A Study of Liner Shipping Services Into and Out of Australia, Vol 2

Report

Volume 1 of the Bureau's Report No 60, 'A Study of Liner Shipping Services into and out of Australia', presents a distillation of the findings of the study and was intended to address the interests of a wide audience and provide a succinct basis for an understanding of the liner shipping industry. Volume 2 presents the findings of the study in full, together with the details of the analyses carried out. Volume 2 will be of particular interest to those who wish to explore in sone depth the structure, conduct and performance of the industry.

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Report 60

A Study of Liner Shipping Services into and out of Australia

Volume 2

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FOREWORD

Volume 1 of the Bureau's Report No 60, 'A Study of Liner Shipping Services into and out of Australia', presented a distillation of the findings of the study and was intended to address the interests of a wide audience and provide a succinct basis for an understanding of the liner shipping industry. Volume 2 presents the findings of the study in full, together with the details of the analyses carried out. Volume 2 will be of particular interest to those who wish to explore in some depth the structure, conduct and performance of the industry.

The study has been confined to the collection, analysis and presentation of information and was provided in draft form to the industry Task Force.

The Bureau is also currently conducting research for the industry Task Force examining shore-based shipping costs. The liner shipping study has therefore addressed land-side activities only to the extent required to explain the involvement of liner operators and to complement the work conducted by the Bureau for the Shore-Based Shipping Costs Task Force.

The success of a study of this nature is heavily dependent on the good will of those who can provide information. I would like to acknowledge the interest, support and co-operation of all the organisations approached by the Bureau in the course of the study. The high degree of co-operation may reflect a genuine concern about the lack of factual information on liner shipping and, to some extent, a concern about the future.

The study team was directed by Mr C. Sayers, and Mr A. Smith, Ms S. Austen, Dr R. Mellor, Mr S. Wheatstone, Mr B. Honu, and Mr D. Dao all made significant contributions.

I hope that this report will provide a useful factual basis for consideration of the significant issues facing the liner shipping industry and its customers.

G. K. R. REID
Director

Bureau of Transport Economics
Canberra
February 1986

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CHAPTER 1 INTRODUCTION

This introduction outlines the background to the study, and describes the study approach, scope and conduct.

Volume 1 of this report presented a distillation of the findings of the study together with some concluding remarks addressing inferences drawn from the study. This volume presents the findings in full together with the details of the analyses carried out.

BACKGROUND TO STUDY

In August 1984 the Federal Bureau of Transport Economics was directed by the Minister for Transport to undertake a broad study of liner shipping services into and out of Australia. The study was programmed so that a draft report could be provided to the industry Task Force established to review Australia's shipping arrangements.

The Bureau was asked to investigate and report on:

1. the physical characteristics of the major inward and outward trade routes including the commodities carried and the types of service;
2. the size, ownership and organisation of fleets serving these trades, with particular reference to Australian-flag participation;
3. conference and non-conference capacity in these trades and the impact of trends in capacity and other relevant factors on the level and stability of services;
4. rates charged for key commodities and the factors associated with variations in rate structures;
5. the extent and nature of competition within conferences and by 'outsiders' and its effect on rates and other aspects of the industry; and

6. technological developments affecting liner shipping and their implications for the structure of Australia's shipping service and fleet replacement programs.

The Bureau was also invited to examine other related matters pertinent to the study.

APPROACH

The Terms of Reference provided for a systematic examination of the structure, conduct and performance of liner shipping. Furthermore, the areas of investigation were, in many respects, self-contained in terms of information interest. Given this, the investigations for this report were structured on the basis of the Terms of Reference. However, to ensure that the study produced an information base which gave a complete picture of the industry, including the background to its development, three additional study areas were added:

- an historical review of the development of the industry structure with particular reference to the overseas and Australian regulatory environment in which liner shipping and national flag participation have developed;
- an examination of the current arrangements which focuses on the physical aspects of the movement of overseas freight, the organisation of the industry and the institutional setting; and
- an examination of the shore-based activities of liner operators, and in particular the relation of these activities to their shipping operations.

While not specifically addressing policy issues, the study was developed to present the factual information required under the terms of reference in a way that shed light on the main issues of concern to shippers and shipowners. These issues were identified by extensive consultation with industry participants.

The examination of market power is a central aspect of the study. This traditional theme of industry organisation analysis was chosen because it is relevant to the examination of the adequacy of legislative arrangements for liner shipping, which usually concede some market power to shipowners in return for the provision of stable and efficient services. The theme was also considered relevant because many of the identified issues related to aspects of market power, that is, the adequacy of service provided, the rates charged and the effect that competition has on these factors.

STUDY SCOPE

A general aim of the study was to examine all of Australia's liner trades and present information that was as current as possible. Outlined below are some of the significant elements which define the coverage of the study and this report.

For the purpose of this study, liner services have been defined as scheduled regular shipping services where at least part of the cargo is break bulk. Services such as those offered by ABC Containerline which combine the carriage of minerals and containers are therefore included.

In accordance with the Terms of Reference, inward and outward services have been investigated with the intention of providing similar information for both. However, because of a general lack of consistent data on inward shipping, which could not be overcome in the time available, there is a greater depth of analysis of outward services.

Wherever appropriate, information is reported for all of the recognised shipping trades to give a comprehensive world-wide picture of the task and services. To assist with the investigation of ship utilization, a system of trade routes which closely approximate the common trading patterns of liner shipping to and from Australia were defined. For the examination of conference and non-conference competition, a set of trades has been selected which encompasses a range of competitive situations. The trade areas and the trade routes referred to in this report are defined in Appendix I.

The Terms of Reference call for the examination of rates in terms of key commodities. To ensure that the study was manageable, a set of commodities was selected for detailed examination. These commodities were chosen on the basis of their:

- importance in the liner trades in terms of tonnage and value; and
- significance in regard to highlighting shipping problems by providing a range of demand elasticities, stowage characteristics and freight rates.

Information on the level of trade is current to June 1984. The majority of the information concerning trade and the fleet of ships serving Australia is for the 1983-84 financial year. The scheduled rates reported are, however, those which applied in January 1985.

STUDY CONDUCT

The initial study activity was directed at identifying issues of concern and information sources so that the methodology could be fully developed. The issues were canvassed from selected informed sources and the literature.

The next identifiable step was an approach to shippers to obtain information on their cargo flows, cargo practices and perceptions of the importance of service characteristics. This approach provided information for the design of an attitudinal survey on the relative importance of service characteristics and the relative performance in respect of those characteristics of conference and non-conference operators. A list of the organisations contacted is presented in Appendix XI.

Conference and non-conference operators were then approached formally for the information required for the study. Both inward and outward conference secretariats were approached because of their separate responsibilities for consolidating information and co-ordinating responses to requests for information.

A significant research activity was the development of a computer data base which was used to generate a major proportion of the tables presented in this report. This data base linked the Australian Bureau of Statistics (ABS) Sea and Air Cargo Commodity Statistics with information on shipping services, ship characteristics, stowage factors, rates and operator organisation.

CHAPTER 2 REVIEW OF THE DEVELOPMENT OF LINER SHIPPING

Australia's geographic isolation and dependence on foreign trade for its development has conferred on ocean shipping an important role since first settlement.

The Australian international liner task is significant in terms of world shipping markets. An estimated 15.4 per cent of the world fleet of fully cellular containerships were deployed on the Australian deep-sea routes (Drewry 1978). Furthermore Australia is ranked as the ninth largest generator (both inward and outward) of world container traffic (Containerisation International 1983).

Australia has traditionally relied predominately on overseas operators for the provision of liner shipping services. Over the period 1927 to 1969, no Australian-flag ship participated in the international trades. In 1982-83, of the total freight earnings derived from Australian international trade, only 15.4 per cent was attributable to Australian operators (ABS 1984).

As a trading, rather than a shipping nation, Australia had little direct influence on the evolution of the character and structure of the liner shipping industry. Organisation of the market was undertaken primarily by private, non-government shipping interests of the dominant maritime countries, in particular those of the pre-World War II Europe.

The organisation and supervision of the industry was undertaken primarily by private, non-government shipping interests, with a freedom derived from the Grotian 'freedom of the seas'[1] principle, and from supporting liberal economic attitudes amongst the major European maritime countries. In the Australian trades, this has resulted in a history of dominant liner firms which largely determined the responses made to changing technical and competitive conditions.

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1. Established by Hugo Grotius in 1609 and by which navigation is free to all to fit the needs of humanity.

This chapter reviews the development of the international liner shipping industry, with specific reference to Australian experience.

The historical perspective is aimed at providing background to the current organisation and economy of the liner shipping industry, the topic of later chapters. It is also intended to highlight current trends in the industry's development, and the important implications of these for the future organisation of liner markets.

DEVELOPMENT OF INDUSTRY STRUCTURE

The international liner shipping industry has historically been characterised by a trade route division of markets, and by shipping services supplied by ship operators through cartel-like frameworks known as conferences.

The evolution of this structure reflects a combination of economic, political and technical factors primarily relevant to an era which ended with the introduction of containerization, in the mid-1960s. New market forms evolved after this period, mainly because containerization changed the economic and technical conditions of production, and, to a lesser extent, in response to changes in the political environment.

This section reviews the development, first, of the conference system and other market forms, giving particular reference to Australian experience. Second, the evolution of the geography of liner shipping particularly the development of round-the-world (RTW) services, as opposed to the traditional end-to-end structure.

Frameworks of supply

Liner shipping operators have traditionally co-operated in the supply of shipping services, with two main forms of co-operation being typical:

- agreements to regulate capacity and freight rates; and
- ventures to finance new technologies and/or to achieve economies of plant size in capital intensive operations.

The conference system which operates on agreements of the first type has been the dominant market organisation form, and has provided the basis for the other organisational developments.

Conferences evolved on most deep-sea routes between 1870 and 1914.

They formed in response to rapid increases in shipping tonnage, and a consequent fall in freight rates, caused by the introduction of steamers and a rapid growth of non-British (US and Norwegian) merchant fleets. The form of conference agreements, and the consequent industry organisation, reflect these market conditions. The agreements provided for:

- pricing through agreements between the shipowners participating in the conference;
- the establishment of freight and earnings pools to allocate cargo and traffic revenue, respectively, between member operators (the aim of this was to prevent price cuts below the tariff and agreed rebates);
- common action against competition from non-member operators which usually took the form of 'fighting ships' conducting a rate war with the competition; and
- the tying of shippers to the conference through 'loyalty agreements' which provided deferred rebates on freight rates paid in return for shipper loyalty.

These various aspects of liner conference organisation were evident on the Australian inward trades prior to 1900. In 1876, a scheme was submitted by a sub-committee of the London-based Melbourne Shipping Association for the formation of an association (comprising eight shipping lines) interested in shipping between London and Melbourne. The agreement provided for freight and earning shares of the trade and for the setting of freight rates (Bach 1976, 163). A freight rate agreement with shippers was drafted in 1878 by nine London sailing ship companies. Shippers agreed not to ship by any other sailing vessels from London without the consent of parties to this agreement. In return, the operators agreed to rebate 5 per cent of the nett freight charged on all goods shipped in vessels loaded by any of the broker parties'. The agreement, commonly known as the 'Davis Agreement', applied initially only to Melbourne cargoes. Other ports were progressively covered in similar terms and in 1884 the agreement was extended to steam ships. In 1881, the Australia/Far East Conference was formed, and by 1909 the United States, Straits and Calcutta trades had conference agreements (Moore 1981a, 67-68).

Conference formation was made more difficult in the inward trades due to their susceptibility to tramp competition. Attempts to form conferences made soon after 1900 were further hindered by the Australian Government's banning of the deferred rebate system in the outward trades. By 1909, however, a formal agreement between shipowners in the Australia/UK trade for non-refrigerated cargoes was settled which provided for minimum freight rates, rationalized sailings, broker agent loyalty and freight and earning pools.

By 1911, foreign shipowners received legal sanction to operate deferred rebates in the Australian outward trades. The survival of the closed conference system was further assurred in 1930 when the Government adopted the findings of the 1906 Royal Commission on Shipping Rings in its policy.

In the American trades, closed conference practice was prohibited by the 1916 American Merchant Marine Act. Deferred rebates, the use of 'fighting ships' and other barriers to entry into the industry were also outlawed under the Act. The market organisation sanctioned was termed an 'open-conference'.

Prior to World War II, development of the industry structure was mainly influenced by the horizontal integration of liner companies. Mergers and acquisitions, most intense during the 1870 to 1890 and 1929 to 1933 periods of economic downturn, created dominant firms with large market shares. The mergers represented attempts to restrict competition and thereby reduce business risk, and to achieve economies of scale in management and ship operation. Ventures, involving the establishment of joint companies which comprised independent firms, also became common in passenger trades for new and capital intensive operations. Their purpose was to reduce financial pressure through the spreading of risk.

Sea transport in the period 1938 to 1948 was organised under national control and the development of co-operative arrangements therefore ceased over this period. The liberalization at the end of World War II, however, resulted in increased competition (in particular from tramp shipping and the expanded US fleet) and consequently the reactivation of conferences.

In the post-war period to 1965, conferences remained as the dominant market organisation for co-operation between shipowners and negotiations with shippers and governments. The advent of containerization and developments in international maritime policy, however, required a reorganisation of liner markets after 1965, to prevent the development of overcapacity, to reduce financial pressure, and to strengthen the position of shipowners relative to both governments and shippers. Horizontal integration was the main form of industry restructuring with four main types of joint operations evolving, that is, cartels, consortia, container syndicates, and joint ventures.

The form of joint operation introduced on each trade route reflected, in part, the strength of the conference organisation prior to the introduction of containerization. Cartels were established on those routes where the conference traditionally held a strong position, that is, in the Far East and Caribbean trades. Consortia and container syndicates were introduced in trades characterised by a strong bargaining position of consignors, for example, in the Australian trades. Joint ventures, the closest form of co-operation between independent lines, allowed the establishment of world-wide operations (von Schirach-Szmigiel 1979, 148). Each joint operation, however, had a similar purpose:

- to facilitate the withdrawal of ships from the trade, necessitated by the increase in productivity associated with large ships;
- to achieve economies of scale in operations through the development of a large and fairly homogeneous fleet; and
- to reduce financial pressure through the spreading of risk.

Containerization also required the close co-ordination of terminal and transport functions, to ensure the economy of the system by allowing short turn-around times. This could be achieved either by vertical integration or by long-term agreements between ocean carriers, terminal and land transport operators. The latter often proved to be the preferred option due to the capital costs and large organisation task involved in operating an integrated container system (von Schirach-Szmigiel 1979, 128). The major UK operators, in the Australian trades, however, committed themselves to through transportation services, 'the Birmingham to Bourke' concept. This involved heavy investment by the operators in terminals and depots.

Developments on the Australian trades since 1965

Greater co-operative working among the major shipping lines also featured in the post-1965 developments in the Australian trades. Joint companies, consortia and container syndicates were established to rationalize and integrate services and to keep costs down. Until the late 1970s, these arrangements were largely successful in minimising non-conference competition. The subsequent development of round-the-world services and State-owned lines, however, has led to a rapid expansion in capacity and a consequent erosion of closed conference market power. This is expected to provide the catalyst for a new round of industry restructuring, resulting in further concentration of ownership and the rationalization and integration of services.

The post-containerization evolution of the industry structure on two of the major Australian trades, that is, the Australia/Europe and Australia/Japan trades is described here in detail with some reference to developments in other trades.

Australia/Europe trade

Containerization of the Australia/Europe trade at first seemed to offer the prospect of changing an already strong conference into a super-conference (EIU 1984, 29). To an extent it was successful in keeping outside penetration to low levels and achieving high levels of co-operation between conference members until the mid 1970s. However, the trade since the late 1970s has faced increased non-conference competition.

Restructuring of the trade in response to containerization initially took the form of amalgamation of the major shipping lines. In 1965, the four largest British lines, the Ocean Steamship Co Ltd, P & O, British and Commonwealth Shipping Co Ltd and Furness Withy and Co Ltd formed Overseas Containers Ltd (OCL). In 1966, the major West German lines, Hamburger America Line and Norddeutscher Lloyd, combined to form Hapag Lloyd and began container operations. Nedllovd, the leading Dutch container ship operator, was formed from the amalgamation of three lines, which occurred in 1970, and two further lines which joined operations in 1977 and 1981 respectively. Consolidation of the French fleet also took place through the combination of the lines Messangeries Maritimes and Compagnie Generale Transatlantique to form Compagnie Generale Maritime, (CGM). In 1980, these four fleets accounted for almost 60 per cent of total fully cellular capacity in the Australia/Europe trade (see Table 2.1).

In 1969, the British liner operators, Blue Star Line, Ben Line, Ellerman Lines, T. and J. Harrison and Port Lines (Cunard) founded the container syndicate Associated Container Transportation Ltd, (ACT). The Australian National Line, (ANL), entered the Australia/Europe trade in August 1969, under a consortia agreement with ACT (Australia Ltd (ACT(A)) a subsidiary of ACT.[2] In 1980, the ACT(A)/ANL consortia accounted for 26.3 per cent of total route capacity of the fully cellular market (see Table 2.1).

2. ACT(A) comprises Blue Star Line, Ben line and Ellerman Lines.

TABLE 2.1 OPERATOR SHARES IN THE EUROPE/AUSTRALASIA FULLY CELLULAR MARKET, 1980

(per cent)

Shipping operators	*Share of total route capacity*	*Cumulative percentage*
OCL	36.4	36.4
ACT(A)	16.2	52.6
ANL	10.1	62.7
Nedlloyd Lines	9.1	71.8
Hapag Lloyd	8.5	80.3
Lloyd Triestino	5.9	86.2
Shipping Corp. of NZ	5.7	91.9
Compagnie Generale Maritime	4.7	96.6
Others	3.4	100.0

Source Fossey, J. and Pearson, R., (1983, 53)

Further integration of services in the trade took place in 1970 with the formation of Australia/Europe Container Services (AECS). Formed to co-ordinate services between member companies and to provide shippers with the best possible frequency (Drewry 1978, 8), the initial members comprised OCL, ACT(A), ANL, Hapag Lloyd, Nedlloyd, Compagnie Generale Maritime and Lloyd Triestino. In September 1972, however, ACT(A) withdrew its ships together with the two which it managed for ANL, and began a separate service between UK/Europe and Australia/NZ. In September 1977, AECS also introduced containership services to NZ and subsequently became known as Australia New Zealand Europe Container Service (ANZECS).

Scan Austral, later known as Scan Carriers, also began its first services in 1970. This joint operating company was established by the East Asiatic Co of Copenhagen, A.B. Transatlantic and Wilh Wilhelmsen. It provides mainly ro-ro services within the conference structure (see Table 2.2).

The three consortia, ANZECS, ACT(A)/ANL and Scan Carriers dominate the trade. Outsider penetration remained very low to the late 1970s, and had risen to only about 10 per cent by 1982 (see Table 2.3) (EIU 1984, 30). This increase in competition to the consortia has been primarily from the non-conference operators, ABC Containerline, Polish Ocean Lines (POL) and Eagle (Europe Australian Gulf Express). ABC Containerline introduced round-the-world services to the trade in

1978, operating a Europe/Australia/North America circumnavigation with six vessels. In 1983, Atlantrafik Express Service (AES), a liner service provided by the Swedish Brostrom Shipping Co. Ltd, also entered the trade with a round-the-world service, extending its

TABLE 2.2 OPERATOR SHARES IN THE EUROPE/AUSTRALASIA RO-RO MARKET, 1980

Shipping operator (with over 4,000 TEU pa)	*Share of total route capacity*	*Cumulative percentage*
Scan Carriers	77.2	77.2
Compagnie Generale Maritime	22.8	100.0

Source Fossey, J and Pearson, R., (1983, 60)

TABLE 2.3 SLOTS DEPLOYED IN THE EUROPE/AUSTRALASIA TRADE, 1 JULY 1982-16 FEBRUARY 1983

Carrier	*Share of total slots (20ft)*
Conference	
ANZECS	48.2
Scan Carriers	17.5
ACT(A)/ANL	16.5
Conference total	82.2
Non-conference	
ABC Containerlines	7.9
Polish Ocean Lines	6.3
Eagle Containerlines	3.6
Non-conference total	17.8
Total	100.0

Note Slot totals are based on maximum theoretical container carrying capabilities of Scan Carriers' and POL's ro-ro, ABC Containerline container-adapted bulkships and Eagle's semi-container vessels, stated in relation to full cellular capability of ANZECS and ACT(A)/ANL fleets.

Source Lloyd's Shipping Economist (1983, 39).

previous service between the US East Coast and Australia/NZ to link the European ports of Leghorn and Cadiz.

The consortia response to this increased competition, thus far, has been the rationalization and integration of sailing schedules of their combined fleet of over 20 ships. However, attempts to establish 'fundamental changes in the structure and operation of container shipping since the formation of the OCL and.....ACT' have been reported (ITJ 1985, 400).

Australia/Japan trade

Major rationalization of the Japanese shipping industry was undertaken by the Japanese Government in 1964, creating the 'big six', Mitsui OSK (MOL), Nippon Yusen Kaisha (NYK), Yamashita-Shinnihon Steamship (YS), Kawasaki K Line, Japan Line and Showa Line. This rationalization enabled the formation of consortia similar to those which were established in the Australia/Europe trade. The two major consortia comprised the Anglo-Swedish group, Australian Japan Container Line (AJCL), which operates a rationalized fully container service with NYK, MOL and YS, and the Eastern Searoad Service (ESS) which operates a ro-ro service.

AJCL was established in 1970 by the previous conventional cargo service operators in the trade, Australia West Pacific Line, China Navigation Company and Eastern and Australian Steamship Co Ltd, in conjunction with OCL and ACT(A). In 1971, however, ACT(A) abandoned its plans to enter the trade under an arrangement involving the sale to ACT(A) of the OCL ship *Chesapeake Bay* which was destined for the Australia/East Coast North America trade. In return for the withdrawal from the Australia/East Coast North America trade, OCL was relieved of ACT(A) competition to AJCL, (of which OCL has a 56 per cent interest), (LSE 1981a, 38). NYK, Mitsui OSK and YS began operating a combined service with AJCL in 1971. The consortia provides for fully integrated services with each line agreeing to carry each others cargo on a space charter basis. Marketing and booking functions are, however, left separate.

ESS was established in 1969 by ANL and K Line. These two companies now function as a consortium, in conjunction with MOL, NYK and YS who jointly provided a ship.

Development on other Australian trades

Rationalization of liner services also followed the introduction of unitization on other Australian trades and further concentration has been evident since 1980. In the North American trades, ACT(A)/ANL introduced the integrated services, PACE and PAD in 1971. ANRO, a consortium of ANL, Neptune Orient Line (NOL), Australia Straits Container Line and Nedlloyd, was formed on the South East Asia trade in 1977. In 1983, following the liquidation of the Jumbo Lines consortium, an integrated service comprising ANRO and the Malaysian Shipping Corporation (MISC) was formed. In the trans-Tasman trade, ANL and the Shipping Corporation of New Zealand introduced a joint service in 1983.

The geography of liner shipping

Another distinctive characteristic of the liner shipping industry is a trade route division of markets. Unlike the bulk or tramp sector, in which ships ply for hire between trades according to demand, the operation of liner ships is geographically defined. The degree of division is increased in the liner sector by the separate arrangements for inward and outward services. This feature of the industry structure reflects a historical perspective of ship technology, government intervention and trade conditions that has only recently been challenged by an alternative geography, that is, round-the-world (RTW) services.

The initial impetus for a trade route division of markets came from the geographical allocation of mail rights, between the major UK merchant shipping interests, in the period 1837-1848 (von Schirach-Szmigiel 1979, 12). The division, however, also reflected physical limitations of ship performance, and differences in trade conditions and regulatory environments between trade routes. The benefits which this division provided, through the restriction of competition, supported its retention by the conference system.

The partition of the inward and outward services in conference arrangements had similar motives. Differences exist not only in the volume but also in the types of cargo moved in opposite directions on a trade route. Shipper demands and regulatory environments also differ at the two ends of the route, resulting in particular conference structures and requiring specific expertise. Furthermore, the diversity of cargoes and shippers involves an extensive management task to organise freight. This task could only be kept to a reasonable size within a confined market.

The advent of unitization, however, greatly redefined the physical and economic constraints on ship operations. Containerization and other forms of unitization has allowed the standardization of a diverse range of shipments. Ships and containers are therefore more easily deployed between trade routes. It has also provided scope for the freight forwarder to take over some of the land operations of the ocean carriers. For example, an operator may decide not to invest in containers and leave the organisation of freight into containers to the forwarder. The forwarder is charged on a per container basis and the operator's responsibility ends at the wharf. The forwarder is left to assess shipper needs and provide transport services accordingly.

A further consequence of unitization is the potential for inter-modality. Land bridging of transhipment operations may be implemented as a feeder service across continents or regions. These allow the achievement of economies of scale in ship operations by concentrating traffic on a few major routes.

All these factors, the standardization of shipments and ships, the potentials for simplification of the management task, and the availability of land bridging options, have promoted the feasibility of RTW services. Evergreen and US Lines have both commenced RTW services utilizing large, cost effective containerships.

DEVELOPMENT OF THE MARKET FOR LINER SHIPPING SERVICES

Over the period of the evolution of Australian liner services major changes have occurred in the market. This section examines the development of liner shipping on the basis of the main influences, that is:

- the development of specialist ship types, and air cargo, and the resulting division of international freight transport markets; and
- the changing commodity composition and market distribution of Australian international trade.

The development of liner cargo

Prior to 1850, general carriers provided deep-sea services, transporting both goods and passengers. The development of special ships since then has formed the basis for a technical segmentation of markets which has progressively narrowed the compass of liner shipping.

The impetus for the development of special ships are two fold:

- the existence of a large and stable cargo flow; and

- the potential for reductions in transport costs through reduced cargo handling times.

The international oil trade, from 1914, was the first commodity trade to satisfy these criteria. Between 1913 and 1939 international seaborne trade in oil increased from 11 to 110 million tons per annum (von Schirach-Szmigiel 1979, 30). This resulted in the development of a specialised fleet of tankers and associated transport market. The characteristics of the bulk liquid market were and remain distinct from the liner market:

- ships were deployed between trades on voyage or time charter arrangements;
- individual ships, rather than lines, formed the unit of production; and
- shipping was often integrated into the production strategies of the associated firm via long term contracts or ownership.

In the major dry-bulk trades (iron-ore, coal and wheat), the development of specialised shipping services was limited up until the late 1950s. The self-sufficiency of both North America and Europe in iron-ore and coal, and the limited costs and time savings offered by specialist carriers, restricted innovation. General carriers, favoured for their flexibility, thus continued to dominate the deep-sea dry-bulk trades until the beginning of the 1960s. The ability of tramp operators to offer a competitive alternative service to liner shipping in the bulk trades, and to enter the non-bulk trades when bulk trading was depressed, provided a threat to liner operators.

The Australian trades in particular were susceptible to this competition due to the high proportion of bulk commodities, such as wool and wheat, in the outward trades. As a consequence, Australian consignors were conferred a relatively high degree of leverage on conference rates and service schedules. The competition, however, also resulted in a continuation of considerable tonnage surpluses in the outward trades.

Since the 1960s, the nature of liner shipping has changed radically. The development of specialised bulk carrier services removed the bulk mineral and food trades from the general carrier sector.[3] The

3. Between 1960-61 and 1971-72 coal exports from Australia increased from 1.9 million tons to 21.8 million tons. Iron ore exports increased from 0.3 million to 47.6 million tons between 1965-66 and 1970-71 (various Australian Year Books and ABS (1985a).

evolution of multi-national companies in the food, car and wood industries further segmented the market. These transport buyers started to establish their own transport capability or signed long term contracts with operators offering special systems based on special ships. Bulk cargo flows therefore disappeared from the liner market.

Within the liner market segmentation also occurred. The introduction of unitization resulted in a division between the general non-bulk trades, capable of being unitized, and the break-bulk trades. Separate consortia for fully cellular and ro-ro services developed on the major Australian trades. Some division also occurred, following containerization, between the less-than-container-load (LCL), and the full-container-load (FCL) liner trades. The responsibility for marketing and organising transport services for LCL cargoes, in some cases, was assigned to freight forwarders.

The introduction of the wide-bodied Boeing 747 after 1970 challenged a traditionally secure domain of liner shipping. Since 1970 an increasing amount of high valued cargo has been diverted to the air mode (see Table 4.4). Air freighting has advantages of speed and inland penetration. This trend has been supported by the progressive miniaturization of a wide variety of 'high-tech' cargoes, and by the development of multi-national production strategies (that is, the assembly of products from a variety of components made in a number of countries).

In response to these changes, liner operators have sought new business from the bulk sector. Some liner operators have been able to provide competitive services in small bulk trades in which the costs of stockpiling against bulk shipment may outweigh the price of more regular liner services. ABC Containerline, for example, provide both bulk and container services on the same ships. They employ this combination of cargoes to overcome the 'back haul' problem associated with the imbalance in the Australian container trade.

Developments in Australia's international trade

Over the period 1900 to 1970, Australia's exports were dominated by resource based commodities and the import trades by manufactured commodities. The UK continued, at least until the mid 1960s, to be the major source of Australian imports and destination for Australian exports.

Changes did occur, however, in the commodity composition and market

TABLE 2.4 SHIFTS IN SOURCE OF AUSTRALIAN IMPORTS, 1904 TO 1970-71

(Annual average percentage of total value)

Period	*United Kingdom*	*France Germany Italy*	*USA and Canada*	*Japan*	*South and South East Asia*[a]	*New Zealand*
1904 to 1913	60.1	8.1	12.5	1.1	-	4.7
1920-21 to 1928-29	45.1	5.0	25.9	3.0	-	1.7
1929-30 to 1938-39	37.9	6.1	21.8	3.2	-	1.6
1947-48 to 1952-53	46.1	4.8	15.5	1.5	7.7	0.7
1953-54 to 1958-59	43.1	7.5	15.5	2.4	5.2	1.3
1959-60 to 1964-65	30.3	9.0	24.6	6.3	4.2	1.7
1965-66 to 1970-71	22.6	10.4	29.1	11.5	4.9	2.0

a. India, Malaysia, Hong Kong, Pakistan, Singapore, Indonesia.

