imports. Australia's real GNE, which is the main driver of imports in Adelaide, is forecast to rise by 2.7 per cent over the forecast period as compared with a growth rate of 4.2 per cent in the last five years. Non-containerised imports are expected to increase by 3.3 per cent a year over the forecast period to 9.2 million tonnes in 2024-25.

Following positive expected growth in non-containerised exports and imports, total non-containerised trade is forecast to increase by 3.5 per cent a year over the next twenty years to 15.7 million tonnes in 2024-25.

In 2003-04, international non-containerised trade accounted for 67.4 per cent of noncontainerised exports and 30.7 per cent of non-containerised imports. It is forecast to increase by 3.6 per cent a year over the next twenty years, from 3.0 million tonnes in 2004-05 to 6.1 million tonnes in 2024-25 (Table 4.20).

Year		Trade	Average	Ship visits	
_	- · · · · ·			tonnes per	
_	Export	Import	Total	ship	
	('0	00 tonnes)			
1999-00	2 156	2 373	4 529	6 213	729
2000-01	2 716	2 560	5 277	6 506	811
2001-02	3 759	2 541	6 299	7 411	850
2002-03	3 011	2 646	5 657	7 134	793
2003-04	2 800	4 110	6 910	7 933	871
2004-05	3 157	4 788	7 944	8 013	991
2005-06	3 304	4 720	8 024	8 093	992
2006-07	3 692	4 547	8 239	8 174	1 008
2007-08	3 851	4 953	8 805	8 256	1 067
2008-09	4 074	5 183	9 256	8 338	1 110
2009-10	4 326	5 228	9 554	8 422	1 134
2010-11	4 527	5 379	9 905	8 506	1 165
2011-12	4 647	5 663	10 311	8 591	1 200
2012-13	4 812	5 817	10 629	8 677	1 225
2013-14	5 006	5 944	10 951	8 764	1 250
2014-15	5 123	6 186	11 309	8 851	1 278
2015-16	5 242	6 438	11 680	8 940	1 307
2016-17	5 364	6 700	12 064	9 029	1 336
2017-18	5 489	6 973	12 462	9 119	1 367
2018-19	5 617	7 257	12 874	9 211	1 398
2019-20	5 748	7 552	13 300	9 303	1 430
2020-21	5 881	7 860	13 741	9 396	1 463
2021-22	6 018	8 180	14 198	9 490	1 496
2022-23	6 159	8 513	14 671	9 585	1 531
2023-24	6 302	8 859	15 161	9 680	1 566
2024-25	6 449	9 220	15 669	9 777	1 603
Annual average growth	rate (per cent)				
1994-95 to 1999-00	7 5	26	E 0	NIA	NIA
1999-00 to 2004-05	7.5 7.0	3.0 1 = 1	0.0 11.0		INA 6.0
2004-05 to 2024-25	7.9 3.6	10.1 2.2	11.9 3.5	0.2 1 0	0.3 2 /
	3.0	ა.ა	ა.ე	1.0	۷.4

TABLE 4.19 NON-CONTAINERISED SEA TRADE, AVERAGE TONNES PER SHIP AND SHIP VISITS: PORT ADELAIDE

NA = Data are not available.

*Numbers in bold are forecasts.

There were 991 non-containerised ship visits at Port Adelaide in 2004-05. The number of non-containerised ship visits is forecast to increase by 2.4 per cent a year in the next twenty years to around 1 600 visits in 2024-25 (Table 4.19).

Year	Export	Import	Total
	('	000 tonnes)	
1999-00	1 691	353	2 043
2000-01	2 122	330	2 452
2001-02	2 723	300	3 023
2002-03	2 097	274	2 371
2003-04	1 888	1 262	3 150
2004-05	2 204	844	3 049
2005-06	2 308	832	3 140
2006-07	2 578	802	3 380
2007-08	2 689	874	3 563
2008-09	2 845	914	3 759
2009-10	3 021	922	3 943
2010-11	3 161	948	4 110
2011-12	3 245	999	4 244
2012-13	3 360	1 026	4 386
2013-14	3 496	1 048	4 544
2014-15	3 577	1 091	4 668
2015-16	3 661	1 135	4 796
2016-17	3 746	1 182	4 928
2017-18	3 833	1 230	5 063
2018-19	3 922	1 280	5 202
2019-20	4 014	1 332	5 346
2020-21	4 107	1 386	5 493
2021-22	4 203	1 442	5 645
2022-23	4 301	1 501	5 802
2023-24	4 401	1 562	5 963
2024-25	4 503	1 626	6 129
Annual average growth rate (p	per cent)		
1994-95 to 1999-00	17.6	8.6	15.7
1999-00 to 2004-05	5.4	19.1	8.3
2004-05 to 2024-25	3.6	3.3	3.6

TABLE 4.20 INTERNATIONAL NON-CONTAINERISED SEA TRADE: PORT ADELAIDE

*Numbers in bold are forecasts.

Port capacity

Like other city port authorities, Flinders Ports is taking a number of initiatives to increase the capacity of Port Adelaide. One of the initiatives is to deepen Adelaide Port's outer harbour channel, from 12.2 to 14.2 metres. The current depth cannot handle larger vessels, which are expected to replace smaller vessels following the channel deepening at Melbourne Port. The deepening of the channel is required to receive larger container vessels to meet future high growth in export and import demand as well as to ensure larger ships do not bypass Adelaide Port. It allows large vessels to enter and leave the harbour with a full load irrespective of tides. If the channel is not deepened by

2013, around 150 000 containers are expected to be transported by alternative transport modes (road and rail) to and from Melbourne each year, resulting in an estimated annual loss of \$2.8 billion in South Australian trade (FPPL 2004).

The benefits of the channel deepening project have been estimated to vary between \$500 million and \$1.9 billion over a twenty-year period and the cost of dredging is estimated to be \$55 million (FPPL 2004). The South Australian Government has announced an extra \$15 million, in addition to its previous funding of \$15 million, for the project. Further, a new grain wharf is under construction and is planned to be completed by the end 2005. The wharf will facilitate grain exports from Port Adelaide.

FREMANTLE PORT

Fremantle Port, Western Australia's principal general cargo port, is fully owned by the State Government of Western Australia. It is managed by Fremantle Ports (FP) which is a State business enterprise. Fremantle Ports contributed \$15.5 million to the State Government in 2003-04 as taxes, tax equivalent payments and dividends (FP 2004).

Fremantle Port has both inner and outer harbours. The Inner Harbour is used to handle containerised trade, livestock exports, motor vehicle imports and other general cargo trade, whereas the Outer Harbour is used for handling grain, petroleum, liquid petroleum gas, alumina, mineral sands, fertilisers, sulphur and other non-containerised commodities. There is a well established rail link to facilitate the movement of cargoes to destinations within and outside of the State. Fremantle Ports also provides stevedoring services at Kwinana.

Fremantle Port currently handles a total of 25.5 million tonnes of trade, including 14.1 million tonnes of exports and 11.4 million tonnes of imports.

The main export commodities are grain (37.6 per cent), alumina (19.1 per cent), refined petroleum (18.8 per cent) and animal feeds (3.0 per cent); whereas the main import commodities are crude petroleum (43.8 per cent), phosphates/fertilizers (7.0 per cent), refined petroleum (6.7 per cent), caustic soda (4.6 per cent), cement clinker (4.2 per cent), sulphur (3.4 per cent), iron and steel products (2.7 per cent) and chemicals and related products (2.5 per cent) (FP 2005).

Its main export destination countries are China (18.6 per cent), Australia - coastal (16.7 per cent), Japan (14.5 per cent), South Korea (6.6 per cent), Indonesia (6.5 per cent), New Zealand (4.5 per cent), Singapore (4.3 per cent), the USA (3.7 per cent) and Malaysia (3.7 per cent); whereas its main import origin countries are Australia – Coastal (25.2 per cent), United Arab Emirates (14.5 per cent), Singapore (7.2 per cent), Indonesia (7.1 per cent), Malaysia (6.1 per cent), the USA (5.7 per cent), Saudi Arabia (4.1 per cent), China (3.9 per cent), Canada (3.5 per cent) and Japan (3.3 per cent) (FP 2005).

As in other city ports, Fremantle's containerised trade consists of lighter and high-value commodities, whereas its non-containerised trade consists of heavy and low-value commodities. Non-containerised trade presently accounts for 27 per cent of outbound sea trade volume and 47 per cent of inbound sea trade volume (Figure 4.13). However,

it accounts for 15 per cent of outbound sea trade value and 11 per cent of inbound sea trade value.

Containerised trade and ship visits

Total containerised trade at Fremantle Port increased by 9.5 per cent a year in the last five years to 467 000 teus in 2004-05 (Table 4.21). Exports and imports account for 49.0 and 51.0 per cent of total containerised trade respectively.





In volume terms, the top ten non-trans-shipment container commodities exported are hay, chaff, fodder peas (stock feed), waste paper, titanium dioxide, non-ferrous metals, fresh fruit and vegetables, fresh meat (chilled or frozen), mineral sands, malt, wheat and oats; and the top ten non-trans-shipment container commodities exported are machinery (agricultural and industrial), furniture and parts, chemicals and related products, paper, paperboard and articles of paper, manufactures of metal, unclassified goods, iron and steel products, newsprint, rubber manufactures and miscellaneous manufactured articles (FP 2005).

Following the assumptions of population, economic growth and exchange rates presented in Chapter 3, total containerised trade of Fremantle Port is forecast to increase by 5.4 per cent a year over the next twenty years to 1.3 million teus in 2024-25 (Figure 4.14 and Table 4.21).

Around 70.5 per cent of total containerised exports are full container exports, whereas the remaining 29.5 per cent are empty container exports. Total containerised exports increased by 10.1 per cent a year in the last five years to 229 000 teus in 2004-05 and they are forecast to increase by 5.3 per cent a year in the next twenty years to 640 000 teus in 2024-25. Full container exports will increase by 5.6 per cent a year to 482 000

teus in 2024-25, whereas empty container exports will increase by 4.3 per cent to 158 000 teus in 2024-25.



