ISBN 0 646 33551 0

Inquiries:

Media and Publications Officer
Productivity Commission
Locked Bag 2
Collins Street East Post Office
Melbourne VIC 8003

Tel: (03) 9653 2244
Fax: (03) 9653 2303

An appropriate citation for this paper is:

Productivity Commission 1998, *International Benchmarking of the Australian Waterfront*, Research Report, AusInfo, Canberra, April.

Information about the Productivity Commission and its current work program can be found on the World Wide Web at http://www.pc.gov.au

FOREWORD

Performance benchmarking of key infrastructure industries such as the waterfront, where government has played an important role, provides essential information by which to judge whether services central to the well being of Australians are being supplied efficiently.

This benchmarking study is part of a continuing program of research into the performance of economic infrastructure industries, which was commenced by the Bureau of Industry Economics. It is the third Waterfront Benchmarking report in the cycle.

The study builds on the two previous waterfront studies by providing new insights into timeliness, reliability and the economic consequences of failure to match levels of performance achieved overseas. It is based on data collected throughout 1997.

The study also provides a broad context for the Productivity Commission's companion study on *Work Arrangements in Container Stevedoring*, which examines selected work arrangements and assesses their implications for the performance of container stevedoring workplaces.

The study was prepared in the Economic Infrastructure Branch of the Commission. It could not have been undertaken without the active co-operation of many participants in the sector, who either assisted the Commission directly or provided detailed information to its consultant, Thompson Clarke Shipping. We are grateful to all those who took part.

The Commission welcomes further feedback on both reports, consistent with its objective to improve the information base on key issues affecting Australia's economic performance and community living standards.

Gary Banks

Acting Chairman

April 1998

CONTENTS

Appendices

ABBREVIATIONS

ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ACS	Australian Customs Service
AQIS	Australian Quarantine and Inspection Service
AWB	Australian Wheat Board
BCA	Business Council of Australia
BHC	Bulk Handling Corporation
BHP	Broken Hill Proprietary Ltd
BIE	Bureau of Industry Economics
BSR	Basic Service Rate
BTCE	Bureau of Transport and Communications Economics
CBU	Completely Built Up
CCC	Container Clearance Charge
CIF	cost, insurance,freight
CTAL	Container Terminals Australia Limited
DoT	Department of Transport
EBA	Enterprise Bargaining Agreement
ECN	Export Clearance Number
EDI	Electronic Data Interchange
ERA	Export Receival Advice
FCAI	Federal Chamber of Automotive Industries
FCL	Full Container Load
FOB	free on board
GBE	Government Business Enterprise
GDP	Gross Domestic Product
GRT	Gross Registered Tonnage

IC	Industry Commission
IDO	Import Delivery Order
ISC	Inter-State Commission
LCL	Less than a Full Container Load
NRT	Net Registered Tonnage
PCC	Pure Car Carrier
PPA	Port Pricing Additional
PSA	Prices Surveillance Authority
PSC	Port Services Charge
QSC	Queensland Sugar Corporation
SCA	Sea Cargo Automation
SIA	Stevedoring Industry Award
TEU	Twenty foot equivalent unit
THC	Terminal Handling Charge
VANs	Value Added Networks
VBS	Vehicle Booking System
WIRA	Waterfront Industry Reform Authority

OVERVIEW

Waterfront industries are critical to Australia's economic performance.

The waterfront is a key link in the distribution of traded goods. The efficiency of the waterfront affects the competitiveness of Australia's trade and the welfare of all Australians.

In value terms, approximately 70 per cent of imports and 78 per cent of exports were transported by sea in 1995–96. These trade flows amounted close to $60 billion.

Key findings

This international benchmarking study shows Australia to be under-performing on the waterfront.

Container stevedoring charges were higher than overseas, ship loading and unloading were slower, and services were less reliable.

Other areas of traditional break-bulk and bulk stevedoring examined also performed relatively poorly.

Cruise ship baggage handling charges in Sydney were 5 times those in Auckland. The cost of provedoring was 4 times that in Miami.

Marine services and port infrastructure charges were 2 to 3 times greater in Australia, not all of which reflects pricing policies to recover costs.

The *Port-land interface* is not operating effectively. There is a need for better co-ordination throughout the transport chain.

Poor performance increases costs to exporters, importers and other shippers both directly and indirectly.

Overall, there is significant scope for improvement. In particular, higher stevedoring productivity would improve timeliness and reliability. However, incentives to improve performance are muted.

Some basic terms

Shipper	The consignor or consignee of sea cargo.
'Blue water' freight rate	Charge by shipping line for carriage of cargo and lifting it on and off the ship.
Bulk cargo	Cargo (such as coal, ore, sand or oil) that is carried loose and takes up the shape of the ship's hold.
Break-bulk cargo	Non-bulk cargo that is not containerised.
Conservancy dues	Charges for services such as navigation aids, dredging and channel markings.
Pilotage	Navigation of a ship within ports and their approaches by a licensed pilot.
Towage	Tug operations assisting the movement of ships.
Stevedoring	The process of loading and unloading ships.
Provedoring	Supplying ships' crew and passenger provisions.
Net crane rate	Hourly rate at which a single crane moves containers while a ship is actually being worked (net lifts per hour).

Performance is compared and gaps identified.

This study provides information by which the performance of Australian ports can be compared — both with overseas ports and with each other. The aim is to identify and quantify the extent of any performance deficiencies and some of their economic effects by evaluating the scope for improvement. The study approach and scope are outlined in Box 1.

Policy prescriptions to redress performance concerns are beyond the scope of this informational study.

Box 1 Study approach and scope

The *stevedoring of containers* was benchmarked at the following ports:

- *Australia*: Adelaide, Brisbane, Fremantle, Melbourne and Sydney-Port Botany;
- *New Zealand*: Auckland and Lyttelton;
- *Asia*: Port Klang, Singapore, Nagoya and Pusan;
- *North America*: Philadelphia and Los Angeles; and
- *Europe*: Tilbury and Hamburg.

The general approach was to measure actual charges and service performance for individual ships engaged in Australian liner shipping trades. This approach differed from that adopted in the benchmarking studies conducted by the Bureau of Industry Economics in two respects: the use of actual rather than estimated data, and like-with-like comparisons using a ship typical of those operating in each trade.

The *break-bulk stevedoring* of passenger motor vehicles, pulp and newsprint paper, timber and hot-rolled steel coil was benchmarked. The ports covered across this range of commodities were:

- *Australia*: Sydney, Melbourne, Brisbane, Adelaide, Fremantle, Port Kembla and Devonport;
- *Europe*: Amsterdam, Barking, Grangemouth and Hull;
- *North America*: Philadelphia;
- *New Zealand*: Auckland and Tauranga; and
- *South Africa*: Durban.

The cost of *stevedoring bulk grain loading and bulk fertiliser unloading* was examined in the following ports:

Grain

- *Australia*: Average across all grain ports; and
- *North America*: New Orleans, Portland and Prince Rupert

Fertiliser

- *Australia*: Adelaide, Albany, Brisbane, Geelong, Hobart, Kwinana, Newcastle, Townsville; and
- *New Zealand*: Lyttelton, Napier, Dunedin.

Pilotage, *towage* and *mooring* charges (marine charges) along with *government* and *port authority* charges for port infrastructure, were examined for each of the ports included in the benchmarking of container and bulk shipping stevedoring.

Cruise shipping baggage handling and provedoring charges were also benchmarked across a range of major cruise ports in Australia and overseas.

The focus is on outcomes for Australian shippers.

The focus of the benchmarking in this report is on charges and level of service to ship operators and shippers.

Indicators of labour and capital productivity are also reported to provide insights into differences in outcomes. But they require careful interpretation.

Services within port boundaries are examined ...

The study is confined to activities within the port precincts and at the land-side interface where cargo is received by stevedores or delivered to shippers. The activities studied are those associated with servicing container, break-bulk, bulk and cruise ships.

... but activities beyond the waterfront are recognised.

Waterfront services are an important part of the chain of services used to transport goods. A number of land-side private and government services are involved that also affect the overall efficiency of the movement of sea cargo.

A breakdown of the actual total shipment cost for an imported container shows that waterfront charges were approximately 13 per cent of the total charge, of which the container handling charges represented two-thirds (see Box 2).

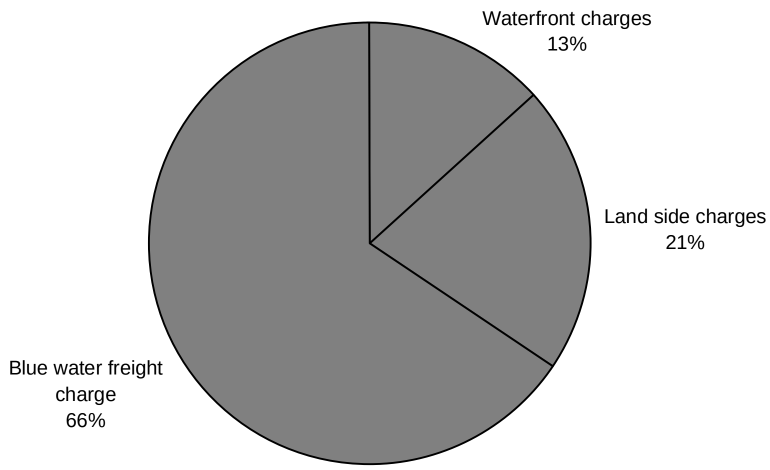
Waterfront services are not homogeneous ...

The waterfront services used by shippers vary with exports and imports, cargo type, ports and ships. In addition, there are differences in the nature and extent of government involvement, the scale of operation and the physical environment.

... consequently, care is required when comparing performance.

With this diversity, it is difficult to make robust, like-with-like comparisons. The Commission has endeavoured to structure its benchmarking analysis so that comparative performance is interpreted correctly.

Box 2 An example of the breakdown of total transport costs for imported containerised cargo, 1997



Note: Land-side charges include delivery order fees, AQIS fees, ACS Sea Cargo Automation fees, Customs administrative charges, brokerage fees and transport charges.

Australian waterfront in context

Australian sea trade and waterfront operations are small by world standards, which affects performance.

Australia is disadvantaged relative to many other countries because of the 'thinness' of its shipping trades. Not only is the level of cargo throughput lower, it is more difficult to provide a high quality of service because demand is more variable. As a consequence, costs can be expected to be higher or the level of service lower than at the largest overseas ports, other things being equal.

.

Diseconomies also arise because of the requirement for sufficient capacity to provide adequate levels of service for periods of peak demand that are more pronounced than in overseas ports with higher levels of throughput.

Container ships make multiple port calls in Australia.

Container shipping services have a multi-port pattern of operation in Australia — unlike most of the other countries where the benchmarked ports are located. On most container trades, ships call at Fremantle, Melbourne, Sydney and Brisbane.

Disruption to a service schedule in one port can thus have 'knock-on' effects. This can cause further problems unless shipping lines build slack, and the attendant costs, into their service schedules.

Shipping lines typically allow for contingency in their Australian schedules. For example, one Australia–US West Coast service operator requires an additional ship to protect its schedule integrity against delays on the Australian coast.

The potential for 'knock-on' effects underlines the importance of eliminating delays and improving reliability.

The scope for competition between ports is limited.

The volume of trade to and from Australia does not support numbers of closely located ports with ships visiting at the levels of service frequency required by shippers. This constrains competitive pressures on Australian ports to achieve high levels of performance.

In addition, there are contractual problems.

Shippers do not contract stevedores to load and unload their cargo — this is done by the shipping line. Shipping lines seek to minimise their cost of operation by turning ships around as quickly as possible. They are less concerned about wider costs resulting from delays to the door-to-door movement of cargo.

Government involvement varies from country to country.

The nature of government involvement has a bearing on the cost of providing port infrastructure and the efficiency of stevedores and other waterfront participants. Government involvement varies from country to country in terms of ownership, scope of activity, corporate structure, degree of vertical integration and regulation.

Most Australian port authorities operate as landlords ...

In Australia, all the ports benchmarked are owned by the respective State governments and are statutory authorities. With some minor exceptions, they predominantly have a landlord role.

With the major port authorities responsible primarily for land management and port development issues, the more contestable services such as towage, pilotage, mooring, stevedoring and provedoring are provided by private sector operators.

... whereas other countries have adopted different models.

Government ports overseas are typically more vertically integrated than Australian ports, combining landlord services with other more contestable services. For example, Singapore, Auckland and Tilbury integrate cargo handling and other waterfront services. Some governments have privatised their ports; however, as in Australia, this is not the norm.

Australian port authorities fully recover costs ...

Each of the Australian ports and the two private overseas ports in this study (Tilbury and Auckland) operate as fully commercial entities and seek to recover all costs.

... but this is not generally the case overseas.

Most of the other overseas ports studied receive some government support. And the extent to which costs are recovered by port authorities varies widely across the ports examined. This means that charges for port infrastructure and marine services do not always reflect costs.

Regulation of port authority pricing varies widely.

Government regulation of port authority fees and charges also varies across the benchmarked ports. In recognition of the limited competition among ports in Australia, there is provision for independent prices oversight in most jurisdictions.

Price regulation is less of an issue for the selected overseas ports because of greater competition between local ports and, in some cases, viable land-based transport alternatives.

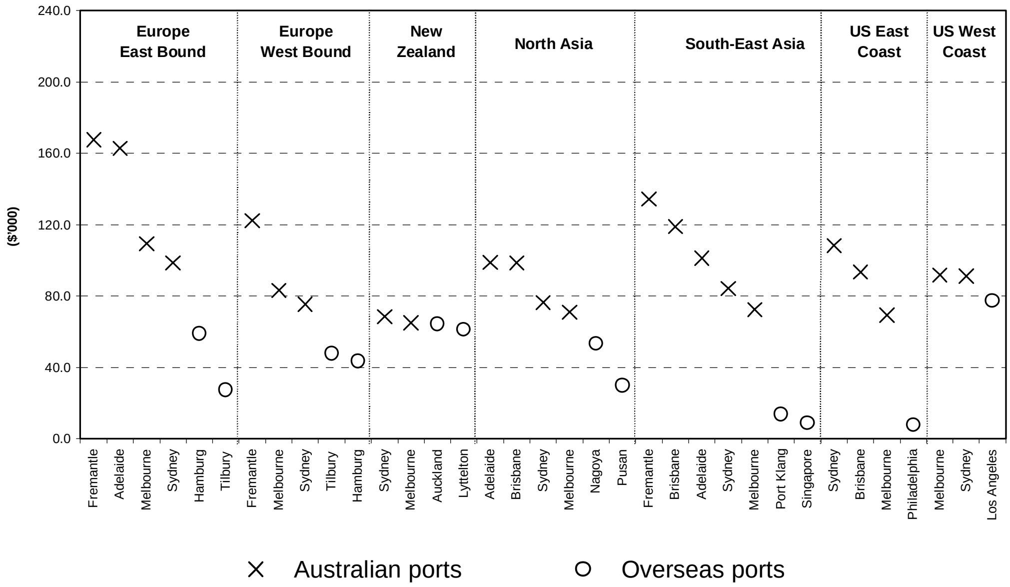
Comparative performance

Marine services and infrastructure charges

Overall, Australian infrastructure and marine service charges are 2 to 3 times greater than the overseas ports studied.

Infrastructure and marine services charges are best compared in aggregate because charging structures differ among ports. The combined charges are higher for container ships at Australian ports than at the overseas ports (see Figure 1). These charges are also generally higher for other types of ships.

Figure 1 Combined infrastructure and marine services charges per TEU — container ships (all trades), 1997



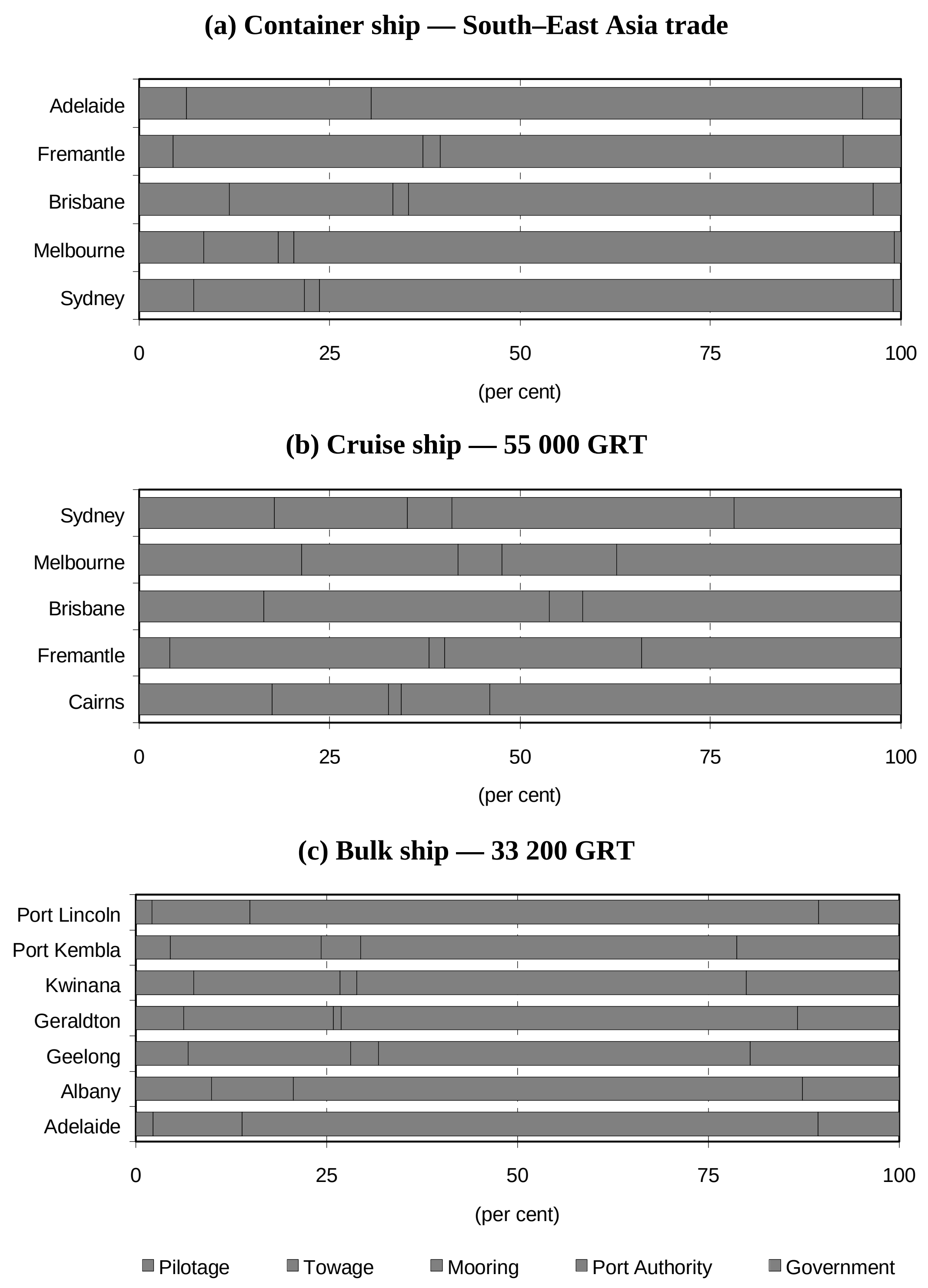
Note: Combined port and maritime infrastructure and services charges includes government charges (light dues, conservancy and oil pollution charges), port authority charges (wharfage, tonnage, berth hire), pilotage, towage, and mooring charges.
The range of values for Australian ports reflects the variation in ship size and container exchange among the liner shipping trades serviced by the port.
See Figure 5.11 in Chapter 5 for other details.

The share of *pilotage*, *towage* and *mooring* in the combined charges varies among ships and ports (see Figure 2).

Pilotage charges levied on container and cruise ships were generally higher at Australian ports than most of the overseas ports studied. In some cases, this reflects pilotage distance and the extent of navigational hazards.

Towage charges were also generally higher at Australian ports. High towage charges reflect low tug utilisation and the use of one more tug per ship movement at some Australian ports.

Figure 2 Composition of charges at Australian ports, 1997



Mooring charges, with the exception of those for bulk (wheat) ships, were generally higher at the Australian ports than overseas. This appears to result from the use of up to 30 per cent more linesmen per ship in Australia than overseas.

Australia charges directly for conservancy and pollution control.

Government charges (*conservancy*, *light dues* and *oil pollution dues*) are not levied explicitly at the overseas ports studied. Consequently, government charges on ships calling at Australian ports were higher than overseas — and highest at those Australian ports charging conservancy dues.

Australian port authority charges are generally higher than overseas ...

Port authority charges (both cargo and ship-based) levied on container ships were generally higher than overseas. Port authority charges levied on bulk ships (wheat) are higher than in Canada, but lower than in the USA (Portland and New Orleans).

... in part, reflecting the full cost recovery policy adopted by Australian governments.

The relatively high *port authority* charges in Australia, reflect the priority placed by owner governments on covering all costs and ensuring competitive neutrality.

All Australian ports are self-funding. They pay State and local government taxes, and make tax-equivalent and dividend payments. These payments amount to around 15 per cent of total port revenue.

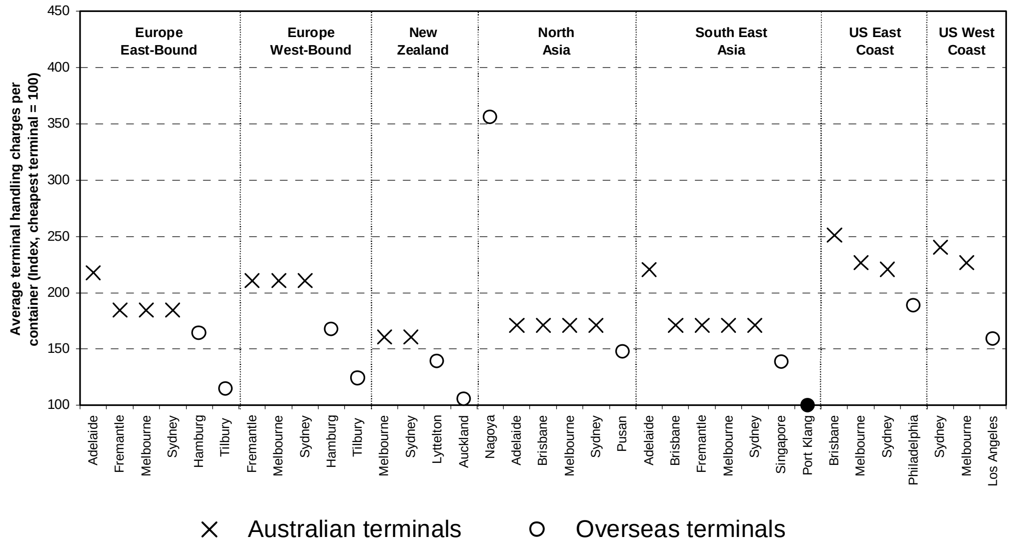
In contrast, only a small number of the overseas ports studied paid income tax, and Singapore is the only publicly owned port to pay a dividend.

Container stevedoring performance

Australian container terminal charges were higher than overseas ...

Container stevedoring charges were, for most trades, higher at all Australian container terminals than at any of the overseas terminals surveyed (see Figure 3).

Figure 3 Indexed container terminal stevedoring charges per TEU by port and liner shipping trade, 1997

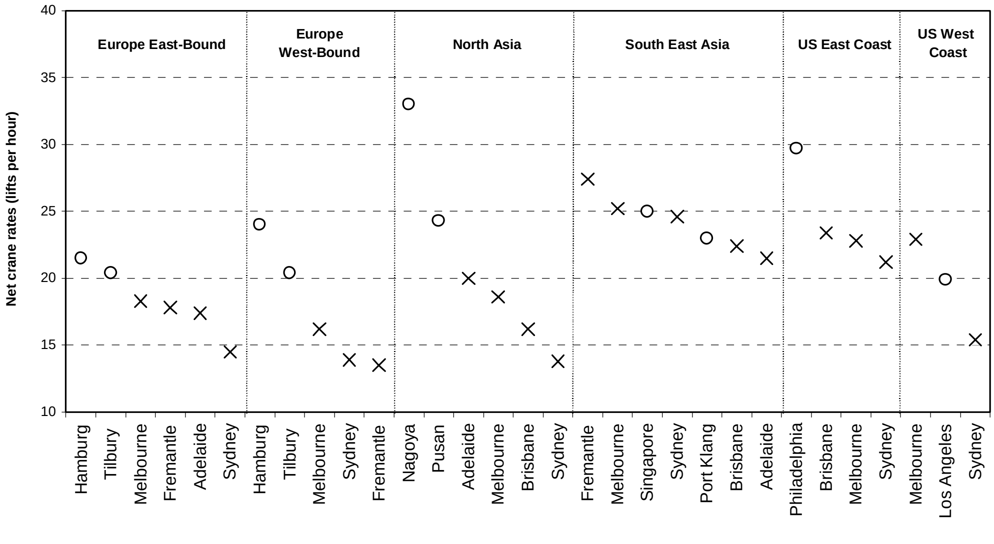


Note: Comparisons should only be made within liner shipping trades because performance is significantly affected by ship size and type, and cargo composition and stow.

... and labour and capital productivity were lower.

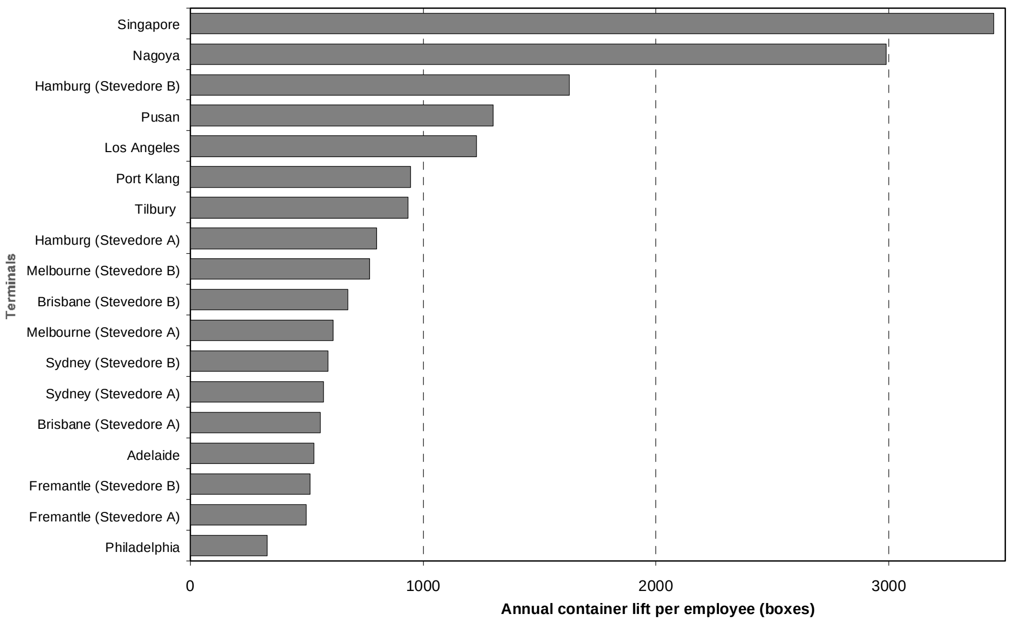
Net crane container handling rates (lifts per net crane hour) are a key measure of service and overall performance of the terminal. On most trades, the handling rates at Australian terminals were generally well below those at overseas ports for the same ships (see Figure 4). And, on average, container lifts per terminal employee were significantly lower than at overseas terminals (see Figure 5).

Figure 4 Net crane rate by port and liner shipping trade, 1997 (Lifts per net hour)



Note: Comparisons should only be made within liner shipping trades because performance is significantly affected by ship size and type, and cargo composition and stow.
Net crane rates are annual averages for each ship studied.

Figure 5 Container lifts per terminal employee by terminal and liner shipping trade, 1997



.

Further analysis suggests that the differences could not be explained simply by scale diseconomies.

Reliability is also relatively poor ...

Overall, the quality of service provided at Australian container terminals is lower than overseas. About one-fifth of ships surveyed experienced a delay of more than 4 hours at Australian ports.

Furthermore, net crane rates were found to vary significantly among Australian ports for each ship in the benchmarking sample. Sydney terminals performed particularly poorly.

... and there are delays at the terminal land-side interface.

Road transport operators experience delays in delivering and receiving containers, resulting in truck queues. These delays reflect a lack of co-ordination of the transfer of cargo between stevedores and land transport operators and between other land-side activities.

Other areas of stevedoring

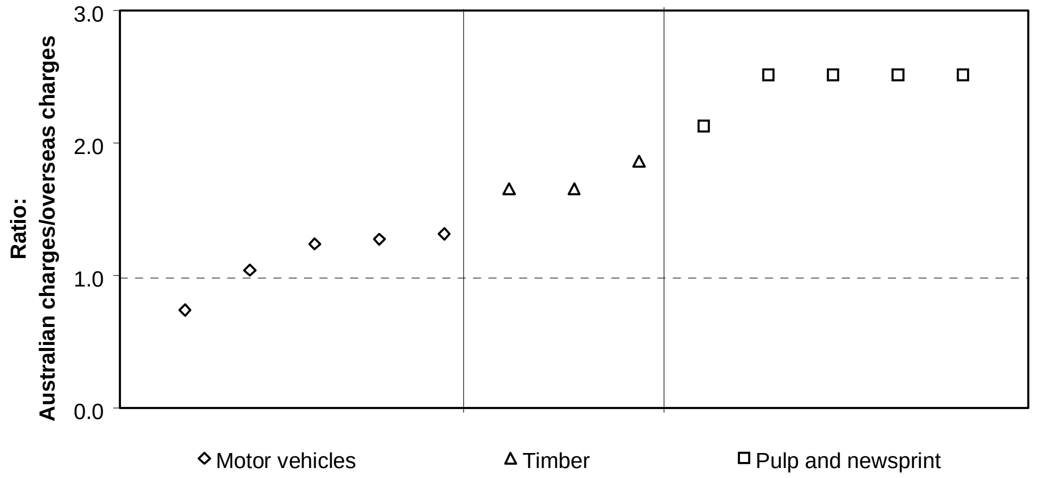
Australian break-bulk stevedoring costs are higher than in other countries.

Stevedoring charges levied on importers and exporters of break-bulk cargo (timber, motor vehicles, pulp and newsprint and hot rolled coil) were up to two and a half times higher than overseas (see Figure 6).

Cruise ship baggage handling is the highest of the ports studied.

Sydney had the highest baggage handling costs of the ports surveyed — five times more expensive than Auckland. The cost of fully provedoring a typical cruise ship at Sydney was four times that at Miami and twice that at Los Angeles.

Figure 6 Ratio of stevedoring charges levied at Australian ports versus overseas ports for selected break-bulk cargoes, 1997



Notes: Each data point corresponds to the ratio of charges at an Australian port compared to an overseas port.

Stevedoring costs have been reduced significantly for bulk grain loading ...

The cost of stevedoring services for the Australian Wheat Board (AWB) averaged around 25 cents per tonne in 1996–97, significantly lower than in late 1989, when the cost was about 70 cents per tonne.

The average Australian cost for grain handling is now significantly lower than typical stevedoring costs at four major North American grain ports — approximately half the cost at Vancouver, Prince Rupert and New Orleans, and one-fifth the cost at Portland.

... where substantive labour reforms have been achieved.

The fall in the cost of stevedoring for bulk grain in Australia came about after the AWB assumed responsibility for stevedoring from shipping lines, thereby gaining greater control over the operation.

However, charges for bulk stevedoring of fertilisers are higher than New Zealand.

In another traditional bulk stevedoring activity — bulk fertiliser — New Zealand stevedoring charges were about 20 to 25 per cent lower than Australian ports.

Scope for improvement

Waterfront performance has improved ...

Since the WIRA reforms, waterfront charges have fallen in real terms. Productivity measured by net crane rates also improved initially, but over recent years the rate of improvement has slowed.

... however, there is significant scope to do better.

That said, the benchmarking results provide evidence that Australia's performance remains well below that in the overseas ports examined in this study. With the exception of bulk grain, charges were generally higher and service performance lower than enjoyed by our trading partners.

Productivity was also significantly below that at most overseas ports. Even allowing for scale diseconomies, there is scope to do better.

Higher stevedoring productivity, by reducing ship turnaround times, would also improve timeliness and reliability and lower the overall cost of transporting sea cargo.

Greater co-ordination of activities outside the waterfront is needed.

Shippers consulted in the course of the study indicated that timeliness and reliability are also being adversely affected by land-side activities through:

- documentation delays involving customs and quarantine clearance;
- lack of logistical planning and co-ordination on the part of exporters and importers;
- AQIS, container park and warehouse operating hours;
- inflexibility in the transport union award; and
- problems associated with gaining accessing to the vehicle booking schemes.

These sources of poor timeliness were also identified in the 1992 Parliamentary report 'Warehouse to Wharf'. Yet significant problems remain.

Some of these problems can be mitigated by improvements to shippers' own logistical organisation. However, better co-ordination between all parties involved, including government agencies and road transport operators, is required. Further uptake of electronic commerce would help.

Gains from better performance

Poor performance results in other costs as well as higher charges ...

Poor waterfront performance not only results in higher charges for shippers, the lack of timeliness and reliability also gives rise to other costs, including higher production, inventory and financing costs.

The potential savings in these indirect costs can be substantial. For example, indicative calculations suggest that the gains to shippers from improved performance could amount to around $50 per TEU, equivalent to a 25 per cent reduction in container terminal charges.

... and detracts from Australia's reputation as a reliable trading nation.

Australian exporters are already disadvantaged by their remoteness from overseas markets. Unreliability further disadvantages them because of the higher risk to overseas buyers of disruptions in supply.

One significant incident involving delay can have lasting consequences when overseas buyers redirect their business.

Co-ordination throughout the transport chain is required as well as better performance in stevedoring.

The broader implication is that performance improvement must be directed toward better co-ordination of waterfront interface operations and of land-side activities, as well as better performing stevedoring services.

The latter is the subject of the Commission's companion study of work arrangements in container stevedoring.

1 ABOUT THIS STUDY

The benchmarking undertaken in this study is aimed at measuring the performance of key waterfront activities relative to those in other countries. The focus is on charges and level of service to ship operators, exporters and importers.

Government involvement in the provision of ports is also studied to take into account those arrangements, processes and policies that affect the delivery of waterfront services when making performance comparisons. The overall effects of under-performance on importers and exporters is also examined.

This is the third international benchmarking study of the Australian waterfront. The two previous studies were conducted by the Bureau of Industry Economics (BIE) and were published in 1993 and 1995.

A complementary Productivity Commission (PC) study of container stevedoring work arrangements was conducted concurrently with this study (PC 1998). That study examines the impact of selected work arrangements on container stevedoring workplace performance. The two studies were co-ordinated to ensure that the Commission did not duplicate effort and impose an unnecessary burden on the waterfront industries, particularly stevedores.

Performance benchmarking has been used in this study with the aim of identifying areas where performance improvement may be possible. It is beyond the scope of this study to address what needs to be done to improve the performance of the lower performing ports.

1.1 Role of waterfront benchmarking

The chief purpose of benchmarking is to identify performance gaps and areas of potential improvement. Benchmarking requires the measurement of performance. This may involve measuring the performance achieved by a better performing business engaged in the same or similar activity, or by a business regarded as having ‘best-practice’ performance. In another form, the current performance of a business can be measured against the benchmark of its past performance to gauge whether improvement is occurring.

The term ‘benchmarking’ is also used to encompass the *process* of identifying ‘best practices’ — that is, finding ways of doing better. This involves assessing a businesses’ practice against those of other high performing businesses engaged in the same activity (in-industry benchmarking) or against businesses in other industries engaged in similar activities (out-of-industry benchmarking). It is also possible to determine which practices make a significant contribution to performance.

Benchmarking primarily addresses technical efficiency. The best practice identified is not necessarily economically efficient — that is, the best possible use of resources from a community perspective.

Many industry participants are broadly aware of the nature of performance problems and what would be ‘good practice’. However, they are not in a position to assess the overall magnitude of the problem and the gains that are possible from improved performance.

Performance benchmarking has been undertaken in this study to determine how well some parts of the Australian waterfront service industries compare in relation to their counterparts in other countries. The main focus of performance comparisons are charges and service outcomes for importers and exporters. In addition, selected indicators of labour and capital productivity performance are also reported. The benchmarking is relevant to all shippers, including users of coastal shipping.

The objective of the study is to identify and quantify the extent of any under performance and to provide an indication of its economic impact.

1.2 Approach

The Commission’s approach in conducting this study has been to identify in the areas covered the nature, extent and cost of poor performance for Australian shippers.

The conceptual framework, study scope and performance indicators were developed after consultation with shipping lines, waterfront service providers and shippers. The Commission also consulted widely to identify and understand waterfront user concerns. A list of those consulted is presented in Appendix A.

Limitations of benchmarking

There are a range of factors which impact on the usefulness of benchmarking. These include:

- the accuracy and integrity of the data used in the analysis;
- the difficulty in ensuring that comparisons are being made between like-with-like situations; and
- lower observed performance may not equate with inefficiency; for example, higher port charges may represent an efficient full cost recovery pricing structure.

These factors have been taken into account in the analysis and interpretation of the indicators used in this study. However, it is not possible to precisely measure performance.

The need to convert charges to a common currency adds a further complication when making international comparisons. Fluctuations in the exchange rate between Australian and other countries can alter the Australian dollar value of charges between ports without any change in underlying efficiency. Charges are reported in Australian dollars at June 1997. The exchange rates applying at that time, used for conversion are presented in Appendix B.

Since June 1997 there has been considerable changes in the exchange rate between the Australian dollar and other countries. Australia's ranking in the levels of charges has not been affected by the recent changes in exchange rates. In cases where the Australian dollar has depreciated against the foreign currency, the change has reduced the differences in charges, but has not been enough to increase the charges in low cost countries above those levied in Australia. In other cases, the Australian dollar has appreciated, thereby making overseas charges appear lower in Australian dollar terms.

Productivity has also been examined to provide insights into differences in outcomes. Ideally, comprehensive indicators of productivity, such as total factor productivity, should be used but have not been measured because of the difficulties involved in collecting the data required. Instead, partial productivity measures based on comparable data have been calculated (see Appendix B).

Conceptual issues

The cost of inefficiency is usually thought of as higher than necessary charges. For example, inefficient terminal operations result in increased terminal charges. However, poor service performance can also affect the efficiency of others — for example, shipping lines may have to provide additional capacity because ships are delayed on the Australian coast.

Service performance throughout the waterfront chain affects the cost of importing and exporting. Poor performance adversely impacts on the competitiveness of Australian exports. It also increases the costs of consumption of imported goods and the cost of manufactured products that use imported inputs.

Outcomes for exporters and importers are not only determined by the price they pay for services, but also depend on the cost associated with timeliness. Timeliness is achieved when cargo is delivered and received on time. There are two dimensions to waterfront timeliness. First, the overall time taken to process cargo. Second, the reliability — measured as variability of the time taken.

Poor timeliness and reliability create the need for larger stocks of traded goods to be held, which affects other waterfront users and downstream businesses generally. Unreliability also affects the productivity of waterfront activities by adversely impacting on capital utilisation.

The costs of poor timeliness and unreliability of waterfront services include:

- capital costs (those costs associated with goods in transit and holding inventories to avoid shortages);
- costs associated with hedging on exchange rates;
- costs associated with disruption to production (for user industries);
- indirect production costs (those associated with adopting less than optimal production techniques or using alternative inputs);
- additional costs associated with contingency arrangements (alternative transport arrangements); and
- additional costs incurred at the port–land interface (that is, costs associated with truck queues and so on).

Waterfront services are just part of the chain of services used to transport goods by sea. A large number of land-side private and government services are involved that also affect the overall efficiency of the movement of sea cargo.

The waterfront services used by shippers vary between exports and imports, cargo type, ports and ships. Consequently, it is difficult to generalise about services. In addition, there are differences in government involvement, the scale of operation and physical environment.

With this diversity it is difficult to find similar services to make robust like-with-like performance comparisons. Consequently, the benchmarking results in this report have been carefully analysed and interpretations of comparative performance qualified where appropriate.

Government involvement in the waterfront has been examined. This was undertaken to take into account some important elements of the operating environment when making performance comparisons — that is, to have regard for some of the factors that are beyond the control of the industry and to reduce the risk of drawing inappropriate conclusions.

Scope

The scope of the study is confined to activities within the port precincts and at the port-land interface. The activities studied were those associated with servicing container, break-bulk, bulk trades and cruise shipping.

Container depots (parks), and the operations of freight forwarders including non-vessel owning common carriers (NVOCCs) are not covered. The omission of these port-related waterfront industries is not a reflection of their perceived importance. They were excluded for study manageability reasons.

Container services associated with Australia's main shipping trades have been studied. The approach adopted was to select a typical ship in each trade and collect actual charge and service information for that ship over a period of 12 months.

This approach is different from that adopted by the Bureau of Industry Economics (BIE) for the last international benchmarking study of the waterfront (BIE 1995a). The BIE benchmarked container shipping operations for typical ships and loading and unloading operations. Hypothetical ship visits were used to estimate the charges that would have been levied on the basis of scheduled charges. The ship parameters used are discussed in BIE (1995a).

The underlying reason for the difference in approach is the Commission's decision to benchmark actual charges and operations. Actual charges often differ from published charges. The Commission's approach involved collecting information on the charges levied against particular ships. It provides a broad range of benchmarks for ships typical to Australian trades. Examining the performance of the principal overseas ports through which Australian imports and exports pass, also increases the relevance of the benchmarking.

The *break-bulk* cargoes studied are built-up motor vehicles, hot-rolled steel coil, pulp and paper and timber. These commodities were chosen because of their significance in terms of volume.

The *bulk* cargoes studied were wheat as an export commodity and fertiliser as an import commodity.

Stevedoring has been benchmarked for every cargo type. In the case of cruise shipping, baggage handling and provedoring of supplies are covered.

The services provided to ships — such as pilotage, towage and mooring — have been benchmarked for container and cruise ships as well as bulk ships carrying wheat.

The selection of *ports* and facilities was limited to the ports that have direct services with Australia. This was dictated by the need to approach shipping lines for the majority of the performance information. However, these ports are of particular interest because they are served by ships operating in Australian shipping trades.

The container ports benchmarked were:

- *Australia*: Adelaide, Brisbane, Fremantle, Melbourne and Sydney-Port Botany;
- *New Zealand*: Auckland and Lyttelton;
- *Asia*: Port Klang, Singapore, Nagoya and Pusan;
- *North America*: Philadelphia and Los Angeles; and
- *Europe*: Tilbury and Hamburg.

The cruise ship ports benchmarked were:

- *Australia*: Brisbane, Cairns, Fremantle, Melbourne and Sydney;
- *New Zealand*: Auckland and Wellington;
- *Asia*: Singapore;
- *North America*: Los Angles and Miami; and
- *Europe*: Copenhagen and Tilbury.

Government involvement, institutional settings and practices

Governments influence the operating environment and practices through their direct involvement and the institutional settings under their control. The operating environment, in turn, affects incentives and performance outcomes for individual activities and the overall performance of the system.

Government involvement was examined in the following ports:

- *Australia*: Adelaide, Brisbane, Burnie, Fremantle, Melbourne and Sydney-Port Botany;
- *New Zealand*: Auckland;

- *Asia*: Port Klang, Singapore and Nagoya;
- *North America*: Philadelphia and Los Angeles; and
- *Europe*: Tilbury and Hamburg.

Choice of indicators

BIE benchmarked performance in the 1995 study using indicators of user satisfaction and productivity. This study provides similar information. However, additional indicators of reliability (user satisfaction) have been measured and the scope of the study has been widened to increase the coverage of activities, commodities and ports.

Wherever possible, the Commission has adopted the definitions of indicators used by the Bureau of Transport and Communications Economics (BTCE) for its Waterline publication. This ensured comparability of performance measures between Australian ports over time. It also allowed the Commission to draw on the information already collected to minimise the burden placed on industry.

User satisfaction

Charges for waterfront services are included in the overall cost of transporting goods by sea. They are an important, but not the sole, determinant of user satisfaction. Service characteristics, such as timeliness, reliability and cargo integrity are taken into consideration when shippers (importers and exporters) assess their satisfaction with service.

In this study, considerable effort was taken to report *actual* charges, rather than *scheduled* or *listed* charges. This was necessary because some waterfront industry participants have sufficient market power to discriminate between shippers and their agents in setting charges. Scheduled charges are usually a poor indication of actual charges. The charges benchmarked include government, port authority and stevedoring charges.

Charges are difficult to benchmark because of identification and comparability problems. There are many reasons why the costs of the services are not directly comparable with similar services elsewhere. Many are external factors — such as the cost of inputs — that are outside the control of individual industry participants. Indeed, it may be the case that two service providers are efficient but have different costs of production.

Timeliness of unloading and loading operations has been measured as cargo handling rates. The timeliness of cargo receival and dispatch is also affected by the turnaround time for trucks at container terminals and has been examined to identify its effect on performance. Reliability has been measured by the availability of port services and berths and the variability of port and stevedoring services.

There are two parties involved in waterfront service activities. The reliability of the customer as well as the service provider affect the time taken for the service to be completed. The actions of the customer can affect the commencement of the service. Increases in the time taken to provide the service — taken together with the delay to commencement — result in overall delays to the planned completion of the service.

Reliability has been measured for container operations in each of the following areas:

- pilotage;
- towage;
- ship arrival at port;
- berth availability;
- availability of cargo for loading; and
- stevedoring.

The chosen indicators are those currently being measured by the BTCE for Australian ports. The equivalent information was collected to calculate these indicators for the nominated overseas container and cruise ports.

Productivity

Productivity has been examined using a small number of industry recognised partial indicators. Labour and capital productivity measures are examined covering all of the benchmarked services.

Labour and capital utilisation have been measured also. Stevedoring operations require trained labour which must be available to meet variable work loads. Consequently, labour utilisation is a significant productivity issue. Similarly, port operations are typically capital intensive. However, demand — and hence operational intensity — fluctuates and affects capital productivity.

Data collection

Thompson Clarke Shipping was engaged to collect data and information for a large part of the study. The consultants were engaged because of their detailed industry knowledge and extensive overseas contacts — both of which were essential to the data collection assignment. The consultants task was undertaken in two parts. Part A of the consultancy comprised collection of data and supplementary information for the quantification of indicators and interpretation of comparisons. Part B dealt with governance of ports authorities (and related government involvement) and with the organisation of labour for stevedoring operations.

The consultant was responsible for the collection of performance data for container shipping operations and cruise shipping operations. Information on break-bulk and bulk stevedoring operations were collected by the Commission.

The international fieldwork was undertaken by Thompson Clarke Shipping and its overseas affiliates (see Table 1.1).

Table 1.1 Thompson Clarke Shipping overseas affiliates

Area	*Consultant*
Australia and New Zealand	Thompson Clarke Shipping Pty Ltd
Europe	Eurolist Limited
North America	Mariners Marketing Associates, Inc
Japan	Japan Marine Services Ltd
Korea	Hyopsung Shipping Corporation Ltd
South East Asia	Piers Resources and Services Pty Ltd

Source: Thompson Clarke Shipping (consultant).

The Commission also collected indicative cost data from a large number of Australian importers and exporters to understand the implications of poor performance.

Further information on the data collection methodology adopted in this study is presented in Appendix B.

Interpretation of performance comparisons

There are many factors that affect performance including:

- the cost of inputs;
- the physical characteristics of the port;
- type and size of ship;
- cargo stow; and
- the overall scale and nature of stevedoring operations.

Information was collected to enable the Commission to allow for these factors in its analysis. In particular, information was collected on capital intensity and port characteristics. Additional information was also collected on the diseconomies associated with variable demand when overall throughput is relatively small.

1.3 Report structure

The next chapter (Chapter 2) includes a description of Australia's trade, port and shipping arrangements, to provide the backdrop for the subsequent analysis of Australia's comparative performance.

Government involvement and port authority practices are described and analysed in Chapter 3. Further analysis is presented in Appendix C and D. The purpose of this analysis is to determine the efficacy of the arrangements for the efficient provision of port facilities and an operating environment that is conducive to efficient services. This analysis also provides context for the subsequent analysis of performance.

The charges and performance of services to ships is reported in Chapter 4 (marine services) and Chapter 5 (port and maritime infrastructure). Pilotage, towage, mooring and port infrastructure services for container, bulk grain and cruise shipping are benchmarked.

Stevedoring services for container, break-bulk and bulk cargoes are benchmarked in Chapters 6, 7 and 8 respectively. The passenger baggage handling and other services associated with cruise shipping are reported in Chapter 9.

Interface problems at Australian terminals affect the overall performance of the Australian waterfront. Interface problems are identified in Chapter 10. The implications of these problems for waterfront performance are also discussed. However, no international benchmark comparisons could be made.

Unreliability impacts on exporters and importers by giving rise to costs in addition to direct charges. These ‘indirect costs’ can be significant, particularly when they affect the perceptions of overseas purchasers of Australia as a reliable trading nation. Examples of the costs are presented and their implications for importers and exporters, and in aggregate are discussed in Chapter 11.

2 THE WATERFRONT

The waterfront is part of a complex chain with a large number of participants, services and charging arrangements. Competitive disciplines are limited by a lack of inter-port competition and constraints on entry, as well as problems resulting from incompatible incentives generated by current contractual arrangements.

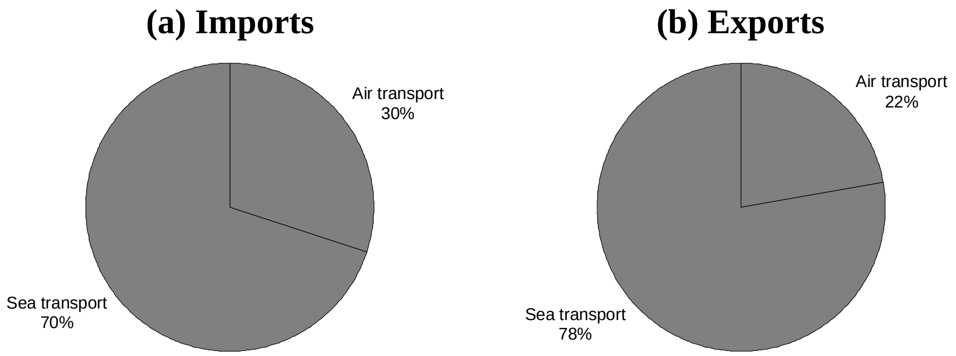
To be efficient, requires high levels of productivity in each of the waterfront services and for the system as a whole to work seamlessly. The key to overall performance is reliability and co-ordination, both among waterfront services and between the waterfront and related land-side services.

The waterfront is an essential link in the services chain for delivery of products from manufacturers and producers to customers. For exports, this encompasses the movement of goods from manufacturers or producers to the wharf, and the loading of goods onto ships. Similarly, imports are unloaded for final delivery to customers.

2.1 Australia's international sea trade

In terms of volume, approximately 99 per cent of imports and 96 per cent of exports were transported by sea in 1995–96. In terms of value, 70 per cent of imports and 78 per cent of exports were transported by sea (see Figure 2.1). Those imports and exports transported by air are generally high value to volume goods.

Figure 2.1 International freight by value and type of transport, 1995–96



Source: BTCE estimates based on unpublished ABS *International Customs Statistics, 1995–96.*

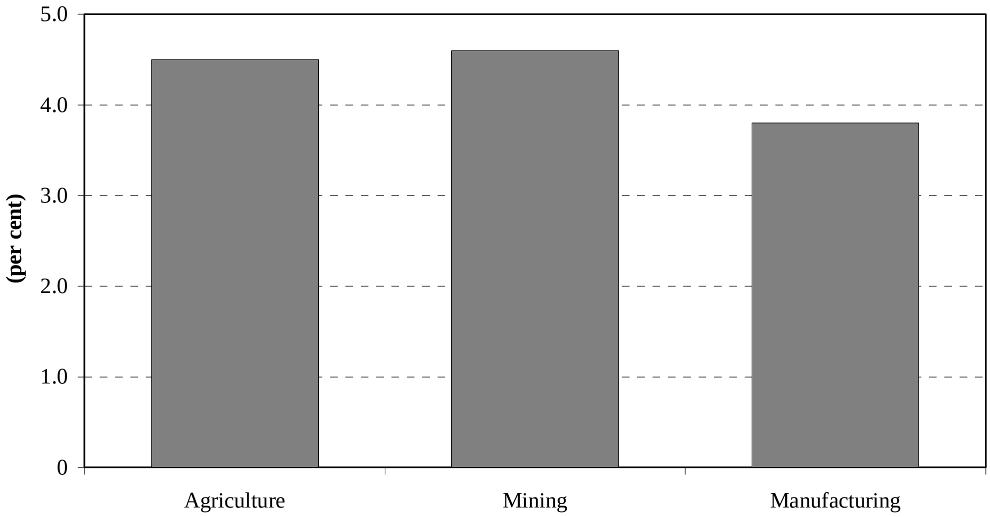
In 1995–96, Australia imported nearly 50 million tonnes of cargo and exported over 370 million tonnes of cargo by sea.

In addition to international shipping, coastal shipping is a significant mode of domestic transport. It is estimated that the freight bill for coastal shipping is about $600 million annually.[1] Approximately 30 per cent by volume of coastal trade is liquid bulk and 60 per cent is dry bulk, mainly mineral ores and coal. About 3 per cent is containerised and 6 per cent is break-bulk and general cargo.

The significance of waterfront costs vary according to the type of cargo (Figure 2.2). For imports of highly transformed goods with an average value of $7500 per tonne waterfront costs represent, on average, 3.5 per cent of the import prices. For exports of basic raw material such as ores, with an export price of around $70 per tonne, waterfront costs average around 4.5 per cent of the export price.

[1] BIE (Bureau of Industry Economics) 1995b, *International Performance Indicators: Coastal Shipping*, Research Report 68, AGPS, Canberra.

Figure 2.2 Waterfront costs as a share of export prices, 1994–95



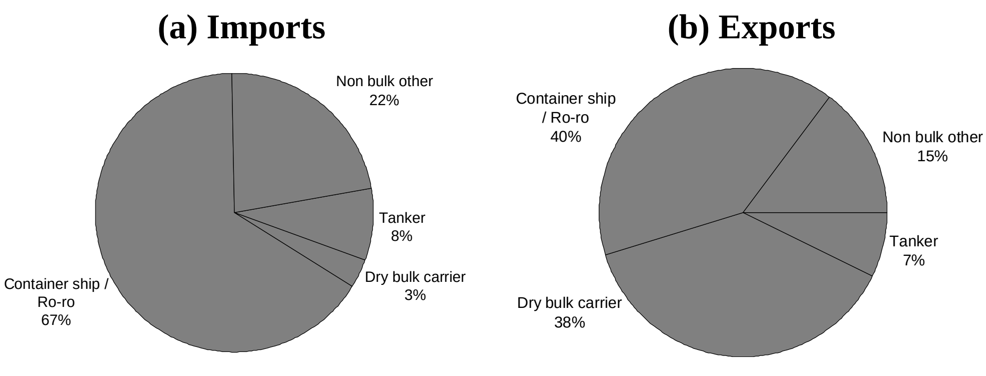
Note: Export prices are defined as free-on-board (fob). They include the price the producer obtains plus the margins (such as transport to the waterfront and the costs of waterfront services and any taxes).

Source: Centre Of Policy Studies 1995.

Trade by cargo type

The type and volume of cargo handled at any particular port determines the type of services and infrastructure required. The composition of Australia's exports and imports by type of ship are presented in Figure 2.3.

Figure 2.3 Value of imports and exports by type of ship, 1995–96



Source: BTCE estimates based on unpublished ABS *International Customs Statistics, 1995–96.*

Both dry and liquid cargo accounted for about 45 per cent of the value of imports in 1995–96 and 75 per cent of imports by volume. Dry and liquid bulk cargo exports represented 45 per cent of total value of exports in 1995–96 and 93 per cent of exports by volume.

Dry bulk commodities such as coal, grain, sugar and minerals generally have dedicated terminal and port infrastructure for each type of cargo. Similarly, liquid bulk cargo carried in tankers requires specialised infrastructure.

Australia's bulk export terminals are among the largest in the world. In the case of mined commodities, the location of the port is largely determined by the location of the mine. For bulk agricultural commodities such as grain and sugar, export terminals are located at seaboard regional centres close to production areas.

Container cargo is mainly shipped on specialised container ships, but it is also shipped on roll-on and roll-off (ro-ro ships) and on conventional ships. The major container ports have specialised cranes for loading and unloading containers from ships, and equipment for the movement of containers around the wharf area. About 66 per cent of the value of sea imports were in containers in 1995–96 or 16 per cent by volume. In the case of exports, 40 per cent of total value and 2.6 per cent of total volume were containerised. The combined value of containerised cargo is estimated to be approximately $60 billion.

Australia's container trade is small by world standards (see Table 2.1 for the size of container trade ranked by volume for the ports benchmarked in this study). For example, Australia's total container throughput is 21 per cent of the Port of Singapore's throughput. Indeed, five of the benchmarked ports have a total throughput greater than that for all Australian ports.

Break-bulk cargo is generally carried on conventional ships — some of which have on-board cranes — and on ro-ro ships. Break-bulk cargo imports represent about 22 per cent of the value of all sea imports in 1995–96 and 10 per cent by volume. Exports of break-bulk cargo in 1995–96 was about 5 per cent of the value of all sea exports and 3 per cent by volume.

Most break-bulk and container traffic flows through ports located close to or in the State capital cities where the majority of goods for export are produced and where the majority of imports for final consumption enter Australia for distribution.

Table 2.1 Relative size of Australian container trade, 1994

Port	*Throughput*	*Relative world size*	*Share of total world trade*
	(TEUs '000)	*(rank)*	*(%)*
Singapore	10 399.4	2	8.3
Pusan	3 212.6	5	2.6
Hamburg	2 725.7	7	2.2
Los Angeles	2 518.6	9	2.0
Nagoya	1 224.4	24	1.0
Port Klang	943.8	30	0.8
Melbourne	*801.2*	*36*	*0.6*
Sydney[a]	*539.0*	*50*	*0.4*
Tilbury	369.2	69	0.3
Auckland	341.2	76	0.3
Brisbane	*232.9*	*102*	*0.2*
Fremantle	*189.3*	*111*	*0.2*
Lyttelton	127.9	143	0.1
Philadelphia	108.8	155	0.1
Sydney[b]	*100.0*	*166*	*0.1*
Adelaide	*66.6*	*196*	*0.1*
All Australian ports	**2 191.7**	**15**[c]	**1.8**

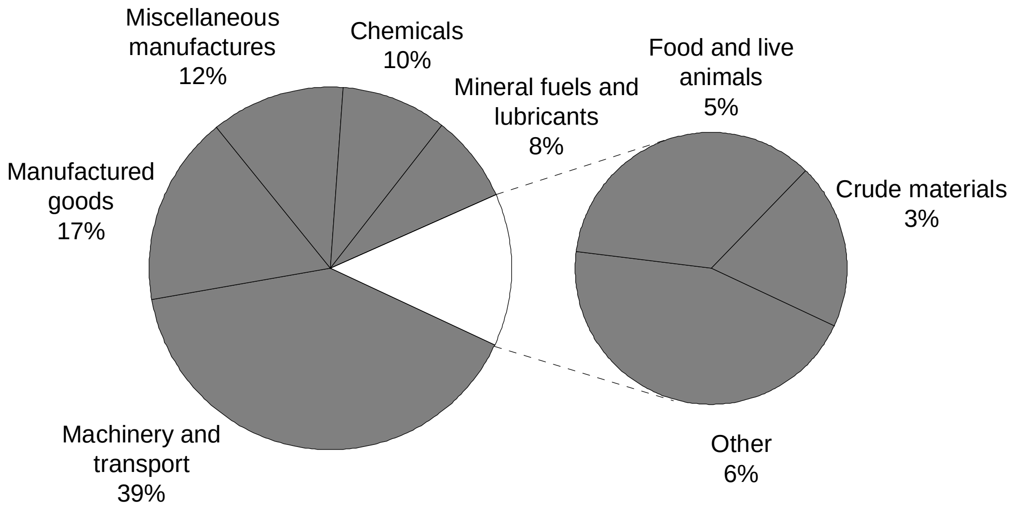
a Port Botany (the port benchmarked in this study).
b Port Jackson.
c Australia's ranking as a country in the top 60 countries.
Note: The total world trade for 1994 was 124.963 600 TEUs.
Source: Container International, 1996.

Trade by commodity

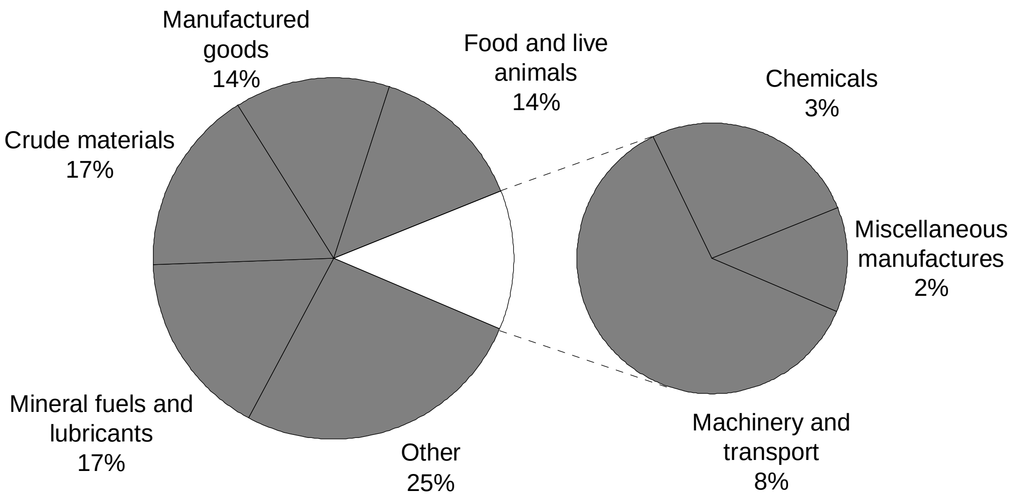
The value of both import and export trade by sea was about $60 billion in 1995–96. The commodity breakdown is presented in Figure 2.4.

Figure 2.4 International sea freight cargo, commodity share by value, 1995–96

(a) Imports



(b) Exports

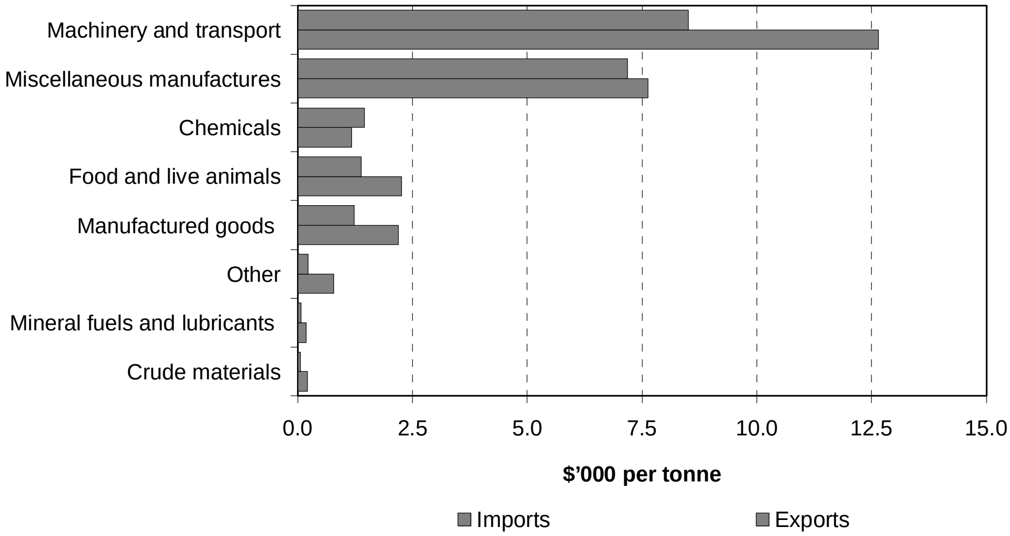


Note: Other includes beverages and tobacco, animal and vegetable oils, fats and waxes, and commodities not elsewhere included and transactions.

Source: BTCE estimates based on unpublished ABS *International Customs Statistics, 1995–96.*

The tonnage value of commodities traded vary significantly across commodity groups. As to be expected for the more highly transformed goods, the tonnage values increase significantly as indicated in Figure 2.5. Accordingly, the impact of waterfront costs is more significant on low value goods.

Figure 2.5 Tonnage values for major commodity groups, 1995–96



Source: BTCE estimates based on unpublished ABS *International Customs Statistics, 1995–96.*

Thin trade volumes

The most significant 'external' factor affecting Australia's relative waterfront performance is the 'thinness' of the liner shipping trades. Australia and New Zealand are disadvantaged relative to many other countries in this respect. Not only is the level of cargo throughput lower, but it is more difficult to provide a high quality of service, because demand is relatively more variable. The consequence of this is that costs can be expected to be higher or the level of service lower in Australia and New Zealand, other things being equal.

Absence of scale economies

One of the underlying factors that explain relative performance are economies of scale and density. Where these exist, the cost of services decrease as relative output increases.

The capital intensiveness of port facilities with significant fixed costs results in average costs falling as output increases (economies of scale). Economies of density arise because of fluctuating demand and the requirement to provide a fixed level of service quality. For example, in the case of towage, the level of service is fixed by the requirement to service the largest ship in adverse weather and the demands of ship owners who want tugs to be always available when their ship sails.

In other waterfront services there can be both economies of scale and density. For example, a greater number of higher capacity cranes can be used as the volume of throughput increases in container terminals, which lowers the average cost of capital equipment. This is possible because idle time reduces as the variability of demand in any given period decreases as demand and the scale of operation increase.[2]

The 'thinness' of shipping trades also restrict stevedoring and shipping competition; facilitate union power; and, increase the difficulty of logistical co-ordination (see Box 2.1). The restrictions on effective competition are particularly significant. Competitive disciplines are important to the achievement of high levels of performance and investment.

Disadvantages resulting from the 'thinness' of trade volumes do not excuse poor performance. Instead, they underline the need for greater effort to ensure that the best standards of service reliability possible are achieved by attending to those factors that industry can influence.

Multi-port calls

A further implication of 'thin' shipping trades — and to some extent the dispersion of Australia's major ports — is that shipping lines engaged in the liner container trades make multiple calls in Australia. As there are economies in ship size, it is not possible to make single port calls and operate large ships in trades with relatively low cargo flows. Indeed, some ships serve both Australia and New Zealand.

Typically, ships in East–West trades call at Sydney, Melbourne, Fremantle and occasionally, Adelaide. In North–South trades, Brisbane, Sydney and Melbourne might typically be served. Elsewhere in the world, ships of comparable size, and larger, typically visit fewer ports in each voyage.

---

2 This phenomena is sometimes referred to as economies of massed reserves. The concept of economies of massed reserves was first introduced by Robinson (1958). In response to uneven or stochastic demand, firms hold a proportion of total capacity in reserve to meet peak demands. The level of 'idle capacity' necessary to compensate for a given level of variability in demand will fall (as a proportion of total capacity) as scale of the plant increases — raising overall asset productivity (Mulligan 1983).

Box 2.1 Performance consequences of 'thin' shipping trades

The variability of ship arrivals and service demand is greater in ports serving 'thin' trades (long, low volume routes) — a manifestation of the law of large numbers. By world standards Australia's shipping trades are 'thin'.

Relatively long delays due to the unavailability of berths occur where demand variability is high. The reason for higher levels of delay is that it is not financially viable to provide sufficient capacity to meet peaks in demand, because investment in container terminals is capital intensive and 'lumpy' (efficiently supplied in large quantum of capacity because of indivisibilities).

The 'thinness' of the shipping trades has sustained conference arrangements and concentration in the purchasing of stevedoring services. This has the potential to strengthen the market power of shipping lines and ensure that their demands are met first, to the possible detriment of the efficiency of the overall service to shippers.

Prior to 1989, the variability in service requirements also led to industry arrangements for stevedoring labour. These were a response to diseconomies associated with fluctuating demand — ensuring better overall utilisation of labour by moving labour amongst stevedores. Although these arrangements no longer apply in major ports, they have left a cultural legacy of water-side labour identifying their interests more closely with their union rather than their employer (See IC 1998).

The relative lack of competition among ports reinforces the market power of the industry union. This occurs because the potential for loss of employment through changes of market share is low.

Stevedores have problems in fully utilising their labour. The service demand for the unloading and loading of ships is variable. Operational difficulties also occur because transport operators prefer to deliver and collect their cargo in normal business hours, whereas ship's operations are twenty-four hours — giving rise to operational difficulties.

The relatively less frequent shipping services in Australia also has implications for port–land interface operations (see Chapter 10).