\- Nil or rounded to zero.

Source Boehm (1979, 205-206).

distribution of Australian international trade, with consequent impacts on the development of liner shipping. This section outlines those changes in Australia's trade which were most significant to the market for liner shipping services prior to 1970. A more detailed discussion of developments since 1970 is provided in Chapter 4.

The inward trades

Significant structural change also occurred through shifts in the sources of Australian imports over the period to 1970 (see Table 2.4). The proportion of imports from the UK fell from about 60 per cent in the decade prior to World War I to 21.8 per cent in 1969-70, and, in the mid-1960s, the US replaced the UK as Australia's main source of imports. Australia/Japan trade also increased significantly, particularly after 1957 and 1963 when trade agreements removed discrimination against Japanese goods. However, South and South East Asian countries, although an important source of imports during World War II and in the immediate post war period, failed to maintain their share of Australian import markets in the late 1950s and 1960s.

The decline in the share of imports from the developing countries of South and South East Asia can be largely attributed to the commodity composition of Australian imports over this period. It was primarily import demand for highly processed manufactured goods and sophisticated capital equipment which increased. These demands, which were largely met by the US and Japan, could not have been met by the developing countries (Kumar 1970, 41).

The proportion of imports accounted for by producer materials and capital equipment had been increasing since the 1930s (see Table 2.5). This trend away from finished consumer goods reflected the progress of Australian industrialisation and, also, the levels of protection offered to Australian manufacturing industries. This has also resulted in the significant characteristic of high stowage factors in the Australian inward liner trades.

The outward trades

Continued expansion of the export of staple commodities, which had been firmly established in the 19th century, characterised much of the development of Australia's export trade over the period 1900 to 1970. Wool remained Australia's major export throughout this period and with meats, wheat and butter prior to the 1930s, comprised the majority of the cargo (see Table 2.6)

However, the relative importance of wool to export earnings declined

TABLE 2.5 IMPORTS OF MERCHANDISE TO AUSTRALIA, 1913 TO 1968-69
(Annual average percentage of total value)

	Economic class		
Period	*Producers' materials*	*Capital equipment*	*Finished consumer goods*
1913	54	15	31
1919-20	58	8	34
1920-21	61	9	30
1927-28 to 1929-30	58	9	33
1934-35 to 1939-40	59	12	29
1945-46 to 1948-49	63	10	27
1953-54 to 1957-58	54	18	28
1964-65 to 1968-69	55	25	20

Source Boehm (1979, 201).

from the early 1950s, caused principally by the falling price of wool (Boehm 1979, 91). Increases in world wool production and, more importantly, the development of synthetic fibres combined to reduce market prospects. In the USA, for example, wool consumption per capita fell by about half between 1950 and 1970. In the UK, wool consumption per capita also fell after the mid 1960s. Rising real incomes in Japan, however, provided some compensatory market growth, and in 1959-60 Japan displaced the UK as the largest buyer of Australian wool. Growth also occurred in the East European market, however, as in the Japan trade, these 'new' buyers of Australian wool tended to purchase on a free-on-board (FOB) basis to control the transport of the commodity and facilitate the employment of their own ships. The traditional carriers, therefore, did not benefit greatly from the developments of these new markets.

In 1957-59 the US displaced the UK as Australia's principal market for beef exports. Strong demand by the US for Australian beef since the mid 1950s was a major source of export growth, with beef exports recovering from just over 10 000 tonnes in 1944 to a peak of 600 000 tonnes in 1974 (Boehm 1979, 97 Chart 4.4).

Wheat exports also grew substantially from the mid 1950s. In the 1960s, however, the forward linkages of this growth to the liner sector were not significant as the development of specialised bulk

TABLE 2.6 EXPORTS OF PRINCIPAL ARTICLES OF AUSTRALIAN PRODUCE AND GOLD PRODUCTION, AS A PROPORTION OF TOTAL MERCHANDISE EXPORTS AND GOLD PRODUCTION, 1881 TO 1969-70[a]

(Annual average percentage of total value)

Period	*Wool*	*Wheat*	*Flour*	*Butter*	*Meats*	*Hides and skins*	*Tallow*	*Fruit*	*Sugar*	*Minerals (excl. gold)*	*Gold production*	*Other*
1881 to 1890	54.1	4.2	1.1	0.1	1.2	1.7	1.7	0.2	0.5	9.6	17.6	7.9
1891 to 1900	43.5	2.4	0.5	2.4	4.1	3.1	2.6	0.3	0.4	9.5	23.6	7.6
1901 to 1913	34.3	8.1	1.6	4.1	5.1	4.4	1.7	0.5	-	14.8	20.6	4.8
1920-21 to 1928-29	42.9	16.2	4.3	5.6	4.6	5.4	1.1	2.2	1.6	6.6	2.2	7.3
1929-30 to 1931-32	34.9	15.2	4.3	8.6	6.4	4.3	0.8	4.8	2.3	6.0	3.1	9.3
1932-33 to 1938-39	37.0	11.0	3.6	7.6	7.1	3.7	0.5	4.2	2.1	5.3	7.5	10.4
1945-46 to 1949-50	43.4	9.4	6.1	4.6	6.0	3.3	0.2	2.0	1.8	5.4	2.2	15.6
1950-51 to 1954-55	51.9	6.3	3.7	2.0	6.2	2.5	-	3.1	2.6	6.4	1.9	13.4
1955-56 to 1959-60	43.9	5.5	2.0	2.9	8.2	3.0	-	3.7	3.4	7.2	1.9	18.3
1960-61 to 1964-65	34.9	12.1	1.6	2.2	9.6	3.2	-	3.3	4.4	7.7	1.4	19.6
1965-66 to 1969-70	24.6	9.9	0.7	1.7	10.0	2.6	-	3.1	3.4	17.3	0.7	25.9

a. Refers to home produced merchandise.

\- Nil or rounded to zero.

Source Boehm (1979, 86-87).

carriers made the general cargo ships uncompetitive. Similarly, the massive expansion in Australia's minerals exports after 1960 did not imply major growth prospects for liner shipping.

Exports of manufacturers grew strongly in the 1960s (between 1956-60 and 1971-72 the contribution of the manufacturing sector to export earnings increased from 9.2 per cent to 21.0 per cent (Boehm 1979, 89). This helped to rectify the imbalance in shipping requirements between the inward and outward liner trades, and was particularly significant to the introduction of containerization.

The principal gains in manufacturers' exports were in the chemicals and semi-manufactures groups (see Table 2.7). Export of transport equipment also grew significantly, although the machinery exports recorded little growth. Despite the growth in exports of

TABLE 2.7 EXPORTS OF AUSTRALIAN MANUFACTURED MERCHANDISE IN VALUE AND AS A PERCENTAGE OF TOTAL MERCHANDISE EXPORTS, 1963-64 TO 1969-70

Standard International Trade Classification (SITC) Code	*Commodity*	*Annual average 1963-64 to 1966-67* $Am	*(per cent)*	*Annual average 1967-68 to 1969-70* $Am	*(per cent)*
5	Chemicals	53	1.9	137	4.0
67	Iron, steel	71	2.6	113	3.3
68	Non-ferrous metals	128	4.7	205	6.1
69	Semi metal manufactures	8	0.3	34	1.0
	Other	45	1.7	66	2.0
71	Non electric machinery	14	0.5	71	2.1
72	Electric machinery	107	3.9	30	0.9
73	Transport equipment	16	0.6	105	3.1
86	Instruments	10	0.4	18	0.5
	Other	22	0.8	33	0.9

Source McColl and Nicol (1980, 148 Table 3).

manufactures, the sector did not, however, perform well in international markets (see Table 2.8). Commodities which failed to maintain their share of world export markets included iron and steel, transport equipment, machinery, instruments and metal manufactures, because Australia was unable to match high world rates of growth in these commodities (Boehm 1979, 156).

By the late 1960s Japan had replaced the UK as the major market for Australian exports (see Table 2.9). Exports to the South East Asian region also became significant, compensating somewhat for the loss of traditional market shares in the UK, EEC and US.

Resulting implications for the Australian market for liner services

Development in the commodity composition and market distribution of Australian international trade, when coupled with developments in transport technology, clearly had several implications for the Australian liner markets:

- imbalance between the import and export tasks evolved to be a major feature of Australian trades;
- Australia failed to develop significant export markets for

TABLE 2.8 IMPORTS BY AUSTRALIA'S MAJOR TRADING PARTNERS AS A PROPORTION OF THEIR TOTAL IMPORTS, 1963-64 TO 1969-70
(Annual average percentage of total value)

Standard International Trade Classification (SITC) Code	*Commodity*	*Period 1963-64 to 1966-67*	*Period 1967-68 to 1969-70*
5	Chemicals	0.69	1.14
67	Iron, steel	1.30	1.22
68	Non-ferrous metals	2.41	2.17
69	Metal manufactures		
	Other manufactures materials	0.29	0.28
71	Machinery (non-electric)	0.24	0.18
72	Electric machinery	0.28	0.20
73	Transport equipment	0.44	0.24
86	Instrument	0.48	0.38
	Other manufactures	0.30	0.22

Source McColl and Nicol (1980, 151 Table 3)

TABLE 2.9 SHIFTS IN THE DESTINATION OF AUSTRALIAN EXPORTS (EXCLUDING GOLD), 1899 TO 1969-70

(Annual average percentage of total value)

Period	*United Kingdom*	*France Germany Italy*	*USA and Canada*	*Japan*	*South and South East Asia*[a]	*New Zealand*
1899 to 1913	47.2	16.4	4.7	1.1	-	3.1
1920-21 to 1928-29	41.3	19.4	7.7	7.2	-	3.6
1929-30 to 1938-39	49.5	13.2	4.6	9.4	-	3.6
1947-48 to 1952-53	37.2	15.0	10.8	4.9	0.4	3.6
1953-54 to 1958-59	32.3	17.4	8.3	10.9	0.6	5.4
1959-60 to 1964-65	20.5	12.9	11.5	16.6	5.5	6.0
1965-66 to 1969-70	13.6	9.6	15.1	21.8	8.3	5.3

a. India, Malaysia, Hong Kong, Pakistan, Singapore, Indonesia.

\- Nil or rounded to zero.

Source Boehm (1979, 114-115).

manufactures which are now, major determinants of demand for liner services; and

- Australian trades became increasingly oriented towards the West Pacific region, implying reduced shipping distances and, hence, tonnage requirements of Australian trades.

These points are be examined further in Chapter 4.

THE REGULATORY ENVIRONMENT OF LINER SHIPPING: HISTORICAL PERSPECTIVE AND CURRENT TRENDS

This section reviews the development of the regulatory environment of the liner shipping industry with particular reference to Australian experience. It examines, in turn, public policy approaches to industry regulation, and international maritime law. It also provides background to the existing organisation and economy of the liner shipping industry and the current demands for organisational change.

The development of government policy

Since 1929, Australian government policy towards liner shipping industries has been characterised by the adoption of 'conference enfranchising, bilateral monopoly solutions' (Cassidy 1980a, 1) which feature:

- the acceptance of closed conference practice;
- the establishment of national shipping associations as a countervailing force on conference monopoly power so as to 'regulate' conference practice; and
- a role for government which is mainly supervisory and non-interventionist.

The origins of current policy can be traced, to early English common law interpretations of monopoly practice and to the findings of early Commonwealth and US investigations into the conference system.

Common Law Foundations: 1850-1900

The degree of acceptance of *laissez-faire* principles, particularly those relating to trade practices, was an essential element in determining early approaches to liner shipping practice. Divergence in this period occurred between UK and US shipping policies and reflected primarily different anti-trust objectives (Gold 1981,47). This divergence had a consequent effect on the regulatory environment which evolved and, hence, also on the organisation of shipping markets.

In the UK, the principle of *disinterested malevolence* had a clear influence on early judicial interpretations of shipping practice and, thus, on the perceived need for government regulation. By this principle,an enterprise is not prevented from disposing of a rival provided that:

- it does not commit a recognised crime, that is, arson, libel, and so on; and
- the objective is commercial advantage.

It was tested with respect to conference practice in 1889 in the *Mogul Steamship* Case. The defendents in this case were conference operators who had used 'fighting ships' to undercut Mogul's rates and so force him out of the trade. They had also threatened to discontinue the employment of agents who arranged to load Mogul's ships, and threatened shippers with the loss of their rebates if they used Mogul's services. The presiding judge found in favour of the defendents. The decision was upheld by the Court of Appeals, and was unaminously affirmed by the House of Lords in 1892 (Gold 1981, 49). The principle was tested again in 1894, in the *Nordenfelt* v. *Nordenfelt* case, where general restraints of trade were held to be valid.

In the US, acceptance of the laissez-faire doctrine was less complete. After 1850, divergence between US and British common law occurred and was particularly obvious in the introduction of anti-trust legislation (Gold 1981, 48). 'In the US the word monopoly always referred to an unjustified power, especially one that raised obstacles to equal opportunity' (Gold 1981, 50). In 1888, Senator Sherman initiated the US Anti-Trust Act. At this time US law still prohibited engrossing or monopolising, general or total restraint of trade and combinations which tended toward monopoly. The Sherman Act (1890) went beyond this, declaring combinations in restraint of trade illegal. It thus gave courts power to prohibit agreements on which the combinations were based (Gold 1981, 50).

Judicial interpretations of the Act in subsequent years however were according to common law. These held that combinations in restraint of trade were illegal only if they restrained trade unreasonably, that is, by using restrictive agreements or physical coercion, or by excessively raising prices. Shipping conferences thus continued to develop in the US trades (Gold 1981, 51).

Early investigations: 1900-1925

In the UK complaints from commercial interests concerning conference monopoly practice, particularly the use of deferred rebates, initiated specific public policy action on the industry. In 1906, the Royal Commission on Shipping Rings was appointed to investigate shipping conference practice. The majority report supported the conference system, finding that it possessed only limited monopoly power and that the latent possibility of alternative transport modes coming into existence would limit the abuse of monopoly power of the conferences (paras 106 and 110). Its major recommendations for the regulation of conference practice were:

- the establishment of representative shippers associations to bargain in the most favourable position with conferences (paras 324 and 325);
- the vesting in the Board of Trade the power to investigate and act on complaints relating to national interest arising against shipping conferences (para 331); and
- greater publicity of the matter with conference agreements, rebate circulars and so on having to be lodged with the Board of Trade either confidentially or in published form (para 333).

These recommendations and conclusions largely defined the future public policy approaches to liner shipping adopted by most western maritime states. Its influence on Australian policy provides sufficient illustration and this will be outlined later.

The minority report of the 1906 Royal Commission was less supportive of conference practice. It found that the conference system had created a monopoly on which the limitations were, in many cases, illusory. They also noted that such a monopoly was not subject to statutory or legal control and saw this position as inadmissable (Imperial Shipping Committee 1923). The perceived need to regulate shipping practice was therefore considered to be far greater. To ensure regulation, the minority recommended that the Board of Trade's powers to investigate and act on complaints should not be only limited to those relating to public interest. It also recommended greater publicity of conference agreements, requiring them to be presented annually to Parliament, and that publicity also be required of agreements with non-conference operators. Significantly, the minority report foreshadowed some recent policy initiatives which will be outlined later.

In 1923, the final Report of the Imperial Shipping Committee on the Deferred Rebate System was published. The committee had enquired into the system following complaints from the Australian Government concerning its operation. The committee issued its support for the system, concluding that 'conferences must be allowed to extract some assurance of continuous support from shippers as would limit intermittent and irresponsible competition.'

In 1912, the US House of Representatives approved a resolution to have the Committee on Merchant Maritime and Fisheries (the Alexander Committee), investigate shipping combinations. The committee issued its report of findings in 1914 and they subsequently formed the basis of the regulatory portions of the 1916 Shipping Act (Marx 1953, 49). This committee supported the continuation of conference agreements, noting the advantages of greater regularity and frequency of service, stability and uniformity of rates, economy in the cost of service, and so on. However, an important rider was placed on these conclusions, that is, the conference agreements had to be fairly, honestly and openly conducted before the claimed advantages could be secured. The Committee continued, 'the disadvantages and abuses are inherent and can only be eliminated by effective government control'. Its recommendations therefore differed somewhat from that of the British Commission. As implemented in the 1916 Shipping Act, the Alexander Committee recommended:

- that the use of deferred rebates and/or 'fighting ships' be illegal on American trades;
- shipping companies be brought under the supervision of the Interstate Commerce Commission in respect of the regulation of rates and the approval of conference agreements; and
- that the Commission be empowered to investigate complaints and institute proceedings on its own initiative, and to order the discontinuance of unfair practice (Marx 1953, 66).

These two distinct approaches to the liner shipping industry provided the context for the development of Australian public policy and the future organisation of the Australian liner shipping trades.

The evolution of Australian liner shipping policy

Prior to 1925, public policy initiatives in Australia toward liner shipping displayed a clear association with US attitudes, that is, a reluctance to accept the conference system in general, and the more anti-competitive aspects of the system in particular (Zerby 1984, 47). Early Australian anti-trust legislation, the *Australian Industries Preservation 1906 (AIP) Act,* was in fact modelled on the Sherman Act. The Act outlawed, inter-alia, combinations in restraint of trade (s.4), and monopolisation or attempt to monopolise (s.7), although it allowed the defence that agreements were in the public interest. It claimed extra-territorial jurisdiction and thus directly related to overseas shipping. One section (s.7a), which specifically outlawed the use of deferred rebates, was of special significance to liner shipping (Dick 1983, 6).

Australia's status as a dominion of the Commonwealth, however, had a pervasive influence on the attempts to introduce regulation of ocean shipping. Pressure from the colonial office delayed implementaton of the AIP Act until consideration had been given to the findings of the 1906 Royal Commission on Shipping Rings. Implemented in 1910, the Act was rendered innocuous by 1911 through a High Court and supporting Privy Council decision in the *Adelaide Steamship Co* case. Furthermore, as the prohibition of deferred rebates applied only in practice to the outward trades and thus later on provided an obstacle mainly to the operation of the Australian owned Commonwealth Line.

The continued operation of the 1865 UK Colonial Laws Validity Act also restricted Australian public policy. This law declared that:

> A colonial law repugnant to the provisions of an Act of the Parliament of the UK extending to the Colony ....should be void to the extent of such repugnancy (CoA 1930, 11).

The implications for Australian maritime legislation were clear:

- legislation applying to the Dominions enacted by the UK parliament prior to 1911 (that is the UK Merchant Shipping Act, 1884 and 1906) remained as the controlling legislation, (Dick 1983, 16); and
- the Australian parliament had no authority to enact legislation relating to ships coming into the harbours or territorial waters of the Dominion, if the ships were registered in other parts of the British Commonwealth or were foreign ships (Dick 1983, 17).

The Bruce Government removed the conflict by adopting a more conciliatory attitude to conference operators in Australian government policy. By June 1923, the government had introduced a bill to sell off the Australian Commonwealth Line, a major source of hostility between the Government and conference operators. The line was eventually sold in 1929 to the British White Star Line in response to financial pressure due, at least in part, to its inability to retaliate against deferred rebates used by the conference operators to 'squeeze' it out of the trade (Dick 1983, 7-8).

The Bruce Government also introduced the Crimes Act in 1925 to allow the deportation of strike leaders at Sydney's Garden Island; and, in 1928, introduced the Transport Workers or 'Dog Collar' Act. This Act required the formal licensing of waterside workers, with its object being to protect voluntary workers and also to eliminate job control and sectional delays (Burley 1968, 209). Its consequence was the destruction of the power of both the Waterside Workers Federation and the Seamen's Union.

Supporting this came the introduction of the 'Austral' form in 1926 which transferred control of stevedores from charterers to shipowners and thus greatly extended shipowner influence over dock activities. Stridently opposed by charterers, its introduction required the support of the entire British shipping industry as a whole by way of a 'club indemnity', and involved the Chamber of Shipping of the UK in protracted negotiations (Burley 1968, 205).

On the sale of the Commonwealth Line in 1928, conference operators agreed not to increase freight rates without reference to a representative shipper body to be formed for this purpose. No further action was taken however to establish such a body and in 1928 a 7 per cent increase in rates on outward trades was announced. Shippers reacted with strong protests and calls for government intervention. As a result, the Government convened the Overseas Shipping Conference in 1929. Comprising overseas shipowners and shipper representatives this conference was appointed to examine 'the general position of the transport of Australia's overseas trade'. Its primary concern in this was to organise the different interests to ensure the economical and efficient performance of the task.

The parties agreed upon the need to rationalize the trade, and that this rationalization could be best achieved within the framework of closed conferences. 'The quid pro quo was the establishment of a shipper body (Exporters Overseas Transport Committee: EOTC) to negotiate with shipowners (SOTC), with both bodies represented within an organisation known as the Australian Overseas Transport Association (AOTA)' (Dick 1983, 9). AOTA was the body with responsibility for securing economies by rationalizing tonnage, approving freight rates and by approving agreement between shippers and shipowners involved in the various commodity trades. The Government provided facilitative legislation in 1930 by exempting agreements made with AOTA approval from the provisons of the AIP Act. The exemptions included the deferred rebate system. AOTA's purview however extended only to the Australia/British-continental Europe trade. Thus the use of deferred rebates remained, in theory, illegal on other routes; and only the export trade received the benefits of 'consultation' (Dick 1983, 9).

The operation of this system to the mid-1950s was characterised by a general lack of cohesion of shippers (Cassidy 1980a, 1). Shipper dissention by 1934 in fact led to the abolition of the federal EOTC. Thereafter, shippers had to negotiate through separate State EOTCs (Dick 1983, 10). This added to the unwieldiness of the shippers' association as a countervailing force. Shipper influence over conference procedure through the pre-war period remained limited, and was largely confined to shippers, such as The Dried Fruits Board, The Dairy Produce Board, and The Meat Board (Dick 1983, 12).[4]

During the war, and in the post-war period to 1953, AOTA became defunct whilst the British Ministry of Food organised food purchases from the Australian government on an FOB basis.

The inability of government to control freight rate increases in 1953 and 1955 (see Dick 1983, 12), resulted in a reunited federal EOTC setting up an agreement with shipowners to fix freight rates according to a 'cost-plus' type of freight formula (Cassidy 1980a, 1). Under this system freight rates were set (that is, adjusted across-the-board) for the next period (year) on the basis of an analysis of the costs. After allowing for full cost recoupment including depreciation on ships and an agreed return to capital, the historical record of voyage revenues was compared with what the conference was 'allowed' to earn under the formula. This system persisted until 1967 and still has a discernible influence on freight rate negotiations.

Cassidy (1980a) provides a critique of this approach. Two main sources of weakness in the implementation of the approach were identified. First, the lack of provision of meaningful and adequate business and accounting data from conference sources and second, inherent problems in the technique itself. These inherent problems raised by Cassidy are summarised below:

- The use of average cost data rather than best practice levels in the computations for freight rate adjustments introduces a bias into the consequent resource allocations;

  > If an industry is already behaving competitively, prices should clearly be related to best-practice costs if the price surveillance process is not actually to worsen resource allocation. On the other hand, if the industry is not competitive then the adoption of best-practice pricing criteria by the price authority would

4. Only the threatened withdrawal of shipper support from the AOTA system achieved rate reductions in 1933-34 (Dick 1983, 12).

contribute to an improvement in efficiency of resource allocation as well as to the moderation of inflation (Parmenter and Webb 1974, 59).

- The approach ignores the demand side of the equation and takes no account of changes in productivity (see also Bennathan and Walters 1966, 96-97). Consequently, whilst shippers are insulated from rate increases caused by dramatic increases in demand, rationing of shipping space on a price basis during trade boom conditions is not allowed for.
- The practice sanctions 'a cementation of profit relativities between liner shipping and other industries' through the allowance for a 'reasonable profit'. As a consequence, quasi rents become 'price determining' rather than 'price determined' and the relevance of the price mechanism for allocative efficiency is removed.
- Cost-plus contracts transfer the risk involved in a business venture entirely on to one partner (see also Arrow, 1971). Thus the incentives to cost-reduction are removed and 'consumer contractees are also called upon to shoulder all the commercial risk involved as well' (see also Scott 1979, 3).
- The approach strengthens conferences vis-a-vis competitive shipping alternatives and introduces unnecessary rigidities into rate-making.

By the mid-1960s, the failure of this policy approach to address issues associated with the underlying justification of conferences was becoming increasingly apparent. The conferences had not rationalized port calls and services, nor introduced new ship and cargo-handling technologies in the post-war period. This resulted in major inefficiencies in the Australia/Europe trade (Dick 1983a). New legislation was introduced to rectify the situation which, although holding to the general philosophy and approach towards liner shipping, elaborated and tightened the old AOTA provisions (Dick 1983, 12).

The *Trade Practices Act 1965* (and subsequent enactments) continued to reaffirm the philosophy of early legislation that is, conferences 'suitably regulated' were in the 'public interest'.[5] Conferences were allowed (by exemptions provided by s.112 and s.113 in Part IV of the Act) to:

- fix and regulate freight rates;

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5. Part X, which exempts liner conferences from the general provisions of the Act.

- give or withhold special rates, privileges or advantages;
- allocate ports or restrict sailings; and
- restrict volume or character of goods carried (DoT 1978, 31).

To ensure regulation of these activities, shipowners were required to negotiate with 'designated shipper bodies' (s.122). To add force to this, in 1966, through an amendment to the Act, the Governor General was given discretion to disapprove a conference agreement if he was not satisfied on a number of grounds, including that the services were 'economical, efficient and adequate.'

A single designated shipper body was not nominated in the legislation until a 1972 amendment of the Act. This body was formed 'for the purpose of negotiations with shipowners and other carriers with regard to arrangements for, and the terms and conditions applicable to the carriage of cargo.... from Australia' (ASC Constitution). The creation of the ASC reflected a continuing belief in the enhanced bargaining power provided to shippers by a centralised negotiating body (Cassidy 1980a, 4).

This reliance on commercial negotiations to ensure efficiency in overseas liner shipping defined a role for government action which was primarily supervisory. Two purposes for government intervention were cited in the Department of Transport (DoT) review of the legislation, 1978:

- to ensure that monopoly powers are not used to produce unreasonably high profits or to dull innovation and responsiveness so that costs or quality of service become unreasonable; and
- to ensure the reasonableness of commercial responses.[6]

A role was also established for government involvement through the operation of the Australian National Line (ANL). ANL was required to compete on commercial terms and does so as a member of the established shipping conferences.[7] Its perceived role in contributing to the

6. Existing legislation supports this role by providing Ministeral powers to disapprove conference agreements (s.123 and s.129), and to request the provision of any information necessary to determine whether there is any case not to disapprove such an agreement (s.132 and s.129).
7. Tax concessions and so on are provided in line with common OECD practice (see Crawford 1982).

achievement of more efficient overseas shipping was, at the time (DoT 1978, 61-62):

- through direct influence within a conference to support Australian trading interests or by itself meeting special shipping needs not catered for by a conference;
- through influence on foreign shipowners to improve their service rather than risk the entry of ANL service into a trade; and
- to encourage innovation through the employment of different types of vessels in different trades and the adoption of modern cost-saving techniques; and to afford the Government, as well as the Line, a closer insight into the costs and conditions of operating in overseas shipping.

The final aspect of government liner shipping policy which warrants attention is the emphasis on outward trades. A reason suggested for the lack of weight given to inward shipper interest in liner shipping policy was that the higher rates on the inward trades were welcomed because they effectively increased protection for domestic import competing industries (Cassidy 1980a, 11). However a major reason for not attempting to regulate inward shipping is the need to maintain comity in international relations.

Current policy perspectives

Public policy in Australia towards liner shipping has been characterised by the conference enfranchising bilateral monopoly solutions that were advocated in 1909 by the Royal Commission on Shipping Rings. The adoption of this approach to the industry displayed a clear association with British judicial and governmental, rather than US, attitudes towards monopoly, and in particular conference practice.

Recently, however, these approaches have been reassessed, both in Australia by the industry groups concerned, and overseas in various legislative reviews. Current views are outlined below to provide a perspective of future possible directions in Australian approaches to the regulation of the industry.

Australia

Conference operators in the Australian trades support the 1909 majority view of the industry of the Royal Commission on Shipping Rings by claiming that the market is highly contestable and consequently the threat of new entrants provides for regulation of conference practice in itself. However, they do perceive a need for government regulation of 'non-commercial' practice in the industry, specifically that of State-owned operators and cargo reservation schemes. The operators believe that the market-value compensation for qualitative differences in the service between conference and independent operators, especially those which are government-owned and controlled, should be carefully monitored and the equity effects of differing preferences for speed and frequency, for loyalty arrangements and for the structure of tariffs, be closely examined (Various Liner Conferences 1984, 108).

Australian shippers' perceptions of the need for industry regulation, however, are markedly different. In ASC's opinion, the transport task would be performed better if conference operators were exposed more to competition for the privilege of being legalised cartels, and more accountable for their collective exercise of the privilege (Blair 1984, 16).

To achieve this increased competition and accountability the ASC (1984, 3-4) proposes several changes in the regulatory environment:

- Conference agreements be subject to review and approval prior to their implementation, and that this review be conducted according to guidelines which clearly identify Australia's expectations of liner shipping. The objectionable practices which this review process would aim to preclude includes the discriminatory use of rebates, the use of predatory practices to exclude entry of new lines, and bans on service to shippers who had previously used non-conference services.
- Parties who do not comply with the legislation be made subject to the penalties of the anti-trust legislation from which they are exempted.
- The imposition of a uniform 100 per cent loyalty system and associated rebating practices be proscribed. The ASC proposes instead a system based on: approved service contracts, negotiation of maximum tariff rates by the shipper body, and a margin below these rates within which tariff rates will be set.