FIGURE 4.14 CONTAINERISED TRADE, 1993-94 TO 2024-25: FREMANTLE PORT

Total containerised imports to Fremantle Port increased by 8.9 per cent a year in the last five years to 238 000 teus in 2004-05. They are forecast to increase by 5.5 per cent per annum during the forecast period to 698 000 teus in 2024-25. Full container imports dominate total containerised imports, accounting for 87.9 per cent of total containerised imports. Both full and empty container imports will increase respectively by 5.7 and 3.5 per cent a year during the same period to 640 000 and 58 000 teus in 2024-25.

International containerised trade accounts for 80.1 per cent of Fremantle's total containerised trade. In 2004-05, it stood at 376 000 teus, including 143 000 teus of full exports and 152 000 teus of full imports (Table 4.22).

International full container exports are forecast to increase by 5.6 per cent a year over the next twenty years to 429 000 teus in 2024-25 (Table 4.22). Similarly, international full container imports are expected to rise annually by 5.7 per cent a year over the forecast period to 464 000 in 2024-25. Total international containerised trade is expected to reach 1.1 million teus in 2024-25.

The number of 40-foot containers being used by importers and exporters at Fremantle Port is increasing. The proportion of 40-foot containers increased by 6.1 per cent a year in the last five years, from 29.0 per cent in 1998-99 to 39.0 per cent in 2004-05 (Table 4.23). However, such a high rate of growth in the container proportion will not continue in the future as there is no perfect substitutability between 20-foot and 40-foot containers.

Year		Exports			Imports		Total
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	112	30	141	122	34	156	297
2000-01	126	44	170	136	48	184	354
2001-02	142	44	186	154	42	196	382
2002-03	153	56	208	186	37	223	431
2003-04	160	58	219	204	35	238	457
2004-05	161	67	229	210	29	238	467
2005-06	172	70	242	216	30	245	487
2006-07	185	71	257	225	30	256	512
2007-08	196	75	270	252	32	284	555
2008-09	210	79	289	272	34	306	595
2009-10	224	83	307	279	34	314	621
2010-11	239	87	326	296	36	331	657
2011-12	249	89	338	315	37	352	690
2012-13	263	93	356	330	38	368	723
2013-14	283	96	380	349	40	388	768
2014-15	297	101	398	368	41	409	808
2015-16	312	106	418	389	42	432	849
2016-17	328	111	438	411	44	455	893
2017-18	344	116	459	435	45	480	940
2018-19	361	121	482	459	47	507	988
2019-20	379	126	505	486	49	534	1,039
2020-21	397	132	530	513	50	564	1 093
2021-22	417	138	555	542	52	595	1 150
2022-23	438	144	582	573	54	627	1 210
2023-24	460	151	611	606	56	662	1 272
2024-25	482	158	640	640	58	698	1 338
Annual average growt	h rate (pe	er cent)					
1994-95 to 1999-00	8.6	14.1	9.6	8.5	12.6	9.3	9.5
1999-00 to 2004-05	7.7	17.7	10.1	11.4	-3.0	8.9	9.5
2004-05 to 2024-25	5.6	4.3	5.3	5.7	3.5	5.5	5.4

*Numbers in bold are forecasts.

The proportion is assumed to increase gradually to 54 per cent in 2024-25. The number of 20-foot and 40-foot containers will reach 405 000 and 467 000 respectively in 2024-25.

Container ships are regular callers at Fremantle Port. A total of 467 visits were made by container ships in 2004-05. Despite strong growth in containerised trade, the number of container ship visits declined by 2.1 per cent a year in the last five years. The main reason seems to be an increase in the average teus carried by container ships. The average teus carried per ship visit increased by 11.8 per cent a year during the period, from 574 teus in 1999-2000 to around 1 000 teus in 2004-05.

Year	Year Exports Imports				Imports		Total
	Full	Empty	Total	Full	Empty	Total	trade
				('000 teus)			
1999-00	108	29	137	89	24	114	251
2000-01	119	43	162	92	37	129	291
2001-02	129	41	170	109	31	141	311
2002-03	130	52	181	134	20	154	335
2003-04	147	56	203	151	18	169	372
2004-05	143	64	207	152	17	169	376
2005-06	153	66	219	156	18	174	393
2006-07	165	67	232	163	18	181	413
2007-08	174	70	244	182	19	202	446
2008-09	187	75	262	197	20	217	479
2009-10	199	79	278	202	21	223	501
2010-11	213	82	294	214	21	236	530
2011-12	221	84	305	228	22	251	556
2012-13	234	87	321	239	23	262	583
2013-14	252	91	343	253	24	276	619
2014-15	264	95	360	267	25	291	651
2015-16	277	100	377	282	25	308	685
2016-17	291	104	396	298	26	324	720
2017-18	306	109	415	315	27	342	757
2018-19	321	114	435	333	28	361	796
2019-20	337	119	456	352	29	381	837
2020-21	353	125	478	372	30	402	880
2021-22	371	130	501	393	31	424	926

TABLE 4.22 INTERNATIONAL CONTAINERISED EXPORTS AND IMPORTS: FREMANTLE PORT

*Numbers in Italic and bold are estimates and forecasts.

Annual average growth rate (per cent)

389

409

429

8.7

5.9

5.6

136

142

149

15.9

16.9

4.3

2022-23

2023-24

2024-25

1994-95 to 1999-00

1999-00 to 2004-05

2004-05 to 2024-25

With expected strong growth in containerised trade and marginal increase in ship size, the number of container ship visits to Fremantle Port is forecast to increase by 4.4 per cent a year during the forecast period to around 1 100 visits in 2024-25 (Table 4.23).

526

551

578

10.0

8.6

5.3

415

439

464

5.2

11.2

5.7

32

34

35

12.9

-6.7

3.5

448

472

499

6.6

8.3

5.6

973

1 024

1 076

8.4

8.5

5.4

Year	Proportion of	Containe	er numbers	("000)	Average teus	Ship
	40-foot (%)	20-foot	40-foot	Total	per ship	visits
	(per cent)		('000)			
1999-00	29	164	67	231	574	518
2000-01	35	171	92	262	629	563
2001-02	33	193	94	288	665	574
2002-03	35	208	112	320	830	520
2003-04	36	214	122	336	975	469
2004-05	39	205	131	336	1 001	467
2005-06	40	211	138	349	1 011	482
2006-07	40	218	147	365	1 021	502
2007-08	41	233	161	394	1 031	538
2008-09	42	246	175	420	1 041	571
2009-10	42	252	184	437	1 052	590
2010-11	43	263	197	460	1 062	619
2011-12	44	271	210	481	1 073	643
2012-13	44	279	222	501	1 084	668
2013-14	45	291	238	530	1 094	701
2014-15	46	301	253	554	1 105	731
2015-16	46	311	269	580	1 116	761
2016-17	47	321	286	607	1 128	792
2017-18	48	331	304	635	1 139	825
2018-19	49	341	324	665	1 150	859
2019-20	49	351	344	695	1 162	895
2020-21	50	362	366	727	1 173	932
2021-22	51	372	389	761	1 185	970
2022-23	52	383	413	796	1 197	1 011
2023-24	53	394	439	833	1 209	1 052
2024-25	54	405	467	871	1 221	1 096
Annual average growth	rate (per cent)					
1994-95 to 1999-00	NA!	NA	NA	NA	7.5	1.8
1999-00 to 2004-05	6.1	4.6	14.4	7.8	11.8	-2.1
2004-05 to 2024-25	1.6	3.5	6.6	4.9	1.0	4.4

TABLE 4.23 PROPORTION OF 40-FOOT CONTAINERS, CONTAINER NUMBERS, AVERAGE TEUS PER SHIP AND CONTAINER SHIP VISITS: FREMANTLE PORT

NA = Not available.

*Numbers in bold are forecasts.

Non-containerised trade and ship visits

Non-containerised trade at Fremantle Port was 20.7 million tonnes in 2004-05. Of the total trade, 55.7 per cent were exports and 44.3 per cent were imports.

Most non-containerised trade facilities are provided at Kwinana Bulk Terminal and Kwinana Bulk Jetty at Kwinana. The main non-containerised commodities are grain, phosphate, alumina, oil, livestock, pig iron, fertilizer, sand and motor vehicles. There is a seasonal variation in grain and livestock exports. Alumina and oil are handled at Fremantle Port. Fertilizer and sand are handled by Port Bunbury. Vessels carrying motor vehicles call at the Inner Harbour of Fremantle Port. These vessels are run by motor vehicle companies.

Non-containerised trade increased by 0.7 per cent a year in the last five years and is forecast to increase by 1.3 per cent a year over the next twenty years to 26.8 million tonnes in 2024-25 (Figure 4.15 and Table 4.24). Non-containerised exports will rise by 0.9 per cent a year to 13.8 million tonnes in 2024-25, whereas non-containerised imports will rise by 1.7 per cent a year to 12.9 million tonnes in 2024-25.



FIGURE 4.15 NON-CONTAINERISED TRADE, 1993-94 TO 2024-25: FREMANTLE PORT

International non-containerised trade accounts for 76.6 per cent of non-containerised exports and 70.9 per cent of non-containerised imports. It declined by 1.0 per cent a year in the last five years to 15.3 million tonnes in 2004-05. However, it is forecast to increase by 1.3 per cent a year over the next twenty years to 19.8 million tonnes in 2024-25 (Table 4.25).

In 2004-05, non-container ships made a total of 630 visits at Fremantle Port (Table 4.24). The number of visits is expected to increase by 0.3 per cent a year to 667 in 2024-25. With the start of production at the HIsmelt commercial pig iron plant at the Kwinana Bulk Terminal and completion of the channel deepening project, some large vessels, such as Post Panamax vessels, are likely to visit Fremantle Port.