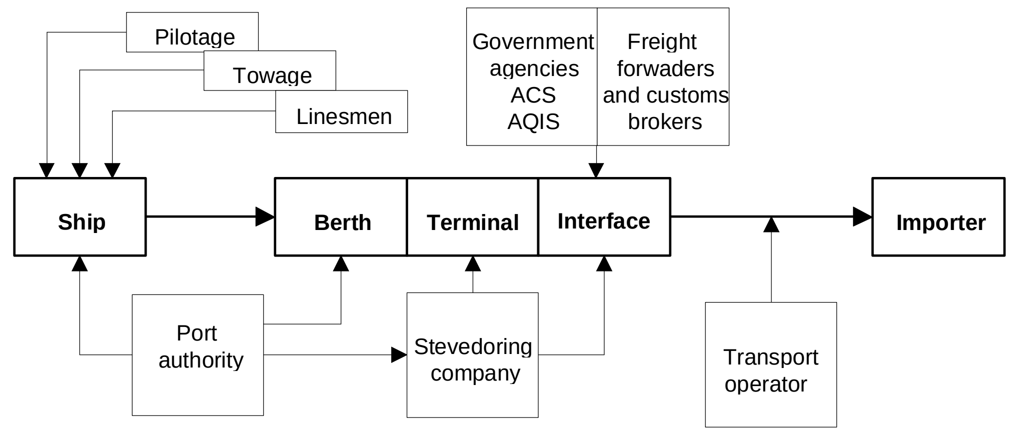
The implication of this multi-port pattern of operation is that disruption to schedules in one port, because of unreliable port and stevedoring services — can have 'knock on' effects. The schedules of services in subsequent ports can be disrupted, creating the potential for further delays to the ship. This can, in turn, cause further problems in the next port visited unless the shipping lines build slack into their service schedule. Moreover, the disruptions to services may delay other ships.

The potential for 'knock-on' effects underlines the importance of eliminating delays and achieving best practice in waterfront service reliability.

2.2 Industry participants

The waterfront participants involved in providing services for imports are illustrated in Figure 2.6.

Figure 2.6 The Australian waterfront: service providers



The movement of cargo across the waterfront involves a large number of services and service providers and depends on the type of cargo involved (container, break-bulk and bulk).

The complexity of the arrangements demands co-ordination and disciplined service transactions. Without co-ordination and discipline the system will not work efficiently and unreliability will ensue. Given the high variability of demand in Australia, flexibility in work arrangements is also critical (IC 1998).

Shippers

There is limited capacity for shippers to have a significant influence because many operators are involved in the movement of cargo across the waterfront and most have little market power.

Shippers of general cargo (containerised and break-bulk) tend to be 'atomistic' — with many provided with a service on each ship voyage. Consequently, they are locked into a particular chain of service which best suits the shipping lines they contract for the carriage of their goods. For example, they cannot decide from whom stevedoring services are provided, the level of services and the prices at which those services are provided.

For bulk trades, the arrangements for shippers, providers of services and the shipping line tend to be more integrated.

Shipping services

Nearly 100 shipping lines provide scheduled services. In addition, a number of companies engaged in mining, petroleum and gas production and some manufacturers, such as BHP and Shell, have their own ships to transport their own production. However, the largest number of ships visiting Australia are bulk carriers. These ships are used for shipments of commodities such as coal, grains, sugar, fertiliser and wood chips.

Many liner shipping services are provided under ‘conference’ and ‘rate agreements’. These arrangements relate to particular trades (traffic between particular destinations) and cover such matters as ship scheduling, tariffs, and arrangements to manage capacity and to provide regular and co-ordinated shipping to and from Australia.

More than 25 cruise ships visited Australian ports during 1996. The total number of port visits by these ships exceeded 140.

Port authorities

Port Authorities in Australia and overseas are responsible for the provision and maintenance of navigation aids, channels and wharves. They co-ordinate the provision of marine services and are sometimes involved in their provision. Port authorities are also involved in port promotion and the provision of land.

Most ports are public authorities or corporations. In recent years, many of the port authorities have been corporatised or privatised and have divested non-core activities. Most authorities have adopted a landlord model — leasing facilities to stevedoring companies and contracting out or privatising the provision of port services such as pilotage, towage and mooring and unmooring.

Private companies under agreements with State governments, operate about 15 ports in Australia. These ports are generally associated with petroleum and mining activities.

Marine service

Pilotage, towage and mooring and unmooring of ships in Australia are typically provided by private businesses. In overseas ports, and particularly in privatised ports, these services are provided by the port owner.

Stevedores

Stevedores unload, sort and dispatch imports and receive and load exports. They also provide services such as power for refrigerated containers. Typically they are private businesses; however, in some ports these services may be provided in part or wholly by the port owner.

Land-side service providers

Outside the waterfront, land-side services are provided by transport operators, custom brokers and freight forwarders, who facilitate the clearance of goods through customs and facilitate financial transactions associated with taking or handing over possession of the cargo. For most imported goods, clearance is required by Australian Quarantine Service (ACS) and by the Australian Customs Service (AQIS) (to prevent illegal imports and ensure the payment of import duty).

Contractual arrangements

Shippers do not contract stevedores to load and unload their cargo — this is done by the shipping line. The indirect contractual link and incompatible incentives can give rise to what are technically referred to as principal–agent problems (see Box 2.2).

Shippers wish to minimise their overall transportation cost for a given quality of service. Shipping lines, with whom the stevedores deal, are primarily concerned with minimising the cost of operating their ships — which are only one component of the total transport cost. In most cases shippers have no direct influence in the negotiation of charges and overall service.

Box 2.2 Accountability under contracting and principal–agent problems

The underlying principle of accountability and the key consideration of principal–agent theory is how those whose money is used to finance an activity (the *principals*) are able to control the performance of those who act on their behalf (their *agents)* and exercise sanctions when necessary (Smith 1990).

Accountability problems arise where the principal and the agent do not share the same objectives. As the level of discretion provided to the agent increases, the opportunity to diverge from the principal's interests increases. The challenge for the principal is to design and implement mechanisms or incentives to induce the agent to act in the interest of the principal, rather than pursue its own interests.

To achieve control it is necessary that:

- for each principal–agent relationship, it is clearly established who is *responsible* for different aspects of the service;
- sufficient *information* is readily available so that the performance of the various principal–agent relationships [activities] is transparent; and
- there is the opportunity for *redress* where substandard performance is identified and a capacity for that to be corrected or sanctions to be imposed.

Source: IC 1996, pp. 82-83.

Efficient contractual outcomes require:

- clearly defined responsibilities to ensure accountability;
- transparent transactions; and
- redress for non-performance.

In the Australian container and some break-bulk trades, shipping lines are not responsible for door-to-door delivery — which is commonly the case in North America.[3] Consequently, shipping lines are not responsible for ensuring the timely availability of cargo at a warehouse and that the port–land interface operates smoothly.

The cost of stevedoring is made transparent by some shipping lines, which itemise the cost in their freight bills. However, shippers are not privy to

---

[3] When containers were first introduced shippers offered through Bills, however this approach was rejected by shippers and consignees who preferred to make their own arrangements. Shippers might explore using through bills as a way of overcoming problems with the timeliness of cargo availability and operations at the port-land interface.

contractual arrangements, particularly service aspects.[4] Moreover, they do not have information to judge performance. Apart from the average stevedoring charge, the only information available to them is the time taken for the ship to depart after they deliver their cargo or the time taken to receive their cargo after a ship arrives in port.

Shippers do not have redress for poor stevedoring performance because their contractual arrangements are with the shipping line. These contracts only cover carriage of cargo.[5]

These contractual problems would not have any great consequence for shippers if the incentives were compatible; that is, if the interests of the ship owner coincided with those of shippers. However, this is not necessarily the case.

Under traditional arrangements, the incentives on the part of the stevedore are such that it is in their interest to satisfy the requirements of the shipping line more diligently than those of shippers. For example, shipping lines have the leverage to ensure that their ships are not delayed, even if this has the consequence of diverting resources away from services performed for the shipper, such as container receival and dispatch. This can result in additional logistic and cargo costs for shippers, manifesting as truck queues. Indeed, stevedores may reduce the overall resources dedicated to stevedoring services other than ship loading and unloading operations under pressure to reduce terminal handling charges by ship owners, with the consequence of increasing cost outcomes for shippers.

Historically, pressures from shipping lines for more efficient stevedoring operations have been equivocal. Although it is in the interest of shipping lines to ensure terminal and stevedoring charges are at a minimum, shipping lines reputedly apply pressure to have stevedores make concessions to labour when their ships are threatened with a delay caused by industrial problems.[6]

---

4 This is the case for containers and small lots of general cargo where the shipping company negotiates stevedoring rates directly with the stevedoring company and these rates are included in the freight rate.

5 This includes the lift-on lift-off ‘over the side operations’, but not wharf or terminal activities.

6 Although not a decisive factor, this behaviour is made easier by vertical links between shipping lines and stevedores.

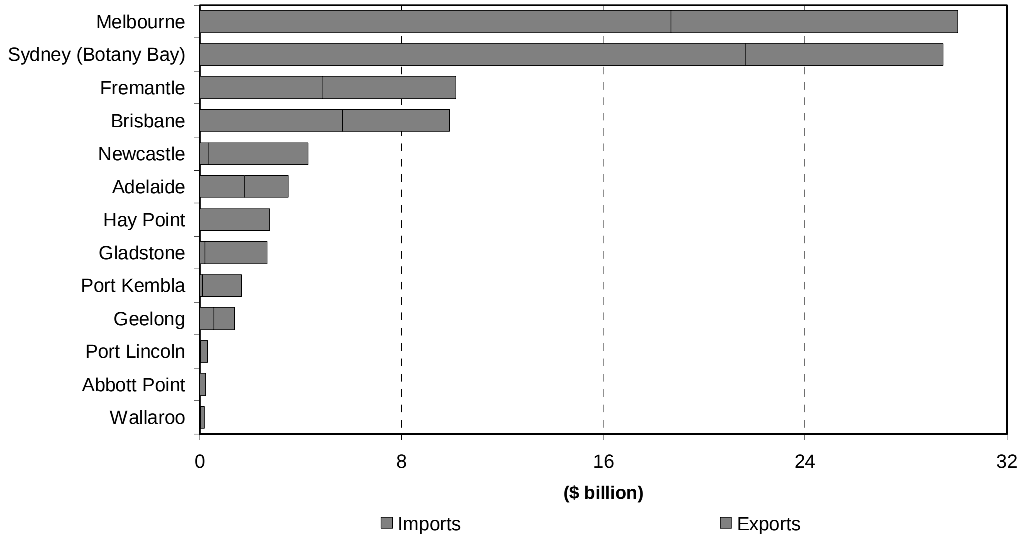
2.3 Ports

About 80 commercial and semi-commercial ports are located around the Australian coastline and on its surrounding islands (see Figure 2.7).

Approximately 98 per cent of sea imports by value enter through the ports of Sydney, Melbourne, Brisbane, Adelaide and Fremantle. Approximately 75 per cent by value of these imports enter either through Sydney or Melbourne ports. Approximately 80 per cent by value of sea exports are shipped through the ports of Sydney, Melbourne, Brisbane, Adelaide and Fremantle. The flow of sea cargo through major ports is illustrated in Figure 2.8.

Figure 2.7 Australia's ports

Figure 2.8 Value of sea freight by major port, 1995–96



Source: BTCE estimates based on unpublished ABS *international trade statistics, 1995–96.*

A number of physical, demographic and land-transport factors limit the scope for competition between ports in Australia (see Box 2.3). Compared with other countries, Australia's ports are widely separated, and its population is small and concentrated in coastal cities.

These factors — reinforced by the 'thinness' of Australia's shipping trades (as discussed above) — inhibit competition. There is not the volume of trade to support numbers of closely located ports with ships visiting at the levels of service frequency required by shippers.

Box 2.3 Physical, demographic and land-transport factors affecting inter-port competition

For bulk cargo, particularly voluminous minerals exports, the choice of port is limited. Either the cargo is shipped through the nearest existing port to which suitable transport is available or which has suitable bulk loading facilities, or a ‘new’ port is developed to handle it. Competition is limited by the relatively high cost of land transport compared to sea transport.

Competition is more feasible for cargo originating in, or destined for, locations midway between two or more ports, or derived from a relatively diverse area. Some agricultural commodities, such as grains, fall into this category.

A large proportion of general cargo, including containers, is destined for, or originates in, Australia’s large capital cities. Except in special cases, such as time-sensitive or high-value cargo, the use of more distant ports is uneconomic.

The feasibility of competition between ports is also affected by cost, frequency and reliability of land-transport links. However, not all main ports are linked into the national standard gauge rail network.

Another factor affecting inter-port competition is the existence of economies of scope and density. If the volume of trade destined for, or from, a particular port is large, it will be relatively less costly per unit of cargo for a ship to call there. Thus ports attracting large shipments, such as Sydney and Melbourne, are advantaged. A port operating on a large scale can also provide more frequent shipping services, with bigger ships operating to a wider range of destinations. Sydney and Melbourne receive twice the number of conference line visits as Brisbane and Fremantle, and some three to four times the number of visits as Adelaide.

2.4 Charges

Waterfront charges and how these are transmitted to users differ according to the type of trade (container, break-bulk and bulk). There are however, some common elements.

Generally, the ‘blue water’ freight rate quoted to a particular port or from a particular destination includes pilotage, towage, mooring and unmooring charges and 'over the rail' stevedoring costs at Australian ports.[7] Notionally, 'blue water' shipping rates are negotiated for each shipper in each ports. In practice, shippers demand and generally receive the same rates as shippers in other Australian ports.[8]

Waterfront charges fall into three categories — ship-based, cargo-based and stevedoring.

Ship-based charges include those for pilotage, towage, mooring and some port authority infrastructure. They are generally based on the gross registered tonnes. These are imposed on ship owners generally via the port authority. Governments also have statutory charges for lights and pollution control infrastructure that are ship- and cargo-based.

Cargo-based charges are for the provision of port infrastructure that is nominally provided for the stacking and sorting of cargo and are borne by the shipper — either directly or passed on by the stevedore. Generally, these charges are becoming less prominent with port authorities shifting most of the charges for port infrastructure onto the shipping line.

The structure of port authority charges varies considerably between jurisdictions. A summary of the ship- and cargo-based charges which currently apply for major ports in Australia is provided in Table 2.2.

Stevedoring charges include those for lift-on lift-off — 'over the rail'— which are borne by the shipping line. They also include charges for wharf handling that are passed on to the shipper. Terminal operators also charge shippers directly for receival and dispatch services.

In addition to these waterfront charges, there are land-side charges. These include those associated with the charges imposed by the AQIS, ACS, customs brokers, freight forwarders, and those costs incurred in getting exports and imports to and from ports respectively.

The typical incidence of charges on imports is shown in Figure 2.9. The relative significance of these charges for containerised cargo on a per TEU basis is presented in Figure 2.10.

---

7 In addition to the 'blue-water' freight rate discussed above, for containers the costs of re-positioning empty containers internationally is borne by the shipping lines.

'Over the rail' stevedoring costs includes the cost of lifting cargo off the ships and placing the cargo alongside the ship only.

8 These are referred to as pan-Australian rates.

Table 2.2 Port authority and related charges for major container ports, 1997

Charges	*Brisbane*	*Sydney*	*Melbourne*	*Adelaide*	*Fremantle*
Ship-based					
Conservancy[a]	Conservancy Dues[a]	-	-	Navigation Service Charge	Conservancy Dues[a]
Tonnage	-	Navigation Services Charge	Channel use Charge	Harbour Service Charge[d]	Tonnage Rates
Berth hire	-	-	Berth hire	-	-
Cargo-based					
Wharfage	Wharfage	Wharfage [c]	Wharfage	Cargo Service Charge	Wharfage
Harbour dues	Harbour Dues	-	-	-	-
Berth charge[b]	-	-	-	-	Cargo Berth Hire

a previously called State government.
b previously called berthing.
c Includes Port Cargo Access Charge.
d All mooring costs associated with ship's initial arrival and final departure at Adelaide are included in the Harbour Service Charge.
\- not applicable.
Source: BTCE *Waterline* 9, December 1996.

Figure 2.9 Flow of charges: Imports

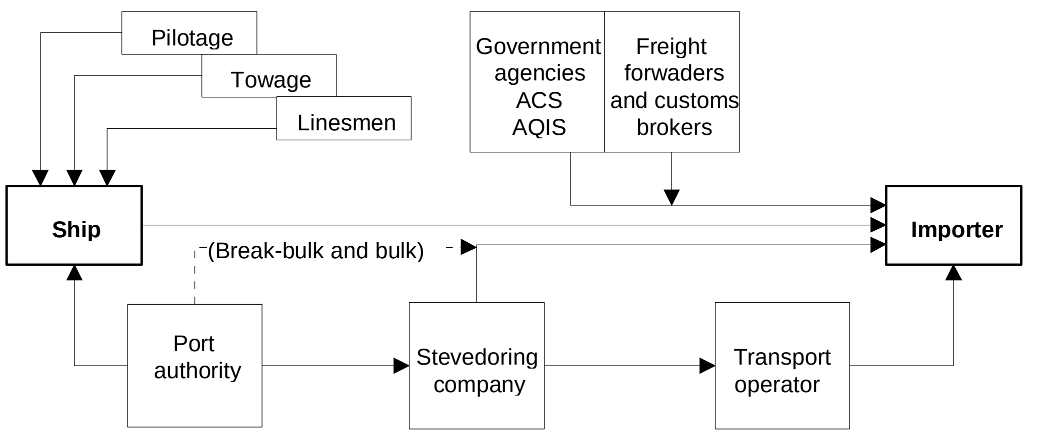
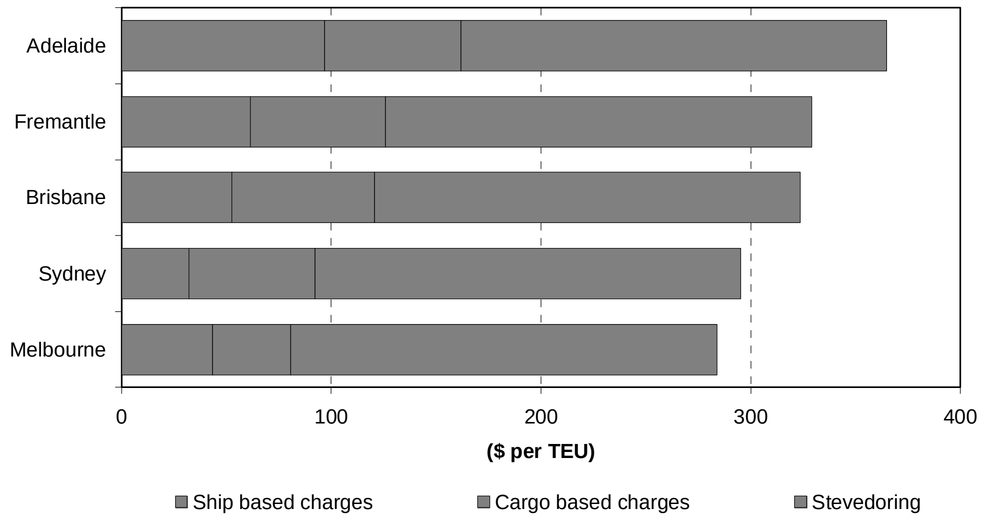


Figure 2.10 Waterfront costs, December 1996



Source: BTCE *Waterline* 10, March 1997.

The per TEU cost of waterfront services is affected by the number of container exchanges at each port call. The smaller the number of TEUs exchanged the higher the per TEU cost, because many of the charges are fixed and relate to servicing the ship. Consequently, the per TEU cost is larger for the smaller ports. This is a manifestation of economies of density and does not necessarily reflect differences in productivity.

Stevedoring charges represented between 55 per cent and nearly 70 per cent of waterfront charges in 1996. Cargo-based charges accounted for 13 per cent of total waterfront charges at the Port of Melbourne and 18 to 21 per cent for other major ports. At the Port of Adelaide, ship-based port charges were 26 per cent of waterfront charges, while at other ports they varied between 10 and 18 per cent (see Figure 2.10).

Container shipping

The principal charges, in addition to the 'blue water' freight charge, identified in the shipping line's account to shippers are :

- Port Services Charge; and
- Terminal Handling Charge.

These charges are specific to Australia and to in-bound conference services. They do not necessarily apply in other circumstances.

The *Port Services Charge* (PSC) is made up of wharfage on full containers charged by the port authority and the Port Pricing Additional (PPA) which arose when the ports of Sydney, Melbourne and Fremantle, shifted a major proportion of their costs from the shipper (importer or exporter) on to the shipowners in 1990. In Melbourne, where a berth hire charge is imposed on the stevedoring companies, this charge is passed on to the shipping lines along with their costs for stevedoring by container terminal operators and is incorporated in the PSC for that port.

In 1996 the AQIS *Container Clearance Charge* (CCC) for imports was included in the PSC. On 1 September 1996, this charge was increased from $3 per container to $6 per TEU container (or $12 per 40 foot container). From 1 February 1997 this charge was standardised to $10.40 per container irrespective of size.

The PPA includes a navigational services charges, tonnage charges, wharfage on empty containers excluding Adelaide and berth hire in Melbourne. The PPA is calculated by comparing costs incurred by ships at ports of Sydney, Melbourne and Fremantle with costs in the base year of 1989. This charge is added to the outward or inward wharfage and the CCC to determine the PSC.

The *Terminal Handling Charge* (THC) is the charge for the equivalent of sorting and stacking in traditional stevedoring. The historical background to the establishment of the THC is provided in Box 2.4.

The THC is currently calculated on a weighted average basis for each port according to:

- ‘conference’ container flows of reefer and general 20 foot and 40 foot containers;
- container flows are multiplied by the respective stevedoring rate (including the movement and storing of containers);
- total stevedoring costs (including the movement and sorting) for all ‘Conferences’ are determined by dividing by the total container flow for each container type; and
- an 80 per cent rule to the above is applied to determine the THC for each container.

Accordingly, a separate equalised THC for each port is specified for each type of container, depending on size.

Box 2.4 Terminal Handling Charge

Prior to the introduction of containers in the late 1960s, the sorting and stacking charges at the wharfs were paid by importers. These related to the movement of cargo from along ships to the wharf shed where the sorting of cargo was carried out. When containers were introduced, the original charge for this activity was referred to as a Basic Service Rate (BSR) and included all charges for door-to-door movement of cargo. When stevedoring charges increased more rapidly than could be recovered by the BSR, the Conferences introduced the Terminal Handling Charge (THC) to extract the stevedoring component of the BSR and commenced treating ‘blue-water’ freight and the THC as separate items.

A formula was introduced in 1986 to determine the THC. The formula was intended to equate the THC to 80 per cent of the costs of unloading containers off ships on to the wharf including the movement and sorting of containers to the stage where they are ready to be picked up from the stevedoring company for delivery to importers.

Source Liner Shipping Services.

Where there are vehicle booking systems in place, registered users are either charged on an annual basis or on a fee-for-service basis. These charges are levied on those involved in the delivery and collection of containers from container terminals.

In addition, to avoid congestion at container terminals, there is a daily charge to shippers if containers are not removed within a specified time.

Waterfront charges make up a small proportion of importer’s and exporter’s freight bills (see examples presented in Box 2.5). Usually, they are less than half of land-side charges and less than a quarter of the blue water freight charge.

The relative size of land-side charges underlines the importance of ensuring that port–land interface operations are efficient and co-ordinated with land-side activities. Providing reliable waterfront services to minimise the delay to shipping schedules is also important because of the significance of shipping line charges. The size of waterfront charges compared with the overall freight bill and the value of the cargo implies that the demand for waterfront services is not affected greatly by changes to the level of charge.

Box 2.5 Examples of shipment costs (freight bill)

	City dry (%)	*Country dry (%)*	*City reefer (%)*
Imports (fob)			
Waterfront			
Port service charge	4.6	8.6[a]	3.3
Terminal handling charge	8.6	-	4.7
All	*13.2*	*8.6*	*8.0*
Land-side			
Delivery order fee	1.8	0.9	-
AQIS fee	-	3.6	1.4
Sea Cargo Automation fee	0.4	0.3	1.2
Customs charge	2.6	-	-
Brokerage fee	6.3	3.1	5.3
Transport charge	10.1	34.6	14.0
All	*21.2*	*42.5*	*21.9*
Blue water freight rate	*65.5*	*48.5*	*70.0*
Total	**100.0**	**100.0**	**100.0**
Exports (cif)			
Waterfront			
Port service charge	3.4	3.5	1.7
Lift-on charge	-	0.5	0.4
All	*3.4*	*4.0*	*2.1*
Land-side			
AQIS fee	-	-	1.2
Transport charge	-	19.0	10.7
All	-	*19.0*	*11.9*
Blue water freight rate	*96.6*	*77.0*	*86.0*
Total	**100.0**	**100.0**	**100.0**

a Includes terminal handling charge.

Note: Example taken from record of an actual shipment, they are not to be regarded as typical. All containers are 20 foot, except the country dry import container which are 40 foot.

Source: Productivity Commission estimates based on information supplied during industry consultation.

Break-bulk shipping

For break-bulk trades, the ‘blue water’ freight rate quoted to a particular port or from a particular destination includes pilotage, towage, mooring and unmooring charges and 'over the rail' stevedoring costs at Australian ports. The charges are port specific.

As with containers, when individual 'blue water' freight rates are negotiated, shippers demand and generally receive the same rates as shippers in other Australian ports. However, there is not a formally accepted industry arrangement. Consequently, shipping lines are free to differentiate their rates to reflect differences in the charges they incur at each port if they wish.

Shippers are also charged a PSC by the inbound conference shipping lines calculated on the same basis as for containers and separately identified in the shipping lines' account to the shipper.

Typically, stevedores charge importers directly for wharf handling. This charge incorporates sorting and stacking services and loading and unloading of cargo for dispatch and receipt. For example, in the case of motor vehicles, the sorting and stacking charge incorporates stevedoring from the top of the wharf ramp to the sorting and stacking area. Shippers of break-bulk cargo may also be charged for storage and area hire.

Shippers are responsible for the payment of any wharfage due to the port authority or corporation.

Bulk shipping

The arrangements for shipment of bulk commodities and materials varies considerably. Some companies, such as BHP and Shell, own ships and ship their own products. Where this is the case, they are responsible for meeting all port services, stevedoring and port charges.

For other commodities, the shipper may be the exporter or the importer. For example, for wheat, the Australian Wheat Board (AWB) is now selling a large proportion of wheat exports on the basis of cost, insurance and freight (cif). The AWB, charters a ship to undertake the voyages necessary to pick up and deliver exports of wheat. The AWB, in this case, is responsible for all costs associated with loading and delivery including all port services, stevedoring and port costs.

For imported bulk commodities such as fertiliser, similar arrangements may be entered into as the terms of purchase may be ex-factory in the country of origin, on wharf or free on board (fob) in the country of origin. In this situation, the importer is responsible for all costs associated with loading and delivery including all port services, stevedoring and port costs.

For the examples cited above, the shipper is responsible for any other charges incurred such as those services provided by AQIS.

3 GOVERNMENT AND PORT MANAGEMENT PRACTICES

Government involvement in the waterfront varies widely internationally. In most Australian ports, governments adopt a landlord only role, while in other ports, they are more directly involved in the provision of services. Similarly, port management practices and policies vary both among Australian ports and between the Australian and overseas ports.

These differences impact on many aspects of waterfront performance and can have significant implications for benchmark comparisons.

Government involvement in the waterfront and the policies and practices of port authorities have significant implications for benchmark comparisons. An understanding of these institutional arrangements is important because they impact on waterfront performance measures. Indeed, for some performance measures, a knowledge of institutional arrangements can help explain observed differences.

The interaction of different levels of government involvement and various polices and practices increases the range of influences affecting benchmarks of port performance. Hence, interpreting the relative performance of several ports is much more complex than making simple comparisons of measures such as port authority charges or crane rates.

3.1 Government involvement

The degree of government involvement in the waterfront in Australia and overseas is outlined in this section. A more detailed treatment is provided in Appendix C.

Ownership of ports

The majority of ports benchmarked in this study are government owned. The precise form of government ownership varies between the various ports. All five Australian ports included in the study are owned by their relevant State government. Of the overseas ports:

- Los Angeles and Hamburg are owned by their city government;
- Nagoya is jointly owned by the city government and the Prefecture adjacent to the port;
- Port Klang and Singapore are owned by the central government; and
- Philadelphia is jointly owned by the two neighbouring State governments.

Two other ports included in this study are partly, or wholly, privately owned. The Port of Auckland is a publicly listed company, however 80 per cent of the stock is held in a community based trust. The port of Tilbury is a privately owned subsidiary of Forth Ports Plc.

The commercial organisation of the government-owned ports varies widely. Hamburg and Los Angeles, are run as government departments. The remaining ports, including all of the Australian ports (except Fremantle) in this study, operate as statutory corporations. Fremantle operates as a statutory authority.

Institutional arrangements

The ports also differ widely in terms of the services offered to port users and customers.

Australian governments have predominantly adopted a ‘landlord model’ of port operation. The landlord model is characterised by the port authority supplying core services only, with the more contestable waterfront services such as stevedoring being supplied by private businesses. The exception in this study is Fremantle, which offers some non-core services such as pilotage.

Among the overseas ports only Los Angeles, Philadelphia and Port Klang have adopted the landlord model. The other overseas ports included in the study are vertically integrated to varying degrees and provide a range of core, cargo and other services.

Both Auckland and Singapore offer a range of waterfront services including pilotage, towage, stevedoring and general port operations. The two private ports are ‘mixed ports’ in that they offer cargo handling services in competition with other private stevedores and terminal operators. In the Port of Hamburg, the City State that owns the port also owns the largest container terminal operation at the port. Other container handling capacity is provided by private operators.

Port authority objectives and governance

Governance refers to the systems and arrangements established to direct and control organisations. A range of governance arrangements may be put in place to control ports and these arrangements may influence the choice and achievement of port objectives.

The Australian ports generally operate as corporatised statutory authorities or as commercialised statutory authorities. Port objectives are generally set out, albeit in general terms, in each authority's enabling legislation. A board is generally appointed to oversee the operation of the authority with responsibility for determining commercial strategy and for the day-to-day operation of the port.

Although port authorities in Australia are largely autonomous, they may be required to follow publicly announced ministerial directives relating to their operations. The use of such directives ensures transparency of government action when the ports are required to pursue a variety of goals on behalf of the public.

In some overseas ports included in the study, port managers have significantly less autonomy. In Hamburg and Los Angeles, for example, the relevant government has considerable powers to direct the day-to-day activities of the port. In Port Klang, the Maritime Division of the Ministry of Transport is required to review all major policy issues.

Only the private ports are free from direct government involvement in their operations. However, the ports are still bound by legislation affecting the operation of any private company, including in the case of ports, marine safety regulations.

The degree of government involvement in determining port authority objectives and governance arrangements has implications for benchmark comparisons. Higher government involvement increases the possibility that port authorities may be required to undertake activities which are not commercially viable, but are justified on other grounds. Pursuit of non-commercial objectives may result in the cost of services being higher than otherwise would be the case. In other cases, charges may be lower when services are provided at subsidised cost.

Financial arrangements

The sources of finance and taxation arrangements under which the ports included in this study operate vary widely. The variation between ports may influence performance measures, such as charges, included in this benchmarking study.

Sources of finance

The extent of government financial contributions and the degree of port authority control over financial arrangements varies considerably among the ports benchmarked. The ports range from Tilbury, which operates in a private commercial manner with no government intervention in its financial affairs, to those such as Hamburg, which operate as government departments.

The corporatised ports lie between these extremes. Corporatised entities, despite their operating autonomy, tend to be subject to government directions on capital raising, investment and payment of dividends.

The degree of government funding or assistance varies widely among the various ports. Tilbury receives no government contribution and nor do the publicly owned ports of Singapore and Port Klang. Los Angeles receives some support for dredging via the US Corps of Engineers when the work is considered of national strategic interest. The ports of Hamburg, Nagoya and Philadelphia receive direct government funding to at least cover operational deficits.

Ports which have access to government financial support, through for example capital grants or loans at concessional interest rates, do not need to recover the full cost of providing services through charges on users. Their charges will, other things being equal, be lower than for ports which do not receive such support. When port authorities are able to access loans at concessional interest rates additional costs may arise, however because the lower interest rates may distort the investment decision and lead to inappropriate investment decisions.

Taxation and dividends

The Australian ports are required to pay State taxes and most are, or will be, making tax-equivalent payments to the relevant State government as if they were paying Commonwealth income and sales tax. These tax-equivalent payments are justified on the grounds of competitive neutrality. They are intended to make government authorities operate under comparable taxation arrangements to those applying to private sector firms.

Only some overseas ports pay income tax and none are required to make tax-equivalent payments. Tilbury, Auckland (the two privately owned ports) and Port Klang are the only ports to pay income tax.

Australian ports are also required to pay a dividend to their State government. This dividend is usually justified as a return on shareholder equity. The dividend payment is influenced by the valuation of the port's assets. (The issue of asset valuation is discussed later in this chapter). Of the publicly owned overseas ports, only Singapore is required to make dividend payments to the government.

The financial cost of taxation and dividend payments will be reflected, other things being equal, in higher charges on users. Australian port authority charges will be higher than those of overseas ports because of the requirement to pay tax equivalence and dividend payments which are not levied to the same degree in other ports.

Regulation and competition

The regulation of waterfront activities in Australia is generally carried out by independent departments or agencies rather than by the port authorities themselves. The separation of regulatory and operational responsibilities is justified on the grounds of avoiding potential conflicts of interest which may arise if regulating activities in which the port authority is involved. Malaysia (where Port Klang is located) and Singapore have also moved to separate the regulatory and operational responsibilities of port authorities.

Nagoya and Port Klang authorities have responsibility for the regulation of waterfront services. For example, in Nagoya, fees and charges must be reviewed by the local Port and Harbour Council and finally authorised by the Port Assembly. In Hamburg the port authority is responsible for the regulation of traffic and the movement of dangerous goods.

Price and competition regulation

The Australian ports appear to be subject to closer price and competition regulation than the overseas ports.

The Competition Principles Agreement entered into by the States, Territories and the Commonwealth removes the exemption previously enjoyed by port authorities (and other government trading enterprises) from the provisions of the *Trade Practices Act 1974*. This ensures that port authorities and other government trading enterprises are now subject to the same general anti-competitive legislation as private companies.

In addition, most Australian States have also established independent prices oversight bodies. In all cases, a specific port must be 'declared' by the relevant minister before its pricing can be subjected to investigation. Details of the specific arrangements vary between States.

Thus far, only the Victorian port industry has been 'declared' to be a regulated industry under the *Office of Regulator General Act 1994*. In other States formal declaration has not occurred. In NSW, the Sydney Port Corporation's fees are approved by the portfolio Minister, but the Independent Price and Regulatory Tribunal (IPART) has the power to set maximum prices. In Queensland, the Port of Brisbane has not been declared a 'government monopoly business activity' and is therefore not subject to the Queensland Competition Authority.

On the basis of the information available to the Commission, the overseas ports do not appear to be subject to close regulatory oversight. Although the publicly owned ports are subject to pricing approval processes, these are not through arms-length independent pricing agencies. However, port authorities overseas are generally subject to their country's general trade practices or anti-trust legislation. One reason for the lack of close regulation is that many overseas ports operate in environments with stronger inter-port competition than exists among Australian ports.

Safety, quarantine and environmental regulation

Safety, quarantine and environment regulations are enforced at all the ports included in this study. Among the Australian ports, safety and environmental regulation is the responsibility of the Commonwealth and relevant State governments. Similar arrangements tend to apply in the majority of overseas ports. However, there are exceptions, for example, in Hamburg and Nagoya responsibility for safety regulation lies with a dedicated organisation. Environmental regulation is the statutory responsibility of the ports of Tilbury and Nagoya.

In Australia quarantine is the responsibility of the Australian Quarantine and Inspection Service (AQIS). Similar organisations exist in the countries whose ports are benchmarked.

3.2 Port management practices and policies

In addition to differences in government involvement in port operations, the management practices and polices of the port authorities themselves differ widely. Differences are evident not only between the Australian and overseas ports but also among the various Australian ports. Detailed information on port management practices and policies is contained in Appendix D.

Infrastructure provision and investment

Capital investment may influence measures of performance, such as ship turnaround times, included in this benchmarking study. However the cost of this investment must be recovered and so may influence port authority charges. Similarly asset valuation methods may influence port authority charges.

Investment assessment

Two broad approaches are adopted by the ports included in this study to assess new investment projects. Some ports set an objective hurdle rate-of-return which must be exceeded for the project to proceed. Other ports adopt a wider range of social, economic and financial criteria when assessing competing investment projects.

The details of specific arrangements vary between ports, but in general, the Australian ports tend to adopt the rate-of-return approach to assessing investment projects. The overseas ports of Los Angeles, Auckland and Tilbury also adopt an objective rate-of-return method to determine investment projects.

In contrast, the ports of Hamburg, Nagoya, Port Klang and Singapore adopt wider social, economic and financial criteria when deciding whether to undertake a particular investment project. For example, in Hamburg, new investment projects are determined on the basis of port capacity, cargo and service demand and safety considerations.

When wider social and economic criteria are used to evaluate investment proposals, there is scope for investment to occur when the cost of that investment will not be fully recovered from user charges. Australian ports tend to adopt the rate-of-return approach and recover the cost of investment through user charges. As a result, Australian charges are likely to be higher than those levied in ports which do not recover investment costs through user charges.

Valuation of assets

The approach taken to value port authority assets will impact directly on the costs to be recovered through charges. The port authorities in Australia and overseas adopt one of two broad approaches to asset valuation — the historical cost approach and the economic or fair market value approach. The method adopted is important because the different approaches to asset valuation may give a different valuation for the same set of assets.

The historical cost approach which involves valuing assets on the basis of their original cost less depreciation is not adopted by Australian ports. However, this approach is adopted by the overseas ports of Hamburg, Nagoya, Philadelphia, Singapore and Port Klang.

The current or fair market value approach is adopted by some Australian and overseas ports, including Brisbane and Sydney as well as Los Angeles, Tilbury and Auckland.

Leasing arrangements

The right to use the physical assets of a port are conferred by the lease agreement. The nature of the lease, and in particular the period for which it is awarded, can have major implications for the nature of competition on the waterfront.

Competitive tendering

Most of the ports included in this study generally do not call for competitive tenders when allocating leases. Leases are typically negotiated on a bilateral basis between the port authority and the lease holder. In these negotiations price is not always the only criterion used to select lessees. For example, in Hamburg the selection of a lessee is based on a combination of commercial, value adding and qualitative criteria.

Competitive tendering is adopted, at least part of the time, in some ports. Sydney and Melbourne use competitive tendering to allocate some leases, but bilateral negotiations may also be adopted, depending on the circumstances of each case. Among the overseas ports, Nagoya and Port Klang use a competitive tendering process to allocate leases.

Lease terms and conditions

Among both the Australian and overseas ports included in this study, leases may be awarded for substantial periods. Typical maximum lease periods being offered in Australia are 21 years. However, in some cases longer leases may be granted with the relevant minister’s approval. Among the overseas ports, lease periods of up to 30 years are offered in Hamburg and Nagoya.

Long-term leases may facilitate higher stevedoring charges by conferring market power, especially if there is no effective competitive selection process at the end of the lease period.

Competitive tendering and contracting out

The degree of competition in the provision of waterfront services is also affected by the extent and nature of any competitive tendering and contracting of service provision. A clear difference of approach can be identified between the largely landlord Australian ports and the more mixed models at overseas ports.

Contracting out

The extent of contracting out depends, to some extent, upon the operational model of the port authority. The Australian port authorities which have adopted the landlord model for their operations undertake very little contracting out of services. But when it occurs it is generally on the basis of commercial criteria.

Among overseas ports the experience is more varied. Hamburg and Tilbury engage in widespread contracting out of service provision to the private sector. Significant contracting out also occurs in the ports of Nagoya, Port Klang and Los Angeles. However, Singapore contracts out very little.

Competitive tendering

Where tendering occurs, different methods may be adopted to award the contract to the successful contractor. These vary from full competitive tendering to direct negotiation with preferred contractors. The method by which the successful contractor is chosen has implications for the incentives generated to ensure improved performance.

The full range of methods of allocating tenders are exhibited by the ports included in the study. Los Angeles adopts a system of competitive bidding for tenders, as do Tilbury and Port Klang. Singapore adopts a more limited competitive tendering approach by inviting selected suppliers to tender. While Nagoya and Hamburg adopt direct negotiation with suppliers rather than public tender to allocate contracts.

Failure to competitively contract out (where appropriate) may result in higher charges for services because the services may not be being supplied by the lowest cost service provider.

Pricing practices

The pricing practices adopted by the port authorities will directly impact on the charges included in this benchmarking study. The degree to which the port authorities decide to recover the full cost of supplying services and the extent of price discrimination are central issues.

Pricing to recover costs

The extent to which prices are intended to recover the full cost of supplying services will have a major impact on port authority pricing levels and structures. Adelaide, Brisbane and Melbourne aim to recover all costs and overheads through charges. In contrast, other ports may not place as high a priority on full cost recovery via user charges.

Among the overseas ports there is a similar distinction between those port authorities which aim to recover costs through charges and those which use their charging structure to pursue other objectives. Some of the overseas ports fully recover costs through charges. In the case of the private ports of Tilbury and Auckland, prices are determined according to market forces and with no direct government involvement.

In other overseas ports, charges are based on criteria other than full cost recovery. For example, in Hamburg, harbour dues are determined on the basis of budgetary needs by the Ministry of Economic Development, not on the basis of cost. In addition, Nagoya and Philadelphia do not base charges on the cost of service provision.

Price discrimination

Port authorities may charge users different prices for the same service or facility. Price discrimination is likely to be widespread amongst the ports included in this study. This is inferred from the ability of port authorities in many ports, both in Australia and overseas, to negotiate prices with individual customers. It is difficult to obtain direct evidence of the extent to which port authorities engage in price discrimination because such information is commercially sensitive.

4 MARINE SERVICES

Service providers levy charges on ship operators to recover the costs of providing pilotage, towage and mooring services.

Pilotage and mooring charges at Australian ports are relatively high for container and cruise ships, but low for bulk ships. Towage for all classes of ships (container, bulk and cruise) are high by international standards.

Differences in charges reflect a range of factors including throughput, the scope for competition, tug and pilot utilisation, the number of tugs used per ship movement and the number of linesman used in the case of mooring and unmooring.

Ships usually require assistance to enter and leave a harbour, berth and to move around within a harbour. These marine services — pilotage, towage and mooring — can either be provided by a port authority or by independent private providers.

Performance information for this study was collected on a shipping trade basis for container ships and for two ship sizes for cruise and bulk (wheat) ships. For a discussion of the methodology employed in collecting the information see Chapter 1 and Appendix B.

4.1 Pilotage

Pilots ensure the safe passage and manoeuvring of ships in a port and its approaches. Pilot services can be provided either by port authorities or by independent entities. Pilotage charges are levied on ship operators.

Pilotage is compulsory in most ports, but exemptions can be made (see Box 4.1).

The significance of pilotage as a share of combined port and maritime infrastructure and marine services charges varies between ships and ports (see Figure 4.1).[1] For example, pilotage as a share of combined charges levied

[1] Combined port and maritime and infrastructure and marine services charges include, government, port authority, pilotage, towage and mooring charges.

on bulk (wheat) ships ranges from 10 per cent at the port of Albany to 2 per cent at Adelaide and Port Lincoln. Pilotage levied on container and cruise ships ranges from 4 per cent at the Port of Fremantle to 12 per cent at the Port of Brisbane (container ships) and 21 per cent at the Port of Melbourne (cruise ships).

Box 4.1 Pilotage at Australian and overseas ports

In Australia, State government legislation makes pilotage compulsory in most ports — for reasons relating both to the safety of ships entering and leaving a port and to the protection of port infrastructure. State legislation also provides for exemptions, the appointment and licensing of pilots and the regulation of charges. Pilotage is also compulsory at most overseas ports with exemptions available under certain conditions. Of the ports included in the benchmarking study, only Copenhagen does not have compulsory pilotage.

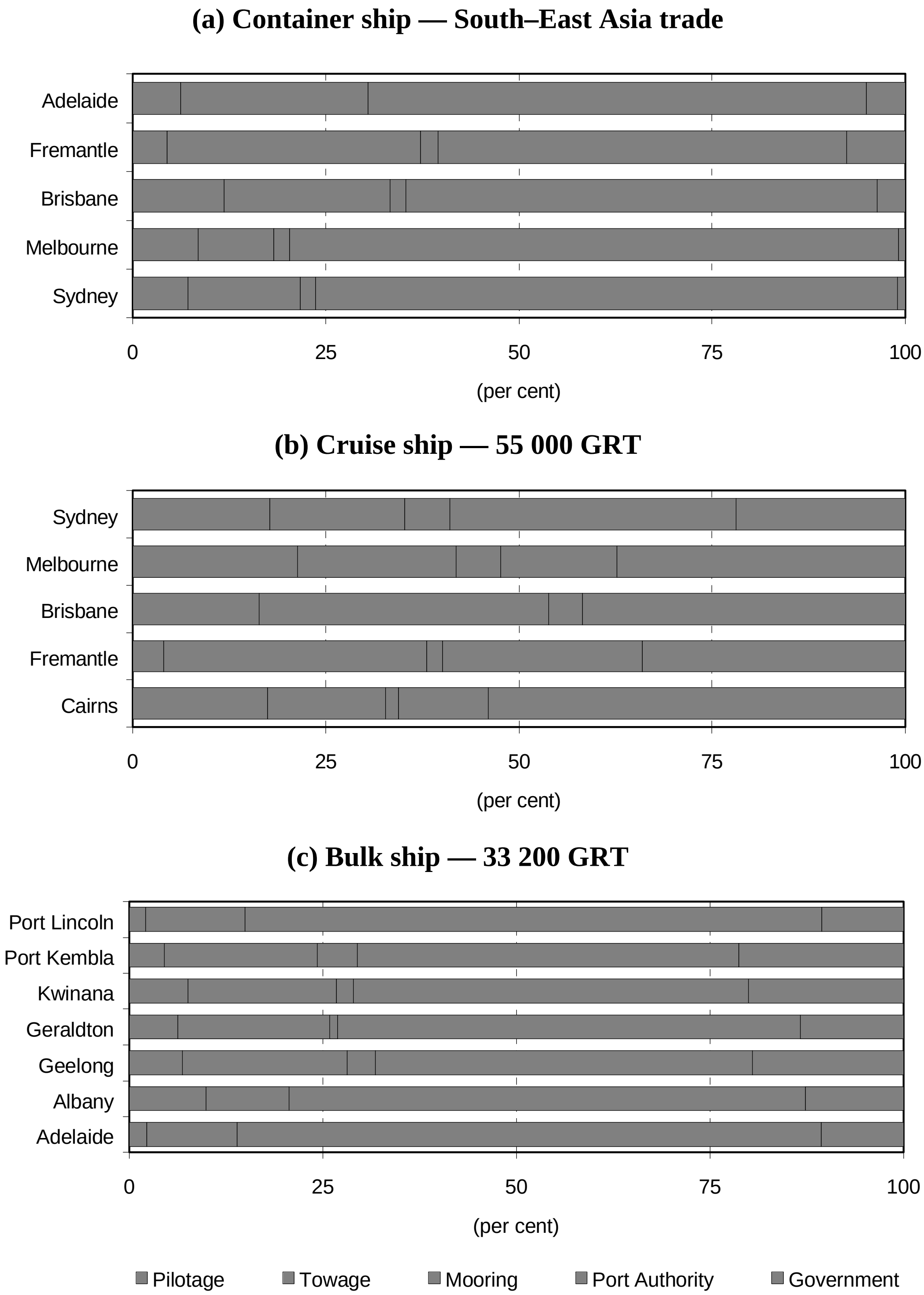
Exemptions are typically made on the basis of ship length or tonnage, category of ship (naval or non-commercial ships) and on whether the ship master holds an exemption certificate. Exemption certificates are awarded once prescribed criteria relating to technical qualifications (master’s certificates of competency), qualifying numbers of voyages into and out of a port within a prescribed period, and a satisfactory standard of examination has been met.

Pilotage services are provided by private operators at the ports of Sydney, Melbourne, Brisbane and Fremantle and by port authorities at the ports of Adelaide and Burnie. Pilotage is provided by the port authority at the ports of Singapore and Auckland and by private operators at Port Klang.

Pilotage charges are generally levied on the basis of the GRT of the ship and depend on the distance of pilotage and the extent of navigation hazards associated with a particular port. Pilotage charges can also be levied on a per service basis, as occurs at the ports of Fremantle and Hamburg, where a fixed charge is levied for each service. There may also be charges associated with the cancellation or detention of a pilot.

In most cases, the structure and level of charges are set out in charge schedules. Actual charges might vary from scheduled charges because of agreements between ship operators, ports authorities and other service providers.

Figure 4.1 Composition of charges at Australian ports, 1997



Source: Thompson Clarke Shipping (consultant) and Asiaworld Shipping (consultant).

Pilotage charges on container and cruise ships at the Australian ports included in the study have fallen, in real terms, over the last four years. For example, at the ports of Fremantle and Sydney pilotage levied on container ships fell 17.3 per cent and 16.5 per cent and pilotage levied on cruise ships fell 15.6 and 14.8 per cent (see Tables 4.1 and 4.2).

Table 4.1 Change in marine services charges — container ships, 1994 to 1996

	Pilotage			*Towage*			*Mooring*		
Port	*1994–95*	*1995–96*	*1994–96*	*1994–95*	*1995–96*	*1994–96*	*1994–95*	*1995–96*	*1994–96*
	(%)	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*
Sydney	-3.5	-13.5	-16.5	-4.1	-4.4	-8.3	-31.7	-5.0	-35.2
Melbourne	-2.6	-3.6	-6.1	-2.6	-3.6	-6.1	18.3	-3.8	13.9
Brisbane	-3.6	-3.7	-7.1	-6.5	-3.6	-9.9	38.2	-3.7	33.1
Adelaide	-2.9	-3.8	-6.6	-3.0	-3.7	-6.6	0.0	0.0	0.0
Fremantle	-3.4	-14.4	-17.3	-4.4	-5.3	-9.4	-3.6	-24.5	-27.2

Note: Calculated in real terms by deflating charges by the appropriate capital city CPI.
Changes in towage charges will not only reflect changes in price but also changes in the services provided.

Source: Productivity Commission estimates based on BTCE *Waterline* (various issues).

Table 4.2 Change in marine services charges — cruise ships, 1994 to 1997

Port	*Pilotage*	*Towage*	*Mooring*
	(%)	*(%)*	*(%)*
Sydney	-14.8	-6.1	-7.8
Melbourne	-12.3	-29.2	12.3
Brisbane	-5.5	10.8	69.8
Fremantle	-15.6	-10.5	-25.7
Cairns	-5.7	-40.6	-32.5

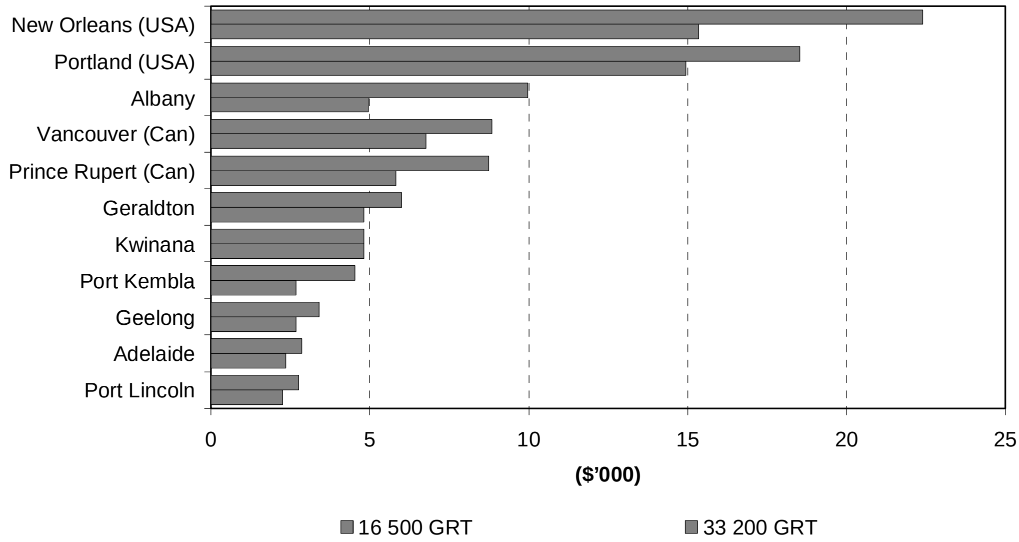
Note: Based on charges levied on a 19 000 GRT ship.
Calculated in real terms by deflating charges by the appropriate capital city CPI.
Changes in towage charges will not only reflect changes in price but also changes in the services provided.

Source: Thompson Clarke Shipping (1994) and Thompson Clarke Shipping (consultant).

Comparisons of pilotage charges

The relativities of nominal pilotage charges vary with the class of ship. Pilotage charges for bulk (wheat) ships at Australian ports are low by international standards (see Figure 4.2).

Figure 4.2 Pilotage charges — bulk ships, 1996–97

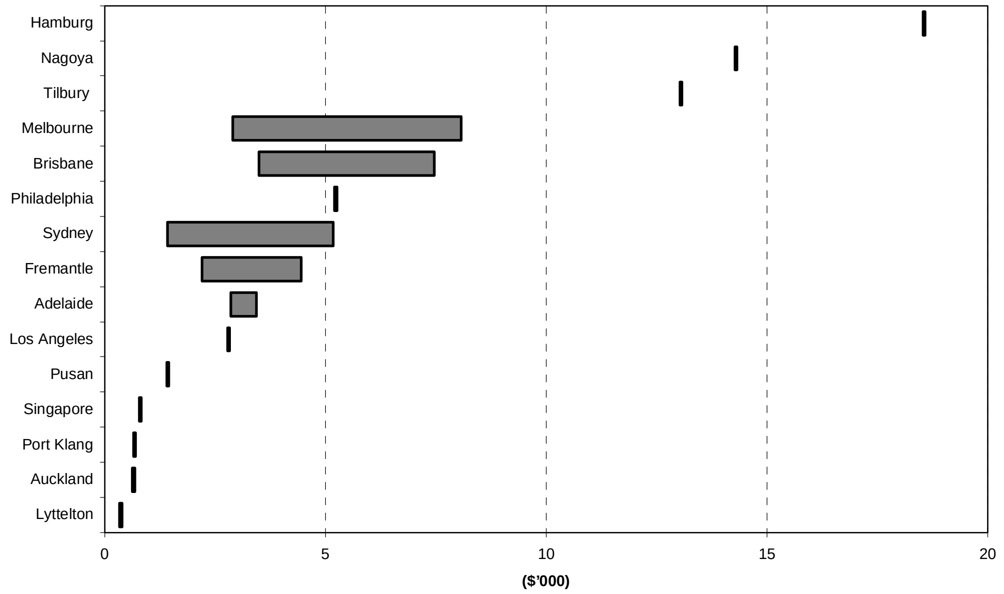


Note: Pilotage charges at the ports of Portland and New Orleans include bar and river pilotage.
Source: Asiaworld Shipping (consultant).

Pilotage charges for container and cruise ships at Australian ports were higher than those in some overseas ports. For example, pilotage charges for container ships at the ports of Melbourne and Brisbane, while generally lower than at Hamburg, Tilbury and Philadelphia, were higher than at the other overseas ports studied (see Figure 4.3).

Pilotage charges on cruise ships at the Port of Fremantle, while low compared to other Australian ports, were still higher than pilotage levied at the Port of Singapore. Pilotage charges at the ports of Brisbane and Sydney were generally the highest of the Australian ports. Pilotage charges at the ports of Melbourne and Brisbane were more than seven times those at the Port of Singapore in the case of the 19 000 GRT ship. At the Port of Sydney, pilotage charges were almost nine times those at the Port of Singapore in the case of the 55 000 GRT ship (see Figure 4.4).

Figure 4.3 Pilotage charges — container ships (all trades), 1997



Note: Pilotage levies vary by ship size. The above chart presents the range of charges for ships of different sizes on different trades. For example, the pilotage charge for the smallest ship in the sample at Melbourne was about $2 900 while the pilotage for the largest ship was just over $8 000. Most overseas ports only accounted for one ship call in the sample and are therefore point estimates. For example, pilotage at Port Klang was about $630.
River and sea pilotage are required at the ports of Tilbury and Hamburg.

Source: Thompson Clarke Shipping (consultant).

Factors explaining differences in charges

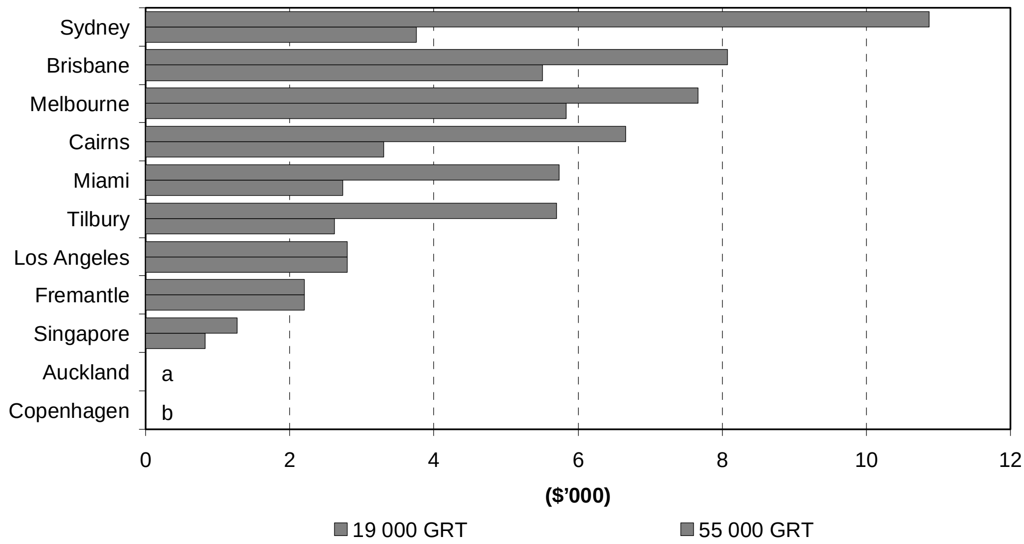
There are a number of factors which can influence pilotage charges, including pilotage distance and the extent of navigation hazards, pilot utilisation, the number of vessel calls, the level of pilot wages and the scope for competition within a port.

Pilotage distance and navigation hazards

At those ports with lengthy and difficult approaches — the ports of Hamburg, Tilbury, Philadelphia, Melbourne and Brisbane — charges might be expected to be higher. Shorter pilotage distance at ports such as Fremantle, Adelaide and Auckland tend to have lower charges. It is unlikely that pilotage distance and navigation hazards explain the relatively high pilotage charges at the port of Sydney.

Pilotage per mile provides an alternative way of comparing pilotage charges across ports — accounting for pilotage distance, but not for the extent of navigation hazards. Smaller ports such as Fremantle and Adelaide have significantly higher per mile pilotage than the larger ports, such as Melbourne and Brisbane (see Table 4.3).

Figure 4.4 Pilotage charges — cruise ships, 1996–97



a	Pilotage charges are not available. They are included with towage and mooring charges.
b	Pilotage not compulsory.
Note:	Pilotage charges at the Port of Tilbury include river and sea pilotage.
	At the Port of Brisbane small ships berth at Sugar Wharf and larger ships berth at Fisherman Islands, and so charges may be levied at different rates.
Source:	Thompson Clarke Shipping (consultant).

Total pilotage charges for the ports of Melbourne and Brisbane were up to four times higher than at the Port of Pusan (see Table 4A.1 in Attachment 4A). However, the Port of Pusan has higher pilotage per mile than both Brisbane and Melbourne. Furthermore, pilotage per mile at the ports of Brisbane and Melbourne is not significantly higher than at the Port of Singapore. Pilotage per mile at the Port of Sydney, however, is significantly higher than would be expected given the required pilotage distance and the number of ship calls to the port (see Table 4.3).

Sufficient resources must be in place to meet demand for pilotage services in peak periods — there are economies of density in provision of pilotage services. Also adequate resources are required to provide pilotage services to the largest ship in the worst weather conditions.

To some extent it is difficult to predict the actual time of ship arrivals and what weather conditions will prevail. Consequently, there will be times when resources are lying idle, and this is obviously more likely at ports with a low number of ship calls. A high number of ship calls could help to explain lower pilotage charges at the ports of Singapore, Port Klang and Pusan (see Table 4.3).

Table 4.3 Pilotage statistics for selected ports, 1997

Port	*Pilotage distance*	*Pilotage per mile*	*Pilots*	*Ship calls per year*	*Ship calls per pilot*	*Pilot wages*
	(miles)	*($)*	*(No.)*	*(No.)*	*(No.)*	*($A)*
Hamburg	81[a]	229	381[b]	13 340	43[c]	91 000
Philadelphia	84	62	65	2 560	39	250 000
Tilbury	58[d]	225	100[e]	2 291	171[f]	87 000
Brisbane	49	129[g]	22	1 804	82	130 000[h]
Melbourne	45	118[g]	29	2 872	99	140 000[h]
Nagoya	42	340	135	9 244	68	235 000
Sydney	12	343[g]	16	2 166	135	82 000 junior 93 000 senior
Port Klang	12	54	45	4 476	99	27 920 junior 59 840 senior
Lyttelton	7	49	5	1 600	320	multi-skilled
Singapore	7	112	136	117 723	866	28 000 junior 78 500 senior
Fremantle	5	550[g]	11	1 786	162	100 000
Los Angeles	5	556	16	2 634	165	151 000
Pusan	4 to 5	281	28	33 409	1 193	162 000
Adelaide	3 to 4	569[g]	5	1 357	271	100 000[i]
Auckland	1.5	55	8	2 291	286	multi-skilled

a Includes river and harbour pilotage.
b Includes 311 river and 70 harbour pilots.
c Ship calls per river pilot.
d Includes sea and river pilotage.
e Includes 83 sea and 17 river pilots.
f Ship calls per sea pilot.
g Based on average pilotage charges for the trades included in the study.
h Remuneration package.
I Less shared expenses to pilot's association for administration costs.
Source: Thompson Clarke Shipping (consultant).

Pilot utilisation

Pilot productivity or utilisation can be measured by the ratio of the number of pilots to the number of piloted ships and may help explain differences in charges. However, because it is not a measure of output — safe navigation — nor takes into account the skill required, this measure is not ideal. Moreover, pilots may provide a number of different services to a ship, including guiding the ship to enter and leave the harbour and move the ship within the harbour if necessary.

Ship calls

Moreover, a low ship call per pilot ratio may not necessarily imply low pilot productivity. At small ports the number of ship calls per pilot must necessarily be lower relative to larger ports if the same level of services is to be provided with fluctuating demand for pilotage services. Furthermore, the time involved in providing pilotage services will vary with the length of pilotage and travelling time to and from the ship and this will also influence the ship call per pilot ratio.

The ratio of ship calls per pilot at Australian ports is generally lower than at overseas ports. Ship calls per pilot at the ports of Singapore and Pusan (low cost ports) is high reflecting the combination of a short pilotage distance and a high number of annual ship calls. Low pilot utilisation at the ports of Melbourne, and Brisbane (high cost ports) possibly reflect long pilotage distance. Low pilot utilisation at the ports of Fremantle and Adelaide possibly reflect the low number of ship calls to these ports (see Table 4.3).

It is not clear that the relatively high pilotage charges at Australian ports are the result of low pilot productivity. Any reduction in pilot numbers may result in delays and a deterioration of service quality, which is likely to be unacceptable to ship operators.

Level of pilot wages

Another factor which might explain the difference in charges across ports is the level of pilot wages (see Table 4.3). However, it is difficult to draw any strong conclusions solely on the basis of pilot wages without a clear understanding of the environment within which wages are determined. In addition, other aspects of pilot remuneration, such as leave and superannuation arrangements impact on the cost of supplying these services. Furthermore, the pilot skills required have different emphasis from port to port, but all require a degree of expertise in confined water navigation and ship handling.

A lack of effective inter-and intra-port competition might also help to explain higher charges in Australia. Providers of pilotage services are not exposed to competitive pressures.

Timeliness of pilotage services

Thompson Clarke Shipping, in consultation with the BTCE, collected some information on the timeliness of pilotage services provided to container ships. Timeliness was assessed in terms of the percentage of ship movements where the pilot boarded the ship within plus or minus an hour of ship movement time, advised by the shipping agent six hours previously.

The limited information obtained does not allow strong conclusions to be made. However, in Australian and most overseas ports, 100 per cent of services were provided within that range. There were two exceptions — 95 per cent of pilotage services were provided within the above range at the ports of Hamburg and Singapore.

Summing up

The significance of pilotage as a share of total port and maritime infrastructure and marine services charges varies between ships and ports. Although pilotage charges on container and cruise ships have fallen over the last four years, pilotage charges at most Australian ports are high compared to overseas ports.

The difference in charges is likely to reflect pilotage distance, difficulty of approach, trade volume, service requirements and inter-port competition. For example, pilotage distance and difficulty of approach might explain high pilotage charges at Brisbane and Melbourne but not Sydney. The comparatively low ratio of ship calls at most Australian ports and the requirement for a regular service might also explain high pilotage charges at some Australian ports. The interaction of these factors makes it difficult to conclude whether there is scope for pilotage charges at Australian ports to fall.

4.2 Towage

Harbour towage involves tugs assisting ocean-going ships to berth and depart a port, or move between berths within a port. Tugs assist ships to manoeuvre through navigation channels, to berth and turn in swinging basins prior to berthing or sailing (see Box 4.2). Towage charges are levied on ship operators.

Box 4.2 Towage operations

Towage services contribute to the safe handling of ships and are an important element of the efficient operation in ports. In addition to assisting the ship under tow, towage services protect other ships and port facilities from damage.

Pilots determine the number of tugs required for a particular ship manoeuvre, on the basis of guidelines set by pilots, or port authorities in conjunction with pilots. Guidelines are primarily implemented to ensure safety within the port. There are a range of complex factors that determine the number of tugs required for a particular ship movement:

- ship characteristics such as size, type of rudder, propulsion system, power and reliability of thrusters and sensitivity to weather conditions;
- human factors including training and experience of ship's master, the pilot and the tug master(s) and familiarity of the ship's master with the port;
- port characteristics such as the size and depth of navigation channels, swinging basins and berths;
- variable factors including weather and sea conditions tides and other traffic in the port and whether adjacent berths are clear; and
- tug characteristics such as bollard pull, manoeuvrability and line handling equipment.

Guidelines typically specify the number of tugs to be used for ships of certain lengths and tonnages and for a range of manoeuvres such as entering and berthing, switching berths while in port and departure from the port. Typically, they do not specify the particular tugs in the port's tug fleet to be used. Towage operators allocate tugs to be used for each ship to rotate their fleet and provide an even number of jobs for each tug. Although towage operators have no direct role in determining the number of tugs used for individual ship movements, their decisions in areas such as tug characteristics and operating procedures have an indirect impact on the number of tugs used.

Towage services are provided by private operators at each of the five Australian ports included in the study and at Port Klang. Towage services are provided by port authorities at the Ports of Auckland and Singapore.

At Australian ports, charges for towage services are specified in schedules published by harbour towage operators. Schedules differ among ports, but contain a number of common elements. The structure generally comprises a basic towage charge based on the GRT and the number of tugs required plus additional charges. Additional charges might include cancellation and deferral fees, waiting time and tow lines. Total towage charges will be determined by the number of tugs used plus any additional charges.

The significance of towage charges varies on both a ship-to-ship and a port-to-port basis. For example, towage charges levied on the 33 200 GRT (bulk) ship range from 21 per cent of combined charges at the Port of Geelong to 12 and 11 per cent at the ports of Adelaide and Albany (see Figure 4.1).

In some cases, towage charges represent a significant share of combined port and maritime infrastructure and marine services charges levied on both container and cruise ships calling at Australian ports. For example, in the case of container ships, towage charges represent 33 per cent of combined charges at the Port of Fremantle and 37 per cent of combined charges at the Port of Brisbane (see Figure 4.1).

Over the last four years, towage charges levied on container and cruise ships have fallen in real terms at the Australian ports included in the study, with the exception of Brisbane (cruise ships).[2] For example, between 1994 and 1996, towage charges levied on container ships fell 9.9 per cent and 9.4 per cent at the ports of Brisbane and Fremantle respectively (see Table 4.1). There were also significant falls in towage charges levied on cruise ships — 40.6 per cent and 29.2 per cent at the ports of Cairns and Melbourne respectively (see Table 4.2). Changes in towage charges over time can either reflect a change in the per tug charge or a change in the number of tugs used to assist the ship.