Europe

European public policy approaches towards the liner shipping industry remain characterised by an acceptance of the closed conference system and the virtues of self regulation. This was clearly demonstrated in the proposals to exempt most aspects of shipping conference agreements from the anti-trust provisions (Articles 85 and 86), of the EEC's

Treaty of Rome.[8] Article 85 prohibits agreements between undertakings to fix prices and share markets. Article 86 prohibits the abuse of dominant position by, for example, the fixing of unfair prices. The exemptions were designed to maintain the closed conference system. Regulation is minimised, except in trades where non-conference competition is precluded. In these cases a tighter regime of monitoring conferences has been proposed.

Under the proposed regulations there is no obligatory filing of agreements, however, an agreement may be checked for its harmony with the competition rules. There is no filing of freight rates, however, there is a condition that the rates will not discriminate between shippers, ports and other carriers on the basis of nationality. The loyalty-contract system is recognised as a necessary tool of the conference system. The role of shipper councils as a countervailing power has been reaffirmed and the encouragement of their activities by government supported. Where foreign shipowners engage in unfair practices (as defined in the regulation) which cause injury to community shipowners, penalties may be applied.

The development of specific provisions for the regulation of conference practice, however, has been largely left to the concerned private interest groups - The Committee of European National Shipowners' Association (CENSA) and the European Shippers Council (ESC). These two groups devised consultative machinery for regular discussions between shippers and conferences[9] and a code of practice for liner conferences.[10] Both are purely commercial instruments based on voluntary co-operation, 'the height of non-government international relations' (Hermann 1983, 127) and as a consequence the codes are not enforceable and provide no assurance that parties will abide by the provisions.

The United States: the 1984 Shipping Act

The Shipping Act of 1984 provides for significant changes in the regulatory environment of the US liner shipping trades. Its general thrust, as seen by Friedmann and Devierno (1984, 312), 'is to reduce government regulation of carriers while placing greater reliance on

8. Progress towards a common transport policy: Maritime Transport EEC VII/285/84. Communications and Proposals by Mr Contogeorgis to the Commission in agreement with Mr Andriessen. See also *Containerisation International*, February 1985, 64.
9. Note of Understanding (1963), cited in Hermann, (1983, 124).
10. Code of Practice for Conferences prepared by CENSA and ESC 1971.

shipper demands for low rates and good service as a means of 'regulating' carriers'. It reaffirms recognition of the open conference system by the United States, attempting to redress the 20-year trend in court decisions, which have had the effect of bringing the regulation of liner conferences into accord with other industries (that is according to anti-trust legislation).

Most significant, however, is the increased reliance placed on market place regulation by the Act. To ensure carrier responsiveness to shipper demands the Act contains several 'shipper' provisions.

First, there is a statutory requirement that every conference agreement provide its members with the right to take independent action on rate and service matters at 10 days notice; and second, authority is given for operators to offer 'service contracts' to shippers. These are defined in the legislation as:

> a contract between a shipper and an ocean carrier or conference in which the shipper makes a commitment to provide a certain minimum quantity of cargo over a fixed time period, and the ocean common carrier or conference commits to a certain rate or rate schedule as well as a defined service level - such as assured space, transit time, port rotation, or similar service features; the contract may also specify provisions in the event of non-performance of either party (S. 3(2)).

Recognition that these contracts confer benefits, in terms of discounted rates, primarily to large shippers, resulted in another provision in the Act which gives statutory recognition to shippers' associations. These are allowed under the Act to consolidate and distribute freight on a non-profit basis to secure volume rates or service contracts (S.3(24) of the Act, 46 USC 1702(24)). Together with the other shipper provision this provision aims to increase shippers' negotiating power vis-a-vis carriers, so that 'shipper regulation' could substitute for government regulation (Friedmann and Devierno 1984, 348).

Developing Countries: The Code of Conduct for Liner Shipping

In contrast to the trend evident away from government regulation in US shipping policy, developing countries advocate an organisation of shipping markets where the government both lays down the policy and either engages directly or, closely supervises, the development of appropriate practice (Sturmey 1980, 44).

The UN Code of Conduct for Liner Conferences, adopted 6 October 1983, endorses this involvement. Whilst the code also endorses closed conferences, it provides for the regulation of conference practice. The aim of the code is to make conferences more open and responsible in their dealings with shippers (EIU 1984, 57).

The main regulatory provisions of the code are outlined below:

- Conference members are left to decide admission of a new line (Article 1). However, conferences are only open to national shipping lines which serve the trade of their country, membership is based on the 40:40:20 cargo sharing principle (Article 2), and conference decisions are subject to dispute settlement procedures (Article 23).
- Guidelines for the self-policing of conference member practice are set. 'Failure to comply with self-policing decisions will be regarded as a violation of the code' (Article 5).
- Conference agreements must be made available on request to appropriate authorities and the public of those countries whose trade is served by the conference or whose national line is a member of the conference (Article 6).
- Loyalty agreements, and the use of deferred rebate and dual contracts are supported. Guidelines on the form of the loyalty contract, are provided, however, to safeguard shippers (Article 7).
- Freight rates are regulated. 'Freight rates shall be fixed at as low a level as is feasible from the commercial point of view and shall permit a reasonable profit for shipowners' (Article 12).
- Shippers' Councils are recognised and fostered. Subjects for discussion in consultations are also nominated (Article 11).
- International dispute settlement machinery is outlined, defining possible disputes which must be subject to mandatory international conciliation at the request of any of the parties (Articles 24 to 26).

The evolution of international maritime law

As in the case of policy approaches to the liner industry, European attitudes have also greatly determined the form of the various commercial contracts which relate to international maritime transport. The evolution of this body of law is outlined below.

Most present day international maritime law was developed by the

Comite Maritime International (CMI), a body created in 1897 to:

> promote the establishment of national association, by conferences, by publications, by other activities or means, the unification of international maritime and commercial law and practice, whether by treaty or convention or by establishing uniformity of domestic laws, usages, customs or practices.

The CMI can be viewed as the product of attempts to standardize the various national codes which had developed relating to bills of lading, charter parties, insurance, liability and so on (Gold 1981, 108). These attempts were made by private interest groups (shipowners, merchants, bankers and insurers) in a period when nationalism dominated international affairs. As a consequence, the early development of common maritime law was concerned almost exclusively with private maritime law, examining only legal and policy matters as they related to maritime commerce. This separation of private commercial law from public concerns relating to the oceans was reflected in the interests of the CMI and, consequently, to the development of maritime law.

> Private-law matters would now truly belong in the private sector whereas public law and policy relating to the oceans would from now on be completely under the jurisdiction of the foreign ministries of the major maritime states, (Gold 1981, 105).

The CMI's European origins also had a pervasive influence on the development of international maritime law. In 1972, of the 33 member states only six were third-world nations, and of these five were long established Latin American maritime states (Gold 1981, 360). In commenting on this Verziyl (1968) stated

> ...there is one truth that is not open to denial or even doubt, namely, that the actual body of international law, as it stands today, not only is a product of the conscious activity of the European mind, but also draws its vital essence from a common source of beliefs and in both aspects it is mainly of western European origin.

The consequent bias in the development of international maritime law was first considered fully when the United Nations Conference on Trade and Development (UNCTAD), in 1969, established a Working Group on International Shipping Legislation (Astle 1981, xi). Its terms of reference gave particular mention to bills of lading. The evolution of these documents, and the implications of this development for the organisation and economy of shipping markets, provides illustration of general development and consequences of international maritime law.

Historically, maritime law held the carrier of goods by sea absolutely liable for cargo loss or damage, whether or not the carrier was negligent and regardless of the cause of loss. By the eighteenth century however, judicial decisions began to afford shipowners the ability to exempt themselves from liability in respect of all perils of the sea and of navigation 'of whatever kind'. Through provisions inserted in bills of lading such as 'exoneration' or 'negligence' clauses, shipowners began to limit contractually the strict liability imposed on them by maritime law (Astle 1981, 5).

As a result, by the late nineteenth century, shippers were being given little or no protection for their goods. In addition, due to the diversity of national contractors and freedom of contracts, no standardized procedure was available to formalize contracts. Under pressure from shippers, insurers and bankers, British shipowners adopted a model bill of lading, 'The Conference Form,' in 1882. This unified procedure provided the basis of the 1885 Hamburg Rules, and, on demands for further reform, The Hague Rules in 1924.

These rules, developed under the auspices of the CMI and the International Law Association, determined the distribution of liability for cargo loss between cargo owner and carrier, in most trades, over the period to 1978. Revision of the rules did take place over this period under the auspices of the CMI, the most significant revision being the introduction of the 'Visby Rules' in the late 1960s to adjust the limit of liability to keep pace with inflation (Allan 1984, 26).

On reviewing the economic aspects of these bills of lading (BL) the UNCTAD Committee in the early 1970s found that:

- the BL as constituted failed the test of cost effectiveness;
- the incidence of the cost involved was mainly on the cargo owners and only to a limited extent on the carrier;
- there was a real income transfer from countries which were more important as cargo owners to those which were important as carriers; and
- the developing countries as a group were among the losers in real income transfer (Astle 1981, 32-33).

The Hamburg Rules, as passed by the Final Act of the United Nations Conference on the Carriage of Goods by Sea (held in Hamburg on the 6-31 March 1978), were intended to re-distribute the risks borne by cargo owners and shipwners. UNESCAP (1982a) outlined the main changes introduced by the convention.

These are:

- The period of responsibility was extended to cover the entire period when the goods are in charge of the carrier.
- Its provisions were applied to the contract of carriage and not merely to BL.
- When carriage is performed by a person other than the carrier, the 'actual' carrier was made jointly and severally responsible to the extent that both parties are liable.
- The long list of exceptions exonerating the carrier from liability was eliminated. The carrier was instead made liable for loss, damage or expense resulting from loss of, or damage to, the goods, as well as from delay in delivery, of the occurrence which caused the loss, damage or delay which took place while the goods were in his charge. Liability can only be escaped if all measures that could reasonably be required to avoid the occurence and its consequences had been taken. The exception of fire was removed leaving the carrier liable if the claimant proves that the fire was caused by fault or neglect of the carrier. The carriage of live animals, which was not covered by the Hague Rules, was brought into the new Convention by making the carrier liable unless loss or injury to them arose from any special risks inherent in such carriage.
- The Hague Rules' exception of 'any reasonable deviation' was eliminated but the carrier would be immune for loss, damage or delay to goods resulting from measures to save life and from reasonable measures to save property at sea.
- The carrier was made liable for loss or damage to deck cargo (which was not covered under the Hague Rules) if the cargo is carried contrary to agreement with the shipper, usage or regulation, and resulting solely from deck carriage.
- A 'common understanding' was annexed to the effect that the Convention is based on the principle of presumed fault or neglect, the burden of proof resting on the carrier except where this may be modified in a particular provision.
- The monetary limit of liability was raised. For delay in

delivery of goods, liability was limited to 2.5 times the freight bill.[11]

- The imposition of inconvenient venues for litigation or arbitration was in effect barred by virtue of claimants being permitted to bring legal actions, including arbitration proceedings, in various listed venues, which include the port of discharge.

Australia has yet to adopt the Hamburg Rules. Australian shippers, however, support accession, claiming that they are severely handicapped by the legislation in addressing inequality in this area (Blair 1984, 14). Shipowners and the Australian Marine Insurance industry, however, have voiced considerable opposition to accession, claiming such a move will result in increased costs to users.

The formulation of such laws of carriage by UNCTAD represents a divergence in the development of international maritime law. Representation of shipper interest is novel to the industry as are the outcomes in terms of the industry's organisation and economy.

The development of national fleets

Adherence to principles of economic liberalism and the freedom of the seas relies on an absence of barriers which might have discriminatory effects on the allocation of cargoes between national fleets. This liberal order of shipping markets results, in principle, in the determination of cargo allocations between national flags on the basis of comparative advantage (Boehme 1978, 35). Acceptance of this economic premise in Australian policy has been reflected in the continued foreign flag domination of Australian shipping. It contrasts the interventionist approach of, in particular, the US and the new maritime order advocated by developing countries. It is the purpose of this section to examine the development of the various approaches to national flag participation and in particular the evolution of Australian-flag participation.

The liberal shipping order developed in the UK with the repeal of the Navigation Acts in 1849 was adopted, in principle, by most other maritime states. The rationale for allowing free access to ships of

11. It should be noted that, with regard to countries which are not members of the International Monetary Fund (IMF), special provisions apply for conversion of the relevant units of account, in the Amending Protocol of 1979 and in the Hamburg Rules.

all flags to UK ports was clearly stated by a Board of Trade departmental committee in 1918.

> In view of its relative size, the British mercantile marine stood to gain more from free access to foreign countries than foreign flags stood to gain from free access to British ports.

This competitive organisation of international shipping markets quickly proved inadequate to the various shipping aims of the other maritime states in the twentieth century. Protectionism and/or preferential shipping policies have become common to most maritime states and had a consequent influence on the allocation of cargoes between national fleets.

The United States in particular adopted interventionist approaches to the industry. This reflects a reconciliation between the visible and invisible aspects of ocean shipping, as was clearly illustrated in 1937 by the US Maritime Commission when it recognised that:

> shipping in the United States is not a commercial enterprise in the orthodox sense of the word, but an instrument of national policy maintained at a large cost to service the total needs of commerce and defence (The Economic Survey of American Merchant Marine, cited in Gold (1981, 195)).

To promote the competitiveness of the US fleet, subsidies and financial assistance were provided, whilst cargo reservation laws were also applied to ensure the use of national ships in the carriage of US foreign trade.

For the traditional maritime states of industrialised Europe and Japan principles of economic liberalism had a more permanent influence. Government intervention has in general remained limited to the provision of shipping subsidies and financial assistance to promote competitiveness, or in some cases to the reservation of certain classes of freight to their national fleets.

These states have agreed to the principle of 'free circulation of shipping in free and fair competition' (OECD Code of Liberalisation of Current Invisible Operations, 1970 (OECD, 1982)). However, the shipping provisions (embodied in Note 1 to Annex A of the Invisible Code) have been broadly interpreted to accommodate government measures of the kind identified above, and to encompass government approval for commercially-determined restrictions on access to freight in the liner shipping sector, (that is, the operation of liner conferences). As a member of the OECD Australia also subscribes to the Invisibles Code.

Within United Nations shipping forums, developing countries, as a group, have rejected exclusive reliance on comparative advantage determinations. Their claims for a new international maritime order (in which national shipping aims, rather than intrinsic economic criteria, govern the organisation of shipping), and the consequent role for government, comprise three main elements:

- the need to have some control over the significant proportions of their foreign income accounted for by expenditure on freight services and, consequently, involvement in freight rate determinations;[12]
- the desire to give assistance to national enterprises in the shipping field, either private or with State involvement and consequently, discriminatory provisions in favour of national lines;
- the attitude that the cargo generator is 'per se' entitled to the transportation of that cargo, and hence the concept of bilateral cargo-sharing arrangements, the rejection of comparative advantage determinations, and the discrimination against cross-trading lines (OECD 1982, 117).

The UN Code of Conduct for Liner Shipping provides some support for these principles. It requires that 'equal rights to participate' be given to national lines in a trade between two countries, with cross traders also having rights to a part of the trade 'such as 20 per cent.' The code has thus become synonomous with the 40:40:20 cargo sharing principle, a hallmark of developing countries' claims. The principle, however, is not an explicit requirement of the code.

In any case, the impact of this upon the traditional, private-market organisation of international shipping is expected to be minor, see Sturmey (1984), EIU (1984) and Moore (1984). First, the 'Brussels Package', adopted by the European Community Council in 1979, provides that the 40:40:20 principle should not apply to trade between EEC and other OECD countries by reciprocal agreement. OECD countries would however, still have rights to operate as cross traders outside OECD

12. IMF study (International Services Transaction Under-developed, UN Pub Sales No 64.II.5.15) estimated that greater than one-third of total balance of payments deficits of developing countries were accounted for by freight costs.

trades (EIU 1984, 58-59). Second, the US has refused to ratify the code, insisting that the principle of 'free access' be retained for agreements in its trade (Moore 1984, 274). Third, while the code applies only to conference trade, in most trades, since the advent of containerization, outsiders have claimed increasing proportions of the traffic. EIU (1984) claim that outsider penetration increased on many routes from 5 to 10 per cent ten years ago, to 20 to 30 per cent more recently. A similar trend has been experienced on Australian trades (see Chapter 5).

Australian participation

Australian shipping policy towards the development of national flag participation has traditionally been characterised by an acceptance of market determined allocations. The perceived role of national flag participation in the interests of commerce and defence, which justified market intervention in the US case, were apparently not accepted in Australian policy. Indeed between 1927 and 1969 no Australian-flag ship participated in the overseas trades.

In 1969, the Federal Government-owned Australian National Line entered the overseas trades. It was required to operate on a commercial basis, government policy in the 1970s being to continue to support and encourage entry of Australian-flag ships into the overseas trades where this would be 'economical and efficient'.[13] This proscribed the adoption of any protectionism or preferential policies that supported the development of a national fleet.

The Crawford Report (1982), examined the implications of this policy stance for the ability of Australian lines to capture a larger share of the available trade. Amongst the reasons specified for a demonstrated lack of competitiveness of Australian shipping was the nature of financial assistance given to foreign owners for building and/or operating ships. Its recommendations which were subsequently adopted by the Government, included the following provisions for Australian ships:

- accelerated depreciation allowances;
- exemption from import duties;
- investment allowances; and
- financial assistance, if manning levels were reviewed and agreed.

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13. Liberal-National Party Policy 1975. The Whitlam Labor Government, 1972-75, supported but did not implement the 40:40:20 principle.

The fact that ANL operates within the conference structure has been cited as limiting the Line's ability to capture larger shares of the available trade. The limitations imposed by conference pooling arrangements were demonstrated as early as 1970. ANL had inaugurated the Eastern Sea Road service between Australia and Japan employing ro-ro ships, which, by common consent had been able to give better service and faster delivery to its clients and has been favoured with reasonable loadings throughout (Australian Shipping Commission 1970, 7). As a consequence ANL quickly exceeded its allotted pool share (23.3 per cent of the northbound and 17.6 per cent of the southbound trade) and was thus required to reimburse the conference approximately $1m *(South China Mail,* 25 July 1970). Commenting on this, Mr J. Williams, then Chairman of ANL, remarked:

> ....whatever justification there may be for 'pooling shares'; at a time of vast technological change such as the industry is now going through, and with the need to promote and aid any new development likely to yield a more economic service, the question should be faced as to whether those members of a conference, by their voting strength alone, should be able to hamstring the enterprise of local minorities, whose ships have proved their worth, by refusing a reasonable share, by overtonnaging a trade, or by any course save by providing an equal or better service.

ANL has been successful in negotiating higher conference shares in some trades in recent years. Australian maritime unions also have used the conference system to maintain Australian-manned ships in overseas trades. The 'accords' to regulate non-conference competition in the northbound trade, which resulted from union action in support of ANL's operations, serves as an example.

Government policy retains the requirement that ANL be operated on a commercial basis.

> ...the only responsible way to expand our shipping industry is for the industry to become more efficient, more competitive and more aggressive in the marketing of its services' (Morris, MHR, Hansard, 19/2/84, 203).

Some recent willingness to intervene in support of Australian-flag participation, however, has been demonstated. In 1984 the Government announced that Australian shipowners operating in the overseas liner trades would receive priority in the carriage of Commonwealth cargoes, provided the service offered is reasonably competitive in price, announced that Australian shipowners operating in the overseas liner trades would receive priority in the carriage of Commonwealth cargoes, provided the service offered is reasonably competitive in price, timeliness and reliability. Extended depreciation allowances were also introduced in 1984, as were investment allowances, on the condition of reduced manning levels (Income Tax Assessment Bill (No.5) February 1984).

CHAPTER 3 CURRENT INDUSTRY ORGANISATION AND INSTITUTIONAL SETTING

This chapter presents details of the organisation of the international liner sea task. It describes the various participants in the sea transport chain, their role and function, as well as how they interact to organise the movement of cargo. The description includes a discussion of the:

- structure of the Australian shipping industry;
- commercial rationale of the current organisation and responses occurring to technological change etc; and
- limitations of this organisation in terms of broader economic objectives.

Of the various participants in the liner shipping industry, the most obvious are the ship operators and the exporters and importers. Conceptually, the organisation of liner services involves the interaction of these two groups; with the various freight services provided reflecting the transport characteristics of the commodities.

The international liner market in reality is far more complex. Individual shippers, consignees and shipowners are, most often, not directly represented in the market. Rather, their interests are represented by industry organisations (such as commodity groups and conferences) and specific intermediaries (such as freight forwarders and agents). The interests of national governments and unions are also represented and influence the organisation of the market.

Three broad levels in the liner sea freight task are identified to examine the various participants and their activities in the market:

- the organisation of the movement of freight;
- the organisation of the provision of shipping services; and
- the institutional setting.

These and the various activities and participants involved are outlined in Figure 3.1.

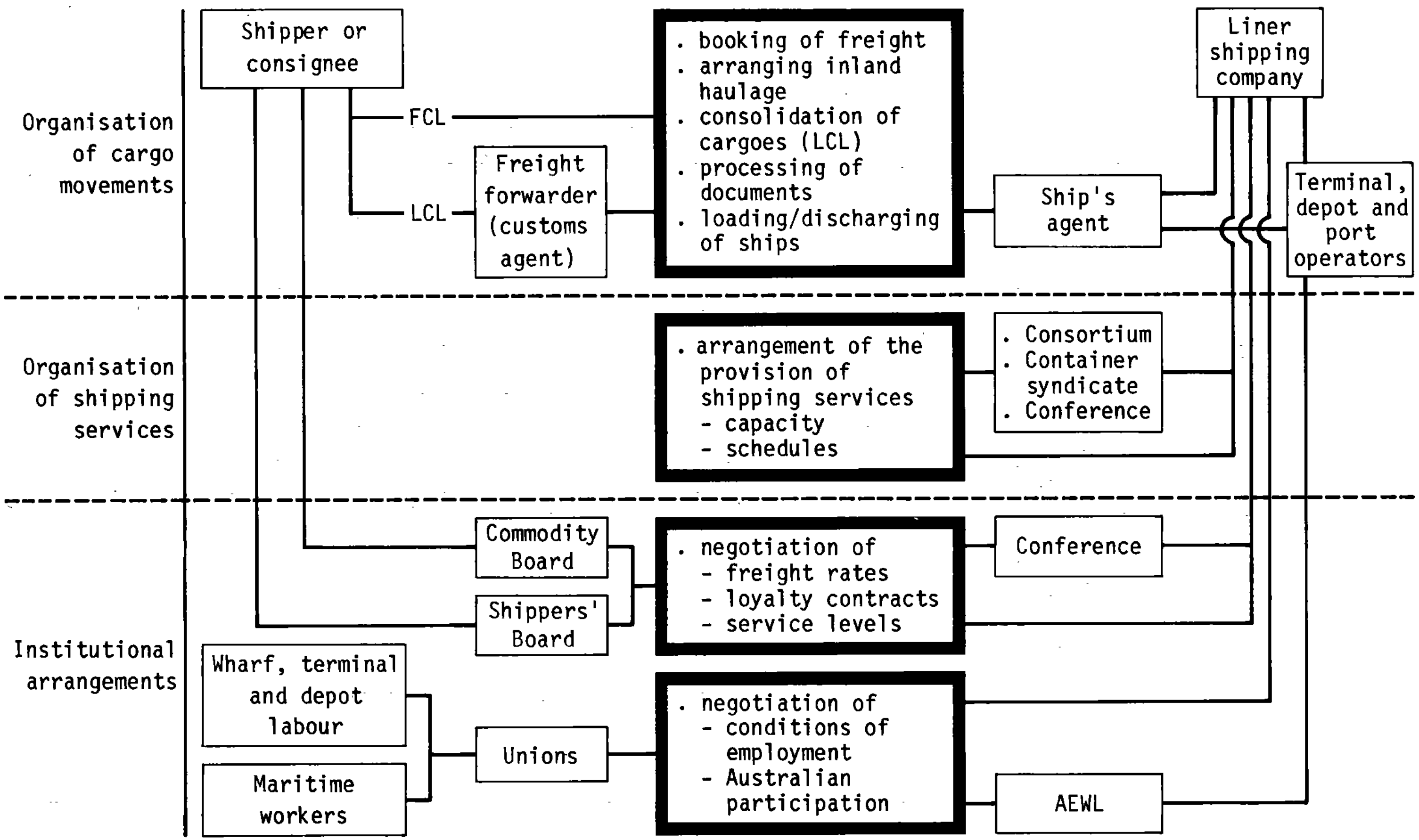

Figure 3.1 Role and structure of the major participants in the liner industry

IMPORT AND EXPORT PROCEDURES FOR LINER CARGO

This section traces the organisation of the movement of an article of liner freight following a transaction of goods between two parties, in different countries. This organisation has commercial, financial and transportation aspects, each involving different parties, and each requiring specific documentation. These are examined in turn.

An analysis of this requires a degree of generalisation of circumstances. This description should therefore only be treated as an overview, not a detailed portrayal of events.

Commercial aspects

Following a decision by the importer to purchase goods from a particular overseas supplier, the two parties enter into a *sales contract* regarding the sale and purchase of the goods.

This contract governs the rights and obligations of the parties to a transaction. It specifies the physical details of the purchase and stipulates details relating to shipment and payment. These may include:

- liability for freight, insurance and handling charges;
- the method of payment; and
- the date by which shipment is to be made.

Other documents required in the transaction include the *commercial invoice* and the *insurance certificate*. The commercial invoice is the accounting document by which the seller charges the goods to the buyer. It provides a description of the goods, their price, terms of delivery and payment, and shipment details. It is normally required for presentation before payment and customs clearance can be arranged. A *packing list* may also be provided which amplifies the details of the invoice, for example, specifying the individual contents of each carton.

The insurance certificate provides coverage of the risks which the supplier or consignee may be liable for in the movement of the goods. It is required to arrange payment for the goods and must be consistent with the description of goods and carriage of the other documents. It is endorsed by the insurance company or underwriter (or their agents) and must be dated on or before the date of shipment (ICC 1985, 26).

Financial aspects

Arrangements for the settling of international payments necessarily play a fundamental role in the organisation of trade. Most payments are organised through banks as intermediaries. The parties' requirements of security in the transaction, prompt payment and finance has formed the basis for development of international standard practices on payment procedures. The two main methods of payment which have evolved are *The Documentary Credit Method* and *The Documentary Collections Method*. These are outlined below according to the International Chamber of Commerce's 'Uniform Customs and Practices' (UCP).

The Documentary Credit Method
This is a method of payment whereby the supplier can receive payment for the goods on the provision of stipulated documents to a bank nominated by the importer.

The importer arranges for his bank (issuing bank) to issue a *documentary letter of credit* in favour of the supplier, prior to the shipment of the goods. This is a conditional undertaking by the bank given to the seller, to pay at sight or at a determinable future date up to a stated sum of money, within a prescribed time limit and against stipulated documents (ICC 1985, 6). These documents are likely to include those required for commercial, regulatory and transport aspects of the transaction.

The Documentary Collections Method
By this method, payment for the goods follows the presentation of stipulated documents to the buyer.

The seller ships the goods and instructs his bank (the remitting bank) to present the agreed documents to the presenting bank. The presenting bank delivers the documents to the buyer against payment or acceptance of drafts according to the terms of the collection order. The presenting bank advises payment to the remitting bank, which advises the seller.

As this method obligates only the buyer, not the bank, to pay on presentation of the relevant documents, it offers less security than the credits method. It is, however, less expensive and thus useful where the parties are well known to each other.

Transportation aspects

Arranging the movement of goods by sea involves a wide range of activities, including communications, material handling, warehousing, transportation and storage. Organising this movement is largely the responsibility of the ships' agent, on the one hand, and the shipper or consignee (or their representative freight forwarder or commodity board) on the other.

The division of responsibility between these organisations and/or individuals can not be comprehensively described because variations exist in each trade due to customs, regulatory environments and trade conditions. The terms of sales contract and the quantity of cargo shipped, however, provide a more universal basis for describing transportation aspects.

The terms of the sales contract determine the division of responsibility between the consignee and consignor for the organisation of transport services. If the terms of delivery are FOB (free on board), FAS (free alongside ship), or ex-works the buyer is responsible for the method and routing of shipment, transport from the port, and/or transport to the port. If the terms are CIF (cost, insurance, freight), C & F (cost and freight) or 'delivered', it is the sellers' responsibility (see Figure 3.2).