Year	Trade			Average	Ship visits
-				tonnage per	
_	Export	Import	Total	ship	
	('0	00 tonnes)			
1999-00	11 932	8 036	19 968	31 545	633
2000-01	10 727	8 057	18 784	31 891	589
2001-02	9 740	8 754	18 494	31 831	581
2002-03	10 030	8 777	18 806	32 821	573
2003-04	11 487	9 340	20 827	32 541	640
2004-05	11 526	9 184	20 710	32 867	630
2005-06	11 617	9 314	20 932	33 196	631
2006-07	11 744	9 371	21 115	33 527	630
2007-08	11 918	9 614	21 532	33 863	636
2008-09	12 058	9 800	21 858	34 201	639
2009-10	12 162	9 913	22 075	34 543	639
2010-11	12 267	10 077	22 344	34 889	640
2011-12	12 373	10 276	22 649	35 238	643
2012-13	12 480	10 435	22 915	35 590	644
2013-14	12 588	10 598	23 185	35 946	645
2014-15	12 696	10 790	23 486	36 305	647
2015-16	12 806	10 986	23 792	36 668	649
2016-17	12 917	11 185	24 101	37 035	651
2017-18	13 028	11 388	24 416	37 406	653
2018-19	13 141	11 594	24 735	37 780	655
2019-20	13 254	11 804	25 059	38 157	657
2020-21	13 369	12 018	25 387	38 539	659
2021-22	13 484	12 236	25 720	38 924	661
2022-23	13 601	12 458	26 059	39 314	663
2023-24	13 718	12 684	26 402	39 707	665
2024-25	13 837	12 914	26 751	40 104	667
Annual average growth	rate (per cent)				
1994-95 to 1999-00	2.3	1.6	2.0	1.0	1.0
1999-00 to 2004-05	-0.7	2.7	0.7	0.8	-0.1
2004-05 to 2024-25	0.9	1.7	1.3	1.0	0.3

TABLE 4.24 NON-CONTAINERISED SEA TRADE, AVERAGE TONNES PER SHIP AND SHIP VISITS: FREMANTLE PORT

*Numbers in bold are forecasts.

Port capacity

Fremantle Port is also likely to face capacity constraints with the expected high growth in export and import demand over the next twenty years. Fremantle Ports (which manages Fremantle Port) has been undertaking many initiatives to increase the capacity of Fremantle Port. The key initiatives are the deepening of the Inner Harbour channel, the development of additional port facilities at the Outer Harbour and the development of the North Quay rail loop and rail terminal.

Year	Export	Import	Total
		('000 tonnes)	
1999-00	9 881	6 266	16 146
2000-01	8 534	5 184	13 718
2001-02	7 630	6 255	13 885
2002-03	7 423	6 110	13 533
2003-04	8 880	6 694	15 575
2004-05	8 824	6 513	15 337
2005-06	8 893	6 606	15 499
2006-07	8 991	6 646	15 636
2007-08	9 124	6 818	15 941
2008-09	9 230	6 950	16 181
2009-10	9 310	7 030	16 340
2010-11	9 391	7 147	16 537
2011-12	9 472	7 288	16 760
2012-13	9 553	7 401	16 954
2013-14	9 636	7 516	17 152
2014-15	9 719	7 652	17 371
2015-16	9 803	7 791	17 594
2016-17	9 888	7 932	17 820
2017-18	9 973	8 076	18 049
2018-19	10 059	8 222	18 282
2019-20	10 146	8 371	18 518
2020-21	10 234	8 523	18 757
2021-22	10 322	8 678	19 000
2022-23	10 412	8 835	19 247
2023-24	10 502	8 995	19 497
2024-25	10 592	9 158	19 751
Annual average growth rate	e (per cent)		
1994-95 to 1999-00	2.9	0.9	2.1
1999-00 to 2004-05	-2.2	0.8	-1.0
2004-05 to 2024-25	0.9	1.7	1.3

TABLE 4.25 INTERNATIONAL NON-CONTAINERISED SEA TRADE: FREMANTLE PORT

*Numbers in Italic and bold are estimates and forecasts.

The channel deepening project is expected not only to increase the port capacity to handle large volume of containerised trade but it will also avoid large ships bypassing Fremantle Port while on their way to Melbourne. This is the reason why Fremantle Ports is planning to deepen the Inner Harbour channel from 12.2 metres to 14.2 metres before Melbourne Port completes its proposed channel deepening project.

The capacity of Fremantle Port will increase to 1.2 million teus with the completion of the channel deepening project, and to 2.1 million teus with the development of additional port facilities at the Outer Harbour. The Outer Harbour is expected to handle the excess cargo once the capacity of the Inner Harbour is fully utilised. Around \$50 million will be spent on the Inner Harbour channel deepening project and \$600 million on the development of new port facilities at the Outer Harbour.

The development of the North Quay rail loop and rail terminal is expected to increase rail use to move containers to and from the Inner Harbour. Fremantle Ports is aiming to move 30 per cent of its containerised trade by rail in the next ten years, mainly to reduce the present queuing time of trucks and congestion on roads linking to the port.

Presently, private jetties are in operation in the Kwinana area for oil exports and imports. A few new jetties are expected to be constructed to facilitate non-containerised trade.

OTHER PORTS

As mentioned in Chapter 1, other ports include all Australian ports excluding Brisbane, Sydney, Melbourne, Adelaide and Fremantle ports. The main ports included in other ports are located in Cairns, Devonport, Burnie, Launceston, Townsville, Newcastle, Gladstone, Hobart, Rockhampton and Darwin.

Containerised trade and ship visits

The total containerised trade of other ports increased by 7.8 per cent a year in the last five years, from 357 000 teus in 1999-2000 to 521 000 teus in 2004-05. Exports and imports currently account for 47.7 and 52.3 per cent of the total containerised trade respectively. The trade is forecast to increase by 5.3 per cent a year over the next twenty years to 1.5 million teus in 2024-25 (Figure 4.16 and Table 4.26).

Containerised exports, which constitute 74.2 per cent of full containers and 25.8 per cent of empty containers, are forecast to increase by 5.6 per cent a year in the next twenty years to 735 000 teus in 2024-25. Full container exports will increase by 5.3 per cent a year to 521 000 teus in 2024-25, whereas empty container exports will increase by 6.2 per cent to 214 000 teus in 2024-25.

Containerised imports to other ports increased by 10.1 per cent a year in the last five years to 272 000 teus in 2004-05. It is forecast to increase by 5.0 per cent per annum during the forecast period to 723 000 teus in 2024-25. Containerised imports are dominated by full container imports with a share of 73.8 per cent in volume terms. Full and empty container imports will increase respectively by 5.4 and 3.8 per cent a year over the forecast period to 574 000 and 150 000 teus in 2024-25.

International containerised trade accounts for 85.1 per cent of the total containerised trade. It is forecast to increase by 5.3 per cent a year over the next twenty years to 1.3 million teus in 2024-25 (Table 4.27). International containerised exports will increase by 5.6 per cent a year to 641 000 teus in 2024-25 and international containerised

imports by 5.1 per cent a year to 615 000 in 2024-25. The 40-foot containers will account for 53 per cent of the total container trade in 2024-25 (Table 4.28).



FIGURE 4.16 CONTAINERISED TRADE, 1993-94 TO 2024-25: OTHER PORTS

Container ships made around 1 600 visits at other ports in 2004-05 (Table 4.28). Following a strong growth in containerised trade at other ports and relatively small growth in ship size, the number of ship visits is expected to increase by 4.6 per cent over the next twenty years to 3 800 in 2024-25.

Non-containerised trade and ship visits

The bulk of Australia's non-containerised cargo moves through other ports. In 2004-05, about 95.4 per cent of non-containerised exports and 51.9 per cent of the non-containerised imports were moved through other ports. Other ports handled a total of 576.7 million tonnes of non-containerised trade comprising 525.3 million tonnes of exports and 51.3 million tonnes of imports (Figure 4.17 and Table 4.29).

Non-containerised trade increased by 4.6 per cent a year in the last five years and is forecast to increase by 3.9 per cent a year over the forecast period to 1.2 billion tonnes in 2024-25. Non-containerised exports, which account for 91.1 per cent of the total non-containerised trade, are expected to increase by 4.2 per cent a year during the period to nearly 1.2 billion tonnes in 2024-25. On the other hand, non-containerised imports, which increased by 0.5 per cent a year in the last five years, will continue to increase at the same rate to nearly 56.6 million tonnes in 2024-25.

International non-containerised trade accounts for 88.0 per cent of the total noncontainerised trade. It is forecast to increase by 4.0 per cent a year over the forecast period to around 1.1 billion tonnes in 2024-25 (Table 4.30). International noncontainerised exports will increase by 4.2 per cent a year to around 1.1 billion tonnes in 2024-25, whereas international non-containerised imports will increase by 0.3 per cent a year to 25.9 million tonnes in 2024-25.

Year		Exports			Imports		
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	163	26	189	121	48	168	357
2000-01	88	112	200	125	55	179	379
2001-02	252	31	284	138	64	202	486
2002-03	273	45	317	155	74	230	547
2003-04	285	52	337	179	85	264	601
2004-05	184	64	248	201	71	272	521
2005-06	194	66	261	207	75	282	543
2006-07	211	68	279	216	78	294	573
2007-08	225	77	302	238	83	321	623
2008-09	242	83	325	254	87	342	667
2009-10	258	86	344	262	91	353	696
2010-11	273	91	364	276	95	371	735
2011-12	286	98	385	293	98	391	776
2012-13	301	103	404	306	102	407	811
2013-14	318	108	426	322	105	427	853
2014-15	332	115	447	339	109	448	896
2015-16	347	123	470	357	112	470	940
2016-17	363	130	493	376	116	493	986
2017-18	380	138	518	397	120	516	1 035
2018-19	397	147	545	418	124	542	1 086
2019-20	416	157	572	441	128	568	1 140
2020-21	435	167	601	464	132	596	1 197
2021-22	455	177	632	489	136	625	1 257
2022-23	476	189	664	516	140	656	1 321
2023-24	498	201	698	544	145	689	1 388
2024-25	521	214	735	574	150	723	1 458
Annual average growth	h rate (pe	er cent)					
1994-95 to 1999-00	17.1	36.9	19.0	25.2	16.7	22.4	20.5
1999-00 to 2004-05	2.5	19.6	5.6	10.8	8.4	10.1	7.8
2004-05 to 2024-25	5.3	6.2	5.6	5.4	3.8	5.0	5.3

TABLE 4.26 CONTAINERISED EXPORTS AND IMPORTS: OTHER PORTS

*Numbers in bold are forecasts.