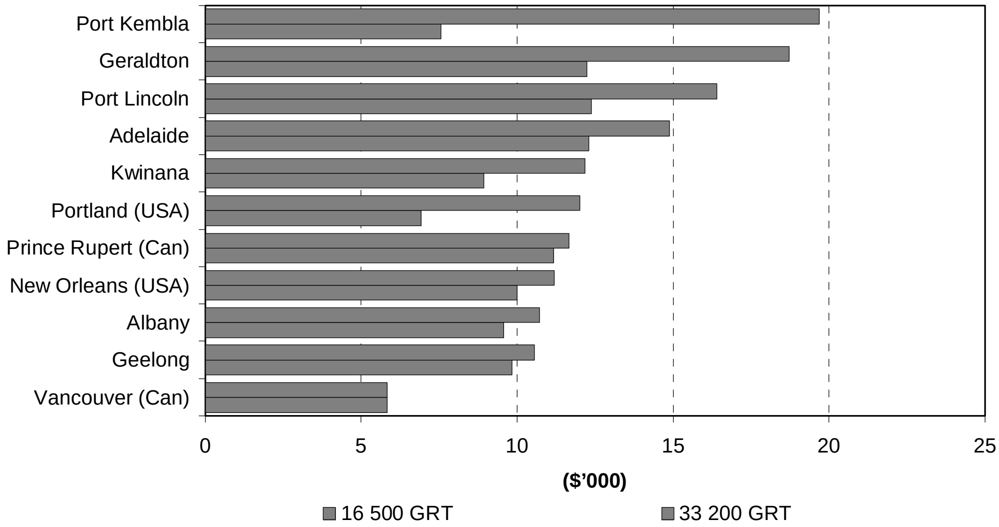
Comparisons of towage charges

Towage charges levied on all classes of ships were generally higher at Australian ports than at the overseas ports included in the study. For example, towage charges on bulk (wheat) ships at the ports of Geraldton, Port Kembla and Port Lincoln, were more than three times as expensive as at the Port of Vancouver (see Figure 4.5).

Towage charges for container ships were highest at the ports of Adelaide and Fremantle. Towage charges at the ports of Melbourne and Brisbane, while low by Australian standards, were still significantly higher than at the ports of Pusan, Singapore and Port Klang (see Figure 4.6).

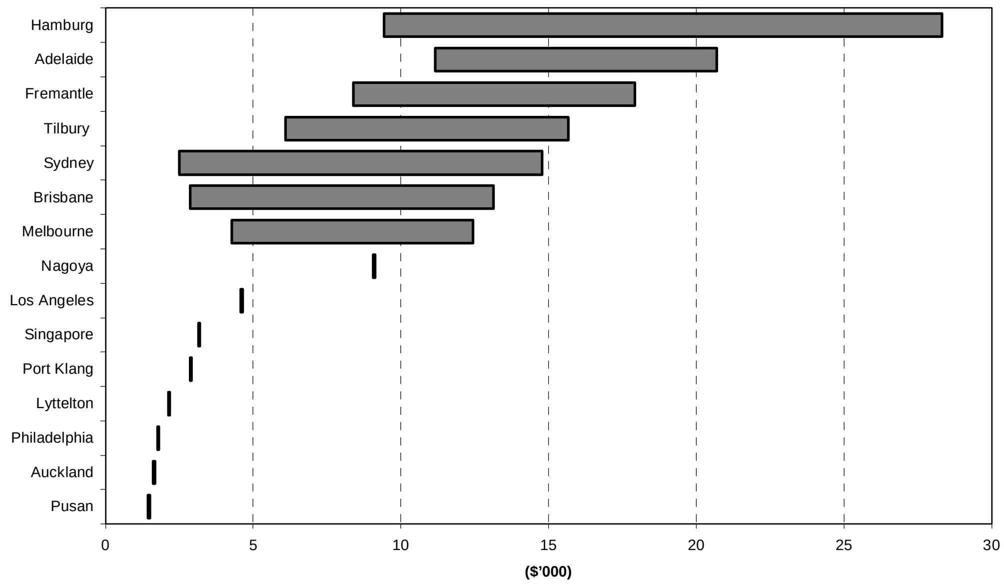
2 Between 1994 and 1997 towage charges levied on cruise ships at the Port of Brisbane increased by 10.8 per cent.

Figure 4.5 Towage charges — bulk ships, 1996–97



Source: Asiaworld Shipping (consultant).

Figure 4.6 Towage charges — container ships (all trades), 1997



Note: Towage levies vary by ship size. The above chart presents the range of charges for ships of different sizes on different trades. For example, the towage charge for the smallest ship in the sample at Melbourne was about $4 300 while the towage for the largest ship was just over $12 400. Most overseas ports only accounted for one ship call in the sample and are therefore point estimates. For example, pilotage at Port Klang was about $2 800.

Source: Thompson Clarke Shipping (consultant).

Towage charges at the ports of Fremantle, Brisbane and Sydney were more than three times higher than at the ports of Copenhagen, Los Angeles and Tilbury for the same sized cruse ships. Of the Australian ports, towage was lowest at the Port of Cairns — still twice as expensive as at the ports of Tilbury, Los Angeles and Copenhagen (see Figure 4.7).

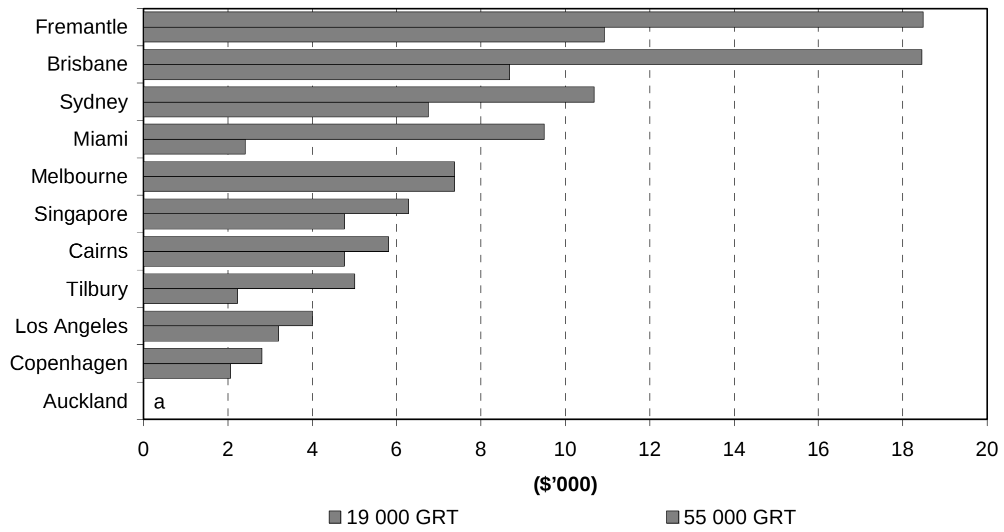
Factors explaining differences in charges

There are a number of factors that influence the level of towage charges, including navigation distance and hazards, the degree of competition facing towage operators, tug utilisation, the number of ship calls and crew size and wages.

Harbour conditions

The harbour towage requirements of individual ports reflect the impact of the physical characteristics of the port, weather conditions, the size and design of ships handled and the needs of shipping lines. Towage charges will be high at ports with difficult approaches. For example, the relatively difficult approach at the Port of Melbourne means that more tugs might be required to berth a ship than at ports with easier access (for example, the Port of Auckland).

Figure 4.7 Towage charges — cruise ships, 1996–97



Note: At the Port of Brisbane small ships berth at Sugar Wharf and larger ships berth at Fisherman Islands, and so charges may be levied at different rates.
a Towage charges are not available. They are included with pilotage and mooring charges.
Source: Thompson Clarke Shipping (consultant).

Competition

Competition in the Australian harbour towage market is generally weak. It is accepted that there is little scope for direct competition between operators of harbour towage services in Australian ports (see Australian Competition and Consumer Commission (1995) and Industry Commission (1993). Towage services at individual ports are generally provided by a single operator and towage is considered to be a natural monopoly in the majority of Australian ports.

The scope for potential competition is also limited as a result of high barriers to entry. These result from high capital costs of entry and associated high sunk costs (the second hand market for tugs in Australia is 'thin').[3] In addition, the towage industry is characterised by economies of scale and vertical integration. For example, several towage operators have vertical links with shipping lines and agents, and providers of mooring services.

The lack of effective competition at the port level and the limited scope for potential competition could contribute to higher charges at Australian ports.

Tug numbers and productivity

The number of tugs per ship movement serves as a partial indicator of tug utilisation and productivity (see Table 4.4). The factors affecting the productivity of pilots will also have an influence on the productivity of tugs (see Section 4.1). Any measure of tug productivity will reflect both the mix of traffic and the extent of the navigation hazards associated with a particular port.

Tug utilisation is generally measured by the ratio of the number of ship calls to the number of tugs. As a measure of capital productivity, tug utilisation may help explain differences in charges. Low towage charges at the ports of Singapore and Pusan are likely to reflect high ship calls per tug ratio (see Table 4.4).

Low rates of tug utilisation typically arise because of the need to have sufficient tugs in place to ensure adequate service quality (in terms of waiting times). In off-peak periods there will be an excess of tugs. Reductions in tug numbers to improve overall tug utilisation and lower towage charges could result in longer ship delays during peak periods — generally unacceptable to shipping lines.

---

3 The ACCC (1995, p. 43) concluded that it was unlikely that entry costs incurred by a new entrant could be recouped if the operator left the market because of limited opportunities in the second hand market in Australia. Opportunities to dispose of tugs overseas might also be limited because of international variations in tug specifications.

Table 4.4 Towage statistics at selected ports, 1997

Port	*Tugs*	*Ship calls per year*	*Ship calls per tug*	*Tug crew size*	*Crew berth ratio*
	(No.)	*(No.)*	*(No.)*	*(No.)*	*(ratio)*
Pusan	22	33 409	1519	4	1.25
Singapore	21	117 723	5606	4	4 masters 4 engineers 10 crew
Hamburg	21	13 340	635	3 or 4	3.5
Nagoya	21	9 244	440	5	1.45
Los Angeles	16	2 634	165	3	2
Port Klang	14	4 476	320	5	3.75 masters 4.4 engineers 3.4 crew
Philadelphia	11	2 560	233	4	1
Tilbury	10	2 291	1 418	5	3.14
Sydney	8	2 166	271	4	2.4
Melbourne	5	2 872	574	4	2.4
Brisbane	5	1 804	361	4	2
Auckland	5	2 291	458	4	na
Adelaide	4	1 357	339	4	1.5
Fremantle	3	1 786	595	4	2.7
Lyttelton	2	1 600	320	4	na

Note: The crew berth ratio provides a measure of the number of crews per tug.
na Not available.
Source: Thompson Clarke Shipping (consultant).

Moreover, if additional tugs cannot be obtained from a nearby port to deal with large ships and the largest ships account for a small proportion of total ship calls, their requirements may contribute to low tug utilisation.

The number of tugs used per ship movement may also indicate over-servicing and unnecessarily high towage charges. The number of tugs per ship movement will, to some extent, be determined by the extent of the navigation hazards and the weather conditions at the time.

The number of tugs used per ship movement at Australian ports is generally comparable with overseas ports on the Europe and New Zealand trades. In most cases, more tugs are used per ship movement at Australian ports on the North American and Asian trades (see Table 4.5).

The use of more tugs per ship movement, in part, explains higher towage charges at some Australian ports. As the primary task of tugs is to ensure the safe passage of ships into an out of port, it is not clear whether more tugs per ship movement reflect over-servicing or the desire to ensure safe passage.

Another factor which might explain the difference in charges across ports is tug crew size and wages. Australian tug crew wages do not appear to be significantly higher than those at some overseas ports (see Table 4.6).

The tug crew to berth ratio measures the number of crews per tug. Tug crews at the Australian ports are generally comparable with tug crew sizes at overseas ports and in some cases are lower. Crew to berth ratios at Australian ports are generally comparable with crew to berth ratios at overseas ports (see Table 4.4).

Table 4.5 Tugs used per ship movement for selected ports, 1997

Port	*Europe West bound*	*Europe East bound*	*US West Coast*	*US East Coast*	*North Asia*	*South East Asia*	*New Zealand*
Fremantle	1 in/1 out	2 in/2 out	nr	nr	nr	2 in/2 out	nr
Melbourne	1 in/1 out	2 in/2 out	3 in/2 out	3 in/2 out	3 in/1 out	2 in/1 out	1 in/ 1 out
Adelaide	nr	2 in/3 out	nr	nr	3 in/2 out	2 in/1 out	nr
Sydney	1 in/1 out	2 in/3 out	3 in/2 out	3 in/2 out	2 in/1 out	3 in/ 2 out	1 in/1 out
Brisbane	nr	nr	nr	2 in/1 out	nr	2 in/ 2 out	nr
Tilbury	1 in/1 out	3 in/1 out	nr	nr	nr	nr	nr
Hamburg	1 in/1 out	3 in/ 2 out	nr	nr	nr	nr	nr
Los Angeles	nr	nr	2 in/1 out	nr	nr	nr	nr
Philadelphia	nr	nr	nr	1 in/1 out	nr	nr	nr
Pusan	nr	nr	nr	nr	1 in/ 1 out	nr	nr
Nagoya	nr	nr	nr	nr	1 or 2	nr	nr
Port Klang	nr	nr	nr	nr	nr	2	nr
Singapore	nr	nr	nr	nr	nr	2[a]	nr
Auckland	nr	nr	nr	nr	nr	nr	1 in/1 out
Lyttelton	nr	nr	nr	nr	nr	nr	1 in/1 out

a One (1) if bow thrusters operational.
nr Not relevant.
Source: Thompson Clarke Shipping (consultant).

Tugs at Australian ports are also used for deep-sea and salvage operations. As a result, larger and more powerful tugs are required than would be the case if tugs were only used for harbour towage. This may contribute to higher towage charges at some Australian ports.

Timeliness of towage services

Charges are only one factor that users of towage services consider to be important. Ship operators also want a timely and reliable service.

Thompson Clarke Shipping, in consultation with the BTCE, collected information on the timeliness of tug services provided to container ships. Timeliness was assessed in terms of the percentage of ship movements, where tugs were in attendance within an hour either side of ship movement time, advised by the shipping agent six hours previously.

Table 4.6 Tug crew wages at selected ports, 1997

Port	*Master*	*Engineer*	*Crew*	*On-costs*
	($)	*($)*	*($)*	*(%)*
Sydney	75 000 to 85 000	75 000 to 85 000	48 000 to 54 000	30 to 35
Melbourne	100 000	100 000	62 500	30
Brisbane	82 000	82 000	55 500	30
Adelaide	75 000 to 85 000	75 000 to 85 000	48 000 to 54 000	30 to 35
Fremantle	75 000 to 85 000	75 000 to 85 000	48 000 to 54 000	30 to 35
Auckland	na	na	na	na
Lyttelton	na	na	na	na
Philadelphia	na	na	na	na
Singapore	44 860	44 860	16 822	na
Los Angeles	na	na	na	na
Port Klang	28 723	26 170	10 851	12[a]
Tilbury	69 000	69 000	39 000	30
Hamburg	73 282	73 282	64 122	na
Pusan	41 291	39 790	27 027	na
Nagoya	129 412	129 412	100 000	30 to 40

a Minimum.
na Not available.
Source: Thompson Clarke Shipping (consultant).

In all cases, with the exception of Melbourne, 100 per cent of towage services at the Australian ports included in the study were provided within the above range.[4]

In most cases, 100 per cent of towage services at the overseas ports in the study were also provided within the above range. In particular, in the North Asia trade, 90 per cent of towage services were provided within the above range at the ports of Melbourne and Pusan respectively. On the South–East Asia trade, 95 per cent of towage services were provided within the above range at the Port of Singapore.

Summing up

The significance of towage charges varies both on the basis of ship type and port. Over the last four years, towage charges levied on container and cruise ships have fallen at most of the Australian ports included in the study. However, towage charges at most Australian ports are still high compared to the overseas ports included in the study.

Higher charges reflect a number of factors including trade volume, service requirements, limitations on competition and the number of tugs used per ship movement. Competition in the Australian towage market is generally weak, with towage services at individual ports being provided by a single operator in most cases. The scope for potential competition is also limited.

Low rates of tug utilisation and the comparatively high number of tugs used per ship movement, might help explain high towage charges at some Australian ports. However, it is likely that any reductions in tug numbers at Australian ports would result in a more infrequent service.

It is thus not clear whether there is scope for towage charges at Australian ports to fall.

4.3 Mooring and unmooring

Linesmen are used for tying up and letting go of the ship, heaving the line from the ship to the wharf and tying the lines to bollards — sometimes assisted by

[4] At the Port of Melbourne (North Asia trade), 97 per cent of towage services were provided within an hour of ship movement time as advised by the shipping agent.

mooring launches. The number of linesmen used depends on the size of the ship and the type of line the ship carries.[5] It will vary from ship to ship.

Mooring and unmooring services are provided by port authorities at the ports of Adelaide and Fremantle and by private operators at the ports of Brisbane, Sydney and Melbourne.[6] Charges for mooring and unmooring are based on the number of staff and time taken to handle the ship at the Port of Brisbane, the GRT of the ship at the Port of Sydney, ship length at the Port of Melbourne, and a flat rate per service at the Port of Fremantle. The charge for mooring and unmooring services at the ports of Adelaide, Singapore, Auckland and Lyttelton is incorporated in other port authority charges.

Mooring charges are generally not a significant component of combined port and maritime infrastructure and marine services charges levied on all classes of ship (container, bulk and cruise). For example, mooring as a share of combined charges levied on bulk ships ranges from 5 per cent at Port Kembla to 1 per cent at the Port of Geraldton (see Figure 4.1).

In the case of container ships, mooring at Australian ports represents 2 per cent of combined charges. In the case of the 55 000 GRT ship, mooring as a share of combined charges ranges from 6 per cent at the ports of Melbourne and Sydney to 2 per cent at the ports of Cairns and Fremantle.

Between 1994 and 1996, mooring charges levied on container ships increased in real terms at the ports of Melbourne and Brisbane and fell at the ports of Sydney and Fremantle (see Table 4.1).

Between 1994 and 1997 mooring levied on cruise ships fell in real terms at the ports of Sydney, Fremantle and Cairns. Mooring charges increased in real terms at the ports of Melbourne and Brisbane (see Table 4.2).

Comparisons of mooring charges

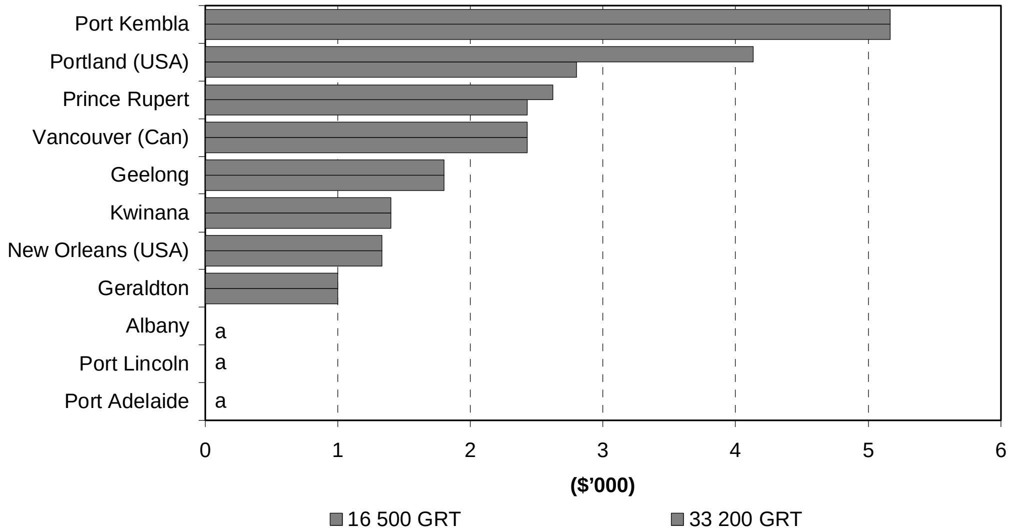
For the study sample, mooring charges for bulk (wheat) ships at Australian ports were generally lower than at overseas ports (see Figure 4.7). However, mooring charges for container and cruise ships at Australian ports were generally high by international standards.

---

5 The type of line can affect the number of men required, polypropylene line is lighter than rope which is lighter than wire.

6 Mooring and unmooring services, at the Port of Melbourne, were previously provided by Melbourne Port Services a subsidiary of the Melbourne Port Corporation. Melbourne Port Services was privatised in 1997.

Figure 4.7 Mooring charges — bulk ships, 1996–97



a Mooring is included in port authority charges.
Note: There is no explicit mooring charge levied at the ports of Adelaide and Port Lincoln.
Source: Asiaworld shipping (consultant).

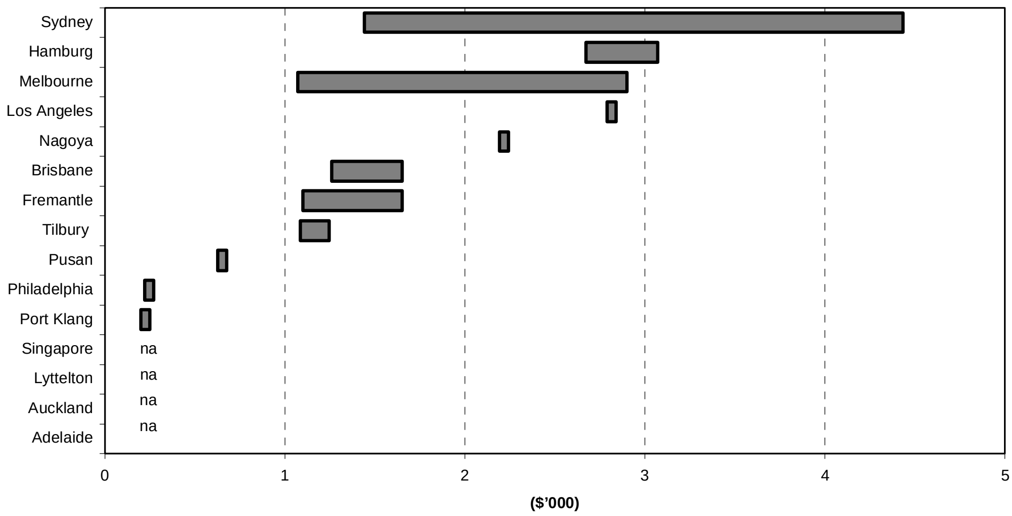
Of the Australian ports, mooring charges for container ships were highest at the ports of Sydney, Melbourne and Brisbane. Mooring charges at the Port of Fremantle, although low by Australian standards, were still up to six times higher than at Port Klang (see Figure 4.8).

Mooring charges for cruise ships were highest at the port of Sydney and lowest at the Port of Cairns. Mooring at the ports of Melbourne and Brisbane were more than twice as high as at the Port of Cairns (see Figure 4.9).

Factors explaining difference in charges

A significant determinant of mooring charges is the number of linesmen used on each ship — the number of linesmen required increases with the size of the ship. More linesmen per ship were used at the Port of Sydney than at most of the other Australians ports and most of the overseas ports included in the study (see Table 4.7). This may help explain why mooring charges were higher at the Port of Sydney than at other Australian ports and most overseas ports.

Figure 4.8 Mooring charges — container ships (all trades), 1997



Note: Mooring levies vary by ship size. The above chart presents the range of charges for ships of different sizes on different trades. For example, the mooring charges for the smallest ship in the sample at Melbourne was about $1 000 while the mooring for the largest ship was just over $2 800. Most overseas ports only accounted for one ship call in the sample and are therefore point estimates. For example, mooring at Port Klang was about $200.

na Not applicable.

Source: Thompson Clarke Shipping (consultant).

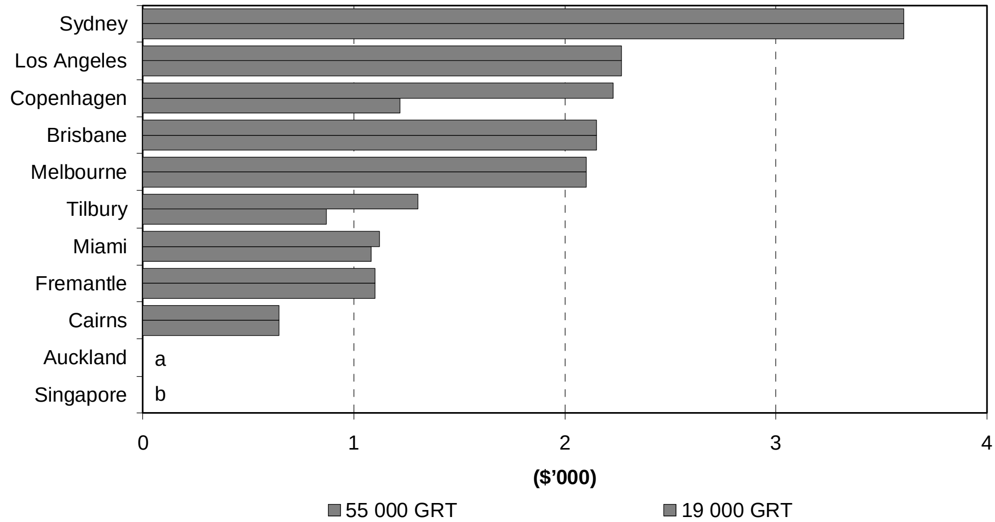
The decision as to how many linesman to use is made by the service provider. Shipping lines have an indirect influence over the number of linesmen used per ship, because the decision is also influenced by the type of lines used.

Summing up

Mooring charges are generally not a significant component of total charges. Over the last four years, mooring charges have increased in real terms at some of the Australian ports in the study and decreased at others.

Mooring charges at most of the Australian ports in the study were high compared to the overseas ports. A significant determinant of mooring charges is the number of linesmen used on each ship. Consequently, there may be scope for mooring charges to fall at some Australian ports in the study if the number of linesman used could be reduced to similar levels used at overseas ports.

Figure 4.9 Mooring charges — cruise ships, 1996–97



a	Mooring charges not available. Included in pilotage and towage charges.
b	Mooring charges are not levied.
Note:	At the Port of Brisbane small ships berth at Sugar Wharf and large ships berth at Fisherman Islands, and so charges may be levied at different rates.
Source:	Thompson Clarke Shipping (consultant).

Table 4.7 Linesmen per ship for selected ports, 1997

Port	*Europe East bound*	*Europe West bound*	*US West Coast*	*US East Coast*	*North Asia*	*South–East Asia*	*New Zealand*	*19 000 GRT*	*55 000 GRT*
Fremantle	6 in 6 out	8	nr	nr	nr	7	nr	6	6
Melbourne	6 to 8	8	6 to 8	6 to 8	6 to 8	6	4 to 5	7	9
Adelaide	nr	8	nr	nr	1 gang in 1 gang out	8	nr	nr	nr
Sydney	10 in 8 out	10 in 8 out	10 in 6 out	10 in 6 out	1 gang in 1 gang out	10 in 8 out	5	8	12 in 10 out
Brisbane	nr	nr	nr	8	na	6 in 4 out	nr	8	8
Cairns	nr	nr	nr	nr	nr	nr	nr	6	6
Tilbury	8	8	nr	nr	nr	nr	nr	6	8 to 9
Hamburg	4	2 to 4	nr	nr	nr	nr	nr		
Los Angeles	nr	nr	6 in 4 out	nr	nr	nr	nr	6 in 4 out	8 in 6 out
Philadelphia	nr	nr	nr	4	nr	nr	nr	nr	nr
Miami	nr	nr	nr	nr	nr	nr	nr	4	4
Pusan	nr	nr	nr	nr	2	nr	nr	nr	nr
Nagoya	nr	nr	nr	nr	2	nr	nr	nr	nr
Port Klang	nr	nr	nr	nr	nr	6	nr	nr	nr
Singapore	nr	nr	nr	nr	nr	5	nr	4	4
Auckland	nr	nr	nr	nr	nr	nr	4	2	2
Lyttelton	nr	nr	nr	nr	nr	nr	4	nr	nr
Copenhagen	nr	nr	nr	nr	nr	nr	nr	2	2 to 4

nr not relevant.

Source: Thompson Clarke Shipping (consultant).

Attachment 4A — Data

Table 4A.1 Pilotage charges — container ships by trade, 1997

($)

	Europe		*New*	*North*	*South–*	*North America*	
Port	*East bound*	*West bound*	*Zealand*	*Asia*	*East Asia*	*East coast*	*West coast*
Australian							
Adelaide	3 390	-	-	3 390	2 860	-	-
Brisbane	-	-	-	7 420	7 238	3 500	-
Fremantle	4 400	2 200	-	-	2 200	-	-
Melbourne	7 217	6 786	3 180	8 031	6 799	2 905	2 905
Sydney	5 120	5 120	1 420	5 120	5 120	3 731	3 731
Overseas							
Auckland	-	-	630	-	-	-	-
Hamburg	18 533	18 533	-	-	-	-	-
Los Angeles	-	-	-	-	-	-	2 781
Lyttelton	-	-	343	-	-	-	-
Nagoya	-	-	-	14 270	-	-	-
Philadelphia	-	-	-	-	-	5 211	-
Port Klang	-	-	-	-	652	-	-
Pusan	-	-	-	1 405	-	-	-
Singapore	-	-	-	-	785	-	-
Tilbury	13 028	13 028	-	-	-	-	-

Note: River and sea pilotage are required at the ports of Tilbur y and Hamburg.
- Port not included in sample for trade.
Source: Thompson Clarke Shipping (consultant).

Table 4A.2 Towage charges — container ships by trade, 1997 ($)

	Europe		*New*	*North*	*South–*	*North America*	
Port	*East bound*	*West bound*	*Zealand*	*Asia*	*East Asia*	*East coast*	*West coast*
Australian							
Adelaide	20 650	-	-	15 840	11 160	-	-
Auckland	-	-	1 620	-	-	-	-
Brisbane	-	-	-	9 360	13 080	2 880	-
Fremantle	17 880	8 390	-	-	16 160	-	-
Hamburg	28 260	9 420	-	-	-	-	-
Los Angeles	-	-	-	-	-	-	4 584
Lyttelton	-	-	2130	-	-	-	-
Melbourne	10 740	5 240	4 270	7 860	7 860	12 400	12 400
Overseas							
Nagoya	-	-	-	9 071	-	-	-
Philadelphia	-	-	-	-	-	1 767	-
Port Klang	-	-	-	-	2872	-	-
Pusan	-	-	-	1 448	-	-	-
Singapore	-	-	-	-	3 140	-	-
Sydney	14 734	5 198	2 514	7 797	10 396	12 215	12 215
Tilbury	15 630	6 087	-	-	-	-	-

Note:
- Port not included in sample for trade.

Source: Thompson Clarke Shipping (consultant).

Table 4A.3 Mooring charges — container ships by trade, 1997

($)

	Europe		*New*	*North*	*South–*	*North America*	
Port	*East bound*	*West bound*	*Zealand*	*Asia*	*East Asia*	*East coast*	*West coast*
Australian							
Adelaide	0	-	-	0	0	-	-
Auckland	-	-	na	-	-	-	-
Brisbane	-	-	-	1 602	1 261	1 436	-
Fremantle	1 600	1 284	-	-	1 100	-	-
Hamburg	3 019	2 672	-	-	-	-	-
Los Angeles	-	-	-	-	-	-	2 789
Lyttelton	-	-	na	-	-	-	-
Melbourne	2 320	2 850	na	1 070	1 720	1 780	1 780
Overseas							
Nagoya	-	-	-	2 193	-	-	-
Philadelphia	-	-	-	-	-	220	-
Port Klang	-	-	-	-	200	-	-
Pusan	-	-	-	627	-	-	-
Singapore	-	-	-	-	0	-	-
Sydney	4 382	3 197	na	4 548	1440	1 546	1 546
Tilbury	1 196	1 087	-	-	-	-	-

na: Separate mooring charges not available for ports of Melbourne and Sydney for the New Zealand trade. There is no explicit mooring charge at the ports of Auckland, and Lyttelton.

\- Port not included in sample for trade.

Source: Thompson Clarke Shipping (consultant).

5 PORT AND MARITIME INFRASTRUCTURE

Port authorities and governments levy charges to recover the costs of providing port infrastructure such as berths, navigational aids and channels. Accurate inter-port comparisons of individual charges are difficult to construct because of differences in terminology and charge structure.

Port and maritime infrastructure charges were generally higher in Australia than overseas. This mainly reflects Australian governments' application of a 'user-pays' approach to infrastructure provision on efficiency grounds. A range of other factors, including port- and trade-specific characteristics, such as trade volume, are relevant when making comparisons.

Governments and port authorities levy a range of charges for the provision of port and maritime infrastructure. Some governments provide navigational aids and pollution control infrastructure outside port boundaries. Port authorities typically levy charges for navigational aids, berths, channels and storage areas within port boundaries.

Port and maritime infrastructure charges levied by governments and port authorities on container ships, cruise and bulk (wheat) ships, are benchmarked in this chapter. Charges were collected on a shipping trade basis for container ships and two sizes of cruise and bulk (wheat) ships (see Appendix B).

Payments made by stevedoring companies to port authorities under leasing arrangements are beyond the scope of this chapter.

Care needs to be exercised when making comparisons across ports to ensure that the impact of institutional arrangements are considered. The level of charges at ports will in part reflect the nature of government involvement and port management practices and policies (see Chapter 3 and Appendices C and D). Without an understanding of the institutional framework in which charges are set, it is difficult to interpret differences in charges across ports. Lower charges are not necessarily synonymous with efficiency.

5.1 Government charges

Charges are levied by governments for the provision of navigational aids and marine pollution infrastructure. These statutory charges include *conservancy dues*, *light dues*, and *oil pollution* charges:

- *Conservancy dues* — charges to meet the cost of providing navigational aids outside port precincts. In Australia, conservancy dues are levied at the ports of Brisbane, Adelaide and Fremantle.[1] Although conservancy is included in the stevedoring charge at the port of Tilbury, Port Klang is the only overseas port to explicitly levy conservancy dues.
- *Light dues* — charges to meet the cost of providing light houses and navigational aids. In Australia, light dues are levied by the Australian Maritime Safety Authority (AMSA), a Commonwealth Government agency. Overseas, light dues are also levied at the ports of Tilbury, Port Klang, Los Angeles, Auckland and Lyttelton.
- *Oil pollution* — charges to meet the cost of infrastructure required to be available in the case of marine oil pollution. In Australia, a marine oil pollution levy is levied against commercial shipping by the AMSA. None of the overseas ports included in the study levy a marine oil pollution levy.

Government charges at Australian ports are generally based on ship size and length, and can generally be spread across a number of calls, for ships on regular schedules (see Box 5.1). In most cases, the structure and level of charges are set out in port authority handbooks and charge schedules.

The overall significance of government charges faced by shipping lines at Australian ports varies depending on the type of ship and cargo. This is, in part, a result of the fixed rate system of government charges, which discriminates against ships which call irregularly. For example, charges faced by cruise ships which may be visiting only one port for a single day within the period for which the charge applies, are disproportionate when compared with container ships which may be high-frequency users, providing a regular service.

The impact of government charges at Australian ports is greatest for cruise ships and least for container ships. For a 55 000 GRT cruise ship, government charges account for between 22 and 54 per cent of combined port and maritime infrastructure and marine services charges — compared with between 11 and

[1] Conservancy dues are levied by State governments in Queensland and Western Australia. In South Australia, the conservancy charge is known as a navigation service charge and is levied by the port authority.

20 per cent for a 33 200 GRT bulk (wheat) ship.[2] In contrast, government charges represent less than 8 per cent of combined charges for container ships (see Figure 5.1).

Box 5.1 Structure of government charges

Conservancy dues

Conservancy dues at the ports of Brisbane and Fremantle are based on the gross registered tonnage (GRT) of the ship and are valid for 2 months. At the Port of Adelaide, the charge includes a fixed charge per visit plus a variable charge based on the GRT of the ship, with a 25 per cent reduction for each additional visit within a 6 month period. Consequently, the per call charge for a ship will be lower the more times it enters a State's waters within the specified period.

Light dues

Light dues are usually levied on the net registered tonnage (NRT) of a ship. In Australia, light dues are levied by the AMSA in the form of a marine navigation levy.[3] The marine navigation levy is payable on arrival at an Australian port and a certificate valid for three months is issued on payment. Only ships with a length of 24 metres or greater are obliged to pay the marine navigation levy. AMSA also levy a marine navigation (regulatory functions) levy to finance such regulatory functions as assessing the seaworthiness of Australian ships and the random inspection of foreign ships to ensure compliance with international regulations. The payment of this levy is calculated on an identical basis to the marine navigation levy. Again, the per ship call charge for a ship will fall the more times it enters Australian waters within the three month period over which the charge is valid.

Oil pollution charges

In Australia, the marine oil pollution levy administered by the AMSA is based on the NRT of a ship. It applies to ships which are more than 24 metres in length and have on board more than 10 tonnes of oil in bulk as fuel or cargo.

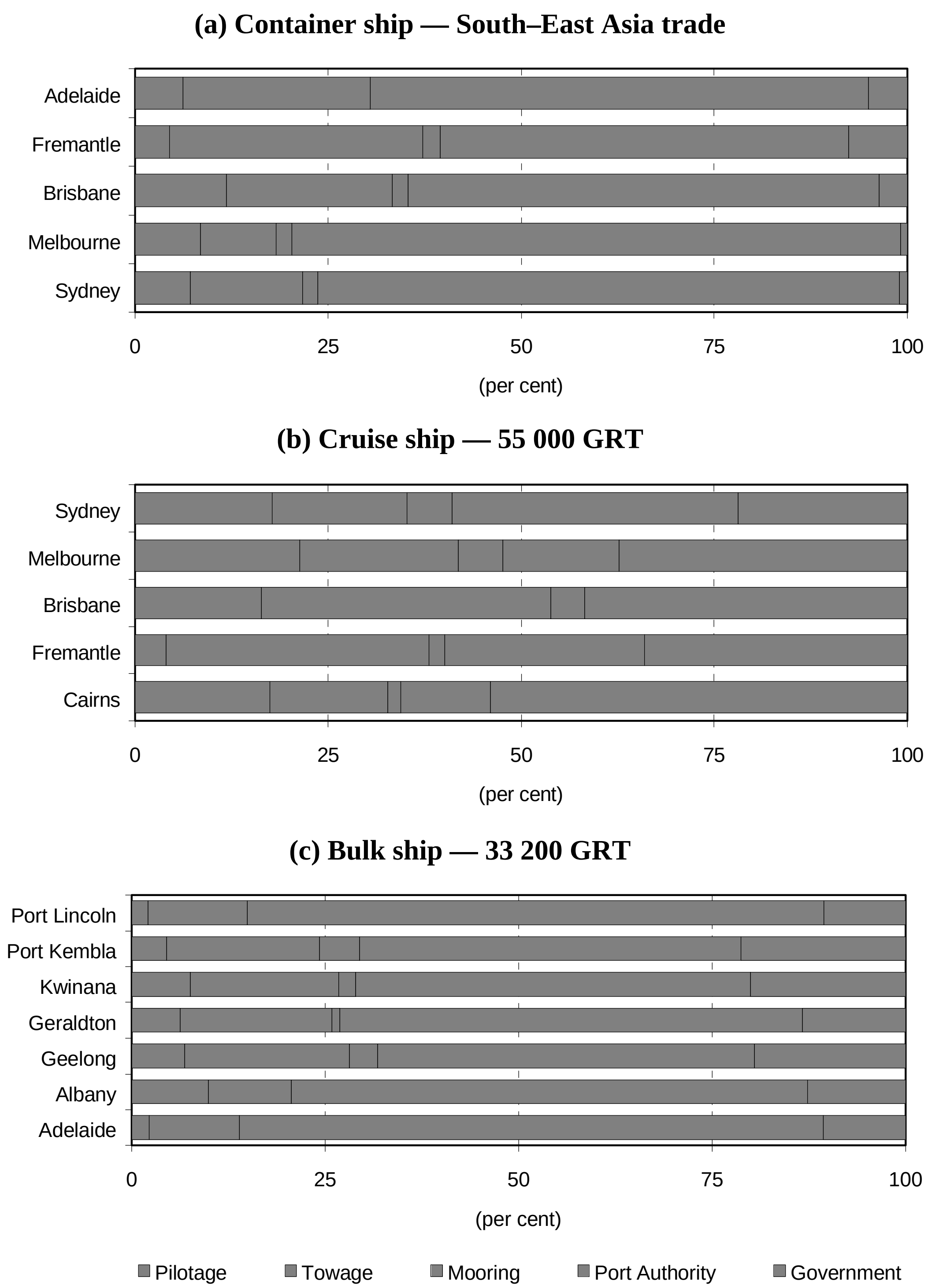
There was a significant decline (in real terms) of government charges at all the Australian ports in the study between 1994 and 1997. For example, government charges at the Port of Melbourne fell 76.5 per cent over this period, reflecting the abolition of State-based conservancy dues at this port.

---

2 Combined port and maritime infrastructure and marine services charges include government, port authority, pilotage, towage, and mooring charges.

3 AMSA's marine navigation levy fell for ships over 20000 tons from 1 July 1997.

Figure 5.1 Share of port and maritime infrastructure and marine services charges at Australian ports, 1997



Source: Thompson Clarke Shipping (consultant) and Asiaworld Shipping (consultant)

Similarly, government charges at the ports of Brisbane and Cairns fell 19.7 per cent over this period (see Table 5.1).

Table 5.1 Change in government and port authority charges — cruise shipping, 1994 to 1997

	Government charges	*Port authority charges*
	(%)	*(%)*
Sydney	-7.5	-16.6
Melbourne	-76.5	-22.4
Brisbane	-19.7	-41.2
Fremantle	-6.1	45.1
Cairns	-19.7	na

Note: Based on charges levied on a 19000 GRT ship.
Calculated in real terms by deflating charges by the appropriate capital city CPI.
na Not available.
Source: 1994 charges from Thompson Clarke Shipping 1994 and 1997 charges from Thompson Clarke Shipping.

Comparisons of government charges

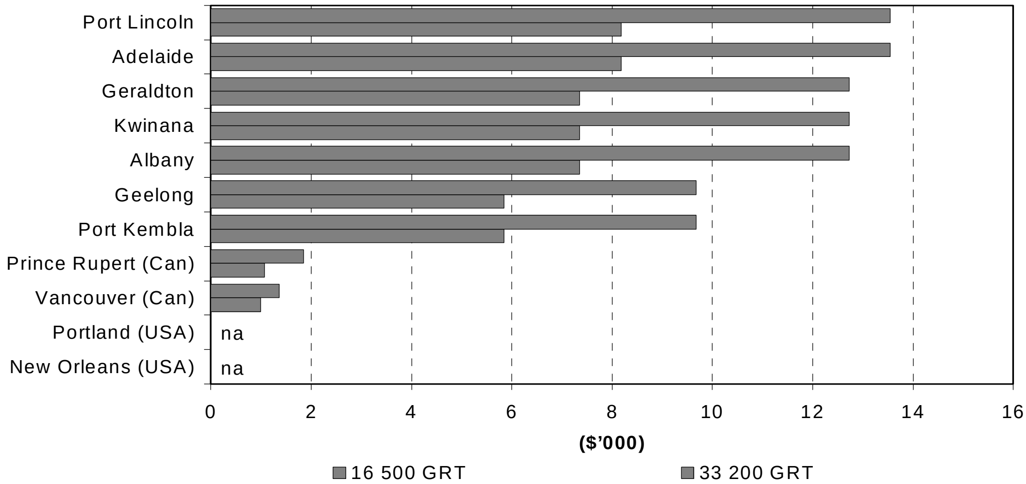
Government charges levied on all classes of ship (container, cruise and bulk) were generally higher at Australian ports than the overseas ports in the sample. For example, only Tilbury — which charges significant light dues — has higher government charges for 55 000 GRT cruise ships (see Figure 5.4).[4] Government charges for bulk (wheat) and container ships exhibited similar patterns (see Figures 5.2 and 5.3).

Factors explaining differences in charges

A significant difference in the structure of government charges between the relatively low cost overseas ports and the higher priced Australian ports is *conservancy* charges. Many of the overseas ports in the sample do not levy infrastructure charges. For example, the lowest cost ports in the container ship sample — Hamburg, Philadelphia, Nagoya and Singapore — have no government infrastructure charges.

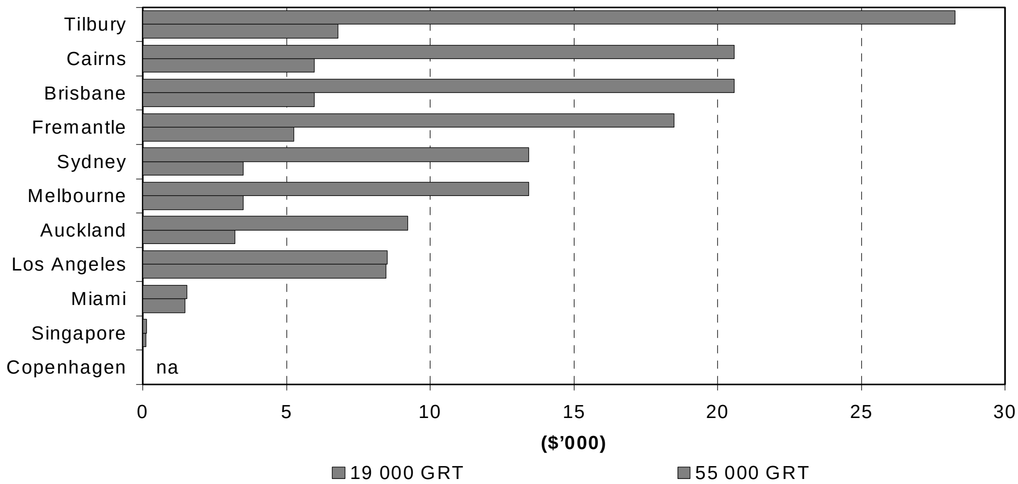
[4] Los Angeles also has high government charges for 1900 GRT cruise ships, and also charges significant light dues.

Figure 5.2 Government charges — bulk ships, 1996–97



Note:	Government charges include conservancy, light dues and oil pollution charges. Government charges at the Australian ports are based on a single call. Government charges at Vancouver and Prince Rupert are levied to finance services provided by the Canadian coast guard.
na	Not applicable.
Source:	Asiaworld Shipping (consultant).

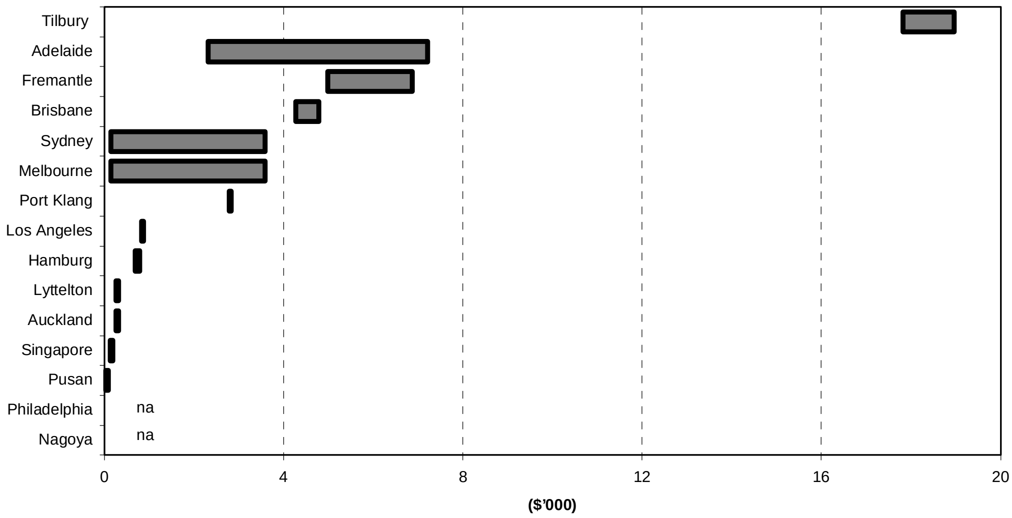
Figure 5.4 Government charges — cruise ships, 1996–97



Note:	Government charges include conservancy, light dues and oil pollution charges. Charges are based on a single call. Government charges levied at Los Angeles and Miami include Agriculture and Customs fees payable on the first 15 calls. US Flag ships calling at Los Angeles and Miami, are exempt from light dues.
na	Not applicable.
Source:	Thompson Clarke Shipping (consultant).

Most overseas governments do not explicitly charge ship operators to finance navigational aids and marine pollution — preferring to finance these through other means. This is also in contrast with Australian governments, whose approach allows a closer alignment of the costs and charges of the provision of such infrastructure.

Figure 5.3 Government charges — container ships (all trades), 1997



Note: Government charges include conservancy, light dues and oil pollution charges. Charges valid for a number of months have been averaged over the number of ship calls made over the year. Government charges vary by ship size. The above chart presents the range of charges for ships of different sizes on different trades. For example, government charges for the smallest ship in the sample at Melbourne were about $140 and just over $3 500 for the largest ship. Most overseas ports only accounted for one ship call in the sample and are therefore point estimates. For example, government charges at Los Angeles were about $630.
Conservancy charges at Tilbury are recovered in the container handling charge. Government charges at Hamburg include a State levy to finance life boats and a seamen's mission.

na Not applicable.

Source: Thompson Clarke Shipping (consultant).

Summing up

Charges are levied by governments for the provision of navigational aids and marine pollution infrastructure. The overall significance of government charges at Australian ports varies depending on the type of ship and cargo. This partly reflects the fixed rate system of government charges, that discriminates against ships calling irregularly.

There was a significant decline (in real terms) of government charges at each of the Australian ports between 1994 and 1997. However, government charges levied on all classes of ship were generally higher than at the overseas ports in the sample. Many overseas governments do not charge directly ship operators, preferring to finance navigation infrastructure and oil pollution control through other means.

5.2 Port authority charges

Charges are levied by port authorities for the provision of navigational aids, berths, channels and storage areas within port boundaries. Typically, the structure and level of charges are set out in port authority handbooks and charge schedules. However, there may be some cases where the actual charges paid by users of port and maritime infrastructure might vary from scheduled charges because of agreements between ship operators and port authorities or owners.

The main charges levied by port authorities are *tonnage*, *berth hire* and *wharfage*:

- *Tonnage* — charges levied on ship operators to recover the cost of dredging and the provision of navigational aids. All Australian and most overseas ports in the study have some form of tonnage charge. Dockage is levied at the ports of New Orleans and Portland (USA).[5]
- *Berth hire* — charges levied on ship operators to recover the cost of providing wharf infrastructure. In Australia, berth hire is levied at the ports of Melbourne and Sydney (on cruise ships). Some overseas ports in the study have a form of berth hire charge.
- *Wharfage* — charges levied on cargo owners to recover part of the cost of providing port infrastructure and facilities. All Australian and overseas ports in the study have some form of wharfage.[6] However, individual ports exempt some classes of ship.[7]

---

5 Dockage is levied by each facility operator for the use, maintenance and up-keep of the dock and is normally levied on the ship operator.

6 At the Port of Adelaide, wharfage is referred to as a cargo service charge.

7 Wharfage is levied on container ships by all the ports in Australia. The port authorities of Nagoya and Hamburg do not levy wharfage on container cargo. Wharfage is included in container handling charges at the ports of Singapore, Port Klang, Philadelphia and Tilbury. Wharfage is not levied on cruise ships entering any of the Australian ports, with the exception of the Port of Cairns. Wharfage is also levied on cruise ships in the ports of Singapore, Tilbury, Los Angeles and Miami. With the exception of the ports of Vancouver and Prince Rupert, all the ports in the study levy wharfage on bulk cargo. (A service and facility charge is levied on bulk cargo owners using the Port of Portland in the USA. It is

Most port authority ship-based charges are levied on the basis of the size of the ship. Cargo-based charges such as *wharfage* are levied on the basis of the unit of cargo being carried, for example on a per TEU basis in the case of container cargo or on a per tonne basis in the case of bulk cargo (see Box 5.2). Unless both cargo and ship-based charges are included in any comparisons, differences in charges are not likely to reflect relative cost performance.

Box 5.2 Structure of port authority charges

Tonnage

At the ports of Sydney and Melbourne, tonnage is based on the GRT of the ship, and is known as the *navigation services charge* and the *channel use charge* respectively. At the Port of Adelaide it is known as a *harbour service charge* and is levied as a fixed charge plus a variable charge based on the GRT of the ship per hour at berth. At the Port of Fremantle it is known as *tonnage rates* and is based on the GRT of the ship.

Berth hire

Berth hire can be based on the time a ship occupies a particular berth, the size of the ship or on the cargo being loaded or unloaded. At the Port of Melbourne ship-based *berth hire*, is levied in some cases on the ship operator and in other cases on the terminal operator, depending on which dock is used. In most cases the terminal operators pass this charge onto ship operators.

Wharfage

Wharfage is levied on cargo owners. As port authorities have no direct relationship with importers or exporters, wharfage is generally collected by ship operators through a direct wharfage charge or through a port services charge. Additional cargo-based charges are levied at the ports of Brisbane and Fremantle.[a]

In the case of containers, port authorities generally levy separate wharfage rates for 20 and 40 foot containers and for loaded and empty containers. Different wharfage rates may also apply to incoming and outgoing cargo. Wharfage is typically levied on a per TEU basis.

a Harbour dues are levied on exporters and importers at the Port of Brisbane. A cargo berth hire charge is levied on importers and exporters at the Port of Fremantle.

---

only charged on the West Coast of the USA and is a cargo based charge, primarily including a wharfage component).

Where port authorities do not levy ship-based charges it is likely that port authorities will levy higher cargo-based charges to recover the costs of providing port infrastructure.

Total wharfage charges levied per ship call will be determined by how much cargo is loaded and unloaded. In the case of container cargo it will also depend on the composition of cargo as most port authorities levy different wharfage rates on empty, full, 20 foot and 40 foot containers. Therefore, total wharfage charges for two similar sized ships visiting the same port could vary significantly, depending on the amount and composition of cargo exchanged.

In order to make comparisons of total port authority charges levied on container ships, it is necessary to estimate cargo-based charges, by making assumptions about the composition of the cargo being loaded and unloaded at a port (see Table 5.2).

Table 5.2 Cargo composition used in calculating wharfage charges per ship call — container ships, 1997

Port	*Average exchange* [a]	*Full*		*Empty*
		Inward	*Outward*	
	(TEU)	*(%)*	*(%)*	*(%)*
Sydney	814	45	45	10
Melbourne	825	45	45	10
Brisbane	510	45	45	10
Fremantle	353	45	45	10
Adelaide	477	45	45	10
Los Angeles	1386	45	45	10
Pusan	665	45	45	10
Auckland	545	45	45	10
Lyttelton	253	45	45	10

a: Average exchange calculated as a weighted average. Weighted by share of ship calls to each port for each trade.

Source: Productivity Commission estimates based on Thompson Clarke Shipping (consultant) data.

Port authority charges for container and bulk ships (wheat) are generally the most significant component of combined port and maritime infrastructure and marine services charges (see Figure 5.1). For example, port authority charges for container ships on the South–East Asia trade accounted for between 53 and 79 per cent of combined charges at the ports of Melbourne and Fremantle, respectively. Similarly port authority charges for a 33 200 GRT bulk (wheat) ship accounted for between 49 and 75 per cent of combined charges at the ports of Geelong and Adelaide, respectively (see Figure 5.1).

The significance of port authority charges levied on cruise ships varies from port to port. For example, in the case of the 55 000 GRT ship, port authority charges account for between 37 and 12 per cent of combined port and maritime infrastructure and marine services charges at the ports of Sydney and Cairns, respectively (see Figure 5.1).[8]

There was a significant decline (in real terms) in port authority charges at Sydney, Melbourne and Brisbane between 1994 and 1997. For example, at Brisbane, port authority charges levied on cruise ships fell 41.2 per cent, reflecting the Brisbane Port Authority's policy of eliminating ship-based charges (see Table 5.1). Although there were similar falls for charges on container ships at most Australian ports, port authority charges at the Port of Melbourne increased by about 6 per cent over the same period (see Table 5.3).[9]

Table 5.3 Change in port authority charges — container ships, 1994 to 1996

Port	*1994 to 1995*	*1995 to 1996*	*1994 to 1996*
	(%)	*(%)*	*(%)*
Sydney	10.9	-13.8	-4.5
Melbourne	27.1	-16.5	6.2
Brisbane	-17.8	16.4	-4.3
Adelaide	0.6	-26.7	-26.3
Fremantle	18.6	-31.2	-18.4

Note: Calculated in real terms by deflating charges by the appropriate capital city CPI.
Differences in charges over time might reflect the impact of movements in the level of cargo-based charges associated with changes in cargo exchange and composition.

Source: Productivity Commission estimates based on BTCE *Waterline* (various issues).

8 At the Port of Brisbane large ships berth at Fisherman's Island and small ships berth at Sugar Wharf. Ships berthing at Fisherman's Island are not levied with any port authority charges and ships berthing at Sugar Wharf are levied with berth hire.

9 It is not clear whether differences in port authority charges over time reflect changes in port authority tariffs or the impact of changes in the exchange and composition of cargo.

Comparisons of port authority charges

Port authority charges for bulk (wheat) and cruise ships were generally mid-range when compared with the overseas ports in the study. For example, although port authority charges levied on bulk (wheat) ships at Australian ports were higher than the Canadian ports of Prince Rupert and Vancouver, they were lower than the US ports of Portland and New Orleans (see Figure 5.5). Similarly, port authority charges for 55 000 GRT cruise ships at all Australian ports were lower than Copenhagen, Miami and Los Angeles (see Figure 5.6).

The mix of cargo-based and ship-based port authority charges varies from port to port and is generally determined by the objectives of the port authority (see Box 5.3). The Brisbane Port Authority, for example, does not have any ship-based charges, preferring to levy both wharfage and harbour dues on cargo importers and exporters, in an attempt to attract more ships to Brisbane. All other Australian port authorities levy a combination of ship-based and cargo-based charges.

Box 5.3 The mix of ship-based and cargo-based charges

Tonnage and *berth hire* are ship-based charges and *wharfage* is a cargo-based charge. Port authorities may vary the incidence of charges to reflect their policies on trade facilitation and to attract more ships to a port. The Port of Brisbane, for example, does not levy any ship-based charges, preferring to levy charges on cargo owners.

Port authority ship-based charges levied at Australian ports are generally higher than those levied at the overseas ports included in the study[a].

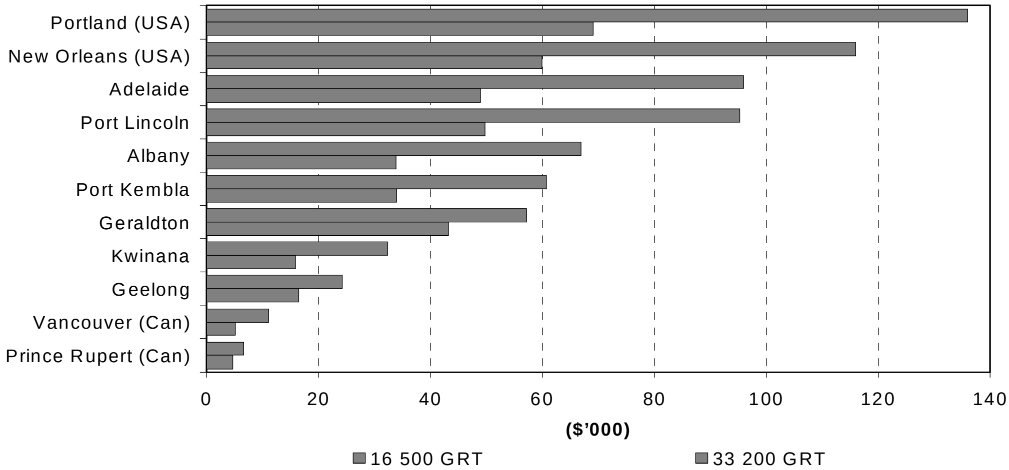
Port authority ship-based charges are not levied at Brisbane, Tilbury, and Port Klang. The ports of Sydney and Melbourne have the highest ship-based port authority charges of the Australian ports included in the study. Ship-based charges at Adelaide and Fremantle are low in comparison to the overseas ports in the study (see Figure 5A.2).

The port authorities of Nagoya and Hamburg do not levy any cargo-based charges and at the ports of Singapore, Port Klang, Philadelphia and Tilbury, wharfage is included in container handling charges.

The Port Klang port authority does not levy any explicit ship-based or cargo-based charges — tonnage and wharfage are both included in the charge for container handling.

a Port authority charges at Sydney, Melbourne and Adelaide fell from 1 July 1997.

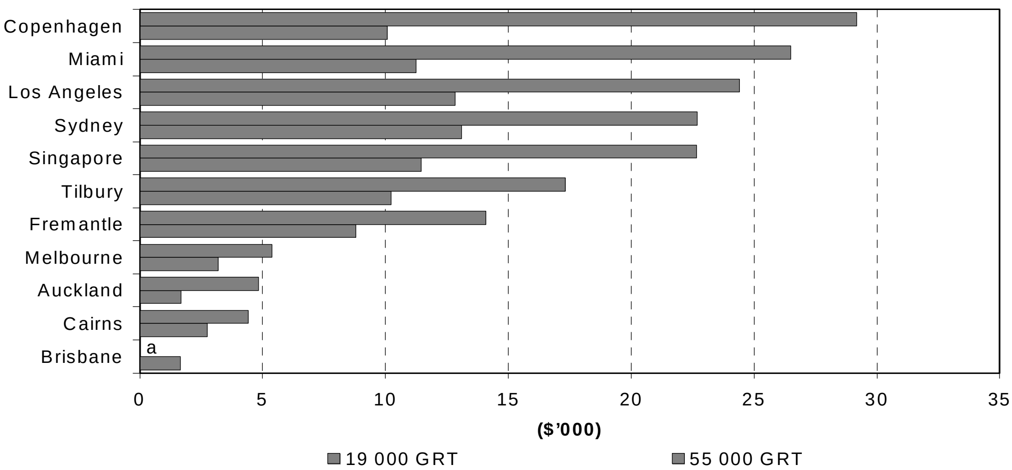
Figure 5.5 Port authority charges — bulk ships, 1996–97



Note: Charges include berth hire, wharfage and tonnage or harbour dues. Port authority charges at Adelaide and Port Lincoln include mooring charges. Charges at Geelong include facility hire. Dockage and a service and facilities charge are levied at Portland. Dockage is levied for the use, maintenance and up keep of the dock and is levied on the ship operator. The service and facility charge is a cargo based charge including a wharfage component.

Source: Asiaworld Shipping (consultant).

Figure 5.6 Port authority charges — cruise ships, 1996–97



a In Brisbane small ships berth at Sugar Wharf and large ships berth at Fisherman's Island, and so charges may be levied at different rates.

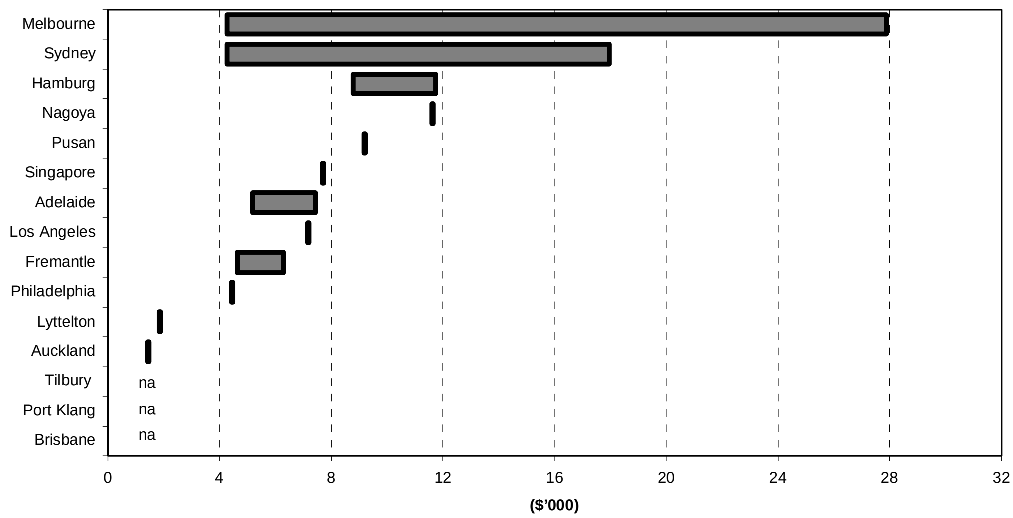
Note: Includes tonnage, berth hire and wharfage. Tonnage is not levied at Brisbane, Melbourne and Auckland. All wharfage charges are based on 90 per cent load factor and exchange, except Cairns where it is assumed that the full passenger compliment is in transit. Wharfage is not levied on passengers at Auckland and all Australian ports, with the exception of Cairns. Wharfage and berth hire are not levied at Copenhagen.

Source: Thompson Clarke Shipping (consultant).

The importance of comparing only combined port authority charges is demonstrated by the following example. Ship-based charges at the ports of Adelaide, Fremantle and Los Angeles are low by international standards (see Figure 5.7). However, when ship- and cargo-based charges are combined they are no longer low cost ports (see Figure 5.8).

Combined ship- and cargo-based port authority charges were generally higher at Australian ports than the overseas ports in the study. Total port authority charges were generally highest at the ports of Sydney, Melbourne and Brisbane.

Figure 5.7 Port authority ship-based charges — container ships (all trades), 1997

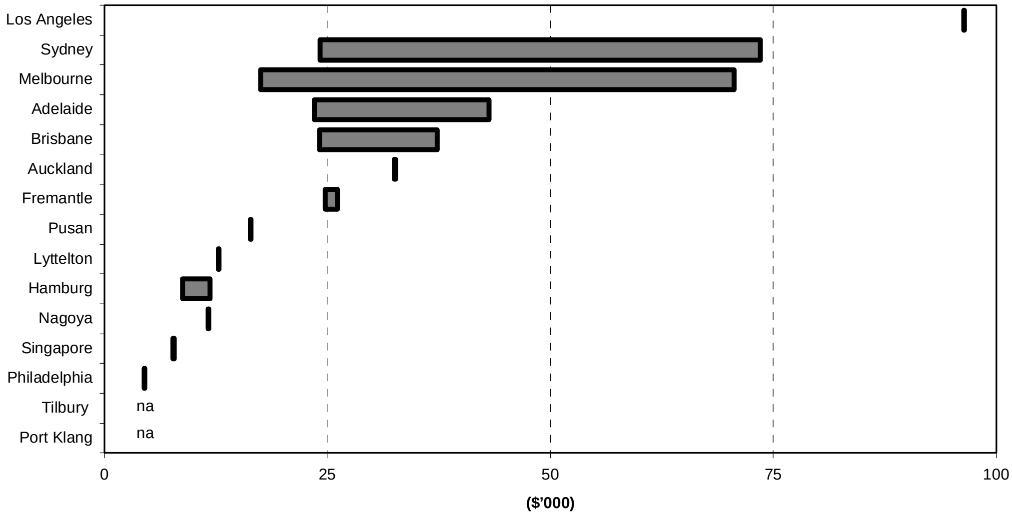


Note: Port authority ship based charges include *tonnage*, and *berth hire* charges. Charges at Adelaide, Lyttelton and Auckland include mooring charges. *Berth hire* is not levied at Sydney, Fremantle, Adelaide, Port Klang, and Hamburg.
Port authority charges vary by ship size. The above chart presents the range of charges for ships of different sizes on different trades. For example, port authority charges for the smallest ship in the sample at Melbourne were just over $4 000 and about $28 000 for the largest ship. Most overseas ports only accounted for one ship call in the sample and are therefore point estimates. For example, port authority charges at Singapore were about $7 600.

na Not applicable. *Berth hire* and *tonnage* are not levied at the ports of Brisbane and Tilbury. *Berth hire* not levied at Port Klang and *tonnage* is included in container handling charges.

Source: Thompson Clarke Shipping (consultant).

Figure 5.8 Port authority ship- and cargo-based charges — container ships (all trades), 1997



Note: Port authority ship and cargo based charges include *tonnage*, *berth hire* and *wharfage* charges. Port authority charges vary by ship size. The above chart presents the range of charges for ships of different sizes on different trades. For example, port authority charges for the smallest ship in the sample at Sydney were just over $24 000 and about $73 400 for the largest ship. Most overseas ports only accounted for one ship call in the sample and are therefore point estimates. For example, port authority charges at Nagoya were about $11 602. Total wharfage charges are calculated on the basis of average TEU exchange. *Berth hire* is not levied at the ports of Sydney, Fremantle, Adelaide, Port Klang, Tilbury and Hamburg. *Berth hire* and *tonnage* are not levied at the Port of Brisbane. *Wharfage* at the Port of Brisbane includes harbour dues. Wharfage rates for the Port of Los Angeles were estimated by Thompson Clarke Shipping. *Wharfage* charges at the ports of Philadelphia, Tilbury, Singapore and Port Klang are included in container handling charges. *Wharfage* is not levied at the ports of Hamburg and Nagoya. Port authority charges at the ports of Adelaide, Lyttelton and Auckland include *mooring* charges. *Wharfage* at ports of Singapore, Philadelphia and Tilbury is recovered in container handling charges.

na Not applicable. *Tonnage* and *Wharfage* at the Port Klang included in container handling charges. *Berth hire* is not levied at Port Klang.