The quantity shipped largely influences the participation of such intermediaries as freight forwarders and depot operators. A large shipper seeking to ship a commodity may deal directly with the ship's agent to arrange transport services where Full Container Loads (FCLs) can be presented directly to the terminal. Small shippers, with Less than Container Loads (LCL) however, may not deal directly with the ship's agent but instead employ a freight forwarder to arrange all or some of the transportation and associated documentation required.[1]

The need to consolidate LCL consignments into containers for shipment adds stages to the transport chain confronting small shippers. Where the liner operator employed offers only a FCL service (this is rarely the case in Australia), freight forwarders will receive, consolidate, and then arrange shipment of LCL cargo. Where the liner operator does offer a LCL service, the depots it operates will compete with the consolidation services offered by the forwarder. In cases where the shipping operator provides a 'through transport' service, it may also assume responsibility for arranging road or rail haulage of cargoes to

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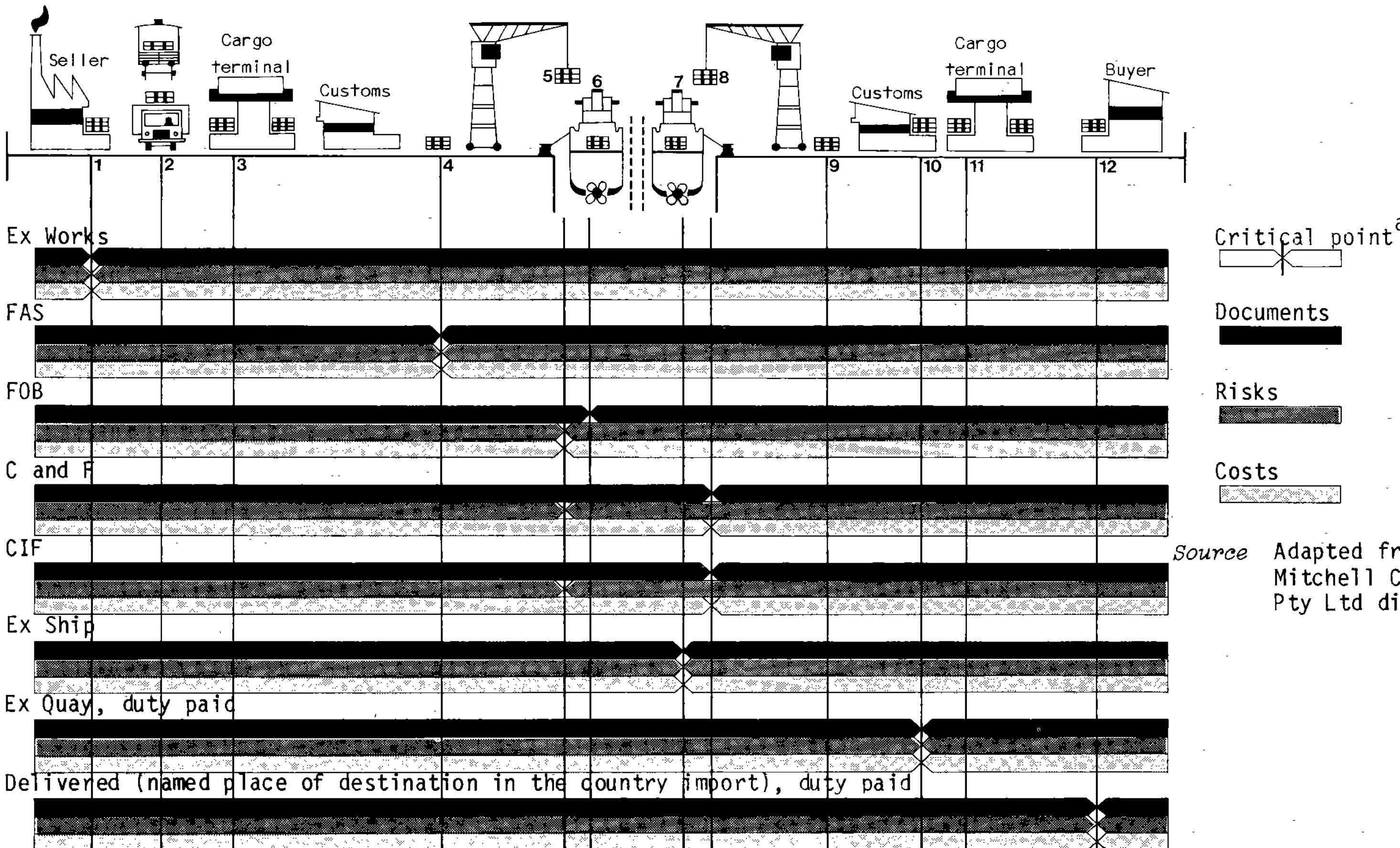
1. It is assumed here that the forwarder also acts as a customs agent.



Source Adapted from a Mitchell Cotts Pty Ltd diagram.

a. Critical point refers to where the sellers' responsibility ends and the buyers' responsibility begins.

Figure 3.2 Critical points in the transaction of international transport services

and from the ports. This, again, will impinge on the traditional functions of the forwarder.

The stages involved in a CIF shipment are outlined below to illustrate the steps in the arrangement of transport. The ocean carrier in the example offers both FCL and LCL services and the ocean carrier's responsibility is assumed to commence on the receipt of goods at the terminal or depot.

Booking of space
Following the conclusion of the sales contract, the shipper/freight forwarder will approach the ships' agent to book space, provide details of the cargo, destination and required date of shipment. If suitable space is available, the agent will allocate the cargo to a ship, creating a *booking note* to document this. This note lists the shipper, the consignees, loading and discharge ports, details of the cargo, the voyage and the vessel, and details of the carrier service to the port.

A *booking list*, which summarises the above information for each voyage, is distributed to terminal and depot operators (where applicable) to enable them to plan for the receipt of cargo. A summary of this list is also forwarded to the ship's principals to enable them to allocate space on the ship.

'Ordering out' and receiving of cargo
Approximately one week prior to shipment, the agency will make available empty containers for delivery to FCL shippers and freight forwarders. The LCL shipper will be advised of times for delivery of cargo to depots.

If the operator has agreed to a through transport service, the agency will telex their cartage contractor to deliver the cargo to the shipper for stuffing and return to the terminal, otherwise the shipper contracts or provides the haulage services.

On the receipt of an empty container , the cartage contractor is required to sign an *equipment handover agreement*. This is endorsed, notifying receipt, on the containers' return to the terminal.

Transfer of cargo
Prior to delivery of cargo to the terminal, the shipper/freight forwarder prepares a *forwarding instruction*, or similar document, which provides details of the cargo, shipper, consignee, and instructions for the forwarding of the cargo to the consignee. Copies

of this document are given to the wharf receivals clerk on delivery of the cargo, who in turn delivers them to the agent. The LCL shipper receives a *cargo receipt*, containing similar information on delivery of cargo to a depot.

Preparation of dispatch of the bill of lading
The *marine bill of lading* (BL) is the contract of carriage between the ocean carrier and the shipper. It defines the obligations of each party and the liability of each in cases of damage to the goods, late delivery, and so on (see Chapter 2). The BL has several further important functions in international transactions, it is a:

- receipt for the goods;
- title for the goods, if in a negotiable form;
- necessary document for a claim for payment; and
- necessary document for support of an insurance claim.

The agent may complete the BL from the information contained within the forwarding instruction. The agency will issue either a *received for shipment* or a *loaded on board* BL. In the former case the agency will require consistency with the *received for shipment* releases compiled by the terminals before releasing the BL. In the latter case the agency checks the *terminal load report* to ensure the cargo is on board the ship.

The shipper/forwarder gains receipt of the BL, and any non-negotiable copies required, on presentation of their copy of the *forwarding instructions* or *cargo receipt*.

In cases where the carrier offers a through transport service, or the freight forwarder assumes responsibility for organising the entire transport chain for his customer, a *combined transport bill of lading* may be used. With such bills, the contract of carriage extends from the place of acceptance of the goods to the point of hand over. The functions of the bill are however identical to those of the marine bill. It is received by the shipper on delivery of the goods to the freight forwarder or his agent, not at the port of loading.

Transfer of information to agencies in ports of discharge
From the information contained within each BL a *manifest* which lists the details of cargo on board is prepared by the agent. A *bay plan* is also prepared showing, for each container, its position on board the ship, its details (FCL, LCL, depot for unpacking and so on) and port of discharge. These are both forwarded to the head office of overseas

agents, 7 to 14 days before the ship's arrival for the longer trades, and 4 to 10 days for the shorter trades. The overseas agent is also telexed to notify the ship's departure and expected time of arrival at the first overseas port.

On receipt of this information the head office of the overseas agent adjusts or confirms the sailing schedule and forwards the information to agencies in each port.

Notification and arrangement of port, terminal and depot facilities
The head office of the agent also prepares a *consignee notification* or arrival notice which is sent to each consignee. This provides details of the cargo, the container in which it is carried, and the expected time of arrival.

The agency in port is responsible for submitting, where relevant, the *manifest*, *bay plan* and a *notification of intention to convey dangerous goods form* to customs and quarantine authorities, port authorities, terminals and depots.

After examining the *manifest,* the quarantine authority will return to the agent a list of the containers which have a quarantine impediment.

The port authority will forward to the agency a *wharfage assessment notice* on the basis of the *manifest*. This may be paid as a lump sum by the agent or separately by each importer. The port authority also arranges allocation of a berth on confirmation of the date of arrival, and arranges tugs, pilots, and so on once a time is confirmed. From the notification of dangerous goods, the port authority compiles a hazardous cargo list. This is submitted to the agents and terminal, specifying times for removal of these goods from the wharf.

The terminal operator will meet with the ship's agent to discuss the working of the ship(s) and arrange work programs. The terminals will also advise depots on the availability of LCL containers for the depots.

Arranging customs clearance
The consignee will receive from the supplier copies of the commercial invoice, packing list and BL. From the information contained within these documents, the importer, freight forwarder or customs agent, prepares a *customs entry*. This lists such details as the ship name, the importer, supplier, the tariff item, the quantity of each item and its price, the number of packages and the basis of the transaction.

The customs authority then decides the duty payable, and the clearance status from this information.

The documents which relate this information are then lodged with the customs authority by the importer, freight forwarder or customs agent. The customs authority receives the manifest from the ship's agent and conducts a 'random check' of the consistency of the goods' descriptions. If the goods are passed, clearance advice is given to the relevant party.

Arranging the transfer of cargo
On the receipt of this information the shipper/freight forwarder will approach the ship's agent to arrange the transfer of cargo. Following presentation of the BL, *customs clearance* and *quarantine clearance*[2] (if required), the agent will issue a *delivery order* in favour of the consignee.

'Ordering out' the cargo
Two main methods of organising transport services for the movement of cargo from the terminal or depot to the importers premises exist. Either:

- the importer or freight forwarder provides or arranges the transport, that is, 'merchant haulage'; or
- the liner operator provides or arranges the transport as part of a 'through transport service', that is, 'carrier haulage'.

In the first case, the importer or freight forwarder will arrange transport services after receipt of the delivery order. The necessary documents are then forwarded to the transport operator, who will receive notification of the availability of containers and cargo by the ship's agent (for example, an advertisment in a local trade newspaper).

In the case of FCL cargoes, the transport operator will be required to sign an *equipment handover agreement* to take delivery of the container. Following delivery to the importer's premises, and unpacking, the container is returned to a container yard, and its receipt acknowledged.

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2. In cases of LCL shipments only the BL is presented to the agent. The other two documents are presented at the depot.

Ship's agents

The ship's agent acts as the shipowner's representative in ports. The agency does not work on behalf of any other party in the contracting of freight services. It may, however, represent more than one operator in port.

The agent's general role is to conduct, for the ocean carrier(s) it represents, business with:

- shippers and consignees of that port regarding the booking of cargo and processing of transport documents; and
- the various authorities associated with ship loading and discharge.

It may perform functions additional to those defined by this role, depending on the requirements of the operator(s) it represents and/or local conditions. The structure of the agency and its relationship to the ocean carrier will vary accordingly.

Functions
In the conduct of a shipowner's relationships with shippers and consignees the ship's agent's functions include:

- advising the shipper which ship will be available to carry cargo;
- taking bookings for space;
- processing documentation, such as BL, for the export and import of freight; and
- collecting reimbursement for the operator's services.

Additionally, the agent may perform the functions of a *loading broker* for the operator. In such cases, the agent is also responsible for marketing the operator's services to shippers and obtaining cargo for the operator.

In the conduct of an ocean carrier's relationships with various authorities (such as port and quarantine authorities and terminal and depot operators) the agents functions will include:

- overseeing the loading/discharging of containers and other cargoes on or off the ship;
- supplying each of the authorities with necessary details on ship arrival dates, cargo booking, etc;
- monitoring the movement of containers in port; and

- arranging payment of wharfage, administration costs, etc.

In cases where the operator, represented by the agent, provides a through transportation service, the agent may also be responsible for the contracting and payment of inland haulage operators. The payment of centralization costs, where applicable, is also the responsibility of the agency.

In cases where the operator provides a LCL service, the agent may also be responsible for the contracting of depot services and/or arranging payment for these services.

The agent may also be responsible for the payment of certain charges attributable to the shipper, such as packing/unpacking costs, and the forwarding of these charges to the shipper.

Relationship with the operator

Through the performance of these various functions the agent becomes a major point of information for the operator.

The agent prepares a booking list for each ship and voyage from the various bookings for space it receives. A summary of this list is forwarded to the operator to aid their determination of space requirements, the programming of itineraries and so forth. In the case of a consortium partner, this information is influential in the negotiation of space allocations, space charter requirements and so forth.

The marketing of the operator's services requires the agency to be in close contact with the various major shippers of the port. This enables the agency to provide the operator with feedback on problems experienced by the shippers in moving their cargoes, offers being made by competing operators, trade conditions and so on.

The agency also provides the accounting information which shows the various developments in shore-based costs and sources of revenue. It is also an important source of information on shore-based activities and developments in ports.

Structure

Agencies typically are either independent organisations or subsidiary or affiliate companies of the shipping company they represent. On the Australian trades, Burns Philp is an example of the first type, ACT(A), OCL and ANL agencies are examples of the latter.

In the case of consortia partners, agency functions are often provided in each country by the company of that flag. Payment for the agency's services, including those cases of affiliate companies, is usually on the basis of 5 per cent of the operator's total revenue from that port and 2.5 per cent of inward revenue.

Freight forwarders

Forwarding is defined by the US Federal Maritime Commission as the preparation and processing of international transport documents, the co-ordination of transport, including the provision of warehousing, and the giving of expert advice (cited in NEDO (1970, 1)).

Broadly, the forwarder acts as an intermediary between consignors or consignees, and the providers of transport. However, as there are no particular legal barriers which restrict the undertaking of forwarding and, as the initial capital requirements of the activity are low, it is not easy to identify freight forwarders.

Role

The main role for freight forwarders is in the assistance of small or medium sized shippers in the conduct of the international transport arrangements. Shippers may employ a forwarder to:

- provide advice on existing transport services and rates;
- conclude the contracts of carriage; and/or
- organise transport from point of receipt to point of destination.[3]

Whilst large shippers have usually developed well organised shipping departments, they may employ a forwarder in an advisory capacity, as a consultant on port activities, developments in shipping markets, and so on. Alternatively, a large shipper may prefer to employ the services of freight forwarders on a needs basis, rather than keep specialist shipping advice 'in house'.

There is, therefore, a broad spectrum of possible functions performed by a freight forwarder. These will vary, not only according to the size distribution of shippers in a particular trade, but also according to the extent to which the ocean carriers provide through

3. A distinction is sometimes made between a 'freight forwarder' and a 'forwarding agent'. The former is said to be an organisation which assumes responsibility for the door-to-door transport of cargo. The latter performs only the narrower range of functions.

transportation services, and according to the geography of consignors and consignees.

Functions of forwarders

The range of functions of a 'traditional' freight forwarder, according to NEDO (1970) are as follows:

- the preparation and handling of documents such as, BL, customs papers, certificates of origin, insurance certificates and shipping notes;
- planning and costing of routes to give the desired combination of speed, economy and reliability;
- booking and co-ordinating transport and freight services, domestic, international and foreign;
- arranging any ancilliary services, such as warehousing and packing;
- consolidating and paying charges payable to transport operators, port authorities etc;
- presenting goods for customs clearance (that is, acting as a customs agent);
- advising of special requirements, trade and financial, of foreign countries;
- providing exporters with information to prepare quotations; and
- advising importers of details of, and changes in, import procedures.

The forwarder may also provide services directly, as a principal, rather than procuring services on behalf of the consignor or consignee. Those most commonly offered are:

- Groupage or Consolidation: The process of bringing together so-called LCL cargo so as to pack each container, as nearly as possible, with a full load.
- Road Haulage: The operation of a cargo collection and delivery service to and from sea ports.
- Container Services: Some freight forwarders own or lease containers to consolidate cargoes or provide services to consignees with FCL consignments, and operate scheduled container services. Such forwarders are known as Non Vessel Operating Common Carriers (NVOCCs).

Other functions may include insurance, finance, and market research.

Structure

There appears to be no typical structure of firms which engage in forwarding activities. In 1981, about 35 000 freight forwarding firms were in existence in the world (Defryn 1982, 54). The majority of these firms were small. Some were subsidiaries of larger organisations whose major activity was not freight forwarding. A number were owned by ocean carriers.

The smaller firms tend to specialise in a particular trade route to achieve a high level of expertise on trade and shipping conditions. Each major Australian trade is served by between 7 and 10 Australian based freight forwarders which provide a broad range of services. The larger freight forwarding organisations may specialize in more than one route.

Sources of income

Forwarders derive income from two principal sources, from exporters and importers, and from ocean carriers.

Income for 'traditional' forwarding work is derived from an agent's charge, paid by the consignee or consignor, and from charges for specific work (such as the preparation of documents) (NEDO 1970, 3). The scale of charges appears to be 2.5 to 5 per cent of the ocean tariff paid.

Arrangements may also exist between ocean carriers and freight forwarders to facilitate the transport of LCL cargoes. Two forms of organisation allow the operation of such systems. These are:

- the provision of minimum freight rates, on which basis remuneration is paid in the form of consolidation or administration fees; and
- allowance for profits which arise from differences between 'freight-all-kinds' (FAK) box rates and the proceeds received from shippers at the rate applied to each item (Matsuura 1984, 2).

Compensation for the movement of cargo to port is not normally paid to forwarders by liner operators in Australia or Japan. It is paid in the US and in Europe.

Some current issues

The multi-modal potential of containers has allowed ocean carriers to extend their operations, and hence control, into land based activities, traditionally the sphere of the freight forwarder and other land transport operators. Freight forwarders in particular have claimed that through transport ocean carriers have denied the achievement of economies in the transport of LCL cargoes in particular. They propose instead a division of responsibility for LCL and FCL shipments between freight forwarders and liner operators respectively. The aspects of this system are discussed later, following a review of the extension of ocean carrier responsibilities, and its implications for land based operators.

The advent of containerization presented a real threat to the operations of traditional freight forwarders. Operators (such as ACT(A) and OCL) committed themselves to through transportation services and became involved in various land based activities such as inland haulage, consolidation and documentation. Tariffs were established not only on a port to port basis but also between certain inland points, and investments were made in consolidation facilities (such as depots or container freight stations).

Cargoes organised on a through transport basis by these operators were removed from the freight forwarders' or independent transport operators' market. This trend was exacerbated by the discounts offered by the operators for full load containers. On the one hand, these discounts induced shippers to consolidate their own cargo, therefore reducing the demand for consolidation services. On the other, the extent of the discounting was not sufficient to enable forwarders to cover the costs of packing and unpacking containers. Hence they were unable to compete effectively with the combined services offered by consortia operators.

The resulting organisation of land based activities in the LCL trades has been claimed by freight forwarders to be inefficient and inadequate (see IFAA 1985, 10-11). The reasons suggested for this deficiency include:

- the administrative task of permanently maintaining depots (and the freight handling equipment and workers required), in addition to operating a quay to quay service, is too great; and
- many LCL shippers are small companies and hence require a personalised service not available from large ocean carriers (White 1984, 5; Shono 1984, 7).

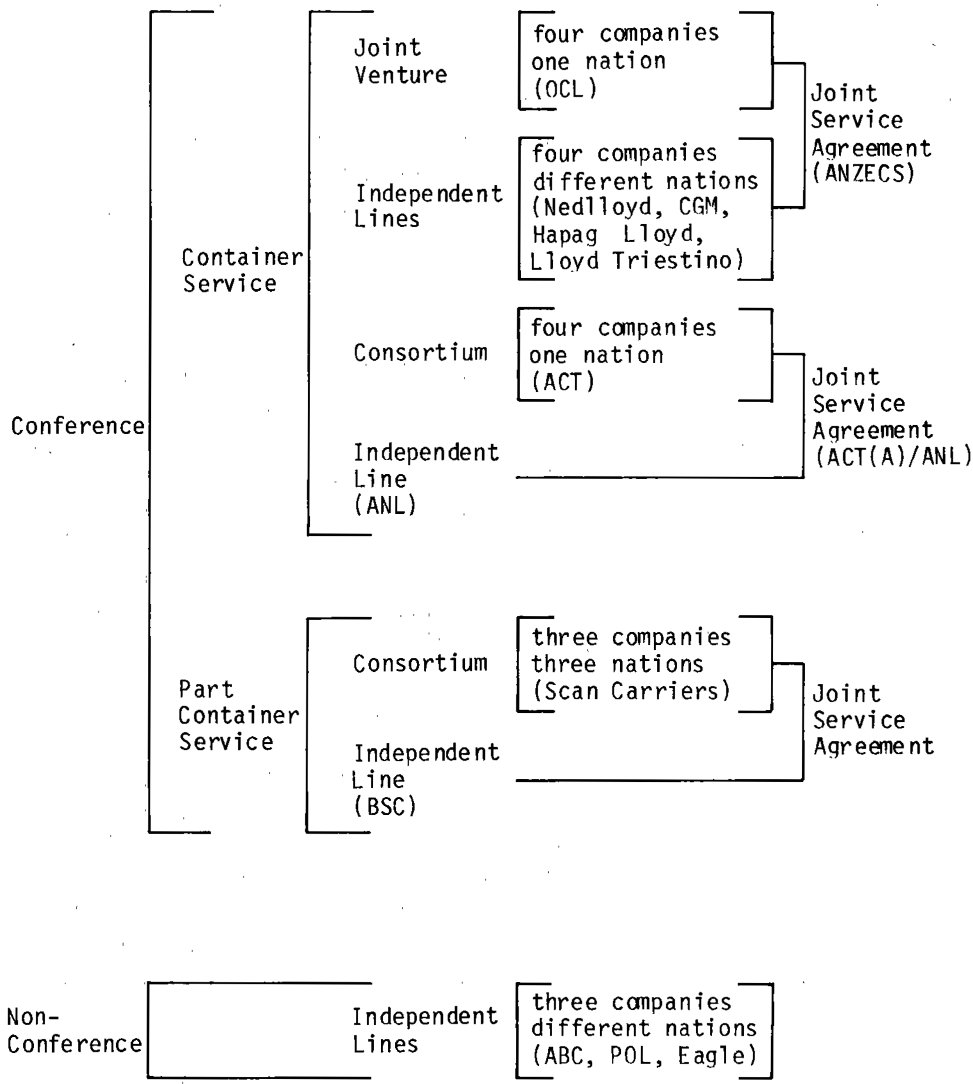
Forwarders have proposed co-operative service arrangements between ocean carriers and freight forwarders, such as those which currently exist between several non-conference operators and NVOCC's. Under such arrangements the forwarder assumes responsibility for the organisation of LCL shipments, leaving the ocean carrier to concentrate on the handling of FCL cargo and the management of ship operations. The simplest rate structure to allow the operation of such a system is, according to White (1984, 5,) one which allows the forwarder to buy on a per container basis, with the purchase price related to quantity and to sell on a weight/measure basis, either FAK or on a simple commodity tariff to suit the requirements of a specific trade.

ORGANISATION OF LINER SERVICES

In this section, the organisation of shipping services by the major liner operators which serve Australian international trade is described. A variety of forms of liner operators exist reflecting, in particular, the influence of a process of co-operation and diversification which followed the introduction of unitization in the mid-1960s. To illustrate the various forms of shipping operations evident in the Australian liner trades, the main forms, the consortium, the joint venture, the 'centrally planned' line, and the Japanese line are described, with the aid of examples.

First, however, an overview is provided of how these operators organise the provision of shipping services. Figure 3.3 shows the structure of supply and shipping services in a highly containerized trade, such as the Australia/Europe and North Mediterranean trade, and Table 3.1 shows the main forms of co-operation. As described in Chapter 2, containerization has resulted in a close integration of the activities of liner companies on most deep sea routes. This trend is continuing with integrated scheduling of ships between the major consortia/container syndicates, and even 'accords' between conference and non-conference operators are becoming evident.

Vertical integration of associated transport activities also followed containerization on many trades, and has become a significant feature of the supply of shipping services. This integration in some cases was achieved by the taking of shares in existing companies in associated transport sectors, and/or the establishment of affiliate companies. In other cases, ocean carriers form part of a broad industrial organisation which include these activities. Table 3.2 shows the general fields of activities into which liner operators have diversified. The more detailed examination of the major liner operators on the Australian trades which follows should amplify these relationships.



Note To provide an illustrative example, participants in the Australia/Europe and North Mediterranean trade are shown in brackets.

Source Adapted from Beth (1980).

Figure 3.3 Organisation of services for a highly containerized trade

TABLE 3.1 FORMS OF CO-OPERATION BETWEEN OCEAN CARRIERS

Areas of co-operation	*Cartel*	*Syndicate*	*Consortium*	*Joint venture*
Service scheduling	Common	Common	Common	Common
Operation of				
Ships	Common	Common	Common	Common
Terminals	Common	Common	Common	Common
Tariffs	Common	Common	Common	Common
Revenues	Common	Common	Common	Common
Name	Common	Common	Common	Common
Marketing	Individual	Common	Common	Common
Inland container operations	Individual	Common	Common	Common
Management	Individual	Partly common	Common	Common
Investment plans	Individual	Partly common	Common	Common
Ownership				
Vessels	Individual	Individual	Individual	Common
Terminals	Individual	Individual	Common	Common

Source von Schirach-Szmigiel (1979, 149).

Japanese liner shipping lines

Six so-called 'core' companies are the backbone of Japan's shipping industry. These companies (Nippon Yusen Kaisha (NYK), Mitsui OSK Line (MOL), Japan Line, Kawasaki Kisen Kaisha (K-Line), Showa Line, and Yamashita-Shinnihon Steamship Co Ltd (YS) were formed in 1965 by merger of existing smaller shipping companies under the direction and encouragement of the Japanese Government in accordance with its policy for rationalizing the country's shipping industry (LSE 1981d, 36).

The lines are located within industrial groupings of Japanese companies which feature in the Japanese economy. As holding companies are not permitted in Japan, each industrial grouping tends to conform to a pattern where leader companies form a core group surrounded by key member companies in various industrial sectors. Subsidiary and affiliate companies form an outer layer to the overall group. Group ties are complex, revolving around various factors including corporate officers (LSE 1981b, 36). The Japanese Ministry of Transport has recently recommended a move to revitalize shipping enterprises by encouraging the lines to operate more independently of the core group.

TABLE 3.2 TYPICAL AREAS OF DIVERSIFICATION OF LINER OPERATORS

Stage in the transport chain from production to consumption	*Involvement of shipping company*
1. Production[a]	
2. Land transport	. heavy lift transport
	. forwarding
	. depots
	. road hauling
3. Port	. terminals
	. bunkering
	. agencies
	. container leasing
	. stevedoring
4. Sea transport	. ship brokering
	. consultancy
	. ship chartering
5. Port	. see above (3)
6. Land transport	. see above (2)
7. Consumption[b]	

a. Involvement in commodity production is usually restricted to operators of specialised carrier services.
b. Involvement in companies which consume the commodity is not usual. A 'mother company' of the whole chain, however, may be involved, especially in the case of specialist carriers.

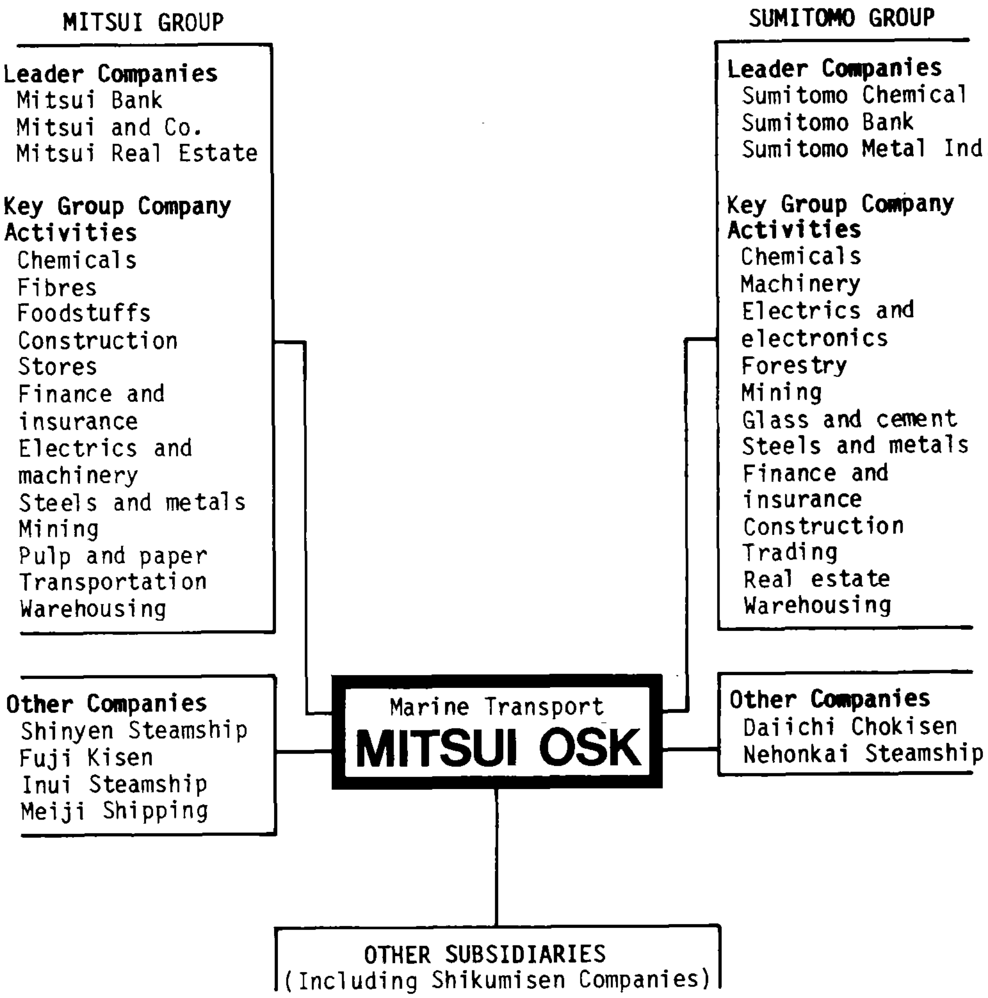
Source Adapted from Beth (1980, 224).