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Year		Exports		Imports			Total
_	Full	Empty	Total	Full	Empty	Total	trade
_				('000 teus)			
1999-00	148	25	172	109	38	147	319
2000-01	80	103	183	112	41	153	336
2001-02	227	27	253	123	48	172	425
2002-03	235	38	273	140	49	189	462
2003-04	245	44	290	161	51	212	502
2004-05	160	55	215	181	47	228	443
2005-06	169	57	226	186	50	236	462
2006-07	184	58	242	194	52	246	489
2007-08	197	66	262	214	55	269	531
2008-09	211	71	283	229	58	287	569
2009-10	225	73	299	236	60	296	594
2010-11	238	78	316	248	62	311	627
2011-12	250	84	334	264	65	328	663
2012-13	263	88	351	275	67	342	693
2013-14	278	93	371	290	69	359	730
2014-15	291	99	389	306	71	377	766
2015-16	304	105	409	322	74	396	805
2016-17	318	112	430	339	76	415	845
2017-18	333	119	452	358	78	436	887
2018-19	348	126	475	377	81	458	932
2019-20	364	134	499	397	83	481	979
2020-21	381	143	524	419	86	505	1 029
2021-22	399	152	551	442	89	530	1 082
2022-23	417	162	580	466	91	557	1 137
2023-24	437	173	610	491	94	586	1 195
2024-25	457	184	641	518	97	615	1 257
Annual average growth	n rate (pe	er cent)					
1994-95 to 1999-00	NA	NA	NA	NA	NA	NA	NA
1999-00 to 2004-05	1.7	17.4	4.5	10.6	4.7	9.2	6.8
2004-05 to 2024-25	5.4	6.3	5.6	5.4	3.6	5.1	5.3

TABLE 4.27 INTERNATIONAL CONTAINERISED EXPORTS AND IMPORTS: OTHER PORTS

NA = Not available.

*Numbers in Italic and bold are estimates and forecasts.
Year	Proportion of	f Container numbers		Average teus	Ship	
	40-foot (%)	20-foot	40-foot	Total	per ship	visits
	(per cent)		('000)	<u> </u>		
1999-00	31	188	85	273	NA	NA
2000-01	33	189	95	284	302	1 256
2001-02	33	245	121	365	393	1 237
2002-03	36	256	145	402	432	1 267
2003-04	39	267	167	434	453	1 327
2004-05	41	220	151	370	334	1 557
2005-06	41	226	158	384	337	1 608
2006-07	42	236	169	405	340	1 687
2007-08	42	253	185	438	341	1 824
2008-09	43	268	200	467	344	1 939
2009-10	43	276	210	486	347	2 006
2010-11	44	287	224	511	350	2 102
2011-12	44	299	239	537	352	2 205
2012-13	45	308	252	560	355	2 289
2013-14	46	319	267	586	357	2 392
2014-15	46	330	283	613	359	2 495
2015-16	47	341	299	640	361	2 601
2016-17	47	352	317	669	364	2 712
2017-18	48	364	335	699	366	2 829
2018-19	49	376	355	731	368	2 951
2019-20	49	388	376	764	370	3 080
2020-21	50	401	398	799	373	3 214
2021-22	51	413	422	835	375	3 356
2022-23	51	426	447	874	377	3 504
2023-24	52	440	474	914	379	3 659
2024-25	53	453	502	956	381	3 823
Annual average growth	rate (per cent)					
1994-95 to 1999-00	NA	NA	NA	NA	NA	NA
1999-00 to 2004-05	5.6	3.1	12.2	6.3	NA	NA
2004-05 to 2024-25	1.3	3.7	6.2	4.9	0.7	4.6

TABLE 4.28 PROPORTION OF 40-FOOT CONTAINERS, CONTAINER NUMBERS, AVERAGE TEUS PER SHIP AND CONTAINER SHIP VISITS: OTHER PORTS

NA = Not available.

*Numbers in bold are forecasts.

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FIGURE 4.17 NON-CONTAINERISED TRADE, 1993-94 TO 2024-25: OTHER PORTS

Around 14 400 visits were made by non-containerised ships at other ports in 2004-05 (Table 4.29). With an expected strong growth in non-containerised exports and a relatively small growth in non-container ship size, the number of non-containerised ship visits to other ports is forecast to increased by 3.3 per cent a year over the forecast period to around 27 300 visits in 2024-25.

ALL PORTS

Containerised trade and ship visits

Australia's total containerised trade increased by 8.0 per cent in the last five years and is forecast to increase by 5.4 per cent a year over the next twenty years, from 5.2 million teus in 2004-05 to 14.9 million teus in 2024-25 (Figure 4.18 and Table 4.31). The low growth rate forecast is the result of expected slowdown in economic growth in Australia and the depreciation of the Australian dollar against the US dollar. Real GNE in Australia which grew by 4.2 per cent a year in the last five years is expected to increase by only 2.7 per cent a year over the next twenty years. Similarly, the value of the Australian dollar is forecast to decline from US 74 cents in 2004-05 to US 59 cents in 2024-25.

Exports and imports account for 49.4 and 50.6 per cent of total containerised trade respectively. Containerised exports are forecast to increase by 5.7 per cent a year over the next twenty years to 7.7 million teus in 2024-25, whereas containerised imports are expected to increase by 5.2 per cent a year to 7.2 million teus in 2024-25.

Year		Trade	Average	Ship visits	
-				tonnes per	
	Export	Import	Total	ship	
		(mi	llion tonnes)		
1999-00	411	50	461		
2000-01	428	46	474	33 506	14 159
2001-02	439	46	485	33 956	14 282
2002-03	462	47	508	35 880	14 172
2003-04	468	48	516	36 388	14 176
2004-05	525	51	577	40 165	14 358
2005-06	552	53	605	39 529	15 304
2006-07	582	54	636	39 497	16 090
2007-08	619	55	674	39 857	16 911
2008-09	661	56	717	40 006	17 919
2009-10	697	56	753	40 042	18 814
2010-11	731	56	787	40 287	19 528
2011-12	763	56	819	40 624	20 160
2012-13	792	56	849	40 903	20 750
2013-14	820	56	877	41 245	21 262
2014-15	849	57	906	41 621	21 760
2015-16	878	57	935	42 006	22 266
2016-17	909	57	966	42 397	22 782
2017-18	940	57	997	42 793	23 309
2018-19	973	57	1,030	43 195	23 848
2019-20	1 007	57	1 064	43 604	24 397
2020-21	1 042	57	1 099	44 018	24 959
2021-22	1 078	57	1 135	44 437	25 532
2022-23	1 115	57	1 172	44 863	26 118
2023-24	1 153	57	1 210	45 295	26 716
2024-25	1 193	57	1 250	45 732	27 327
Annual average growth	rate (per cent)				
1994-95 to 1999-00	4.4	2.8	4.2	NA	NA
1999-00 to 2004-05	5.0	0.5	4.6	NA	NA
2004-05 to 2024-25	4.2	0.5	3.9	0.7	3.3

TABLE 4.29NON-CONTAINERISED SEA TRADE, AVERAGE TONNES PER SHIP AND
SHIP VISITS: OTHER PORTS

NA = Not available.

*Numbers in bold are forecasts.

Full container exports account for 63.6 per cent of the total containerised exports and they will increase by 5.3 per cent a year over the next twenty years to 4.6 million teus in 2024-25. Empty container exports will increase by 6.2 per cent a year to 3.1 million teus in 2024-25.

Year	Export	Import	Total
	(n	nillion tonnes)	
1999-00	NA	NA	NA
2000-01	NA	NA	NA
2001-02	NA	NA	NA
2002-03	425	23	449
2003-04	431	23	453
2004-05	483	25	508
2005-06	508	25	533
2006-07	535	26	560
2007-08	568	26	595
2008-09	607	27	634
2009-10	640	27	667
2010-11	671	27	697
2011-12	700	27	726
2012-13	727	27	754
2013-14	753	27	779
2014-15	779	27	805
2015-16	806	27	832
2016-17	833	27	860
2017-18	862	27	889
2018-19	892	27	918
2019-20	923	26	949
2020-21	954	26	981
2021-22	987	26	1,014
2022-23	1 021	26	1 047
2023-24	1 056	26	1 082
2024-25	1 093	26	1 119
Annual average growth rate	(per cent)		
1994-95 to 1999-00	NA	NA	NA
1999-00 to 2004-05	NA	NA	NA
2004-05 to 2024-25	4.2	0.3	4.0

TABLE 4.30 INTERNATIONAL NON-CONTAINERISED SEA TRADE: OTHER PORTS

NA = Not available.

*Numbers in Italic and bold are estimates and forecasts.

Full container imports dominate total containerised imports in Australia, accounting for 87.3 per cent of total containerised imports. Full and empty container imports are forecast to increase respectively by 5.4 and 3.8 per cent a year over the forecast period to 6.5 and 0.7 million teus in 2024-25.

International containerised trade accounts for 86.7 per cent of Australia's total containerised trade. About half of the total international containerised trade was exports and the remainder imports (Table 4.32). International containerised trade is expected to increase by 5.5 per cent a year over the next twenty years to 13.1 million teus in 2024-

25. International containerised exports and imports will increase respectively by 5.7 and 5.3 per cent a year to 6.7 and 6.3 million teus in 2024-25.



FIGURE 4.18 CONTAINERISED TRADE, 1993-94 TO 2024-25: ALL PORTS

The proportion of 40-foot containers in total container numbers will rise from 41 per cent in 2004-05 to 53 per cent in 2024-25 (Table 4.33).

Around 5 300 visits were made by container ships at all Australian ports in 2004-05 (Table 4.33). Following strong growth in containerised trade and relatively small growth in ship size, the number of container ship visits is expected to increase by 4.6 per cent a year over the next twenty years to around 13 100 in 2024-25.

Non-containerised trade and ship visits

Australia's non-containerised trade stood at 649.6 million tonnes in 2004-05 (Figure 4.19 and Table 4.34). It is dominated by exports which account for 84.8 per cent of the total non-containerised trade volume. It includes 550.6 million tonnes of exports and 99.0 million tonnes of imports. The trade increased by 4.3 per cent a year in the last five years and is forecast to increase by 3.8 per cent a year over the next twenty years to 1.4 billion tonnes in 2024-25.