Source: Thompson Clarke Shipping (consultant).

Factors explaining differences in charges

The institutional environment in which port authority charges are set can have a significant impact on the level of charges. Differences in charges may reflect different policy approaches rather than superior performance. The extent of cost recovery pursued by port authorities through their pricing practices directly impacts on the observed level of charges (see Section 3.2).

Australian owner governments generally place a higher priority than foreign governments on the objective of cost recovery, although other objectives, such as encouraging regular ship visits, may also be pursued through pricing policies. The ports of Adelaide, Melbourne, and Brisbane aim to recover costs through charges, whereas the ports of Sydney and Fremantle appear to place a lower priority on cost recovery. However, on the basis of available information, full cost recovery is not pursued at the ports of Philadelphia, Nagoya and Hamburg (all low charge ports) (see Table C.9).

In addition, all Australian ports are self-funding and do not receive additional government funding for operational deficits. Some overseas ports receive both direct and indirect government funding in the form of operational subsidies, interest free loans and funding for major dredging and infrastructure development (see Table C.8).[10] These subsidies have an impact on both the level and structure of port authority charges at these ports.

The requirement for port authorities to make tax equivalent and dividend payments will also have an impact on pricing practices and hence the observed level of charges. All port authorities in Australia are, or will be, making tax-equivalent and dividend payments to their state government owners. Only a small number of overseas ports included in the study make tax and dividend payments (see Table C.10).

Where such polices are not pursued, charges may not reflect the true cost of providing services and facilities. For example, the low cost ports identified in this study (Hamburg, Philadelphia and Nagoya) are not required to fully recover costs, nor to make tax and dividend payments. Under the current institutional arrangements under which Australian port authorities operate, it is unlikely that charges could equate to those levied at these ports.

In Australia, port authority charges are highest at the ports of Sydney and Melbourne. These are the largest container ports servicing shipping in Australia — but throughput is still significantly lower than some of the overseas ports included in the study. Higher throughput at these ports suggest that both costs and charges should be lower compared to other Australian ports. The combination of government policies (full cost recovery and dividend and tax equivalent payments) and the exercise of market power are likely to be the major reasons why charges at these ports are high by both Australian and international standards.

10 The port of Philadelphia appears to incur an annual operating deficit of around double its revenue base. In addition, major dredging costs at strategic US ports are financed by the United States Government through the US Army Corps of Engineers.

Summing up

Port authorities levy a range of charges on ship operators and cargo owners for the provision of port infrastructure. Port authority charges for container and bulk ships are generally the most significant component of combined charges. The significance of port authority charges levied on cruise ships varies from port to port.

Port authority charges on bulk and cruise ships at the Australian ports in the study were generally mid-range when compared with the overseas ports. Port authority charges on containers ships were generally higher.

There are a number of possible reasons why port authority charges are higher at some Australian ports. The policies of Australian governments on cost recovery, self funding and tax equivalent and dividend payments will also have an impact on pricing practices and hence the observed level of charges. There is also limited scope for inter-port competition within Australia.

5.3 Combined port and maritime infrastructure and marine services charges

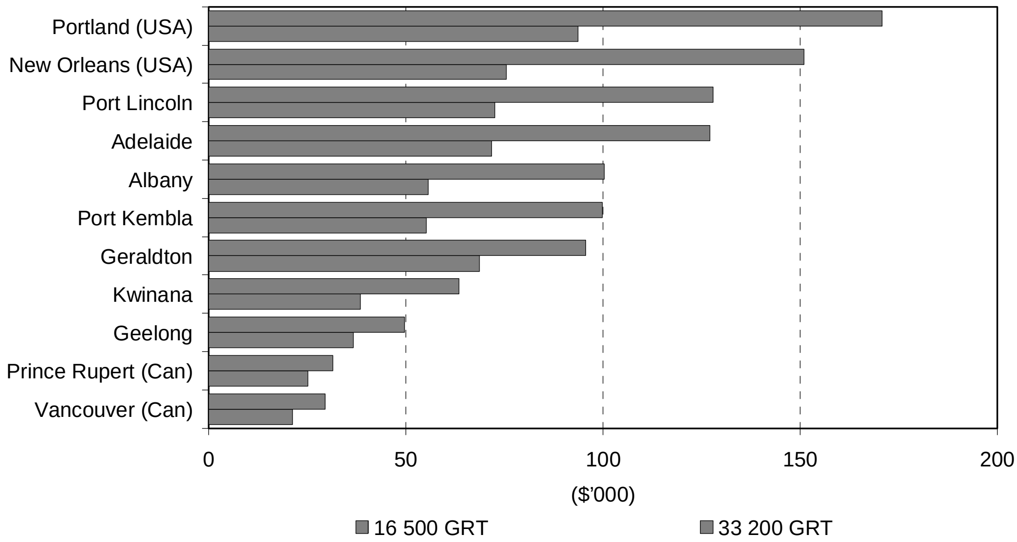
The variation in terminology and charging structures limits the usefulness of inter-port comparisons made solely on the basis of individual charges. Combined infrastructure and marine services charges provide a clearer picture of the costs incurred by both shipping lines and shippers of cargo.[11] Information on charges provided in Chapter 4 and in the preceding sections of this chapter are therefore aggregated in this section.

Bulk ships

Combined charges levied on bulk (wheat) ships at Australian ports, while not the highest, were still significantly higher than combined charges at the Canadian ports of Prince Rupert and Vancouver. Of the Australian ports, combined charges were highest at the South Australian ports of Adelaide and Port Lincoln, reflecting relatively high government, port authority and towage charges at these ports (see Figure 5.9).

[11] Combined port and maritime infrastructure and marine charges include government and port authority charges (ship-based and cargo-based), pilotage, towage and mooring charges.

Figure 5.9 Combined infrastructure and marine services charges — bulk ships, 1996–97



Note: Combined infrastructure and port services charges is calculated by adding government charges, port authority charges, pilotage charges, towage charges, and mooring charges.

Source: Asiaworld Shipping (consultant).

Container ships

The combined charges levied on container ships were generally higher at Australian ports than at overseas ports, although there was some variation between trades (see Box 5.4). Of the Australian ports, combined charges were highest at the ports of Melbourne and Sydney, whereas charges at the ports of Adelaide and Fremantle were not significantly different to the port of Tilbury. Combined charges at the ports of Fremantle and Adelaide were still four times higher than at the Port of Singapore (see Figure 5.10). Combined charges were lowest at the ports of Tilbury, Philadelphia, Singapore, Port Klang and Lyttelton.

Box 5.4 Comparisons of combined port and maritime infrastructure and marine services charges for container ships by trade

European trades

Combined charges levied at the ports of Hamburg, Tilbury, Fremantle and Adelaide are similar. Combined charges are substantially higher at the ports of Melbourne and Sydney, largely reflecting the high level of port authority charges levied at these two ports (see Figure 5.10 and Table 5A.3).

US trades

On the US West Coast trade, combined charges are highest at the Port of Los Angeles, reflecting high port authority charges. Ship-based port authority charges levied at Los Angeles are low by Australian standards, cargo-based charges (wharfage) are, however, relatively high (seeFigure 5.10 and Tables 5A.2, 5A.3).

On the US East Coast trade, combined charges are highest at the ports of Sydney and Melbourne (see Table 5A.4). However, the Port of Philadelphia receives funding to cover annual operating deficits.

Asian Trades

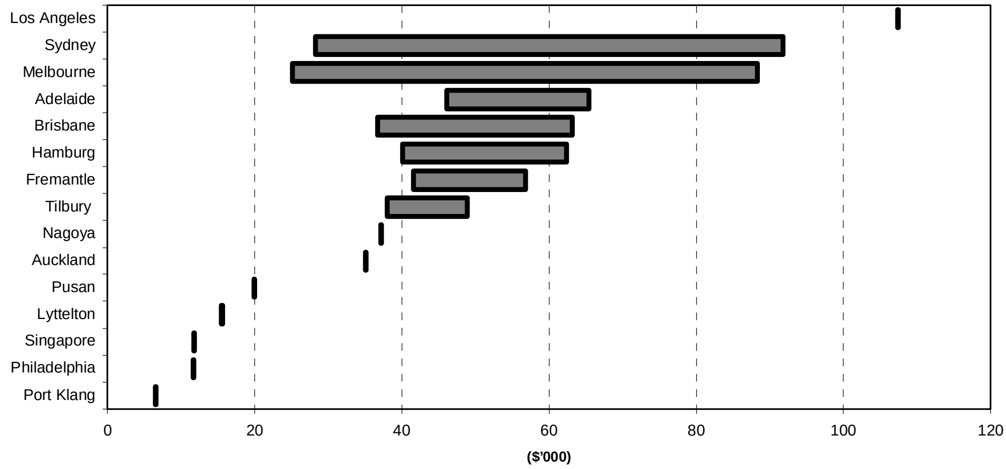
On the North Asia trade combined charges at all Australian ports are substantially higher than at the Port of Pusan. Port authority charges at the Port of Pusan are low by Australian standards (no cargo-based charges are levied at Pusan). Pilotage, towage and mooring charges are also significantly lower relative to the Australian ports called at (see Tables 5A.3, Figure 5.10, and Tables 5A.1, 4A.2 and 4A.3).

On the South–East Asia trade all the Australian ports are more expensive than Singapore and Port Klang. Port authority charges at both ports are low (no port authority charges are levied at Port Klang). Singapore and Port Klang are also able to achieve low pilotage, towage and mooring, because of high annual ships calls and high pilot and tug utilisation.

New Zealand trade

Combined charges are highest at the Port of Auckland, although there is not a significant disparity in charges between Auckland, Melbourne and Sydney. Although, ship-based charges levied at the Port of Auckland are comparatively low, combined port authority charges are high when compared to Melbourne and Sydney (seeTables 5A.2, 5A.3).

Figure 5.10 Combined infrastructure and marine services charges — container ships (all trades), 1997



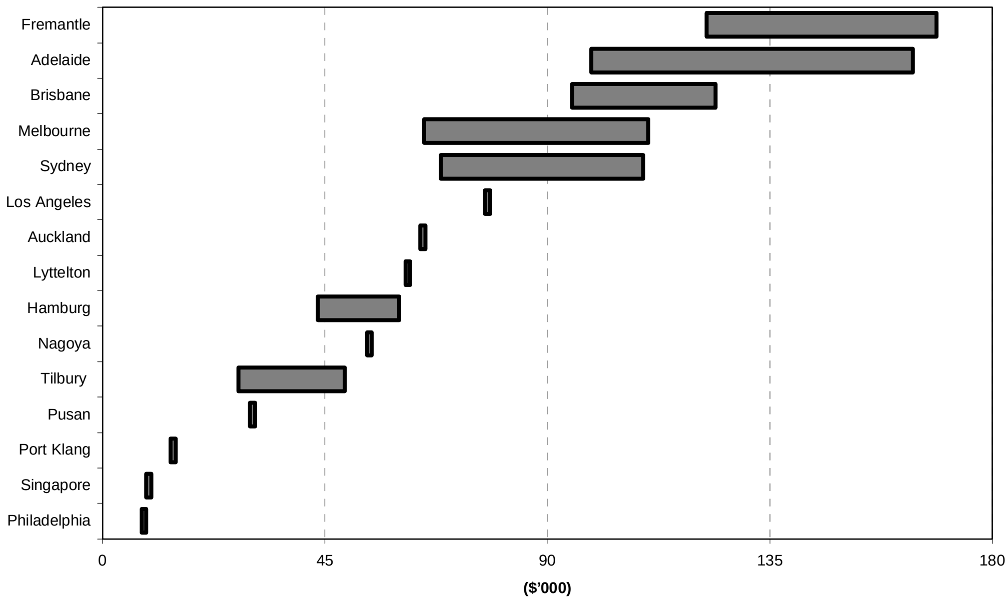
Note: Combined port and maritime infrastructure and services charges includes government charges (light dues, conservancy and oil pollution charges), port authority charges (wharfage, tonnage, berth hire), pilotage, towage, and mooring charges.
The above chart presents the range of combined charges for ships of different sizes on different trades. For example, combined charges for the smallest ship in the sample at Sydney were just over $28 000 and about $91 600 for the largest ship. Most overseas ports only accounted for one ship call in the sample and are therefore point estimates. For example, combined charges at Pusan were about $11 700.
See the notes to Figure 4.3, 4.6, 4.9, 5.3 and 5.8.

Source: Thompson Clarke Shipping (consultant).

Expressing charges on a per TEU basis, provides an alternative way of comparing the cost incurred by shipping lines and shippers in moving cargo. At the larger ports, ship-based charges can be defrayed against larger TEU exchanges. Combined charges per TEU were higher at Australian ports than at the overseas ports. Per TEU charges were highest at the ports of Fremantle, Adelaide and Brisbane, and lowest at the ports of Sydney and Melbourne (see Figure 5.11). This is in contrast to the outcome when combined charges were compared on a per ship basis. The average TEU exchanged at Melbourne and Sydney is generally larger than at the ports of Fremantle, Brisbane and Adelaide.

In most cases the high combined charges per TEU at the Australian ports reflect smaller average TEU exchanges. Lower per TEU charges could be achieved by increasing the number of TEUs exchanged, principally through a reduction in the number of ship calls. However, this would result in a less regular service. Shippers prefer more ship calls to less, so that a reduction in ship calls would represent a deterioration in service quality.

Figure 5.11 Combined infrastructure and marine services charges per TEU — container ships (all trades), 1997



Note: Combined port and maritime infrastructure and services charges includes government charges (light dues, conservancy and oil pollution charges), port authority charges (wharfage, tonnage, berth hire), pilotage, towage, and mooring charges.
The above chart presents the range of combined per TEU charges for ships of different sizes on different trades. For example, combined charges for the smallest ship in the sample at Melbourne were $65 per TEU and about $109 per TEU for the largest ship. Most overseas ports only accounted for one ship call in the sample and are therefore point estimates. For example, combined charges at Pusan were $30 per TEU.
Most port and maritime and marine services charges are levied on the basis of ship size. Expressing charges on a per TEU basis will favour ports with high average TEU exchanges.
See the notes to Figure 4.3, 4.6, 4.9, 5.3 and 5.8.

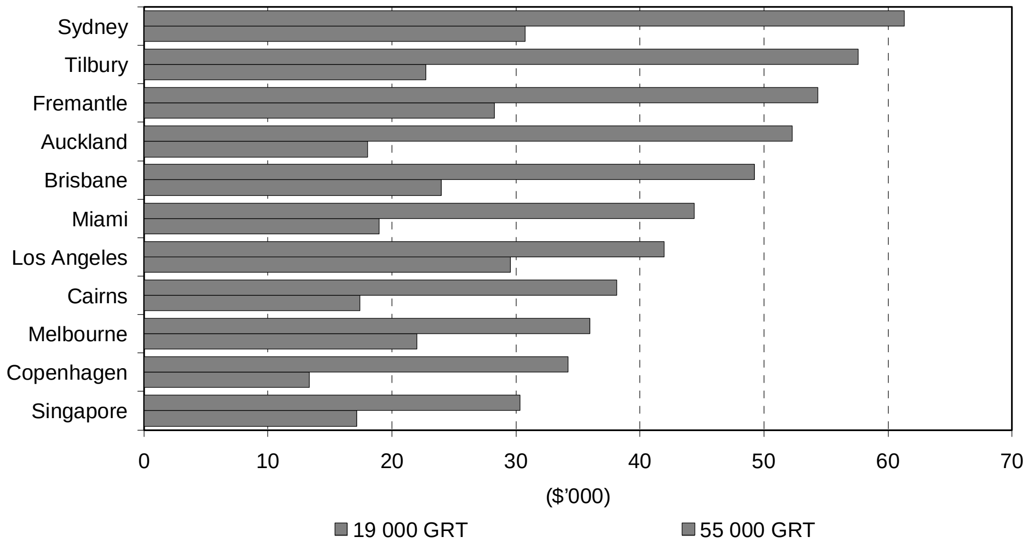
Source: Thompson Clarke Shipping (consultant).

Cruise ships

Combined charges on cruise ships are highest at the Australian ports of Sydney and Fremantle. Although combined infrastructure and marine services charges on cruise ships were lowest at the ports of Singapore and Copenhagen, charges at the ports of Melbourne and Cairns were not significantly higher (see Figure 5.12).

High combined charges at the Australian ports reflect comparatively high government, port authority, pilotage and towage charges.

Figure 5.12 Combined infrastructure and marine services charges — cruise ships, 1996–97



Note: Combined infrastructure and port services charges is calculated by adding government charges, port authority charges, pilotage charges, towage charges, and mooring charges.
Source: Thompson Clarke Shipping (consultant).

Summing up

The variation in terminology and charging structures limits the usefulness of comparisons of individual charges. Combined government, port authority and marine service charges provide a clearer picture of the costs incurred by both ship operators and cargo owners.

Combined charges at the Australian ports for all classes of ship were higher than the overseas ports in the study. High combined charges on bulk and cruise ships at some Australian ports reflect relatively high government, port authority, pilotage and towage charges at these ports.

For container ships, combined charges per TEU were higher at the Australian ports in the study. In most cases, the high combined per TEU charges at the Australian ports reflect smaller average TEU exchanges than those overseas.

However, higher charges are not necessarily excessive in efficiency terms. Higher charges will depend upon cost recovery policies, the achievement of appropriate rates of return and appropriate asset utilisation.

Attachment 5A — Data

Table 5A.1 Government charges — container ships by trade, 1997

($)

	Europe		*New*	*North*	*South–*	*North America*	
Port	*East bound*	*West bound*	*Zealand*	*Asia*	*East Asia*	*East coast*	*West coast*
Australian							
Adelaide	7156	-	-	3036	2310	-	-
Brisbane	-	-	-	4440	4264	4741	-
Fremantle	6826	4987	-	-	3741	-	-
Melbourne	2813	3530	139	729	698	1538	1615
Sydney	2813	3530	139	729	698	1538	1615
Overseas							
Auckland	-	-	259	-	-	-	-
Hamburg	731	687	-	-	-	-	-
Los Angeles	-	-	-	-	-	-	829
Lyttelton	-	-	259	-	-	-	-
Nagoya	-	-	-	0	-	-	-
Philadelphia	-	-	-	-	-	0	-
Port Klang	-	-	-	-	2783	-	-
Pusan	-	-	-	30	-	-	-
Singapore	-	-	-	-	131	-	-
Tilbury	18920	17826	-	-	-	-	-

Note: Government charges include conservancy, light dues and oil pollution charges. Charges valid for number of months have been averaged over the number of ship calls made over the year.

a Government charges at the Port of Hamburg include a State levy to finance life boats and a seamen's mission.

Conservancy charges at the Port of Tilbury are recovered in the container handling charge.

\- Port not included in sample for trade.

Source: Thompson Clarke Shipping (consultant).

Table 5A.2 Port authority ship-based charges — container ships by trade, 1997

($)

	Europe		*New*	*North*	*South–*	*North America*	
Port	*East bound*	*West bound*	*Zealand*	*Asia*	*East Asia*	*East coast*	*West coast*
Australian							
Adelaide	5399	-	-	7381	5192	-	-
Brisbane	-	-	-	0	0	0	-
Fremantle	6240	4864	-	-	4635	-	-
Melbourne	26790	21296	4265	27821	20708	15699	15699
Sydney	17906	13009	4275	15540	12921	10212	10212
Overseas							
Auckland	-	-	1435	-	-	-	-
Hamburg	11709	8779	-	-	-	-	-
Los Angeles	-	-	-	-	-	-	7166
Lyttelton	-	-	1843	-	-	-	-
Nagoya	-	-	-	11603	-	-	-
Philadelphia	-	-	-	-	-	4435	-
Port Klang	-	-	-	-	0	-	-
Pusan	-	-	-	9169	-	-	-
Singapore	-	-	-	-	7686	-	-
Tilbury	0	0	-	-	-	-	-

Note: Port authority ship based charges include tonnage, and berth hire charges.
Port authority charges at the ports of Adelaide, Lyttelton and Auckland include mooring charges.
Berth hire is not levied at the ports of Sydney, Fremantle, Adelaide, and Hamburg.

\- Port not included in sample for trade.

Source: Thompson Clarke Shipping (consultant).

Table 5A.3 Port authority ship- and cargo-based charges — container ships by trade, 1997

($)

	Europe		*New*	*North*	*South–*	*North America*	
Port	*East bound*	*West bound*	*Zealand*	*Asia*	*East Asia*	*East coast*	*West coast*
Australian							
Adelaide	23543	-	-	43021	29762	-	-
Brisbane	-	-	-	32114	37184	24101	-
Fremantle	25979	24720	-	-	26009	-	-
Melbourne	49666	49263	17543	70477	54867	49549	36304
Sydney	60993	66277	24154	73440	53885	49899	43118
Overseas							
Auckland	-	-	32527	-	-	-	-
Hamburg	11709	8779	-	-	-	-	-
Los Angeles	-	-	-	-	-	-	96355
Lyttelton	-	-	12772	-	-	-	-
Nagoya	-	-	-	11602	-	-	-
Philadelphia	-	-	-	-	-	4435	-
Port Klang	-	-	-	-	0	-	-
Pusan	-	-	-	16351	-	-	-
Singapore	-	-	-	-	7686	-	-
Tilbury	0	0	-	-	-	-	-

Note: Port authority ship- and cargo-based charges include tonnage, berth hire and wharfage charges. Total wharfage charges are calculated on the basis of average TEU exchange.
Port authority charges at the ports of Adelaide, Lyttelton and Auckland include mooring charges.
Berth hire is not levied at the ports of Sydney, Fremantle, Adelaide, and Hamburg.
Berth hire and tonnage are not levied at the Port of Brisbane. Wharfage at the Port of Brisbane includes harbour dues.
Wharfage charges at the ports of Philadelphia, Tilbury, Singapore and Port Klang are included in container handling charges.
Wharfage is not levied at the ports of Hamburg and Nagoya.
Wharfage rates for the Port of Los Angeles were estimated by Thompson Clarke Shipping.

\- Port not included in sample for trade.

Source: Thompson Clarke Shipping (consultant).

Table 5A.4 Combined port and maritime infrastructure and marine services charges — container ships by trade, 1997

($)

	Europe		*New*	*North*	*South–*	*North America*	
Port	*East bound*	*West bound*	*Zealand*	*Asia*	*East Asia*	*East coast*	*West coast*
Australian							
Adelaide	54739	-	-	65287	46092	-	-
Brisbane	-	-	-	60006	63027	36658	-
Fremantle	56685	41581	-	-	49210	-	-
Melbourne	72756	67669	25132	88167	71944	68172	55004
Sydney	88042	83322	28227	91634	71539	68929	62225
Overseas							
Auckland	-	-	35036	-	-	-	-
Hamburg	62251	40090	-	-	-	-	-
Los Angeles	-	-	-	-	-	-	107339
Lyttelton	-	-	15503	-	-	-	-
Nagoya	-	-	-	37135	-	-	-
Philadelphia	-	-	-	-	-	11632	-
Port Klang	-	-	-	-	6507	-	-
Pusan	-	-	-	19861	-	-	-
Singapore	-	-	-	-	11742	-	-
Tilbury	48774	38028	-	-	-	-	-

Note: *Combined port and maritime infrastructure and marine services charges* includes government charges, port authority charges, pilotage, towage, and mooring charges.
Government charges valid for a number of months have been averaged over the number of ship calls made over the year.
Conservancy charges at the Port of Tilbury are recovered in the stevedoring charge.
Government charges at the Port of Hamburg include a State levy to finance life boats and a seamen's mission.
Government charges are not levied at the ports of Pusan, and Nagoya.
Tonnage charges at the Port of Port Klang are included in container handling charges.
Berth hire is not levied at the ports of Sydney, Fremantle, Adelaide, Port Klang, and Hamburg.
Berth hire and tonnage are not levied at the ports of Brisbane and Tilbury.
Total wharfage charges calculated on basis of average TEU exchange.
Wharfage rates for the Port of Los Angeles were estimated by Thompson Clarke Shipping.
Wharfage is not levied at the ports of Hamburg and Nagoya.
Pilotage charges at ports of Tilbury and Hamburg include river and sea pilotage.

\- Port not included in sample for trade.

Source: Thompson Clarke Shipping (consultant).

Table 5A.5 Combined port and maritime infrastructure and marine services charges per TEU — container ships by trade, 1997

($)

	Europe		*New*	*North*	*South–*	*North America*	
Port	*East bound*	*West bound*	*Zealand*	*Asia*	*East Asia*	*East coast*	*West coast*
Australian							
Adelaide	163	-	-	99	101	-	-
Brisbane	-	-	-	101	123	95	-
Fremantle	168	122	-	-	134	-	-
Melbourne	109	83	65	71	72	69	92
Sydney	99	75	69	76	84	108	91
Overseas							
Auckland	-	-	64	-	-	-	-
Hamburg	59	44	-	-	-	-	-
Los Angeles	-	-	-	-	-	-	77
Lyttelton	-	-	61	-	-	-	-
Nagoya	-	-	-	54	-	-	-
Philadelphia	-	-	-	-	-	8	-
Port Klang	-	-	-	-	14	-	-
Pusan	-	-	-	30	-	-	-
Singapore	-	-	-	-	9	-	-
Tilbury	27	48	-	-	-	-	-

Note: *Combined port and maritime infrastructure and marine services charges per TEU* is calculated by dividing combined port and maritime infrastructure and marine services charges (government charges, port authority charges, pilotage, towage, and mooring charges). by the average TEU exchanged by the ship at each port.
Government charges valid for a number of months have been averaged over the number of ship calls made over the year.
Conservancy charges at the Port of Tilbury are recovered in the stevedoring charge. Government charges at the Port of Hamburg include a State levy to finance life boats and a seamen's mission. Government charges are not levied at the ports of Pusan, and Nagoya.
Tonnage charges at the Port of Port Klang are included in container handling charges.
Berth hire is not levied at the ports of Sydney, Fremantle, Adelaide, Port Klang, and Hamburg.
Berth hire and tonnage are not levied at the ports of Brisbane and Tilbury.
Total wharfage charges calculated on basis of average TEU exchange. Wharfage rates for Los Angeles were estimated by Thompson Clarke Shipping. Wharfage is not levied at Hamburg and Nagoya.
Pilotage charges at ports of Tilbury and Hamburg include river and sea pilotage.

\- Port not included in sample for trade.

Source: Thompson Clarke Shipping (consultant).

6 STEVEDORING — CONTAINERS

Container trade represents just over half the value of all cargo passing through Australian ports. When compared with overseas terminals on a trade-by-trade basis, using the same ships, Australian container terminals generally have higher stevedoring charges, lower productivity, and evidence of poor reliability, indicating significant scope for improvement. The differences in performance could not be explained simply by scale diseconomies.

Container stevedoring operations have been the focus of efforts to raise the performance of the Australian waterfront over recent years. Performance improvement can provide direct and indirect benefits for Australian consumers and businesses by lowering waterfront charges and raising service quality — thereby expanding export opportunities and lowering import prices.

In this chapter, 'container stevedoring' refers to the traditional role of container movement between ship and shore, and container yard handling operations. International comparisons involve comparing services that may be identified by different terminology or work organisation. For example, at container terminals in the US, ship-to-shore handling services are referred to as 'longshore' operations and may be provided by a different 'stevedore' (and be performed by employees from different unions) to yard handling services.[1]

The relative performance and charges for container stevedoring services between Australian and overseas ports are examined in this chapter.

Error! AutoText entry not defined.**.1 Container stevedoring and terminal operations**

Container trade has significantly increased in importance since the introduction of standardised container sizes in 1966.[2] In value terms, more than half of all

---

1 Shore-to-stack, shore-based reefer services and stack-to-land transport handling.

2 The International Standards Organisation (ISO) originally defined standard container sizes based on an 8 foot square external end area with lengths and incorporated standard fastening and lifting points. However, 8 foot 6 inch and 9 foot 6 inch high ISO containers are used extensively in the Australian trades. Lengths vary in multiples of 10 feet from 10 to 40 foot with the 20 foot (representing one 'twenty foot equivalent' or TEU) being a common

trade (three-quarters of all non-bulk trade) that passed through Australian ports in 1995–96 was accounted for by container and roll-on-roll-off (ro-ro) cargo (see Table 6.1). This proportion has increased significantly since 1983–84, with most of the increase in non-bulk cargo occurring in the period to 1988–89.

Table 6.1 Container and ro-ro ship trade as a proportion of non-bulk and total cargo trade in Australia, 1983–84, 1988–89 and 1995–96 (per cent)

	1983–84		*1988–89*		*1995–96*	
	Volume[a]	*Value*[b]	*Volume*[a]	*Value*[b]	*Volume*[a]	*Value*[b]
Proportion of total non-bulk cargo[c]						
Exports	28.4	63.0	40.1	71.5	53.4	74.0
Imports	58.9	72.0	61.4	79.8	69.4	76.1
Throughput	38.0	68.3	46.9	75.8	59.3	75.3
Proportion of total cargo trade[d]						
Exports	1.9	28.1	2.2	35.3	2.9	39.9
Imports	16.7	52.3	17.7	62.0	17.0	65.9
Throughput	3.3	39.4	3.5	46.2	4.4	52.4

a Container and ro-ro ship trade as a proportion of cargo weight in tonnes.
b Container and ro-ro ship trade as a proportion of cargo value in $A.
c Excludes cargo trade that could not be classified by the ABS.
d Includes unclassified trade in total.
Source: Productivity Commission estimates based on unpublished ABS *International Customs Statistics* data.

Container terminals

Container terminals generally comprise purpose-built berths and large open areas for storing containers before loading or after discharge from purpose-built container ships. Specialised cranes on the berth — 'portainer' cranes — are used to transfer containers between the ship and shore.

In addition to loading and unloading the ship, container stevedoring includes the receival of export containers and the delivery of import containers at the terminal.

measure. Containers (or ISO boxes) based on these dimensions come in a variety of forms including: open top; open sides; ventilated, and refrigerated ('reefers').

Container shipping and terminal industry

Increasing competition in international container shipping is reflected in Australian container trades and indirectly contributes to pressure on Australian container terminal operators to improve performance.

The Commission’s consultant reported that one source of increased competition is the excess capacity in container shipping as a new generation of container ships (in the 4000 to 6000 TEU range) enter the world’s East–West trades. This in turn has increased the capacity in the Australian container trades, as ships in the 2000 to 3000 TEU range have been displaced into the North–South trades. The result is heightened competition in most Australian trades as shipping lines compete to establish, retain or increase market share — with consequential pressures on all their service suppliers, including the Australian container terminal operators.

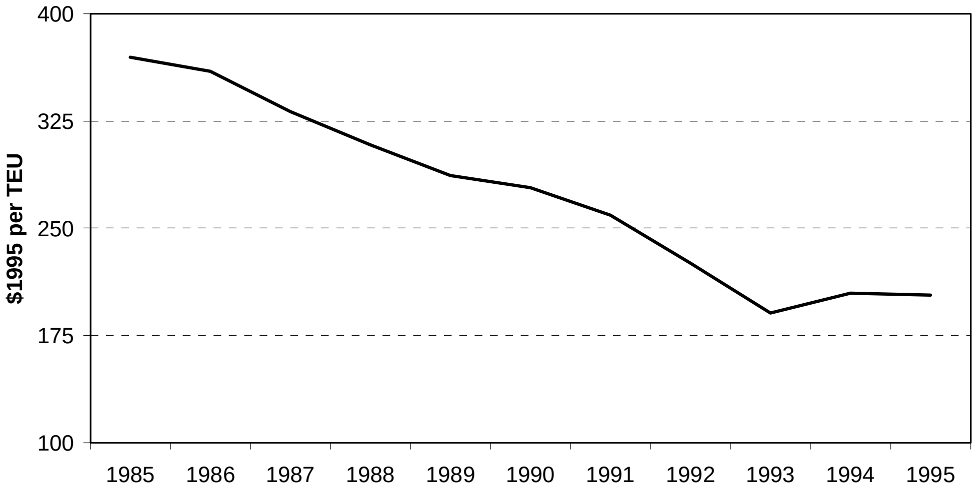
Increasing pressure from shipping lines, coupled with labour reforms and capital investment since the completion of the Waterfront Industry Reform Authority (WIRA) process, have contributed to heightened price competition between the two major national container terminal operators. However, it is unclear whether the current price levels are sustainable at the current level of operating efficiency, with terminal operators claiming that a normal return on investment is not being achieved at current prices.

Data collected by the Prices Surveillance Authority (PSA) suggests that average stevedoring charges in Australia have fallen in real terms from $370 per TEU in December 1985 to $203 per TEU in December 1995 (see Figure 6.1).

Error! AutoText entry not defined.**.2 Waterfront charges for container services**

The total cost to traders of moving a container from its country of origin to its final destination consists of the ‘blue water’ freight rate, and land-side and waterfront charges in the origin and destination countries. Australian waterfront charges are a relatively small proportion of the total direct cost of moving the container. They may for example, account for around 13 per cent or less of the total direct cost of importing a container (see Box 2.5 in Chapter 2).

Figure 6.1 Average stevedoring charges in Australia, 1985 to 1995



Source: Derived from PSA – Monitoring of Stevedoring Costs and Charges – various reports.

Waterfront charges (associated with moving the ship and cargo to and from the wharf) include those for marine services, port infrastructure and container stevedoring:

- *Marine services* — charges for ancillary services that help ships to enter, berth and leave a port (includes pilotage, towage and mooring charges). These charges are discussed in detail in Sections 4.1, 4.2 and 4.3;
- *Port infrastructure* — port owner charges shipping lines to recover the cost of managing and maintaining port infrastructure (includes area hire, berth hire, wharfage and tonnage). Governments also levy charges on ship operators utilising their waters (includes conservancy, light dues and marine pollution levies). Port authority and government charges are discussed in detail in Sections 5.1 and 5.2; and
- *Container stevedoring* — charges for the cost of loading or discharging a container between wharf and ship. The charge also covers handling the container in the terminal yard and either road or rail receival and delivery.

Container stevedoring charges are the most significant waterfront charges faced by shipping lines. For example, on average, about 66 per cent of waterfront charges for Australia's five major ports in June 1997 were stevedoring (see Table 6.2).

Table 6.2 Port and related charges, June 1997

	Waterfront charges per TEU				
Port	*Ship-based charges*[a]	*Cargo-based charges*[b]	*Stevedoring*[c]	*Total*	*Stevedoring share of total*
	($/TEU)	*($/TEU)*	*($/TEU)*	*($/TEU)*	*(%)*
Adelaide	96	65	188[c]	349	53.9
Brisbane	55	68	188[c]	311	60.5
Fremantle	52	64	188[c]	304	61.8
Melbourne	43	37	188[c]	268	70.1
Sydney	33	60	188[c]	281	66.9
All Five[d]	44	53	188[c]	286	65.8

a Ship-based charges include conservancy, tonnage, pilotage, towage, berth-hire and mooring.
b Cargo-based charges include wharfage, harbour dues and berth charge.
c The five port average is used for the stevedoring component at each port for confidentiality reasons.
d Average for five ports weighted by TEU throughput for June quarter 1997.
Note: Cargo based charges are lower for exports in Sydney ($45/TEU) and Adelaide ($61/TEU).
Source: BTCE *Waterline* 12, September 1997.

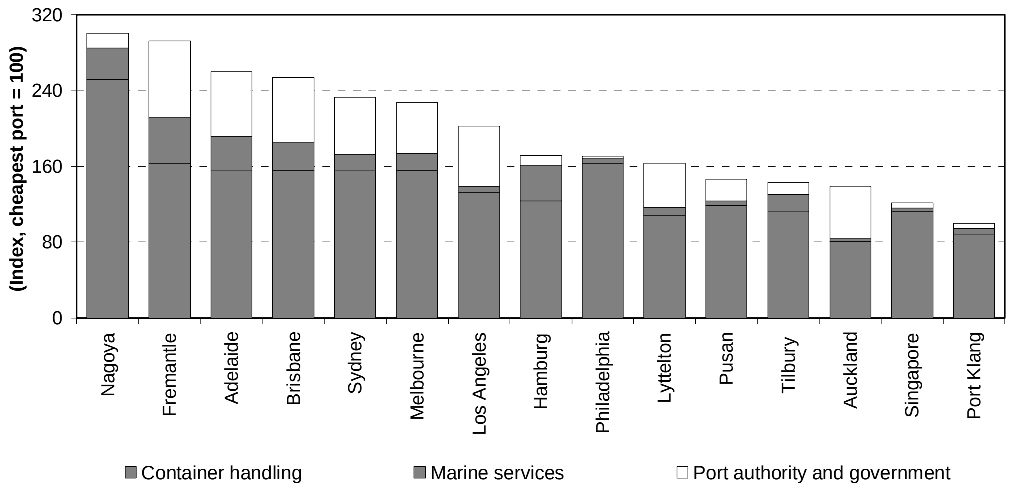
The sample data from the current study show similar patterns, with stevedoring representing between 56 and 68 per cent of all waterfront charges per TEU at Australian ports (Figure 6.2). The experience at overseas ports, however, was mixed. At some overseas ports — Auckland, Hamburg, Los Angeles and Lyttelton — the contribution of stevedoring to total waterfront charges per TEU was similar to the Australian ports, ranging between 58 and 72 per cent. At the other overseas ports, stevedoring represents a greater proportion of total waterfront charges. For example, stevedoring charges represented 86, 93 and 96 per cent of total waterfront charges per TEU at Port Klang, Singapore and Philadelphia, respectively.

The variation in the importance of container stevedoring charges among ports may result from differences in the charge structure, port-specific characteristics, port ownership and cost recovery policies.

Marine services, port authority and government charges are based on factors such as ship size and length, time at berth, services provided and the nature of cargo (see Chapter 4 and Chapter 5). Charges for marine services vary because of geographical factors, competition amongst service providers or the nature and volume of traffic serviced by the port (see Section 4.1, 4.2 and 4.3). Government and port authority charges will depend partly on the degree of commitment to 'user pays' and a commercial posture (see Section 5.1 and 5.2).

When all waterfront charges are taken into consideration, the relative total charges per TEU changes for some terminals (for example, Philadelphia–Hamburg–Los Angeles and Pusan–Lyttelton). However, this does not significantly affect the relative costs of Australian and overseas ports (see Figure 6.2).

Figure 6.2 The average composition of waterfront charges per TEU for the sample trades, 1997



Note: The indices are based on a trade-mix weighted average of the average box exchange to take account of different container stevedoring charges for full/empty and 40'/20' containers. Shore-based reefer charges have been excluded because data on the number of reefers were not available. This is likely to exaggerate the level of container stevedoring charges at Australian terminals relative to overseas terminals because, on average, waterfront reefer charges at Australian terminals represent a significantly lower increment to overall stevedoring charges.

Marine services include charges for pilotage, towage and mooring (see Sections 4.1, 4.2 and 4.3). Port infrastructure is discussed in more detail in Sections 5.1 and 5.2.

Exchange rates: Charges at overseas ports have been converted into Australian dollars based on exchange rates as at 30 June 1997 (see Chapter 2).

Source: Productivity Commission estimates based on Thompson Clarke Shipping (consultant) data.

Comparison of container stevedoring charges

Container shipping lines were approached for actual cost data for container stevedoring charges and the additional waterfront reefer charges, which were defined as:

- *Container stevedoring charges* — charges for loading and unloading a container between wharf and ship (stevedoring) plus the charge for handling the container in the terminal yard and of receiving or delivering it to either road or rail. The data presented is expressed on a per TEU basis.
- *Shore-based reefer charges* — charges for shore-based reefer services — plugging and unplugging refrigerated containers into power or attaching fixed and portable refrigeration units as well as the cost of monitoring temperatures and the power consumed. They are charged in addition to the container stevedoring charge.

These charges take into account volume discounts, productivity incentives and paid idle time incurred for scheduled interruptions.

Container stevedoring charges were, on average, higher at all Australian container terminals than at any of the overseas terminals surveyed. On the South–East Asia trade, for example, container stevedoring charges were over 150 per cent higher at Adelaide than at Port Klang. The exception is Nagoya, which was at least 130 per cent more than for Australian terminals on the same trade (the North Asia trade). However, the Australian charges on this trade were still between 10 and 15 per cent higher than Pusan in South Korea.

Charges may vary between different Australian terminals and between different trades at the same Australian terminal due to contractual arrangements. However, there is evidence in the data collected for this study that shipping lines typically negotiate national contracts for container terminal services with the one national provider. This may reflect the transaction costs of negotiating separate prices for each terminal and network cost advantages.

Shore-based reefer handling charges apply to a small proportion of the export and import containers passing through terminals. For example, in the six months to December 1997, reefers comprised 15 per cent of the full containers handled at the Port of Brisbane.

In contrast to container handling charges, shore-based reefer charges were generally lower at Australian terminals. Shore-based reefer handling charges at Hamburg on the European West Bound trade, for instance, were over three times more than the comparable Australian terminals. Similar differences existed across all ports except Philadelphia on the US East Coast trade, which was lower than the Australian ports with which it was compared.

Excluding the North American trades, shore-based reefer handling charges generally represent an additional 10 to 15 per cent on the standard handling charge for a full container at Australian terminals.[3] The difference was more significant at the overseas terminals in the study with shore-based reefer handling charges adding, on average, about 27 per cent to the cost of container stevedoring.

Differences in container stevedoring charges can be explained, in part, by characteristics of individual terminals and trades. Characteristics such as scale, productivity and the composition of the workforce directly affect the cost of providing stevedoring services.[4] And the level of competition (both between terminal operators within the same port and between ports) influences terminal operator performance and profitability.[5]

Comparisons of container stevedoring charges are presented in the following sections. They were undertaken on a trade basis using a typical ship to ensure comparability (see Chapter 1 and Appendix B). Indices are used to respect the commercial confidentiality of the container shipping lines that provided data.

US East Coast trade

On the US East Coast trade, the shipping service included in the study employed container ships in the 1000 to 2000 TEU class. Data were obtained for Brisbane, Melbourne and Sydney in Australia, and for Philadelphia in the US.

---

3 Charges are significantly higher for all terminals on the North American trades because of the relatively high use of port-hole containers — representing a 24 to 45 per cent addition to the standard container handling charge at Australian terminals, and as much as 71 per cent at some overseas terminals.

4 Work force composition is affected by the proportion of workers working overtime compared with the use of supplementary workers. This issue is discussed further in the Commission's study 'Work Arrangements in Container Stevedoring' (PC 1998).

5 Industry dynamics also influence the comparison of terminal handling charges between ports. In particular, about three-quarters of all the container terminal handling contracts in Australia were renegotiated during the second half of 1996. This resulted in some major switches of allegiance — for example AAX, the major South–East Asia trade consortium switched from Patrick to P&O Ports and the ANSCON consortium switched in the opposite direction. In addition, there were important consortia realignments in the South–East Asia trade and New Zealand trades which altered operating patterns.

Philadelphia is the major entry port for containerised frozen meat shipments from Australia and New Zealand to East Coast North America (including Canada). For the sample service, frozen meat is the dominant North-bound commodity, and containers destined for the Canadian market are transferred to rail at an intermodal container transfer facility.

Container stevedoring charges were more than 20 per cent higher at Australian terminals, when adjusted for the average trade share of 20 and 40 foot containers. The greatest difference was at Brisbane, where charges were about 30 per cent higher (see Figure 6.3(a)).

Shore-based reefer charges at all Australian terminals on the trade were also higher than Philadelphia, with the difference being greatest at Melbourne which is more than twice as high. The difference is less pronounced for Sydney and Brisbane respectively (see Figure 6.3(b)).

Shore-based reefer charges were relatively high in both the US East and West Coast trades when compared with other trades. This can be explained, in part, by greater use of port-hole refrigerated containers, which have high attendant capital infrastructure costs. Unlike standard reefer containers, port-hole containers are not fitted with their own refrigerated system and require separate blown-air refrigeration units when not connected to the ship's system.

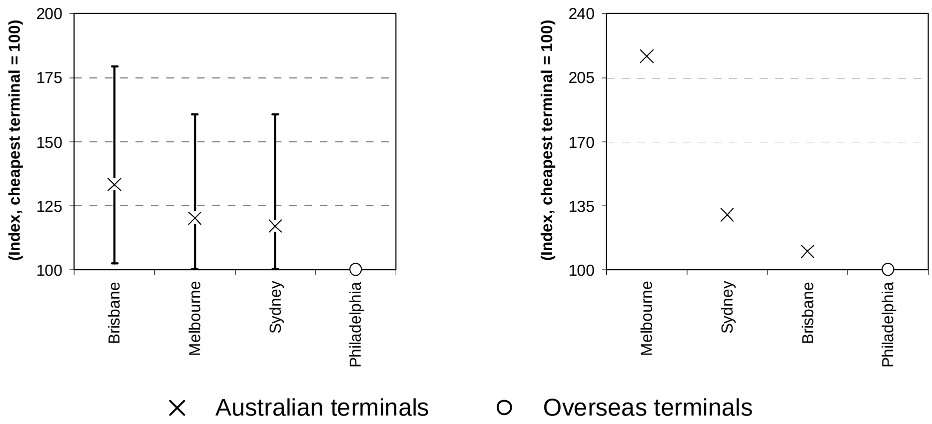
US West Coast trade

On the US West Coast trade, the shipping service included in the study employed container ships in the 500 to 1800 TEU class. Data was obtained for Melbourne and Sydney in Australia and for Los Angeles.

A significant feature of the US West Coast trade is the relationship between the container shipping line and the container terminal operator at Los Angeles. That is, the container terminal operator at Los Angeles is a subsidiary of an organisation that also contracts with the container shipping line on the US West Coast trade to supply feeder and intermodal services management. This relationship may be taken into consideration when negotiating container stevedoring rates.

Figure 6.3 Index of container stevedoring charges per TEU on the US East Coast trade, 1997

(a) Container stevedoring charges **(b) Shore-based reefer charges**

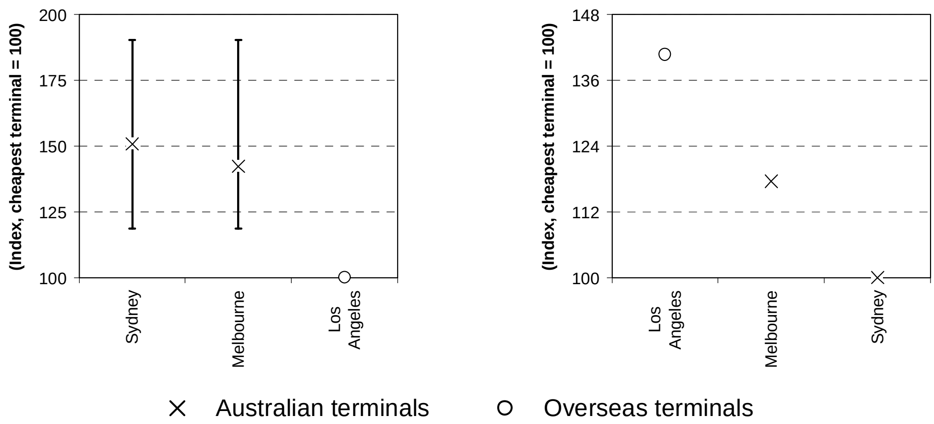


Note: Index is based on the lowest cost port.
The bounds represent the charges for 40 foot (upper) and 20 foot (lower) containers relative to the cargo mix weighted average.
See note on exchange rate in Figure 6.2.

Source: Thompson Clarke Shipping (consultant).

Figure 6.4 Index of container stevedoring charges per TEU on the US West Coast trade, 1997

(a) Container stevedoring charges **(b) Shore-based reefer charges**

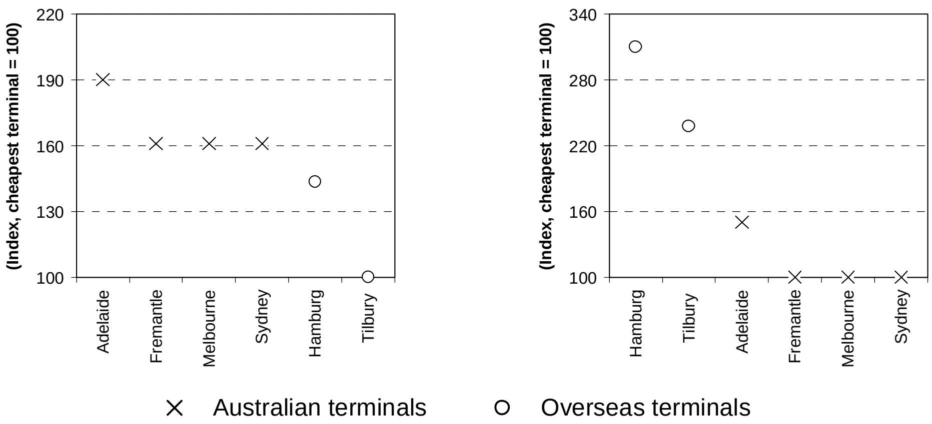


Note: Index is based on the lowest cost port.
The bounds represent the charges for 40 foot (upper) and 20 foot (lower) containers relative to the cargo mix weighted average.
See note on exchange rate in Figure 6.2.

Source: Thompson Clarke Shipping (consultant).

Figure 6.5 Index of container stevedoring charges per TEU on the European East Bound trade, 1997

(a) Container stevedoring charges **(b) Shore-based reefer charges**

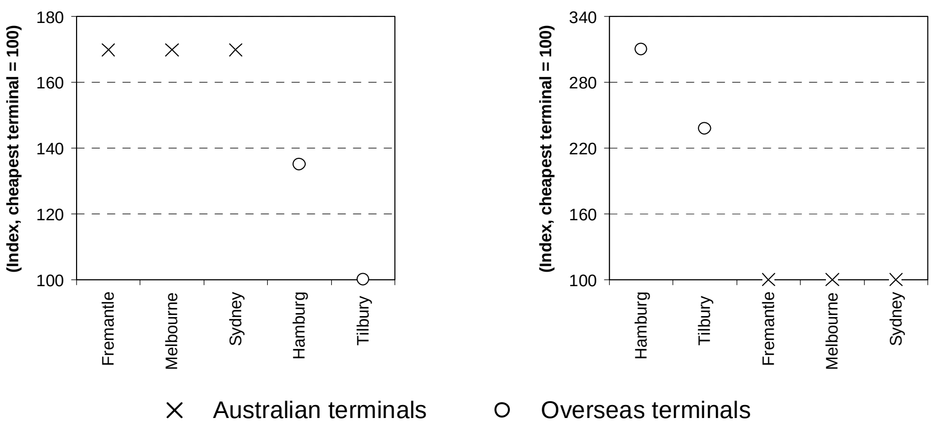


Note: Index is based on the lowest cost port.
See note on exchange rate in Figure 6.2.

Source: Thompson Clarke Shipping (consultant).

Figure 6.6 Index of container stevedoring charges per TEU on the European West Bound trade, 1997

(a) Container stevedoring charges **(b) Shore-based reefer charges**



Note: Index is based on the lowest cost port.
See note on exchange rate in Figure 6.2.

Source: Thompson Clarke Shipping (consultant).

On this trade, Australian container stevedoring charges were between 40 and 50 per cent higher than the Los Angeles terminal. However, both Melbourne and Sydney had considerably lower shore-based reefer handling charges than Los Angeles (see Figure 6.4 (a) and (b)).

European East Bound trade

On the European East Bound trade, the sample service employed container ships in the 2000 to 3000 TEU class. Data was obtained for Sydney, Melbourne, Adelaide and Fremantle in Australia, Tilbury in England and Hamburg in Germany.

Adelaide had the highest container stevedoring charges on this trade and was about 90 per cent higher than Tilbury. However, at all other Australian terminals the charges were higher than for Tilbury — and to a lesser extent Hamburg (see Figure 6.5(a)). In contrast, shore-based reefer charges at Australian terminals were generally less than half those in overseas ports (see Figure 6.5(b)).

European West Bound trade

On the European West Bound trade, the sample service employed container ships in the 2000 to 3000 TEU class. Data was obtained for Sydney, Melbourne and Fremantle in Australia, Tilbury in England and Hamburg in Germany.

Container stevedoring charges at Australian terminals were about 70 per cent higher than for Tilbury — the port with the lowest charge on the trade (see Figure 6.6(a)). However, as with the East Bound European trade, shore-based reefer charges at Australian terminals were considerably lower than either Tilbury or Hamburg (see Figure 6.6(b)).

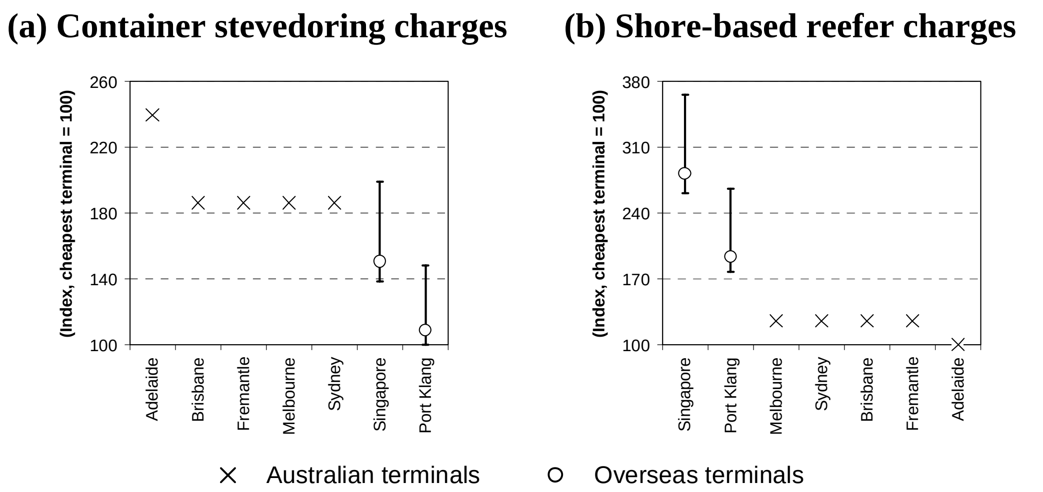
South–East Asia trade

On the South–East Asia trade, the sample service employed container ships in the 1500 to 2500 TEU class. Data was obtained for Adelaide, Brisbane, Sydney, Melbourne and Fremantle in Australia, Port Klang in Malaysia and Singapore.

Container stevedoring charges at the majority of Australian terminals were about 1.9 times those at Port Klang — the terminal with the lowest charges on the trade. The exception is Adelaide which was about 2.4 times higher (see Figure 6.7(a)). However, the relatively high charges at Adelaide may, in part, be explained by the regular scheduling of the port call on a Sunday with corresponding penalty rates for labour.

Shore-based reefer charges, on the other hand, were considerably lower at Australian terminals with the lowest being Adelaide. In comparison, Port Klang and Singapore were more than 80 and 180 per cent higher, respectively (see Figure 6.7(b)).

Figure 6.7 Index of container stevedoring charges per TEU on the South–East Asia trade, 1997



Note: Index is based on the lowest cost port.
The bounds represent the charges for 40 foot (upper) and 20 foot (lower) containers relative to the cargo mix weighted average.
See note on exchange rate in Figure 6.2.

Source: Thompson Clarke Shipping (consultant).

North Asia trade

On the North Asia trade, the sample service employed container ships in the 1500 to 3000 TEU class. Data was obtained for Adelaide, Brisbane, Sydney, Melbourne and Fremantle in Australia, Pusan in South Korea and Nagoya in Japan.

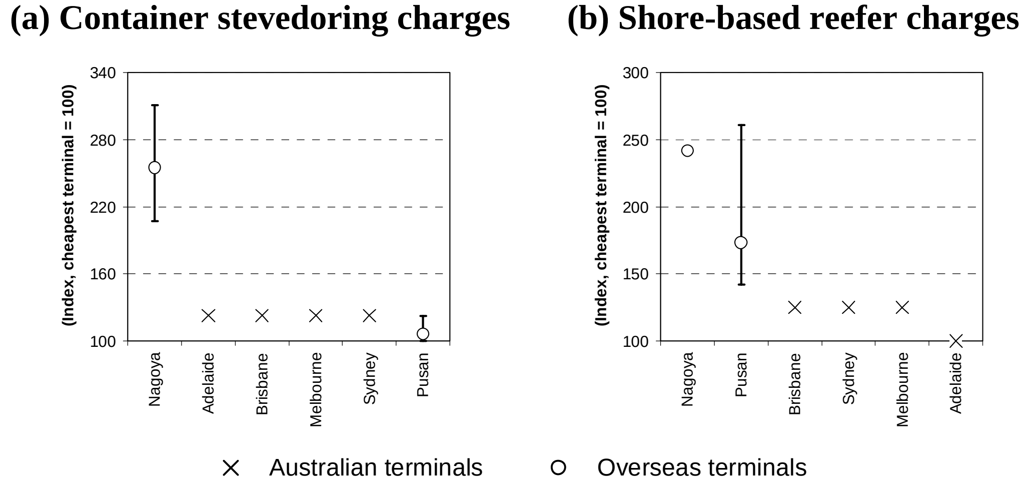
Some container ship operators on the North Asia trade were reluctant to divulge their container stevedoring costs. For the Australian ports, the consultant (Thompson Clarke Shipping) used the market rate that applied at the time the consortia (included in the study) negotiated its stevedoring handling charges.[6] For the overseas ports, the data were based on published charges with

6 This occurred at a time when several shipping consortia renegotiated their contracts and changed their stevedore.

adjustments made for the estimated degree of discounting likely in that port and the relative market power of the consortia.

The evidence on container stevedoring charges on the North Asia trade is somewhat mixed. Although charges at Australian terminals were higher than Pusan, the difference was not great. Container stevedoring charges at Australian terminals were less than those at Nagoya (see Figure 6.8(a)). Nagoya is reputedly the most expensive container port in Japan. The favourable performance of Australian terminals when compared with Nagoya should also be treated with caution because of the difficulty in obtaining data for this trade.

Figure 6.8 Index of container stevedoring charges per TEU on the North Asia trade, 1997



Note: Index is based on the lowest cost port.
The bounds represent the charges for 40 foot (upper) and 20 foot (lower) containers relative to the cargo mix weighted average.
See note on exchange rate in Figure 6.2.

Source: Thompson Clarke Shipping (consultant).

In contrast, shore-based reefer charges at all Australian terminals were considerably lower than either Pusan or Nagoya which were between 75 and 150 per cent higher than those for Adelaide — the cheapest port in Australia (see Figure 6.8(b)).

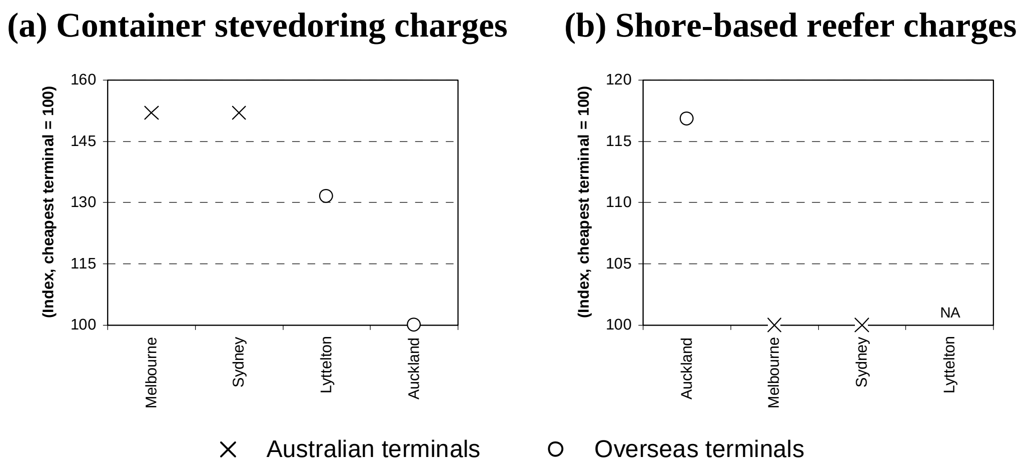
New Zealand trade

The ships on the sample service for the New Zealand trade were all less than 1000 TEU capacity. Furthermore, container ships on the New Zealand trade sample service were not worked at the major container terminals in Melbourne, Sydney and Lyttelton, but at outside berths using shipboard cranes that transfer containers at a lower rate than specialised shore-based cranes.[7]

Container stevedoring charges were higher at Australian ports than at the New Zealand counterparts (see Figure 6.9(a)). However, container stevedoring charges for the New Zealand trade were lower than for any other trade at both Melbourne and Sydney.

Shore-based reefer servicing charges were lower at terminals in Melbourne and Sydney than at Auckland (see Figure 6.9(b)). Furthermore, as with container stevedoring charges, the shore-based reefer charges for this trade were the lowest for any trade.

Figure 6.9 Index of container stevedoring charges per TEU on the New Zealand trade, 1997



Note: Index is based on the lowest cost port.
See note on exchange rate in Figure 6.2.
Source: Thompson Clarke Shipping (consultant).

Error! AutoText entry not defined..3 **Container terminal productivity**

Container productivity is a key determinant of the cost of providing container stevedoring services. Industry-recognised partial indicators of capital productivity, labour productivity and capital utilisation are examined in this section.

7 Ships using shipboard cranes were chosen for the sample because these are typical of the ships on this trade.

Measures and influences on productivity

Productivity is defined as output per unit of inputs employed. Improvements in productivity can result from advances in technology or more efficient use of inputs, through better utilisation of capital equipment or improved work practices.

Although overall productivity growth can result from more efficient use of capital or labour, it is often difficult to isolate the contribution of each. Increasing the efficiency of labour will also increase the output per unit of capital and *vice versa*. This suggests that approaches that take into account the contribution of all factors of production (such as total factor productivity measures or data envelopment analysis) are preferable to partial measures. However, the data requirements of such measures are considerable. In addition, some of the assumptions underlying the analysis do not always hold, making interpretation difficult.

For practical reasons, the analysis in this section is limited to measures of labour and capital productivity. The two industry-recognised partial productivity measures examined are annual lifts per employee and net crane rates:

- *Annual lifts per terminal employee* — the number of container movements (box lifts) per terminal employee. Terminal employees include all those engaged in terminal activities. No allowance could be made for hours worked because these data were not available (see below).
- *Net crane rates* — the number of container movements (box lifts) per net crane hour. A net crane hour excludes award shift breaks, among other things.[8]

These indicators are compared for Australian and overseas terminals.

Caution must be exercised when comparing measures such as 'crane rates', because they may not be defined in the same way. For this reason, data were collected specifically for this study to enable consistent measurement of performance. Further information on the various measures of 'crane rates' are presented in Box 6.1.

8 An alternative measure is 'elapsed rate' — which the BTCE defines in terms of labour aboard to labour ashore (BTCE 1997). Although this measure incorporates different working arrangements (including scheduled breaks), it understates the actual 'working rate' of the crane.

Box 6.1 Capital productivity measures

A number of capital productivity measures are commonly used when discussing stevedore performance. They all seek to measure the efficiency of the stevedores in one of their main tasks — loading and unloading ships. The measures can differ widely, however.

A first source of difference depends on whether they are *crane* rates or *ship* rates.

- *Crane rates* measure productivity on an individual crane basis; that is, the average number of lifts or TEUs moved over the period by a crane.
- *Ship rates* measure the total productivity of loading and unloading a ship, that is the total number of lifts or TEUs moved over the period. The measure will therefore depend, in part, upon the number of cranes in use on the ship.

Productivity measures also differ depending upon how the time period is defined. The rates are measured either in terms of *elapsed* time (the time labour is on to labour off), or *net* time, which is equal to elapsed time minus time unable to work the ship due to award shift breaks, ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at the ship operator's request.

The four measures most commonly used are:
Crane rates

- *elapsed crane rate*: the number of containers moved per crane per elapsed hour;
- *net crane rate (also known simply as the crane rate)*: the number of containers moved per crane per net hour;

Ship rates

- *elapsed rate*: the number of containers moved per elapsed hour for the ship; and
- *net rate*: the number of containers moved per net hour for the ship.

In making comparisons of capital productivity performance between workplaces, it is important to compare like with like. For example, comparing an Australian workplace net crane rate with an overseas workplace net rate would be invalid. The former measures individual crane productivity, the latter total productivity of the ship being worked (and is therefore dependent on the number of cranes being used).

Differences in measured productivity may reflect differences in operational characteristics that are outside the control of the operator — for example, the size of ships and the variability of demand — as well as differences in underlying performance. The other influences on productivity are analysed by comparing the partial labour and capital productivity measures with measures of the scale of operation, asset utilisation and factor intensity.

Scale of operation

The proposition that larger terminals are likely to be able to achieve greater productivity through economies of scale is tested by two measures of the *scale of operation*, namely:

- *Average exchange per ship call* — the average number of containers exchanged per ship call. This measure gives an indication of the impact of job-by-job scale on terminal performance. When compared with *net cranes rates, average exchange per ship call* refers to exchanges on a liner shipping trade basis (the same basis on which net cranes rates were collected). However, *annual lifts per terminal employee* is a terminal-wide measure and is therefore compared with *average exchange per ship call* for the port as a whole.[9]
- *Annual terminal throughput per berth metre* — the total number of containers exchanged at the terminal, divided by the total length of available terminal berth. This provides a standardised measure of terminal throughput.

Asset utilisation

Greater productivity is likely to be achieved at higher levels of asset utilisation. However, economies of massed reserves will also place bounds on the levels of asset utilisation that can be achieved at smaller ports and terminals.[10] The influence of asset utilisation on terminal performance is examined using terminal berth occupancy rates:

- *Terminal berth occupancy rates* — the percentage of the time container berths are occupied. This can be affected by a number of factors, including the relative variability of ship arrivals, delays at other ports and terminal productivity. Very high berth occupancy is not necessarily optimal, because it may be associated with ship queuing.

---

[9] Terminal specific data were not available.

[10] See Chapter 2.

Factor intensity

The combination of inputs is likely to have some influence on the level of performance. However, different combinations of capital and labour can achieve similar performance depending on the quality of the capital and labour involved. The influence of factor intensity on terminal performance is examined using berth metres per terminal employee and berth metres per terminal crane:

- *Berth metres per terminal employee* — the average number of berth *metre*s per terminal employee; and
- *Berth metres per terminal crane* — the average number of berth *metre*s per crane.

Capital productivity and asset utilisation

Container terminal operations are typically capital intensive. However, because demand — and hence operational intensity — fluctuates, equipment utilisation is an important measure of overall capital productivity.

Portainer productivity is particularly important because it also reflects the level of service provided to ship owners. Ship turnaround time depends on the rate at which the crane works. Turning ships around quickly also reduces the likelihood of berths not being available and ships having to queue at times of peak demand.

Shippers also potentially benefit from the possibility of lower ‘blue water’ freight rates. The improved reliability of shipping services assist them in co-ordinating land-side activities, thereby reducing their overall transport cost.

Crane productivity

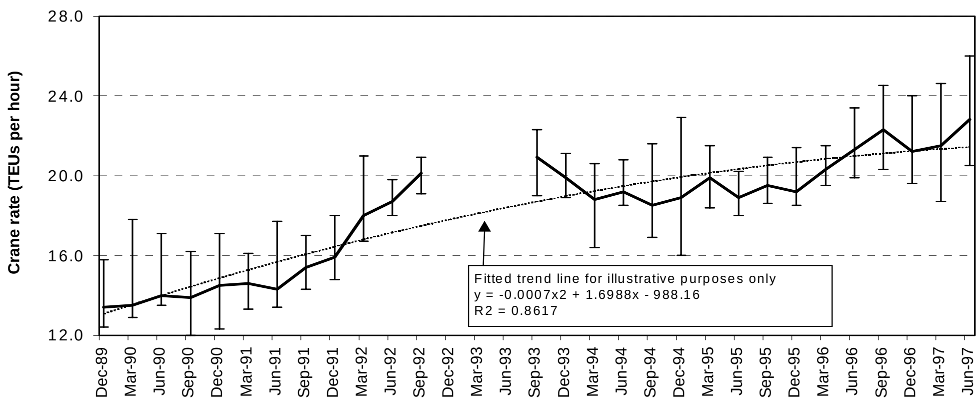
Various crane rate measures are widely used as indicators of capital productivity

in stevedoring (see Box 6.1). While this is generally appropriate, the crane rate measures also embody elements of labour productivity (for example, how well the crane operator works) and management performance. It is difficult to separate out these influences to achieve a true capital only productivity measure.