Figure 3.4 shows the pattern of companies in the Mitsui and Sumitomo group, and the location of Mitsui OSK in relation to these groups. Mistui OSK is the main transportation arm of both groups, although the former relationship is predominant (LSE 1981d, 36).

Included in each line's list of shareholders are its financiers, insurers and ship building contractors. Its major customers also play an influential role in each line's development, reflecting the emphasis placed by both industry and government upon the intrinsic importance of shipping facilities structured to meet the overall requirements of the Japanese economy (LSE 1981d, 40).

Each shipping company normally has a diverse range of shipping activities within its portfolio, as is indicated by the structure of the YS and MOL fleets shown in Table 3.3.

In the operation of container services the Japanese lines have shown a noticeable preference for joint operations, involving consortia, pools and slot chartering. This is attributed to the conservative and conference minded traditions of Japanese liner operators (LSE 1981b, 34-38).



Source Adapted from Lloyds Shipping Economist (1981b).

Figure 3.4 Organisation of Mitsui OSK

TABLE 3.3 NUMBER OF SHIPS BY TYPE IN THE YAMASHITA-SHINNIHON STEAMSHIP LINE AND MITSUI OSK LINE FLEET, 1981

Ship type	*YS*	*MOL*
Container ships	12	16
General cargo/heavy lifts	6	28
Car carriers	-	6
Dry bulk carriers	123	26
Tankers	26	12
Ferries	-	2
Combined carriers	4	-

\- nil

Source Adapted from LSE 1981c, 37 and LSE 1981d, 36.

This consortia approach is evident in the lines' operations in the Australian trades: MOL, NYK and YS work in combination with AJCL in the Japan/Australia container service; MOL, NYK and K Line operate in conjunction a service between Japan and West Australia; and K Line works in combination with ANL to operate ro-ro services in the Australia/Japan and Korea trades.

Several of the ships operated in these trades are owned jointly by the Japanese shipping companies. This also features in the other trades where the lines operate in consortium.

Shipping lines of centrally planned countries

Competition from lines of centrally planned countries such as Polish Ocean Lines (POL) and the Far East Shipping Company (FESCO) has caused anxiety amongst major western shipowners in recent years (NSN 1984, 15). The operating strategies of these lines are apparently very different to those of other operators, however, certain similarities do exist. This section outlines some characteristics of the operations of Comecon and Soviet fleets, with specific reference to POL, a significant participant in the Australia/Europe and North Mediterranean trade.

POL is a pure general cargo liner operator initially formed in 1950 was re-formed in 1970 following a decision to abandon the concepts of mixed operation by Polish shipping companies (LSE 1982, 20). POL's liner services, which are similar to those provided by lines of other centrally planned countries, are organised on a geographical basis.

Separate divisions are responsible for liner operations within broad geographic areas, (such as the Asia and Australia Division) within a framework of policies decided by management.

Similar to other lines of centrally planned countries, the services offered by POL are supplied both within and outside the conference system. POL is a long standing member of 17 conferences; it only operates non-conference services in the North Europe/United States and Canada trade, and the Australia/Europe and North Mediterranean trade.

On the operation of the Soviet fleet, Norwegian Shipping News (1984, 17) made the following observation:

> It is known that Moscow supports the cartel concept as a means of regulating traffic and tonnage.

Another characteristic of the operations of the lines of centrally planned countries is a commitment to integrated transport systems. POL diversified into land based and container leasing activities following containerization. In the case of POLs' East German counterpart, the controlling VEB Kombinat organises the provision of shipping, cargo handling and storage in ports, agency functions, dredging, towage and ship supplies (LSE 1981c, 21). The development of all these aspects forms an integral part of the country's economic plans which are organised on a five year basis.

Bilateral agreements, as a basis for the provision of shipping, are also supported. Various cargo-allocation measures exist between the USSR and developing countries. The Russo-Indian pact, which provides a bilaterally agreed cargo sharing arrangement, has existed for 20 years (NSN 1984, 17).

A specialist in 1974 nominated four main functions of the Soviet merchant fleets, these were:

- to carry the State's foreign cargo;
- to contribute to the balance of payments;
- to earn foreign exchange; and
- to provide lifting potential for defence (cited in Moore 1981b, 138).

The participation of the lines of centrally planned countries in international trades is likely to continue to reflect these aims. The fleets are also expected to pose a growing competitive threat in liner and other general cargo trades (Lloyds List 1984).

Joint ventures

Joint ventures represent the highest degree of co-operation possible between previously independent lines without redress to mergers. The joint venture features common management, ship ownership and financial policy. The participating lines become shareholders in the joint company which operates services on their behalf. The joint venture most often operates in more than one trade.

The decision to form a joint company rather than merge operations appears to be a question of partner size, the general financial situation of the firms, extension of other activities than those included in the venture, and the fear of diseconomies of scale arising from the merging of large lines with business distributed in several areas (von Schirach-Szmigiel 1979, 151).

Overseas Containers Ltd (OCL) is the major joint venture operating in the Australian liner trades. A description of OCL follows to illustrate the activities and structure of joint ventures.

In 1983 OCL's fleet had a capacity of 44 000 TEUs, placing it as the world's fourth largest containership operator (EIU 1984, 5). The service network of OCL reflects largely the historic trading ties of Britain. The Europe/Australasia, Europe/Far East and Australasia/ Japan and Far East trades accounted for nearly 96 per cent of all OCL container moves up until 1977 (LSE 1981e, 38). Since then, the Europe/South Africa and Australia/South East Asia trades have accounted for increasing proportions of OCLs' traffic. It also operates services to India, East Africa and the Middle East but has not entered either the transpacific or the transatlantic trades.

Lloyds Shipping Economist (1981e, 38) identified several fundamental courses of action which OCL has maintained since it commenced operations in the late 1960s. The facets of the overall strategy it identified are as follows:

- operation of its services within multinational consortia;
- involvement in the cross trades;
- commitment to through transport services;
- commitment to containerization; and
- preference for fuel efficiency rather than vessel speed.

These various facets have been reflected in OCL's operations in the Australian trades. The consortia in which OCL participates and its involvement in terminal operations is shown in Figure 3.5. OCL also remains strongly committed to conferences, and, in the case of the Europe/ Australasia trade, has begun to rationalize services with the other consortia, to optimise scheduling and meet outside competition.

Consortia

A consortium is a sophisticated partnership agreement between individual lines. It provides the means of achieving cost advantages of scale in containership operations with a minimal loss of individual identity. It has proved to be the most popular of the forms of co-operation between lines which evolved following the introduction of containerization in the 1960s.

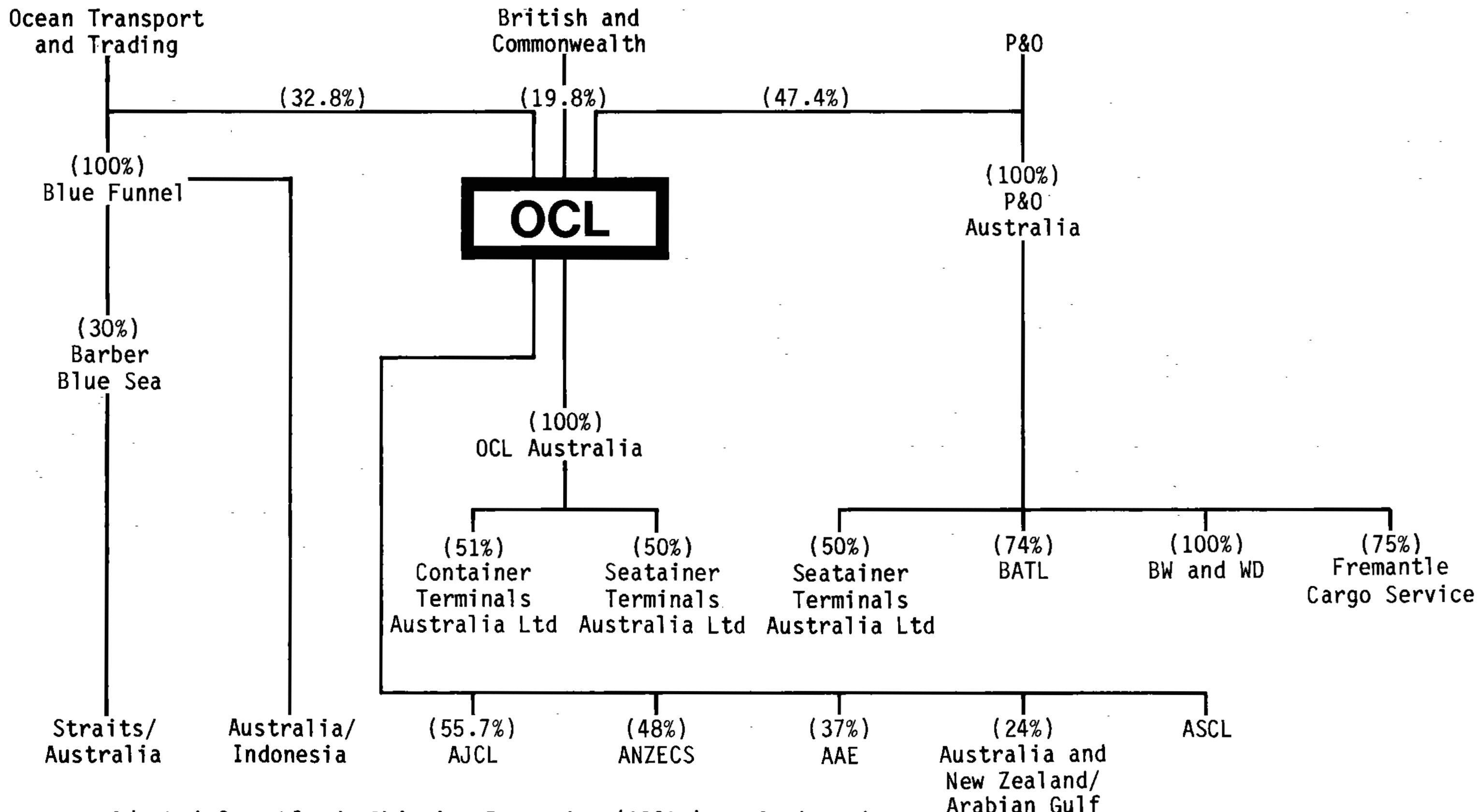
Consortia are either formed by lines which operate on a certain trade route, and their operations are restricted to that trade, or by lines, usually of the same flag, with commonality of operating strategy on a number of routes.

Consortia feature the operation of an integrated schedule of ships typically provided independently by each participating line. Freight and earnings are pooled and ship operating costs are sometimes shared. The framework for this co-operation is usually provided in an operations agreement which sets out the objectives and intended pattern for the venture, together with provisions to cover eventualities such as strikes, and the loss of a ship (ITJ 1984, 4027). It also incorporates a legal agreement with provisions to cover the liability of the parties, and third parties, arising from the use of each others ships under their own BL.

The form of this agreement and the basis of capacity, pooling and cost sharing arrangements vary between consortia according to trade conditions, government regulation and other local cicumstances. Outlined below is a general form of capacity pooling and cost sharing arrangements contained in consortia agreements. This is followed by an outline of the consortia which operate in the Australian trades and the implications for the role of conferences of their operation.

Capacity arrangements

Ships operated in a consortium become the joint responsibility of the partners for the duration of the agreement. Space is allocated on a space charter basis to each partner on each ship, regardless of ownership, according to the proportion of the pool each partner controls.



Source Adapted from Lloyds Shipping Economist (1981e). P&O (1985).

Figure 3.5 Percentage ownership of various terminals, consortia and associated shipping lines by OCL and its shareholders

Decisions regarding investment in a new ship by any of the partners normally requires the consent of the consortium, to ensure compatibility with the existing fleet and service objectives. Ideally, the participants would build a fleet of sister ships, but this is rarely achieved (ITJ 1984, 4027). Joint ownership of a ship may also be contemplated.

Decisions to 'lay-by' (temporarily lay-up) a ship during depressed trading conditions are usually also the responsibility of the consortium. The ship for 'lay-by' is usually chosen on a 'turn-about' basis among the lines. The decision to withdraw a ship is more serious and may need to take account of each ship's operating costs, regional interests, and so on.

Decisions on the response to an application of a new line for membership of the consortia appear, like the conferences, to depend on the perceived competitive threat and/or the financial resources of the outsider.

Freight pooling

The participants' freight earnings, after the deduction of some cargo related expenses, are shared in pre-agreed proportions. These proportions, which also form the basis of revenue pooling, most commonly reflect:

- the existing tonnage of each partner in the trade;
- negotiations on the basis of pool shares and freight revenue value over previous periods; and
- national interest.

The intensity of pooling does vary between consortia and is achieved through variation of the deductible cargo expenses.

Sharing of ship operating costs

The sharing of costs, sometimes known as pipeline or system costs, takes into account capital remuneration, port-charges, ship operating costs and bunkers (ITJ 1984, 4027). Depending on the circumstances of the trade, calculations are based on either:

- the total capacity of each ship; or
- an agreed amount of space or number of slots per sailing.

Consortia operations have featured in most Australian trades. They include, for example, ACT(A)/ANL in the European trade, ANRO in the

South East Asian trade, AAO in the East Asian trade, PAD and PACE in the North American trades and AJCL in the Japanese trade.

In all these cases the consortium has developed within the compass of a conference agreement, and, on some trades, consortia members now comprise the majority of the conference lines. The consortium in these cases has replaced the conference as the main mechanism for the achievement of rationalized services, and for limiting competition. The significance of this will become more evident in the discussion of conferences which is included in the following section.

THE INSTITUTIONAL SETTING

This section describes the institutions which participate in the international liner shipping industry, as the national representatives of the various individuals and companies which the industry comprises. In the Australian trades, the main institutions are the conferences, shippers' councils, commodity boards and maritime and shore-based unions.

The structure of the involvement of each of these groups reflects, not only the concerns of the communities they represent, but also the influence of a particular regulatory environment, historical foundations and trade conditions.

The role, function and structure of conferences and shippers' councils is first outlined, followed by a description of the framework of consultation between the groups. Commodity boards, and their role in the Australian outward trades are then examined. A description of the role, structure and concerns of the unions involved in the industry completes the analysis.

Shipping conferences

A shipping conference is an association of competing liner operators engaged in a particular trade who have agreed to limit the competition amongst themselves (Sturmey 1972, 322). As a minimum, they will have promised to adhere to an agreed schedule of freight rates. To this there is usually added an agreement to regulate sailings and to allocate berth rights. A further step may be to add a pooling agreement under which cargoes and earnings on the trade are shared between members according to agreed proportions.

In addition to these internal arrangements, each conference may include in it's agreements with it's shippers loyalty provisions.

These contracts are designed to assure the continued custom of the shipper and they also have the effect of inhibiting. competition. In return the shipper is offered reduced rates and an assured service.

Conferences vary in size from only two members to over 20, and in scope of geographical coverage. The structure of conference agreements also vary with some comprising only an agreement to charge an agreed schedule of rates whilst others include cargo and earning pools. These differences reflect the different roles conferences play in the organisation of liner shipping in the various trade routes. These roles in turn reflect trade conditions, regulatory environments and shipper demands in the trade.

The role of conferences

The various functions of a present day conference may include:

- the co-ordination and rationalization of schedules and capacities to maximize utilization of capital intensive operations (Sletmo and Williams 1981, XXIX-XXX);
- the co-ordination of members transactions with shippers, shippers' councils and governments;
- the co-ordination of responses to non-conference competition; and
- the provision of administrative services to facilitate the gathering and distribution of information required for reasons of trade, government regulation and so on.

Amongst the major differences in conference responsibility which occur between trades is that caused by the distinctive regulatory environment operating in US trades.

The 'open' conference is required by US regulation on all US trades. Open conferences impose no restrictions on entry other than requiring a new member to charge published rates and observe conference rules. Operators are free to move tonnage in and out of the trade as desired (Trace 1981, 31). The level of co-ordination and rationalization of capacity is therefore limited. Conference relationships with shippers are also distinctive in US trades. Deferred rebates are prohibited and shippers' associations, prior to 1984, were not recognised.

The 'closed' conference is allowed on most other trades. This permits the conference participants to restrain the entry of new operators and impose conditions based on specific criteria for admission (Hermann 1983, 17).

In most cases, the regulatory environment existing on these trades also requires that the conference negotiate with a designated shipper body on matters such as rate variations. Deferred rebates in most cases are allowed.

Differences in conference responsibility also occur between trades in which closed conferences operate. In trades where consortia dominate the provision of services, the conference may remain only as a framework within which consortia negotiate freight rates and the terms of carriage with shippers.

In those trades which feature an acceptance of bilateral cargo sharing arrangements, the role of the conference may, however, be expanded. The conference may become the mechanism to secure the allocation of cargo for national lines, that is, its role is politicised.

These differences make it difficult to generalise the structure of the conference organisation, conference agreements and arrangements with shippers. Some features of organisation are, however, common to most conferences. These are outlined here with a description of the pooling arrangements and the various forms of loyalty provisions.

Structure

The conference is not a legal entity. The relationship among the members is contractual, the members are not partners of any kind and they do not integrate services. As a consequence, each member retains its individual identity (Hermann 1983, 15)

Conference coverage of a route is normally in one direction only, although membership of the backhaul direction is often identical. The relationship between the conferences which operate in opposite directions is therefore usually close. They sometimes share administrative offices and may jointly program tonnage to serve the requirements of the inward and outward trade. The membership of closed conferences typically comprise operators which have historically dominated the trade. Admission of lines to membership of the conference is actively restrained and specific criteria for entry are imposed. To enter the conference an independent shipowner will need to display a permanent interest in the trade. National lines, rather than cross traders, therefore have a strong case. In addition there is usually a requirement that members own and not charter the ships they use (Deakin and Seward 1973, 56). Other factors which are also taken into account include the adequacy of existing capacity on the route and, importantly, the financial strength of the potential member.

The basis of voting within the conference is usually one member one vote. Voting is not normally weighted according to the number of ships each member operates. However, voting does appear to be nationally determined. Empirical evidence shows that more and more national lines are tending to vote as a block[4] (Hermann 1983, 16).

In some cases members are not equal. Associate membership of a conference may be granted to prospective members for a trial period, or to operators which serve only a particular fraction of the trade. Such members usually are not allowed to vote at meetings and have restricted sailing rights.

Decision making procedures vary between conferences. Decisions on the admission of a new member usually requires a unanimous vote. Rate variations normally require a majority vote (either two-thirds or three-quarters).

Committees are often established to which some decision making powers are delegated. These committees overcome delay problems associated with calling a meeting of all members. Most often they are given authority over routine matters. A quorum is only required for policy matters.

Local secretariats of conferences, to represent headquarters in overseas ports, are also typical. These secretariats are often given authority to liaise and negotiate with the local shippers, shippers' council, government and so on. Most often policy decisions require the approval of the conference principals at headquarters.

The conference members also usually appoint a chairman or head of the conference. The main function of this chairman is to direct and co-ordinate the conference's rating. Rarely is the chairman given decision making powers, although his views may be influential (Hermann 1983, 15-16).

The structure of conference decision making is demonstrated most clearly in the various committees which it comprises. Again, the committees formed vary among conferences, depending on trade conditions, regulatory environments and so on. However, certain

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4. See Discriminatory Ocean Freight Rates and The Balance of Payments, Rep. of the Joint Economic Comm., 89th Congress, 1st Session, S. Rep., Vol. 3, Rep. No. 1 at 20 (1965), and the UNCTAD Code.

committees appear common to most conferences. These comprise a:

- Policy Committee: which determines general policies rating service levels, surcharges and so on;
- Action Committee: which observes cargo movements and trends, and reacts by adjusting rates and contracts with shippers;
- Programming (Tonnage) Committee: which co-ordinates the scheduling of services to ensure 'coverage of the berth';
- Pooling Committee: which supervises the functioning of the pools, reviewing members obligations and services;
- Tariff Rate Committee: which deals with the formulation of, and adjustments in rates; and a
- Liaison or Negotiations Committee: which represents the conference before governments and shippers' associations.

In cases where a particular commodity dominates the trade, a separate specialist committee is usually established. The Wool Action Committee of the Australia to Europe Shipping Conference (AESC) and the Reefer Committee of the Australian Northbound Shipping Conference (ANSCON) are illustrative examples in the case of the Australian conferences. Various ad hoc committees also exist to perform specific functions such as public relations, centralization and executive finance.

Membership of these committees varies as do voting procedures. All members will normally be represented on the policy committee. Membership of other committees varies according to local expertise, trading interests and so on.

Some characteristics of conference agreements

The conference agreement is the basic machinery that establishes co-operation between member operators. Its content reflects the desire of members to restrict competition but also to maintain their individual identities.

The scope of each agreement varies between trades according to differences in membership, the strength of shipper demands, trade conditions and regulatory frameworks. As a generalisation, the stronger and harder the outside competition which the conference has to face, the more likely it is that the ties among its members will be stronger (Hermann 1983, 21).

All conference agreements, however, provide for a uniform schedule of tariffs. Specific rules are provided, which describe in detail the ways to calculate freight rates to prevent secret rate reductions in the form of a different classification of cargoes. Fines are levied on members for violation of these rules. Where the agreement is limited to pricing in this way, member operators are free to compete on a non-price basis for available cargo; that is, each member can schedule as many services as it finds remunerative and service any number of ports. Overtonnaging most often results under these circumstances (Hermann 1983, 23).

Closed conference agreements may also provide for the allocation of sailings and ports between members. This fixing of members' itineraries avoids excess capacity and also helps ensure that the conference fulfils its obligations to the entire trade and not only the most lucrative ports.

Further rationalization, to ensure discipline within the conference can be undertaken via pooling arrangements. Two forms of pools exist:

- cargo pools: in which the cargo carried by the members is pooled and then divided into precise shares; and
- revenue pools: in which the earnings of the members are also pooled and divided into predetermined shares.

Whilst the former provides incentive for competition between members for the higher rating cargoes, this incentive is removed by the latter option. Therefore, the two forms of pools are usually operated in conjunction with each other.

The extent of pooling varies among conferences. In some cases only a certain limited number of commodities are classified as 'pool' cargo. Such pooling arrangements are introduced to eliminate competition within the conference which is centred around certain types of commodities. Where the route is overtonnaged, cargo is diverse, or malpractice is common and no specific cargo is regarded as the major traffic component, pooling of the whole cargo is usual. Cargo pools may also be introduced to complete the members' obligations as common carriers; that is, low-valued cargoes and cargoes from outports are often pooled. Some commodities, such as hazardous and bulk cargoes are difficult to include in pooling arrangements.

The practical organisation of the administration of pools is very complicated, requiring comprehensive calculation provisions within the conference agreement. Each member's share in the pool is usually based on past performance (average lifting over a number of years), although the nationality of the operator may play a determining role. Special policy and programming committees conduct the management of the agreement. In conjunction with an independent accounting firm, these committees supervise the functioning of the pool, reviewing members' obligations, performances and so on. In the case of cargo pools, tonnages coming onto the berth are estimated and then allocated to the members according to what they will be allowed (expected to) carry. If a member's liftings exceed its pool share by a certain, limited amount, for example 10 per cent in a single period, then it will be required to 'payback' into the pool the extent of the excess. If a member lifts less than its cargo entitlement it risks having it's pool share reduced by the extent of its failure. The organisation of revenue pools is similar. Deductions are allowed, however, from the earnings submitted to the secretariat. These deductions usually include handling expenses, costs of providing ships and containers, the movement of empty containers on backhaul voyages, port charges and so on.

The consequences of pooling cargoes and revenue largely reflect their aims of restricting competition and allowing the rationalization of services. Competition between members is largely eliminated, although the system still confers benefits on low cost operators. Entry into conferences is also made more difficult since the market is strictly divided and in order to gain a share of the market prior to joining the conference a newcomer will usually have to quote below-cost rates. Pooling arrangements also confer on the incumbents advantages of scale and increasing barriers to entry.

Other consequences of pooling arrangements include a decline in malpractice, such as secret rebates and rate-cutting, because the benefit is removed by earnings sharing. The pooling system can also be used to divide cargoes between national flags. This last feature is particularly relevant to the cargo sharing system advocated by UNCTAD (see Chapter 2).

Loyalty arrangements

The cartel-like system of conferences and their rate fixing practices make it essential that they achieve some sort of loyalty arrangement with shippers (UNESCAP 1982b, 44). The need for loyalty agreements has been agreed by most national and international organisations which have investigated the conference system (see DoT 1978, 42; UNCTAD Convention on a Code of Conduct for Liner Conferences, Article 7(1)).

The form of loyalty system operated, however, is often an important rider on such approval. Three main forms of loyalty agreements are currently in operation, each with different implications for shipper and operator rights and obligations. These are examined in turn below.

Deferred rebate system

The deferred rebate system is an arrangement between shippers and the conference in which the shipper promises exclusive patronage of the conference and, in return, the conference agrees to repay a certain percentage of the tariff. The payment of the rebate is deferred beyond the completion of the service for which it is paid and is made only if, during both the period for which it was computed and the period of deferment, the shipper has complied with the terms of the rebate agreement or arrangement.

Shippers do not usually have rights over accumulated rebates held by the conferences. The latter will forfeit the rebate if shippers breach the agreement. The burden of proof that there was no such breach lies with the shipper (Hermann 1983, 60). Therefore, to prefer an alternative carrier's services a shipper would require rates low enough to offset the loss of the deferred rebates. This form of deferred rebate is consequently a powerful mechanism of the conferences to counter outside competition. Shippers are still allowed to choose between the services of the different conference members without losing rights to discounts. This may stimulate competition between member lines for the cargo of loyal shippers (Hermann 1983, 60-61). Whilst the system was common in the past, it has been largely abandoned because it was unpopular with shippers (UNESCAP 1982b, 46).

Contract system

This is the most usual form of loyalty agreement operating on liner trades (including Australia but not US trades). The contract is a written agreement which explicitly sets out the rights and obligations of the parties. It provides for a discounted rate in return for an undertaking by the shipper to ship only by the conference. The discount is direct and is enjoyed by shippers immediately. This discount is usually about 10 per cent (Hermann 1983, 46).

In return for this assurance of loyalty the conference normally agrees 'to maintain berth sailings for the ordinary requirements of the trade' (AESC, Memorandum of Agreement for General Cargo). In the event of a breach of the agreement by either party, liquidated charges are levied as a proportion of the tariff which would have otherwise been paid. In the event of an alleged breach of the agreement by a shipper, the burden of proof is on the shipper and must be provided to the satisfaction of the conference.

The agreements normally contain provisions which exempt the conferences from liability in respect of acts of God, force majeure or occurrence of any kind which are outside its control and which in its reasonable opinion renders it impracticable or partially impracticable for the conference to carry out such obligations (Hermann 1983).

The agreements may also contain provisions for increases in rates or the imposition of surcharges in the event of acts of God, force majeure or significant variation of circumstances relevant to the fixing of the rates for which contingency provision has not already been made and which, in the opinion of the conference, increases or will increase the cost of operation of the services. Agreement of the designated shipper body is required for such an increase and, failing agreement, independent accountants may review the respective cases.

Opposition to loyalty contracts by shippers has been increasing both in Australia and overseas. The ASC, in its 'Proposals to Amend Australian Legislation on Outwards Liner Shipping' (1984), claims that the conferences' uniform demands for 100 per cent loyalty are unwarranted. The ASC also maintains that the system has been a major deterrent to non-conference competition, and a means by which conferences have maintained high rates. The ASC support instead the recognition of time/volume or service contracts. The uniform demand for 100 per cent loyalty, it claims, should be proscribed.

The European Shippers' Council has adopted a similar position, reportedly claiming that, with the growth of containerization, 'doubts are growing concerning the validity and practicability of these loyalty arrangements as a matter of principle and more still as specific conditions, rights and obligations of the parties'.

Service contracts

Time/volume or service contracts represent an alternative loyalty arrangement, which preserve the role of competition in the trade. Since the introduction of the US Shipping Act in June 1984, these have progressively replaced loyalty agreements in US trades. Between June 1984 and March 1985, for example, nearly 700 service contracts were signed (Bickingham 1985).

These contracts are binding agreements between shippers and operators. The shipper pledges a minimum volume of cargo to be shipped with the operator or conference over a certain period of time. In return the operator guarantees service levels and may offer the shipper a discount on the scheduled rate. Penalty clauses for non-performance of obligations may also be included (Bickingham 1985).

The innovative aspect of these contracts is that they are easier to enter and hence have broader applications. Mandatory rights of 'Independent Action' on 10 days notice, (another provision of the 1984 Act) also co-exist with service contracts. These rights provide operators with greater freedom to react individually or collectively to market pressures (LSE 1984a, 18). The risks involved in setting minimum cargo throughputs and in predicting future cargo flows and rate movements make it unlikely that a shipper will commit all its cargo to service contracts. Estimates of 50-60 per cent have been made (LSE 1984a, 18), although much depends upon the regularity of importing and exporting patterns.

Shippers' councils

Shippers' councils are collective organisations of shippers in particular countries or regions which have formed to further their interests in dealing with carriers, government departments, and other related bodies (Hermann 1983, 117).

Objectives and functions

The multiplicity of technological and economic factors facing shippers, and the market organisation in which many shippers face relatively few carriers is the main rationale for shippers' councils (UNESCAP 1982b, 3).

The objectives and functions of shippers' councils reflect this rationale. The prime objective of a shippers' council is to attain strength for shippers in negotiations with the shipping industry. This is most commonly achieved by providing:

- greater analytical power through the provision of some technological and economic insight into the market not attainable by individual shippers; and
- some countervailing monopoly power to the shipping conferences.