Non-containerised exports, which increased by 4.8 per cent a year in the last five years, are expected to increase by 4.1 per cent a year in the next twenty years to nearly 1.2 billion tonnes in 2024-25. Non-containerised imports, which increased by 1.8 per cent a year during the last five years, will increase by 1.7 per cent a year to 138.8 million tonnes in 2024-25.

Year		Exports			Imports		Total
	Full	Empty	Total	Full	Empty	Total	trade
				('000 teus)			
1999-00	1 306	410	1 716	1 532	265	1 797	3 513
2000-01	1 302	495	1 797	1 520	318	1 837	3 635
2001-02	1 526	438	1 964	1 620	344	1 964	3 928
2002-03	1 554	693	2 247	1 889	320	2 209	4 456
2003-04	1 633	789	2 422	2 107	330	2 437	4 859
2004-05	1 625	930	2 555	2 284	332	2 616	5 171
2005-06	1 714	964	2 678	2 356	346	2 702	5 380
2006-07	1 859	994	2 853	2 452	364	2 816	5 669
2007-08	1 988	1 114	3 102	2 701	385	3 086	6 188
2008-09	2 136	1 209	3 345	2 889	406	3 295	6 640
2009-10	2 273	1 248	3 521	2 974	422	3 396	6 917
2010-11	2 407	1 328	3 734	3 135	440	3 575	7 309
2011-12	2 526	1 429	3 956	3 327	457	3 784	7 740
2012-13	2 656	1 495	4 151	3 472	473	3 945	8 096
2013-14	2 802	1 575	4 376	3 657	490	4 147	8 523
2014-15	2 931	1 675	4 606	3 853	506	4 359	8 965
2015-16	3 065	1 780	4 845	4 059	522	4 581	9 426
2016-17	3 205	1 892	5 097	4 277	539	4 816	9 913
2017-18	3 352	2 011	5 363	4 506	556	5 063	10 426
2018-19	3 506	2 138	5 644	4 749	574	5 323	10 967
2019-20	3 667	2 274	5 941	5 005	593	5 598	11 539
2020-21	3 836	2 419	6 255	5 276	612	5 887	12 142
2021-22	4 013	2 574	6 587	5 561	632	6 193	12 780
2022-23	4 198	2 740	6 937	5 863	652	6 515	13 453
2023-24	4 391	2 917	7 308	6 182	673	6 855	14 163
2024-25	4 594	3 107	7 701	6 519	695	7 214	14 915
Annual average grow	vth rate (pe	er cent)					
1994-95 to 1999-00	11.1	12.5	11.4	12.8	10.4	12.5	12.0
1999-00 to 2004-05	4.5	17.8	8.3	8.3	4.6	7.8	8.0
2004-05 to 2024-25	5.3	6.2	5.7	5.4	3.8	5.2	5.4

TABLE 4.31 CONTAINERISED EXPORTS AND IMPORTS: ALL PORTS

*Numbers in bold are forecasts.

International non-containerised trade accounts for 85.5 per cent of the total noncontainerised trade and is forecast to increase by 3.9 per cent a year over the forecast period to around 1.2 billion tonnes in 2024-25 (Table 4.35). International noncontainerised exports will increase by 4.1 per cent a year to around 1.1 billion tonnes in 2024-25, whereas international non-containerised imports will increase by 1.7 per cent a year to 75.1 million tonnes in 2024-25.

Year		Exports			Imports		Total
-	Full	Empty	Total	Full	Empty	Total	trade
-				('000 teus)			
1999-00	1 184	384	1 568	1 390	209	1 599	3 166
2000-01	1 181	457	1 638	1 364	240	1 604	3 242
2001-02	1 370	373	1 744	1 453	257	1 710	3 454
2002-03	1 339	590	1 930	1 699	212	1 911	3 841
2003-04	1 404	672	2 076	1 896	198	2 094	4 170
2004-05	1 415	794	2 209	2 054	221	2 274	4 484
2005-06	1 494	823	2 317	2 119	230	2 349	4 666
2006-07	1 623	849	2 473	2 206	242	2 447	4 920
2007-08	1 737	951	2 688	2 430	255	2 685	5 373
2008-09	1 866	1 032	2 898	2 600	268	2 868	5 766
2009-10	1 987	1 065	3 052	2 677	279	2 955	6 007
2010-11	2 104	1 133	3 237	2 823	289	3 112	6 349
2011-12	2 209	1 220	3 429	2 996	301	3 296	6 725
2012-13	2 323	1 277	3 600	3 127	311	3 438	7 038
2013-14	2 453	1 346	3 798	3 295	321	3 616	7 415
2014-15	2 566	1 432	3 998	3 472	332	3 803	7 802
2015-16	2 684	1 523	4 207	3 658	342	4 000	8 208
2016-17	2 808	1 620	4 428	3 855	353	4 208	8 636
2017-18	2 937	1 723	4 661	4 063	364	4 427	9 088
2018-19	3 073	1 834	4 907	4 283	375	4 658	9 565
2019-20	3 215	1 952	5 167	4 515	387	4 902	10 069
2020-21	3 364	2 078	5 442	4 761	399	5 159	10 601
2021-22	3 519	2 213	5 733	5 020	411	5 431	11 164
2022-23	3 683	2 358	6 040	5 293	424	5 718	11 758
2023-24	3 853	2 513	6 366	5 583	437	6 020	12 386
2024-25	4 032	2 678	6 711	5 889	451	6 340	13 051
Annual average grow	th rate (pe	er cent)					
1994-95 to 1999-00	15.2	14.8	15.1	15.7	16.3	15.8	15.4
1999-00 to 2004-05	3.6	15.6	7.1	8.1	1.1	7.3	7.2
2004-05 to 2024-25	5.4	6.3	5.7	5.4	3.6	5.3	5.5

*Numbers in Italic and bold are estimates and forecasts.

Non-containerised ships made around 21 200 visits at all Australian ports in 2004-05 (Table 4.34). Following an expected strong growth in non-containerised exports and a relatively small growth in non-container ship size, the number of non-containerised ship visits is forecast to increase by 2.8 per cent a year in the next twenty years to over 36 400 visits in 2024-25.

Year	Proportion of	of Container numbers			Average teus	Ship
	40-foot (%)	20-foot	40-foot	Total	per ship	visits
	(per cent)		('000)			
1999-00	31	1 850	831	2 682	NA	NA
2000-01	33	1 815	910	2 725	735	4948
2001-02	33	1 978	975	2 953	794	4950
2002-03	36	2 087	1 184	3 272	891	5003
2003-04	39	2 157	1 351	3 508	983	4941
2004-05	41	2 181	1 495	3 676	979	5281
2005-06	41	2 242	1 569	3 811	987	5453
2006-07	42	2 333	1 668	4 001	992	5715
2007-08	42	2 514	1 837	4 351	1 000	6187
2008-09	43	2 663	1 989	4 652	1 009	6582
2009-10	43	2 739	2 089	4 828	1 017	6804
2010-11	44	2 855	2 227	5 082	1 025	7131
2011-12	44	2 981	2 379	5 360	1 034	7489
2012-13	45	3 074	2 511	5 585	1 042	7773
2013-14	46	3 190	2 667	5 857	1 049	8126
2014-15	46	3 305	2 830	6 135	1 057	8479
2015-16	47	3 422	3 002	6 424	1 066	8845
2016-17	47	3 543	3 185	6 728	1 074	9230
2017-18	48	3 667	3 379	7 047	1 082	9632
2018-19	49	3 795	3 586	7 381	1 091	10 055
2019-20	49	3 927	3 806	7 733	1 099	10 498
2020-21	50	4 062	4 040	8 102	1 108	10 963
2021-22	51	4 200	4 290	8 490	1 116	11 451
2022-23	51	4 343	4 555	8 898	1 124	11 964
2023-24	52	4 489	4 837	9 326	1 133	12 502
2024-25	53	4 638	5 138	9 776	1 141	13 067
Annual average growth	rate (per cent)					
1994-95 to 1999-00	NA	NA	NA	NA	NA	NA
1999-00 to 2004-05	5.6	3.3	12.5	6.5	NA	NA
2004-05 to 2024-25	1.3	3.8	6.4	5.0	0.8	4.6

TABLE 4.33 PROPORTION OF 40-FOOT CONTAINERS, CONTAINER NUMBERS, AVERAGE TEUS PER SHIP AND CONTAINER SHIP VISITS: ALL PORTS

NA = Not available.

*Numbers in bold are forecasts.



FIGURE 4.19 NON-CONTAINERISED TRADE, 1993-94 TO 2024-25: ALL PORTS

OTHER SHIPS

As mentioned in an earlier chapter of this study, forecasts of other ship visits are developed using average growth from the previous normal years (1998-99 to 2001-02) and are presented in Table 4.36. This forecasting technique is used because of the difficulty in identifying different types of ships in the group of other ships, and in finding appropriate explanatory variables to explain the variation in other ship visits. The number of other ship visits is forecast to increase by 1.8 per cent a year in the next twenty years, from nearly 2 800 in 2004-05 to nearly 4 000 in 2024-25.

Year	Trade			Average	Ship visits
	_			tonnes per	
_	Export	Import	Total	ship	
	(mil	lion tonnes)			
1999-00	436	91	527	NA	NA
2000-01	454	87	540	26 741	20 200
2001-02	464	87	551	27 149	20 294
2002-03	485	90	575	28 267	20 345
2003-04	492	95	587	28 401	20 679
2004-05	551	99	650	30 699	21 159
2005-06	578	101	679	31 006	21 887
2006-07	608	102	710	31 316	22 680
2007-08	645	106	752	31 630	23 770
2008-09	688	109	797	31 946	24 948
2009-10	725	109	834	32 265	25 863
2010-11	759	111	870	32 588	26 687
2011-12	791	113	904	32 914	27 467
2012-13	821	114	935	33 243	28 137
2013-14	849	116	965	33 575	28 755
2014-15	878	118	996	33 911	29 375
2015-16	908	120	1 028	34 250	30 010
2016-17	939	122	1 061	34 593	30 659
2017-18	971	124	1 094	34 939	31 323
2018-19	1 003	126	1 129	35 288	32 003
2019-20	1 037	128	1 165	35 641	32 698
2020-21	1 073	130	1 203	35 997	33 409
2021-22	1 109	132	1 241	36 357	34 137
2022-23	1 147	134	1 281	36 721	34 882
2023-24	1 185	137	1 322	37 088	35 643
2024-25	1 226	139	1 364	37 459	36 423
Annual average growth	rate (per cent)				
1994-95 to 1999-00	4.3	3.7	4.2	NA	NA
1999-00 to 2004-05	4.8	1.8	4.3	NA	NA
2004-05 to 2024-25	4.1	1.7	3.8	1.0	2.8

TABLE 4.34 NON-CONTAINERISED SEA TRADE, AVERAGE TONNES PER SHIP AND SHIP VISITS: ALL PORTS

NA = Not available.