Crane performance indicators have been collected by various government agencies since 1989. Quarterly crane performance indicators were collected by the WIRA between June 1989 and September 1992. After a short interval, regular quarterly monitoring was resumed by the Bureau of Transport and Communications Economics (BTCE) from September 1993.[11]

There appears to have been significant improvement in net crane rate performance — measured in TEUs per hour — since the initiation of the WIRA reforms in 1989, although the rate of improvement has slowed (see Figure 6.10). However, some of the observed improvement may be due to a change in the mix of container sizes, with an increase in the proportion of 40 foot containers (which count as two TEUs). Between December 1989 and September 1992, the average annual improvement in net cranes rates was 3.8 per cent; however, this declined to less than 0.7 per cent over the period September 1993 to June 1997.

Figure 6.10 Net crane rate (TEUs per hour) at Australian container terminals (five port average), December 1989 to June 1997



Note: Error bars indicate the highest and lowest recorded net crane rates for the five Australian ports (Sydney, Melbourne, Brisbane, Adelaide and Fremantle). The curved line is an estimated trend. See Attachment 6A for detail on individual ports.

Source: *Waterline*, various issues.

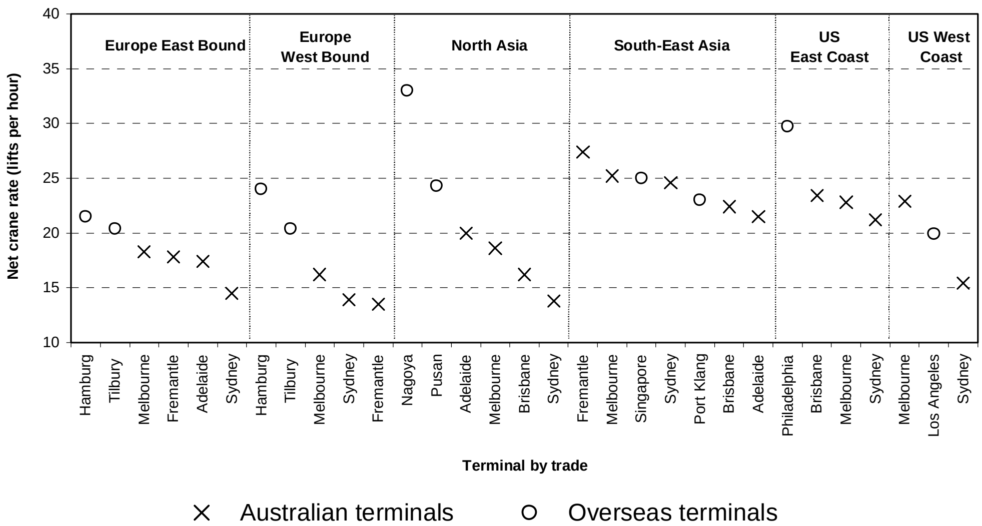
The five port average crane rate (*measured as containers per hour*) at September 1997 was reported by the BCTE to be 18.3. This had increased from

[11] There are some differences between the indicators collected by these two agencies. The WIRA measure of net crane rate referred to the number of TEUs moved per crane gross hour, where a gross hour was defined as the elapsed time minus the time unable to work the ship due to ship's fault, weather, awaiting cargo, industrial disputes, closed holidays, or shifts not worked at shipowner's request. The BTCE measure of net crane rate refers to the number of TEUs moved per crane net hours, where a net hour is the same as the WIRA's gross time less award shift breaks. In the first issue of its *Waterline* series, the BTCE suggested these differences were '... not expected to have a major impact on the analysis' (BTCE 1994, p. 5).

15.9, two years previously. This measure is almost equivalent to the lifts per net hour used in this study.[12]

Notwithstanding these improvements in performance, net crane rates at Australian terminals were found in this study to be significantly below those at most of the overseas ports examined (see Figure 6.11).[13]

Figure 6.11 Net crane rate (lifts per hour) for sample port and trade, 1997



Source: Thompson Clarke Shipping (consultant).

The greatest performance differences occurred on the North Asia trade. However, there were also marked performance gaps on the Europe West bound

---

12 A minor source of difference occurs when cranes are capable of lifting two containers simultaneously. The Commission would count the movement as a single lift and the BTCE would count the movement as two lifts. However, few cranes in Australia are capable of lifting two containers simultaneously.

13 It is not appropriate to compare the data in Figure 6.11 across trades because of differences in ship size and the number and composition of container exchanges. Note that data presented in Figure 6.10 were an average of the recorded net crane rate at each of Australia's five major container ports (Sydney, Melbourne, Brisbane, Adelaide and Fremantle). These port net crane rates are in turn averages over all trades and vessel calls for that port. The result is a range of net crane rates for the best and worst performing port (shown by the error bars) around the five port average. The international comparison of cranes rates, on the other hand, is based on the average rate experienced by the sample ships on individual trades at each port. As such, the net crane rates presented in Figure 6.11 are not directly comparable with those presented in Figure 6.10.

and US East coast trades. The results for the South–East Asia and US West coast trades were mixed.

The differences highlight the potential gains that may be derived from increasing crane performance at Australian terminals. One form these gains might take is faster turnaround times for container ships. For example, were Australian terminals to achieve net crane rates comparable with the best practice rate on the trades for that sample, cumulative turnaround times for container ships on some trades could be reduced considerably for most trades (see Table 6.3).

It is important to note, however, that the potential savings are based on the difference between terminal and trade best net crane rates and the average box exchange. The greater the difference between the terminal's recorded net crane rate and the trade best practice rate, the greater the potential time saving per TEU. However, if two terminals have the same differential in net crane rate relative to the trade best rate, the terminal with the greater average box exchange will have a potentially higher saving in total average exchange time.

Differences in net crane rates among terminals within Australia suggest that the scope for improvement varies. For example, analysis of sample data for Melbourne and Sydney, where terminal throughput is similar, indicates statistically significant variations in net crane rates between terminals in these cities.[14] The Sydney terminals' performance was significantly lower than at the Melbourne terminals.

The analysis suggests that differences in capital and labour productivity at Sydney and Melbourne are behind the observed difference in net crane rates — given that variation due to ship type was eliminated.

The analysis also indicated statistically significant differences between liner shipping trades. This supports the view that trade-specific characteristics such as the ship type and the loading and unloading task, have a bearing on net crane rates. It highlights the care that must be exercised in making international comparisons of crane handling rates involving different types of ships.

[14] The results of a two factor (port and ship) statistical analysis of variance. The F-statistic for ports was 11.33 (compared with a critical F-statistic of 6.61 at 95 per cent confidence) and the F-statistic for ships was 9.49 (critical F-statistic 5.05 at 95 per cent confidence).

Table 6.3 Potential gains from improving net crane rates, 1997

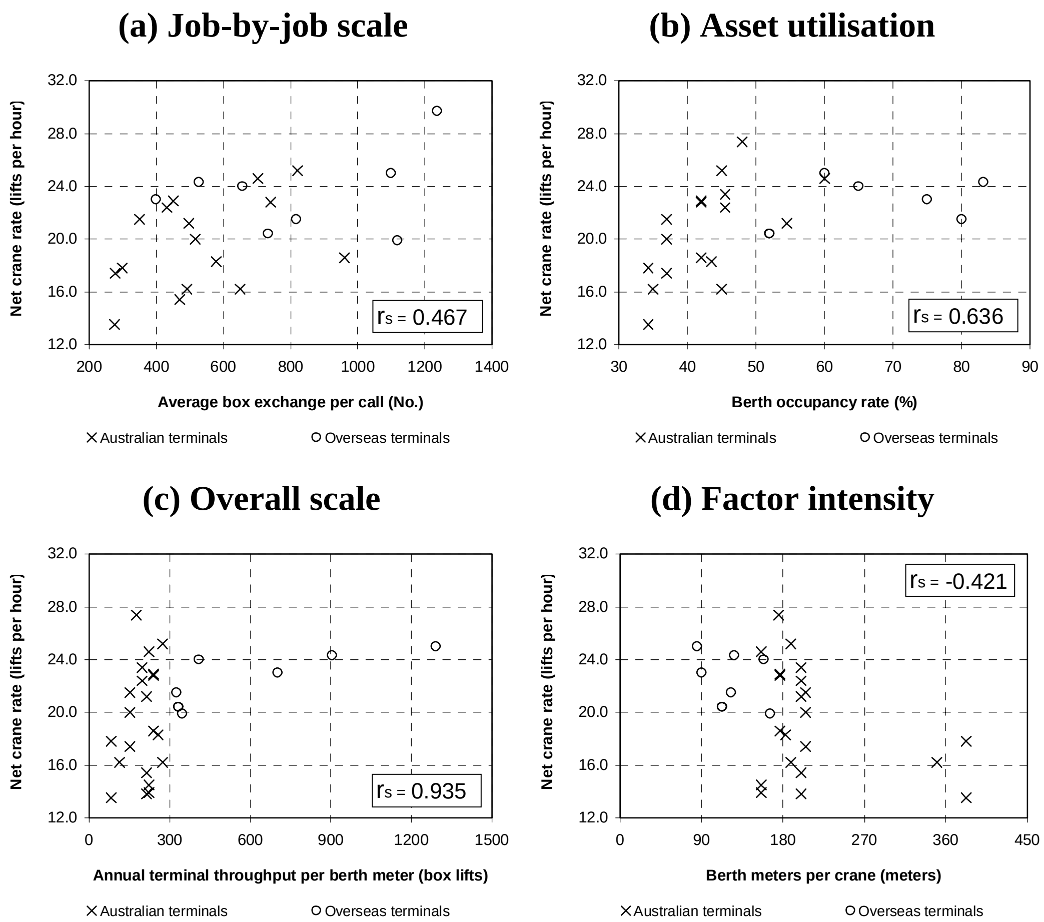
	Potential saving in total unload time if performing at trade best rate											
	Europe East Bound		*Europe West Bound*		*North Asia*[a]		*South–East Asia*		*US East Coast*		*US West Coast*	
Terminal	*ABX*	*500 boxes*[b]	*ABX*	*500 boxes*[b]	*ABX*	*500 boxes*[b]	*ABX*	*500 boxes*[b]	*ABX*	*500 boxes*[b]	*ABX*	*500 boxes*[b]
	(hrs)	*(hrs)*	*(hrs)*	*(hrs)*	*(hrs)*	*(hrs)*	*(hrs)*	*(hrs)*	*(hrs)*	*(hrs)*	*(hrs)*	*(hrs)*
Adelaide	3.0	5.5	-	-	4.6	4.4	3.5	5.0	-	-	-	-
Brisbane	-	-	-	-	10.1	10.3	3.5	4.1	2.5	4.5	-	-
Fremantle	2.9	4.8	8.9	16.2	-	-	nil[c]	nil[c]	-	-	-	-
Melbourne	4.7	4.1	13.0	10.0	12.1	6.3	2.6	1.6	7.5	5.1	nil[b]	nil[b]
Sydney	17.3	11.2	26.7	15.1	27.8	15.7	2.9	2.1	6.7	6.7	10.0	10.6
Total	**27.9**		**48.6**		**54.6**		**12.5**		**16.7**		**10.0**	

a Although Nagoya had the highest net crane rate for this trade, this represents a terminal rather than trade average. To avoid inconsistent comparisons, Pusan was used as the 'best practice' rate.
b Potential savings for an exchange of 500 boxes. Calculated in the same way as ABX but weighted for a standard 500 box exchange.
c Fremantle is the best performing port on the South–East Asia trade and Melbourne is the best performing port on the US West Coast trade.
ABX Potential savings per average box exchange. Calculated by subtracting the total time taken to unload an average box exchange at the trade 'best practice' or highest net crane rate from the total time taken to unload an average box exchange at the current net crane rate.
\- not applicable (terminal not included in sample for this trade).
Note: These savings are based on the sample data which are indicative of the experience of a single ship on the above trades. See Chapter 1 and Appendix B for more detail on the study scope and methodology.
Source: Productivity Commission estimates based on Thompson Clarke Shipping (consultant) data.

As noted previously, the ability of Australian terminals to realise net crane rates achieved at overseas terminals is likely to be influenced not only by terminal performance, but also by a number of factors that are beyond the terminal operator's control. Some indication of their potential influence can be gained from Figure 6.12.

For example, the size and nature of the stevedoring task could be expected to influence net crane rates. The unloading task at terminating ports such as those in Australia is complicated by the need to unload specific boxes for final destinations. This may involve moving or restowing other containers to gain access. Such difficulties are not as significant at large transhipment ports such as Singapore. Although the data exhibited a degree of variability, there was some correlation between job-by-job scale of operation and net crane rates (see Figure 6.12(a)).

Figure 6.12 Factors influencing terminal crane performance, 1997



Note: In each of the charts above, obvious outliers have been excluded from the analysis.

r_s The ‘Spearman Rank Correlation Coefficient’ presents a measure of correlation between two data series. A coefficient of +1 indicates perfect positive correlation, a coefficient of -1 indicates perfect negative correlation and a coefficient of zero indicates no correlation. For sample sizes presented above, a coefficient of greater than +0.40 or less than -0.40 indicates a 97 per cent probability that the two series are correlated.

Source: Productivity Commission estimates based on Thompson Clarke Shipping (consultant) data.

However, there was a stronger relationship between overall scale and crane productivity for the overseas terminals in the study, than for the Australian terminals (see Figure 6.12(c)).

Demand volatility and the lumpy nature of capital investment also influence performance.[15] The more cranes available to work a ship, the greater the

[15] See Chapter 2, Box 2.1 for further discussion.

potential net crane rate for any one crane.[16] However, a generalised industry standard for investment in a portainer crane is around 50 000 lifts per year. Most Australian terminals fall below this level of utilisation. Similarly, most Australian terminals fail to achieve the berth occupancy rates of the more productive overseas terminals (see Figure 6.12(b)).

The relatively low throughput and short-term volatility of Australian trades contribute to the lower crane intensity of Australian terminals when compared with the overseas terminals in the study. Australian terminals, for example, generally have about one crane for every 180 metre of berth, less than half the intensity of some overseas terminals (see Figure 6.12(d)).

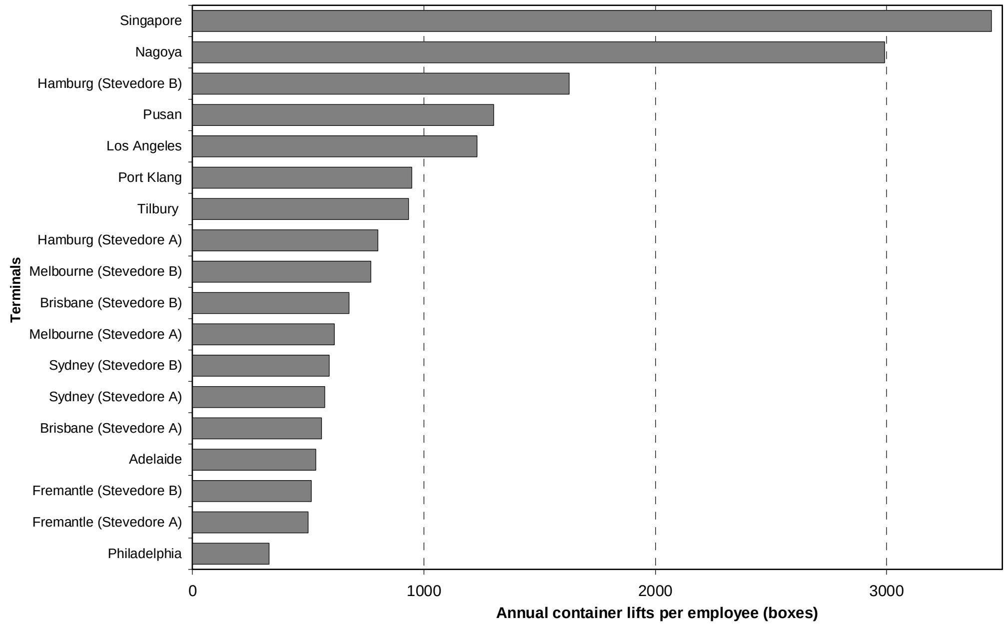
Labour productivity

On average, box lifts per terminal employee at Australian terminals were significantly lower than at overseas terminals. For example, one terminal at the Port of Hamburg averaged around 1600 box lifts per employee per year, compared with between 500 and 800 for Australian terminals. The only overseas terminal in the study with lower performance (in terms of box lifts per employee) was Philadelphia (see Figure 6.13).

Although there was observable variation in performance at any given Australian terminal on a trade-by-trade basis, it is unclear whether this is atypical when compared with overseas terminals. For all overseas terminals, except Tilbury and Hamburg, data were collected for a single trade, precluding judgements of variability in performance between trades at a given terminal. In the case of Hamburg, where information is available, there was considerable variability in performance between the European East bound and West bound trades.

[16] That is, the greater the number of cranes working a ship, the less time lost in moving the crane to access different holds. There are of course limits placed on this by congestion and also by ship size. With some smaller ships the achievable net crane rate is limited by the ship’s ability to maintain stability by adjusting its ballast.

Figure 6.13 Container lifts per terminal employee by terminal, 1997



Source: Thompson Clarke Shipping (consultant).

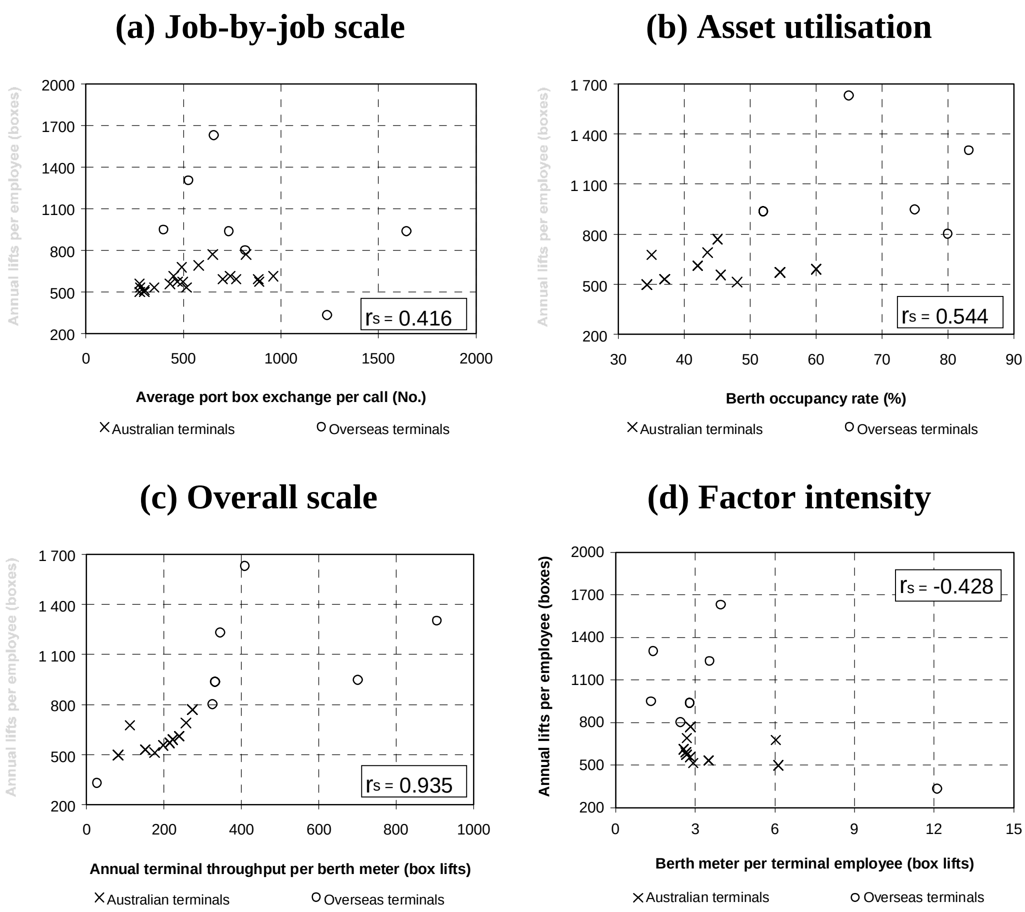
Overall, the relatively small scale of container operations is likely to limit the ability of Australian terminals to match the levels of labour performance experienced in the largest terminals included in the study.[17]

There appears to be some positive correlation between the overall scale of terminal activity and labour performance (see Figure 6.14(c)). However, the number of container transfers — scale on a job-by-job basis — does not appear to have a significant correlation with labour productivity (see Figure 6.14(a)).[18]

[17] Four of the ten international ports benchmarked in this study have a greater annual throughput than Australia as a whole (see Chapter 2, Table 2.1).

[18] One possible explanation for the weak relationship between performance and scale on a job-by-job basis may be the different types of operations performed at the larger international terminals. For example, receival and delivery operations at ports such as Singapore are relatively less significant because they are trans-shipment ports. In comparison, receival and delivery operations are likely to be more significant at smaller terminating ports such as Melbourne.

Figure 6.14 Factors influencing terminal employee performance, 1997



Note: In each of the charts above, obvious outliers have been excluded from the analysis.

r_s The 'Spearman Rank Correlation Coefficient' presents a measure of correlation between two data series. A coefficient of +1 indicates perfect positive correlation, a coefficient of -1 indicates perfect negative correlation and a coefficient of zero indicates no correlation. For the sample sizes above, a coefficient of greater than +0.40 or less than -0.40 indicates a 97 per cent probability that the two series are correlated.

Source: Productivity Commission estimates based on Thompson Clarke Shipping (consultant) data.

There is a weak positive correlation between asset utilisation and labour performance (see Figure 6.14(b)). The lower performing Australian terminals generally also have considerably lower berth occupancy rates than the more productive overseas terminals.

The international level of workforce intensity averages one employee for every 2 to 4 metres of berth (see Figure 6.14(d)). Although generally within this range, Australian terminals exhibit significantly lower performance than most overseas terminals. This may result from different work arrangements or the application of labour to different tasks. Further information on work arrangements is in the Commission's study 'Work Arrangements in Container Stevedoring' (PC 1998).

Limitations of analysis

Caution has been used in drawing conclusions from this information on labour productivity for a number of reasons. First, as discussed above, the use of partial productivity indicators has inherent limitations. Second, it was not always possible for the consultant (Thompson Clarke Shipping) to obtain consistent responses across all ports — that is, although some data were obtained from container operators on an individual trade basis, other data related to a terminal as a whole.[19] Similarly, as the majority of the data were supplied by terminal operators based on their information systems, differences in these information systems may have resulted in some measures deviating from the prescribed definition.

Comparing ports on the basis of container lifts per terminal employee (for example in Figure 6.13) also has limitations. A range of factors may influence the comparability of the results. In particular, this measure takes no account of the number of hours worked by each employee, nor the mix of permanent and casual employees. Taking account of these factors could only alter the conclusion that there is scope for improvement if, on average, foreign workers worked considerably longer hours than Australian workers.

The definition of terminal employee includes all employees, not just those directly involved in stevedoring operations. Data on the composition of terminal employees were not available to the Commission. However, differences in the composition of employees are unlikely to be so large as to make a significant difference.

[19] The total terminal activity is the sum of terminal activity on all trades serviced.

Error! AutoText entry not defined..4 Timeliness and reliability of container operations

Timeliness and reliability are among the most important problems facing users of the Australian waterfront. Timeliness and reliability are particularly important to shippers of containerised cargo because of its relatively high value, and time sensitive nature (compared with bulk cargo).

Poor timeliness and reliability adversely affect waterfront users in several ways. Unreliability directly raises the cost of using the waterfront through its effect on shipping schedules and terminal charges. The number of port calls a ship can make is reduced and the ability of container ship operators to maintain schedules is adversely affected (see Box 6.3). It also amplifies time-related terminal charges. For example, unreliability may result in stevedores working through periods that attract high overtime rates.

Poor reliability indirectly increases the cost of using the waterfront by constraining productivity and limiting resource management options. For instance, poor reliability adversely impacts on a container terminal operator's ability to efficiently plan capital utilisation. Similarly, poor reliability restricts the ability of importers and exporters to take advantage of just-in-time delivery of cargo.

Box 6.3 The cost of unreliability on shipping schedules

The cost of poor waterfront reliability on shipping schedules is illustrated by the experience of one of the container ship operators in the study. This operator employs a fleet of 7 ships in the Australia–US West Coast trade.

This operator has found it necessary to employ one additional ship in order to protect schedule integrity against delays on the Australian coast — an asset utilisation contingency factor of 14 per cent. Thompson Clarke Shipping estimate that this contingency factor represents an annual cost of at least US $7.0 million. If other major container operators in the Australia–US West Coast trade have built in comparable contingency factors, Australian waterfront 'unreliability contingency costs' could represent around US $20 million each year in that trade sector alone.

Based on the 1996 total round trade of about 97 000 TEUs between Australia and the US West Coast, this cost penalty can be expressed as the approximate equivalent of A$215 per TEU.

Source: Thompson Clarke Shipping (consultant).

The reliability of container terminal services affects the reliability of waterfront services. In addition, the actions of importers and exporters can affect the commencement of the service — which, taken together with delays in providing the service, adversely affects overall timeliness and reliability.

Timeliness and reliability performance of Australian terminals

Berth availability is a key factor influencing the timeliness and reliability of container services.[20] Delays in securing a berth upon arrival may cascade into delays in unloading (loading) and departure on the next leg of the voyage. They may also force stevedoring tasks across shifts, or into penalty-related time frames.

Berth availability generally appears to be a greater problem in Sydney than in most overseas terminals (see Figure 6.15). This may be of concern given the volume of container trade passing through this port — more than twice that of most other Australian ports (except Melbourne).[21] However, the small sample size from which the data are drawn make it difficult to be conclusive.

Cost and sources of delays

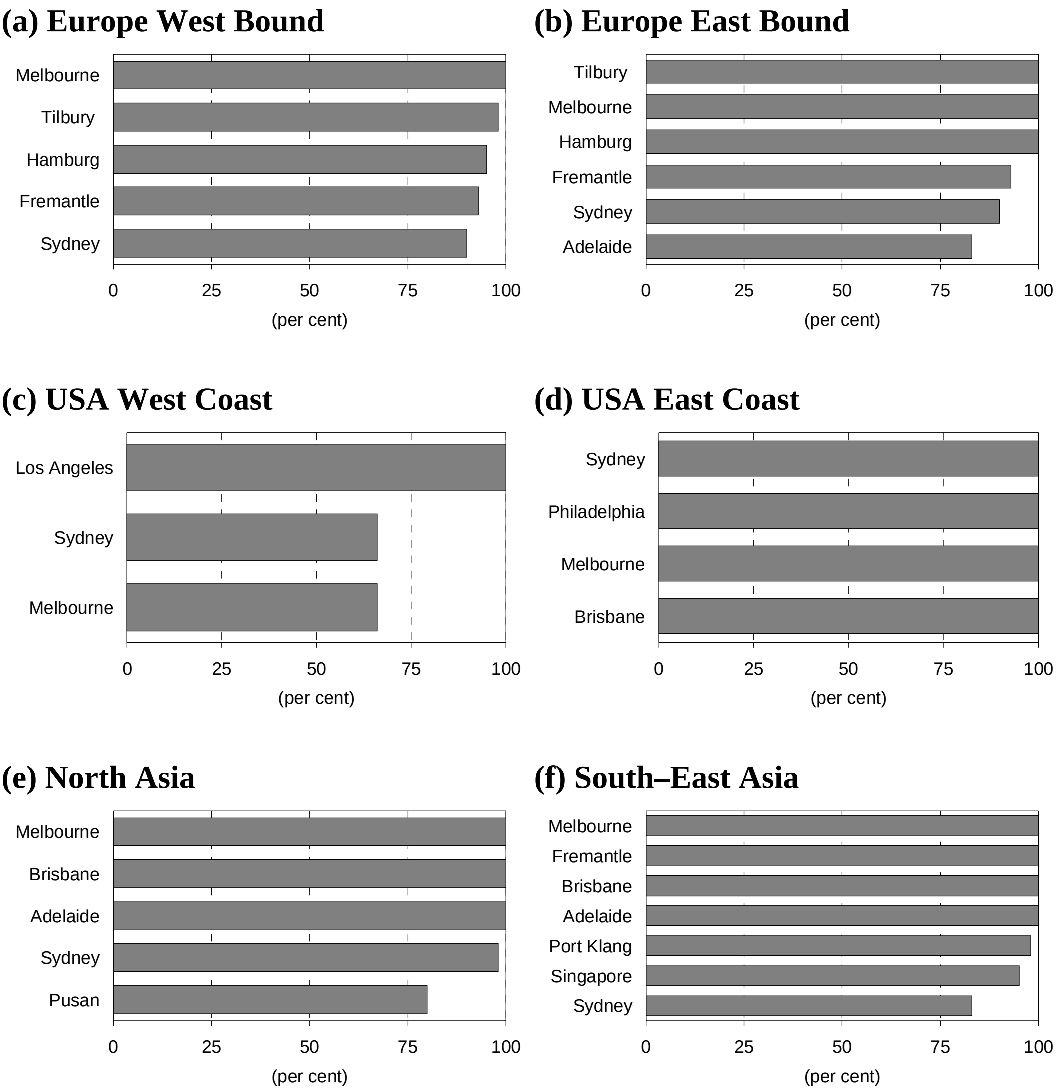
Shipping lines were approached for additional data regarding the cost and source of delays for ships using Australian ports in 1996–97. The definitions are based on those of the individual shipping lines which supplied the data and may vary considerably among shipping lines. This makes detailed comparisons of data from different shipping lines difficult.

---

[20] Berth availability was measured as the proportion of ship arrivals that could access a berth within four hours of the advised arrival time. (This assumes that the terminal operator is advised of the arrival time by the shipping agent more than 24 hours prior to actual arrival).

[21] As the major terminating ports in Australia, Sydney and Melbourne are also especially vulnerable to whatever delay factors may be imposed on them by other ports as well as themselves. For example, a poorly designed loading plan at an overseas terminal may reduce delays (and loading time) at that port but increase them at the unloading end where multiple lifts and restows are necessary to access containers that are to be unloaded at their final destination.

Figure 6.15 Berth availability



Note: Berth availability relates to the percentage of arrivals able to berth within four hours of an arrival time that was advised by the shipping agent more than 24 hours prior to arrival. Nagoya (North Asia) and the New Zealand trade lane have been excluded because no meaningful data were collected.

Source: Thompson Clarke Shipping Pty Ltd (consultant).

Information was collected on the length and source of delays. Delays of less than four hours are generally considered unexceptional in a trading environment and are not recorded by shipping lines. The major sources of delay identified were *berth availability*, *congestion*, *industrial disruption* and '*other*':

- *Berth availability* — indicates a delay because a berth was not available, for whatever reason. Note that this measure of berth availability does not assume the terminal was notified of the ship's arrival time. In some cases failure to notify the ship's arrival time may result in berths being unavailable;
- *Congestion* — indicates a delay because the ship was unable to berth at the terminal, because of traffic congestion;
- *Industrial disruption* — indicates a delay caused by a formal industrial dispute. Disputes in land transport, pilotage or any other port service could be included; and
- *Other* — delays for any other reason, mainly adverse weather.[22]

A ship can be delayed for more than one reason, such as berth availability on the way in and congestion on the way out. It is also important to note that these categories are not mutually exclusive. For example, industrial relations problems other than formal 'disputes', such as 'go slows', can affect both berth availability and congestion, while not being recorded as a dispute.

Table 6.4 Proportion of ships delayed in Australian ports by port, 1996–97 (per cent)

	Port					
	Sydney	*Melbourne*	*Brisbane*	*Adelaide*	*Fremantle*	*All five ports*
Proportion of ships delayed [a]	26	25	27	10	14	21

a Only includes ships delayed for 4 hours or more.

Source: Productivity Commission estimates based on Thompson Clarke Shipping (consultant) data.

Notwithstanding some variation among liner shipping trades, about one-fifth of the sample experienced some sort of delay when calling at Australian ports (see Table 6.4). Around a quarter of ships visiting Sydney, Melbourne and Brisbane experienced delays.

The survey results indicated that, for a five port average, berth unavailability was classified as the cause of delay in 24 per cent of cases, congestion in 28 per cent, and formal industrial disputes in 19 per cent of cases. The category 'other' (mainly weather) accounted for delays in 31 per cent of cases.

22 For the purposes of this study, delays due to ship malfunction or agreed ship rescheduling were excluded.

Cumulatively, these delays represent a direct cost to shipping lines of the order of A$500 000 per year (see Table 6.5).

Table 6.5 Summary of shipping line survey of ship delays, 1997

		Trades		
Experience in Australian ports	*Unit*	*Europe*	*US*	*Asia*
Proportion of calls delayed	*(%)*	22	18	17
Average delay per call	*(hrs)*	3.0	2.1	1.7
Delay per voyage in Australia	*(hrs)*	10.4	4.9	8.5
Delay per ship per year	*(hrs)*	45.2	29.7	88.1
Service days lost in Australia per year	*(days)*	22.6	17.3	18.4
Opportunity cost per year[a]	*(A$'000)*	$565	$432	$460

a This cost is calculated assuming a time charter rate of about A$25 000 per day for a 2500 TEU container ship, and is a function of the delay hours incurred in each service, the number of Australian port calls, the length of the international voyage and the number of ships in the service.

Source: Productivity Commission estimates based on Thompson Clarke Shipping (consultant) data.

Timeliness of container receival and delivery

Data were collected on six indicators of the timeliness of the delivery and collection of containers to and from container terminals:

- *Export cargo cut-off* — the time at which terminals cut-off receival of export boxes was obtained from some terminals;
- *Export cargo truck waiting* — the average time from a truck arriving at a terminal until it is issued a gate pass to deliver a box;
- *Export cargo box off-load* — the time from gate in to gate out after delivering a container;
- *Import cargo FCL availability* — the time at which a full container is available for pick up from a container terminal;
- *Import cargo truck waiting* — the average time from a truck arriving at a terminal until it is issued a gate pass to pick up a box; and
- *Import cargo box load* — the time from gate in to gate out after picking up a container.

The overall results do not reveal any patterns that might assist Australian port authorities or shipping and terminal operators to improve the timeliness of container receival and delivery. However, there is evidence that delays at some

Australian ports are much greater than those typically experienced at overseas ports.

One of the possible reasons why Australian terminals compare poorly with overseas ports is the mismatch of working hours between the waterfront and the land-side delivery, warehousing and distribution facilities (see Chapter 10). Although container terminals are manned to service their shipping customers 24 hours a day for 360 days a year, most land-side operators generally work 8 hours a day for 260 days a year.

Error! AutoText entry not defined..5 Summing up

Container stevedoring charges, labour and capital productivity and timeliness and reliability were benchmarked. The results indicate that, overall, Australian performance lags significantly behind that achieved in other ports.

For the services examined in the study, container stevedoring charges were significantly higher at Australian container terminals than at any of the overseas terminals (except Nagoya). This may be explained, in part, by the scale diseconomies faced by Australian terminals. However, New Zealand terminals, faced with similar conditions, are performing better.

Conversely, shore-based reefer handling charges were generally lower at Australian terminals (excluding the East Coast US trades). The reason for the different outcome for reefers relative to the general container charge is unclear. A contributing factor may be the highly competitive nature of the international trade in meat products.

The international comparisons of indicators of labour and capital productivity indicate scope to improve performance. Although average net crane rates have improved since 1989 at Australian terminals, they were significantly below those at most of the overseas ports examined in this study.

The potential gains from matching best performance outcomes would be significant. For example, if Australian terminals could achieve net crane rates comparable with those of the best performing terminals on the trades for this sample, cumulative turnaround times for container ships on some trades could be reduced by as much as 2 days. However, given the thinness and variability of the trade serviced at Australian terminals, it is unlikely that they could achieve the productivity levels of the largest terminals in this study.

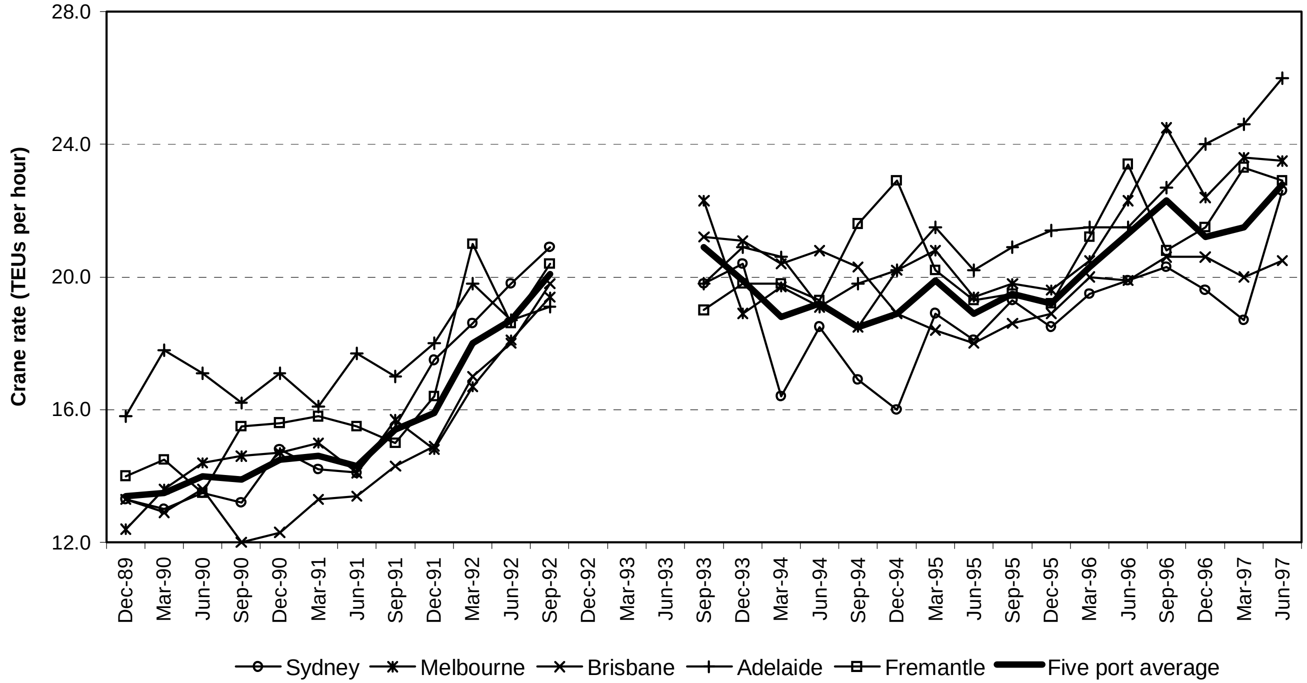
The data relating to timeliness and reliability, although limited, indicated relatively poor performance at key Australian ports. Survey data for Australia suggest that about one-fifth of ships experience some sort of delay calling at

Australian ports, with Brisbane, Sydney and Melbourne experiencing the greatest delays.

Taken together, these results reveal significant scope for improvement in the performance of container stevedoring in Australia.

Attachment 6A — Net cranes rates at Australian ports between December 1989 and June 1997

Figure 6A.1 Net crane rates at Australian container terminals, December 1989 to June 1997



Source: *Waterline*, various issues.

7 STEVEDORING — BREAK-BULK CARGO

There are a range of techniques used in the stevedoring of break-bulk cargo, depending on the nature of the cargo. Stevedoring of hot-rolled coil, motor vehicles, timber, pulp and newsprint were benchmarked.

Charges at Australian ports were found to be high compared to other ports in the study. Service levels were found to be comparable.

The term 'break-bulk' refers to general cargo which is carried 'loose' or in unitised form. Break-bulk cargo is not containerised, generally because the physical characteristics (weight or dimensions) of break-bulk cargo are not suited to transportation in containers. It may be palletised, boxed, coiled or bundled. Examples of break-bulk cargo include iron and steel, timber, metal ingots, motor vehicles, machinery and paper products.

As noted in Chapter 2, break-bulk cargo shipped through Australian ports represented about 22 per cent of the value of total imports by sea in 1995–96 and 10 per cent by volume. Exports of break-bulk cargo represented about 5 per cent of all sea exports by value and about 3 per cent by volume.

Stevedoring of break-bulk cargo involves both ship-based and shore-based stevedoring. This chapter deals with shore-based stevedoring.[1]

7.1 Break-bulk operations

In Australia, most break-bulk cargo is shipped through the ports of Melbourne and Sydney (see Table 7.1). Some regional ports also play an important role — Newcastle, Hastings and Port Kembla are major iron and steel ports.

Several types of ships are used in the shipment of break-bulk cargo, depending on the nature of the cargo. Break-bulk may be carried on conventional cargo ships together with containers. It is also carried on roll-on roll-off (ro-ro) ships specifically designed to carry break-bulk cargo, which can be loaded or unloaded using wheeled transport. There are also several types of specialised

[1] Ship-based stevedoring involves moving the cargo over the ship's rail. Shore-based stevedoring involves moving the cargo from the ship's rail to the sorting and stacking areas. The charge for ship-based stevedoring is typically included in the blue water freight rate.

ships used — pure car carriers (PCCs), reefer ships equipped to carry palletised meat, specialised forest products and livestock carriers.

Table 7.1 Non-containerised general cargo throughput, selected ports, 1996–97

Port	*Non-containerised general cargo*	*Share of total cargo throughput*
	('000 tonnes)	*(%)*
Sydney	806	3.8
Melbourne	2 030	10.9
Brisbane	786	3.9
Adelaide	280	4.7
Fremantle	660	3.0
Total	4 562	5.2

Source: Productivity Commission estimates based on BTCE *Waterline* 11, June 1997.

Stevedoring of break-bulk cargo is traditional stevedoring. Unlike container stevedoring, it is relatively labour intensive and there is limited scope to substitute labour with capital.

Techniques used in the loading and unloading break-bulk cargo can range from using ship's cranes or derricks, to in the case of motor vehicles, the goods being driven on and off the ship.

Loading and unloading may include the use of hooks, slings, nets, mechanical or magnetic grabs or vacuum handling equipment in the case of newsprint. Cargo may be lifted to or from trucks directly under the hook or carried by fork lifts to storage areas in the case of timber. In some cases, there is significant handling and stowing activity on board the ship.

Like the container trades, most importers and exporters of break-bulk cargo do not have a direct relationship with the stevedore, who is engaged by the shipping line.

7.2 Benchmarking break-bulk stevedoring

The shore-based stevedoring of four break-bulk cargoes — hot-rolled coil, motor vehicles, timber, pulp and newsprint — were benchmarked in this study. These cargoes were chosen in consultation with industry participants.

The case studies concentrated on outcomes for importers and exporters in terms of charges incurred and the timeliness and reliability of services. This is a slightly different focus than previous studies, which concentrated on labour productivity and charges, but did not include information on timeliness and reliability.

The disparate nature of break-bulk cargo and the variety of ships carrying it, make it difficult to monitor performance on a consistent basis over time and between ports.[2] Some performance data have been published by the Bureau of Transport Communications and Economics (BTCE 1995), the Prices Surveillance Authority (PSA 1994) and the Bureau of Industry Economics (BIE 1995a). These reports concentrated on labour productivity and stevedoring charges. All found that although stevedoring charges had fallen since the WIRA reforms, they remained high by international standards.

Many importers and exporters of break-bulk commodities do not systematically collect or have readily available information on reliability, timeliness and cargo integrity (damage). The lack of such information limits the ability of importers and exporters to pressure service providers for improved performance.

Hot-rolled coil

Hot-rolled coil is a steel product made from hot rolling steel slabs. It is processed and used in the manufacture of such products as automobiles, refrigerators, pipes and steel cans.

The Commission obtained performance information for the ports of Durban (South Africa), Philadelphia (USA), Auckland (New Zealand) and Port Kembla (Australia).

Completely built up motor vehicles

Completely built up (CBU) motor vehicles are imported through the ports of Sydney, Melbourne, Brisbane, Fremantle, Adelaide and to a lesser extent Darwin and Townsville. They are exported through the ports of Adelaide and

---

2 It is also possible that differences in charges may reflect differences in the services provided rather than best practice.

Melbourne. Motor vehicles are shipped on either ro-ro ships or PCCs. PCCs are purpose-built, car-carrying ships to make loading and unloading straightforward.

Generally, there are three components to the charges incurred by shippers in importing CBU motor vehicles through Australian ports — a port services charge (levied by the shipping line), wharfage (levied by the port authority) and a sorting and stacking charge (levied by the stevedore). Charges are typically levied on a per cubic metre basis, but can be levied on a per unit or vehicle basis.

Unloading involves stevedores unlashing the vehicles and driving them down a ship's ramp into the wharf sorting and stacking area (*vice versa* for loading). A number of motor vehicle importers contract out pre-delivery care. In some cases, companies providing pre-delivery care have car compounds located on or adjacent to the wharf.

As with container shipping, the choice of stevedore rests with the shipping line. Generally, importers and exporters have no contractual relationship with the stevedore. However, shippers are involved in monitoring performance. For example, the Federal Chamber of Automotive Industries (FCAI) has established a transport committee which meets regularly to discuss issues relating to the transportation of motor vehicles.[3]

The Commission obtained some performance information for the ports of Sydney, Brisbane, Adelaide, Fremantle and Amsterdam (Netherlands).

Timber

Timber is shipped in importer or exporter lots known as marks. There are a number of packs of timber per mark, when timber is loaded onto a ship the marks are split and the timber is stowed ship to length.[4] Ship's gear are used to load and unload timber from the ship. Once unloaded, timber is moved to the sorting area and re-sorted into marks, ready for collection.

At Australian ports, importers of timber generally incur wharfage (charged by the port authority), area hire (charged either by the port authority or the stevedore) and a charge for shore-based stevedoring.[5] The level of charges can vary on the basis of conversions used (hard versus soft), gross and net sizes and

---

[3] The committee has representatives from the four Australian manufacturers (Ford, Holden, Toyota and Mitsubishi) and three importers (Honda, Nissan and Mazda).

[4] The packs of timber are stowed on the basis of timber length.

[5] Shore-based stevedoring typically includes running back from the hook to the sorting area, sorting to mark and loading trucks for delivery.

the dimensions of the timber. In addition, all timber imported into Australia must be inspected by the Australian Quarantine and Inspection Service (AQIS) before it is released.

Forest Products Terminal in Melbourne and Timber Tallying in Sydney provide specialised stevedoring for forest products such as timber. Forest Products Terminal is a joint venture between the Strang Stevedoring group and a consortium of the major Victorian timber importers. Forest Products Terminal are able to provide an integrated service from the discharge of ships, handling, quarantine inspection, warehousing, transport and delivery. The joint venture also provides importers with greater control over stevedoring operations.

The Commission obtained performance information for the ports of Melbourne, Grangemouth (Scotland), Hull (England) and Barking (England).

Pulp and newsprint

Pulp and newsprint are shipped either in conventional ships or in specialised forest product ships (which are loaded from the side). Pulp units are formed by strapping together bales of pulp into 1.8 tonne packs. Pulp units are loaded and unloaded using cranes with special clamps or slung with hooks.

Newsprint is transported loose in reels which can vary in diameter and weight — the average height is one metre and weight 1.2 tonnes. Handling requirements are strictly controlled because of the high value of newsprint and the sensitivity of newsprint to damage. It is loaded and unloaded using cranes and paper side clamps or specially designed vacuum lifting equipment.

The Commission obtained performance information for the ports of Brisbane, Melbourne, Sydney, Adelaide, Devonport and Tauranga (New Zealand).

7.3 Performance

The level of charges is a relevant measure of performance. It provides an indication of the cost to importers and exporters of transporting their goods. It is, however, only one element of performance — timeliness, reliability and cargo integrity are also important.

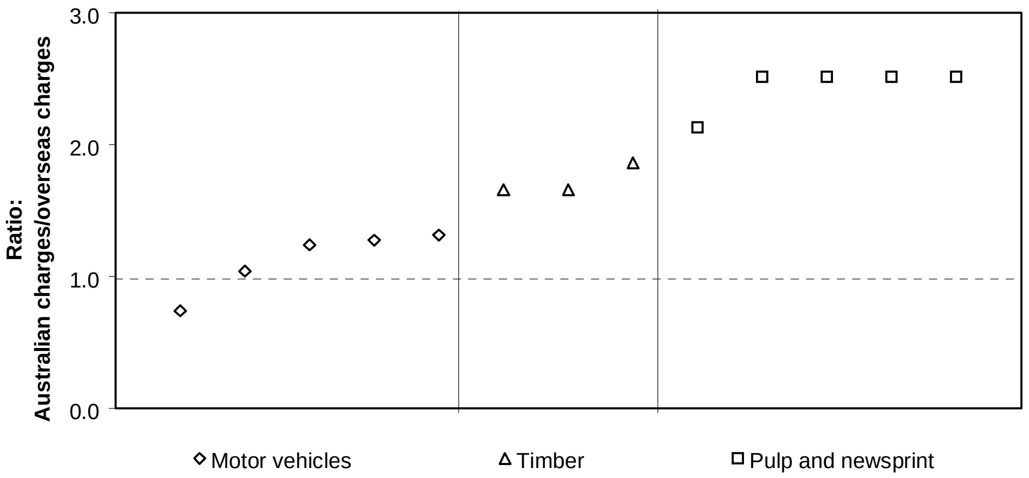
Charges

On the basis of the information provided to the Commission, shore-based stevedoring charges incurred by importers of break-bulk cargo were consistently higher at Australian ports than at overseas ports (see Figure 7.1). Shore-based stevedoring charges levied on motor vehicle importers at Australian ports were up to 1.3 times those overseas, with one exception. Charges at the Port of Amsterdam were 1.3 times those at Fremantle.

Shore-based stevedoring charges levied on timber importers included in the sample were between 1.5 and 2 times those overseas. Charges levied on pulp and newsprint importers were up to 2.5 times those overseas.

Higher charges at Australian ports may reflect poor stevedoring productivity, higher labour costs or market power.

Figure 7.1 Ratio of shore-based stevedoring charges levied by Australian port versus overseas ports, 1997



Notes: Each data point corresponds to the ratio of charges at an Australian port compared to an overseas port.

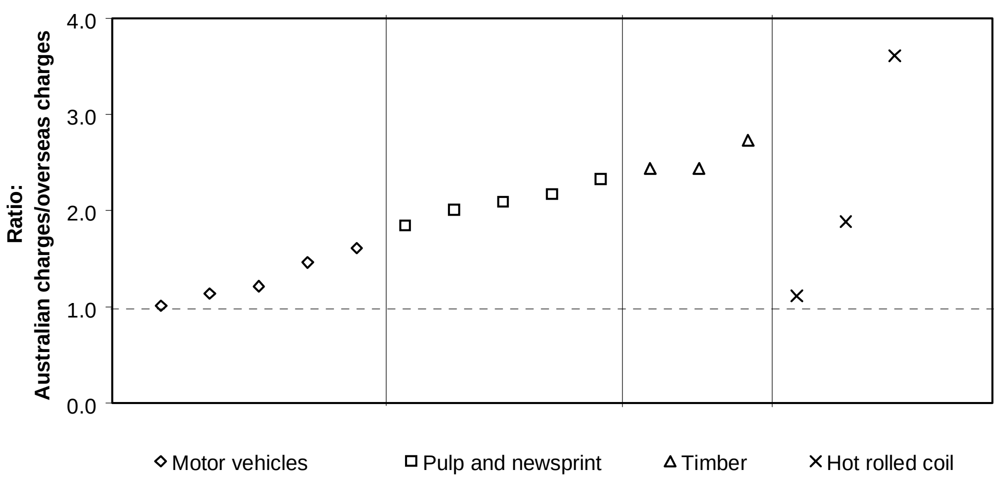
Source: Productivity Commission estimates derived from data provided by importers and exporters.

Shore-based stevedoring charges are not the only costs incurred by shippers of break-bulk cargo — others include site or area hire, port authority cargo-based charges and quarantine or clearance charges.

For the ports included in the study, total charges incurred by importers of break-bulk cargoes were higher at Australian ports than at overseas ports (see Figure 7.2). Total charges at Australian ports were up to 3.7 times those levied overseas.[6] Total charges on motor vehicle importers were up to 1.6 times those overseas and charges on timber importers were between 2 and 2.5 times.

Wharfage is levied on break-bulk cargo at all Australian ports to recover some of the costs of providing port infrastructure. In contrast, most overseas ports do not levy wharfage (for example, the ports of Hull, Barking, Grangemouth and Amsterdam). At ports where wharfage is not charged, the provision of port infrastructure is likely to be recovered through ship-based charges. If these ship-based charges were included it is likely that the difference between Australian charges and overseas charges would be less. This provides a further example of the difficulties in making meaningful comparisons of charges between ports (see Chapters 4 and 5).

Figure 7.2 Ratio of total charges levied at Australian ports versus overseas ports, 1997



Notes: Total charges include stevedoring, port authority and clearance charges.
Each data point corresponds to the ratio of charges at an Australian port compared to an overseas port.

Source: Productivity Commission estimates derived from data provided by importers and exporters.

Comparing shore-based stevedoring charges (Figure 7.1) with total charges (Figure 7.2), the ratios between Australia and overseas generally remain the same, at between one and just under three. In most cases, the relatively higher

6 The disparity in total charges for hot rolled coil between Australia and overseas is likely to reflect significant differences in the wages of stevedoring labour. For example, stevedoring wages at Australian ports are up to 10 times higher than at the Port of Durban.

shore-based stevedoring charges at Australian ports are the major determinant of total charges.

The most significant difference in ratios is in the case of timber — shore-based stevedoring charges were between 1.5 and 2 times higher and total charges were between 2 and 2.5 times higher. This reflects higher port authority, site hire and clearance charges at Australian ports relative to overseas ports.

Service

Although the level of stevedoring charges is important, importers and exporters of break-bulk cargo are also concerned with the timeliness and reliability of stevedoring operations, as well as wanting to minimise damage to their cargo.[7] Importers and exporters want reliable and timely services delivered at a reasonable price. A lack of timeliness and reliability can impose significant costs on importers and exporters, including additional storage costs, the cost of making alternative arrangements and the cost of damage.

Timeliness and reliability

Delays in the availability of cargo can result in additional costs associated with the inability to deliver goods to customers on time, additional storage costs and lost customers. The time taken to complete stevedoring operations and the time taken before cargo can be collected from the wharf impact on timeliness and reliability.

Timeliness and reliability are particularly important in the case of motor vehicles, because of the cyclical nature of the market. Most motor vehicle sales are completed at the end of the month or at Christmas and Easter. It is important for dealers to have sufficient stock on hand at these times to avoid loss of sales.

Infrequent ship calls to some ports can exacerbate this problem. For example, at the Port of Fremantle there is generally only one shipment of motor vehicles per month. A number of importers are likely to be awaiting the discharge of motor vehicles which can result in congestion at the terminal and cause delays for dealers.

Timeliness is, in part, determined by the time taken between the discharge of cargo and the availability of cargo for collection. At Australian ports, motor vehicles and pulp and newsprint are generally available for collection from the

[7] Timeliness is a measure of the time taken for a service to be provided. Reliability is a measure of the variability of performance.

wharf after 2 and 3 working days respectively. At the Port of Philadelphia, hot-rolled coil is generally available for collection ten days after it is unloaded. At the ports of Hull and Grangemouth, timber is generally available for collection two days after it has been unloaded.

Generally, at Australian and overseas ports, stevedores require less than 24 hours notice before importers can collect their cargo.

At the major Australian ports, importers of break-bulk cargo have 3 days of free storage on the wharf, before a storage charge is incurred. This can cause problems especially in the case of timber, which has to be inspected by AQIS before it can be removed from the wharf. If AQIS has not inspected the timber within 3 days, importers incur additional storage charges.

At overseas ports, free storage on the wharf varies from 3 days at the Port of Durban, 5 days at Philadelphia, up to 10 days at the Port of Grangemouth and up to 14 days at the ports of Hull and Amsterdam.

On the basis of the information provided, cargo is generally available for collection at the scheduled time at both Australian and overseas ports. When delays do occur they average between 1 to 2 days. On average there is a maximum delay of 2 days in the availability for collection of motor vehicles at Australian ports. Similar delays occur at the Port of Amsterdam.

Importers and exporters identified the following as typical causes of delays at Australian ports:

- late arrival of ships;
- problems with documentation;
- industrial disputes;
- berth congestion;
- unavailability of equipment; and
- problems with the clearance of cargo.

Importers and exporters identified the following as typical causes of delays at overseas ports:

- the late arrival of ships;
- problems with documentation;
- berth congestion; and
- problems with the clearance of cargo.

In contrast to Australia, importers and exporters did not identify industrial disputes and unavailability of equipment as causes of delays at overseas ports.

Cargo integrity

The integrity of cargo can be a significant issue in the shipment of break-bulk cargo, because of the way in which it is shipped, loaded and unloaded. Compared to containerised cargo, break-bulk cargo is relatively unprotected and exposed to damage both in transit and in loading and unloading.

Damaged cargo imposes additional costs on importers and exporters, be it the cost of repairing damage or the value of goods written off in extreme cases. Furthermore, damaged cargo can result in additional production costs. For example, modern newsprint presses run at high speed and if the reel is out of shape, nicked or damaged in any way, press runs can be stopped or delayed.

In most cases importers and exporters have insurance cover for cargo both in transit and during the loading and unloading process.

On the basis of the information provided to the Commission it appears that the level of service in Australia is comparable to that overseas.

8 STEVEDORING — BULK

The stevedoring of wheat and fertiliser were benchmarked. These are the only two bulk commodities for which contract stevedoring services are engaged.

On average, the Australian Wheat Board pays substantially less for stevedoring services than typical charges at North American ports. The stevedoring of bulk fertiliser in Australia is more expensive than New Zealand, where product is discharged at a faster rate by use of additional labour.

The principle bulk cargoes handled at Australian ports are coal, petroleum products and refinery feedstock, iron ore, alumina, wheat, sugar and fertiliser. Most are handled at specialised bulk-handling facilities in a relatively small number of ports located close to the commodity's source (or destination). Two exceptions are wheat and fertiliser, which are handled at 17 and 21 ports respectively.

Arrangements at bulk terminals and ports are quite different from container operations. Terminals for most bulk commodities are closely integrated with production facilities and transport operations. For example, Alcoa Australia uses its own ships to transport alumina from its terminals in Western Australia to its terminals in Victoria.

Previous benchmarking studies revealed that Australia's bulk terminal operational performance to be among the best in the world for some commodities (BIE 1995a). For example, Australian coal export terminals were found to have relatively high labour productivity and capital utilisation, consistent with observed lower terminal charges.

In work undertaken by the Australian Wheat Board (AWB) and the Queensland Sugar Corporation (QSC), the performance of Australian wheat and sugar terminals was found to be good by international standards, although there is some over capitalisation of grain exporting facilities.[1] The QSC reported Australian sugar terminal handling costs to be about half of those in Thailand and about one eighth as expensive as South Africa. The AWB did not compare terminal or stevedoring charges.

1 This work was consolidated in BIE (1995a).

The vertically integrated nature of most bulk industries makes it difficult to identify and obtain the cost of stevedoring. Stevedoring activities are undertaken 'in-house', usually by terminal employees who also perform other functions. Even when the cost of stevedoring can be isolated, terminal operators will not disclose it.

Wheat and fertiliser are the only two bulk commodities for which contract stevedoring services are engaged. Stevedores play a major role in the discharge of fertiliser, but a relatively minor role in loading export wheat.

8.1 Wheat

Australia is the fourth largest wheat exporter, behind the United States, Canada and the European Community. Australia produced 17 million tonnes of wheat in 1995–96.[2] Although this represented just over 3 per cent of 1995–96 world production, 70 per cent of Australia's harvest was exported, accounting for about 14 per cent of world trade (Gordon *et al* 1997). Cereal grains, of which wheat is by far the largest item, accounted for 7 per cent of Australian merchandise exports in 1996–97 (ABS 1997).

The AWB is the statutory 'single desk' seller of Australian wheat. It markets wheat and other grains on behalf of Australian growers. It also provides finance to growers during the post-harvest period before revenue from wheat sales is received.

Grain storage and handling is undertaken primarily by five Bulk Handling Corporations (BHCs), one in each mainland State. Each BHC operates a network of country receival and storage facilities connected by road or rail transport to seaboard export terminals also owned by the BHC. Bulk wheat is usually stored temporarily within the terminals and value-adding services such as blending are sometimes undertaken before the wheat is loaded onto ships.

Most Australian export wheat is sold 'free-on-board, stowed and trimmed'.[3] The remainder (about 25 to 30 per cent) is sold 'cost and freight' or 'cost, insurance and freight'. The AWB engages the BHCs, together with providers of

2 In 1994–95, Australia produced just 9 million tonnes as a result of the drought throughout eastern grain growing states. Almost 90 per cent of this harvest was exported.

3 'Stowed and trimmed' refers to loading the wheat into all corners of the hold and smoothing it so that it sits level just below the hold's top edge.

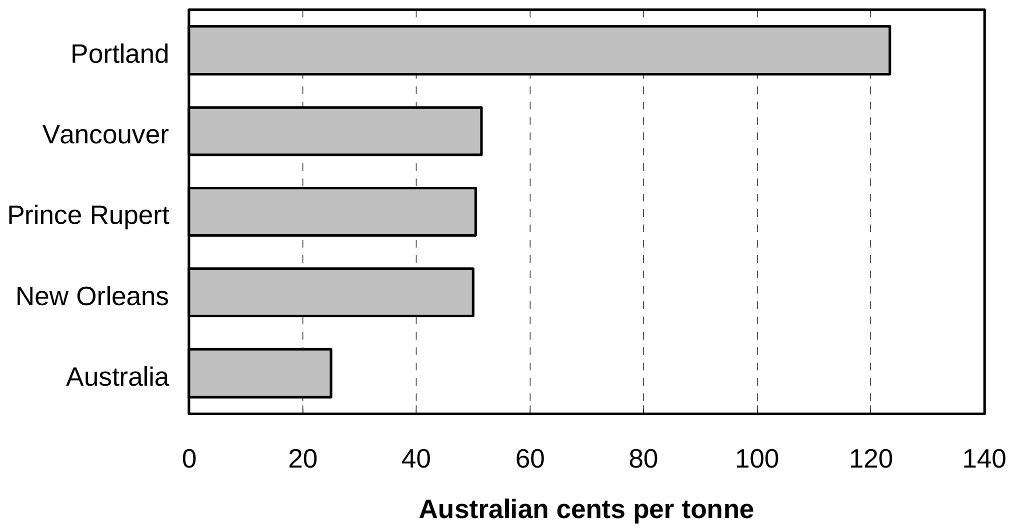
transport services, to handle the movement of bulk wheat from country receival facilities to 'ex-spout' at the terminal.[4]

Stevedoring services consist of stowing and trimming the wheat on board the ship. The AWB engages stevedoring services at each port by tender.

The cost of stevedoring services for the AWB averaged around 25 cents per tonne in 1996–97. This represents a decrease of 70 per cent in real terms since late 1989, when the average cost was about 70 cents per tonne.[5] The AWB was not prepared to disclose port-specific stevedoring cost data because contractual arrangements between itself and stevedores are confidential.

The average Australian cost was significantly lower than typical stevedoring costs at four major grain handling North American ports — approximately half the cost at Vancouver, Prince Rupert and New Orleans, and one fifth the cost at Portland (USA) (see Figure 8.1). The ports of Vancouver, New Orleans and Portland (USA) have multiple grain terminals. Approximately 40 per cent of US wheat exports are handled though Portland (USA).

Figure 8.1 Cost of stevedoring bulk wheat, 1996–97



Notes: Costs at overseas ports are typical only. Actual costs can vary widely over time, between terminals, and depending on the quantity loaded.

Source: Asia World Shipping (consultant) and Australian Wheat Board.

---

4 'Ex-spout' refers to that stage of the transportation and handling chain when wheat has been released from the BHCs' loading infrastructure into the ship.

5 Note that prior to 1990, the AWB did not directly incur stevedoring costs.

The reduction in stevedoring costs in Australia commenced with the waterfront reform processes overseen by the Waterfront Industry Reform Authority (WIRA) during 1989–92. Prior to 1989, stevedoring for grains (like many other commodities) was overmanned, inefficient and over priced. Since l989, a number of changes have occurred within the industry that have had a positive and lasting effect on grain export productivity. In essence, these changes are:

- reductions in the on-board labour requirement for grain loading;
- introduction by BHCs of continuous loading at grain ports on a two shifts minimum of 14 hours with availability on a 7 day basis; and
- the AWB competitively tendering for provision of stevedoring services by stevedoring companies.

The results of these initiatives have been:

- a reduction of stevedoring manning by up to 75 per cent;
- a reduction in stevedoring costs of around 70 per cent;
- a reduction in actual loading time for grain vessels from 4.5 days in 1988–89 to around 1.6 days in 1996; and
- creation of a positive performance history with international grain buyers and ship owners.

The AWB changed its Charter Party in early 1990 to allow for ships to be stowed and trimmed. By taking responsibility for engaging stevedoring services, the AWB could negotiate from a position of strength, facilitating performance improvement.

Previously, wheat was sold free on board, with the buyer responsible for the product ex-spout. The shipping company acted on behalf of the buyer in engaging stevedoring services. This arrangement meant that the AWB did not have a contractual relationship with the stevedores, even though it had most to gain from efficient loading.

In contrast, shipping companies had little incentive to ensure stevedoring was undertaken efficiently and provided at least cost. High stevedoring charges and expected delays in ship turnaround could be factored into the 'blue water' freight rate. In turn, buyers included this margin in the comparative price of Australian wheat.

8.2 Fertiliser

Fertiliser is an important input for Australia's agricultural sector. It is required to correct natural deficiencies in soil and to replace nutrient components absorbed by crops in their growth. Australia's consumption of the three major fertiliser nutrients — nitrogen, phosphorus and potassium — has grown by over 50 per cent since the mid 1980s.

Fertiliser accounts for approximately 5 per cent of Australian farm input costs (FIFA undated). This figure is higher for crop commodities such as grains and sugar, and for those products reliant on pastures.

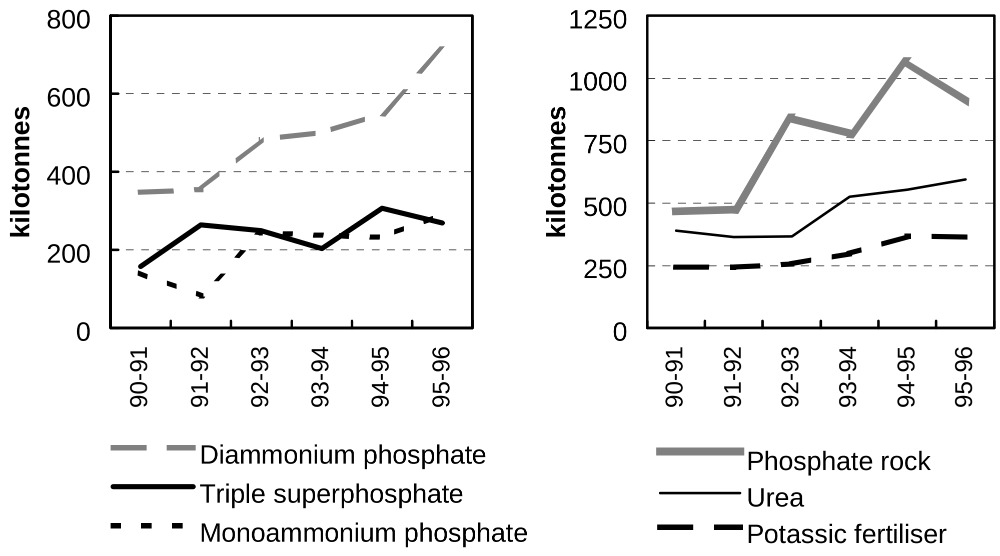
In 1994–95, Australia imported over 3.3 million tonnes of manufactured fertiliser and fertiliser raw materials worth $570 million (see Table 8.1). Single superphosphate and ammonium sulphate have been the traditional source of phosphorus and nitrogen fertilisers in Australia. However, these have been increasingly replaced by imports of high analysis fertilisers such as triple superphosphate, diammonium phosphate and monoammonium phosphate which have higher concentrations of phosphorus and nitrogen. High analysis fertilisers provide cost savings in transportation and application per unit of plant nutrient. Imports of phosphate rock, urea and potassic fertiliser have also increased substantially since 1990–91 (see Figure 8.2).

Table 8.1 Australian imports of manufactured fertiliser and fertiliser raw materials, 1994–95

Manufactured fertiliser or fertiliser raw material	*Quantity*	*Value*
	(kt)	*($m)*
Urea	554	140.0
Triple superphosphate	307	57.4
Diammonium phosphate	549	145.5
Monoammonium phosphate	233	62.8
Other ammonium	125	31.4
Potassic fertiliser	366	67.3
Phosphate rock	1 067	55.4
Sulphur	143	10.7
All	3 343	570.6

Note: Sulphur value is estimate based on Vancouver spot price.
Source: ABARE Australian Commodity Statistics 1996.

Figure 8.2 Australian imports of major fertiliser products and fertiliser raw materials, 1996



Notes: 1995–96 data is preliminary.
Source: ABARE Australian Commodity Statistics 1996.

The waterfront plays a significant role in meeting Australia's fertiliser requirements. Virtually all fertiliser passes through the waterfront, either in manufactured form or as raw materials requiring further processing in Australia. Waterfront costs (port and stevedoring charges) contribute approximately 3 per cent to the price farmers pay for fertiliser.