Shippers' councils, however, may have broader functions than the negotiation of the terms and conditions of agreements with shipowners. Functions which relate to the economic benefits shippers can attain by co-operating with each other and with shipowners in the organisation of freight services are also possible. These include the rationalisation of shipments, packing, documentation, staging and consolidation of cargoes, and the joint chartering of ships; that is, the shippers' council may perform some freight forwarding functions. In addition, shippers' councils may act as representatives of shippers in government or industry sponsored investigations of matters relating to trade or maritime affairs and it may have responsibility for the monitoring of conference agreements.

Structure
In 1976 shippers' councils or equivalent organisations existed in 33 developing countries or territories and in 20 developed market-economy countries (UNCTAD 1976, 3). These organisations all primarily represent the interests of exporter shippers (as distinct from consignee-shippers), that is, they are basically concerned with the outward trades.

Shippers' councils in the Australian trades
The Australian Shippers' Council (ASC) was formed in August 1972 and has been given Ministerial recognition ever since (under the Trade Practices Act), as the representative body of shippers for the Australian outward trades.

In the inward trades, shipper interests in the various exporting countries are most often represented either by national shippers' councils or via regional or sub-regional shipper organisations. These regional organisations exist where particular conferences serve a number of countries on a trade route. Regional councils in these situations provide more effective countervailing power than if national councils negotiated alone. Illustrative examples are the European Shippers' Council (ESC) and the Federation of ASEAN Shippers' Councils (FASC).

No formal shippers' council exists in New Zealand. Consultations with conferences are held instead by a small group of producer board representatives together with representatives of the private sector.

Shipper Associations became established in the US only after 1984, when the Shipping Act removed anti-trust law restrictions. The forms of association which have been established are unique, as will be outlined later.

The actual structure of shippers' councils varies from country to country. Most have been formed essentially within the private sector and act independently of government policy. The ASC is provided with some of its functions by the Trade Practices Act, which also makes provision for an officer representing the Federal Minister for

Transport to attend negotiations (s.122 (2b), Part X, TPA 1974). In most other countries, shipper's councils usually consult without government participation, although some governments do establish independent contacts with various shipping conferences (UNCTAD 1976, 3). In most cases, government policy either encourages or actively supports the operation of shippers' councils.

Membership

Shippers' councils are not legal entities but voluntary bodies of different national groups with a common interest. Membership of a council most often comprises national commodity and producer boards, trade associations and individual manufacturers. Regional shipper groups may be represented. Freight forwarders are rarely full members of councils.

Voting

Formal voting allocations within a council are normally based on the value of the annual tariff paid by each member. The usual practice, however, is a show of hands.

Organisation

Councils usually divide their authority and expertise between a number of committees, plus an executive for policy and political matters. The type and number of committees in each council varies according to the Council's size and the country's trade characteristics.

The ASC, in addition to an executive committee, presently comprises a Negotiations Committee, 10 Area Committees and a Standing Committee on Terms and Conditions. The Negotiations Committee, established on a trial basis in September 1984, conducts negotiations with each conference involved in the outward trades on rate variations and matters applicable to the carriage of goods which are not negotiated separately by the Standing Committee. The committee is empowered to 'settle' a negotiation without ratification from the membership.

The 10 Area Committees of the ASC are constituted on a trade area basis to which particular conference agreements relate, or in which particular operators provide services. These committees comprise representatives of shippers involved in particular trades and, prior to the formation of the Negotiations Committee, had a wide degree of authority in dealing with all matters arising in their respective areas. Since the 1984 restructuring, however, the Area Committees act only as advisors to the Negotiations Committee. The Chairman of each Area Committee has the right to call a Negotiations Committee meeting, and they provide an important mechanism for communications between individual shippers and the Council. They have not, however, met often since the restructuring. The Standing Committee on Terms and Conditions of the ASC considers such matters as BL conditions, surcharges and so forth.

The division of responsibility in other councils has been on the basis of functions and commodity trades, as well as regions. The larger councils, such as the Japanese Shippers' Council (JSC) and the European Shippers Council (ESC), typically establish major committees through a functional division of responsibility. These include freight, intermodal, legal, and finance committees. Sub-committees, defined on a regional basis, are established as a second tier. In other councils, such as the Malaysian National Shippers' Council (MNSC), organisation is on a commodity basis.

Common to most councils is a secretariat which co-ordinates activities between shippers and represents the shippers' individual requests before the executive (Hermann 1983, 119). The secretariat, headed by a director, manages the day to day affairs of the council. In the case of the ASC, it is also responsible for research and administrative functions.

Finance

Options for financing of shippers' councils include member subscriptions, government grants and levies on liner cargo. Membership fees are most commonly levied in proportion to the total tariff paid by each member, and hence in proportion to their voting rights and, in addition a fixed fee per member may be charged. Some limits on individual subscriptions may be placed in order to limit any one groups' control of council activities. Government funding usually reflects either a public policy requirement, or concern, that a viable shippers' council exist. In 1983-84 government grants, (special and operating) to the ASC totalled $212 940 or 65.5 per cent of total income (ASC 1984, 63).

Framework of consultations

Hermann (1983, 119) defines two categories of consultations between ocean carriers and shippers. The first includes questions of a routine, practical nature (such as freight rate variations), and is regarded by the concerned parties as 'negotiation'. The second includes questions of principle and policy and is regarded as 'consultation' per se. Matters for 'consultation' include surcharges, scheduling and loyalty agreements.

The framework of consultations varies between countries and councils. It is, in most cases, provided by either a regulatory statute (such as the 1974 Australian Trade Practices Act and the UNCTAD Code), or by a written agreement between the parties involved (such as the 1963 ESC, CENSA Note of Understanding).

The framework usually outlines the scope of consultations, the responsibilities of the parties involved, and may outline dispute settlement machinery. The procedure of negotiations is left for the parties to determine.

This section outlines the general framework and procedure of freight rate negotiations by a shippers' council and conference. 'Consultations' normally occur on an ad hoc basis and not according to established procedure. Rate 'negotiations' on the other hand operate according to defined responsibilities and procedures.

In Australia and most other countries, the direct negotiation of rates for specific commodities is not considered the responsibility of the shippers' council. The council may be responsible for negotiation of scheduled rate variations with conferences. Individual shippers, however, are left to negotiate specific commodity rates, perhaps within a range defined by a council's negotiations.

Conferences are usually required to consult with a designated shipper body prior to the implementation of a general freight increase (UNCTAD Code, Art. 14). The conference may also be required to submit any information required for the purposes of the negotiations. This information may comprise a report from independent accountants which includes aggregated data on the costs and revenues of the conference membership. In all cases, the details of individual operators are not usually disclosed.

In the process of the negotiations conducted by the ASC (usually on an annual basis), the aggregated information is contained within the conference submission. The information varies but all include:

- costs and revenue for the year ended projected to cover the period under negotiations[5];

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5. The ESC have adopted a policy of not requesting revenue data as it considers that receipt of this information may ultimately place shippers in a position of having to guarantee the conference lines a certain return on their investment (UNCTAD 1976, 13).

- some data on utilization;
- a comparison of the year's results with that of previous years; and
- a summary of sailings.

The costs are allocated between the inward and outward services, and where practicable, to the trades to which they relate. Those costs which can be allocated include loading and discharging costs, terminal costs, port charges, Australian inland transport costs, and charter hire for ships. Extra costs, due to reefer capacity, are allocated between the routes on the basis of filled reefer container movements. The remaining costs (running costs, bunkers, and replacement and capital allowances) are allocated between the routes on a basis of relative container flows.

On receipt of this information the council normally 'monitors' the conference claims using both its own data sources and the results of questionnaires sent to relevant member shippers. The shippers' council will have available data on such items as bunker and Australian terminal costs with which it checks the conference data. It is also able to assess the return on capital claimed by the conference from its own assessment of current market conditions.

The ASC questionnaire seeks information from each member organisation on total tonnages shipped over the period, their value and the freight paid. An analysis of this information provides the council with a means to assess the conferences' claims of revenue earnings.

The returned questionnaires also provide details on the use of non-conference lines, and each shippers' assessment of current trade conditions and the service provided by the conference lines. These factors help determine arguments relating to the validity of a rate variation and the bargaining position of the council in negotiations.

On the basis of the information at its disposal the secretariat prepares and recommends a strategy for negotiations to be used by the negotiating panel of shippers. In the case of the ASC, this committee comprises the council's President, Executive Director and three shipper representatives. In the negotiations, conducted with a panel of shipowner representatives, this committee has authority to decide a matter on behalf of the shipper body. The shipowner representatives often, in the Australian trades at least, require the approval of their 'principals' before settling a decision. The agreement once arrived at is termed a 'Heads of Agreement' which is signed by both parties.

The effectiveness of shippers' councils

Some dissatisfaction with present consultation procedures in Australia has been voiced by both shippers and shipowners. Amongst the shippers' grievances are claims that the council lacks effectiveness in countering conference claims for rate increases. The reasons put forward for the lack of effectiveness include the inability of the council to ensure the preservation of non-conference competition, the lack of 100 per cent commodity support for the council, and a lack of sufficiently accurate, reasonable and detailed information on conference operations. At the same time, shipowners also complain of the heavy demands for financial and statistical information imposed on them when a negotiation may be finalised on the basis of quite different commercial parameters (Various Liner Conferences, 1984, 3).

The claims relating, in turn, to non-conference competition, the unity of member shippers, and the data employed, are outlined below.

Non-conference competition

The amount of capacity available, particularly the availability of alternative carriers, is a major determinant of the strength of shippers' councils in negotiations with conferences. The ability of councils to ensure the continued existence of competitive shipping services however appears limited.

The ASC gives specific mention to this in its 1984 paper 'Proposals to Amend Australian Legislation on Outwards Liner Shipping' (ASC 1984a). Shippers, it claims, have great difficulty in establishing commercial objections to an expanded conference membership and are powerless when confronted with a rate fixing and cargo sharing agreement between conferences and independent lines. Conference agreements, it argues, should be subject to approval prior to their registration and implementation.

Commodity support for council negotiations

Another major determinant of a shippers' council's strength is the degree of unity of its members.

> No shippers' council can expect to hold meaningful consultations with a shipping conference unless it really does represent the shippers which it purports to represent. A substantial majority of the shippers using a liner service must be represented by the council... (UNCTAD 1976, 12).

Individual commodity interests have well defined rights to negotiate separately with conferences in the Australian outwards trades. The propensity of these interests to employ these rights has been cited, both by those shippers dependent on the ASC and the various liner conferences on the Australian trades, as a deficiency of existing negotiation arrangements and one which adversely affects ASC's bargaining position. The reasons cited for this lack of 100 per cent commodity support relate both to ASC negotiating strategy and conference practice.

According to the 1978 DoT Report on overseas cargo legislation, the ASC practice of pursuing uniform adjustments to conference rate proposals has compelled shippers with special competitive conditions affecting them to develop their arguments individually outside the ASC (s.8.68). This has applied both to commodity groups and to regional shipper groups. Blair (1984), however, attributes the problem also to conference practice. He claims that special rates, which are entirely at the discretion of shipowners' have been applied discriminantly among shippers of the same commodity and without care for the growing disparity between rates. The availability of these special rates is thought to encourage shippers to approach the conferences individually.

In response to these problems the ASC introduced a new format of rate negotiations in 1984. The rates negotiated by the ASC are a ceiling or maximum rates below which individual commodity interests may negotiate special rates. Supporting this, the ASC proposes that any new legislation provides for the setting of publicly known schedules of rates on all trades. Commodity groups would thus be more 'inclined' to participate in ASC negotiations and it would ensure proper recording of tariffs and the terms of carriage.

The quality and cost of information

The data supplied by conferences are typically aggregated and reconsolidated statistical information. Heavy reliance on this material by shippers' councils has resulted, implicitly, in the adoption of average cost-plus approaches to negotiations of rates which do not give recognition to changing competitive and cost conditions. As a consequence, the approach does not provide incentive for innovation and increased efficiency.

Shippers have argued that rate adjustments should instead be based on the costs of the most efficient line of the conference (UNCTAD 1976, 13). At a minimum, there needs to be closer investigation, by shippers' councils, of the causes of the reported cost increases, and the scope which may exist for more efficient and economical use of the conference fleet.

Alternative structures of shipper representation
A number of countries have approached the problem of achieving increased strength for shippers in negotiations with conferences via different consultative frameworks. The 'shipper associations' recognised by the 1984 US Shipping Act, and the Sri Lankan Central Freight Bureau are two such approaches. These are outlined below and some comments are made on their relevance to some of the deficiencies experienced with the shippers' council model.

Shipper Associations are defined by the 1984 US Shipping Act as comprising a group of shippers that consoliate or distribute freight on a non-profit basis for members of the group in order to secure carload, truckload, or other volume rates or service contracts (s.3(24) of the Act, 46 U.S.C. 1702(24)).

The associations were formed in response to the recognition that the service contract system offers benefits, in terms of discounted rates, primarily to large shippers ('Commerce Committee Report', S. Rep. No. 3, 95th Cong., 1st Sess. 7-8 (Feb. 17, 1983)). They are therefore planned to comprise only the smaller shippers, leaving the large shippers to negotiate their own terms and conditions of carriage with the carrier.

The Sri Lankan Central Freight Bureau, unlike the US shipper associations, comprises all the nation's shippers. However, its role also features the inclusion of consolidation and other 'forwarding' services. In fulfilling this role it apparently has been able to achieve economies in shipping through the rationalization of bookings (UNCTAD 1976, 19).

These commodity groups also derive increased bargaining strength in negotiations by way of their increased representativeness of member shippers.

Commodity boards

Australian commodity authorities have been established to centralize the control of their industry's commodities and are responsible, *inter alia,* for transport arrangements associated with their industry's output. The authorities are mainly associated with rural industries and consequently in the Australian outward trades can control large volumes of cargo.

It has been noted that

> ...the shippers' organisations which have had the greatest success in reducing freight rates are not shippers' councils but commodity groups, which have succeeded in putting themselves in a position to adopt bulking techniques... (UNCTAD 1976, 21) (see also Ferguson 1976, 13 and 20-21).

This section examines the general functions of commodity boards in these trades, and the elements of market power derived from particular aspects of their operations. This will prelude a discussion of relative market power in Chapter 3.

Participation of commodity boards in the international liner shipping market

The functioning of commodity boards in the transport market is generally associated with their statutory roles as representatives of particular industries. In the export trades this responsibility is most commonly defined in terms of promoting the exports of the commodity and protecting the interests of the industry in relation to that export. This implies, in turn, a responsibility to participate in rate negotiations and investigate the commodity's transportation to enable lower handling and shipping charges.

Commodity boards generally negotiate rate and service agreements (including loyalty contracts). These negotiations are conducted either through the board's membership of the ASC or directly with operators.

Negotiations are commonly held outside the ASC in cases where the commodity trade is large enough to confer independent market power on the industry, or where a highly commercial matter (such as the granting of rebates) is involved, which places negotiation outside the scope of the ASC.

Commodity boards also influence the operation of the liner market through their appointment of 'licensed exporters' or 'marketers'. These traders commonly have authority to arrange shipping services within the limits imposed by the above negotiations. This may include the arranging of discounted rates.

Commodity organisations, such as the Australian Wool Corporation (AWC) which operate price support schemes participate in the liner markets in another significant way. On an irregular basis they require shipment of large volumes of cargo. These cargoes may not be tied to any loyalty agreement and, therefore, provide an inducement for non-conference competition.

Elements of market power

The degree of influence a commodity board may hold in formal freight rate and service negotiations is generally related to three main factors:

- the size and reliability of the commodity trade;
- the degree of unity of commodity interests in negotiations; and
- the terms of the sales contracts.

Outside of these negotiations, a commodity board may also achieve leverage in the market through concentrating export flows to enable volume discounts. Australian examples are used here to illustrate these points.

The size and reliability of the commodity trade

The proportion of the task and, particularly, specialised capacity on a route reliably accounted for by any one commodity is an obvious indicator of that commodity groups' influence in negotiations. On the Australian trades this 'volume' influence varies between commodity boards and trades. The potential influence of such commodity boards as the Australian Meat and Livestock Corporation (AMLC) in the meat dominated Australia to North American reefer markets can be contrasted, for example, with the influence of commodity boards which represent smaller volumes of cargo on more diverse routes.

The degree of unity of commodity interests in negotiations

Similarly, the influence of commodity boards in negotiations varies according to their ability to represent, solely, their industry's various export interests. Contrast, for example, the Australian Canned Fruits Corporation (ACFC) whose statutory authority gives it power to acquire the total Australian production of canned fruits, with the situation experienced by the AWC, where wool cargoes are spread amongst Australian wool buyers, growers, the AWC itself, as well as importers in various countries. When each of these groups is represented in negotiations , conflicts of interest will probably arise and their bargaining position vis-a-vis carriers weaken.[6]

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6. In the Japan trade, for example, wool negotiations include the AWC, the Australian Council of Wool Buyers (ACWB), the Wool Council of Australia (WCA), and the Japanese Wool Commodity Group of Australia (JWCGA).

The terms of the sales contract
Where shipments are arranged on an FOB basis the influence of the commodity board is reduced, as the importer may nominate the operator(s) to be employed. In the Australia to East Europe and Japan trades this is common practice.

The ability of exporters to achieve volume discounts on the rates negotiated by their commodity board is the other aspect of market power. Marketers or exporters licenced by a board, if sufficiently large, are able to provide economies of scale attractive to operators and, hence, achieve discounted rates. The top 40 companies licensed by the AMLC to export account for 85 per cent of the total beef and veal market in 1982-83 (AMLC 1983, 27). The ACFC appoints only four 'marketers' to organise the export of canned fruit from Australia. The Australian Dairy Corporation (ADC) similarly licences several manufacturers to export produce, and, like the AWC, exports large volumes directly.

Commodity boards, by virtue of their activities, have a comparative advantage over other industries that ship on a less cohesive basis. Where these boards also control large volumes of cargo, which represents a significant share of the task in a trade, this comparative advantage is increased, and will be maximised if other circumstances allow this power to be exercised.

Unions

This section provides details of the structure and character of union representation in both the Australian marine and shipping and stevedoring industries. The process of restructuring towards industry unionism, which has followed the introduction of containerization is given particular attention in the first part of the analysis. The second part outlines some of the main objectives and current concerns of the unions involved.

Structure
Organisation of workers within the marine and shipping industry has traditionally been on the basis of particular crafts or trades. Unions evolved which represented separately, seamen, masters and deck officers, seagoing shipwrights, stewards, marine engineers and radio officers.

The Australian stevedoring industry has a tradition of both craft and general unions but also evolved to be characterised by a fragmented structure of worker organisation. Those unions presently involved in the industry include the Waterside Workers' Federation (WWF), the Foreman Stevedores' Association, the Stevedoring Supervisors' Association, the Federal Clerks Union, the Federated Storemen and Packers' Union, and the Transport Workers' Union.

Some rationalization of unionism in both industries has resulted, however, since the containerization of Australian trades. This can be attributed to two main consequences of containerization:

- an increasing capital intensity of the industry which threatened the viability of smaller unions and forced some amalgamation; and
- the introduction of 'new' workers to the industry in the professions of electricians and fitters, to maintain container equipment. This exacerbated problems of demarcation and, hence, has prompted reassessments of the appropriateness of union representations on a craft basis.

The progress toward rationalization to date has involved both voluntary amalgamations and judicial action. By 1978 all shipwrights had amalgamated with the Merchant Service Guild, which previously represented only masters and deck officers. In 1981 cooks amalgamated with the Seamen's Union (SUA). By 1985 amalgamation of stewards and the Seamen's Union was also being mooted. In 1984 the High Court confirmed the WWF's right to include shipping clerks. The Federal Court (59 FLR 78) granted rights to the WWF to cover tradesmen. Amalgamation of foremen with the WWF has also been suggested (Bull 1984, 113).

In the marine and shipping industry there appears to be evolving two broadly based 'industry' unions. One would represent ratings (non-officers) and comprise seamen, cooks and stewards. The other would represent officers, comprising masters and deck officers, marine engineers and radio officers. A 'one-union waterfront' is the objective in the WWF.

Industry unionism: perceived benefits and costs

It is perceived that the process of restructuring towards industry unionism will confer significant benefits to the marine and shipping and the stevedoring industries. Firstly, a reduction in demarcation disputes is envisaged. In 1981-82, such disputes represented 27 per cent of disputes on the Australian waterfront (Bull 1982). Secondly, a simpler negotiations process would be involved. The present situation in the stevedoring industry, for example, involves the employer organisation and the Association of Employers of Waterside Labour (AEWL), conducting separate negotiations, every two years, with each of the unions involved. A smaller number of unions would allow representatives to know each other better and make negotiations more capable of being conducted on a 'sane' basis (Bull 1982).

The perceived benefits to the unions include a simplified organisation and an improvement in communication within the membership. Increased flexibility in response to technological change would also be provided for by allowing the retraining of members within the union structure as certain jobs became redundant. The expanded resources of the unions created would also allow greater sophistication. Duplication would also be avoided, promoting efficiency.

Some barriers to the achievement of industry unionism, however, are evident. Firstly, several of the unions involved in the industries have large components of their membership involved in unrelated industries. Their political structure and agenda of concerns, therefore, are very different to those of the unions directly involved. Persuading them to rescind control of their membership may involve a lengthy process.

Secondly, some opposition also exists within the memberships of the unions which propose amalgamation. Those members of unions who are reasonably confident of their continued employment see amalgamation as involving them 'taking on' the problems of other unions.

Future activities of the major unions involved are likely to reflect their commitment to overcoming these obstacles. They have also, however, a broader range of objectives and concerns which will also influence their activities. These are outlined below.

Objectives and immediate concerns

The objectives of Australian trade unions are commonly categorised into three broad groups, that is, provision of direct services to members, obtaining organisational security and improving conditions of employment (Plowman et al. 1980, 205). These are evident in the activities of unions involved in the liner shipping industry. Of particular concern, however are secondary boycott legislation, redundancy provisions, flag of convenience shipping, and Australian flag participation.

The direct services provided in the marine and shipping, and the stevedoring industry include educational programs, recreational activities, superannuation schemes, and sickness and accident insurance schemes. These are generally financed by members' subscriptions, and by contributions from employers.

Organisational security refers to the rights of unions to organise in their field of employment. Of particular concern to the unions involved in liner shipping at present is Section 45(D) of the Trade Practices Act. This legislation provides for the use of penal powers against unions in cases of secondary boycott disputes. Injunctions under s.45D have been taken out against the SUA and Merchant Services Guild for their action in support of Australian flag participation and against the WWF for its action against flag of convenience shipping.

All unions are committed to the repeal of the legislation which failed to pass the Senate in October 1984. The WWF, TWU and SUA, in addition, have declared their intention to act jointly in the event of any future attempt to use the legislation against any one of them (Brass 1985, 7).

Claims related to the economic conditions of employment include those for improved wages and working hours, better leave provisions, and improved physical conditions. In the liner shipping industry, redundancy provisions are also a particular concern. Between the mid-1950s and 1985 the membership of the WWF 'A Register' (which does not include the tradesmen, clerks, etc) decreased from 27 000 to 6500 (Bull 1984, 111). The developments in employment levels in the marine and shipping industry, since 1976-77 are shown in Table 3.4.

In response to the threat of new technology the unions have sought a variety of agreements from employers and government. These aim first, at minimising the displacement of labour and, second, at securing protection for employees from income loss in the final event of displacement (Plowman et al. 1980, 336).

The 1967 'Memorandum of Understanding' between AEWL and the Federated Clerks Union (FCU) is an example of the first case. This agreement provided for all container terminals owned or controlled by shipping interests to employ only clerical staff nominated by the FCU. It also provided for all LCL shipments to be unpacked and packed by employers in the wharf area, thus ensuring the employment of traditional stevedoring labour in the depot and terminal sector.

Agreements on redundancy and severance payments have typically been negotiated within a framework of discussions at the national level (for example, the National Stevedoring Industry Conference, 1965-67). Pension schemes, severance payments and/or early retirement schemes have been provided in this way for the abandonment of a range of restrictive work practices and reduced manning levels.

The continuing need for work practices to respond to technological change appears to be recognised by the majority of unions involved in the Australian shipping industry (see, for example, the *Guild Log*

TABLE 3.4 EMPLOYMENT LEVELS IN THE AUSTRALIAN MARINE AND SHIPPING INDUSTRY, 1976-77 TO 1983-84

Employment category	*Financial year* 76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84
Officers								
Deck officers	1 199	1 234	1 192	1 139	1 223	1 235	1 347	1 288
Engineer officers	1 457	1 389	1 367	1 262	1 278	1 362	1 488	1 352
Electrical and refriger-ation engineers	195	183	191	192	194	198	193	195
Radio officers	206	197	196	193	181	199	203	192
Total	3 057	3 003	2 946	2 786	2 876	2 994	3 231	3 027
Ratings								
Deck ratings	2 485	2 437	2 426	2 327	2 248	2 566	2 387	2 267
Engine-room ratings	885	840	868	832	815	939	875	844
Stewards	1 020	977	1 001	988	1 008	1 072	1 000	974
Cooks	560	536	569	528	539	601	577	532
Crew attendants	428	424	422	411	356	368	383	404
Shipwrights	247	235	217	172	174	177	172	169
Miscellan-eous	124	104	39	49	142	266	252	129
Total	5 749	5 553	5 542	5 307	5 282	5 989	5 646	5 319
Total	8 806	8 556	8 488	8 093	8 158	8 983	8 877	8 346

Source General register of seamen; masters and seamen employed during the financial year, DoT.

1984, 12-14). Disagreement appears likely to continue, however, on the rate of technological change. The autonomy and scope of managements' right to adjust workforce skills and numbers to changing requirements therefore, is likely to continue to be limited.

The unions also propose continued action against Flag of Convenience (FOC) Shipping in accordance with the International Transport Federation (ITF) campaign. This campaign aims at securing proper terms and conditions of employment for seafarers on FOC ships, and, ultimately, the phasing out of FOC shipping (Maritime Worker, Dec. 1984, 9). In 1983-84, action in support of the crews of FOC ships by Australian unions apparently resulted in the collection of nearly $2 million from foreign owners (Brass, 1985).

A further cornerstone of union activity is support for increased Australian participation in liner trades. The Merchant Services Guild and SUA, with the support of the WWF and other unions, have acted to increase the proportion of Australian cargoes carried by ANL. The 1984 action against the Columbus Line, following the withdrawal of the ANL ship *Allunga* from the North American trade is an illustrative example. Their involvement to restrict non-conference competition with ANL via the mechanism of 'accords' is another.

CHAPTER 4 CHARACTERISTICS OF LINER TRADES

Demand for transport is derived from the need for goods and services. In the international arena trading between nations depends, to a large extent, on shipping services. Consequently, an examination of the pattern of trade between regions, that is, the composition of traded commodities and the directions of the commodity flow, is required to provide an understanding of the provision of shipping services.

This chapter describes the overall pattern of trade between Australia and the rest of the world since the early 1970s. The significance of liner shipping in meeting international trade is highlighted. Characteristics of major import and export commodities are discussed in terms of the value, volume and other physical characteristics relevant to the provision of shipping services such as stowage factors and seasonality. The information on commodity characteristics is then reviewed to highlight the major problem in the liner trade, that of task imbalance within a trade and between trades. Finally, the relative market power of the major commodity shippers is discussed.

The freight quantities reported are measured in mass tonnes and not revenue tonnes. The freight value represents:

- *inward cargo:* the FOB equivalent of the price when the sale of those goods is conducted under open market conditions;
- *outward cargo sold prior to shipment:* the FOB equivalent of the actual price paid to the exporter; and
- *outward cargo sold on consignment:* the FOB equivalent of the price that would have been paid to the exporter had the goods been actually sold to an importer in the country of their final destination.

Cargo commodities are classified according to the Australian Transport Freight Commodity Classification (ATFCC).

OVERALL PATTERN OF TRADE

World events since the early 1970s have significantly affected Australia's trading pattern. Government policies on tariff and protection, in response to increasing overseas competition, have influenced the composition and volume of Australian imports. The entry of the United Kingdom into the European Economic Community and the export-oriented growth of countries in the Western Pacific Region have had adverse effects on Australia's traditional exports which require liner shipping services.

Composition

Australia imports mainly manufactured products. Figures available for 1983-84 show that more than 88 per cent of total imports can be classified as manufactures (ABS 1984b). The composition of the imported manufactures has changed significantly in the last three decades. There has been a reduction in imports of crude and simply transformed manufactures, while imports of the elaborately transformed products have been on the increase. For example, the increase in imports of finished consumer items at the expense of the producer's materials for use in the building, rural and other minor manufacturing industries has been most noticeable (Donath 1980b, 11-13).

Significant features of the export trade in recent years have been the increase in importance of the mining and related industries and the steady decline of agricultural industries. The contribution of agricultural industries, including forestry, to total export income declined from 31 per cent in 1970-71 to around 18 per cent in 1983-84. Mining and related industries, however, increased their share from 19 per cent to about 27 per cent in the same period (ABS 1984a).

Direction

Changes in the direction of trade directly influence the trade routes of shipping operators. Tables 4.1 and 4.2 show, in value terms, the level and share of Australian imports and exports to major regions for the period 1970-71 to 1983-84. A steady decline in imports from Europe from 41 per cent in 1970-71 to 25 per cent in 1983-84 is apparent. Large increases in import trade shares were recorded for Australia's close neighbours in Asia and around the Western Pacific. Between 1970-71 and 1983-84, Japan and South Korea increased their share from 14 per cent to 24 per cent while the rest of Asia doubled their combined share from 6 per cent to 13 per cent.