*Numbers in bold are forecasts.

Year	Export	Import	Total
	(m	illion tonnes)	
1999-00	NA	NA	NA
2000-01	NA	NA	NA
2001-02	NA	NA	NA
2002-03	442	49	491
2003-04	449	51	500
2004-05	502	54	555
2005-06	526	55	581
2006-07	554	55	609
2007-08	588	58	646
2008-09	627	59	686
2009-10	661	59	720
2010-11	691	60	751
2011-12	720	61	782
2012-13	748	62	810
2013-14	774	63	837
2014-15	800	64	864
2015-16	827	65	892
2016-17	855	66	921
2017-18	884	67	951
2018-19	914	68	982
2019-20	945	69	1,014
2020-21	977	70	1 047
2021-22	1 010	72	1 082
2022-23	1 044	73	1 117
2023-24	1 080	74	1 154
2024-25	1 116	75	1 192
Annual average growth rate	(per cent)		
1994-95 to 1999-00	NA	NA	NA
1999-00 to 2004-05	NA	NA	NA
2004-05 to 2024-25	4.1	1.7	3.9

TABLE 4.35 INTERNATIONAL NON-CONTAINERISED SEA TRADE: ALL PORTS

NA = Not available.

*Numbers in Italic and bold are estimates and forecasts.

Year	Ship visits		
1999-00	1 361		
2000-01	1 332		
2001-02	1 393		
2002-03	2 093		
2003-04	2 764		
2004-05	2 813		
2005-06	2 862		
2006-07	2 912		
2007-08	2 964		
2008-09	3 016		
2009-10	3 069		
2010-11	3 123		
2011-12	3 178		
2012-13	3 234		
2013-14	3 291		
2014-15	3 348		
2015-16	3 407		
2016-17	3 467		
2017-18	3 528		
2018-19	3 590		
2019-20	3 654		
2020-21	3 718		
2021-22	3 783		
2022-23	3 850		
2023-24	3 917		
2024-25	3 986		
Annual average growth rate (per cent)			
1994-95 to 1999-00	NA		
1999-00 to 2004-05	15.6		
2004-05 to 2024-25	1.8		

TABLE 4.36 NUMBER OF OTHER SHIP VISITS: ALL PORTS

NA = Not available.

*Numbers in bold are forecasts.

CHAPTER 5 FORECASTS OF CRUISE PASSENGER AND SHIP MOVEMENTS

INTRODUCTION

The cruising industry globally has maintained a moderate level of growth over the past few years and this growth is expected to continue. Within this environment, Australia is well placed to take advantage of this growth and to increase its market share.

Australia's international cruise shipping market grew strongly until 2000-01 (Figure 5.1), and then it declined sharply in 2001-02 and 2002-03, largely as a result of the September 11 terrorist attacks in the USA and the Severe Acute Respiratory Syndrome (SARS) epidemic in Asia. Although several cruise ships moved their operation to Australia to avoid the SARS epidemic in Asia, it was not enough to offset the total adverse impact of the September 11 terrorist attacks and the SARS epidemic on the number of international cruise passengers.



FIGURE 5.1 INBOUND AND OUTBOUND SEA PASSENGER NUMBERS

The total (both inbound and outbound) number of international sea passengers increased by an average annual rate of 17.9 per cent a year during 1993-94 to 2000-01 and then declined by 32.5 per cent in 2001-02 and 36.7 per cent in 2002-03. The declining trend

ended in 2003-04 with an increase of 15.9 per cent in total international sea passenger numbers following 72.7 per cent increase in the number of outbound sea passengers.

The purpose of this chapter is to analyse and forecast the short-term movement of sea passengers and cruise ships over the next twenty years. Its main focus will be the number of overseas sea passengers coming to Australia for a short-term visit and the number of Australian sea passengers going overseas for a short-term visit. However, an attempt has been made to forecast the number of both international and domestic cruise passenger visits and ship visits in Australia.

THE GLOBAL CRUISE SHIPPING INDUSTRY

The global industry

The global cruise shipping industry is dominated by three major players, also known as the 'Big Three'. They are 'Carnival Corporation & Plc', 'Royal Caribbean International', both from the USA, and 'Star Cruises Group' from Malaysia. The global fleet consists of 278 active ships with a total Lower Berth (LB) passenger capacity of 273 226. The 'Big Three' collectively operate 116 ships under 19 brands with a total LB passenger capacity of 198 063. This represents 42 per cent of the global fleet and 73 per cent of the global passenger capacity (DVB 2004).

'Carnival Corporation and Plc' was created in 2003 by a merger of 'Carnival Corporation' and 'P&O Princess Plc Cruises'. Carnival is now the world's leading cruise operator and by 2008 it is expected that it will have a capacity of 149 933 LB (DVB 2004). It is also estimated that this will be twice the size of 'Royal Caribbean' and almost five times bigger than the 'Star Cruises Group'.

The domination of the 'Big Three' allows for greater investment in larger ships that produce greater economies of scale, which in turn, is likely to produce continued domination. The majority of the new building orders are being placed by the 'Big Three', and as at November 2003 there were 28 new ships on order.

The domination of the 'Big Three' is possible because regulatory authorities in the USA and Europe view the cruise industry not as an individual segment but rather as part of the global leisure and tourism industry. Ships are marketed as alternatives to land-based resorts and offer a range of services and facilities that categorise them as floating hotels rather than cruise ships. The cruise ship generates its own demand and is deployed primarily according to the market it can satisfy.

The global cruise industry carried approximately 10.4 million passengers in the year 2002. Over the past two decades the industry has achieved a global annual growth rate of 8.0 per cent, and during the 1990s the industry almost tripled in size (TQ and DSD 2001). Australia's potential share of this global market has been identified as a major growth area.

Cruising types

The cruising product comes in many different forms. Cruising includes ship movements of a local, interstate, intra-region (eg the Caribbean, Asia-Pacific etc) and inter-region (world). The 'cruise' can be divided into three basic types: the local cruise, the flycruise – where passengers fly to a base port and join a ship for a discrete segment(s) of a larger journey, and the world cruise – where the ship substantially circumnavigates the globe. The cruise ship itself is marketed as an alternative to a land-based resort and this is the way to approach thinking about the industry. The product is a combination of destination (itinerary) and the cruise ship itself and is segmented in socio-economic terms.

Cruise ship passenger profile

Of the global cruise market measured by passengers, 69.7 per cent (about 6.9 million) are from North America (DVB 2004). Western Europe comprises 21.5 per cent (about 2.1 million) and Asia comprises 4.0 per cent (about 400 000). The remaining 4.8 per cent is made up of the rest of the world. In the absence of accurate data relating to the demographics of passengers coming to Australia, it can be assumed that these percentages will make up the average cruise ship coming to Australia. In addition, given that approximately 70 per cent of the global market is from the USA, data relating to the demographics of the US cruise ship passengers will serve as a substitute for those passengers arriving in Australia.

A breakdown of the US cruise passenger demographics as at 2002 (DVB 2004) is presented in Figure 5.2. High, medium and low income passengers accounted for 55, 30 and 15 per cent of the total US passenger numbers respectively. Among the total passengers, 28 per cent were of age between 25 and 40 years, 42 per cent were of age between 40 and 59 years and 30 per cent were at and above 60 years of age.

Over the ten year period from 1992 to 2002:

- Passenger numbers in the US\$20 000 US\$39 000 income bracket have fallen by 12.7 per cent
- Passenger numbers in the US\$40 000 US\$59 000 income bracket have risen by 0.2 per cent
- Passenger numbers in the US\$60 000 and above income bracket have risen by 7.9 per cent.



FIGURE 5.2 PASSENGER SHARES BY INCOME LEVEL AND AGE, 2002

Over the ten year period from 1992 to 2002:

- Passenger numbers in the 25 40 years of age bracket have fluctuated, but remained relatively consistent
- Passenger numbers in the 40 59 years of age bracket have increased by 7.8 per cent
- Passenger numbers in the 60 years and over of age bracket have decreased by 3.3 per cent.

CRUISE SHIPPING IN AUSTRALIA

Cruise ships visiting Australia

Australia's potential market share was defined in 2001 as consisting of 69 cruise ships, which was approximately 25.0 per cent of the global fleet, and consists of ships whose itineraries include world cruises, South Pacific cruises, and those lines which have previously been to Australia. These ships came from 36 different cruise companies and provided a passenger capacity of 49 000. Over the period 1991-2002, Australia attracted 67.0 per cent of its defined market, which leaves significant room for growth (DOI 2003).

Australia attracts relatively few ships owing to a low awareness of Australia on the global scale and the tyranny of distance. Also, the large, and largely untapped Asian market, the closest market to Australia, is primarily geared to short cruises.

The majority of cruise ships coming to Australia are headed towards New South Wales and Queensland at around 30.0 per cent each, Victoria and Tasmania attract a little over

10.0 per cent each and the Northern Territory, Western Australia and South Australia accounting for the remaining visits (TQ and DSD 2001). Each State has attracted roughly the same percentage of the total number of visits over the period 1998 to 2001. This is mainly due to a combination of factors including infrastructure, marketing, global awareness and geography, in terms of both location and what each State has to offer. Queensland and Victoria have undertaken to nurture and grow their cruise shipping industry by exercising greater awareness of the global industry and investment in infrastructure.