The majority of bulk fertiliser is purchased 'free-on-board' on world markets. Australian importers are responsible for engaging shipping and stevedoring services. Most cargoes are mixed, that is, each ship carries more than one fertiliser product. A high proportion of shipments are discharged at multiple ports as the ship moves around the coast.

The mix of products passing through each port reflects the crops grown in that area. For example, products with high nitrogen content (such as urea) make up a relatively large proportion of fertiliser discharged through Queensland ports because sugar crops require high quantities of nitrogen. Phosphate rock and sulphur are handled at fewer ports located near fertiliser manufacturing plants.

Bulk fertiliser is discharged using grabs which are lowered and raised using either ships gear or shore-based cranes or gantries. The fertiliser is released from grabs into hoppers which are used to regulate its flow into trucks or on to conveyor belts.[6] Some products tend to 'hang' in the ship holds. In these instances, an excavator is periodically lowered into the hold and used to shift product away from the walls so that it can be removed by the grab.

Discharging the last of a product from a hold is labour intensive and time consuming. Referred to as a 'clean-out', it initially involves the use of a small front-end loader such as a bob-cat to scrape product away from the edges to the centre of the hold. Hand shovelling is then undertaken to remove product from corners.

Stevedoring services are engaged on either a *cost plus* or *charge per tonne* basis. *Cost plus* involves the shipper paying a rate based on the cost of labour employed by the stevedoring company in discharging the fertiliser. A *charge per tonne* is invariant to the time taken but usually varies across products and additional payments for major delays and hold clean-outs are required.

Each system has its merits. A charge per tonne encourages the stevedore to operate efficiently, and the shipper knows the total charge *a priori*. However, in calculating the charge per tonne rate, the stevedore builds in a margin to cover factors that affect stevedoring productivity and are outside its control. Some shippers prefer cost plus charging because many of these factors are within their control and they can therefore avoid paying this margin. For example, shippers can manage the initial stowage of product so that it can be discharged with minimal switching between holds. Shippers also have control over the type of ship and the supply of trucks.

Unlike major bulk exports, fertiliser is not handled through designated terminals. Discharge equipment is leased or owned by the shipper, pertains to the ship, or is supplied by the owner of the berth. Both public access and private berths are utilised.

Benchmarking

Certain aspects of the shipping and stevedoring of bulk fertiliser make benchmarking difficult. These include:

- differences in the physical characteristics of products, especially density, ease of flow, and sensitivity to adverse weather conditions;
- differences in the mix of cargo passing through each port;
- variation in unloading equipment used;

[6] In some instances, the fertiliser is released from the grab onto the wharf and a front-end loader used to load the product into trucks.

- variation in size of typical discharge across ports and across products;
- unequal distribution of ‘clean-outs’ across ports;
- variation in frequency and duration of adverse weather conditions across ports;
- high frequency of ships carrying mixed cargoes; and
- variation in ship size, age, and hold characteristics.

In particular, it is the combination of two or more of the above features which make it difficult to ensure that like is compared to like. For example, it would be preferable to benchmark the stevedoring of bulk fertiliser on a product-by-product basis so as to control for variation in the physical characteristics of products. However, this is not possible, because most shipments include a number of fertiliser types and data is recorded on a per-shipment rather than per product basis.

Port-specific information was collected on many of these features so as to facilitate a more robust comparison. Nonetheless, it was not possible to control for all factors which may affect relative cost and performance.

There are only a small number of overseas ports through which bulk fertiliser is discharged from ocean-going vessels in a manner similar to operations in Australia. These are in New Zealand, South Africa and Europe.[7]

The results presented below are based on data for stevedoring at the Australian ports of Kwinana, Geelong, Newcastle, Adelaide, Albany, Brisbane, Townsville and Hobart, and the New Zealand ports of Napier, Lyttelton and Dunedin. Shippers in countries other than New Zealand were unwilling to provide information.

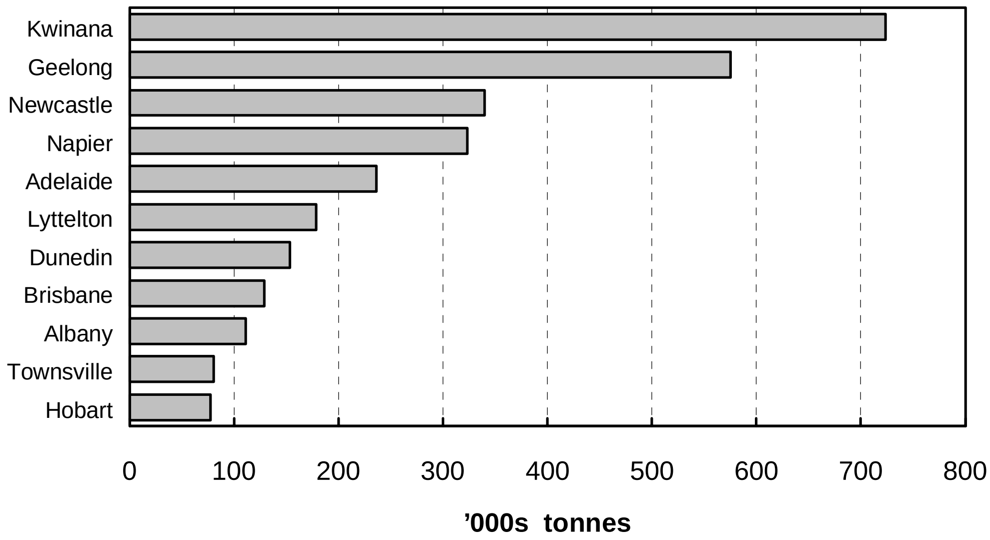
The volume of bulk fertiliser discharged at these ports varies considerably (see Figure 8.3). Shore-based discharge equipment is used at the two high volume ports — gantries at Kwinana and luffing cranes at Geelong. Gantries are also used at Newcastle. Ships gear is used at the other ports.

There is no clearly defined relationship between the type of discharge equipment and its relative rated capacity. The shore-based gear used in Australia has a higher rated capacity than most older ships gear. However, the discharge capability of modern ships gear is generally faster still.

---

7 North America is largely self-sufficient, with most product transported internally by road, rail or barge. Discharge operations in other countries are generally far more labour intensive than in Australia.

Figure 8.3 Bulk fertiliser discharged at selected ports, 1996–97



Source: Productivity Commission, based on data supplied by Australian and New Zealand shippers of bulk fertiliser.

The indicators used to benchmark relative cost and performance have been calculated on both a tonnage and volume basis. They are:

- total stevedoring cost per tonne (cubic metre);
- tonnes (cubic metres) per hour; and
- tonnes (cubic metres) per stevedoring man hour.

Stevedoring productivity is largely a function of volume discharged rather than tonnage discharged. The reporting of indicators on both bases (tonnage and volume) gives some indication of the sensitivity of findings to differences in the mix of products discharged through the different ports.

The total stevedoring cost is inclusive of the cost of discharge equipment. For Australian ports, tonnes (cubic metre) per hour is based on the number of hours that the ship is worked. It excludes all delays such as adverse weather conditions and mechanical failure. New Zealand data do not exclude delays. Consequently, reported tonnes (cubic metre) per hour for New Zealand ports understates performance at these ports relative to Australia.

Comparative performance

It is not possible to benchmark the cost and performance of stevedoring at individual ports from the available data. As previously discussed, the nature of shipping and stevedoring bulk fertiliser means that operations at each port varies due to a multitude of factors — all of which impact upon relative productivity. Observed differences in stevedoring costs and performance between the Australian ports are consistent with the characteristics particular to each port.[8]

However, it is more meaningful to compare the cost and performance of stevedoring at a group of Australian ports with a group of New Zealand ports. This is because a number of factors which have a significant influence on productivity at individual ports no longer apply when data for multiple ports are aggregated. For example, most product at Townsville is discharged from the top half of each hold whereas most is discharged from the bottom half at Brisbane. Combining data mitigates the impact that this difference has on relative productivity.

Data were aggregated for those ports where ships gear is used — Adelaide, Albany, Brisbane, Townsville and Hobart for Australia, and Napier, Lyttelton and Dunedin for New Zealand.[9] The two groups receive a similar mix of products discharged from ships of a similar size and age, and have similar average discharge size.[10]

One difference is that phosphate rock represents a lower proportion of product discharged at the Australian ports than at the New Zealand ports. This is because most phosphate rock discharged in Australia passes through ports using shore-based equipment. To accommodate this difference, data pertaining solely to the discharge of phosphate rock at Australian ports were collected separately from other products. Data for phosphate rock and other products for the group of Australian ports were then weighted by the respective share that each contributes to the total product passing through the New Zealand ports.[11]

---

8 This is not to say that productivity and cost would be equal across all ports if all factors could be taken into consideration but rather that it is not possible to make such an adjustment from the data available.

9 Aggregating data for the three New Zealand ports also overcame another difficulty. The shipper discharging through these ports pays a pan (per tonne) rate to a single stevedore for all product it brings into New Zealand. As such, it is unlikely that this pan rate reflects the true stevedoring charge at any of the three ports. However, the pan rate is close to the true charge for the three ports combined because over 85 per cent of the shipper's product is discharged through the three ports.

10 A minor difference is the mix of products discharged in each country is that New Zealand imports virtually no urea. Urea is the least dense of all products. Consequently, results calculated on a per tonne basis will slightly understate Australia's relative performance. However, this difference is accounted for by making comparisons on a volumetric basis.

11 Separate data for phosphate rock were not available for New Zealand ports.

The relative levels of the indicators used to benchmark stevedoring of bulk fertiliser in the two countries are presented in Figure 8.4. Stevedoring charges for bulk fertiliser at New Zealand ports are about 20 to 25 per cent less than Australian ports.

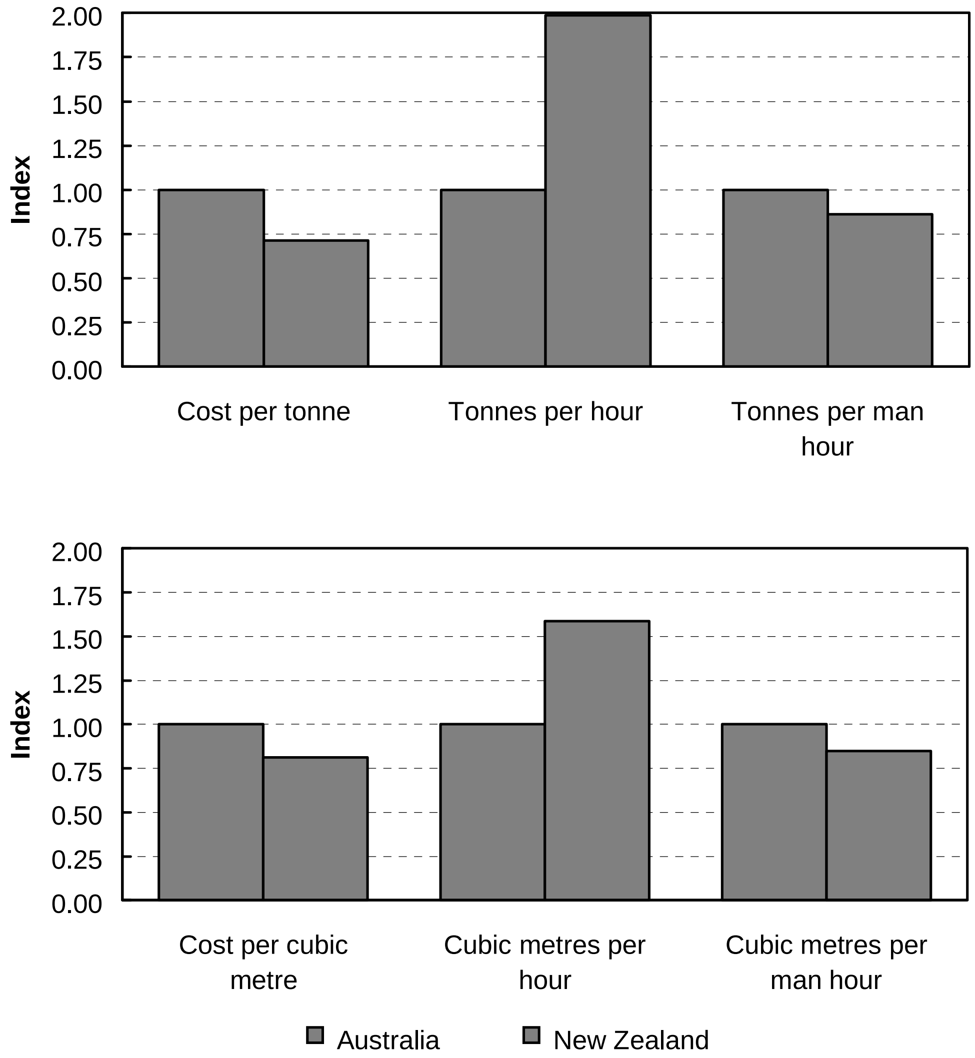
Product is discharged at least 60 per cent faster in New Zealand. However, New Zealand stevedores engage relatively more labour to achieve higher capital productivity. Consequently, labour productivity (measured as quantity discharged per man hour) is about 15 per cent lower.[12]

The same indicators calculated for all eight Australian ports are reported in Figure 8.5 — that is, results include data for the three Australian ports using shore based discharge equipment. Australia's relative discharge rate in terms of both time and man hours improves with the inclusion of these high volume ports. Nevertheless, the results indicate that, on average, bulk fertiliser is discharged at least as quickly in New Zealand using additional labour but at lower cost.

---

12 It was suggested to the Commission that the observed difference between the discharge rate in Australia and New Zealand could be partly attributable to the stricter Australian environmental standards regarding whether product can be stored outdoors. It is possible that bottlenecks in the receival of product from conveyor belts and trucks into works or storage may have contributed to the relatively slow discharge rate in Australia. However, the Commission was informed by the importer shipping product through the three New Zealand ports that discharged product is rarely, if ever, left uncovered.

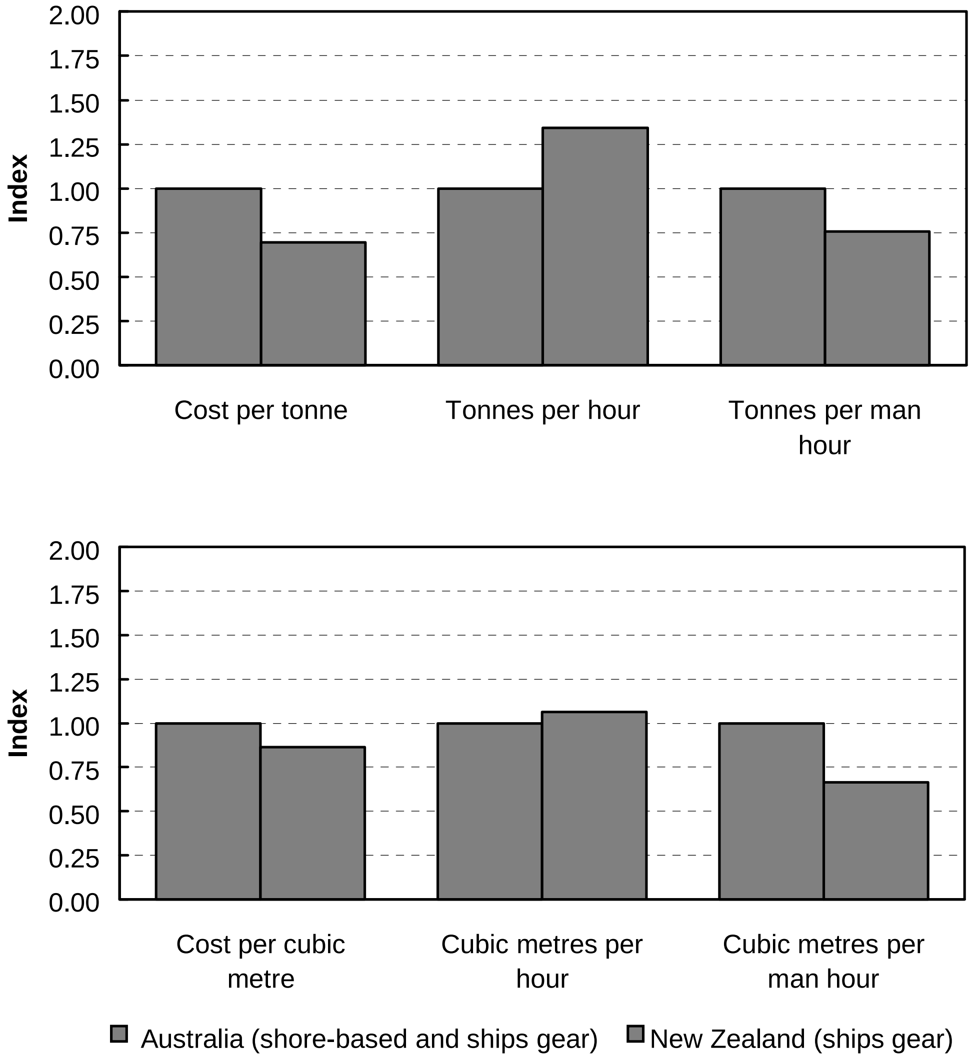
Figure 8.4 Cost and productivity indicators for selected Australian and New Zealand ports using ships gear to discharge bulk fertiliser, 1996–97



Notes: Australian ports: Adelaide, Albany, Brisbane, Hobart and Townsville. New Zealand ports: Dunedin, Lyttelton and Napier.
The measure of cubic meters per hour understates the performance of New Zealand ports relative to Australian ports. This is because the Australian data excludes delays while the New Zealand data does not (see text).

Source: Productivity Commission, based on data supplied by Australian and New Zealand shippers of bulk fertiliser.

Figure 8.5 Cost and productivity indicators for selected Australian and New Zealand ports, 1996–97



Notes: Australian ports: Adelaide, Albany, Brisbane, Geelong, Hobart, Kwinana, Newcastle and Townsville. New Zealand ports: Dunedin, Lyttelton and Napier.
The measure of cubic meters per hour understates the performance of New Zealand ports relative to Australian ports. This is because the Australian data excludes delays while the New Zealand data does not (see text).

Source: Productivity Commission, based on data supplied by Australian and New Zealand shippers of bulk fertiliser.

9 STEVEDORING — CRUISE SHIPS

Sydney receives about half of the cruise ship calls to Australian ports. The cost of baggage handling and stevedoring of supplies at Sydney was up to five times that at overseas ports. Baggage handling charges at other Australian ports are more in line with those experienced overseas.

Cruise ships calling at Australian ports fall into two broad categories:

- Australian-based ships, either permanently or seasonally operating international itineraries and predominantly carrying domestic passengers;[1] and
- ships based in other countries on round-the-world or regional itineraries, predominantly carrying international passengers.

Sydney receives approximately half of all cruise ship calls at Australian ports. In part, this is because Sydney is home to the only permanently Australian-based, deep water cruise ship — P&O's m.v. Fair Princess, which accounts for just under half of the Sydney calls.[2] The number of cruise ship calls and passenger exchanges during 1996 at selected ports are presented in Table 9.1.

Auckland and Tilbury receive a similar number of cruise ship calls to those at Australian ports. Singapore, Copenhagen, Los Angeles and Miami all receive more than the total number of cruise ship calls made in Australia.

Cruise ships represent only a small proportion of ships calling at Australian ports. In contrast, Miami, and to a lesser extent Los Angeles, could be considered cruise ship specialty ports because cruise ships represent a relatively high proportion of calls at these ports (see Table 9.1).

A passenger exchange is defined as a passenger embarking or disembarking a ship at the commencement or termination of their journey. It does not include passenger movements at stop-over ports. Passenger exchanges are highest at home ports. However, a ship sometimes terminates and commences a new voyage at a non-home port. Also, ships on round-the-world itineraries have passengers embarking and disembarking at ports other than the ship's home

---

1 Australian-based does not imply Australian-owned. Rather, the Australian cruise industry was comprised of mostly of foreign-owned ships.

2 P&O operated the m.v. Fairstar rather than the m.v. Fair Princess prior to February 1997.

port. With the exception of Auckland, the selected overseas ports are home ports.

Table 9.1 Cruise ship calls and passenger exchange, 1996

Port	*Cruise ship calls*	*Cruise ship calls as a percentage of total vessel calls*	*Total passenger exchange*	*Average passenger exchange*
	(No.)	*(%)*	*(No.)*	*(No.)*
Sydney	73	3.4	101 715	1393
Fremantle	15	0.8	9 880	659
Cairns	21	0.3	5 235	249
Brisbane	19	1.1	not available	minimal
Melbourne	12	0.4	570	minimal
Auckland	21	0.9	10 500	500
Los Angeles	324	12.3	942 338	2908
Miami	1557	39.0	3 052 450	1960
Tilbury	37	1.3	19 395	524
Singapore	1301	1.1	794 357	611
Copenhagen	201	0.8	150 000	746

Note: *Cruise ship calls* at Tilbury includes 21 calls at PLA Central London River mooring; as a percentage of total ocean-going ship calls only.
Sydney *passenger exchange* numbers are for 1994–95; *ship calls* are for 1995–96.
Auckland *passenger exchange* numbers are estimates.

Source: Thompson Clarke Shipping (consultant).

Although the average passenger exchange at Sydney is high relative to many of the overseas ports examined, it is nevertheless lower than that of the high volume ports of Los Angeles and Miami. Fremantle and Cairns have an average passenger exchange comparable to the other overseas ports.

Cruise ships require a wide range of services upon arriving at a port. The costs of baggage handling and stevedoring of supplies are discussed in this chapter. Those services not specific to cruise ships were discussed in Chapters 4 and 5.

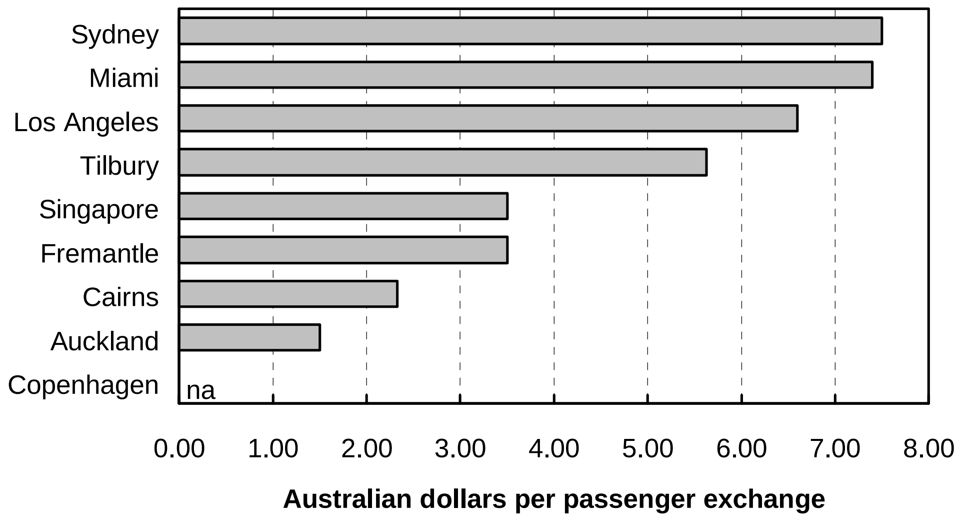
9.1 Baggage handling

Baggage handling is a relatively labour intensive task compared to most waterfront activities. With the exception of those ports with minimal passenger exchange, baggage handling charges will reflect the underlying cost and productivity of labour if baggage handling services are competitive.

The cost of baggage handling at Cairns and Fremantle compared favourably with most overseas ports (see Figure 9.1). However, the cost of baggage handling was highest at Sydney — five times more than Auckland — despite a relatively high average passenger exchange.[3] Baggage handling at Sydney is monopolised by the Marine Porters Association.

The variation in costs is largely attributable to the number of baggage porters engaged. In general, those ports with the highest baggage handling costs engage the most porters for a given passenger capacity, and thus have the lowest labour productivity (see Figure 9.2).

Figure 9.1 Baggage handling costs, June 1997

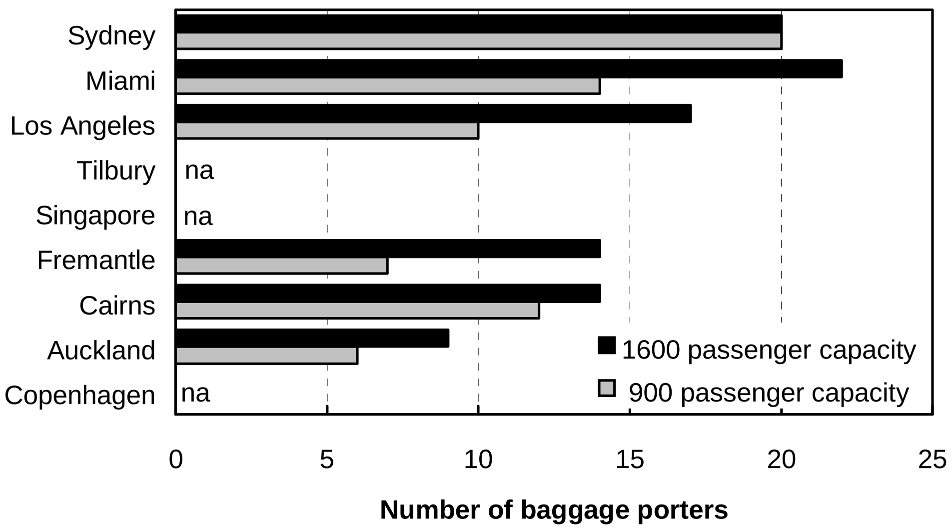


Notes: Melbourne and Brisbane not represented due to minimal average passenger exchange. Cost at Singapore assumes 1.5 pieces of luggage per passenger exchange. Baggage handling at Copenhagen is undertaken by ships crew.

Source: Thompson Clarke Shipping (consultant).

3 Baggage handling charges at Melbourne and Brisbane are also quite high on a per passenger exchange basis. However, this is consistent with the minimal average passenger exchange taking place at these ports.

Figure 9.2 Baggage porters engaged for cruise ships with 900 and 1600 passenger capacity, June 1996



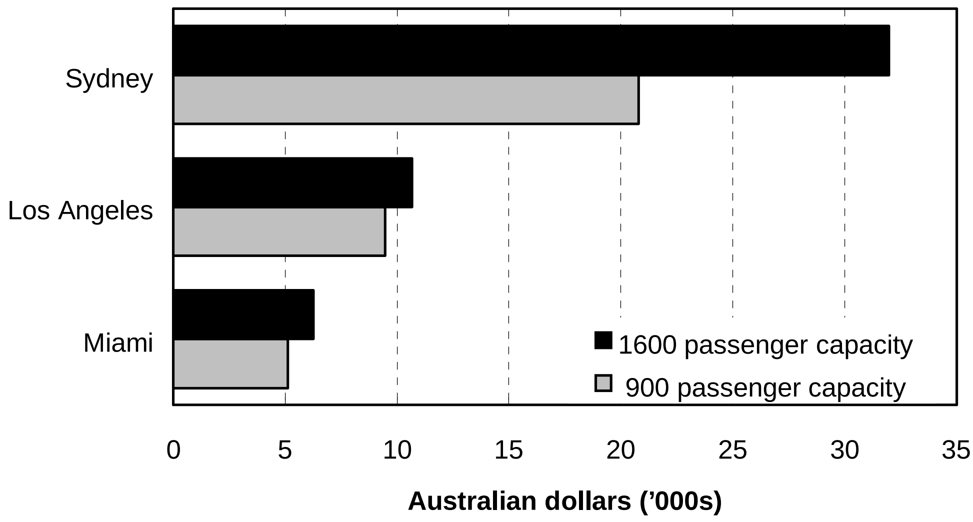
Notes: Data not available for Tilbury and Singapore. Not applicable for Copenhagen.
Source: Thompson Clarke Shipping (consultant).

9.2 Stevedoring supplies

Cruise ships usually take on most supplies at their home port. However, small quantities of provisions are often taken on at transit ports, depending upon the relative cost of supplies, the facilities available, and the length and destination of the cruise. In Tilbury, Singapore and Copenhagen, stevedoring of supplies is undertaken by ships crew or the provedore rather than by a contracted stevedore.

The cost of fully stevedoring a 900 passenger exchange cruise ship at Sydney was four times that at Miami and twice that at Los Angeles (see Figure 9.3). The relative cost of stevedoring a larger ship (16000 passenger) at Sydney was even higher — 5 and 3 times more than at Miami and Los Angeles, respectively.

Figure 9.3 Cost of stevedoring full supplies for cruise ships with 900 and 1600 passenger capacity, June 1996



Source: Thompson Clarke Shipping (consultant).

In instances when cruise ships take on only a small quantity of provisions, the stevedoring charge can be relatively high, because a minimum amount of stevedoring labour has to be engaged regardless of the quantity of stores to be loaded.

Until recently, a stevedoring gang of 6 to 8 persons had to be employed for a full shift at most Australian ports (with a cost of $4 000 to $5 000), regardless of the quantity of stores to be loaded. Whilst this remains the situation in Sydney and Fremantle, small quantities (less than about four pallets) can be loaded by the ships crew or provedore in Melbourne. Larger quantities must be loaded by contracted stevedoring labour but less than a full gang shift can be engaged.

In Brisbane, the use of contracted stevedoring labour depends upon where the ship is berthed and the quantity to be loaded. Arrangements for the dedicated cruise ship berth due for completion in December 1998 are yet to be determined. All stevedoring of supplies in Cairns is undertaken by the ships' crew or provedore.

10 PORT–LAND INTERFACE

Port–land interface operations involve many participants and a wide range of activities. Efficient interface operations require that each activity be undertaken in a timely fashion and be co-ordinated with the rest.

There is evidence of problems that are affecting overall timeliness and reliability.

Moving imports and exports to and from the waterfront involves the services of a number of participants. They include container terminal operators or stevedores, transport operators, freight forwarders, customs brokers, the Australian Customs Service (ACS), Australian Quarantine and Inspection Services (AQIS) and facilitators of electronic data interchange (EDI). The range of activities for which they are responsible include loading, unloading, delivery, collection, clearance and preparation of documentation for all cargo types.

Efficient port-land interface operations depend on the container terminal operator or stevedore undertaking their activities in a timely and reliable fashion. Similarly, there are a number of land-side activities that must be completed before cargo is delivered or collected. There are others, such as quarantine inspection, that must be co-ordinated with the cargo transfer operation where delays can act to the detriment of overall timeliness and reliability.

If delays occur anywhere in the chain, their cost will ultimately be borne by shippers. The magnitude of these costs are considered in Chapter 11.

The roles and responsibilities of stevedores and land-side participants in Australia and the factors that affect the timeliness and reliability of their operations at the port–land interface, are considered in this chapter. Container terminal interface operations are discussed in particular. However, the factors that affect timeliness and reliability could equally apply to non-containerised bulk and break-bulk cargo.

International comparisons have not been undertaken. The complexities of interface operations make it difficult to compare performance on a consistent basis over time and between ports.

10.1 Stevedoring operations

At the port–land interface, stevedores are responsible for operating receival and delivery facilities for land transport operators.[1] Although a number of factors affect the timeliness and reliability of stevedoring services, those most often raised by importers and exporters are:[2]

- industrial disputes, stop-work meetings, 'go slows'; and
- lack of terminal–transport operator co-ordination or planning for the receival and delivery of containers, resulting in truck queues.

Industrial disputes, stop work meetings, 'go slows'

Industrial disputes have ramifications for all land-side operators as well as importers and exporters and shipping lines. Any dispute adversely affects timeliness and reliability of interface activities.

The number of working days lost due to industrial disputes declined from around 30 000 in 1986 to 4 500 in 1996 (ABS Catalogue No. 6322.0 various issues).[3] Nevertheless, the stevedoring industry continues to have a much higher incidence of industrial disputation than other Australian industries — exceeded only by the coal mining industry (Productivity Commission (PC) 1998).

Under the *Stevedoring Industry Award 1991 (SIA),* all stevedores are entitled to eight stop-work meetings per year, of up to four hours duration, with two of these on full pay. The number of stop-work meetings held each year may vary from port to port. In some ports, these meetings take place during the afternoon when there is a shift changeover, in other ports they occur in the morning, for example 7.30 am to 11.30 am. These meetings directly affect road transport operators who cannot deliver or collect containers during these periods.

---

1 Includes both road and rail transport operators. Only road transport operations are discussed in this chapter.

2 Other factors include technical provisions at the port, (size of cranes), maintenance of equipment and the incidence of break downs, the variability of shipping arrivals and departures, the work organisation of the port (pay incentives, leave structures, work specific provisions, flexibility of rosters and the industrial relations environment).

3 These data understate the extent of time lost to industrial action because of the definitions used. For example, a dispute is not included when it involves a stoppage of less than ten working days at an establishment. A dispute which involves 3 000 workers on strike for two hours is counted as 750 working days lost (assuming that employees work an eight hour day).

Stevedoring employees reputedly also engage in what is commonly referred to in the industry as ‘go slows’ (Smithwick 1995, and DCN 1997a). Although not measured, they can affect the timeliness of operations at the waterfront, including those at the interface. Effectively, ‘go slows’ increase the time taken to unload and load cargo. For example, one importer noted that stevedores normally discharge 800 cars in a shift. However, the rate of discharge declined by 50 per cent on one occasion when the stevedores were renegotiating an enterprise agreement.

There are incentives within enterprise agreements for stevedores to engage in this practice. Stevedoring employees can generally earn more from overtime payments than productivity bonuses (PC 1998).

Co-ordination of cargo receival and delivery

Any lack of co-ordination between stevedores and the large number of transport operators for the delivery and dispatch of containers, can either mean that stevedoring operations get ahead of truck arrivals so that idle time is created, or they fall behind and schedules have to be re-organised. The latter often results in truck queues at the terminal gate and can have a direct impact on importer and exporter operations.

Terminals either operate a random receival and delivery or a vehicle booking system (VBS) service in Australia.[4] While truck queues are more likely to be a problem where a random receival and delivery system operates, they may still occur under a VBS.

Truck queues are a manifestation of delays resulting from poor co-ordination of cargo receival and delivery. These delays are caused by inadequate levels of service to meet demand peaks. Whether the levels of service provided in terminals for this activity are economically appropriate is not considered here.

The prospect of delays at the terminal is often factored into the time road transport operators expect to collect or deliver containers, irrespective of the existence of a VBS. Consequently, the delays associated with truck queues and the inefficient use of transport resources increases the cost of cartage to both importers and exporters. These higher costs may be incorporated in the total cost of cartage or explicitly charged as demurrage.[5]

---

4 A VBS assigns time slots for the delivery and collection of containers.

5 Demurrage is a charge relating to the time spent waiting in a truck queue and is usually based on an hourly transport rate.

The incidence of truck queues is more common at container terminals in Fremantle and Sydney than at any other major ports in Australia.[6] Container terminals in Fremantle operate a random receival and delivery service. In Sydney, the P&O and Patrick terminals introduced a VBS in 1995 and 1997 respectively.[7]

It is generally accepted by terminal and road transport operators that a 30 minute truck turnaround time is achievable in Australia.[8] However, estimated truck turnaround times at the container terminals in Fremantle range from one hour to one and a half hours (information supplied by Western Australian Port Operations Taskforce).[9] The Road Transport Association of NSW (RTA) also estimated that truck turnaround times averaged around one and a half hours at the Sydney container terminals in 1995–96.[10]

Causes of co-ordination problems

Container terminal and road transport operators may agree that operational problems at the terminal disrupt the receival and delivery of containers and cause delays. However, they have different perceptions about the causes.

One of the major difficulties faced by container terminal operators is their inability to plan and co-ordinate the late delivery of containers, when exporters do not abide by container delivery cut-off times. For example, as one operator noted, terminals can be receiving cargo up to ten minutes before the ship sails.

In Australia, some shipping lines are prepared to accept late container deliveries — even if this involves delaying their departure.[11] Consequently, there is often a concentration of trucks arriving after cut-off time. In the March quarter 1997, the proportion of receivals (exports) completed by the stevedores after cut-off

---

6 Includes Sydney, Melbourne, Brisbane, Adelaide and Fremantle.

7 Patrick introduced a VBS at their container terminal in Fremantle in December 1997. There are no VBS operating at bulk and break-bulk terminals in Australia.

8 Terminal and road transport operators measure truck turnaround time differently. Terminal operators define truck turnaround time as the time taken from when the paperwork is presented at the terminal gate to when the truck leaves the terminal. Road transport operators include the time spent waiting outside the gate or in the queue. Consequently, road transport operators turnaround statistics will be higher than those quoted by terminal operators.

9 These figures measure the time from arrival at the terminal or in a queue to departure from the terminal.

10 The RTA figure measures the time from arrival at the terminal or in a queue to departure from the terminal.

11 In Rotterdam, a 24 hour cut-off prior to the ships scheduled departure is imposed.

averaged 9 per cent at Brisbane, 7 per cent at Sydney, 4 per cent at Fremantle and 5 per cent at Melbourne (BTCE 1997d).[12]

Container terminal operators also find it difficult to co-ordinate the collection of containers when their operating hours do not coincide with those of road transport operators. This limits the ability of stevedores to utilise their capital and equipment to its maximum potential.

Most transport operators prefer to collect and deliver containers between 7 am and 3 pm on weekdays. There appear to be a number of reasons for this:

- first, there is a reluctance on the part of some transport operators to pay overtime above a 38 hour week; and
- second, transport operators have to organise their business activities around the hours of ACS, AQIS, the container parks and customer warehouses.[13]

Stevedores service shipping lines 24 hours a day for 360 days per year.[14] However, the same operating hours do not apply to receival and delivery activities. Terminals will accept receivals and deliveries of containers after 3 pm and will open on weekends only if sufficient demand exists. For example, one container terminal in Brisbane operates an evening shift from 3.30 pm to 10 pm for four of the larger transport operators (information supplied by Road Transport Authority of Queensland). The VBS are also designed to operate for up to 15 hours per day.

Although terminals open on weekends for delivery or collection, the reluctance of transport operators to collect containers on the weekend results in a concentration of truck arrivals on Monday mornings, leading to congestion at the terminal gate.

In addition, container terminals provide for 3 days' free storage after a ship's departure. Some importers delay collection until the third day to take advantage of the free storage time, however this sometimes results in congestion and truck queues on the third day after the ship has been unloaded.

---

[12] The proportion for Brisbane is higher than at the other ports because one terminal operator has special arrangements for late receival of refrigerated containers because of a limited number of powered outlets at the terminal (BTCE 1997d).

[13] ACS, AQIS, container parks and customer warehouses normally operate eight hours a day, Monday to Friday.

[14] Refers to the loading and unloading of ships by stevedores. In Brisbane stevedores work 3 by 8 hour shifts per day, in Melbourne, Sydney, Adelaide and Fremantle stevedores work 3 by 7.5 hour shifts per day. In Adelaide and Brisbane stevedores work 3 by 7 hour shifts on weekends.

Road transport operators contacted in the course of the study believe that there is insufficient communication with the stevedore. Operational delays or disruptions to receivals and deliveries are allegedly not being reported to truck drivers. This denies them the opportunity to consider alternative plans to utilise their vehicles and offset non-productive time.[15]

They claim that the first priority of stevedores is to service the shipping line, because stevedores are contracted to the shipping line and not to road transport operators. Hence receival and delivery activity is not afforded the same priority as loading and unloading ships. There is a lack of co-ordination between equipment and manning levels for receivals and deliveries and ship-based activities. This is evident when terminal employees are transferred at short notice from the receival and delivery area to service a ship that may have just berthed — leaving truck drivers waiting.[16]

Transport operators can also experience delays during shift changeover at the terminals where a vehicle booking scheme is not in place. The recent introduction of continuous shifts at the port of Fremantle has largely overcome the delays once experienced by road transport operators.[17] It was also noted by a large transport company that more delays were experienced in Melbourne on the evening shift, because there were less management on duty and hence reduced control over operational activities.

Vehicle booking systems

In an attempt to improve the co-ordination of cargo receival and delivery, some terminals have introduced a VBS.[18] A VBS controls the rate at which trucks arrive to coincide with the terminal's ability to service them. Regulating the distribution of truck arrivals allows for the more efficient use of both stevedore and transport operator resources.

Although similar in concept, P&O Ports and Patrick stevedores have taken different approaches to developing a VBS (see Boxes 10.1 and 10.2 for an overview of their current VBS).

---

[15] This information was supplied by the Western Australian Port Operations Taskforce

[16] This should not occur where a VBS exists because terminal operators have made a commitment to road transport operators to honour the pre-booked time slot.

[17] Prior to the introduction of continuous shifts at the port of Fremantle, up to 35 minutes could be lost during the day to evening shift changeover. This caused all waiting trucks to suffer consequential delays until the backlog was eliminated. Information supplied by Western Australian Port Operations Taskforce.

[18] First introduced during 1994 at container terminals operated by P&O Ports and Patrick in Melbourne.

These systems both impose and require discipline from all interface operators. They require a commitment by container terminal operators to provide the appropriate equipment and manning levels to undertake receivals and deliveries. Furthermore, road transport operators must be punctual. They also provide a greater level of certainty for road transport operators, importers and exporters, insofar as they know the time that their goods will be collected and delivered.

The systems have significantly reduced truck turnaround times, reduced the cost of waiting in queues and minimised truck queues. In 1993, delays of up to 3 hours were common at the P&O terminal in Melbourne. With the introduction of the VBS it now takes less than 1 hour from arrival at the terminal to departure from the terminal (Maunsell 1997). In referring to the improvement in Melbourne's West Swanston Dock, Mr Tim Blood from P&O Ports stated that:

> A well formed carrier interface was established and truck delays vanished as did a staggering $35 million in demurrage charges that end users had been paying because of the constant queue of trucks and other infra-structural problems (Truck Australia 1997, p. 12).

A VBS also allows containers to be received and delivered quicker. In addition, there is a reduction in cartage charges if demurrage is charged explicitly by road transport operators. One major importer in Australia advised that their overall waterfront costs had declined by 30 to 40 per cent as a result of a reduction in demurrage charges.

That said, the current incompatibility of systems places a burden on road transport operators who have to install and train for multiple systems. Although there have been positive outcomes from the implementation of VBS, it may have been more efficient to have designed a standard system for all container terminals.

There may also be scope for improvement to the existing systems. Some of the concerns about the operation of the systems raised with the Commission are:

- the terminal operators will not compensate road transport operators for the costs they incur while waiting in a truck queue if they fail to unload and load trucks and truck queues occur. (P&O Ports will compensate 'B' class operators; refer to Box 10.1);
- the lack of certainty that the stevedore will have the equipment or appropriate manning levels available to clear the containers, despite having a VBS in place; and
- the cost to install an on-line computer system and the associated charges are considered to be too expensive by some road transport operators.[19]

Some road transport operators argue that delays are still occurring. They claim that the problem is less apparent because the queues have been transferred to the transport operator's yard, because of the difficulty in obtaining time slots. The cost to the transport operator of having the truck waiting in the yard may still be reflected in the overall cartage charge levied on their customers.

In addition, country transport operators indicated that they found it difficult to obtain concurrent time slots — which would enable them to deliver and collect a container simultaneously. Two independent booking systems operate, and do not provide for import slots to be booked at the same time as export slots. However, country operators can arrange with container terminal operators to obtain concurrent time slots independently of the VBS.

For metropolitan operators, it is not so critical to obtain concurrent time slots, as very few are contracted to both importers and exporters.[20]

---

[19] Both VBS system operators offer a telephone booking service. Logichip offer this service to road transport operators who do not have access to the required computer equipment or whose size does not warrant the purchase of computer equipment. A surcharge applies for this service. The P&O Booking Bureau offer a telephone service for country or metropolitan road transport operators for an annual registration fee of $500.

[20] As stated by one large metropolitan operator only 12 per cent of their total container movements were arranged concurrently. P&O Ports also stated that less than 10 per cent of all container movements at the port of Melbourne were arranged concurrently (back loaded).

Box 10.1 VBS operated by P&O Ports

- P&O Ports system categorises carriers by fleet size, proximity of their container park to the terminal and the level of service required. 'A' class carriers pay in advance an annual registration fee of either $1 000 if the past years total time slot usage was greater or equal to 250 time slots, or $500 if the past years usage was less than 250 time slots. 'B' class carriers pay in advance an annual registration fee of $20 000. The higher registration fee provides the carrier with more time slots available per day and first access to new available bookings.
- P&O Ports also operate a stand-by access to their terminal. This is available to all carriers, however it is primarily intended for carriers not participating in the VBS.
- Each day is divided into 14 time slots from 7 am to 10 pm. These time slot zones begin at 7 am and most are 50 minutes long, starting on the hour. Bookings can be made one day in advance for the collection of import containers and two days in advance of the proposed delivery of export containers.
- Once bookings are made they cannot be cancelled but may be offered to another carrier. Import and export time slots cannot be interchanged. Failure to meet a time slot incurs a $100 fine.
- P&O Ports accepts claims for reasonable out of pocket costs incurred by 'B' class carriers delayed at the terminal for more than two hours. There is a limit of up to $500 per incident and in any one year (July 1 to June 30) up to $10 000 total per year maximum. 'A' class carriers have no claim to such reimbursement.
- 'B' class carriers have first choice of available time slots and can access these bookings from 7.30 am. 'A' class carriers are only able to access these bookings from 8.30 am. Country carriers based 100 kilometres from West Swanston Dock can access export time slots at 8 am or 30 minutes before other carriers (excluding major carriers). Country carriers have the same access time for import time slots as other 'A' class carriers.
- 'A' class carriers are permitted up to 4 time slots per time slot zone on day shifts (7 am to 2.30 pm) and a maximum of eight time slots per time slot zone on evening shifts (2.30 pm to 10 pm). 'B' class carriers are permitted a maximum of eight time slots in each time slot zone.
- Carriers are required to arrive at the terminal from the commencement of the time slot zone and no later than 30 minutes after the commencement of the zone. Carriers who arrive late may not be admitted and maybe directed to the stand-by queue.

Source: P&O Ports (undated).

Box 10.2 VBS operated by Patrick terminals

- Logichip, an independent company, administers the VBS for Patrick. Registered users pay Logichip directly for the service they provide. Charges include a booking fee of $3.30 per container, a monthly service fee of $10, a telephone booking surcharge of $2 (for those carriers who do not have an on-line computer system).
- The system does not differentiate between carriers and there is no random queue system for road transport operators.
- There are no restrictions on the number of bookings a user can make in any one time slot. However, there are penalties for excessive bookings in the form of cancellation and ‘no-show’ fees of $20 and $50 respectively. The ‘no-show’ fee is the only charge imposed by Patrick. On average one per cent of bookings are cancelled per week in Melbourne.
- A user is only allowed one container per booking. Where a truck is to move more than 1 container then multiple booking numbers need to be presented at the terminal (around 2 per cent of moves are booked for multiple containers in Melbourne). Import container numbers can be swapped between 2 bookings but import and export container numbers are not interchangeable between 2 bookings.
- Once bookings are made they can be cancelled but a cancellation fee applies. However, to avoid the cancellation fee transport operators are able to move a container to an earlier (but not later) time slot (subject to availability). They can offer the booked slot to a third party and change a container number on an import booking and a vessel number on an export booking right up to the time the trucks arrive at the terminal.
- There is one opening time for bookings. Users can access the system 24 hours a day, seven days a week, however during the peak period (8am to 10am) each user’s access is limited to a maximum of ten minutes per session.
- Prior to each day Patrick determine the volume of containers that can be handled and enter this volume into the booking system. In Melbourne around 50 per cent of planned export time slots are entered for five days hence, with additional top-up slots entered the following day. However, import time slots are only released 1 to 2 days in advance because terminal operators need to be sure that there is no risk of a shipping delay prior to the release of import time slots.

Source: Information supplied by Logichip.

10.2 Land-side operations

Land-side operations involve road transport operators, freight forwarders, customs brokers and facilitators of EDI.

Road transport plays the pivotal land-side role.[21] In the major Australian capital city ports at least 80 to 85 per cent of containerised cargo is delivered to and collected from the waterfront by road transport operators (HORSCOTCI 1992, p. 30). They also deliver and collect empty containers to and from container parks.[22] Bulk and break-bulk cargoes are also carried by road.

Road transport operators co-ordinate the delivery and collection of containers to and from the terminal, container parks and customer warehouses. In addition, road transport operators must obtain the relevant documentation from either the importer, exporter or freight forwarder prior to delivery or collection of a container. This documentation is required by the terminal operator to enable containers to be collected and delivered.

The ACS (see Attachment 10A, and AQIS (see Attachment 10B) have statutory responsibilities. Land-side service providers must interact with these agencies in the course of their activities.

There are a number of factors that affect the timeliness and reliability of land-side operations. These include:

- documentation problems, including customs and quarantine clearance;
- lack of exporter and importer discipline;
- incompatible AQIS, container park and warehouse operating hours;
- lack of flexibility in the transport workers award;
- the slow uptake of EDI; and
- problems associated with accessing the VBS (already discussed in Section 10.1 above).

---

21 There are a large number of road transport operators at each major port in Australia. For example, at least 120 operate at the port of Fremantle, a further 300 or so operate at the port of Melbourne, at least 150 operate at the port of Brisbane and more than 550 operate in Sydney.

22 Container parks store and repair empty containers and act as the shipping companies' agents for receiving and issuing containers. In addition, they offer storage of full containers, container packing and unpacking, bond and free storage, welding and other engineering services and container transport.

The interactions of each and every land-side operator has an impact on overall timeliness and reliability. Cartage rates range from $50 to $60 per hour.[23] Therefore any delay adds to road transport costs and to the overall cost of sea freight transport.

Documentation problems

To deliver a container for export, the transport driver must produce an export receival advice (ERA).[24] To collect an import container the transport driver must produce an import delivery order (IDO) at the terminal gate.[25] If the document is incorrect or has not been cleared by ACS, the terminal operator will not allow the truck driver to deliver or collect until corrections or clearance are obtained.

Documentation problems delay delivery and collection because the driver has to contact either the importer, exporter or freight forwarder to make the necessary corrections or obtain clearance. For example, P&O Ports in Melbourne advised that it is not unusual for at least 5 per cent of trucks in any one day to be delayed at the terminal gate because customs duty has not been paid on imported containers.

Road transport operators can also experience delays when delivering or returning empty containers to the container parks or when presenting documentation that is found to be inadequate or inaccurate (information supplied by the Road Traffic Authority of Queensland). These delays may occur if trucks arrive with incomplete or inaccurate container release or hand-over documentation, or if the shipping line has failed to provide the container park with release details. On some occasions, delays may also occur if releases

[23] Road cartage cost have not changed significantly over the past 15 years, partly because of productivity improvements in road transport. For example, some transport companies have invested in B-doubles or super B-doubles. These trucks have the capacity to transport up to 4 containers on any one movement.

[24] A document which accompanies the export consignment to the terminal or wharf detailing information about the cargo and quoting the export clearance number (ECN) issued by the Australian Customs Service. The VBS operated by Patrick terminals allows for the pre-entry of Export Receival Advice (ERA) details. This eliminates the need for road transport operators to present the ERA at the terminal gate.

[25] A document which is initiated by the shipping line and forwarded to the shipper. It includes information on the container number, pick up point, shipping line reference number, Lloyds' number, voyage number, type of container, bill of lading number, contents, where empty container should be returned to, the weight and quarantine information.

for containers have been issued by the shipping line before empties have been returned following unpacking of import cargo.

Such delays can be critical if the container park is unable to contact the shipping line during their operating hours. For export containers it might result in the container missing the ship's cargo cut-off time.

Road transport operators can also experience delays at authorised tail-gate inspection facilities if the paperwork they present is inadequate.[26] One tail-gate inspection operator commented that this can occur once or twice a day.

Documentation and communication with AQIS and the ACS are critical to the timeliness and reliability of freight forwarder and customs brokers operations. Some of the problems experienced in these two areas are set out in Box 10.3.

The timeliness and reliability of current operations could be improved by implementing a fully integrated electronic system — linking the Sea Cargo Automation system (SCA) into other electronic systems such as electronic funds transfer and electronic payment systems. However, there is no central body — such as the ACS in the case of the SCA — to drive the use of EDI in commercial and operational activities.

Lack of exporter and importer discipline

As discussed in Section 10.1, it is not unusual for some exporters to leave the movement of containers to the wharf until the last day prior to cut-off or after cut-off time. This impacts on road transport operators as well as stevedores. It limits their ability to plan and co-ordinate the use of their trucks in the most efficient way (HORSCOTCI 1995).

This lack of discipline also makes it difficult for country operators to obtain time slots if exporters have not given them advance notice of an expected delivery. Country operators require information two to three days in advance to allow them enough time to obtain a time slot.

[26] Tail-gate inspections are carried out to check containers for the following: wooden packaging ie dunnage, inadequate certification, verification of new or used machinery, verification of packaging used, verification of documentation, peatmoss contamination, internal and external cleanliness of the container and insect infestation.

Box 10.3 Documentation and communication problems with the ACS and AQIS

The SCA system allows all cargo to be reported electronically and provides for the electronic clearance of cargo. However, registered users of the system are unable to identify exactly why there may be a problem with the clearance of cargo, because each registered user has access to a limited amount of information. Consequently, time can be wasted tracking down a problem — such as contacting shipping lines, terminal operators and the ACS — adding to business costs.[a]

Freight forwarders expressed concerns about the prescriptive manner in which AQIS undertakes its role and responsibilities. It was alleged that communication with AQIS officers can be difficult because of the time taken for them to respond to a query and the difficulty in identifying the appropriate person to contact.

The COMPILE system, which is currently used by registered users to input manifest information, is to be replaced by an EDI based system referred to as EDIFICE. This is a message-based system and delays in the transmission of information are inevitable because it is a store and forward system.

When problems are experienced with the COMPILE system it is difficult to reach the help desk or obtain a response from an ACS officer. If problems occur outside the operating hours of the ACS — that is 8.30 am to 4.51 pm Monday to Friday — substantial delays can occur.

Containers cannot be cleared until a freight forwarder or customs broker has paid duty (if applicable), presented the bill of lading to the shipping line or agent and paid wharfage on the cargo. Shipping lines or their agents have been slow to implement electronic payment systems for wharfage. As a result, freight forwarders or customs brokers are required to pay wharfage and present the bill of lading at shipping line offices. This is a time-consuming task which has the potential to be streamlined. Furthermore, until recently, customs brokers had to present the customs clearance advice to the shipping lines.

The export integration (EXIT) system is an electronic system for the lodgement of export entries and manifests by exporters and shipping companies respectively. It is not user friendly for those involved with exports and, as one freight forwarder acknowledged, delays of up to 2 hours are not uncommon. However, this system is currently being redeveloped to make it more attractive to users.

a On 16 January 1998, the ACS advised Brokers that a new diagnostic facility has been developed to enhance the SCA system. Brokers will be given greater access and improved problem solving facilities.

Source: Freight forwarders.

Country operators often receive information on the same day that containers are ready for delivery to the container terminal. This is not always under the control of the exporter. For example, the exporter may receive a just-in-time request for a container of fruit. This places pressure on the exporter, who in turn places pressure on the transport operator to book a time slot and arrange delivery to the wharf.

Some importers display a similar lack of discipline by delaying container collection until the third day to maximise free storage time — this affects the timeliness of road transport operations.

Operating hours of AQIS, container parks and warehouses

As discussed in Section 10.1, the majority of land-side operators have less flexible operating hours than container terminal operators.

Warehouse operating hours have the greatest impact on the timeliness and reliability of road transport operations. Most warehouses are open for limited hours — typically, eight hours a day, but it can be less. As noted by one transport operator, the delivery window at a number of warehouses is being more compressed in an attempt by importers and exporters to reduce operating costs.

Consequently, road transport operators are unable to utilise their trucks in the most efficient way. They are forced to move containers from the terminal, to their yards instead of directly delivering containers to their customer's warehouse.

One large transport operator advised that at least 50 per cent of all containers collected from the terminal were delivered to the transport yard prior to delivery to the customer's warehouse. There are costs involved in this double handling — a greater number of trips than necessary and the additional cost of container handling.

For country operators, the operating hours of AQIS and container parks can be more critical. Country operators have a preference for morning time slots to allow them enough time to either collect an import container which will require a tail-gate inspection or to collect an empty container from a container park after delivering a container to the terminal.

All containers destined for country unpacking addresses must receive a tail-gate inspection during daylight hours. Operating hours for tail-gate inspection services vary from port to port. In Melbourne, one private company conducts tailgate inspections (employing the services of an AQIS officer) from 7.30 am to 3 pm on weekdays with out-of-hours inspection by prior arrangement.

In the event that a country transport operator does not obtain a morning time slot, or one early enough to meet the 3 pm deadline for a tail-gate inspection, the container has to be held overnight until the inspection service reopens the next day. The result of a 24 hour delay in import delivery adds to the cost of doing business for both the importer and road transport operator.

Similarly, the opening hours of container parks — typically eight hours a day weekdays only, effectively eliminates the opportunity to collect and deliver empty containers after 4 pm. Furthermore, empty containers have to be returned to a designated container park within a specified period and during operating hours, irrespective of whether a transport operator is city or country based.

The late delivery of an empty container to a container park incurs a fine. The time period and the magnitude of the fine varies between shipping lines operating on Australian trades. Container park operating hours and the time allocated to return empty containers to the container park disadvantage country operators.

Lack of flexibility in the transport workers award

Road transport operators stated that the award covering transport workers does not provide the flexibility for road transport operators to adopt more flexible hours of operation. However, this situation is improving.

The Industrial Relations Commission of NSW recently allowed an application (by the Transport Workers' Union of Australia, New South Wales Branch) for a pay increase accompanied by a number of award changes. These changes have provided greater flexibility for the industry with the inclusion of Saturday as part of ordinary hours, an increase in the span of hours, a reduction in the minimum engagement for casual employees, a provision for part-time work for drivers and the payment of wages by electronic funds transfer.

At the Federal level, the *Workplace Relations Act* is intended to ensure that issues to do with workplace flexibility are dealt with through enterprise bargaining, rather than prescriptively in the award.

Electronic data interchange

In Australia, over 110 million documents are produced to support more than three million import and export consignments that occur annually. An individual transaction could involve over 27 to 30 parties and over 40 documents. It is estimated that 15 per cent of consignment detail is repeated at least 30 times and that 70 per cent of data is re-keyed at least once (information supplied by Tradegate ECA).

EDI has the capability to improve the timeliness and reliability of exchanging consignment-based data by reducing the delays and costs associated with generating and dispatching documentation. It involves the computer-to-computer exchange of documents and information in a structured form using commonly agreed standards.[27] It is not necessary for trading partners to have identical document processing systems.[28] The need for standard messages in EDI necessitates a significant amount of co-operation between users in developing those standards.

EDI makes significant savings in time and money possible by eliminating or reducing the paper flow between importers, shipping lines, freight forwarders, customs brokers, banks, insurance companies, terminals, container parks and exporters. An efficient and effective EDI system also enables businesses to monitor the performance of particular links within the transport chain.[29] It provides businesses with additional information, allowing them to adjust their business operations accordingly. In addition, those involved in the transport operation are in a better position to respond to new developments more rapidly and benefit from enhanced communication and co-ordination between transport chain participants.

Factors affecting implementation of EDI

Implementation of EDI in Australia has been significant in the area of regulatory messaging. The uptake of EDI in commercial and operational activities has been comparatively slow. The following factors have been cited for this:

- lack of awareness of the benefits and implications of EDI;
- partial implementation throughout the transport chain;
- user establishment costs, including the cost of software acquisition;

[27] The International Standards Organisation and the United Nations Economic Commission for Europe are responsible for the development and promotion of the International EDI standard, EDI for Administration, Commerce and Transport (EDIFACT). These standards are known as UN/EDIFACT.

[28] In most cases, EDI messages are transferred on value added networks (VANs) or by the Internet, which provide an electronic link to users. Users do not need to be connected to the same VAN in order to send messages to each other. However, VANs providing services need to be able to communicate with each other.

[29] The transport chain includes shipping lines as well as the port-land interface.

- the inability of industry bodies such as Tradegate ECA to impose or enforce the use of consistent implementations;
- concerns about message security, legal matters relating to international trade, and the negotiability of instruments; and
- inconsistent proprietary messaging and system interface formats.[30]

Most, if not all, of the developments in EDI for sea transport have concentrated on container cargo. This is because container cargo, unlike break-bulk cargo, is readily identifiable through container numbers. There have been some recent developments relating to the electronic release of break-bulk cargo under the SCA system. However, while the declaration of manifests may be electronic, a parallel process requires the cargo to be manually cleared before it is released from the wharf.

With the development of the ELECTRA project and other commercial and operational messages, participants in the transport chain can now implement EDI beyond regulatory messaging.[31] However, the significant benefits of EDI will not be realised until there is a critical mass of users. For this to occur, greater demand for, and commitment to, the use of EDI by importers and exporters would be needed.

10.3 Logistical co-ordination

Many of the problems identified in this chapter could be overcome by improved co-ordination. However, there are few incentives to encourage the numerous operators to co-ordinate their activities.

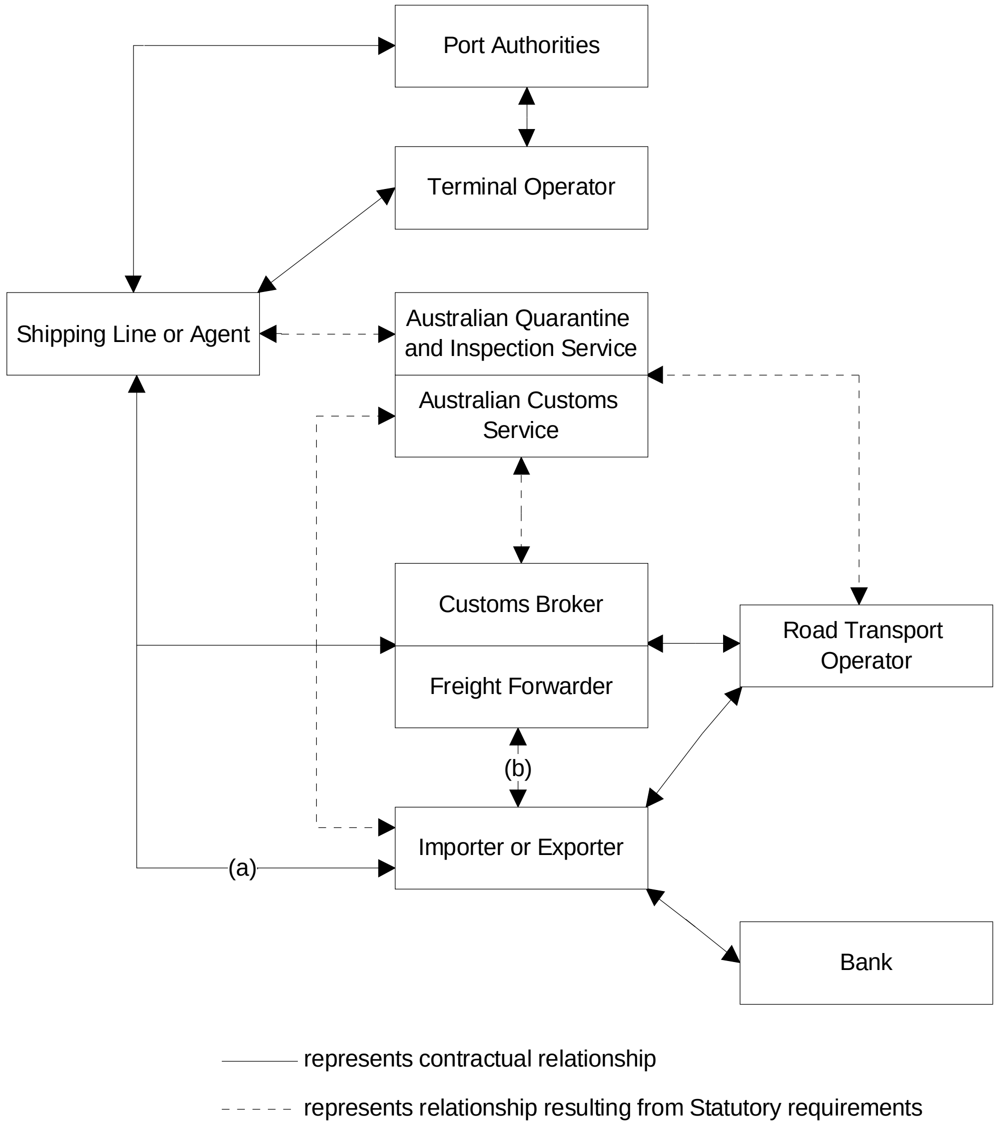
Stevedores are usually contracted to the shipping line in Australia. They do not have a direct contractual relationship with the transport operator contracted to an importer, exporter or freight forwarder (see Figure 10.1).

---

30 See HORSCOTCI (1992, 1995) and Cameron (1996a, 1996b).

31 The ELECTRA project is a suite of messages which allow importers, exporters, airlines, shipping lines, forwarders, brokers, transport operators, terminal operators, container parks and banks to exchange electronic messages in a standard electronic format.

Figure 10.1 Contractual links



a Exporters typically deal directly with shipping lines and their agents.
b Importers typically use the services of freight forwarders and customs agents.

The absence of contractual arrangements between the terminal operators and road transport operators, the inflexible operating hours of customer warehouses, the absence of a facilitator to drive the use of EDI in commercial and operational activities, and the lack of discipline on the part of exporters and importers, act as barriers to co-ordination.

The lack of contractual relationships acts as a barrier because there is no incentive for a container terminal operator to improve the efficiency with which cargo reaches importers and exporters as they have no direct relationship. Similarly, container terminal operators incur no financial penalty for imposing delays on road transport operators. They are not directly accountable to road transport operators for their actions. Furthermore, transport operators may be able to recover the costs of delays from importers and exporters by charging demurrage, which weakens the incentive to use resources efficiently.

There have been some attempts to improve co-ordination at the interface. For example, for the past six years, P&O Ports in Melbourne have employed two people to discuss logistics issues with road transport operators. In addition, the ACS is attempting to pursue with other government agencies, the concept of a single window to government, by promoting greater co-ordination and co-operation among government agencies. The objective is to examine ways of sharing information and resources to provide a more co-ordinated approach to services.

The ACS envisages further development of existing arrangements with AQIS in order to establish the basis for wider Government involvement in such arrangements. In addition, the ACS supports the development of a unique client identifier for all Commonwealth Government agencies (DCN 1997b).

Attachment 10A

Customs

The ACS is responsible for the collection of customs and excise duty, maintaining an export data entry system as well as providing border protection to ensure that prohibited cargo is not brought into the country. All sea cargo entering Australia must be cleared by the ACS.

Freight forwarders and customs brokers prepare on behalf of importers most of the required documentation. In the past this task was time consuming and complex.

Freight forwarders and customs brokers have benefited in recent years from the introduction of a number of electronic systems by ACS and AQIS.[32] These systems are the national SCA system and the electronic export inspection and clearance system known as EXDOC which interacts with the EXIT system.

The SCA system was implemented in July 1994 by the ACS to complete the clearance process for containerised cargo.[33] The SCA system automates the reporting, screening and clearance of imported cargo through the use of computer links between the ACS, parties reporting and delivering cargo, and other members of the cargo importing community (TEDIS 1996).

It allows manifests to be reported electronically by shipping companies and freight forwarders. These manifests are processed through a computerised profile utility, identifying 'high risk' cargo to the ACS and AQIS.

Since 1994, the ACS has shifted the balance of its responsibilities from control to facilitation and as a result has adopted a more risk assessment mindset. The ACS no longer examine all manifests but rely on the SCA and COMPILE

---

[32] Freight forwarders are responsible for arranging the movement of cargo using one or more transport modes according to the wishes of importers and exporters, with whom they have a contractual relationship. Customs brokers are engaged by importers to arrange clearance and payment of customs duty on cargo (HORSCOTCI 1992). However, some importing companies have their own in-house customs brokers. Freight forwarders may also have a packing and unpacking facility on their site and operate their own road transport operations.

[33] In 1998 Patrick and P&O Ports intend to implement an electronic reporting system for the clearance and delivery of break-bulk cargo. For bulk cargo, there are no benefits to be gained from developing an electronic system for a one line entry.

systems to assess the risk profiles of the cargo and to identify those items that may be 'high risk'.

The COMPILE system allows customs brokers to create, lodge and pay import entries at their offices and obtain ACS clearance within minutes. Messages concerning the status of cargo are transmitted to the container terminal at the time of the ship's arrival and made available to customs brokers through the COMPILE system progressively as it becomes available.

Although clearance may occur within minutes via the COMPILE system, the affect of polling, that is, the frequency in which mailbox messages are read can impact on the timeliness of container collection. This is of particular concern where waterfront activities are concentrated close to a port. For example, in Fremantle where it may only take a few minutes for a road transport operator to reach the terminal. A road transport operator may arrive at the terminal to collect a container (having received advice from the ACS that the container has been cleared) to find that terminal staff have not received or read the clearance advice.[34]

The SCA has reduced both the amount of paperwork in the waterfront chain and the number of staff required to process the paperwork.