The entry of the UK into the EEC has contributed greatly to a

TABLE 4.1 IMPORTS TO AUSTRALIA, 1970-71 TO 1983-84

	1970-71		*1978-79*		*1979-80*		*1980-81*		*1981-82*		*1982-83*		*1983-84*	
Region	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*
Europe[a]	1.70	41.0	4.24	30.8	4.70	29.0	4.70	24.8	5.80	25.2	5.27	24.2	6.16	25.6
North America[b]	1.21	29.1	3.62	26.3	4.04	24.9	4.69	24.7	5.86	25.5	5.23	24.0	5.68	23.6
Japan/ Korea[c]	0.58	14.0	2.56	18.6	2.67	16.4	3.83	20.2	4.83	21.0	4.80	22.0	5.75	23.9
Middle East[d]	0.13	3.1	0.78	5.7	1.37	8.5	1.67	8.8	1.73	7.5	1.58	7.2	1.39	5.8
New Zealand	0.09	2.2	0.42	3.0	0.55	3.4	0.63	3.3	0.72	3.1	0.69	3.2	0.92	3.8
Rest of Asia[e]	0.27	6.5	1.60	11.7	2.21	13.6	2.63	13.9	3.14	13.7	3.20	14.7	3.14	13.0
Rest of World	0.17	4.1	0.53	3.9	0.68	4.2	0.81	4.3	0.92	4.0	1.04	4.7	1.02	4.3
Total trade	4.15	100.0	13.75	100.0	16.22	100.0	18.96	100.0	23.00	100.0	21.81	100.0	24.06	100.0

a. Europe: EEC countries, Albania, Austria, Bulgaria, Cyprus, Czechoslovakia, Finland, E. Germany, Gibraltar, Hungary, Iceland, Malta, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, Turkey, USSR, Yugoslavia.
b. North America: Canada, Mexico, USA.
c. Japan/Korea: Japan and South Korea.
d. Middle East: Bahrain, Egypt, Ethiopia, Iran, Iraq, Israel, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan, Syria, N & S Yemen.
e. Rest of Asia: Bangladesh, Bhutan, Brunei, Burma, China, Hong Kong, India, Kampuchea, North Korea, Laos, Macao, Maldives, Mongolia, Nepal, Pakistan, Sri Lanka, Taiwan, Vietnam and ASEAN countries of Indonesia, Malaysia, Philippines, Singapore and Thailand.

Source ABS (1985b).

TABLE 4.2 EXPORTS FROM AUSTRALIA, 1970-71 TO 1983-84

Region	*1970-71*		*1978-79*		*1979-80*		*1980-81*		*1981-82*		*1982-83*		*1983-84*	
	($'000m)	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*	*($'000m)*	*(per cent)*
Europe[a]	1.09	24.9	2.47	17.3	4.20	22.2	3.71	19.3	3.53	18.0	4.28	19.4	4.55	18.4
North America[b]	0.64	14.6	2.09	14.7	2.41	12.8	2.62	13.7	2.55	13.0	2.54	11.5	3.04	12.3
Japan/ Korea[c]	1.20	27.4	4.56	32.0	5.48	29.0	5.77	30.1	6.03	30.8	6.79	30.8	7.47	30.2
Middle East[d]	0.17	3.9	0.73	5.1	1.34	7.1	1.36	7.1	1.39	7.1	1.48	6.7	1.59	6.4
New Zealand	0.23	5.2	0.74	5.2	0.86	4.6	0.92	4.8	1.04	5.3	1.16	5.3	1.42	5.7
Rest of Asia[e]	0.59	13.5	2.43	17.1	3.34	17.7	3.38	17.6	3.65	18.7	3.84	17.4	4.44	17.9
Rest of World	0.46	10.5	1.22	8.6	1.24	6.6	1.42	7.4	1.39	7.1	1.97	8.9	2.26	9.1
Total trade	4.38	100.0	14.24	100.0	18.87	100.0	19.18	100.0	19.58	100.0	22.06	100.0	24.77	100.0

a. Europe: EEC countries, Albania, Austria, Bulgaria, Cyprus, Czechoslovakia, Finland, E. Germany, Gibraltar, Hungary, Iceland, Malta, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, Turkey, USSR, Yugoslavia.

b. North America: Canada, Mexico, USA.

c. Japan/Korea: Japan and South Korea.

d. Middle East: Bahrain, Egypt, Ethiopia, Iran, Iraq, Israel, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan,Syria, N & S Yemen.

e. Rest of Asia: Bangladesh, Bhutan, Brunei, Burma, China, Hong Kong, India, Kampuchea, North Korea, Laos, Macao, Maldives, Mongolia, Nepal, Pakistan, Sri Lanka, Taiwan, Vietnam and ASEAN countries of Indonesia, Malaysia, Philippines, Singapore and Thailand.

Source ABS (1985a).

reduction in Australian exports to Europe from almost 25 per cent in 1970-71 to 19 per cent in 1983-84. On the other hand, Japan and South Korea increased their imports from Australia over the same period to a level which represented almost a third of total Australian exports in 1983-84. Asia, excluding Japan and South Korea, was almost as important an export market as Europe and increased its level of imports to 18 per cent in 1983-84. Exports to the Middle East have remained steady at about 7 per cent of total exports in recent years.

INTERNATIONAL FREIGHT TASK OF VARIOUS MODES

In this section, the international freight task performed over recent years by the non-liner, liner and air modes will be analysed in terms of tonnage and value.

Recent patterns

Table 4.3 presents the tonnages carried by the non-liner, liner and air modes for the period between 1979-80 and 1983-84. Comparison of the task over this period indicates that there has been a steady decline in the inward task performed by non-liner ships while the outward tonnage increased by almost 40 million tonnes between 1982-83 and 1983-84. There was a marginal decline in the tonnages carried by non-liner ships before 1982-83. This feature was probably the result of the world recession in the late 1970s and early 1980s which depressed the demand for mineral and metalliferrous ores.

With the exception of 1980-81 when the tonnage carried by the liner ships both inward and outward was almost equal, the outward liner task

TABLE 4.3 INTERNATIONAL FREIGHT TASK BY MODE, 1979-80 TO 1983-84
('000 tonnes)

	Sea					
Year ending	*Non-liner*		*Liner*		*Air*	
30 June	*Inward*	*Outward*	*Inward*	*Outward*	*Inward*	*Outward*
1979-80	20 657	181 381	4 777	5 997	70	52
1980-81	20 345	172 396	6 464	6 404	72	56
1981-82	20 307	170 812	5 462	5 566	90	68
1982-83	18 628	167 403	5 019	6 768	90	77
1983-84	16 885	203 519	5 683	6 317	109	85

Sources ABS (1983b and 1985e). DofA (1985).

was usually greater than the inward task. However, it has been suggested that the inward liner task has been larger than the outward in terms of volume (Stubbs n.d.).

Both the inward and outward air task have grown significantly since 1980 with the inward task consistently larger than the outward task.

Overall, the task performed by non-liner mode has been the most important in terms of tonnages carried, followed by liner and then air. The imbalance in tonnages carried has also been most severe in the case of the non-liner mode.

Quantity and value of the freight task

The tonnages total value and the value per tonne of the cargo carried inward and outward by the three international freight modes are presented in Table 4.4 for the year 1983-84. A number of features emerge from the information presented. First, the value per tonne of the inward cargo was higher than outward cargo for all modes. Second, the value per tonne of the air cargo was almost 20 times larger than that of both inward and outward liner cargo, suggesting that the characteristics of commodities carried by the two modes are so different that competition between them could be considered to be insignificant for all but a few commodities. Third, the inward liner task was greater in terms of total value of cargo carried whilst the outward non-liner bulk task was the more significant.

THE LINER TASK

The liner task to and from Australia is very diverse. The ABS lists 55 groups of commodities traded between Australia and 23 overseas trading areas served by liner ships.

Table 4.5 summarises the trading situation between Australia and the 10 major liner trade areas for the year 1983-84. These 10 major trade areas accounted for more than 95 per cent of the value and more than 85 per cent of the task in all liner trades in 1983-84. Five trade areas, Europe, East Asia, Japan, North America and South East Asia, recorded a two-way trade value of more than one billion dollars.

Comparison of the inward and outward liner task for each trade area reveals imbalance. The inward task is generally greater than the outward task in terms of both value and tonnage. In the case of Japan, East Asia and South Korea the outward liner task is greater, although the value of inward task is larger for each of these trades.

TABLE 4.4 QUANTITY AND VALUE OF INTERNATIONAL CARGO BY MODE, 1983-84

Direction of trade	*Sea*						*Air*		
	Non-liner			*Liner*					
	('000 tonnes)	*($m)*	*($/ tonne)*	*('000 tonnes)*	*($m)*	*($/ tonne)*	*('000 tonnes)*	*($m)*	*($/ tonne)*
Inward	16 885	6 149	364	5 683	13 219	2 326	102	4 171	40 900
Outward	203 519	13 588	66	6 317	8 429	1 335	85	2 073	24 400

Source ABS (1985e).

TABLE 4.5 QUANTITY AND VALUE OF THE TASK IN THE MAJOR AUSTRALIAN LINER TRADES, 1983-84

	Quantity ('000 tonnes)		*Value ($m)*	
Trade area[a]	*Inward*	*Outward*	*Inward*	*Outward*
Europe and North Mediterranean	1 491	897	3 835	2 091
Philippines, Hong Kong and Taiwan	610	674	1 439	696
Japan	629	1 314	2 834	1 544
South Korea	80	116	263	207
West Coast North America	714	332	1 381	479
East Coast North America	503	595	1 674	914
Middle East Gulf	6	134	10	164
Singapore, W. Malaysia, Indonesia and Thailand	432	754	602	787
New Zealand	388	317	482	500
Papua New Guinea and Solomon Islands	39	330	73	306
Other	791	854	626	741
All trades	5 683	6 317	13 219	8 429

a. Trade areas are defined in Appendix I.

Source Derived from ABS Shipping and Air Cargo Commodity Statistics.

The tonnage and value of some major inward and outward commodities shipped in the liner trades are presented in Tables 4.6 and 4.7 respectively. The tables highlight the relative significance of individual commodities as well as the large spread of value and tonnage amongst the commodities. For example, in the inward trades, machinery equipment accounted for 29 per cent of total value of liner cargo but only 9 per cent of total tonnage. In the outward trades, wool and meat were significant both in terms of tonnage and value however, cereals and cereal preparations were important in terms of tonnage alone.

CHARACTERISTICS OF COMMODITIES AND THE ASSOCIATED DEMAND FOR LINER SERVICES

Commodity characteristics have a major influence on fleet composition and therefore the overall level of costs. Their characteristics can

TABLE 4.6 QUANTITY AND VALUE OF MAJOR INWARD CARGO COMMODITIES IN AUSTRALIAN LINER TRADES[a], 1983-84

	Quantity		*Value*	
Commodities	*('000 tonnes)*	*(per cent)*	*($m)*	*(per cent)*
Machinery	492	9	3 791	29
Textile yarns and fabrics	245	4	1 091	8
Road vehicles and transport equipment	130	2	772	6
Paper and articles of paper	508	9	468	4
Chemicals	270	5	412	3
Manufactures of metals	250	4	460	4
Other	3 788	67	6 225	47
All cargo	5 683	100	13 219	100

a. Some commodities are affected by confidentiality embargoes for trade purposes and are excluded from their relevant ATFCC category, however they are included in the 'Other' category.

Source Derived from ABS Shipping and Air Cargo Commodity Statistics.

TABLE 4.7 QUANTITY AND VALUE OF MAJOR OUTWARD CARGO COMMODITIES IN AUSTRALIAN LINER TRADES[a], 1983-84

	Quantity		*Value*	
Commodities	*('000 tonnes)*	*(per cent)*	*($m)*	*(per cent)*
Wool	607	10	1 870	22
Meat	564	9	1 233	15
Machinery	69	1	456	5
Non-ferrous metals	387	6	370	4
Metaliferrous ores	534	8	491	6
Dairy products	226	4	336	4
Cereals and cereal preparations	931	15	267	3
Hides and skins	174	3	258	3
Fruit and vegetables	258	4	178	2
Iron and steel	255	4	127	2
Other	2 312	37	2 843	34
All cargo	6 317	100	8 429	100

a. Some commodities are affected by confidentiality embargoes for trade purposes and are excluded from their relevant ATFCC category, however they are included in the 'Other' category.

Source Derived from ABS Shipping and Air Cargo Commodity Statistics.

also affect service costs and are thereby relevant to the formation of differential rates. In addition, characteristics such as seasonality and variability affect the level of capacity which must be provided and, therefore, the level of ship utilization and costs.

As outlined later in the chapter, commodity characteristics may also have a role in determining the market power of shippers.

Characteristics of selected commodities

Tables 4.8 and 4.9 present some characteristics of a number of selected commodities in the inward and outward liner trades respectively. The commodities correspond to the two-digit commodity groups under the ATFCC system. These commodities are selected on the basis of their significance in the liner trade (that is, they are large in terms of tonnage and/or value) and other characteristics which underlie differential costs and rate setting. The characteristics considered include the average value, the average stowage factor, the proportion of the commodity shipped in reefers and, where possible, the imputed elasticity of demand for the shipping service.

Commodities in the liner trades vary greatly in terms of average value per tonne. Overall, inward commodities were higher-valued than outward commodities. High-valued inward commodities were typically medicinals and pharmaceuticals, machinery and transport equipment. Wool, machinery and professional equipment were amongst the highest-valued outward commodities.

The stowage factor measures the relationship between the volume of the cargo (in cubic metres) and its weight (in tonnes). Since the capacity of containers is limited in weight and space, the stowage characteristics of the cargo is important in determining the capacity utilization of containers and ultimately the utilization of ships. The average stowage factor for any commodity group was, for the purpose of this study, derived from individual stowage factors of commodities classified at the four-digit level of the ATFCC system by weighting the tonnage of each commodity within the commodity group. As can be seen from the tables, the inward cargo is more bulky than the outward cargo by more than half a cubic metre per tonne on average. Textile yarns and fabrics and transport equipment were the most bulky of the imported items. Road vehicles and transport equipment have the largest stowage factors amongst the export commodities.

The proportion of inward and outward reefer cargo in each commodity group, with the exception of fruit and vegetables, is similar. Imbalance in the tonnages of each commodity, however, results in a greater overall requirement for reefer capacity in the outward trades.

TABLE 4.8 CHARACTERISTICS OF SELECTED INWARD CARGO COMMODITY GROUPS[a], 1983-84

Commodity	*Average value ($ per tonne)*	*Stowage factor (m^3 per tonne)*	*Proportion of reefer (per cent)*
Dairy products	2 510	1.96	92
Fish, crustaceans and molluscs	2 882	1.52	44
Fruit and vegetables	1 149	2.34	28
Chemicals	1 521	1.19	0
Medicinal and Pharmaceutical products	15 505	3.03	0
Paper and articles of paper	920	1.87	0
Textile yarns or fabric	4 438	3.68	0
Iron and steel	935	0.86	0
Manufactures of metal	1 847	0.96	0
Machinery and equipment	7 705	2.81	0
Road vehicles and transport equipment	5 931	4.66	0
Printed matter	3 911	3.27	0
Total inward cargo	2 404	2.00	na

a. Some commodities are affected by confidentiality embargoes for trade purposes and are excluded from their relevant ATFCC category, however they are included in the 'Other' category.

na not available

Source Derived from ABS Shipping and Air Cargo Commodity Statistics.

TABLE 4.9 CHARACTERISTICS OF SELECTED OUTWARD CARGO COMMODITY GROUPS[a], 1983-84

Commodity	*Average value ($ per tonne)*	*Stowage factor (m^3 per tonne)*	*Proportion of reefer (per cent)*	*Imputed elasticity of of demand for shipping*
Meat	2 186	1.85	96	-0.20
Dairy products	1 480	1.78	45	na
Fish, crustaceans and molluscs	8 339	1.96	92	na
Cereals	287	1.69	0	-0.31
Fruit and vegetables	690	1.92	61	na
Hides and skins	1 478	2.02	0	na
Wool	3 083	2.98[b]	0	-0.02
Metalliferrous ores	919	0.64	0	na
Iron and steel	500	0.56	0	-3.0
Non-ferrous metals	956	0.28	0	-1.60
Machinery	6 597	2.60	0	na
Road vehicles and equipment	4 500	3.10	0	na
Professional equipment	9 561	2.31	0	na
Personal effects	2 485	9.00	0	na
Total outward cargo	1 347	1.48	na	na

a. Some commodities are affected by confidentiality embargoes for trade purposes and are excluded from their relevant ATFCC category, however they are included in the 'Other' category.
b. The average stowage factor for wool is expected to decrease as super density dumping increases.

na not available

Source Derived from ABS Shipping and Air Cargo Commodity Statistics.

The last column of Table 4.9 shows imputed elasticities of demand for shipping services. The measure indicates the proportional response of demand for shipping to proportional changes in freight rates. Bennathan and Walters (1966) method was used to calculate the demand elasticities. The lack of data on imports prevents a similar analysis for import commodities. The limited information available for the outward trade indicates that demand elasticities for semi-manufactured commodities such as iron and steel and non-ferrous metals were generally greater than those of agricultural-related commodities.

Characteristics of demand

The fact that Australian exports include a large proportion of agricultural products results in distinctive seasonal patterns for the demand for shipping services. The volatility of world demand for Australian minerals and related products and the susceptibility of rural output to climatic conditions also introduces variability into Australia's liner trades. Table 4.10 presents the seasonal pattern, average growth rate and a measure of the variability of tonnage shipped for 19 major export commodities. The data were taken from the period September Quarter 1975 to September Quarter 1984.

Table 4.10 shows the seasonal pattern for exported wool, meat for human consumption, fruit, nuts and butter associated with the pattern of production within Australia. For example, the adult cattle slaughterings in Queensland and to a lesser extent New South Wales and Victoria peak in the June Quarter (Broadbent and Weeks 1984). Other semi-manufactured commodities such as aluminium alloys, iron and steel and refined copper also exhibit an export pattern which peaks in the final quarter of the year.

Out of 19 commodities considered, only fruits, milk and cream, and wool recorded positive growth rates for the period under consideration. Aluminium alloys, iron and steel experienced the largest falls in tonnage shipped, reflecting a depressed world demand for metals in recent years.

As an indication of the predictability of export tonnages a measure of the proportion of variation explained by the trend line is also included in Table 4.10. The measure is an indicator of the degree of difficulty which exists in attempting to predict the export task with a simple trend. The generally low degree of predictability observed is expected to impose considerable difficulties in providing adequate services and at the same time achieving high levels of ship utilization.

TABLE 4.10 SEASONAL PATTERN, AVERAGE GROWTH RATE AND RELATIVE PREDICTABILITY OF MAJOR OUTWARD CARGO COMMODITIES, 1975 TO 1984

Commodities	*Quarters*				*Average[a] growth rate per quarter (per cent)*	*Relative[b] predictability*
	March	*June*	*September*	*December*		
Aluminium alloys, unwrought	N	L	H	H	-5.7	0.56
Fruit and nuts, fresh or dried	L	H	H	L	2.7	0.75
Hides, bovine or equine	L	N	N	N	1.5	0.75
Iron and steel ingots	L	N	H	L	-5.1	0.75
Meat, boneless beef	L	H	H	L	-0.7	0.62
Meat, bovine animals	L	L	H	H	-1.8	0.48
Meat, edible offal	N	N	N	N	-1.1	0.68
Meat, sheep, lamb and goats	H	H	L	L	-1.5	0.57
Milk and cream	H	H	L	N	-1.6	0.35
Rice	L	L	H	N	1.3	0.45
Wood chips	N	N	N	N	0.3	0.39
Wool, greasy equivalent	H	H	L	N	-0.4	0.48
Wool, greasy	H	H	L	N	-0.7	0.52
Wool, scoured	H	H	L	L	1.2	0.64

TABLE 4.10 (Cont.) SEASONAL PATTERN, AVERAGE GROWTH RATE AND RELATIVE PREDICTABILITY OF MAJOR OUTWARD CARGO COMMODITIES, 1975 TO 1984

Commodities	*Quarters* March	June	September	December	*Average*[a] *growth rate per quarter (per cent)*	*Relative*[b] *predictability*
Cheese	N	L	L	H	1.5	0.42
Flour, plain white	N	H	L	L	-5.6	0.70
Iron, pig, cast and spiegeleisen	L	L	N	H	-3.8	0.60
Butter	H	H	L	H	-3.9	0.61
Copper, refined unwrought	H	L	L	H	-0.1	0.21

a. The growth rate is obtained by fitting an exponential growth function to the data.
b. The measure used is R^2, the proportion of the explained variation to total variation in the tonnage of the exported commodity using the exponential growth function. The higher the value the better the predictability.

H = Seasonally high
L = Seasonally low
N = Seasonally neutral

Note Seasonal patterns were derived with the assistance of the Seasonal Analysis Section of the ABS.

Source ABS (1985d).

IMBALANCE IN THE LINER TRADES

The earlier examination of the liner task revealed that Australia's liner trades are not generally balanced in terms of quantity or value. In this section the underlying reasons for the imbalance and how it is manifested in terms of container flows are examined.

Differences in stowage characteristics

Table 4.11 presents average inward and outward stowage factors for the major liner trades in 1983-84. Table 4.11 shows that a cargo tonne imported to Australia tends to be, on average, half a cubic metre larger than an export tonne. This is true in all trades except the Middle East Gulf. The differences in average stowage factor were largest for the Australia/North American, Japan, South Korean and East Asian trades.

Where stowage factors are greater than 1.7 for dry commodities and 1.5 for reefer commodities the container will 'cube out' by reaching its cubic capacity before its weight capacity. Table 4.11 indicates that, in general the inward trades 'cube out' and the outward trades 'mass

TABLE 4.11 AVERAGE STOWAGE FACTORS FOR INWARD AND OUTWARD CARGO IN THE MAJOR AUSTRALIAN LINER TRADES, 1983-84
(m^3 per tonne)

	Stowage factors	
Trade area[a]	*Inward*	*Outward*
Europe and North Mediterranean	1.92	1.81
Philippines, Hong Kong and Taiwan	2.55	1.35
Japan	2.32	1.58
South Korea	2.80	1.63
West Coast North America	1.90	0.83
East Coast North America	1.94	1.75
Middle East Gulf	1.28	1.75
Singapore, West Malaysia and Indonesia	1.87	1.34
New Zealand	2.12	1.71
Papua New Guinea and Solomons	1.62	1.53
All trade areas	2.00	1.48

a. Trade areas are defined in Appendix I.

Source Prepared by BTE.

out'. This difference causes a large imbalance in container flows for those trades in which there is already a greater inward tonnage task.

Container flow

The problem of trade imbalance manifests itself in a flow of empty containers to or from a trade area. Table 4.12 records the container movements into and out of Australia for all major trade routes in 1982-83. In 1982-83, 384 607 cargo carrying TEUs were shipped on the inward trades, however only 340 876 cargo carrying TEUs were shipped outward, leaving a surplus of about 40 000 containers.

The flow of empty containers indicates that there are significant numbers being shipped into Australia despite the greater quantity of cargo and containers in the inward trades. The trades which

TABLE 4.12 INWARD AND OUTWARD CONTAINER MOVEMENTS: UTILIZED AND EMPTY CONTAINERS BY TRADE ROUTES, 1982-83

	Utilized containers		*Empty containers*	
Trade route[a]	*Inward*	*Outward*	*Inward*	*Outward*
Europe, Mediterranean and Red Sea Ports	122 921	82 377	6 182	38 176
East Asia	52 110	49 142	2 896	8 709
Japan and South Korea	89 829	79 929	12 761	22 432
West Coast North America	31 578	21 569	2 453	8 019
East Coast North America, Latin America and Caribbean	39 668	29 454	7 229	16 523
Africa	4 093	3 095	105	316
South Asia	4 740	5 769	28	297
Middle East Gulf	6 552	10 609	1 294	44
South East Asia	16 168	24 313	6 060	738
New Zealand	9 797	11 431	420	1 173
Papua New Guinea and Solomons	6 427	20 285	12 620	74
Pacific Islands	724	2 898	2 072	75
Unclassified trade routes	-	5	18	40
Total	384 607	340 876	54 138	96 616

a. Trade routes are defined in Appendix I.

Source DoT (1984b).

experience the greatest absolute flows of empty containers are Europe, Japan and North America.

It is worth noting that while ship and container utilization can be improved in any given voyage, the inherent trade imbalance which is caused by the differences in physical characteristics of traded commodities can not be overcome, although its effects can be reduced by appropriate routing of ships.

RELATIVE MARKET POWER

A cornerstone of the current liner shipping arrangements is that shippers are provided through the Australian Shippers' Council (ASC) with countervailing power to offset the market power of conferences. The ASC does not have any market power as such. However, the freight rates it negotiates on behalf of its members reflect the combined market power of shippers. Accordingly, the ASC can influence the overall level of charges but has little or no influence on the structure of rates. Individual shippers must use their market power outside the ASC framework to improve their position in relation to other shippers.

Shipper market power is defined here as the ability to negotiate rates which are different from those which the ship operators would set in a situation of competition for market shares. Accordingly, under this definition, a prerequisite of market power is the existence or threat of some form of competition. Furthermore, there must be a credible threat that the shipper will use the competitor's services. Without this threat, the existence of competition alone will not influence the ship operators pricing strategy.

There is no single measure of market power. Theories on pricing behaviour of ship operators suggest that the following characteristics are major elements of market power:[1]

- the volume of cargo that a shipper or commodity group offers or, more particularly their task share of the trade; and
- low variability of cargo offerings in relation to other commodities with a significant task share, that is, cargo volumes which are reliable.

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1. This and the other elements of market power were raised in the context of Commodity Boards in the Institutional Setting Section of Chapter 3.

Both these characteristics are particularly important to the ship operator facing uncertainty because they reduce the variability of revenue earnings. Under these conditions the shipper with large, reliable volumes of cargo has greater market power than low volume shippers or shippers with an unreliable offering.

The volume and reliability of cargo offering for the key commodities will be examined below to provide an indication of the potential market power of the shippers of those commodities.

Volume

Tables 4.13 and 4.14 present the relative volume shares of some imported and exported commodities respectively in the major liner trades. The selected commodities for the inward trades are not expected to be fully representative because Australia imports a wide range of manufactured commodities.

Paper, machinery and chemicals were the major imported commodities from Europe and Japan. Textiles is the dominant commodity from South Korea. Little is known about the organisation of importers or the overseas exporters of these commodity groups and it is not possible, therefore, to judge the extent to which large cargo offerings are made. Stubbs (n.d.) however reported that, in his survey of some 12 Australian importers, they indicated that they were unable to influence the level of inward rates. This suggests that the volume of cargo offerings, while significant, may be dispersed amongst many shippers.

In contrast to the inward commodities, there are commodity groups in the outward trades which have significant shares of the task. Their relative strength in this respect can be gauged from Table 4.14. For example, wool is the dominant commodity in the Australia/Europe and North Mediterranean trade and together with hides and skins and fruit accounts for nearly 60 per cent of the task.

The wool interests have been successful in using their market power to negotiate lower conference rates because of their ability and demonstrated willingness to use non-conference operators. On the other hand, although the Australian Meat and Livestock Corporation (AMLC) has effective control of large volumes of cargo in the North American trades, the lack of competition for reefer cargoes and the practice of designating carriers has limited the realization of their potential market power.

TABLE 4.13 TASK SHARE OF SELECTED INWARD CARGO COMMODITIES IN THE MAJOR AUSTRALIAN LINER TRADES, 1983-84[a]

(per cent)

	Trade area[b]									
Commodities[c]	*Europe and North Mediterranean*	*Philippines, Hong Kong and Taiwan*	*Japan*	*South Korea*	*West Coast North America*	*East Coast North America*	*Middle East Gulf*	*Singapore, West Malaysia, Indonesia*	*New Zealand*	*Papua New Guinea and Solomons*
Dairy products	1	0	0	0	0	0	0	0	3	0
Fish, crustaceans and molluscs	1	1	2	2	1	1	0	3	6	0
Fruit and vegetables	3	4	0	1	6	2	38	1	2	0
Chemicals	7	4	8	4	3	7	21	1	0	0
Medicinal and pharmaceutical products	0	0	0	0	0	0	0	0	0	0
Paper and articles of paper	19	1	8	5	10	13	0	1	2	0
Textile yarns and fabrics	2	10	5	26	0	3	0	4	6	0
Iron and steel	3	1	8	6	0	1	0	1	1	0
Manufactures of metals	2	24	4	7	1	2	0	1	3	0
Machinery and equipment	10	9	22	6	9	11	3	3	4	0
Road vehicles and transport equipment	3	3	6	1	1	3	0	0	1	0
Printed matter	2	2	1	0	1	3	0	1	1	0
Other	47	42	35	44	68	54	38	83	71	99
All cargo	100	100	100	100	100	100	100	100	100	100

a. Some commodities are affected by confidentiality embargoes for trade purposes and are excluded from their relevant ATFCC category, however they are included in the 'Other' category.
b. Trade areas are defined in Appendix I.
c. Some commodities were selected for study on the basis of criteria apart from their importance in terms of tonnes shipped.

Note Owing to rounding, figures may not add to totals.

Source Derived from ABS Shipping and Air Cargo Commodity Statistics.