Industry growth in Australia

Australia has been identified as underperforming its potential market share of the global cruising industry. As well as this, innovation is seen as the key driving force in the industry globally, and so we see cruise products are now being marketed towards a broader section of the population. Children are being catered for, so families can enjoy a cruise together, with the expectation that the children whose parents take them on a cruise today, will be the young adult cruisers of tomorrow, and will then in turn take their families on a cruise in the future. However, the increasingly ageing population, with an increasingly disposable income, is considered the greatest potential market for the cruise shipping industry.

There are three main areas of growth for cruise shipping industry in Australia:

- 1. An increase in the number of ships that are being attracted to Australia
- 2. An increase in the number of base ports in Australia (these are ports that signify the beginning or end of a cruise, which means Australia is targeted specifically as a cruise destination in its own right - which it currently isn't - and more importantly, individual ports are targeted as destinations in their own right)
- 3. An increase in the number of transit ports within Australia.

The first is largely a matter of marketing. The other two are matters of infrastructure and inter-agency cooperation. However, the largest factor in growth still remains word-of-mouth publicity.

Growth in this industry requires well developed infrastructure and strong linkages between transport modes.

Infrastructure

- a. *Dedicated cruise berths:* While a dedicated cruise berth is not essential it is important for ports to be able to guarantee a berth to a cruise ship prior to the publication of their sales brochures, which can be up to two years in advance.
- b. Base porting and base port facilities: A base port usually signifies the beginning or end of a cruise. A base port therefore requires dedicated

passenger terminal facilities and proximity to an airport. An increase in facilities would allow a port to become a base port, which allows for greater potential for the port in terms of its recognition as a destination and greater passenger number throughput, and therefore greater revenue.

Industry Links

- a. *International and domestic airline links:* Air links have been identified as a major strategic asset for the cruising industry. International airports link Australia's base ports with the major international cruise markets. Domestic airports link the cruise with additional land-based tourist opportunities.
- b. *Land-based tour operators:* Land-based tour operators provide an enhancement of the cruise, or provide opportunities for separate touring independent of the cruise itself, as do domestic cruise companies.
- c. *Tourism information providers:* Follow up activities are the major attraction for people taking a cruise, and the greater the provision of information at the port, the greater the desirability of the port as a destination.

Market promotion and economic significance

Australia is not currently recognised as a cruise destination in its own right, being regarded by cruise destination planners as part of the Asia-Pacific region. Greater awareness of Australia on the global scene and greater representation by Australian companies overseas increase passenger numbers. This is borne out by the fact that Sydney is generally the most popular cruise destination, even though Queensland has a better geographical situation for cruise ships and the Great Barrier Reef. This is because of Sydney's high profile in the global market.

Queensland, New South Wales and Victoria have identified cruise shipping as a major economic benefit and as a huge untapped potential. All three State governments are working on individual initiatives to develop cruise shipping within their respective State. They are taking an integrated approach to initiate changes, improvements and developments in infrastructure, marketing and land-based tourism products to complement the cruise shipping industry. With this environment in mind, the concentration of cruise ship visits in the future should not vary significantly from the historical data.

FORECASTS OF SEA PASSENGER AND CRUISE SHIP VISITS

In the last three years, the number of inbound cruise ship passengers was adversely influenced by non-economic factors such as terrorism, SARS and ship size (capacity). The threat of terrorism, the September 11 terrorist attacks and SARS had an adverse impact on the global cruising industry. The number of passengers willing to fly to join a cruise decreased, and the number of US passengers willing to take a holiday outside of the USA also fell. The outbreak of SARS caused a decrease in the number of cruises being undertaken by the Asian market.

Similarly, ship capacity on Australian routes has been acting as a constraint to the growth of Australia's cruise shipping industry.

The outlook for the industry suggests a positive growth in the number of inbound and outbound sea passengers. The positive outlook is largely a result of expected high economic growth in the USA, the construction of new ships with increased passenger capacity and the vaporising of the adverse effects of the September 11 terrorist attacks and SARS on cruise shipping.

The number of inbound sea passengers increased by 15.3 per cent a year during 1994-95 to 1999-2000 and then it declined by 9.9 per cent a year during 1999-2000 to 2004-05. It is forecast to increase by 3.1 per cent a year over the next twenty years, from 14 900 in 2004-05 to 27 000 in 2024-25 (Table 5.1). A relatively stronger growth in sea passenger numbers is expected in the first half than in the second half of the forecast period. This is largely due to relatively strong economic growth in the USA in the first half than in the second half of the forecast period.

Like inbound sea passenger numbers, outbound sea passenger numbers increased by 21.2 per cent a year during 1994-95 to 1999-2000, but then it declined by 8.4 per cent a year in the last five years to 8 300 in 2004-05. It is expected to increase by 4.9 per cent a year over the forecast period to 20 600 in 2024-25.

The number presented in Table 5.1 represents a single entry and exit of inbound sea passengers while arriving and departing Australia. However, an inbound passenger may have more than one entry and exit while cruising different destinations around Australia, as they have to clear Customs at each destination. In this study, this multi entry and exit of inbound and outbound sea passengers is referred as international visits. Forecasts of cruise passenger numbers and ship visits are developed on the basis of international visit data obtained from the Australian Customs Service and total visit data obtained from the publications of Downunder Cruise.

Growth rate forecasts of international sea passenger numbers are used to forecast the number of international sea passenger visits. Since 54.1 per cent of total sea passenger visits are international passenger visits, the forecasts of total passenger visits are derived using the growth rate of international passenger visits. The forecasts are presented in Figure 5.3 and Table 5.2. The total number of passenger visits is forecast to increase by 3.8 per cent over the next twenty years to 795 000 visits in 2024-25.

The total number of passenger visits and the average number of passengers per ship visit are further used to forecast the number of ship visits. On average, 480 passengers were carried per ship visit in 2004-05. This number is forecast to increase by 1.0 per cent a year to 586 in 2024-25. As a result, the number of cruise ship visits is expected to increase by 2.8 per cent a year over the forecast period, from 780 in 2004-05 to around 1 400 in 2024-25 (Table 5.2).

Year	Passengers				
	Inbound	Outbound	Total		
		('000)			
1999-00	25.1	12.9	38.0		
2000-01	29.6	15.8	45.4		
2001-02	23.6	7.1	30.6		
2002-03	15.0	4.4	19.4		
2003-04	14.9	7.6	22.4		
2004-05	14.9	8.3	23.3		
2005-06	15.6	8.6	24.3		
2006-07	17.4	8.4	25.8		
2007-08	17.9	8.9	26.8		
2008-09	18.6	9.3	28.0		
2009-10	19.6	9.6	29.2		
2010-11	20.4	10.1	30.4		
2011-12	20.8	10.7	31.5		
2012-13	21.5	11.1	32.7		
2013-14	22.3	11.6	33.9		
2014-15	22.7	12.3	35.0		
2015-16	23.1	13.0	36.2		
2016-17	23.6	13.8	37.4		
2017-18	24.0	14.6	38.6		
2018-19	24.5	15.5	40.0		
2019-20	25.0	16.4	41.4		
2020-21	25.5	17.3	42.8		
2021-22	26.0	18.4	44.3		
2022-23	26.5	19.5	45.9		
2023-24	27.0	20.6	47.6		
2024-25	27.5	21.8	49.3		
Annual average growth rate ((per cent)				
1994-95 to 1999-00	15.3	21.2	17.1		
1999-00 to 2004-05	-9.9	-8.4	-9.4		
2004-05 to 2024-25	3.1	4.9	3.8		

TABLE 5.1 SHORT-TERM INTERNATIONAL SEA PASSENGERS: ALL PORTS

*Numbers in Italic and bold are estimates and forecasts.

Chapter 5



FIGURE 5.3 SHORT-TERM SEA PASSENGER VISITS, 1993-94 TO 2024-25: ALL PORTS

Year	Passenger visits			Average	
	_	L		pax per	Ship
	International ^a	Domestic [⊳]	Total ^c	ship visit	visits
		('000)			
1999-00d	NA	NA	NA	NA	801
2000-01d	153	112	264	356	742
2001-02d	148	142	290	393	739
2002-03d	178	152	330	422	782
2003-04d	195	166	362	476	760
2004-05	203	172	375	480	780
2005-06	211	180	391	485	805
2006-07	225	191	416	490	848
2007-08	233	198	431	495	872
2008-09	243	207	450	500	900
2009-10	255	216	471	505	933
2010-11	265	225	490	510	960
2011-12	274	233	507	515	983
2012-13	284	242	526	520	1 011
2013-14	295	251	545	525	1 038
2014-15	305	259	563	531	1 062
2015-16	315	268	582	536	1 086
2016-17	325	277	602	541	1 112
2017-18	336	286	622	547	1 138
2018-19	348	296	644	552	1 166
2019-20	360	306	666	558	1 194
2020-21	373	317	690	563	1 224
2021-22	386	328	714	569	1 255
2022-23	400	340	740	575	1 287
2023-24	414	352	767	580	1 321
2024-25	430	365	795	586	1 356
Annual average grow	th rate (per cent)				
1994-95 to 1999-00	NA	NA	NA	NA	NA
1999-00 to 2004-05	NA	NA	NA	NA	-0.5
2004-05 to 2024-25	3.8	3.8	3.8	1.0	2.8

TABLE 5.2SHORT-TERM INTERNATIONAL AND DOMESTIC SEA PASSENGER VISITS
AND SHIP VISITS: ALL PORTS

a. Persons clearing Customs (inbound and outbound) at ports.

b. Total cruise passengers minus international cruise passengers.

c. It is obtained from Downunder Cruise publications and includes domestic and international.

d. The data were derived on the basis of calendar year data by taking average of two calendar year data.

NA = Not available.

*Numbers in Italic and bold are estimates and forecasts.