Overall, around 90 per cent of all shipping lines and 70 per cent of all freight forwarders in Australia that use SCA. The number of registered users is constantly changing and varies between States. For example, there are currently 85 out of 165 freight forwarders in Melbourne who use SCA and at least 75 per cent of all manifest lodgements in Melbourne occur electronically (includes electronic entries by both the shipping line and freight forwarder). All container terminals use SCA (with the exception of some berths in Brisbane).

From 1 April 1997, the ACS has applied a policy of cost recovery for commercial customs activities required to process imports. The Cargo Automation Processing Charge has been absorbed by new charges (Australian Customs Notice No.96/44).

The services to be covered by the new charges include cargo reporting (both sea and air) and import entry processing (sea, air and post). Charges will not apply to the processing of export transactions, nor will they cover activity associated with ACS community protection functions relating to the detection and interception of prohibited imports and drugs (Australian Customs Notice No.96/44).

---

[34] This may occur if the terminal has prioritised its messages in such a way that a bayplan will be processed before a clearance message. It may take between 15-20 minutes to process a bayplan before a status message from the ACS can be read.

As a consequence of the introduction of cost recovery, SCA usage has increased and reduced paper flows.

The ACS is also currently developing a cargo management strategy. In June 1997, eight companies were selected to participate in a pilot program aimed at streamlining processes for moving cargo into and out of the country. The objective of such a study is to improve flexibility by breaking the nexus between payment of duty and release of cargo by the adoption of new practices based on periodic accounting and duty deferral.

The electronic clearance of containers has significant benefits for importers, exporters and their agents. First, it has the potential to eliminate transcription errors. Second, it reduces processing and transmission time. Clearance approval can occur within minutes via the transmission of status messages. A 20 ft container can now be cleared on the same day. Finally, it introduces greater flexibility into the system.

That said, ACS claimed that there is scope for improvement. Some of the problems reported to the Commission that affect the timeliness and reliability of sea cargo movements are:

- inadequate training in the use of ACS computer systems;
- slow user uptake of customs systems;
- late submission of documentation; and
- lodgement of inaccurate information.

Inadequate training in the use of ACS computer systems

All registered users (freight forwarders, customs brokers) have had to invest in compatible software. However, there has been a reluctance by a number of users to invest in training. As a result the ACS is inundated with calls by users who do not understand how the system works. ACS are unable to provide assistance because they are not familiar with the systems users have invested in. The SCA help line receives on average 1500 calls per month, the majority of which come from new users or inexperienced staff.

Slow uptake

There are a number of importers, exporters or their agents that have been slow to embrace the SCA system. As a consequence, the manual processing of documentation required to be undertaken by the ACS affects the timeliness and reliability of their operations.

Another reason for slower than expected uptake is the continuing use of paper documents. For example, a large number of permits are required to be administered for exported goods. With EDI this is harder to do because the permits cannot be sighted.

Late submission of documentation

Legislative requirement stipulates that manifests must be lodged with the ACS 48 hours before the arrival of the ship. However, most shipping lines do not lodge the manifest until 24 hours before the arrival of the ship because ACS guarantee that manifests will be screened 24 hours before the ship's arrival. There can be some delays with freight forwarders, but generally they are only penalising themselves.

There may also be problems with trans-Tasman cargo because shipping lines don't often finalise their manifests until the ship is half way to Melbourne. If the ACS receive the manifest information within 48 hours, the cargo can be released before it is discharged and this may reduce delays in delivery.

Shipping lines have to provide a full list of what is being exported, but often it is difficult to know this until the last minute. Shipping lines have asked if they can provide this information 48 hours after exports are loaded because it is easier to know after the event what is on the ship.

Lodgement of inaccurate information

Shipping lines send manifests to the ACS and if the manifest contains errors it will be transmitted to the shipping line for correction. Consequently, it is easy to lose a day correcting for the errors. Around 4 to 5 per cent of cargo is delayed because of problems with the documentation and or clearance of cargo through the COMPILE system (this excludes the computer system going down).

Attachment 10B

Quarantine inspection

AQIS is responsible for export inspection and import quarantine clearance services. All plants, animals and associated products that are to be imported to Australia are subject to quarantine. The inspection procedures for imported containers are described in Box 10.4.

Similarly, most bulk agricultural produce exported from Australia is inspected by AQIS. This includes meat, dairy produce, seafood, grains and fruit and vegetables. The service ensures that export premises are up to standard, that product description, labelling and documentation are in accordance with regulations, and that the requirements of importing countries and Australian marketing authorities are met. The inspection procedures for exported containers are described in Box 10.5.

Since 1991, government policy requires AQIS to recover its user–attributable costs for all quarantine and inspection services on a fee-for-service basis.

AQIS provides services through 20 programs, each program has a different charging structure and there is no cross-subsidisation between programs. Overhead costs are allocated across programs at the start of each financial year based on the number of staff in each program. A flat rate is charged to cover the screening process for container clearance through the SCA system.

At the interface AQIS must co-ordinate the clearance of all imported cargo and inspect most food exports and issue certificates if required by the importing country. The timeliness and reliability of their operations are directly affected by inspection and documentation requirements. It is inevitable that delays will occur in the clearance of some cargoes particularly if the cargo has to be fumigated, or unpacked and if documentation is incorrect.

Box 10.4 Quarantine procedures for imported containers

The AQIS currently inspect:

- The external surfaces of empty containers at the wharf or terminal during unloading operations as well as the interior to determine if the container is contaminated with plant and animal matter. All LCL containers once they are delivered to a quarantine controlled area for unpacking and all necessary treatment, provided the exterior is free from contamination;
- all containers from known Giant African Snail (GAS) locations;
- all containers destined for rural areas. This involves a tail-gate examination;
- all FCL containers which contain goods subject to quarantine ie imported foods, if timber packing, crates, dunnage, straw or other cereal packing has been used in the consignment or if the consignment is not free of soil, insects, plant and animal residues; [a] and
- all timber irrespective of whether it is break-bulk or containerised cargo.

A quarantine entry must be lodged by the importer or authorised agent for any container that is subject to quarantine. Quarantine action may be required for a number of reasons, including the presence of unregistered containers, untreated timber packing, uncertified timber packing, straw packing country destination or incomplete manifest information. Customs brokers that are connected to the COMPILE system can lodge quarantine entry information and will receive information relating to the consignment's quarantine status, via their COMPILE entry message advice.

The immediate release of an FCL container is only possible if appropriate documentation has been provided to AQIS at the port of entry prior to arrival of the vessel. This must include:

- a packing declaration provided by the overseas supplier indicating that no timber or straw packing, crates or dunnage have been used in the consignment;
- a treatment certificate, if timber packing has been used; and
- a container cleanliness statement indicating that the consignment has been swept or has been visually inspected and found to be free of soil, insects, plant and animal residues.

a. Dunnage includes mats, brushwood, gratings and so on stowed under or among cargo to prevent wetting or chafing.

Source: AQIS 1996.

Box 10.5 Quarantine procedures for exported containers

Before a product can be exported, the exporter must prepare an export receival advice which quotes an export clearance number (ECN) which is issued by AQIS. This documentation is all that is required for an establishment that operates under a Quality Assurance inspection system.

However, for those establishments not operating under a Quality Assurance system an export permit must be prepared for each consignment and presented to an AQIS officer prior to shipment for signing and stamping.

For some agricultural products such as meat, meat products, poultry, game and rabbit meat, the ECN can be generated electronically using the EXDOC program. This reduces the time taken to obtain such documentation. For other agricultural exports, such as dairy, seafood, grains and fruit and vegetables, the ECN has to be generated manually.

Some importing country governments insist on having certain product certification before goods are permitted entry. AQIS can provide certificates to satisfy importing country authorities and advice as to certification requirements.

Source: AQIS 1997.

In response to the Nairn report into quarantine services, AQIS recently undertook a review of container inspections and proposes to:

- conduct external inspections of all land-bridged containers, commencing with the major ports of Melbourne, Sydney and Brisbane;
- conduct external inspections of all containers moving to rural areas as well as tail-gate internal inspection;
- conduct random external inspections of up to 5 per cent of all containers delivered in the port of discharge;
- conduct external inspections of all containers from known GAS locations; and
- conduct 100 per cent assessment (external and internal) of imported empty containers using industry based quality assurance (QA) arrangements (DCN 1997c).

AQIS also proposes to implement an accreditation system which is designed to equip customs brokers with the skills to check import documents for quarantine clearance. The introduction of this system is intended to provide customs brokers with increased flexibility through reduced dependence on AQIS. With agents performing some of the tasks formerly carried out by AQIS officers, it is expected that customs brokers will be able to provide faster and potentially cheaper freight clearance through improved efficiency (Chambers, 1997 p. 2).

11 IMPACT OF WATERFRONT SERVICE PERFORMANCE ON IMPORTERS AND EXPORTERS

Delays on the waterfront increase the cost of importing and exporting. They impose production, transport and inventory costs. Ultimately, export sales may be lost and Australia's reputation as a reliable supplier damaged.

The magnitude of the costs that arise when there is a lack of timeliness are the focus of this chapter. They are significant when compared to the sea transport freight bill and highlight the national importance of efficient waterfront service performance.

There are approximately 3000 exporters and 30 000 importers in Australia (Cameron 1996a). They shipped approximately $120 billion of cargo in 1995–96 — $62 billion of which was containerised (see Chapter 2).

The time taken to move sea cargo through the Australian waterfront and its predicability, is usually critical to importers and exporters. They require timely receival of imports to maintain production schedules and delivery of export cargo to meet contractual commitments.

Timeliness is a function of the time taken and the reliability with which a service can be predicted. Reliability is usually the most important aspect of timeliness in planning logistical arrangements. However, with some time sensitive cargoes — such as perishable goods — the time taken is also important.

Some of the typical reasons for delays and hence unreliability of waterfront operations that result in ships being unable to maintain shipping schedules (early or late arrivals and departures) are:

- berth unavailability;
- industrial disputation and inflexible work arrangements; and
- co-ordination problems.

Berth availability problems delay the stevedoring of ships (see Chapter 6). This reduces asset (ship) utilisation, resulting in higher shipping costs and charges.

Industrial action adversely impacts on reliability by disrupting the efficient planning of work arrangements, delaying ship working and exacerbating congestion for the receipt or delivery of cargo. The demand for stevedoring services fluctuates over time and the task varies from ship to ship and voyage to voyage. Flexible work arrangements are also required for the stevedore to be responsive to this challenging service environment to provide an efficient and reliable service.

Co-ordination problems at the port–land interface result in avoidable demand peaks and impact on the planning of stevedoring operations. Some possible underlying causes are:

- insufficient capacity at port terminals to prevent congestion for the receipt or delivery of imports and exports in periods of peak demand;
- the slow uptake of electronic commerce facilities;
- quarantine inspection and customs clearance problems;
- documentation problems; and
- difficulties in obtaining containers for exporting goods (see Chapter 10).

Unreliability militates against effective co-ordination of the complex chain of activities that constitute waterfront services. Furthermore, delays in one activity have ‘knock-on’ effects, because they are difficult to compensate for and affect co-ordination in subsequent activities (as discussed in Chapter 2).

Unreliability adversely affects the efficiency of interface transfers and the co-ordination of land-side logistical arrangements. This gives rise to a range of direct costs borne by shippers, above and beyond those paid for waterfront and shipping services, such as demurrage charges when trucks are delayed in queues outside container terminals.

In addition to the direct costs, there are internal ‘indirect’ costs to Australian shippers. These costs — such as those associated with holding additional inventories — can significantly increase the total costs faced by importers and exporters.

The magnitude of direct and indirect costs resulting from a lack of timeliness — that is, costs other than those for waterfront and shipping services — are the focus of this chapter.

Importers and exporters were approached to identify the difficulties encountered with the timeliness of sea transport. Information was also sought on the costs that poor performance imposes on importers and exporters across a range of cargo types — including high value, perishable, inputs critical to manufacturing and those with special handling requirements (see Appendix B).

The magnitude of the additional costs attributable to poor service performance depends on the gap between ‘efficient’ and current levels of performance. The overseas levels of performance identified in this study do not necessarily provide an adequate indication of what an achievable ‘best practice’ benchmark is for Australia (see Chapter 1 for a discussion of the limitations of benchmarking).

Consequently, the estimated cost savings presented in this chapter represent rough ‘best estimate’ numbers. They are intended to illustrate the broad magnitude of the possible gains.

11.1 Impacts of service problems

Perceptions about the timeliness of sea transport can differ among importers and exporters depending on the type of cargo exported and imported. Generally, shippers are aware that delays are affecting their logistical arrangements and imposing costs. However, those contacted in the course of the study were unaware of the extent to which waterfront services might be improved. Consequently, they were unable to quantify the cost of poor performance.

Timeliness is particularly important to suppliers of highly perishable products, such as fruit and vegetables, seasonal products and non-seasonal products associated with just-in-time deliveries. A 2 day delay in ship arrival and departure is usually critical to shippers of perishable products, but may not be for a product with a longer shelf life.

Delays can also present problems for exporters and importers of seasonal products. Some seasonal products attract premiums during a narrow span of time when no alternative supplies are available. If the product does not arrive before its expiry date it is unlikely that the product can be sold at all. Particular examples include Chinese cabbage, broccoli and asparagus sold into South–East Asia.

Furthermore, if commodities are imported to supply seasonal industries such as the fishing or wine industries and if these goods miss the season for which they were purchased, sales may be lost or made at greatly reduced prices. Shippers incur the financial cost of having the capital tied up when goods are held over to the next suitable season.

Airfreight is used on some occasions, and regularly for some high valued products such as crayfish. However, most shippers have no financially viable option other than sea transport.

There have been improvements in waterfront services over the last 10 years. For example, the number of industrial disputes has reduced. That said, the analysis of stevedoring service performance in earlier chapters indicates significant scope for further improvement (see Chapters 6 to 9).

There has been improvement in interface operations as well. For example: the introduction of vehicle booking systems in Melbourne and Sydney, which are the largest container ports in Australia; the introduction of SCA for the clearance of cargo; the introduction of BAPLIE, which allows the ships stowage plans (bayplans) to be electronically transmitted between the container terminals, container parks and the shipping line, and the introduction of fixed-day sailing schedules in some major ports.

Nevertheless, problems remain, as discussed in Chapter 10. There are a number of proposed changes envisaged, such as greater use of sea waybills and electronic commerce, an upgrade of the EXIT system and the phasing out of COMPILE. The ACS is also trialing a cargo management strategy in partnership with a number of international traders and government. However, these initiatives will not fully address the problems.

Importers and exporters also have to improve their performance so that cargo is delivered to the waterfront and picked up in a timely and reliable manner. As noted by some traders, it is often their own internal operations and practices that create delays.

11.2 Direct costs

Failure to achieve efficient levels of waterfront service results in higher 'blue water' freight charges. Delays to ships in ports affect capital utilisation if shipping schedules are to be maintained at levels required by shippers. Where shipping services are competitive and providing a normal rate of return, the savings from better utilisation of ships and the use of larger ships would be reflected in the service charge.

Direct costs of poor service performance are also incurred at the port–land interface and in contingent international and domestic transport arrangements.

Terminal delays to ships

There is a spectrum of possible changes to both charges and service with productivity improvement. At one extreme, the same level of output or service could be produced with less resources. At the other, services could be improved without increasing charges.

The issue considered in this section is the improvement in service to shipping lines.

Faster turnaround

Savings could be achieved with an increase in the net crane rate through faster ship turnaround times. The benchmarking results for container stevedoring indicate that the differential varies between 12.5 hours and 54.6 hours, depending on the trade (see Table 6.3). The upper and lower bound of these delays account for between 2.4 and 0.6 per cent of the total voyage time respectively.

Not all of this is realisable however, given the scale disadvantages of Australian stevedoring operations (see Chapter 2). It is doubtful whether ship owners would fully rationalise their fleets or services, given that they are not currently facing capacity constraints.

If most of the lower bound of the delay (0.6 per cent of the voyage time) could be removed — say half of one per cent — a saving of around 2 days per year might be achieved. This is equivalent to $25 per TEU per annum, adopting $14 per slot day as a typical current ship operating cost.[1] This amounts to around $2 per TEU for a ship making six voyages per annum (8 hours per round trip or 4 hours per voyage leg).

Delays

Shipping lines claim that they must build slack into their shipping schedules to take account of delays that they may experience on the Australian waterfront. This is required because of the importance placed by shippers on frequent and reliable shipping services — and by shipping lines because it affects patronage, as a consequence. Where delays occur, they are compensated by increasing frequency.

Operators in the North American liner shipping trades report that they found it necessary to employ one additional ship in order to protect their schedule integrity against delays on the Australian coast — a contingency factor of 14 per cent (see Box 6.1). Thompson Clarke Shipping estimate that if this contingency factor were universal to the trade, it would represent a cost of at least US $21.0 million annually.

Based on the 1996 total trade of 97 000 TEU between Australia and the North America, this cost penalty can be expressed as the approximate equivalent of A$215 per 20 foot container.

---

1 A ‘slot’ refers to a space aboard a cellular container ship for one TEU.

On shorter trades, the saving would be much less because of the greater number of ships and sailing options open to shippers. Consequently, an indicative contingency factor may be in the order of 10 per cent.

Assuming that this factor could be halved (to 5 per cent — or approximately one third of the delay experienced by operators in the North American trades), 18 days of ship operating costs would be saved per year. This amounts to 3 days per round trip or 1.5 days for each voyage leg. Again, adopting the Bureau of Transport and Communications Economics' (BTCE) typical cost for a ship making six voyages per annum, the saving represents around $20 per TEU for each leg.

Interface delays

Importers and exporters face a number of interface delays that affect the timeliness and reliability of their logistical arrangements. These delays are caused by a lack of co-ordination and inadequate interface service (see Chapter 10).

The breakdown in co-ordination can emanate from within the waterfront from labour disputes and other disruptions to the operations of terminals (see Section 10.1). They can also be caused by land-side problems — for example, with quarantine and customs clearance or documentation — that delay road transport operations (see Section 10.2). They are exacerbated by late delivery of export containers and collection left until the last day prior to the imposition of storage fees by the stevedore.

Interface delays result in additional road transport costs, typically demurrage charges for trucks waiting at container terminals. They particularly affect imports because the need for co-ordination is greater with more activities involved.

The BTCE (1997d) estimated that a 50 per cent reduction of demurrage costs in Sydney and Botany Bay would save shippers approximately $14 million per annum. This represents approximately $25 per container or 30 minutes of demurrage at $50 per hour.

Sydney ports, through which one third of all containers in Australia pass, are alleged to have the worst truck queuing problems in Australia. The records of one exporter show that average demurrage costs in Melbourne are currently $10 per container. If this is a universal experience in ports other than Sydney, the cost of truck queues in other ports amounts to $10 million per annum

($10 x 1 million containers).[2] Assuming half of the delays could be eliminated, the additional saving in all ports other than Sydney would be $5 million per annum.

On the basis of these calculations an indicative estimate of the savings that could be made by reducing truck queue delays by 50 per cent is around $19 million per annum. This is equivalent to $9 per container.

To this estimate must be added the costs associated with break-bulk operations.

Contingency transport arrangements

When delays occur to the shipment of goods, shippers are sometimes compelled to use alternative transport arrangements (see Box 11.1 for examples). Any additional transport cost incurred, represents a direct cost of poor performance.

Box 11.1 Example of a contingency transport arrangement caused by an industrial dispute

If there is an industrial dispute which prevents a reefer valued at $25 000 from reaching Japan, it can be held until the next sailing in two weeks time.[a] It may be stored at the wharf (storage costs). Payment for these products is delayed by a further two weeks (Opportunity cost of $25 000 invested elsewhere for two weeks).

If these products were to be airfreighted, the costs will include unpacking the container and repacking ($180 times 2), transportation costs ($190 times 2), the cost to airfreight which is three times the cost of sea freight ($3 000 times 3).

The total cost to airfreight is around 40 per cent of the total value of the products.

a This is a low-valued reefer cargo. The value can be $80 000 or more.

To maintain supply schedules, shippers who are unable to airfreight may be required to use road freight to and from other ports, such as Fremantle and Brisbane, when strikes occur at Sydney and Melbourne. This imposes additional costs, because road freight costs are more than sea freight over the same distance. There is also a cost associated with organising the shipment at short notice.

Shippers who have to maintain supplies in Australia or overseas are often forced to airfreight when there is industrial action. Significant additional transport

2 Assuming that the number of containers is equivalent to 80 per cent of the 2.1 million TEUs shipped.

costs are incurred. For example, air freight to New Zealand costs one exporter $0.90 a kilo compared to a sea freight cost of $0.60 a kilo.[3]

General delays — and early arrival of ships for that matter — can also require the importers or exporters to change their land-side transport arrangements. For example, importers might decide to off-load at an earlier port of call and utilise road freight to guarantee that an essential input arrives when required.

11.3 Indirect costs

The indirect costs incurred by importers and exporters are in effect additional production costs. Although intangible, they nevertheless increase the cost of imported goods and reduce the returns from exports.

Indirect costs include *financing* and *insurance* costs. These costs arise because the time taken to transport cargo is longer than it should when efficient and reliable service levels are not achieved. Also included are *inventory* costs, increased *production* costs and *foregone production* because of lost export opportunities. These costs arise because of uncertainty about the time that a shipment will take.

These costs are not normally additive. Trade-offs are usually made between the use of contingency transport arrangements, holding additional inventories of stock, incurring production costs or losing sales.

Financing costs

The financing cost of increased transit times can be substantial. In Section 11.2 it was assumed that shipping lines could reduce transit times in the order of 4 hours (0.17 days) per voyage leg. It was also estimated that the allowance for unreliability could be reduced by 1.5 days per voyage leg. The total saving if ships reduced their transit times and reduced the slack in their schedules to accommodate delays in Australian ports could be in the order of 1.7 days.

Assuming that $62 billion of imports and exports are shipped by container into and out of Australia each year, the interest required to hold these goods for this period is approximately $28 million at 10 per cent interest — or $13 per container.[4]

---

3 With some goods airfreight can be up to three times the amount paid for sea freight.

4 Assuming that 2.1 million TEUs areshipped annually.

For some shippers the cost can be particularly high. For example, one container of a high value commodity can be worth up to $200 000. A 5 day delay in receiving payment on a container of cargo with this value is approximately $200, which is equivalent to the terminal handling cost.

Insurance costs

Delays to the transit time of imports and exports emanating from the Australian waterfront unnecessarily increase the exposure to risk of damage and pilfering. With increased exposure to risk, insurance premiums can be expected to be higher than they would otherwise be with shorter time at sea and in stevedoring.

Estimation of this additional cost is difficult, because sea freight insurance is quoted on a shipment — rather than a daily — basis. To the extent that they are affected, additional insurance costs — like financing costs — will be incurred.

Inventory costs

Inventory costs are higher than necessary when additional stocks must be held here or overseas because of the unreliability of the Australian waterfront. Importers and exporters' customers incur additional financing costs because they have to maintain additional inventories (see Box 11.2 for examples).

Box 11.2 Examples of impact of delays on inventory holdings

Shippers have taken a range of measures in response to the unreliability of the Australian waterfront. For example:

- To overcome the uncertainty of potential industrial disputes, a buffer in ordering goods from the USA and the UK is maintained. Orders are placed at least a month earlier than necessary, that is, every 3 instead of every 4 months.
- The customer of one exporter maintains at least 3 months stock because shipments are not delivered on time.
- As a contingency measure against the threat of a 4 to 6 week strike on the waterfront earlier this year, $20 million of product was shipped off-shore.

In extreme cases, the threat of industrial disputation and delays has caused exporters to stockpile goods overseas. This imposes both financial holding and storage costs. One exporter reported warehouse storage costs averaged around $40 per tonne per day. They estimated that storage costs caused by waterfront delays accounted for 1.4 per cent of their total value of exports in 1996–97.

Shippers might be expected to make the same allowance as shipping lines for delays in Australian ports. This is assumed to be in the order of 10 per cent across all liner shipping trades (see section above on terminal delays to ships). This must be reduced by the saving in the time shipping lines could decrease their transit times with improved reliability, that is, by 5 per cent or 1.5 days per voyage leg.

The opportunity cost of capital for 1.5 days on Australia's imports and exports at 10 per cent interest is $25 million — or $12 per container. This is an underestimate of the inventory cost because it does not include storage costs.

Disruption to production

Delays caused by unreliable waterfront services can disrupt production (see Box 11.3 for examples). For example, access to essential inputs from overseas can be delayed. This imposes costs on manufacturers and increases the cost of their products.

Box 11.3 Examples of disruption to production

Shippers provided some examples of the production problems caused by the unreliability of shipping schedules:

- One shipper noted that shipping schedules vary substantially, 90 per cent of ships do not arrive at Australian ports on the scheduled day. When ships arrive early it causes significant problems because production schedules have to be rearranged. For example, it takes time to plan a new production schedule. Payment of penalty rates is usually required when changes are made at short notice and sales can be lost on the domestic market (stock not available).
- Another shipper observed that the cut-off times for the receipt of cargo at the terminal tend to move around significantly, depending on changes to the ship's scheduled arrival. This can cause problems because of tight production runs. On some occasions overtime has to be worked to ensure that the product can be delivered to the wharf before the cut-off date.

Over the longer term, the additional cost may affect the viability of exporting. Export production in Australia is affected by unreliability when products are differentiated for overseas markets. Differentiated products often require special production runs where a production line has to be shut down and converted for the export product. Increases in cost are therefore incurred if a disruption caused by a waterfront delay involves unscheduled adjustments to production. Otherwise, alternative transport arrangements or an inventory of additional stock holdings is required.

Lost output

There are difficulties in determining the impact of unreliability on potential export sales. It is common for overseas buyers to diversify their source of supply — especially for critical inputs to production — as a risk management strategy. The impact depends on the perceptions of reliability by overseas purchasers of Australian goods and the cost implication of delays. A further complication is that substitute goods are rarely identical in quality and price. Consequently, reliability is only one factor in the decision to purchase Australian exports.

Australian exporters are already disadvantaged by the remoteness from overseas markets. Unreliability further disadvantages them. The higher the risk to overseas buyers of disruptions in supply — all other things being equal — the smaller the market share Australian exporters will be able to gain.

One delay incident can have lasting consequences. Overseas buyers who redirect their business may do so for some time. Unless they continued to monitor the performance of the Australian waterfront, it may take some time for them to discover that reliability has improved.

The lost output may be a long-term phenomenon or result in the loss of seasonal sales overseas because the product does not reach the market in time (see Box 11.4). As the sale of traded goods is involved, any loss of potential output reduces the opportunity to increase national wealth.

Box 11.4 The importance of reliability to overseas purchasers of Australian goods

Some comments about the importance of reliable shipments by Australian exporters follows:

- The Japanese market is very competitive and reliability of supply is essential. The Japanese customer is able to source the same products from other non Australian suppliers.
- Japan is a major destination of our products, accounting for 40 per cent of our exports. The Japanese are very sensitive to disruptions in the supply chain. They undertake a very thorough investigation of companies to establish if they are a reliable organisation. We often receive requests for information about our business from potential customers.
- The most significant cost with respect to the lack of timeliness and unreliability of Australian waterfront services is the damage to customer relations. We estimated that we have lost 40 per cent of business because of these perceptions. Indirect costs associated with loss of sales are estimated at 30 to 35 per cent of the value of exports.
- Delays on the wharf with a seasonal product such as ours would probably cause us to lose $60 000 worth of sales for that month and that would drastically affect the cash flow and cost us $650 in interest. If it occurred in January the effect could be even greater as the sales may then be delayed until the next October which would increase the cost of interest to $5850.

11.4 Implications

The above rough estimates of indicative service costs are presented in Table 11.1. These estimates are not intended to be any more than indicative of the relative order of magnitude. They are not comprehensive — insurance, and contingency transport costs have not been estimated. Furthermore, they may also be conservative because items such as storage costs have been assumed to have zero economic cost.

Savings may be obtained through service improvement that reduces these direct and indirect costs. The savings from faster and more reliable services are estimated to be in the order of $50 per container. As a basis for comparison, a 10 per cent reduction in direct charges — requiring in the order of 20 per cent productivity improvement — would reduce overall cost by approximately $20 per container.

The broader implication is that performance improvement must come primarily from greater flexibility in stevedoring work arrangements, better co-ordination of interface operations and co-ordination of land-side activities with the waterfront.

In the case of stevedoring, this must involve not only work practices but industrial harmony and co-operation between the workforce and management. Improved co-ordination depends on waterfront reliability and requires shipper discipline and better communication between all those involved in the sea transport chain.

Table 11.1 Indicative estimates of savings from service improvements, 1997

Cost saving item	*Indicative amount* Direct	Indirect	Total	*Assumption*
	($/TEU)	*($/TEU)*	*($/TEU)*	
Service time				
Ship turnaround	2		2	Saving of 8 hours per voyage achieved by reducing the net crane rate gap by half.
Finance cost of goods in transit		13	13	An average saving of 1.67 days at 10 per cent interest comprising a ship turnaround and a reduction of delays by five per cent.
All	2	13	15	
Unreliability				
Ship delays	20		20	Saving of 1.5 days.
Demurrage	9		9	Half the current demurrage cost of $50 in Sydney and Port Botany and $10 elsewhere.
Inventory		12	12	Saving equal to 1.5 days in addition to the saving in finance costs.
All	29	12	41	
All service costs	**31**	**25**	**56**	

Source: Productivity Commission estimates based on Thompson Clarke Shipping (consultant) data.

A PARTICIPATION IN THE STUDY

Organisations and individuals contacted by the Commission and its consultant, Thompson Clarke Shipping, in the course of the study are listed below.

A. Hartrodt (Australia)

AAX Consortium

Adams Transport

Adsteam Marine

Altronics Imports

American Association of Port Authorities

ANSCON Consortium

Asahi Unyu KK

Asiaworld Shipping Services

Association of Australian Ports and Marine Authorities

Austral Pacific Exports

Australian Chamber of Shipping

Australian Competition and Consumer Commission

Australian Country Spinners

Australian Customs Service

Australian Maritime Safety Authority

Australian Quarantine Inspection Service

Australian Ship Owners Association

Australian Wheat Board

Dan Murphy

Beaufort Shipping Agency Company

BHP Transport

Blue Star Line (Aust)

Blue Star Line (North America)

Bonlac Foods

BOP Fertiliser

Brisbane Marine Pilots

Bureau of Transport and Communication Economics

Burnie Port Corporation

Burns Philp Shipping

Cairns Port Authority

Cargo Distributors

Carlton and United Breweries

Carter Holt Harvey

Castricum Bros

City of Hamburg State Ministry of Economic Affairs

Co-operative Bulk Handling

Coles Myer

Columbus Lines

Container Terminals Australia

Contship Containerlines

Cruise Europe

Department of Transport and Regional Development

Department of Transport, Queensland

Department of Transport, South Australia

Department of Workplace Relations and Small Business

Dindas Lew Australia

Eurokai

Eurolist

Federal Chamber of Automotive Industries

Fertilizer Industry Federation of Australia

Forest Products Terminal

Fortbildungszentrum Hafen Hamburg (Further Training Centre)

Forth Ports

Fremantle Pilot Service

Fremantle Port Authority

General Motors Holden

Gesamthafenbetrieb (The Dock Workers Pool Executive Board)

Global Seafood Distributors Australia

GrainCorp Operations

Hafen Hamburg Verkaufsfoerderung und Werbung

Harrington and Company

Hetherington Kingsbury

Hi-Fert

Holt Cargo Systems

Holt Stevedoring

Howard Smith Towage and Salvage

Hyopsung Shipping Corporation

IBM Australia

Impact Fertilisers

Incitec

International Longshoreman’s and Warehouseman’s Union

International Lumber Company

Japan Marine Services

Joe White Maltings (Western Australia)

Klang Container Terminal

Klang Port Authority

Kodak Australasia

Korea Maritime Institute

Kotug

Kraft Foods

Kreskas Bros Transport

Liner Shipping Services

Logichip

Lyttelton Port Company

Mariners Marketing Associates

Maritime Union of Australia

Marlows Auto Parts and Accessories

Matson Navigation Company

Mayne Nickless Logistics — E.A. Rocke

Mazda Australia

McCain Foods (Australia)

Melbourne Port Corporation

Mercedes-Benz (Australia)

Metropolitan Stevedoring

Meyer International

MISC Agencies (Australia)

Murray Goulburn Co-operative

Nagoya Container Berth

Nagoya Port Authority

National Bulk Commodities Group

National Road Transport Commission

Neptune Orient Lines

Nestle Dairy Products

New Zealand Ministry of Transport

Nissan Carrier Europe

Nissan Motor Co. (Australia)

Nissan Motor Manufacturing (UK)

North Queensland Shipping

NSW Ministry of Forests and Marine Administration

P&O Holidays

P&O Nedlloyd

P&O Ports

P&O Swire Containers

P&O Towage Services

Patrick

Peters and Brownes Group

Philadelphia Regional Port Authority

Piers Resources and Services

Pivot

Port of Brisbane Corporation

Port of Copenhagen

Port of Hamburg

Port of London Authority

Port of Los Angeles

Port of Miami

Port of Philadelphia and Camden

Port of Tilbury London

Port Phillip Sea Pilots

Ports of Auckland

Princess Cruises

PSA Corporation

Pusan Container Terminal

Pusan Port Authority

Q.E. Marine and Rural Supplies

Queensland Road Transport Association

Rail and Transport Workers Union, NZ

Ravensdown Fertiliser

Road Transport Forum

Roads and Traffic Authority New South Wales

S.P.C.

Sea Freight Council of Western Australia

Sea-Land (Australia) Terminals

Sea-Land Service

Sembawang Maritime

Simplot Australia

Singapore Cruise Centre

Singapore Port Institute

Skilled Maritime Services

South African Stevedores

South Australia Road Transport Association

South Australian Co-operative Bulk Handling

South Australian Ports Corporation

Spencer Imports

Strang Stevedoring Australia

Sumitomo Australia

Sunship Agencies

Sydney Ports Corporation

Sydney Sea Pilots

Tailgate and Inspection Services

Tasman Express Line

Tasman Pulp and Paper (Australia)

Tilbury Container Services

Tradegate Australia

Trinity House Lighthouse Service

Unikai Hafenbetreib

United Ship Services

Variant Agencies

Vicgrain

Victorian Channels Authority

Victorian Department of Treasury and Finance

Victorian Employers' Chamber of Commerce and Industry (VECCI)

Wesfarmers CSBP

West Australian Vintners

Western Australian Department of Transport

Western Australian Port Operation Task Force

Western Stevedores

Wilhelmsen Lines

Wilmington Transportation

WMC Resources

B DATA COLLECTION METHODOLOGY

Consultants were engaged to collect much of the data used in this study. Actual data was collected for ships trading in each of the major liner shipping trades servicing Australian ports. Great care was exercised to ensure consistency among the data collected by the consultants.

The brief issued to potential consultants and the data collection methodology adopted are outlined in this appendix.

B.1 The consultant's brief

A detailed brief was circulated to prospective consultants outlining the Commission's requirements. The brief was specified in two parts. Part A concerned the benchmarking of performance and primarily involved the collection of numerical data. Part B concerned the benchmarking of practices and primarily involved the collection of qualitative information.

The prospective consultants were invited to tender for each part separately and were able to tender for either or both of these parts. The main areas of information to be collected under each part were:

Part A: Benchmarking performance

- Customer satisfaction
- Operating efficiency

Part B: Arrangements and practices

- Government involvement in port provision
- Stevedoring work organisation

A general requirement of the brief was that the consultant ensure that, as far as possible, the information collected was consistent and representative. For example, where shipping lines provided data it should cover a similar period of time. The consultant should nominate the overall period of time for which the indicators have been quantified. Furthermore, the data should relate to the same ships used in the Australian trades.

This was an important requirement of the brief. It ensured that data was collected by tracking the same ship among the Australian and overseas ports which formed the particular trade. The ships chosen were typical of those operating in the particular trade.

Following a rigorous evaluation of the tenders received, Thompson Clarke Shipping Pty Ltd was selected to undertake both parts of the consultancy.

B.2 Data collection

In consultation with the Commission, Thompson Clarke Shipping adopted a data collection approach based on Australia’s five major international container shipping trade lanes:

- Australia — UK/Europe
- Australia — North America
- Australia — North Asia
- Australia — South East Asia
- Australia — New Zealand

A major international container operator, or operating consortium, was identified for each of the liner shipping trades and approached by the consultant for assistance in the provision of data to reflect actual costs incurred and service performance in respect of specific ships engaged in the trade. A particular ship was tracked on each trade and information collected on the charges levied on the cargo or the ship itself.

The ships on each trade were generally tracked for one year. This ensured that several observations were obtained from each port within the trade.

This approach differed from that adopted in waterfront benchmarking studies conducted by the Bureau of Industry Economics in two respects — the use of actual rather than estimated data, and like-with-like comparisons between ports by tracking a specific ship typical of those operating in each trade.

Charges are reported in Australian dollars at June 1997. The exchange rates applying at that time, used for conversion are presented in Table B1.1. Many of the rates have changed substantially since the data was collected. However, Australia’s relative ranking in levels of charges has not been affected by recent exchange rate fluctuations.

Table B1.1 Currency exchange rates used in the study, June 1997

Currency	*Exchange rate (AUD$)*
Denmark	4.90
Federal Republic of Germany	1.31
Japan	85.0
Korea	666.00
Malaysia	1.88
New Zealand	1.08
Singapore	1.07
United Kingdom	0.46
United States of America	0.77

Coverage

Pilotage, towage and mooring charges (marine charges) along with government and port authority charges for port infrastructure were examined for each of the ports included in the benchmarking of container and bulk shipping stevedoring.

In each case, the selection of ports was based on those which have direct service to Australia.

The *stevedoring of containers* was benchmarked at the following ports:

- *Australia*: Adelaide, Brisbane, Fremantle, Melbourne and Sydney-Port Botany;
- *New Zealand*: Auckland and Lyttelton;
- *Asia*: Port Klang, Singapore, Nagoya and Pusan;
- *North America*: Philadelphia and Los Angeles; and
- *Europe*: Tilbury and Hamburg.

Ship size varied among the trades included in the study:

- ships of 2000 to 3000 TEU class in the Australia UK/Europe trade;
- ships of 1000 to 2000 TEU class in the Australia North America (East coast) trade;
- ships of 500 to 1800 TEU class in the Australia North America (West coast) trade;
- ships of 1500 to 3000 TEU class in the Australia North Asia;
- ships of 1500 to 2500 TEU class in the Australia South–East Asia; and
- ships of 500 to 1800 TEU class in the Australia New Zealand.

C*ruise shipping baggage handling and provedoring* charges were benchmarked across a range of major cruise ports in Australia and overseas. The cruise ship ports benchmarked were:

- *Australia*: Brisbane, Cairns, Fremantle, Melbourne and Sydney;
- *New Zealand*: Auckland and Wellington;
- *Asia*: Singapore;
- *North America*: Los Angles and Miami; and
- *Europe*: Copenhagen and Tilbury.

The cruise ships included in the study were of 900 and 1600 passenger capacity.

The consultant also collected some information on berth availability and the timeliness and reliability of Australian terminals. Berth availability was measured as the proportion of ship arrivals that could access a berth within four hours of the advised arrival time.

Methodology

The data collection methodology was developed in consultation with the Commission. The data collection task comprised:

- the preparation of data checklists itemising every information component required to complete the data collection task;
- the consultant identifying against each information component, the appropriate source(s) to be approached; and
- copies of the checklists being circulated to consultancy team members in their respective countries.

The information gathering process was undertaken by means of personal interviews with key staff in each of the port authorities, container operators, and service providers — for example towage operators, terminal operators, and pilot services.

Data collected by the Commission

In addition to the data collected by the consultants, the Commission also collected data on:

- break-bulk and bulk stevedoring operations; and
- the problems associated with poor port–land interface operations.

The *break-bulk stevedoring* of passenger motor vehicles, pulp and newsprint paper, timber and hot-rolled steel coil was benchmarked. The ports covered across this range of commodities were:

- *Australia*: Sydney, Melbourne, Brisbane, Adelaide, Fremantle, Port Kembla and Devonport;
- *Europe*: Amsterdam, Barking, Grangemouth, and Hull;
- *North America*: Philadelphia;
- *New Zealand*: Auckland and Tauranga; and
- *South Africa*: Durban.

Importers and exporters were approached directly by the Commission for information on stevedoring costs and information on timeliness, reliability and cargo integrity (damage).

The cost of *stevedoring bulk grain loading and bulk fertiliser unloading* was examined in the following ports:

Grain

- *Australia*: Average across all grain ports; and
- *North America*: New Orleans, Portland, Prince Rupert

Fertiliser

- *Australia*: Adelaide, Albany, Brisbane, Geelong, Hobart, Kwinana, Newcastle, Townsville; and
- *New Zealand*: Lyttelton, Napier, Dunedin.

Data was collected for the bulk cargoes of wheat and fertiliser, as these are the only bulk cargoes in Australia for which contract stevedores are engaged. Data on the cost of stevedoring wheat in overseas ports was collected by a consultant (Asiaworld). Data on the cost in Australia was obtained from the Australian Wheat Board. Data on the cost of fertiliser stevedoring was obtained from shippers for various Australian and New Zealand ports. Shippers in countries other than New Zealand were unwilling to provided data to the Commission.

The Commission also collected qualitative data on the timeliness and reliability of the port-land interface. This data was collected by direct discussions with the various participants on the waterfront. A list of those consulted in the preparation of this study is in Appendix A.

C GOVERNMENT INVOLVEMENT

Government waterfront involvement varies considerably. Some engage in providing facilities and services, while others adopt a landlord role where they own and lease facilities.

The disparate approach to government involvement has significant implications for benchmark comparisons.

Governments have traditionally been involved in supplying or regulating port services. The reasons for this include the public good characteristics of some of the facilities provided, concerns about the competitive environment where natural monopoly characteristics can also be present, and a broad public interest in using ports as a means of encouraging trade and regional development.

Public good characteristics are present where the consumption of a service by one person or group does not exclude the possibility of consumption by others, nor does it diminish the value of their consumption. Where consumers can free ride, the incentives for private provision are lessened.

To some extent, navigational aids, channels, and breakwaters are examples of infrastructure which it may be difficult to exclude some people from using, and hence have some public good characteristics. However, because control of navigation and mooring by port authorities would bring most users into the regulatory net, these characteristics are relatively weak, and by themselves, probably do not constitute a compelling case for public ownership.

Natural monopoly characteristics are often also present in ports. This means that in any one port it can be more efficient to have one services supplier than two or more. For example only one set of channels is usually required.

Where inter-port competition is muted or absent, private owners have an incentive to use their market power to raise prices, and this may justify regulation. Alternatively, the adverse effects of market power can be addressed through public ownership, but this will depend on government objectives and any controls placed on the authority. Economic rent may be captured by the government owners through dividends or levies, or dissipated by the authority through cost padding and poor work practices, or given back to port users to facilitate trade.

The use of ports to encourage economic and social development is an important issue for many governments. Public ownership and governance structures may be important means for achieving the broad objectives of government.

Governance is concerned with systems for controlling and directing an organisation. In many cases the Minister responsible for the port (the portfolio minister) may have powers to direct the port's managers, with implications for the efficient supply of port services.

C.1 Ownership

Of the ports benchmarked in this study, Government ownership has been the norm rather than the exception:

- two of the ports — Los Angeles and Hamburg — are owned and managed by City governments in their respective countries;
- one of the ports — Nagoya — is jointly owned and managed by the local City government and that of the Prefecture adjacent to the port;
- two of the ports — Port Klang and Singapore — are owned by central governments and managed by statutory authorities; and
- the remaining port — Philadelphia — is owned and managed by two neighbouring State governments (see Table C.1).

All six of the Australian ports are owned by State Governments and have been set up as statutory corporations or as commercialised statutory authorities (see Box C.1).[1]

Only two ports covered in this study are partly or wholly privately owned. These are Auckland (a publicly listed company but 80 per cent of the stock is held by a community based trust), and Tilbury (a subsidiary of Forth Ports Plc).

Prior to 1992, the port of Auckland was a government trading enterprise. In 1992, it was formed into a public company by act of Parliament, and the Auckland Regional Council's 80 per cent holding was transferred to the Auckland Regional Services Trust (ARST). The remaining 20 per cent went to the Waikato Regional Council which subsequently divested its shares. As a result, the Ports of Auckland Corporation now has a large number of shareholders, but is still majority owned by ARST. ARST is a statutory authority, the members of which are elected by the people of Auckland during local body elections. The Government is not represented on the board of ARST.

[1] An alternative model is the company corporation model, in which public bodies are governed by the general rules set out in Corporations Law. By comparison the statutory models allows governments to tailor the regulatory framework to their specific needs.

Table C.1 Ownership and business type, 1997

Port	*Ownership*	*Form*
Australian		
Adelaide	State government.	Statutory corporation.
Brisbane	State government.	Statutory corporation.
Fremantle	State government.	Commercialised statutory authority[b.]
Melbourne	State government.	Statutory corporation.
Sydney	State government.	Statutory corporation.
Overseas		
Auckland	Nominally private, but with the Auckland Regional Trust owning 80 per cent of shares.	Listed company.
Hamburg	City State of Hamburg.	City departments (there is no Port authority as such).
Port Klang	Federal government.	Statutory corporation.
Los Angeles	State government, managed by the City of Los Angeles.	City department.
Nagoya	Jointly owned by Nagoya City and Aichi prefecture.	Statutory authority.
Philadelphia	State governments of New Jersey and Pennsylvania.	A new entity named Ports of Philadelphia and Camden Inc (PPC) has been formed to merge the Port of Philadelphia with the Port of Camden. Formal merger is still pending, but is operating administratively.
Singapore	National government.	Statutory corporation (corporatised October 1997).
Tilbury	Private (wholly owned by Forth Ports Plc, a quoted company).	Private limited company (Plc).

a Port of Adelaide managed by South Australian Ports Corporation which manages all major South Australian ports.
b Fremantle Port Authority was commercialised effective 1 July 1996.
c Responsibility for channels vested in Victorian Channels Authority.
Source: Thompson Clarke Shipping (consultant).

Tilbury on the other hand, is fully privately owned. The owner is Forth Ports Plc, a listed company specialising in the ownership and operation of ports. There is no element of Government proprietorship or regulation, beyond the laws and regulations to which all UK corporations are subject.

Box C.1 Corporatisation

Corporatisation is intended to replicate the many commercial incentives which apply to private firms, and increase the separation between the Government Trading Enterprise (GTE) and government. It encompasses administrative reforms to give public enterprises a more commercial focus and reforms to establish a competitive environment. The key features of corporatisation usually include:

- the government sets clear and non conflicting objectives for the GTE;
- management is given greater responsibilities and autonomy over day-to-day decisions on investments, revenue and expenditure and commercial strategy;
- as a substitute for market-based scrutiny, performance is monitored against a range of financial and non-financial criteria;
- rewards and sanctions related to performance are introduced for managers; and
- competitive neutrality mechanisms are applied to ensure that the GTE does not have any comparative advantages (or disadvantages) relative to a private organisation operating in under similar market risks (usually this entails the application of tax equivalents payments, and a premium to offset the interest rate advantage associated with government ownership).

Corporatisation can be implemented either through incorporation under the corporations law as a limited liability company, or as a statutory authority under its own legislation. The statutory option has been the most common approach for corporatising Australian port authorities. It is usually supported through the application of umbrella legislation which regulates some common aspects of a number of GTEs, and it allows for States to customise the regulatory environment to include features not required under corporations legislation. For example, the Sydney Ports Corporation was constituted by the *Ports Corporatisation and Waterways Management Act 1995*, and is subject to the general governance and corporate rules set out in the*State owned Corporations Act 1989*.

Government involvement is probably at its greatest in the case of Philadelphia. The State government owned ports of Philadelphia and Camden NJ have been engaged in protracted merger negotiations since 1994. Although the two ports are being operated administratively as a single entity, the two governments involved have not yet finalised the merger. The embryonic joint corporation has a board comprising 18 members — nine from each State — with the board members picked as representatives, and not necessarily on their port management skills.

A range of institutional forms are present in the benchmarked ports. At one extreme are the ports run by government departments which have no separate legal identity, and are subject to direct government intervention. At the other extreme, Tilbury is owned and operated by the private sector. In between, there are a range of authorities that have been corporatised in different ways.

All the Australian ports benchmarked are statutory authorities, and all have been effectively corporatised. Recent developments include:

- *Adelaide*: changed from part of a government department to a statutory corporation;
- *Fremantle*: commercialised along lines that make it almost as corporatised as other Australian ports benchmarked (for instance, like the corporatised ports there is a requirement to pay dividends, but less autonomy has been granted to the board over matters such as appointment of senior staff); and
- *Melbourne*: the Victorian State Government has departed somewhat from the standard model and split the old Port of Melbourne Authority into the Melbourne Port Corporation (the land-holding entity), and the Victorian Channels Authority (the entity with responsibility for the channels and navigation aids of Port Phillip Bay).

Overseas, some ports are still run as departments of city or regional governments. These include the ports of Hamburg and Los Angeles. A recent development was the corporatisation of the Port of Singapore Authority in October 1997.

C.2 Institutional arrangements and competition

The ports studied differ markedly in the services offered (see Table C.2). One of the key distinctions is between the predominantly landlord-only models of the Australian ports, with the mixed operations of many overseas ports. The landlord model is characterised by the port authority concentrating on supplying core services only, with the more contestable waterfront services, such as stevedoring, supplied privately.

The move to a predominantly landlord model the Australian ports is now largely complete. Fremantle offers pilotage services and the South Australian Ports Corporation provides pilotage services for all South Australian ports. One of the most recent reforms concerns the sale by the South Australian Ports Corporation of its bulk handling facilities in November 1997. By comparison, only three of the overseas ports are landlord authorities (Los Angeles, Philadelphia, and Port Klang), and of these, the Philadelphia port authority also manages the port of Camden NJ, on the other side of the Delaware river, which is an operating port.

Table C.2 Responsibilities other than landlord services, 1997

Port	*Promote trade*	*Cargo services*	*Marine services*	*Waterways management*	*Regulation*
Australian					
Adelaide	×	a	×		
Brisbane	×				
Fremantle	×		×[c]		
Melbourne[d]	×				
Sydney	×				
Overseas					
Auckland		×	×	e	
Hamburg	×	×	×	×	×
Port Klang	×	f			×
Los Angeles	×		×	×	×
Nagoya	×	×		×	×
Philadelphia[g]	×h				
Singapore	×	×	×		
Tilbury		×	×		

a Some bulk handling facilities recently sold.
b Pilotage.
c Pilotage services provided by a private company under contract.
d Responsibility for channels vested in Victorian Channels Authority.
e Ports of Auckland manages commercial waterways on subcontract to the Auckland Regional Council.
f Port authority holds 20 per cent equity in Klang Container Terminals.
g Port of Philadelphia is being merged with Port of Camden. Former is a landlord port, latter is primarily an operating port.
h The new Port of Philadelphia and Camden is regarded as an important vehicle for securing and protecting regional employment.
Source: Thomson Clarke Shipping (consultant).

The remaining overseas ports are vertically integrated in one way or another — providing landlord services, cargo and other services. For instance, the Ports of Auckland Ltd offers users a total service. The port operates an integrated labour force where a multi-skilled team works in pilotage, towage, stevedoring and general port operations. It is able to provide all port services to customers at fixed prices, irrespective of time and day of arrival and departure.

Singapore is similarly vertically integrated, offering a suite of waterfront services.

Both of the private sector ports included in the study are also ‘mixed ports’, where cargo handling services are operated in competition with independent stevedores and terminal operators.

Other examples of vertical integration, albeit of a less direct nature, include:

- the City State of Hamburg owns and operates the Port of Hamburg and is also the owner and operator of the largest container terminal in the port (see Box C.2);
- the Klang Port Authority operates as a landlord authority but has retained 20 per cent equity in the privatised Klang Container terminal company (Klang Port Authority 1996, p.26); and
- the Nagoya Port Authority builds terminals and leases them to private operators, and thus provides yet another model of industry organisation.

Box C.2 Vertical integration: the Port of Hamburg

The Port of Hamburg provides a different example of integration through common ownership by the City State of Hamburg of the port and the largest container terminal operator.

Before 1970, nearly all cargo operations in the port were supplied by the one operator, the State owned Hamburger Hafen und Lagerhaus AG (HHLA). Private operators were required to subcontract from HHLA. In 1970, HHLA was reorganised along private company lines but its share capital, was and still is, 100 per cent owned by the City State of Hamburg. Private operators were able to contract directly with the Port owner, and thus compete with HHLA.

The entry of independent container stevedoring companies since that time appears now to be to be in reverse, with HHLA having taken over smaller operators such as Tollerot Container Terminal GmbH. HHLA now operate more than 70 per cent of the Port’s container handling capacity.

The mix of services and institutional arrangements can have important implications for the efficient supply of waterfront services. The vertical integration of landlord services — maintenance of channels and navigational aids — and more contestable services, may be important in reducing costs. For example, in Auckland, a labour force which can switch from one activity to another may be able to cope more effectively with the fluctuations in work load and hence provide more efficient services. The ability to smooth workloads and manage risk by being vertically integrated may be especially important to smaller ports where there is a high degree of variability in ship visits and hence work loads.

That said, the benefits of being vertically integrated need to be weighed against any possible adverse influences on competition and economic efficiency. Where problems might arise is in the potential for a conflict of interest between the port authority in setting waterfront service charges and lease payments payable by related cargo handling businesses. In theory, vertical integration offers port authorities with market power the potential to cross subsidise the contestable elements of its business with above normal profits from its monopoly business.

Care is required to ensure that competitive influences are maintained or that provision is made for prices oversight and possibly regulation. Care also needs to be taken that barriers to entry are not created. Even if vertical integration is the least cost approach it may not always stay that way. Availability of land for development is also an important issue, with an incumbent vertically integrated authority likely to resist releasing land to would be competitors.

C.3 Port authority objectives and governance

Governance is concerned with systems for controlling and directing organisations which improve the organisations performance (see Box C.3). Given that owners and managers of ports may have different objectives, the way that they are set up can have an important influence in establishing and achieving those objectives.

Australian statutory authorities may have objectives set out in legislation. These are often couched in fairly broad terms, for example, the Sydney Ports Corporation is required to be a successful business, promote and facilitate trade, and properly carry out its port safety functions.

Within this broad framework — consistent with the corporatisation models implemented in Australia and elsewhere — the board has some autonomy in day-to-day decisions regarding investments, revenue and expenditure and commercial strategy. In exchange, the board and senior management are made more accountable, and to compensate for the absence of market-based sanctions, the performance of the port is usually monitored.

Box C.3 A governance model

The Audit Office of New South Wales has recently suggested a governance model for GTEs would maximise 'value added by governing boards' when:

- the board is responsible to the Minister for the organisation meeting its goals;

- the board appoints the CEO and is able to set the general policies by which the Government's goals can be met;
- the organisation has a clear commercial focus;
- the government could not unilaterally, or without offering compensation, impose its non-commercial policies on the organisation; and
- the board controls resources either through employing them directly or having a formal contract with the provider.

Source: Audit Office of New South Wales 1997, pp. 7–8.

There is a fundamental tension in the corporatisation model. Boards are given a considerable amount of autonomy relative to other government structures and are expected to behave in a commercial manner, but are constrained by ministerial powers of intervention. Therefore, it is neither possible to fully replicate the disciplines and commercial autonomy of a publicly traded company operating in a competitive market place, nor is it necessarily desirable. For one thing, the public cannot withdraw its capital like private shareholders can from publicly listed companies. Moreover, ministerial direction may be appropriate where the public expect ports to pursue a variety of goals.

Ministerial direction occurs most fundamentally in the development of the *statement of corporate intent* or charter, but it may also apply with respect to non-commercial activities. For example, the Sydney Ports Corporation is required under its enabling legislation to negotiate annually with its shareholder ministers on the content of their statement of corporate intent. Similar provisions apply in other States (see Table C.3).

Table C.3 Ministerial responsibilities, 1997

Port	*Portfolio(s)*	*Powers and responsibilities*	*Accountability*
Australian			
Adelaide	Minister for Government Enterprises and Treasurer.	Annually prepare a charter. Monitor financial and other performance.	Instructions issued in writing.
Brisbane	Minister for Transport and Main Roads and the Treasurer.	Monitor performance.	Instructions issued as directives.
Fremantle	Minister for Transport.	Prepare charter. Monitor performance. Approval of some admin. arrangements, eg travel overseas.	Consult with Minister and Treasurer over budget and Statement of Corporate Intent.
Melbourne	Ministers for Finance, Roads and Ports, Treasurer and Premier.	Treasurer approval of Corporate plan. Monitor performance.	
Sydney	Treasurer and Minister for Olympics are shareholders. Minister for Ports is portfolio Minister.	Endorse Statement of corporate intent. Portfolio minister approves some fees and charges.	Instructions may be issued as directives but prior consultation is required. Submit SCI to Parliament.
Overseas			
Auckland	Minister for Transport.	Oversee changes to articles of association or constitution of company.	Written approval of Minister required.
Hamburg	Ministers for Economic Affairs, and Finance.	Ministry of Economic Affairs runs port. Ministry of Finance for budgeting.	Accountable to City State of Hamburg Parliament.
Port Klang	Minister for Transport.	Major policy issues referred to Maritime Division of Ministry of Transport.	Parliament.
Los Angeles	Mayor of Los Angeles.	Board of Commissioners report through mayor’s office.	City council may review board decisions and actions.
Nagoya (NPA)	Ministers of Transport, Finance, and Home Affairs.	Ministry of Transport issues directives to NPA.	

Table continues over page.

Table C.3 (continued)

Port	*Portfolio(s)*	*Powers and responsibilities*	*Accountability*
Philadelphia	In effect the Governors of Pennsylvania and New Jersey responsible for PPC.	State Governments will be able to override PPC disposal of assets.	Written approval for disposal of assets.
Singapore	Minister for Communications.	Approves all board appointments. Can give directions.	Parliament.
Tilbury	Secretary of State for Transport.	Some residual controls for planning and environmental purposes. Powers of appeal concerning statutory charges payable by Tilbury to Port of London Authority.	

Source: Thompson Clarke Shipping (consultant).

In the case of some of the overseas ports, managers have even less autonomy. The city department models of Hamburg and Los Angeles have more or less direct lines of management from elected officials to port management, and considerable powers to direct port activities on a day-to-day basis. The Port of Hamburg does not have a board. In the case of Los Angeles, a board of harbour commissioners exists and nominally has management responsibilities, but the City Council has the power to review every decision the board makes.

Even the statutory joint model of the Nagoya Port Authority (NPA) contains numerous requirements for the board to consult with, or gain the approval of, other organisations, limiting its ability to act unilaterally. The NPA must, for instance, develop its plans to conform to the policy and standards of the Ministry of Transport (MOT), consult with the local Port and Harbour Council and then obtain the endorsement of the MOT. The NPA is also obliged to liaise with the Ministries of Finance (on central funding), and the Ministry of Home Affairs on organisation and staff.

In the case of Port Klang, all major policy issues are referred to the Maritime Division of the Ministry of Transport.

An important feature of the corporatisation models chosen by Australian governments for their port authorities is the provision for the explicit funding of CSOs (see Table C.4). Minister’s retain the power to direct their respective ports to supply non-commercial activities, but typically must make the direction in writing and provide for explicit funding. In the case of Sydney Ports Corporation, the portfolio Minister must give written direction for any non-commercial activity. In addition, if the activity is categorised as being in the public interest, the Minister is required to consult with the Board on whether it is in the Corporation's interests, with the cost of the activity subject to possible reimbursement.

Table C.4 Community Service Obligations, 1997

Port	*Service*	*Government payment*	*Implementation*
Australian			
Adelaide	Nil, but provision for CSOs to be provided.	May reimburse if required.	Ministerial direction in writing required.
Brisbane	Nil, but provision for CSOs to be provided.	Reimbursed if required.	Ministerial direction in writing required.
Fremantle	Nil, but provision exits.		Ministerial direction in writing required.
Melbourne	Nil.	May reimburse if required.	
Sydney	Nil, but provision for CSOs to be provided.	Reimbursed if required.	Ministerial direction in writing required.
Overseas			
Auckland	Nil.		
Hamburg	Nil.	CSO type activities handled by other city departments.	
Port Klang	Some minor responsibilities.	Minimal.	
Los Angeles	Recreational, educational and public access facilities.	Not reimbursed.	Board provides direction.
Nagoya	Navigation facilities, environmental management.	Reimbursed through NPA General account.	n.a.
Philadelphia	Seen as an important regional employer.	State government has contributed to operating losses of Port of Philadelphia.	n.a.
Singapore	Some minor responsibilities.	Not reimbursed.	As directed by Minister (prior to October 1997).
Tilbury	Nil, but links with local council though regeneration project.		

Source: Thompson Clarke Shipping (consultant).

There is a dearth of detail on the formal arrangements that apply to the overseas ports in this respect. The general impression gained is that less formal arrangements are more common than not. For example, Los Angeles maintains some relatively minor responsibilities for recreational facilities, and funds these from its budget without reimbursement.

Trade facilitation is often an important role assigned to port authorities because of their critical role in state and regional development. For example the WA government has stipulated that the Fremantle Port Authority is to facilitate trade in an efficient and commercial manner (FPA 1996, p. 12).

Box C.4 Representation on the Board of the Ports of Philadelphia and Camden

There are 18 members on the board of the Ports of Philadelphia and Camden, nine each from Pennsylvania and New Jersey. Of the nine Pennsylvania Board members:

- four are appointed by the Governor of PA one of whom must represent the City of Philadelphia;
- one each are appointed by the President of the PA Senate, the Minority Leader of the PA Senate, the Speaker of the PA House of Representatives, and the Minority Leader of the PA House of Representatives; and
- one is a Delaware River Port Authority board member selected by the PA member of that board.

The nine New Jersey board members are appointed by the Governor of NJ:

- two representing the Counties of Cape May, Cumberland and Salem;
- four representing the counties of Camden and Gloucester; and
- three representing the Counties of Burlington and Mercer.

A further qualification is that no more than five of the NJ board members may be members of the same political party.

Source: Thompson Clarke Shipping (consultant).

Table C.5 Boards, 1997

Port	*Composition*	*Appointment*	*Term*
Australian			
Adelaide	Up to five.	By Governor on recommendation of the State Minister for Government Enterprises. Based on knowledge, experience and skills.	Up to 3 years.
Brisbane	Seven.	Governor in Council on recommendation of the State Minister for Transport and State Treasurer. Based on relevant experience.	Up to 5 years.
Fremantle	Five.	Governor.	Up to 3 years.
Melbourne	3 to 5 members.	State government.	Not more than 3 years.
Sydney	3 to 7 members.	Governor on recommendation of voting shareholders. Ability to assist Port to achieve its principal objective. One must be staff director.	Not more than 5 years.
Overseas			
Auckland	6 to 9 members.	Shareholders.	Not more than 3 years. Three members retire by rotation each year.
Hamburg	Not applicable.		
Port Klang	Chairman plus nine board members.	King appoints Chairman. Minister for Transport appoints board members.	12 months for board members, but eligible for reappointment.
Los Angeles	Five members of Board of Commissioners.	Mayor.	5 years, but eligible for reappointment.
Nagoya	30 members of Nagoya Port Assembly.	15 each from Aichi Prefectural Assembly and the Nagoya City Assembly. Appt. along party lines.	2 years.
Philadelphia	New entity of PPC has 18 members, 9 appointed by Pennsylvania and 9 by New Jersey.	Most appointments are political, and complex representation conditions apply.	Generally 4 years.

Table continues over page.

Table C.5 (continued)

Port	*Composition*	*Appointment*	*Term*
Singapore	Currently 10 plus chairman.	Minister for Communications.	Up to 5 years for non executive members.
Tilbury	9 directors of parent company, Forth Ports Plc.	Board of Tilbury appointed by Forth Ports board.	Ongoing at discretion of parent company board.

Source: Thompson Clarke Shipping (consultant).

Trade facilitation in its various guises is often an objective of many of the overseas ports benchmarked. Nagoya, and Port Klang are both examples. As part of a thirty year plan developed in 1987, the Nagoya Port Authority has set the objective of facilitating the development of the nine prefectures of the Nagoya region as a major centre for sophisticated industrial technology. A core function of the Klang Port Authority is to facilitate trade, to be achieved by providing a commercial environment conducive to enhancing the port's regional role (Klang Port Authority, p. 3). As the Port Klang example illustrates, trade facilitation need not necessarily imply non-commercial behaviour.[2]

The objectives of port authorities may be influenced by the selection criteria used in appointing board members (Table C.5). The distinction is between board members appointed for their relevant commercial skills and industry knowledge and political appointees. These two approaches are present in the ports benchmarked.

In the Australian ports board members are usually appointed by the Governor in Council on the Minister's recommendation. Consistent with corporatisation principles, it is a normal requirement that appointments be based on skills and experience. At the other extreme, the membership of the boards of ports such as Nagoya and Philadelphia and Camden, are required to meet certain political representation (see Box C.4).

---

2 There is potentially a conflict between trade facilitation and commercial management of port authorities. For example, port authorities may seek to encourage ship visits by lowering charges and not fully recovering costs. The Industry Commission previously expressed the view that the prime objective of port authorities should be the efficient provision of core services and activities, and that trade facilitation is best achieved by managing the ports as efficiently as possible (IC 1993, p. 48).

User representation may be an important issue in designing systems for port governance. Shippers want efficient and timely handling of their cargo, and hence, are concerned with all aspects of performance on the waterfront. Yet in many cases, shippers do not deal directly with port authorities. Where landlord ports are concerned, shippers are affected indirectly through intermediate agents such as shipping lines and stevedores.

There are different approaches to consulting with users present among the benchmarked ports (see Table C.6). Some such as Singapore have user representation on the board, and being a mixed port, deal directly with shippers. Port Klang, which is a landlord port, must consult with a Port Consultative Committee set up under the *Port Authorities Act 1963*. The Committee comprises representatives from government, terminal operators and port users.

In the main though, user consultation is largely through less formal means. For example, the Sydney Ports Corporation liaises with a port user group.

In a previous study, the Commission has concluded that board members should be appointed on their experience, knowledge and skills relevant to port management, and not as representatives of interest groups (IC 1993). This need not exclude someone from the industry being appointed, but there is the potential for conflict of interest where board members are major users of port services. However, to the extent that ports are restricted to the landlord model of management the potential for conflict of interest is lessened.

The way in which CEOs are appointed is an important indication of the autonomy boards have in managing their affairs (Table C.7). Accountability can be blurred if the CEO has his or her contract with the minister and not the board (NSW Audit Office, p.32). Some examples of the arrangements in the ports studied include:

- most of the boards of Australian Ports are able to appoint the CEO and other senior staff, and negotiate their contracts (the exception is Fremantle where approval from the Governor is required for the appointment and dismissal of the CEO);
- in Port Klang senior staff appointments must be submitted to the Public Service Commission and the Maritime Division of the MOT; and
- in Nagoya the Executive Vice President is appointed by the President of the Nagoya Port Assembly on the recommendation of the Mayor of Nagoya City and the Governor of Aichi Prefecture (one of whom is the President), but the appointment must also have the approval of the Port Assembly.

Table C.6 Requirement to Consult, 1997

Port	*With governments*	*With users*
Australian		
Adelaide	State government.	Recommended port charges published in Gazette. Consults with SA Chamber of Commerce shipper group and directly with customers.
Brisbane	With Commonwealth on environmental issues. State on various issues inc. investments over $5M. Local on planning and environmental issues.	Port of Brisbane Corporation is member of Gateway Port Strategy sub committee. Current SCI emphasises better client focus.
Fremantle	State government.	On port charges. Other consultation not mandatory but does occur.
Melbourne	Complex reporting to and consultation with State government.	Customer satisfaction measured and reported to Government. Cargo facilitation committee.
Sydney	State government.	Voluntary consultation with Port User Group.
Overseas		
Auckland	Twice yearly reports to Minister and shareholders.	No statutory requirement.
Hamburg	Port is part of City government.	Extensive consultation with user groups (port associations and private companies).
Port Klang	State and federal governments. Statutory Port Consultative Committee has govt. representatives.	Statutory Port Consultative Committee has user representatives.
Los Angeles	Part of City of Los Angeles. Extensive consultation with all levels Government (City, County, State, Federal).	Not mandated, but extensive consultation occurs with port customers, users, and tenants.
Nagoya	Extensive consultation required with Japanese Government agencies and with City/Prefecture.	Via Port and Harbour Council.
Philadelphia	The PPC must consult with state govts. but they are strongly represented on the board.	
Singapore	Ministerial requests. Annual report and budget.	Representatives of shipping industry on board.
Tilbury	Nil, but member of UK Major Ports Group.	Nil, but several user groups established.

Source: Thompson Clarke Shipping (consultant).

Table C.7 Board functions, 1997

Port	*Responsibilities*	*Approvals*	*Accountability*
Australian			
Adelaide	Strategic issues Policy Planning Broader developments affecting environment	Port pricing and budgets Capital expenditure Appointment of CEO and executive staff. Contracts to be signed under seal.	Report to Minister.
Brisbane	Prepare Statement of Corporate intent.	Appointment of CEO and other executive staff.	Report quarterly to the shareholding Ministers. Capex subject to Qld. Treasury Project Evaluation Guidelines.
Fremantle	Development of corporate and annual operational plans. Terms and conditions of long term leases.	Appointment of executive staff, subject to governor approval. Contracts signed under seal.	Reports annually to Parliament and twice yearly to Minister.
Melbourne	Prepare Corporate Plan for Treasurer’s approval. Sets internal rate of return hurdle.	Appointment of CEO and other executive staff.	
Sydney	Prepare SCI.	Recommends appointment and employment conditions for CEO with approval of portfolio minister.	Report twice yearly to shareholder ministers. Must notify Minister if instructions are against SPC interests.
Overseas			
Auckland	Commercial. Act requires that POAL “operate as a successful business”.	Normal commercial practices apply.	Twice yearly reports to shareholders and Minister. Abides by stock exchange rules.
Hamburg	Not applicable.		
Port Klang	Review policy, objectives, performance and senior staff appointments.	Relatively normal commercial practices apply, but some decisions such as pricing are set externally.	Report quarterly to Minister of Transport.

Table continues over page.

Table C.7 (continued)

Port	*Responsibilities*	*Approvals*	*Accountability*
Los Angeles	Board promotes, supports and regulates use of all tidelands and submerged lands for commerce, navigation and fisheries.	Contracts, agreements and leases.	City Council can review all board decisions.
Nagoya	Management and development of port.	5 and 10 year plans.	Assembly members accountable to respective Prefecture/City.
Philadelphia			
Singapore	Largely non executive, but reviews mission statement, strategic plan, pricing policy, overall budget, major investments.	Annual budget estimates.	Minister can direct board, and delegate authority to his/her Permanent Secretary who is a board member.
Tilbury	Normal commercial. Management and development of port.	Parent company approves major projects and capital expenditures.	Parent company shareholders.

Source: Thompson Clarke Shipping (consultant).

C.4 Financial arrangements

The financial arrangements applying to port authorities influences their ability to act in a commercial manner. The degree of control the benchmarked ports have over the assets they use, investment policy and recurrent expenditure varies considerably, as does government funding (see Table C.8).

Sources of finance

At one extreme, Tilbury has no direct government involvement in its financial affairs. Forth Ports Plc, the owner of the port of Tilbury, is subject to the same commercial pressures, and financial regulation as other publicly traded companies in the UK. Capital must be raised through debt and equity markets, and, in order to maximise shareholder value, the company must adopt a commercial approach to investment and its day-to-day business.

At the other extreme, city or State departments compete for investment and recurrent expenditure within the structure of their parent, and this need not occur on a commercial basis. For example, the Port of Hamburg does not have a separate capital structure, and its budget is subject to approval by Parliament, as part of the wider City State budget. With access to revenues arising from non-port taxes, fees and charges, city or State departments may subsidise their port operations.

In between, corporatised entities have a greater degree of control over their financial affairs than city or State departments, but are almost invariably subject to some government directions on raising capital, undertaking investment, and payment of dividends.

In the main, Australian port authorities have strong balance sheets, Sydney for example, has an effective debt to equity ratio of one to one. Among the overseas ports, Los Angeles has a debt to equity ratio of one to two, and Port Klang and Singapore, both statutory bodies, are effectively debt free and able to fund development from internal resources.

No Australian port receives any direct or indirect government funding for capital projects, though State governments can clearly contribute equity if they wish. The South Australian Government converted some debt ($6.6 million) to equity when the South Australian Ports Corporation was created.

Overseas, the private sector port of Tilbury, and the partially privatised port of Auckland, receive no government funding. Nor, would it appear, do the publicly owned ports of Singapore, and Port Klang. Los Angeles is a recipient of limited funding for major dredging — the US Corps of Engineers contribute to dredging costs where it is in the national strategic interest — and debt capital may be provided by Federal or State Governments. The remaining three ports — Hamburg, Nagoya and Philadelphia — are directly funded by the relevant government departments at least to the level of their operating deficit (over 50 per cent in the case of Nagoya), while all infrastructure development in Hamburg is government funded, and only partially recovered in user fees.

Despite the corporatisation of most Australian ports, some restrictions apply to raising debt capital. Some of the Australian ports such as Melbourne and Adelaide are restricted to borrowing from the respective State treasuries, while others have more freedom to raise debt capital in external markets. For example, the Port of Brisbane must give the Queensland Treasury the chance to supply debt capital, but is able to borrow more widely.

Table C.8 Government funding, 1997

	Direct		*Indirect*
Port	*Capital*	*Operational*	
Australian			
Adelaide	Balance sheet recently restructured with some Govt. debt converted to equity.	Self funding.	Nil.
Brisbane	Government may supply equity. Qld. Treasury Corp. must be given chance to supply debt capital.	Self funding.	Nil.
Fremantle	Port to use Treasury Corp. for funding provided this is competitive.	Self funding.	Liability for past employee superannuation moved to Treasury.
Melbourne	Required to borrow from Treasury Corp. Victoria.	Self funding.	Nil.
Sydney	Generally would borrow from NSW Treasury Corporation. May with written approval of the Minister borrow within or outside Australia.	Self funding.	Nil.
Overseas			
Auckland	Nil.	Nil.	Nil.
Hamburg	Departmental budgets.	Departmental budgets.	Federal government funds autobahn road and rail links.
Port Klang	Self funding.	Self funding.	Nil.
Los Angeles	US Corps of engineers contribute to dredging projects of national strategic interest.	Nil.	Federal, State and local agencies contribute to port related transport projects. Some city services may be charged to POLA.[a]

Table continues over page.

Table C.8 (continued)

	Direct		*Indirect*
Port	*Capital*	*Operational*	
Nagoya	Yes.	Yes. Central, Prefecture and City governments provide operating subsidy.	Interest free government loan. Treasury investment and loan.
Philadelphia	Yes.	Operating losses of Port of Philadelphia partly offset by grants from Pennsylvania state.	
Singapore	Nil.	Nil.	Nil.
Tilbury	Not applicable.		

a In 1995 the Board resolved to pay the City for debts outstanding including an annual recurring charge of $US 11.7 million. The Board entered a memorandum of understanding with the City. However, the State Attorney General and the California State Lands Commission are reviewing the board's decision, and it is also the subject of litigation by the shipping industry.

Source: Thompson Clarke Shipping (consultant).

Investment practices

The ability of Australian ports to independently set target rates of returns is also limited. The development of an annual charter or business plan may involve negotiation with the Minister over a target rate of return. For example, in WA the Minister sets a target rate of return for written down current cost of assets in Fremantle. This is 6 per cent in 1997–98, and the FPA achieved 6.9 per cent in 1996-97. Similarly the SA Ports Corporation must negotiate a medium to long term rate of return target with the Ministers each year with annual targets identified in the Performance Statement.

Furthermore, the corporatised Australian ports are not entirely free to determine their own investment programs. Typically Ministerial approval is required in writing for the purchase and disposal of assets over prescribed value limits. In NSW, the Sydney Ports Corporation must obtain written approval for the sale or acquisition of assets or investments where they exceed a prescribed value. Currently this is 10 per cent of the consolidated fixed assets and investments as disclosed in its last audited accounts.

Within these constraints, the boards reportedly use quite different hurdle rates:

- Brisbane has developed its own investment guidelines with the discount rate varying between 8 to 12 per cent depending upon the project;
- Sydney uses an estimate of the weighted average cost of capital in line with NSW Treasury Financial Appraisal Guidelines;
- Fremantle uses a discount rate based on the cost of capital; and
- the Board of the Melbourne Port Corporation is understood to be using an internal rate of return of 12 to 14 per cent.

Among the overseas ports, Los Angeles (10 per cent return), Tilbury and Auckland use commercially based approaches to investment appraisal. Klang Port Authority assesses the impact of projects on the basis of the social and economic needs of the community, and their own commercial return (see Table C.9).

Appendix D provides further information on financial management practices of the ports studied.

Taxation and dividends

All the Australian ports studied pay State government taxes, and most are or will be making tax-equivalent payments to their State government owners as if they were paying Commonwealth income and sales taxes. This practice is justified on the competitive neutrality grounds of making government authorities operate under comparable conditions to the private sector (see Table C.10). Despite this, some Australian ports do not pay local government rates on land not leased to tenants (land leased is subject to rates, but these are payable by the tenant).

Some overseas ports do not pay income tax. The exceptions among the benchmark group are the two private sector ports of Tilbury and Auckland, and the government owned Port Klang. The Singapore Port Authority used to pay income tax only on the relatively minor surpluses of some of its subsidiaries, but now that it has been corporatised it will be taxable on all of its operations.

In addition to income and sales tax-equivalents, Australian States require their port authorities to pay a dividend which is often justified as a return on shareholder equity. The method for calculating dividends differs, with Fremantle required to pay at different rates of after-tax profit according to their debt to equity ratio, and most others paying a fixed percentage of after tax profit. The South Australian Ports Corporation policy is 60 per cent of net profit after tax on 75 per cent of pre-tax operating profit.

Table C.9 Financial management, 1997

Port	*Target rate of return*	*Cost recovery*	*Performance measurement*
Australian			
Adelaide	13.7 per cent based on weighted average cost of capital used for asset valuation purposes.	Full.	Monitoring.
Brisbane	Depends upon project.	Full.	Monitoring.
Fremantle	Set by the Minister (currently 6 per cent).	Full.	Monitoring.
Melbourne	Set by board (currently 12 to 14 per cent).	Full.	Monitoring.
Sydney	Weighted Average Cost of Capital to SPC.	Full.	Monitoring.
Overseas			
Auckland	Set by the Board.	Full.	Share price, customer retention.
Hamburg	Investment based on financial and non financial criteria.	Partial. Infrastructure financing costs not fully recovered.	Annual budget.
Port Klang	IRR determined on a project by project basis and reflects commercial and socio-economic factors.	Full.	
Los Angeles	Currently 10 per cent.	Full.	
Nagoya	n.a.	Approx. 50 per cent.	Ongoing utilisation reviews.
Philadelphia	n.a.		
Singapore	Currently 9.6 per cent on historical cost.	Full.	Performance generally is monitored by the Maritime and Port Authority as part of licence.
Tilbury	As set by the board of parent company.	Full.	Reports to parent company board, and through consolidated reports to shareholders.

Source: Thompson Clarke Shipping (consultant).

Table C.10 Payments to government, 1997

Port	*Levies*	*Dividends*	*Taxation*
Australian			
Adelaide	Nil.	Dividend of $3.37 million paid for 1995–96. This was over 56 per cent of after tax profit before abnormal and extraordinary items.	Income and sales tax equivalents applied since July 1995. Local Govt. equivalents to apply from 1998-99. Liability to pay land tax introduced at same time.
Brisbane	Nil.	Set in consultation with shareholder ministers (currently 40 per cent of after tax profit).	Tax equivalent regime.
Fremantle	Statutory levy of 3 per cent of total revenue prior to July 1996.[a]	Dividend calculation changed 1 July 1996 to reflect debt ratio, with a maximum 30 per cent dividend where debt ratio is less than 0.2.	Tax equivalent regime introduced 1 July 1996.
Melbourne	Nil.	50 per cent of profit after tax, or 65 per cent of profit before tax.	Tax equivalent regime.
Sydney	Nil.	Negotiated with NSW Treasury, but around 50 per cent of after tax profit.	Tax equivalent regime.
Overseas			
Auckland	Nil.	Nil.	Normal taxation arrangements apply.
Hamburg	n.a.	n.a.	n.a.
Port Klang	Nil.	Nil.	Income tax at standard rate (31%).
Los Angeles	City, for services provided.	Not applicable.	POLA not liable for any property taxes.
Nagoya		Nil.	Nil.
Philadelphia	Nil.	Nil.	Port of Philadelphia exempt from federal taxes.
Singapore		Contribution to consolidated fund set at 20 per cent of net surplus.	All operations taxable now that it has been corporatised.
Tilbury	Nil.	Nil.	Normal corporate taxes.

a In September 1995 the Government agreed to the FPA's request for an extension of the statutory levy arrangement to 1996.

Source: Thompson Clarke Shipping (consultant).

Of the overseas ports, Singapore is the only publicly owned port to pay a dividend. The dividend is set at 20 per cent of net surplus. Los Angeles pays the City Government for services rendered (such as fire protection) but not a dividend per se. It is also in the middle of a review and separate litigation concerning payment for other city services not previously charged for.

C.5 Regulation and competition

As part of port reform in many countries, governments typically separate the regulatory and operational responsibilities of their ports. This action is justified on the grounds that there is a potential conflict of interest in port authorities regulating activities in which they are, or might become, involved.[3]

In general terms, the regulation of waterfront services in Australia is undertaken by organisations other than the port authorities. Regulation of port safety, environmental and other non-competitive issues has typically also been transferred to the department or agency concerned with these issues on a generic basis. The consequence of these institutional changes is that few ports now have regulatory powers. Some exceptions occur.

In recent years Malaysia and Singapore have moved in similar directions to Australia in separating regulatory and operational responsibilities. In Malaysia responsibility now lies with the Ministry of Transport, and in Singapore they rest with the new Marine and Port Authority (MPA).

Price and competition regulation

By virtue of the Competition Principles Agreement (CPA) and associated agreements signed by the States, Territories and the Commonwealth governments, port authorities and other Government Trading Enterprises (GTEs), are no longer exempted from the application of the *Trade Practices Act 1974*, or the *Prices Surveillance Act 1983* (COAG 1995). As a consequence, port authorities are more or less subject to the same competition principles — such as the prohibition on restrictive trade practices, and prices surveillance — as private businesses.

3 The Commission has recognised that it might be more efficient for very small ports to retain some regulation of non core activities such as pilotage (IC 1993).

Table C.11 Regulatory powers, 1997

Port	*Regulation*	*Comment*
Australian		
Adelaide	None.	Regulatory functions transferred to relevant Government departments when corporatised.
Brisbane	Some waterfront services.	
Fremantle	None.	
Melbourne	None.	
Sydney	Administers some environmental, dangerous goods and other regulations.	Part of SPC's Port Safety Operating Licence conditions.
Overseas		
Auckland	Nil.	
Hamburg	Traffic.	Traffic and dangerous goods monitored by the authority's River Police.
Port Klang	Waterfront services.	KPA acts as agent for Ministry in enforcing waterfront services regulations. KPA acts as regulator of Malacca port.
Los Angeles	Some.	Regulation of tidelands, navigable waters and assets of port.
Nagoya	Waterfront services.	Fees and charges reviewed by local Port and Harbour Council, and authorised by Port Assembly.
Philadelphia	Nil.	Pilotage rates set by state governments.
Singapore	Nil.	Marine and Port Authority took over regulatory responsibilities from PSA in 1996.
Tilbury	Bylaws and directions within port premises.	Port can appoint its own police force to enforce bylaws within its premises.

Source: Thompson Clarke Shipping (consultant).

In the CPA, the States and Territories also agreed to consider establishing independent sources of prices oversight where they did not currently exist. In practice, most have complied, with only South Australia and Western Australia not having established independent regulators or practices with the potential to review port fees and charges. However, even in those cases the ACCC could step into oversee prices if certain conditions were met. Currently in South

Australia, the Minister for Government Enterprises must approve the SA Ports Corporation's fees and charges, and in WA the Minister for Transport must approve the fees and charges of the Fremantle Port Authority (see Table C.12).

There are both similarities and some differences between the States in the way they have set up their independent price oversight bodies. For instance, in all cases, a GTE must be declared by the government before the respective authorities can investigate prices. And while all use public interest criterion of one sort or another to guide the regulator in price determination, they have different powers over implementation. For example, in Victoria the ports industry has been declared to be a regulated industry under the *Office of Regulator General Act 1994*, and specific services are also defined as regulated services under the *Port Services Act 1995*.[4] Currently a port pricing order requires the Port of Melbourne Corporation to reduce charges for prescribed services by 10 minus the CPI until 2000.

Similar independent regulators now exist in Tasmania, Queensland and NSW.

In NSW, the Sydney Port Corporation's fees are approved by the portfolio Minister, but the Independent Price and Regulatory Tribunal (IPART) has the power to set maximum prices. If IPART made a recommendation, the Sydney Port Corporation would be obliged to charge the fees prescribed unless it had the Treasurer's approval to levy lower charges.

Queensland has adopted the more advisory role for the recently created Queensland Competition Authority (QCA). It has the power to undertake investigations into fees and charges of declared GTEs, but performs an advisory role only. Currently the Port of Brisbane is not a declared 'government monopoly business activity'. Should it be declared, the Minister for Transport and Main Roads would be required to publish reasons for not implementing the QCA's recommendation.

---

4 This gives the Office of the Regulator General the power to investigate and recommend fees and charges. This advice is considered by the Government, and a port pricing order is subsequently issued by the Governor in Council.

Table C.12 Price regulation, 1997

Port	*Price Regulation*	*Responsible government agency*	*Comment*
Australian			
Adelaide	No.[a]		Currently Minister for Government Enterprises approval is required. No independent state regulatory body exists for port services.
Brisbane	Yes.	Queensland Competition Authority (QCA).	Currently approval of Minister for Transport and Main Roads is required. QCA can recommend prices to Minister if port is declared. Minister would have to publish reasons for not implementing recommendation.
Fremantle	No.[a]		WA does not currently have an independent price oversight body, but the Minister must approve port fees and charges.
Melbourne	Yes.	Office of Regulator General (ORG).	Ports industry has been declared. Port pricing orders — issued by Governor in Council on recommendation of ORG — apply to services defined in *Port Services Act 1995*.
Sydney	Yes.	Independent Pricing and Regulatory Tribunal (IPART).	Currently Minister for Ports approval is required. IPART can set maximum prices which must be charged unless port has Treasurer's approval to charge lower prices.
Overseas			
Auckland	No.	n.a	General trade practices laws apply.
Hamburg	No.	n.a	Approval of City Department of Economic Affairs for port dues and pilotage. General trade practices laws apply.
Port Klang	No.	n.a	Approval of Ministry of Transport and review by Port Consultative Committee. Price caps set for tariffs.
Los Angeles	No.	n.a	Council approval required.
Nagoya	No.	n.a	Approval of Port and Harbour Council and Ministry of Transport required.
Philadelphia	No.	n.a	General trade practices laws apply.
Singapore	No.	n.a	Marine and Ports Authority approval required.
Tilbury	No.	n.a	Port of London Authority monitors waterfront services. General trade practices laws apply.

a All Australian ports could be subjected to prices oversight by the Australian Competition and Consumer Commission where appropriate state arrangements are absent. Other conditions apply .

Source: Thompson Clarke Shipping (consultant).

The use of an independent regulator is superior to the normal ministerial approval models on the grounds of impartiality and transparency. Ministers who are both shareholder and regulator, may be unduly influenced by budgetary considerations to set fees and charges which provide a greater dividend return to the government. There can also be conflicting views between shareholding ministers. And the processes they follow are not as transparent as the public inquiry processes now required of the independent regulators.

Overseas, the pattern is more varied. With the information available to the Commission, it appears that none of the overseas ports are subject to quite the same regulatory attention as some of the Australian ports. In the case of the private port of Tilbury and the partially privatised port of Auckland, there are no overriding regulatory bodies, other than for monitoring purposes. For example, the Port of London Authority monitors waterfront services at Tilbury, but does not have powers to intervene.

Almost invariably the government owned overseas ports are subject to approval processes for setting port fees and charges, but these are through agencies that do not appear to operate at arms length to either the port authority, or the government. However, in most cases, the operations of the ports are subject to general trade practices laws which outlaw restrictive practices, and provide for prices oversight of firms in dominant market positions. For example, US and European ports are subject to similar (Federal and European Commission) anti-trust legislation as the Australian ports. By comparison, port pricing issues in Asia are not normally a matter of specific legislation, and are left to market forces, and the respective Boards and industry ministries to determine.

The general impression is that the reasonably competitive nature of the industry in most other countries means that anti-competitive conduct is less of an issue than it is in Australia where some ports enjoy a strong regional monopoly.

Safety, quarantine and environmental regulation

On the question of safety, all the Australian ports have to comply with specific State legislation, combined where appropriate with Federal regulations. Elsewhere, in Singapore and Malaysia the situation is similar, with specific authority being vested in the MPA and Maritime Division of the Ministry of Transport respectively. For Hamburg and Nagoya, the responsibility lies with dedicated organisations, in the case of the former, the State River Police, and the latter the regional office of the National Maritime Safety Authority.

Quarantine matters in Australia are a Federal responsibility handled by the Australian Quarantine and Inspection Service (AQIS). In nearly all overseas cases there is a similar responsibility residing with the relevant central or local government authority.[5]

The situation in respect of environmental issues is similar to that for safety. In Australia, responsibility for regulating these areas lies primarily with the State Department of Environment (which in Queensland issues an environmental licence to ports) or the State Environmental Protection Authority (EPA). Specifically in respect of ships, the Federal government takes a very active role via the Australian Maritime Safety Authority (AMSA), and port activities have to comply with international regulations in respect of marine pollution (Marpol) and be consistent with the relatively new ANZECC Maritime Accidents and Pollution Strategy.

Overseas, environmental issues are a matter of both central and local government regulation (for example, US National Environmental Policy Act, Malaysian Environmental Quality Act) and normally handled by the relevant Ministry of Environment (Hamburg & Singapore). Responsible environmental behaviour and policies are a statutory duty for the ports of Tilbury and Nagoya, which are enforced in the case of the latter by the Coast Guard.

C.6 Conclusion: service and charge implications

Government involvement in the provision of port services in Australia is an important issue, and has implications for port fees and charges. For the most part competition between the major ports is limited, making it appropriate for governments to develop institutional arrangements which encourage efficiency. For this reason, the presence of the facility in all States to subject port authorities and other GTEs to prices oversight is important.

In addition, many governments have used their ownership of ports to encourage trade and regional development. However, with a strong focus on corporatisation (or commercialisation) regional and trade development imperatives do not appear to have unduly compromised the commercial integrity of the ports. All are operating with full cost recovery, and all are, or shortly will be, paying tax-equivalents and dividends as if they were private sector organisations.

5 Respectively these are: US Department of Agriculture; Japanese Ministry of Health & Welfare; Hamburg Ministry of Labour Health & Welfare; London Port Health Authority; and the respective Port Health offices of Customs, Immigration and Quarantine in Singapore and Port Klang).

If anything, there is the danger that Australian governments may go too far in the other direction, and impose excessive burdens on their authorities' balance sheets. This concern is based on the perception that State governments use dividends as a revenue source. Ideally dividends should be set recognising the authorities own capital requirements and the reasonable expectations of the government for a return on public equity. The dividend should be recommended by the board to government for decision in line with the agreed Statements of Corporate Intent.

Where problems can arise is in the valuation of assets, and the determination of an appropriate rate of return. Consequently, it is relevant who values the assets and the approaches used. State Governments are in a position to generate extra revenue from their port authorities by imposing high capital values and rates of return. The issue of asset valuations is considered further in Appendix D.

While governments own ports they have the ability to influence outcomes for shippers and promote economic efficiency. For example, share-holder State governments can promote contestability by directing their port authorities to encourage new entry into stevedoring by removing barriers to competition. This broader perspective is consistent with government objectives of promoting trade. However, there may be some tensions between such an approach and maximising the return to the community as shareholders. If the broader objective of economic efficiency is pursued and it results in some lessening of the focus on shareholder return, the community will be better off. At the very least, Governments can make their dividend and payment policies transparent to demonstrate that they are consistent with economic efficiency.

The promotion of rail reforms has the potential to increase Australian inter-port competition and hence competitive discipline. The current reforms may also open the way for freight forwarders providing door-to-door service to become more prominent in shipping. With competition between freight forwarders who have sufficient market power to demand improved services from waterfront providers, shippers are likely to benefit from more timely cargo movements.

D PORT MANAGEMENT PRACTICES AND POLICIES

Port management practices and policies vary widely among the ports benchmarked in this report. Differences occur both among ports within Australia and between Australian and overseas ports. These differences impact directly on port charges and performance and hence affect benchmarking measures.

Australian and overseas port management practices and policies are described in this appendix.

D.1 Infrastructure provision and investment

Infrastructure provision and investment policies and practices of port authorities directly impact on waterfront services and infrastructure investment. For example, substantial investment in new facilities increases potential throughput and productivity improving ship turnaround times. At the same time, however, the cost of the investment must be recovered and this may result in port charges for stevedoring services being higher in the port undertaking the investment relative to others.

The investment assessment methods for Australian and overseas ports are presented in Table D.1.

The approach to asset valuation has major implications for charges. The valuation of port assets affects the cost of services. The extent to which these costs are recovered depends on the port’s policies with respect to cost recovery. Asset valuation practices are presented in Table D.2.

Table D.1 Investment assessment methods, 1997

Port	*Rate of return*	*Other considerations*
Australian		
Adelaide	Board applies commercial criteria in its investment assessment methods.	Financial targets are set in the light of the annual Performance Statement under SAPC's Charter.
Brisbane	NPV method. With own guidelines that an appropriate business case exists.	Treasury Guidelines require all projects to be analysed according to economic, social, environmental and budget criteria.
Fremantle	The Minister sets a target financial rate of return on the written down current cost of assets each year.	All projects are analysed in terms of their financial impact using NPV and impact on trade facilitation.
Melbourne	Internal rate of return hurdle set by the Board.	
Sydney	NPV method.	Discount rate determined by the WACC of the SPC.
Overseas		
Auckland	Investment rates of return determined in accordance with normal commercial criteria.	Investment must be consistent with the company's status as a listed public corporation in New Zealand.
Hamburg	Not a specified investment criteria	Based on non-financial criteria, such as port capacity, cargo and service demand and safety.
Los Angeles	Determined by the Board in the context of the Port's strategic and financial objectives.	The major consideration being the preservation of the Port's standing as a bond issuer as determined by the ratings agencies.
Nagoya	Not a specified investment criteria	The prime criterion for investment assessment is the perceived level of use and degree of need of the user(s).
Philadelphia	No information available	Investment criteria are probably related to political and trade facilitation considerations.
Port Klang	Individual IRR criteria established for each major project.	In setting IRR, the KPA takes account of social needs, economic needs of the country/region and commercial return for the Authority.
Singapore	Use varying IRR on different projects.	IRR must be sufficient to ensure satisfactory Economic Value Added achieved.
Tilbury	As determined by the Board of Forth Ports Plc.	

Source: Thompson Clarke Shipping (consultant).

Table D.2 Asset valuation and depreciation, 1997

Port	*Asset valuation*	*Asset revaluation*	*Depreciation*
Australian			
Adelaide	Optimal Deprival Value	Required every 3-5 years.	Straight-line method. Excluding land.
Brisbane	Deprival value, market based or replacement value depending upon asset.	Indexed annually. All items over $500k are formally re-valued every 5 years.	Straight-line method. Excluding land.
Fremantle	At cost or by valuation.	Regular re-valuation of assets is required.	Depreciation charges reflect the estimated useful life of the asset.
Melbourne		Re-values non-current assets every three years.	
Sydney	Valued at cost or by deprival value.	Revaluation of current assets at least every 5 years.	Straight line method. Land is not depreciated.
Overseas			
Auckland	Historical cost basis, (with revaluation of certain assets).	n.a.	Straight-line method. Excluding freehold land.
Hamburg	Not applicable — no port legal entity	No asset revaluation.	Does not apply.
Los Angeles	Valuations on commercial criteria.	No policy for regular asset revaluations.	Straight line method.
Nagoya	Cost of construction or acquisition.	No asset revaluation.	Straight line method. Land is not depreciated.
Philadelphia	Cost less accumulated depreciation.	n.a.	Straight-line method.
Port Klang	Cost less accumulated depreciation.	No asset revaluation.	Straight-line method. Except freehold land.
Singapore	Assets acquired since 1964 are valued at cost less accumulated depreciation	No asset revaluation.	Straight-line method.
Tilbury	Historical cost basis. Tangible fixed assets are recorded at cost or valuation.	Investment properties are re-valued annually by the Directors (and every five years by independent valuers).	Straight-line method. Except land and capital works in progress.

Source: Thompson Clarke Shipping (consultant).

Investment assessment

The ports reviewed in this study adopt a range of methods to assess new investment projects. Two broad approaches to investment assessment can be identified:

- the use of objective rate-of-return criteria; and
- the use of a wider range of social, economic and financial criteria when assessing competing investment projects.

The port authorities that adopt an objective investment criteria are Brisbane, Sydney, Melbourne, Fremantle, Los Angeles, Auckland and Tilbury. Brisbane, Fremantle and Sydney examine the Net Present Value (NPV) of the project to decide whether the investment should proceed. In Brisbane, an appropriate business case must exist and a hurdle rate will be set depending on the nature of the project using CAPM and the weighted average cost of capital. The Board of the Melbourne Port Corporation (MPC) sets an internal rate-of-return (IRR) hurdle which must be exceeded if the investment is to proceed.

In the overseas ports of Los Angeles, Auckland and Tilbury, commercial criteria determine the setting of appropriate rates of return for new investment projects.[1]

Wider social, economic and financial criteria are used in Hamburg, Nagoya, Port Klang and Singapore. No information was available for Philadelphia but the Commission’s consultants indicated that investment criteria are probably partly, at least, related to political and trade facilitation considerations.

In Hamburg the appropriateness of new investment is determined on the basis of port capacity, cargo and service demand and safety. There is no specified rate-of-return for new investment projects. Similarly, Nagoya has no pre-specified hurdle rate-of-return — the prime criteria for new investment being the perceived level of use and degree of need by users.

The Klang Port Authority (KPA) establishes individual IRR criteria for each major project, which take into account the following factors and their impact on the project:

- social needs of the community;
- economic needs of the country and, often, a region; and

[1] Interestingly, the major consideration for Los Angeles in setting the rate of return for new investment projects is the preservation of the ports standing as a bond issuer as determined by credit rating agencies.

- commercial return for the Authority.

Singapore adopts varying IRRs on different projects, but must be sufficient to ensure satisfactory Economic Value Added (EVA) to monetary value of all resources used.

There may be less incentive to maximise price, or minimise cost, in order to achieve a high rate-of-return in ports where investment appraisal is made on the basis of wider social, economic and financial criteria. Some port authority objectives may be facilitated by minimising prices. For example, an investment project may be approved if it facilitates an increase in trade through the port and so prices are held low to achieve this objective. This would impact directly on observed port service charges benchmarked in this report.

Objective rate-of-return hurdles for new investment have the advantage of being set in advance and hence providing some certainty to potential investors, including shareholder governments. However, where the provision of a particular service is by a natural monopoly, high rates-of-return may be achieved on new investment through the exercise of market power.

High rates-of-return may be achieved on new investment through lower service quality when port services are a natural monopoly. Timeliness measures of performance may be affected when service quality is reduced.

Valuation of assets

Asset valuation approaches will have implications for the level of port authority charges. For example, if charges are intended to recover costs and assets are valued highly in one port compared with another, port charges are likely to be correspondingly higher in the port which values the assets more highly. See Box D.1 for a discussion of economic and financial approaches to the valuation of assets.

The approach adopted by the various port authorities to valuing their assets varies across Australia and overseas. One of two major approaches to asset valuation are adopted. The first approach, values fixed assets at cost (less depreciation) this is also known as the historical cost (accounting) approach to asset valuation. The second approach values assets at their current (accounting) value or fair market value, sometimes referred to as the economic approach.

The valuation of assets on the basis of cost less depreciation is not adopted by any of the Australian ports. Among the overseas ports it is the port authorities with strong government involvement such as Hamburg, Nagoya, Philadelphia, Singapore and Port Klang which value fixed assets at cost less the applicable depreciation.

Box D.1 Economic and Financial Valuation of Assets

Non-current assets (that is assets held in the business for more than twelve months) may be valued according to financial or economic criteria. The two approaches may value the same asset differently.

The financial approach values assets on the basis of the cost of acquisition less, in the case of assets having limited useful lives, accumulated depreciation. The weakness of this approach is that a range of factors including, inflation, technological change, and changes in demand and supply conditions cause the value of assets to change overtime. These influences may not be appropriately taken into account.

The economic approach to the valuation of assets focuses on the economic benefits which are expected to flow from the asset. Under perfectly competitive market conditions, the discounted future cash flow of the asset will equate to the assets market value. In a perfectly competitive environment the assets market buying, market selling price and the net present value of future cash flows would all be the same.

However, Australian ports operate in less than competitive markets and the market for port assets is unlikely to be perfectly competitive. The value of the asset to the entity may differ from its net selling price because of market imperfections. Under these circumstances it has been suggested that assets should be valued on the basis of their ‘current value to the entity’, where the current value is to be determined according to the deprival value approach (SCNPMGTE 1994).

Under the deprival method, assets are valued at an amount that represents the entire loss that might be expected to be incurred by an entity if that entity were deprived of the service potential or future economic benefits of the assets at the reporting date.

Source: SCNPMGTE 1994.

Valuing assets on the basis of their historical cost less depreciation will overstate the value of assets with little or no alternative commercial use. For example, assets using out-dated or inefficient technology.

In other cases, the historical cost approach may undervalue some assets. This may be the case for long-lived assets which are depreciated too quickly. The resulting historical value may be lower than the current market value of the asset based on its opportunity cost.

Depreciation arrangements have a significant impact on asset valuations when the historical cost approach is used. The straight line method based on the estimated useful life of the asset is the most widely adopted approach (see Table D.2).

The second group of port authorities adopt the current or fair market value approach to valuing their assets. This group of port authorities includes the Australian ports of Brisbane and Sydney and the overseas ports of Los Angeles, Tilbury and Auckland.

It is not clear how many of the ports calculate the current or market value of their assets. Several approaches could be used. One option is to use the current market value or selling price of the asset. Alternatively, the current value could be determined on the basis of the net present value of the expected future net cash inflows.

D.2 Leasing arrangements

Leases confer the right to use the physical assets of a port. Two issues arise in considering the impact of leasing arrangements on port performance — the extent to which competitive bidding is used to award leases and the nature of conditions imposed on lessees.

However, a more fundamental issue is the period for which the lease is awarded. The lease period has implications for the potential for effective 'serial competition' generated by the leasing arrangements. Serial competition in stevedoring occurs when there is competition for the right to provide stevedoring services when the incumbent's lease expires over the physical assets on the wharf. In this way, competitive pressures can be generated even when the service is most efficiently provided by a single supplier at any given time. Leasing arrangements are summarised in Table D.3.

Competitive tendering

The information presented in Table D.3 indicates that competitive bidding for leases is not general practice amongst the ports surveyed. The Commission's consultants concluded that most leases in the ports under study are negotiated on a bilateral basis. These negotiations occur between the port authority and a particular lease holder.

In the case of the Australian ports, it appears that bilateral negotiations are widely used. Some ports, for example, Sydney and Melbourne, indicate that some form of competitive bidding may be used to allocate leases. In Melbourne whether competitive bidding is to be used or not depends, in part, on the size of the asset being leased. For minor assets direct negotiation is more likely, but as the size of the asset increases competitive tendering is more probable.

Table D.3 Leasing arrangements, 1997

Port	*Policy*	*Competitive bidding*	*Terms and conditions*
Australian			
Adelaide	Determined by the SAPC Board.	In accordance with commercial criteria and market situations.	Land cannot be sold nor leased for longer than 21 years without the consent of the Minister.
Brisbane	A diversified port encouraging private sector operators to compete in providing services.	Leases are established by commercial negotiation.	Charges have been based on achieving a commercial return on an assets value.
Fremantle	The FPA has authority to lease land.	Leases are established by a mixture of competitive bidding and negotiation.	Lease terms must be approved by the Minister, other than for short term leases. Generally, a 21 year maximum applies.
Melbourne	Leasing of assets is MPC major business.	For minor assets, a first in basis might apply. For major assets Expressions of Interest would most probably be called for.	Terms and conditions are as negotiated.
Sydney	Must be consistent with the commercial objectives of the SPC as a successful business promoting trade.	Normal, but private treaty and negotiation of extensions also used.	Duration will depend time to permit recovery of investment, as well as any strategic considerations for SPC.

Table continues over page.

Table D.3 (continued)

Port	*Policy*	*Competitive bidding*	*Terms and conditions*
Overseas			
Auckland	No terminals leased to stevedoring companies		
Hamburg	The City State leases port land to terminal operators via negotiated agreements	Rental is not a factor in the bidding process, — rentals fixed by the Ministry of Finance, subject to review every 5 years.	Maximum period of lease 30 years. Range of obligations on lessee eg maintenance of facilities.
Los Angeles	The Board's goal is to receive fair market returns on POLA's assets.	Not applicable given limited number of terminal operators and shipping lines.	POLA incorporates volume/price incentives to encourage lessees to maximise asset utilisation.
Nagoya	Terminal land can be leased by the NPA to private sector operators, or purchased by users if reclaimed.	Lessee selected after an evaluation of Expressions of Interest & subsequent open Public tenders.	Terms are dictated by the Port Strategic Plan and lease rates may not reflect market value of land.
Philadelphia	Earns an undisclosed proportion of its revenue from leasing.		
Port Klang	Maximisation of returns on the leased assets with a frequent review of utilisation.	Public tenders called lease awarded to preferred tenderer.	Site must be returned in a comparable condition to that at the start of the lease. Longest lease period issued is 30 years.
Singapore	A system of dedicated berths are allocated to specific container ship operators or consortia.	Lease negotiations normally negotiated on a bilateral basis.	Negotiations take into account the clients potential alternatives, the likely facility utilisation and vessel turnaround efficiency.
Tilbury	Market driven	Some berths are leased on long term basis but provision of warehouses is open to either Tilbury or lessees by arrangement.	

Source: Thompson Clarke Shipping (consultant).

Similarly, some overseas ports competitively tender leases while others adopt bilateral negotiation. Competitive tendering is widely used in Nagoya and Port Klang. However, in the majority of ports bilateral negotiation appears to be the usual method of awarding leases.

Price is not always the criteria used to select lessees when bilateral negotiation is used. For example, in Hamburg all leases are priced on a common basis, determined by the Ministry of Finance and subject to revision every five years. The selection of lessee is based on commercial, value added and qualitative criteria.

The extent to which competition is weakened by bilateral negotiation depends upon whether a credible threat to re-allocate the lease to another operator exists. If leases are renewed on the basis of bilateral negotiation and there is no possibility of a new entrant winning the lease and providing the service, then in effect, short term-leases could become defacto long-term leases.

However, the outcome may be different if bilateral negotiation is only the starting point for discussions regarding the renewal of a lease. This is especially true if the incumbent knows that there is a possibility that other firms may be invited into the discussion. The threat of entry, even when bilateral negotiation is the nominated method of renewing leases, may constrain the exercise of market power by the incumbent during the period it operates the lease.

Lease terms and conditions

The terms and conditions imposed on lease holders can impact significantly on port performance. Of particular interest is the duration of the leases — regular revision of leases provides scope to generate ‘serial competition’.

In Australian ports leases may be offered for substantial periods. For example, in Adelaide leases may be offered for up to 21 years without the need for ministerial approval. In the case of Fremantle, the Minister may approve lease periods in excess of 21 years, up to a maximum period of 50 years.

Among the overseas ports, the maximum lease period is 30 years in Hamburg. Port Klang has leases for terminals to 3 different operators, the duration of these leases ranges from 21 to 30 years. In addition, Port Klang has 41 other less critical leases for periods from 3 years and up. Nagoya leases land for periods of 10 years.

Information on the maximum lease period gives no indication of the actual period for which leases are awarded. It is possible that leases may be awarded for periods substantially less than the maximum permitted.

There are advantages and disadvantages for both short-term and long-term leases. Relatively short-term leases have the advantage of ensuring that the lease is regularly subject to tender. Regular tenders increase the contestability of the market for leases and provides greater opportunity for new entrants if the incumbent does not perform efficiently.

However, short-term leases may not provide incentives for lessees to invest in new equipment because there is insufficient time to earn a return on major investments. In addition, short leases may provide insufficient time for the lessees to become proficient with operating equipment. The cost of acquiring this experience must then be recovered over a relatively short lease period and hence charges for the service may be higher than if longer lease periods were available.

Long-term leases provide a greater degree of security for the incumbent operator. Security of tenure may make lessees more likely to undertake improvements to equipment and processes because they have time in which to reap the benefits of such investment. The lessees are also able to spread any ‘start up’ capital and learning costs over a longer period.

However, there are also disadvantages associated with the security of tenure offered to the incumbent operator by long-term leases. Security of tenure severely limits contestability and hence removes a significant discipline on the operation of the incumbent firm.

Each port authority must assess the trade-offs to be made when determining the period for which leases will be issued.

D.3 Licensing provisions

Licensing arrangements confer the right to provide a particular service within the port. They are often used to ensure that safety standards are maintained, for example, licensing arrangements may require that those wishing to provide pilotage services hold appropriate qualifications. However, licensing arrangements can also be used by port authorities to influence entry into the service market — so called economic regulation.

Port authorities may license service providers. For example, the Sydney Ports Corporation under delegation from the portfolio Minister enters into a three year contract for the provision of pilotage services. In other cases, licences controlling activities or services vital to the port may be granted by a third party. For example, in Brisbane marine pilots are licensed by the Queensland Department of Transport and the service is provided under contract by a private company. This situation also arises in some overseas ports, for example, in

Nagoya, pilots towage services and stevedoring are all licensed by the Japanese Ministry of Transport.

Market entry may be regulated depending upon whether an exclusive or non-exclusive licence is issued to provide a service. An exclusive licence allows only one operator to provide the service until the term of the licence has expired. Non-exclusive licences do not limit the number of operators who may provide a particular services provided the basic requirements for the licence are met.

It is appropriate that licence arrangements are used to ensure that safety standards are maintained and services are provided by properly qualified staff. However, once minimum safety standards have been met licences should, in general, be issued on a non-exclusive basis. This would ensure that the licensing arrangements do not impede the entry of new (appropriately qualified) operators into the industry.

D.4 Competitive tendering and contracting out

The degree of competitive tendering and contracting out (CTC) of services varies widely between the ports under examination (see Table D.4). A clear difference of approach can be identified between the Australian ports and many of the overseas ports.

Different approaches to competitive tendering and contracting out affect the degree of competitive pressure faced by service suppliers. The strength of competitive pressures will depend upon whether contracting out occurs and the process by which the successful tender is chosen. In turn, the nature of competitive pressure on suppliers influences incentives to provide efficient and timely services to port users and hence may assist in explaining differences in measures of port performance.

Contracting out

Contracting out is not a major activity of landlord Australian ports. Under the landlord model the port authorities tend to focus on the provision of core services, such as channel maintenance, while leasing facilities to others who provide direct services to port users.

Among the Australian ports Adelaide adopts competitive tendering when contracting out activities. In the Port of Brisbane each case is considered on a case-by-case basis with a range of qualitative and quantitative criteria used to select the successful party.

The diversity of approaches was most evident amongst the overseas ports. Hamburg and Tilbury contract out a wide range of services to the private sector. Nagoya and Port Klang contract out some or all of their stevedoring, towage and pilotage. Los Angeles contracts out a range of services and is required by City legislation to maintain a policy of equal opportunity with 18 per cent of contracts allocated to minority group businesses and 4 per cent to businesses owned by women.

Singapore differs from the other overseas ports in that there is little contracting out. The Port of Singapore has tended to remain an integrated port (some towage being the exception).

Competitive tendering

In general, a system of competitive tendering for services is most likely to generate incentives for contractors to minimise the cost of providing the contracted out services.

Los Angeles generally adopts a system of competitive selection of contracts. This is operated in the context of a policy to favour women's owned and minority owned businesses in awarding contracts. Tilbury appears to have a wider policy of competitive tendering for all contracts with minimum contract periods of one year. Port Klang espouse a system of public tenders for contracted out work.

Singapore adopts a more limited form of competitive tendering. Selected potential suppliers of the contracted out service are invited to tender for the contract. It is competition between the selected pool of potential suppliers which determines the successful bidder.

Table D.4 Competitive tendering and contracting out, 1997

Port	*Policy*	*Competitive tendering*	*Other conditions*
Australian			
Adelaide	Applies commercial criteria towards contracting-out.	Adopts competitive tendering.	
Brisbane	Applies commercial criteria towards contracting-out.	Each case is considered on its individual merits.	Uses both qualitative and quantitative criteria.
Fremantle	Applies commercial and strategic criteria towards contracting-out.	Generally competitive bidding where services are contracted out.	Ensures continuity of service is a criteria.
Melbourne	Very little contracting out as the MPC is purely a landlord.		
Sydney	Applies commercial criteria towards contracting-out.	Adopts competitive tendering.	Pilotage services contracted out for a period of 3 years
Overseas			
Auckland	Selected tendering for capital works	Selected tendering for contracted out activities.	
Hamburg	Range of activities fully or partially contracted out.	Not used.	Contracting out by negotiation with established franchisee.
Los Angeles	Contracting out occurs.	Generally, competitive bidding for contracts.	Port policy to favour women's owned and minority owned business groups in awarding contracts.
Nagoya	Range of services including towage and stevedoring are contracted out.	Not used. Contracts awarded by negotiation with invited parties.	Stevedoring and towage licensed by the Ministry of Transport.
Philadelphia	No information available.		
Port Klang	Most port services, contracted out.	Public Tenders.	Objective is to maximise revenue.
Singapore	Few PSA services have been contracted out.	Tenders by invitation.	None identified.
Tilbury	Range of services contracted out.	Competitive tendering used for minimum contract periods of one year	Contractors have to agree to abide by all health & safety/environmental requirements.

Source: Thompson Clarke Shipping (consultant).

Nagoya and Hamburg do not use competitive public tenders to award contracts. In both cases, direct negotiation is employed, in the case of Nagoya with invited parties and for Hamburg with existing franchisees.

As noted in the discussion of leases, the period for which the contract is awarded has significant implications for the degree of competitive processes generated by the decision to contract out services.

D.5 Pricing practices

Pricing practices of the ports are outlined in Table D.5. Two key issues arise — the extent of cost recovery pursued by the port authorities through their pricing practices, and the extent to which port authorities price discriminate between different users. These factors will, in part, determine charges levied by port authorities and will therefore influence benchmarking results.

Pricing to recover costs

The extent to which costs are recovered from users has a direct impact on the pattern of observed charges at different ports. It may be that certain charges are lower at one port compared with another simply due to differing pricing practices.

Most Australian ports and many of the overseas ports studied aim to recover direct costs and overheads, although little information was made available on how the costs are determined. It also appears that when cost recovery is nominated as the central aspect of pricing policy other objectives are also pursued.

Adelaide, Brisbane, Fremantle and Melbourne aim to fully recover costs and generate profits according to normal commercial business principles. Moreover, Melbourne is required by legislation to recover costs and at the same time to reduce charges in real terms for the three years from 1997. In the case of Adelaide, there is a statutory requirement that all costs be recovered from users.

Sydney adopts a uniform port-wide pricing policy but also uses its statutory powers to negotiate on contractual charges where there are strategic advantages for both the Corporation and the customer.

Ports specifying cost recovery as the primary focus for setting port charges often include other price setting criteria. The Queensland Port Pricing Policy, which covers all State ports including the Port of Brisbane, applies the following general principles:

- pricing must be linked to port performance targets;
- monopoly or near monopoly pricing will be subject to Ministerial reserve powers;
- costs must be reflected in prices; and
- cross-subsidisation must be transparent and agreed by the share holding Ministers.

However, in Brisbane pricing is fundamentally set by executives and the Board based on commercial criteria.

In Sydney full cost recovery is only one of a range of criteria upon which charges are based. The Sydney Ports Corporation bases its charges on the following general principles:

- trade maximisation;
- efficient port usage;
- cost reduction;
- competitive rates;
- return on assets;
- full cost recovery;
- user pays;
- simplicity; and
- port user satisfaction.

There is no indication, however, of the relative importance of these criteria in determining port authority charges. It would therefore appear that the Sydney Ports Corporation has a substantial degree of flexibility in setting port charges.

Table D.5 Pricing practices, 1997

		Pricing process	
Port	*Pricing policy*	*Negotiation*	*Approval*
Australian			
Adelaide	A balance between commercial requirements and trade/industry facilitation.	Legislated authority to negotiate prices with customers.	‘Common user’ prices recommended by SAPC to Minister for fixing and publishing in the Gazette.
Brisbane	Determined by the executive and Board based on commercial criteria subject to broad government guidelines.	Certain tariffs such as harbour dues and wharfage rates have not been increased for at least 10 years.	No formal approval is required beyond the PBC Board.
Fremantle	Board establishes port pricing policy.	Extensive consultation with users to define agreed pricing targets and changes in prices levels.	Changes to Gazetted fees and charges are approved by the Minister.
Melbourne	For leased assets, the MPC look at individual tenancies to ensure an adequate return.	The Business Development and Finance Departments negotiate with prospective lessees.	Changes to gazetted fees and charges approved by the Office of the Regulator General.
Sydney	Generally, uniform port wide. Cost recovery has rarely featured as a basis for pricing.	Legislative authority to negotiate prices with customers.	All prices are recommended by the SPC to the Minister for approval. They may be subject to IPART.

Table continues over page.

Table D.5 (continued)

		Pricing process	
Port	*Pricing policy*	*Negotiation*	*Approval*
Overseas			
Auckland	Market driven. Aim to recover all costs and earn an acceptable profit margin.	Negotiations are commercial in confidence. ‘Packages’ negotiated with individual customers.	Internal disciplines of POAL, no external control.
Hamburg	The City State sets pricing for harbour dues, rents for leased land and quay walls and pilotage dues.	Private sector providers set market determined prices. State set charges determined by other considerations.	Approval by City State Department of Economic Affairs.
Los Angeles	To stay competitive and maintain compensatory pricing levels in a competitive marketplace.	All major pricing processes start with negotiations, mainly with the shipping lines who are the Port’s major customers.	Price approvals have to be obtained from one or more of the Harbour Commission, City Administration Office, full City Council or the Federal Maritime Commission.
Nagoya	Pricing based on historic cost recovery, and is reviewed every 2 - 3 years taking into account changes in the CPI.	Bilateral negotiation taking into account regional economic priorities and competitive pressures.	Port tariffs have to be reviewed by the local Port & Harbour Council and approved by the Port Assembly. Authorised tariffs have to be approved by the Ministry of Transport
Philadelphia	Not available.	Not available.	Not available.
Port Klang	Tariffs set by the Maritime Division of the Ministry of Transport.	Tariffs set having regard to economic impact and commercially acceptable levels for port services.	Major changes to KPA charges must be reviewed by the Port Consultative Committee.
Singapore	Traditionally what the market will bear. Under the new MPA Act 1996, price changes have to be related to stated criteria eg a price index.	Traditionally, PSA port pricing was a matter of unilateral announcement geared to achievement of financial goals. It is now a matter for bilateral negotiation.	Approved by MPA as regulator.
Tilbury	Prices market determined.	All pricing is undertaken through negotiation with customers.	Major pricing require Board approval.

Source: Thompson Clarke Shipping (consultant).

Outside Australia, pricing policies also vary widely between ports. All ports except Hamburg, Nagoya and Philadelphia aim for full cost recovery, and all indicated that pricing took into account competitive and market requirements.

In the case of Tilbury and Auckland, prices are largely determined by market forces and are therefore determined on a commercial basis by the port authority. Pricing in these two ports is therefore less subject to government intervention or determination than in other non-privatised ports.

Pricing arrangements are particularly complex in Hamburg. The Hamburg City State sets three categories of prices: harbour dues; rents on leased land and quay walls; and port pilotage dues. Harbour dues are established by the Ministry of Economic Development in relation to budget needs and competitive pressure from other north European ports (Bremerhaven, Rotterdam, Antwerp, Zeebrugge). Rents for leased land and quay walls are determined in conjunction with port users and the Hamburg Chamber of Commerce. Port (as opposed to river) pilotage dues are determined in order to fund the income of the members of the local Pilots' Association.

The KPA tariff is set by the Maritime Division of the Ministry of Transport having regard to the economic impact and commercial acceptability of the pricing. The tariff set by the KPA is a tariff ceiling, which operators cannot exceed, but may be discounted via a rebate at the end of the year, on condition container or volume throughput exceeds agreed terms.

In Singapore, pricing has traditionally been geared to what the market will bear — where services were not remunerative, they were either disposed of or withdrawn. Under new legislation introduced in 1996, price changes at the Port of Singapore have to be related to stated criteria such as the price index, the cost of providing services or goods, or an acceptable rate of return.

Price discrimination

Price discrimination occurs when different users are charged different prices for the same service or facility, that is, price differences between customers are on based on cost differences. It can be an efficient method of pricing services and may be a desirable practice for port authorities to adopt. However, the existence of price discrimination among port authority charges may impact on the interpretation of data presented as part of the benchmarking report. Approaches to efficient port pricing are outlined in Box D.2.

Direct evidence on price discrimination is difficult to obtain because such information is commercially sensitive. Price discrimination is possible where prices are determined in markets where some players have market power or the port authorities are able to negotiate deals with particular customers.

Box D.2 Efficient Port Pricing

In economic terms, in competitive markets, efficient pricing generally implies that services are priced at the marginal cost of producing them for each user.

However, in order to supply many port services large up-front investments in equipment are required. For example expensive cranes are required to supply stevedoring services. Once the up-front cost is incurred, the marginal cost of supplying the service to an additional user is relatively low. The average cost of supplying the service therefore declines as the fixed cost is spread over a greater number of users.

Setting prices at marginal cost in these circumstances does not cover the fixed costs involved in investing in the cranes and other equipment required. Marginal cost pricing is therefore not sustainable in the absence of government support.

Several pricing structures may be adopted in such situations. A common feature is that each user should at least pay the marginal cost of supplying them with the services. Any user supplied at less than their marginal cost is being cross-subsidised. Different approaches can be taken to recover the fixed costs.

One approach is to price discriminate between users on the basis of their sensitivity to changes in prices. Each user pays the marginal cost of their provision but the fixed cost is allocated predominantly to those users who are least sensitive to price changes. This approach is second best efficient in the sense that it minimises distortions in users behaviour.

An alternative approach is to adopt a two-part pricing tariff. Users would be charged a ‘usage’ charge which directly reflects their marginal cost of using the service. In addition, they would also pay an ‘access’ charge which is intended to cover the fixed costs of supplying the service. This charge may be common to all users or it may vary between different classes of users. This approach may not minimise the distortions in user behaviour but it may be less administratively costly to implement because detailed information on each customer’s sensitivity to price changes is not required.

It is evident from Table D.5 that price discrimination is likely to be widespread amongst the ports included in this study. The majority of Australian and overseas ports negotiate prices with individual customers. These may represent discounts on scheduled charges for large volume customers to full autonomy to negotiate ‘pricing packages’ for individual customers. For example, the Port of Adelaide has legislated authority to negotiate prices with customers.

Direct negotiation with individual customers is the primary method of price setting among the overseas ports. For example, Auckland and Tilbury negotiate packages directly with customers. Singapore is moving towards increased reliance on bilateral negotiation with customers in setting prices.

Ship versus cargo based charges

Pricing structures vary between ports depending upon the extent to which various government and port authority charges are levied against the ship or the cargo. Different pricing structures have implications for efficiency and the interpretation of many results in this benchmarking study. The approach adopted in dealing with a mix of ship-based and cargo-based charges when benchmarking port authority charges is discussed in Chapter 5.

A key consideration is that the costs of supplying services must be recovered (unless the operations of the port are subsidised) through the charging structure. This implies that, other things being equal, lower ship-based charges means that cargo based charges must be higher and vice versa.

In practice, port authorities may use the structure of charges to achieve objectives other than simply recovering the cost of supplying services. For example, the port authority in Brisbane has decided not to levy ship-based charges in order to encourage ship visits to that port. Tilbury and Port Klang have also chosen not to levy ship-based charges. To the extent that port authorities adopt different charging structures benchmarking measures will be affected.

In other cases, port authorities may wish to recover costs largely through ship-based charges and minimise charges on cargo. For example, the port authorities of Nagoya and Hamburg do not levy any cargo-based charges.

Efficient prices should reflect the cost of providing particular goods or services. Some of the costs incurred by port authorities are specifically for ships and depend upon characteristics, for example, berth requirements may be related to the ship’s length. Other costs will depend upon the nature and volume of the cargo, for example, additional costs may be incurred where special handling is required to load or unload particular cargoes.

Variations between the charging structures of competing ports also have efficiency implications. The absence of ship-based charges in some ports will encourage ships which may not have otherwise visited the port to do so. For example, the absence (or subsidised) ship-based charges may encourage ships with low volumes of cargo to visit that port. Several efficiency implications arise in this situation. Increased ship visits may result in congestion within the port and hence increased delays and disruption to scheduled services.

In addition, extra infrastructure to accommodate these ships may have to be provided. For example, extra wharf space may need to be constructed or additional towage services provided. This additional infrastructure would not be justified if the charges accurately reflected the marginal cost of providing the additional infrastructure.

Conversely, a charging structure with high ship-based charges discourages ships from visiting the port which would otherwise have done so if ship-based charges had been lower. Some ships may be less sensitive to changes in ship-based charges and continue to visit these ports.

Alternatively, depending upon the basis for charging, such a charging structure may result in fewer visits by larger ships. In this case, the lower cargo-based charges will encourage more cargo exchanges to occur. This may exacerbate port-land interface problems at the port (see Chapter 10) and create additional delays. Fewer ship visits represents a loss in service quality as importers and exporters may loose some flexibility in determining their shipment times.

GLOSSARY

Bill of lading	Document given on behalf of a ship operator, providing details of the goods received for shipment. It includes terms and conditions for carriage, the condition of the goods at the time of shipment and acts as a document of title.
'Blue water' freight rate	Charge by shipping line for carriage of cargo and lifting it on and off the ship.
Break-bulk cargo	Non-bulk cargo that is not containerised. It can include unitised cargoes as well as miscellaneous goods in boxes, bales, cases or drums. For example assembled cars, steel coil and pallets of timber.
Bulk cargo	Cargo (such as coal, ore, sand or oil) that is carried loose, takes up the shape of the ship's hold and is handled by direct application of conveyors, grabs, pumps, elevators, and so on.
Common-user	Port facilities owned by the port authority to serve all port users and not restricted to particular operators.
Conference	An association of liner shipping lines which act together to offer common prices for scheduled sailings over defined routes.
Conservancy dues	Charges levied on the ship operator and collected by the port authority to cover a range of services such as navigation aids, dredging and channel markings.
Consolidation	The aggregation of two or more lots of cargo from different sources into one

	container or unitised load; includes the acceptance, documentation, sorting and stowing of goods into containers or unitised loads.
Container	International Standards Organisation (ISO) shipping container.
Container depot	A facility at which goods belonging to different shippers making up less than a full container load are consolidated and packed into, or separated and unpacked from, shipping containers.
Container terminal	A facility at which containers are loaded onto or discharged from ships.
Contestability	The degree of ease with which firms can enter or leave a market.
Conventional stevedoring	Stevedoring of non-containerised cargo.
‘Core’ port activities	Activities such as planning, providing and allocating port infrastructure such as channels, breakwaters, navigation aids and berths.
Crane rate	Hourly rate at which a single crane moves cargo onto or off the ship.
Cross-subsidisation	The use of revenue from one source to reduce price below marginal cost elsewhere.
Community service obligation (CSO)	A government requirement on a public body to carry out activities which it would not do on a commercial basis or at the required price.
Deadweight tonnage (dwt)	Total load of cargo, fuel, stores and ballast that a ship can carry.
Depot	See Container depot.
Door-to-door	Term used to describe a service that moves goods from the premises of the consignor to those of the consignee.

Economies of scale	Factors which cause the average cost of producing a commodity or service to fall as output increases. For example, economies of scale would result in a less than doubling of costs as output is doubled.
Economies of scope	Factors which make it cheaper to produce a range of related products than to produce each of the individual products on their own.
Ex-spout	That stage of the transportation and handling chain when bulk product has been released from shore-based loading infrastructure into the ship.
Freight forwarder	Enterprise engaged in the consolidation and movement of freight.
Full container load or lot (FCL)	A container that holds the goods of one consignor or consignee.
General cargo	Break-bulk or container cargo.
Gross registered tonnes (grt)	The cubic foot capacity of a ship's hull below the upper deck, divided by 100.
Harbour dues	Charges levied by the port authority to cover the cost of providing certain port facilities and services.
Integrated port	A port where services such as stevedoring, pilotage, towage and mooring are provided by the one operator.
Landbridging	Substitution of a sea transport link with a land transport link.
Landlord port authority	An authority that limits its activities to 'core' port activities.
Less than container load or lot (LCL)	A container that holds the goods of more than one consignee or consignor.
Mooring	Securing a ship in a particular place by means of chains or ropes.

Natural monopoly	Occurs when economies make it possible for one business to supply the entire market more cheaply than a number of enterprises.
Net crane rate	Hourly rate at which a single crane moves containers while a ship is actually being worked.
Net registered tonnage (nrt)	The cubic foot capacity of a ship's hull below the upper deck, excluding space set aside for crew quarters, stores, fuel, machinery and so on, divided by 100.
Pan-Australian rates	Rates that are the same at each Australian port of call.
Panamax	The term given to a ship that is just able to navigate the Panama Canal. Typically a bulk ship of between 40 000 and 80 000 dwt.
Pilotage	Navigation of a ship within ports and their approaches by a licensed pilot. Also, sometimes the name given to a pilot's charge.
Port authority	Public agency responsible for control and management of a port and its facilities.
Price discrimination	The practice of charging different prices to different users for the same service or facility.
Private ports	Ports operated by private companies.
Provedoring	Supplying ships' crew and passenger provisions.
Revenue tonnes	The greater of mass or the volume of a cargo.
Roll-on Roll-off (ro-ro)	A type of ship for which cargo is driven on and off.
Ship rate	Hourly rate at which cargo is moved onto or off the ship. In the case of containers, this is equivalent to the crane rate multiplied by the number of cranes working the ship.

Shipper	The sender or final receiver of sea cargo.
Shipping agent (or ship's agent)	A licensed agent who transacts business for a ship owner.
Shipping conference	Any type of formal or informal agreement between shipping companies, usually in the liner trades, that is designed to secure regularity and frequency of service and stability of rates.
Stevedoring	The process of loading and unloading ships.
Stevedore	A business that engages in stevedoring.
Stow and trim	The process of loading bulk wheat (or other dry bulk products) into all corners of a ship's hold and smoothing it so that it sits level.
Tonnage charges	Charges levied by the port authority based on the tonnage of the ship for the provision of certain port facilities.
Towage	Tug operations assisting the movement of ships.
Transhipment	Process of transferring cargo from one ship to another.
Twenty-foot equivalent unit (TEU)	A container counting unit based on the International Standards Organisation 20ft by 8.5ft by 8.5ft container.
Vertical integration	Occurs where successive stages in production and distribution are placed under the control of a single enterprise.
Wharfage	Port authority charge on shippers based on the volume or weight of cargo that is loaded or unloaded in the port.

REFERENCES

ABARE 1996, *Australian Commodity Statistics 1996,* Canberra.

ABS (Australian Bureau of Statistics), various years, *Industrial Disputes, Australia*, Catalogue no. 6322.0, AGPS, Canberra.

—— 1997, *Balance of Payments Australia,* Catalogue no. 5302.0, AGPS, Canberra.

AQIS 1996, *Cargo Containers Quarantine Aspects and Procedures*, Paragon Printers, Australia.

——1997, *AQIS and the Export Process*, www.dpie.gov.au/aqis/homepage/exadvice/expfac.html, 20 August 1997.

Audit Office of New South Wales 1997, *Corporate Governance, Volume One: In Principle,* New South Wales, June.

Australian Competition and Consumer Commission (ACCC) 1995, *Inquiry into the Harbour Towage Declaration*, December 1995, AGPS, Canberra.

BIE (Bureau of Industry Economics) 1995a, *International Performance Indicators: Waterfront 1995*, Report 95/16, AGPS, Canberra.

—— 1995b, *International Performance Indicators: Coastal Shipping 1995*, Report 68, AGPS, Canberra.

Bureau of Transport and Communications Economics (BTCE), 1994, *Waterline, Issue 1*, BTCE, Canberra.

—— 1995, *Review of the Waterfront Industry Reform Program*, Report 91, AGPS, Canberra.

—— 1996, *Waterline, Issue 9*, BTCE, Canberra.

—— 1997a, *Waterline, Issue 10*, BTCE, Canberra.

—— 1997b, *Waterline, Issue 11*, BTCE, Canberra.

—— 1997c, *Waterline, Issue 12*, BTCE, Canberra.

—— 1997d, *Potential Benefits of Waterfront Reform*, Unpublished Working Paper.

Cameron, J. 1996a, *Tradegate Australia Limited A Case Study*, www.tradegate.org.au, 27 June 1997.

Cameron, J. 1996b, *EDI in Australian International Trade and Transport*, cameronj@acslink,aone.net.au, 22 October 1997.

Chambers, A. 1997, *FCL Container Clearance - Workshop Notes and Guide to AQIS requirements for FCL Clearance*, Australian Quarantine and Inspection Services, Canberra.

Container International 1996, *Containerisation International Yearbook 1996*, National Magazine Co Ltd, National Magazine House London.

Council of Australian Governments (COAG) 1995, *Competition Principles Agreement*

DCN (Daily Commercial News) 1997a, *Freo go-slow after 'nick-off' sackings*, 12 November, p. 1.

DCN (Daily Commercial News) 1997b, *Customs Cargo Study*, 23 April, p. 1.

DCN (Daily Commercial News) 1997c, *AICCC focus on quarantine concerns*, 20 August, p. 2.

FIFA (undated), *Feeding the Land, Feeding the People — The Australian Fertilizer Industry*, Fertilizer Industry Federation of Australia.

Fremantle Port Authority (FPA) 1996, *Fremantle Port Authority Annual Report 1996*.

Gordon, S., Hardcastle, S., Hooper, S., Krieg, A., Martin, P., Podbury, T. and Foster, M. 1997, 'Outlook for grains, oilseeds and pulses', in Proceedings of ABARE's National Agricultural and Resources Outlook Conference, Canberra, 4-6 February, *Outlook 97*, vol 23, *Agriculture*, pp. 141-156.

HORSCOTCI (House of Representatives Standing Committee on Transport, Communications and Infrastructure) 1992, *Efficiency of the Interface between Sea Ports and Land Transport: Warehouse to Wharf*, (P. Morris, Chairman), AGPS, Canberra.

HORSCOTCI (House of Representatives Standing Committee on Transport, Communications and Infrastructure) 1995, *Efficiency of the Interface between Sea Ports and Land Transport: Warehouse to Wharf*, (P. Morris, Chairman), AGPS, Canberra.

IC (Industry Commission) 1993, *Port Authority Services and Activities*, Report No. 31, May 1993, AGPS, Canberra.

——1996, *Competitive Tendering and Contracting by Public Sector Agencies*, Report No. 48, January 1996, AGPS, Canberra.

Maunsell Pty Ltd 1997, *Congestion Points Study Phase 3 Best Practices Manual and Technical Report Volume 2 - Sea Transport*, APEC Secretariat.

Mulligan, J. G. 1983, 'The Economics of Massed Reserves', *The American Economic Review*, 73(4), pp. 725–734.

P&O Ports (undated), *Carrier Access Arrangements - West Swanson Container and Ro-Ro Terminal.*

Port Klang Port Authority 1996, *Port Klang Port Authority Annual Report 1996*.

Productivity Commission (PC) 1998, *Work Arrangements in Stevedoring*, AusInfo, Melbourne.

PSA (Prices Surveillance Authority) 1994, *Monitoring of Stevedoring Costs and Charges No. 4*, Monitoring Report No. 21, PSA Melbourne.

Robinson, E. A. G. 1958, *The Structure of Competitive Industry*, revised edition, University of Chicago Press.

SCNPMGTE (Steering Committee on National Performance Monitoring of Government Trading Enterprises) 1994, *Guidelines on Accounting Policy for Valuation of Assets of Government Trading Enterprises*, October 1994.

Smith, P. 1990, 'The Use of Performance Indicators in the Public Sector', *Journal of the Royal Statistical Society*, 153, Part 1, pp. 53-72.

Smithwick, D.W. 1995, *Business Development in Australian Ports*, Port Strategy to 2000 Conference, March 1995.

TEDIS Pty Ltd 1996, *Sea Cargo Automation*.

Thompson Clarke Shipping Pty Ltd 1994, *Report of the International Operating Costs Consultancy*, prepared for the Commonwealth Department of Tourism.

Truck Australia 1997, *A seachange for container ports*, vol. 13, no. 2, p. 12.