APPENDIX I ESTIMATED REGRESSION STATISTICS

LAFOI				
Variable by port	Estimated coefficient	t-ratio	Significance level	Other statistics
Brisbane				
PGDPJP	5.573	7.867	0.01	Adjusted- $R^2 = 0.93$
EXUSAU	-0.939	-5.501	0.01	DW = 2.11
Intercept	-47.430	-6.920	0.01	N = 11
Sydney				
PGDPOE	1,734	7,275	0.01	Adjusted- $R^2 = 0.94$
EXUSAU	-0.232	-3.038	0.02	DW = 1.96
Intercept	2.757	4.532	0.01	N = 9
Melbourne				
PGDPOE	1,736	2,229	0.06	Adjusted- $R^2 = 0.96$
EXUSAU	-0.136	-1.325	0.23	DW = 1.38
IC ML	0.228	1.324	0.23	N = 11
Intercept	1.439	0.429	0.68	
Adelaide				
PGDPOF	3 583	5 778	0.01	Adjusted- $R^2 = 0.96$
TWIAU	-0.096	-0.376	0.71	DW = 1.74
IC AD	0.284	2.267	0.02	N = 11
Intercept	4.521	1.876	0.06	
Fremantle				0
PGDPJP	4.816	3.944	0.01	Adjusted- $R^2 = 0.94$
TWIAU	-1.456	-4.375	0.01	DW = 1.61
IC_FR	0.514	3.688	0.01	N = 11
Intercept	-37.731	-3.474	0.01	

TABLE I.1	ESTIMATED REGRESSION STATISTICS: PER CAPITA FULL CONTAINER
	EXPORTS

Variable by port	Estimated coefficient	t-ratio	Significance level	Other statistics
Brisbane				
CM_BR	1.531	12.262	0.01	Adjusted- $R^2 = 0.98$
D0203	0.532	4.055	0.01	DW = 2.08
D0304	0.547	3.925	0.01	N = 11
Intercept	-0.987	-1.102	0.31	
Sydney				
C M_SY	2.617	8.165	0.01	Adjusted- $R^2 = 0.87$
Intercept	-10.066	-3.750	0.01	DW = 1.52
				N = 11
Melbourne				
CM_ML	1.416	8.939	0.01	Adjusted-R2 = 0.94
D0203	0.161	1.729	0.12	DW = 1.72
Intercept	-0.179	-0.135	0.90	N = 11
Adelaide				
CM_AD(-1)	1.903	19.560	0.01	Adjusted-R2 = 0.98
D2001	0.265	2.862	0.02	DW = 2.88
Intercept	-2.564	-4.421	0.01	N = 10
Fremantle				
EMX_FR(-1)	0.599	3.223	0.02	Adjusted-R2 = 0.92
CM_FR	0.674	1.730	0.13	DW = 1.90
D2001	0.456	2.587	0.04	N = 10
Intercept	-0.470	-0.355	0.74	

TABLE I.2 ESTIMATED REGRESSION STATISTICS: EMPTY CONTAINER EXPORTS

Variable by port	Estimated coefficient	t-ratio	Significance level	Other statistics
Brisbane				
PGNEAU	3.780	22.951	0.01	Adjusted- $R^2 = 0.98$
Intercept	16.277	29.424	0.01	DW = 1.63
				N = 11
Sydney				
PGNEAU	2.055	16.398	0.01	Adjusted- $R^2 = 0.97$
TWIAU	0.047	0.317	0.76	DW = 2.43
Intercept	10.934	14.983	0.01	N = 9
Melbourne				
PGNEAU	2.157	22.122	0.01	Adjusted- $R^2 = 0.99$
EXUSAU	0.026	0.371	0.72	DW = 1.71
Intercept	11.941	34.683	0.01	N = 11
Adelaide				
PGNEAU	2.744	5.967	0.01	Adjusted- $R^2 = 0.90$
Intercept	12.225	7.914	0.01	DW = 1.47
				N = 11
Fremantle				
PGNEAU	2.883	17.474	0.01	Adjusted- $R^2 = 0.97$
Intercept	13.820	24.936	0.01	DW = 1.99

TABLE I.3 ESTIMATED REGRESSION STATISTICS: PER CAPITA FULL CONTAINER IMPORTS

Variable by port	Estimated coefficient	t-ratio	Significance level	Other statistics
Brisbane				
CX_BR	0.357	6.828	0.01	Adjusted-R2 = 0.96
D9495	-0.273	-10.274	0.01	DW = 1.70
D2001	0.164	6.360	0.01	N = 11
Intercept	8.157	20.200	0.01	
Sydney				
CX_SY(+1)	0.510	3.040	0.02	Adjusted- $R^2 = 0.51$
D0304	-0.494	-2.373	0.05	DW = 1.80
Intercept	5.748	4.375	0.01	N = 11
Melbourne				
CX_ML	0.617	8.110	0.01	Adjusted-R2 = 0.87
Intercept	6.020	9.233	0.01	DW = 1.81
				N = 11
Adelaide				
CX_AD(-1)	0.618	9.123	0.01	Adjusted-R2 = 0.92
D0102	0.307	2.969	0.02	DW = 2.39
Intercept	5.567	12.108	0.01	N = 10
Fremantle				
CX_FR	0.804	8.066	0.01	Adjusted-R2 = 0.90
D2001	0.613	5.278	0.01	DW = 1.57
Intercept	4.312	5.920	0.01	N = 11

TABLE I.4 ESTIMATED REGRESSION STATISTICS: EMPTY CONTAINER IMPORTS

Variable by port	Estimated	t-ratio	Significance level	Other statistics
Brisbane				
PGDPJP	0.142	0.598	0.55	Adjusted- $R^2 = 0.75$
EXUSAU	-0.152	-3.027	0.01	DW = 1.76
D9697	0.199	7.673	0.01	N = 10
Intercept	2.654	1.154	0.25	
Sydney				
Time trend	-0.124	-6.239	0.01	Adjusted- $R^2 = 0.66$
EXUSAU	-0.216	-0.545	0.59	DW = 2.75
Intercept	8.902	25.360	0.01	N = 7
Melbourne				
PGDPOE	0.581	1.653	0.10	Adjusted- $R^2 = 0.88$
EXUSAU	-0.684	-3.991	0.01	DW = 1.15
D0203	-0.384	7.460	0.01	N = 11
Intercept	-5.000	-5.355	0.01	
Adelaide				
PGDPOE	1.481	1.725	0.09	Adjusted- $R^2 = 0.51$
EXUSAU	-0.752	-1.937	0.05	DW = 1.91
Intercept	-2.801	-1.236	0.22	N = 11
Fremantle				
Т	-0.015	-1.602	0.11	Adjusted- $R^2 = 0.63$
PGDPJP	1.544	1.708	0.09	DW = 2.38
Intercept	-10.276	-1.190	0.23	N = 11
All ports				
PGDPOE	1.934	13.740	0.01	Adjusted- $R^2 = 0.97$
EXUSAU	-0.068	-0.784	0.43	DW = 1.86
Intercept	-3.132	-8.298	0.01	N = 21

 TABLE I.5
 ESTIMATED REGRESSION STATISTICS: PER CAPITA NON-CONTAINERISED

 EXPORTS

Variable by port	Estimated coefficient	t-ratio	Significance level	Other statistics
Brisbane				
PGNEAU	1.214	7.029	0.01	Adjusted- $R^2 = 0.83$
Intercept	5.050	8.708	0.01	DW = 1.70
				N = 11
Sydney				
	1 578	3 096	0.01	Adjusted $\mathbb{R}^2 - 0.86$
D9495	0.313	4 781	0.01	DW = 1.88
D9596	0.313	3 082	0.01	N – 11
Intercept	5.854	3.421	0.01	
Melbourne				
PGNEAU	1.969	5.497	0.01	Adjusted- $R^2 = 0.77$
EXUSAU	0.575	2.193	0.06	DW = 1.36
D9899	0.258	2.460	0.04	N = 11
Intercept	7.049	5.575	0.01	
Adelaide				
	1.061	1 532	0.13	Adjusted $\mathbb{R}^2 = 0.56$
	1.001	1.352	0.13	DW = 1.44
Intercept	-0.201	-0.050	0.00	N = 11
intercept	0.201	0.000	0.00	N = 11
Fremantle				
PGNEAU	0.348	2.916	0.02	Adjusted- $R^2 = 0.40$
EXUSAU	0.117	1.354	0.21	DW = 2.78
Intercept	2.700	6.403	0.01	N = 11
	4 0 4 7	2 0 2 4	0.04	Adjusted $D^2 = 0.02$
	1.247	2.924	0.01	Aujusieu- $\kappa = 0.93$
	0.122	0.701	0.48	Dvv = 1.32
intercept	-1.301	-0.923	0.36	N = 21

 TABLE I.6
 ESTIMATED REGRESSION STATISTICS: PER CAPITA NON-CONTAINERISED IMPORTS

Variable by port	Estimated coefficient	t-ratio	Significance level	Other statistics
Inbound sea passe	ngers			
PGDPUS	0.673	1.231	0.24	Adjusted- $R^2 = 0.68$
EXUSAU	-0.819	-1.683	0.11	DW = 2.28
D9899	0.612	2.772	0.01	N = 21
D9900	0.439	1.983	0.07	
D2001	0.462	1.971	0.07	
Intercept	-1.888	-1.473	0.16	
Outbound sea pass	sengers			
EXUSAU	0.874	1.585	0.11	Adjusted- $R^2 = 0.57$
D9899	0.990	3.979	0.01	DW = 1.91
D9900	0.863	3.235	0.01	N = 21
D2001	1.007	4.101	0.01	
Intercept	-0.861	-4.043	0.01	

TABLE I.7ESTIMATED REGRESSION STATISTICS: PER CAPITA INBOUND AND
OUTBOUND SEA PASSENGERS

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
BTRE	Bureau of Transport and Regional Economics
CDU	Cruise Down Under
DOI	Department of Infrastructure
FP	Fremantle Ports
FPPLFlind	ers Ports Pty Ltd
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GNE	Gross National Expenditure
GT	Gross Tonne
LB	Lower Birth
NSW	New South Wales
OECD	The Organisation for Economic Co-operation and Development
PBC	Port of Brisbane Corporation
PMC	Port of Melbourne Corporation
SARS	Severe Acute Respiratory Syndrome
SPC	Sydney Ports Corporation
teus	Twenty-Foot Equivalent Units
TWI	Trade Weighted Index
UK	United Kingdom
US	United States
USA	The United States of America
USCB	US Census Bureau