TABLE 4.14 TASK SHARE OF SELECTED OUTWARD CARGO COMMODITIES IN THE MAJOR AUSTRALIAN LINER TRADES, 1983-84[a]

(per cent)

	Trade area[b]									
Commodities[c]	*Europe and North Mediterranean*	*Philippines, Hong Kong and Taiwan*	*Japan*	*South Korea*	*West Coast North America*	*East Coast North America*	*Middle East Gulf*	*Singapore, West Malaysia, Indonesia*	*New Zealand*	*Papua New Guinea and Solomons*
Meat	3	5	11	7	18	34	18	3	1	5
Dairy products	1	9	3	1	0	1	21	7	0	1
Fish, crustaceans and molluscs	0	0	1	0	1	0	0	0	0	0
Cereals	5	17	21	0	0	0	11	13	16	47
Fruit and vegetables	10	2	1	0	5	4	9	7	9	1
Hides and skins	15	1	2	4	0	0	0	0	2	0
Wool	31	6	11	27	0	5	0	1	0	0
Metalliferrous ores	6	7	8	15	4	43	0	3	0	0
Iron and steel	0	3	0	0	28	1	0	10	1	8
Non-ferrous metals	7	12	3	11	4	1	2	14	6	0
Machinery	2	0	0	0	1	1	1	2	4	2
Road vehicles and equipment	1	0	0	6	1	0	0	0	4	0
Professional equipment	0	1	0	0	0	0	0	1	1	0
Personal effects	0	0	0	0	0	0	0	0	0	0
Other	19	37	39	29	38	10	37	38	57	35
All cargo	100	100	100	100	100	100	100	100	100	100

a. Some commodities are affected by confidentiality embargoes for trade purposes and are excluded from their relevant ATFCC category, however they are included in the 'Other' category.
b. Trade areas are defined in Appendix I.
c. Some commodities were selected for study on the basis of criteria apart from their importance in terms of tonnes shipped.

Note Owing to rounding, figures may not add to totals.

Source Prepared by BTE using ABS Shipping and Air Cargo Commodity statistics.

Reliability

In relation to the reliability and regularity of cargo offerings, Table 4.10 shows that no commodity group has a clear advantage. As a group, manufacturers probably provide the most stable demands. However, individually, their small share of the task prevents this comparative advantage from being exercised. Furthermore, it has been suggested (Cassidy 1980a) that small volume shippers such as the manufacturers may be disadvantaged by the emphasis of conferences in securing base loads.[2]

While Table 4.10 indicates that the primary industry commodities such as wool and meat are seasonal, the cargo offerings have been relatively stable and their demand, as a consequence, is reasonably predictable. The seasonality of their offerings is not likely to affect their market power because of the excess outward capacity in the liner trades in which they dominate. Given this, and the large volumes of cargo that the commodity groups control, the potential market power of shippers of these commodities are expected to be significant.

2. Cassidy argued that liner operators attempt to reduce the variability of revenue earnings by discriminating in favour of base load commodities. In 'buying out' these commodities the market power of the remaining commodities which are complements in demand for shipping services is weakened.

CHAPTER 5 CHARACTERISTICS OF FLEETS ENGAGED IN AUSTRALIAN LINER TRADES

This chapter presents statistical information on the characteristics of the liner fleet engaged in the carriage of Australia's international trade in 1983-84. To assist with the examination of competition in Chapter 9, characteristics such as capacity and cargo shares of operators which are traditionally assumed to affect the competitiveness of a market are also examined. Information is also provided on the extent of national flag shipping and the level of penetration of flag of convenience and centrally planned operators.

A major influence on the strength of competition in a market is the number of buyers and sellers. This chapter examines the characteristics of the supply side of the market which affect competition separated from any consideration of the influence which shippers can exert.

TEU capacity estimates reported throughout this chapter represent nominal TEU capacity, that is, the maximum number of TEU containers which each ship in a fleet can carry on a single voyage. Nominal capacity must be interpreted with some care. For example, for operational reasons actual capacity in use will generally be lower than nominal capacity. In addition, nominal TEU capacity estimates are inadequate for ships such as ro-ro and general cargo ships which do not normally utilize their full container capacity. Finally, nominal capacity is only a measure of potential service capacity. The actual service capacity over time depends on the frequency of voyages. Information on service capacity and capacity utilization is presented in Chapter 6.

The fleet serving a particular trade area was defined by including only ships which carried 1000 tonnes or more of cargo, either inward from or outward to that trade area, in the 1983-84 study period. Ships which carried small amounts of cargo to or from a trade area enroute to the other trade areas were therefore excluded from the trade area fleet.

Information on the actual cost characteristics of individual ships in the fleet was not available to the BTE. Estimates of typical costs are presented in Appendix VI, however, to provide an indication of total, average and avoidable costs.

SIZE AND COMPOSITION OF THE FLEET

Two hundred and fifteen ships were recorded in the ABS SACCS collection as providing liner services in 1983-84. Thirty of these made only one trip during the period. These probably included ships which were withdrawn from service earlier in the year, ships which entered service later on in the year or ships chartered to carry special or seasonal cargo. These 30 ships were excluded from the analyses of characteristics presented in this chapter.

A complete listing of all ships showing the number of voyages made and the trade routes they predominately served is provided in Table IV.1.

The composition of the fleet (before and after the exclusion of the 30 'one-voyage' ships) is presented in Table 5.1. The information in Table 5.1 indicates that container ships were, by far, more numerous than any other ship type. They accounted for 40.5 per cent of the fleet of 185 ships compared to 21.6 per cent and 14.1 per cent for

TABLE 5.1 DISTRIBUTION OF SHIP TYPES IN THE LINER FLEET SERVING AUSTRALIAN TRADES, 1983-84

	All ships		*Ships which made more than one voyage*	
Ship type	*(number)*	*(per cent)*	*(number)*	*(per cent)*
General cargo	51	23.7	40	21.6
General cargo/container	15	7.0	10	5.4
Container	80	37.2	75	40.5
Ro-ro	28	13.0	26	14.1
Container/ro-ro	8	3.7	8	4.3
Bulk carrier	23	10.7	16	8.6
Others[a]	10	4.7	10	5.4
All	215	100.0	185	100.0

a. Includes several specialised bulk container ships.

Source Prepared by BTE.

general cargo and ro-ro ships respectively. There were only eight container/ro-ro ships representing 4.3 per cent of the fleet.[1]

ORGANISATION OF THE FLEET

Fifty-eight operators served the Australian trades with a fleet of 185 ships. Conference and non-conference operators and the trade areas they served are listed in Tables II.1 and III.1 respectively.

A feature worth noting in Table II.1 is that, in the majority of cases, the same operators served in both inward and outward conferences. In addition, many operators provided services in more than one trade and therefore beloned to more than one conference. An example of such an operator is ACT(A) Ltd which was a member of both inward and outward conferences in the Australia/Europe and North Mediterranean, West Coast North America and East Coast North America trades. A significant implication of these arrangements is that the same operators belong to more than one conference, making it less likely for operators to compete against each other on a route by route basis.

Whereas most operators were either conference or non-conference exclusively, few were members of a conference in one trade and operated outside the conference in others. An example of the latter is ABC Containerline which was a member of the US Atlantic and Gulf/Australia-New Zealand Conference Agreement in the East Coast North America to Australia trade but a non-conference operator in the Australia to East Coast North America trade and the Australia/Europe and North Mediterranean trade. Finally and perhaps more importantly, with the exception of the Australia/West Coast North America trade, there were more conference operators than non-conference operators in all the major trades. This has implications for market shares of conference and non-conference operators and hence their potential market power.

Table 5.2 shows the distribution of conference and non-conference ships serving Australia's major trades.[2] With the exception of the Australia/Philippines, Hong Kong and Taiwan trade, there were more conference ships than non-conference ships in the major trades. There were no non-conference ships in the Australia to Middle East Gulf

1. The ship type classification used throughout this chapter is an abbreviated version of the classification in Lloyd's Register of Shipping, 1983.
2. For more detail on fleet composition see Table VII.1.

trade. For the remaining trades, the proportion of conference ships ranged from a very high 81.8 per cent in the Australia/Papua New Guinea and Solomon Islands trade to 53.6 per cent in the Australia/West Coast North America trade. It should be noted that, because many ships serve more than one trade, adding the numbers across trades will result in double counting of ships.

Table 5.3 presents details of market concentration at the operator level on the basis of TEU capacity, deadweight tonnage and the number of ships. The 20 largest operators, ranked by TEU capacity, operated 107 ships, which represented 57.8 per cent of the fleet. These 20 operators accounted for an even larger share of nominal TEU capacity, that is, 75.1 per cent of total available TEU capacity of 153 335, compared to the 24.9 per cent provided by the remaining 38 operators. It should be noted that some of the capacity of the ships serving

TABLE 5.2 DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING THE MAJOR AUSTRALIAN LINER TRADES, 1983-84

	Conference		*Non-conference*		*Total*	
Trade area[a]	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*
Europe and North Mediterranean	41	68.3	19	31.7	60	100.0
Philippines, Hong Kong and Taiwan	19	47.5	21	52.5	40	100.0
Japan	20	71.4	8	28.6	28	100.0
South Korea	12	63.2	7	36.8	19	100.0
West Coast North America	15	53.6	13	46.4	28	100.0
East Coast North America	27	67.5	13	32.5	40	100.0
Middle East Gulf	10	100.0	-	-	10	100.0
South East Asia	22	56.4	17	43.6	39	100.0
New Zealand	7	58.3	5	41.7	12	100.0
Papua New Guinea and Solomon Islands	9	81.8	2	18.2	-	100.0

a. Trade areas are defined in Appendix I.

\- Nil or rounded to zero.

Note The figures cannot be added up for trade areas (that is, down the columns) because many ships visited more than one trade area.

Source Prepared by BTE.

TABLE 5.3 DETAILS OF THE MAJOR OPERATORS' SHIPS SERVING THE AUSTRALIAN LINER TRADES, 1983-84

Name of operator	*Ships owned* (number)	*Ships owned* (per cent)	*Nominal TEU capacity of fleet* (TEU)	*Nominal TEU capacity of fleet* (per cent)	*Nominal DWT capacity of fleet* (DWT)	*Nominal DWT capacity of fleet* (per cent)	*Average DWT size*	*Type of service*[a]	*Ownership*[b]
Overseas Containers Ltd	9	4.9	15 060	9.8	291 991	8.6	32 442	C	P
Australian National Line	10	5.4	10 990	7.2	214 188	6.3	21 419	C	S
Associated Container Transportation Ltd	7	3.8	10 224	6.7	201 809	5.9	28 830	C	P
ABC Containerline	8	4.3	10 187	6.6	253 268	7.4	31 659	N	P
Columbus Line	8	4.3	8 259	5.4	152 846	4.5	19 106	C	P
Scan Carriers	5	2.7	7 899	5.2	125 765	3.7	25 153	C	P
Karlander Line[c]	7	3.8	6 083	4.0	171 932	5.0	24 562	C	P
Sofrana Unilines	6	3.2	5 641	3.7	119 541	3.5	19 924	C	P
Zim Israel Navigation Company	7	3.8	5 382	3.5	92 392	2.7	13 199	N	S
Polish Ocean Lines	4	2.2	4 746	3.1	82 660	2.4	20 665	N	S
Far Eastern Shipping Company	5	2.7	3 544	2.3	69 684	2.0	13 937	N	S
Nippon Yusen Kaisha Line	4	2.2	3 540	2.3	69 347	2.0	17 337	C	P
East Asiatic Company	4	2.2	3 324	2.2	68 096	2.0	17 024	N	P
Trader Navigation Company	3	1.6	3 279	2.1	71 071	2.1	23 690	C	P
Australia Japan Container Line	2	1.1	3 258	2.1	55 558	1.6	27 779	C	P
Orient Overseas Container Line	2	1.1	3 218	2.1	55 850	1.6	27 925	C	P

TABLE 5.3 (Cont.) DETAILS OF THE MAJOR OPERATORS' SHIPS SERVING THE AUSTRALIAN LINER TRADES, 1983-84

Name of operator	*Ships owned*		*Nominal TEU capacity of fleet*		*Nominal DWT capacity of fleet*		*Average*	*Type*	
	(number)	*(per cent)*	*(TEU)*	*(per cent)*	*(DWT)*	*(per cent)*	*DWT size*	*of service*[a]	*Ownership*[b]
Baltic Shipping Company	5	2.7	3 170	2.1	88 079	2.6	17 616	C	S
Hapag Lloyd	2	1.1	2 513	1.6	53 437	1.6	26 719	C	P
Nedlloyd Lines	6	3.2	2 511	1.6	82 410	2.4	13 735	C, N	P
Australia New Zealand Container Operator	3	1.6	2 388	1.6	49 535	1.5	16 512	N	P
Top 20 operators	107	57.8	115 216	75.1	2 369 459	69.5	22 144		
Others (38)	78	42.2	38 119	24.9	1 038 645	30.5	13 316		
All operators (58)	185	100.0	153 335	100.0	3 408 104	100.0			

a. C and N represent conference and non-conference respectively.
b. P and S represent private and State-owned operators respectively.
c. Now K (Asia-Pacific) and KKL (Kangaroo) Line.

Note Not all the capacity of the ships was available for the Australian trades.

Source Prepared by BTE.

Australia was reserved for cargo which neither originated in nor was destined for Australia.

Table 5.3 indicates that the dominant operators usually belonged to a conference (of the 20 major operators six were non-conference operators). This suggests that the collective market power of the major conference operators is significantly greater than non-conference operators.

Information on average DWT sizes indicates that the major operators used larger ships than the rest of the fleet. This is shown by a higher average DWT size of 22 144 for the major operators compared with 13 316 for the rest of the fleet. Because of the economies of scale associated with large ships, the unit operating costs of the major operators will be lower (other things being equal) than the operators of smaller ships.

A final feature worth noting in Table 5.3 is that, five of the 20 major operators are State-owned.

NOMINAL CAPACITY OF THE FLEET

In this section the average nominal capacity of the fleet is examined in terms of TEU capacity (number of container slots) and deadweight capacity (DWT).

TEU capacity

The nominal TEU capacity distribution presented in Table 5.4, shows that the 250 to 499 TEU capacity range accounted for the highest number of ships followed by the 500 to 749 and 1000 to 1249 TEU ranges.

Table 5.5 presents information on the distribution of TEU capacity among the various ship types. The nominal TEU capacity represented by each type of ship varied from a high of 52.5 per cent of total capacity for container ships to a low 4.9 per cent for general cargo/container ships. Container ships again accounted for the largest share of nominal refrigerated container capacity (68.6 per cent). The corresponding figures for ro-ro and general cargo ships were 9.5 per cent and 3.5 per cent respectively.

The distribution of nominal TEU capacity for conference and non-conference operators for the major trades is presented in Table 5.6. Conference operators, accounted for the largest share of nominal TEU capacity, varying from 85.9 per cent in the Australia/Papua New Guinea and Solomon Islands trade to 58.7 per cent in the Australia/ Philippines, Hong Kong and Taiwan trade.

A similar trend is apparent with the share of nominal refrigerated capacity, with conference operators providing an even greater share of total capacity. For example, the conferences accounted for 94.7 per cent of reefer capacity in the Australia/South Korea and West Coast North America trades. Conference operators had the lowest share of reefer capacity (49.2 per cent) on the Papua New Guinea and Solomon Islands trade.

Table 5.3 shows the significant degree of concentration of nominal TEU capacity in the 20 major operators. The 20 major operators provided a disproportionate share of TEU capacity, accounting for 75.1 per cent of available TEU capacity (see Table 5.3). Table 5.6 shows that these conference operators have a significant capacity advantage over non-conference operators in the major trades.[3]

Nominal DWT capacity

Capacity measured in deadweight tonnage indicates the amount of cargo, fuel and stores, by weight, that a ship can carry. It can be used to

TABLE 5.4 NOMINAL TEU CAPACITY DISTRIBUTION OF SHIPS SERVING THE AUSTRALIAN LINER TRADES, 1983-84

TEU capacity range	*Number of ships*	*Per cent of total*
under 250	21	11.4
250- 499	44	23.8
500- 749	31	16.8
750- 999	17	9.2
1000-1249	31	16.8
1250-1499	18	9.7
1500-1749	14	7.6
1750 and over	9	4.9
Total	185	100.0

Note Owing to rounding, figures may not add to totals.

Source Prepared by BTE.

3. For more detail on capacity see Table VII.2.

TABLE 5.5 NOMINAL TEU AND DWT CAPACITY OF SHIPS SERVING THE AUSTRALIAN LINER TRADES BY SHIP TYPE, 1983-84

	TEU						*DWT*	
	Dry		*Reefer*		*Total*			
Ship type	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*
General cargo	11 355	9.5	1 166	3.5	12 521	8.2	435 375	12.8
General cargo/container	5 690	4.7	1 792	5.4	7 482	4.9	174 357	5.1
Container	57 578	48.0	22 930	68.6	80 508	52.5	1 550 398	45.5
Ro-ro	22 448	18.7	3 193	9.5	25 641	16.7	467 756	13.7
Container/ro-ro	6 223	5.2	2 228	6.7	8 451	5.5	146 130	4.3
Bulk carrier	9 960	8.3	1 284	3.8	11 244	7.3	425 323	12.5
Others	6 639	5.5	849	2.5	7 488	4.9	208 765	6.1
Total	119 893	100.0	33 442	100.0	153 335	100.0	3 408 104	100.0

Note Not all of the capacity of these ships was avilable for the Australian trades.

Source Prepared by BTE.

TABLE 5.6 SHARE OF NOMINAL TEU AND REEFER CAPACITY OF CONFERENCE AND NON-CONFERENCE OPERATORS SERVING THE MAJOR AUSTRALIAN TRADES, 1983-84

(per cent)

	Share of TEU capacity			*Share of nominal reefer capacity*		
Trade area[a]	*Conference*	*Non-conference*	*Total*	*Conference*	*Non-conference*	*Total*
Europe and North Mediterranean	73.7	26.3	100.0	81.7	18.3	100.0
Philippines, Hong Kong and Taiwan	58.7	41.3	100.0	74.9	25.1	100.0
Japan	73.8	26.2	100.0	90.1	9.9	100.0
South Korea	77.7	22.3	100.0	94.7	5.3	100.0
West Coast North America	65.7	34.3	100.0	94.7	5.3	100.0
East Coast North America	70.3	29.7	100.0	85.0	15.0	100.0
Middle East Gulf	100.0	-	100.0	100.0	-	100.0
South East Asia	65.4	34.6	100.0	75.4	24.6	100.0
New Zealand	79.1	20.9	100.0	93.1	6.9	100.0
Papua New Guinea and Solomon Islands	85.9	14.1	100.0	49.2	50.8	100.0

a. Trade areas are defined in Appendix I.

\- Nil or rounded to zero.

Source Prepared by BTE.

approximate the cargo capacity of the ship because of the comparatively small capacity requirement of fuel and stores.

The nominal DWT capacity distribution of the fleet presented in Table 5.7 shows that 25.9 per cent of the fleet had a DWT capacity in the 20 000 to 29 999 range. Twenty seven ships, representing 14.6 per cent of the fleet, have a DWT capacity greater than 29 999. Similar information for conference and non-conference ships in Table 5.8 indicates that, generally, a higher proportion of conference ships had a higher DWT, resulting in a higher average DWT for conference ships.

AGE PROFILE OF THE FLEET

With the current trends in shipping technological development, it is likely that newer ships would embody more modern technology. Given that technology is biased towards automation and fuel efficiency, a fleet with a higher proportion of newer ships will, all other things being equal, have lower fuel and crew costs.

Information on the age distribution of the fleet is presented in Table 5.9. As indicated in Table 5.9, 22.7 per cent of the fleet was five years or younger and 61.1 per cent of the fleet representing 113 ships was 10 years or younger. Only five ships (2.7 per cent) were over 20 years old, however, another 18 ships (9.7 per cent) were between 16 and 20 years old. Effectively, 72 ships (38.9 per cent) were close to the end of their economic life, given that 15 years normally represents useful economic life of a liner ship.

Similar statistics for conference and non-conference ships in the major trades, presented in Table 5.10, suggest that non-conference ships were generally newer than conference ships. For example, a higher proportion of non-conference ships were five years or younger with the exception of the Australia/New Zealand trade where there were no non-conference ships in the zero to five year range. In addition, the average age of ships operated by non-conference operators was lower in all the major trades except in the Australia/Papua New Guinea and Solomon Islands and South Korea trades.

FLAGS OF OPERATION

In this section, the flags under which the liner fleet operated are examined. The flags have been categorised into Australian, centrally planned countries and flag of convenience because of their significance in the debate on the:

- extent to which Australia should develop its own national fleet;

TABLE 5.7 NOMINAL DWT CAPACITY DISTRIBUTION OF SHIPS SERVING THE AUSTRALIAN LINER TRADES, BY SHIP TYPE, 1983-84

	DWT capacity range											
	0-7 999		*8 000-13 999*		*14 000-19 999*		*20 000-29 999*		*30 000 and over*		*Total*	
Ship type	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*
General cargo	14	35.0	19	47.5	6	15.0	1	2.5	-	-	40	100.0
General cargo/ container	-	-	4	40.0	3	30.0	2	20.0	1	10.0	10	100.0
Ro-ro	4	15.4	3	11.5	8	30.8	8	30.8	3	11.5	26	100.0
Container/ ro-ro	1	12.5	1	12.5	1	12.5	5	62.5	-	-	8	100.0
Container	6	8.0	16	21.3	15	20.0	26	34.7	12	16.0	75	100.0
Bulk carrier	-	-	-	-	3	18.8	6	37.5	7	43.8	16	100.0
Others	3	30.0	2	20.0	1	10.0	-	-	4	40.0	10	100.0
Total	28	15.1	45	24.3	37	20.0	48	25.9	27	14.6	185	100.0

\- Nil or rounded to zero.

Note Due to rounding, figures may not add to totals.

Source Prepared by BTE.

TABLE 5.8 NOMINAL DWT CAPACITY DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING THE MAJOR AUSTRALIAN TRADES, 1983-84

	DWT capacity range												
	0-7 999		*8 000-13 999*		*14 000-19 999*		*20 000-29 999*		*30 000 and over*		*Total*		
Trade area[a]	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*Average DWT size*
Europe and North Mediterranean													
Conference	-	-	5	12.2	4	9.8	19	46.3	13	31.7	41	100.0	25 982
Non-conference	4	21.0	4	21.0	1	5.3	6	31.6	4	21.0	19	100.0	20 430
Philippines, Hong Kong and Taiwan													
Conference	-	-	5	26.3	6	31.6	7	36.8	1	5.3	19	100.0	17 888
Non-conference	9	42.9	6	28.6	6	28.6	-	-	-	-	21	100.0	11 130
Japan													
Conference	-	-	8	40.0	5	25.0	5	25.0	2	10.0	20	100.0	18 047
Non-conference	1	12.5	4	50.0	3	37.5	-	-	-	-	8	100.0	12 684
South Korea													
Conference	-	-	2	16.7	2	16.7	6	50.0	2	16.7	12	100.0	22 333
Non-conference	4	5.1	3	42.9	-	-	-	-	-	-	7	100.0	9 419

TABLE 5.8 (Cont.) NOMINAL DWT CAPACITY DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING THE MAJOR AUSTRALIAN TRADES, 1983-84

	DWT capacity range												
	0-7 999		*8 000-13 999*		*14 000-19 999*		*20 000-29 999*		*30 000 and over*		*Total*		
Trade area[a]	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*Average DWT size*
West Coast North America													
Conference	-	-	-	-	9	60.0	3	20.0	3	20.0	15	100.0	21 584
Non-conference	-	-	3	23.1	2	15.4	5	38.5	3	23.1	13	100.0	22 017
East Coast North America													
Conference	1	3.7	1	3.7	6	22.2	15	55.6	4	14.8	27	100.0	23 326
Non-conference	-	-	1	7.7	-	-	6	46.2	6	46.2	13	100.0	29 335
Middle East Gulf													
Conference	-	-	3	30.0	3	30.0	2	20.0	2	20.0	10	100.0	18 868
Non-conference	-	-	-	-	-	-	-	-	-	-	-	-	..
South East Asia													
Conference	-	-	6	27.3	9	40.9	6	27.3	1	4.5	22	100.0	17 848
Non-conference	7	41.2	5	29.4	3	17.6	2	11.8	-	-	17	100.0	11 944

TABLE 5.8 (Cont.) NOMINAL DWT CAPACITY DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING THE MAJOR AUSTRALIAN TRADES, 1983-84

	DWT capacity range												
	0-7 999		*8 000-13 999*		*14 000-19 999*		*20 000-29 999*		*30 000 and over*		*Total*		
Trade area[a]	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*Average DWT size*
New Zealand													
Conference	-	-	2	28.6	1	14.3	2	28.6	2	28.6	7	100.0	23 764
Non-conference	2	40.0	2	40.0	-	-	1	20.0	-	-	5	100.0	10 149
Papua New Guinea and Solomon Islands													
Conference	2	22.2	4	44.4	3	33.3	-	-	-	-	9	100.0	11 835
Non-conference	1	50.0	1	50.0	-	-	-	-	-	-	2	100.0	9 933

a. Trade areas are defined in Appendix I.

\- Nil or rounded to zero.
.. Not applicable.

Notes 1. Owing to rounding, figures may not add to totals.
2. Number of ships cannot be added across trade areas because some ships operated in more than one trade area.

Source Prepared by BTE.

TABLE 5.9 AGE DISTRIBUTION OF THE LINER FLEET SERVING AUSTRALIAN TRADES, 1983-84

Age (years)	*Number of ships*	*per cent*
Less than or equal to 5	42	22.7
6-10	71	38.4
11-15	49	26.5
16-20	18	9.7
Over 20	5	2.7
Total	185	100.0

Source Prepared by BTE.

- alleged unfair competition from centrally planned and flag of convenience operators; and
- alleged undesirable management practices associated with flag of convenience operators.

For the fleet by flag types Tables 5.11 to 5.14 present respectively the:

- composition (ship type);
- TEU and DWT capacity;
- age; and
- share of cargo carried.

Information contained in Table 5.11 indicates that in 1983-84, Australian registered ships accounted for 6.5 per cent of the fleet (12 ships), compared with 10.8 per cent (20 ships) and 9.2 per cent (17 ships) for centrally planned and flag of convenience countries respectively. Although Australian registered ships accounted for 6.5 per cent of the fleet they contributed 7.7 per cent of TEU capacity. In contrast, the nominal TEU capacity share provided by centrally planned countries and flag of convenience ships (9.1 per cent and 5.0 per cent respectively) was lower than their respective share of the fleet (see Table 5.12). It also appears from the information on average DWT size contained in Table 5.12 that, as a group, flag of convenience ships were smaller in size than ships operating under other flags.

TABLE 5.10 AGE DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING THE MAJOR AUSTRALIAN TRADES[a], 1983-84

	Age ranges												
	0-5 years		*6-10 years*		*11-15 years*		*16-20 years*		*Over 20 years*		*Total*		
Trade area[a]	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*Average age (years)*
Europe and North Mediterranean													
Conference	2	4.9	19	46.4	13	31.7	7	17.1	-	-	41	100.0	10
Non-conference	12	63.2	5	26.3	2	10.5	-	-	-	-	19	100.0	5
Philippines, Hong Kong and Taiwan													
Conference	1	5.3	16	52.6	6	31.6	2	10.5	-	-	19	100.0	10
Non-conference	8	38.1	6	28.6	5	23.8	1	4.8	1	4.8	21	100.0	9
Japan													
Conference	2	10.0	10	50.0	6	30.0	1	5.0	1	5.0	20	100.0	10
Non-conference	2	25.0	4	50.0	2	25.0	-	-	-	-	8	100.0	8
South Korea													
Conference	1	8.3	6	50.0	5	41.7	-	-	-	-	12	100.0	10
Non-conference	3	42.9	1	14.3	1	14.3	1	14.3	1	14.3	7	100.0	10

TABLE 5.10 (Cont.) AGE DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING THE MAJOR AUSTRALIAN TRADES[a], 1983-84

	Age ranges												
	0-5 years		*6-10 years*		*11-15 years*		*16-20 years*		*Over 20 years*		*Total*		
Trade area[a]	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*Average age (years)*
West Coast North America													
Conference	3	20.0	7	46.7	4	26.7	1	6.7	-	-	15	100.0	9
Non-conference	7	53.8	1	7.7	5	38.5	-	-	-	-	13	100.0	8
East Coast North America													
Conference	5	18.5	6	22.2	12	44.4	3	11.1	1	3.7	27	100.0	11
Non-conference	9	69.2	3	23.1	1	7.7	-	-	-	-	13	100.0	5
Middle East Gulf													
Conference	-	-	7	70.0	2	20.0	1	10.0	-	-	10	100.0	9
Non-conference	-	-	-	-	-	-	-	-	-	-	-	..	..
South East Asia													
Conference	3	13.6	11	50.0	3	13.6	4	18.2	1	4.5	22	100.0	9
Non-conference	6	35.3	5	29.4	5	29.4	1	5.9	-	-	17	100.0	8

TABLE 5.10 (Cont.) AGE DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING THE MAJOR AUSTRALIAN TRADES[a], 1983-84

	Age ranges												
	0-5 years		*6-10 years*		*11-15 years*		*16-20 years*		*Over 20 years*		*Total*		
Trade area[a]	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*Average age (years)*
New Zealand													
Conference	2	28.6	2	28.6	2	28.6	1	14.3	-	-	7	100.0	10
Non-conference	-	-	4	80.0	1	20.0	-	-	-	-	5	100.0	8
Papua New Guinea and Solomon Islands													
Conference	1	11.1	7	77.8	-	-	-	-	1	11.1	9	100.0	9
Non-conference	-	-	1	50.0	-	-	-	-	1	50.0	2	100.0	14

a. Trade areas are defined in Appendix I.

- Nil or rounded to zero.
.. Not applicable.

Source Prepared by BTE.

TABLE 5.11 DISTRIBUTION OF FLAG IN THE LINER FLEET SERVING AUSTRALIAN TRADES, BY SHIP TYPE, 1983-84

	Flag									
	Australian		*Centrally planned countries*[a]		*Flag of convenience*[b]		*Others*		*All*	
Ship type	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number*	*(per cent)*	*(number)*	*(per cent)*
General cargo	-	-	2	10.0	5	29.4	33	24.3	40	21.6
General cargo/container	-	-	-	-	1	5.9	9	6.6	10	5.4
Container	3	25.0	5	25.0	5	29.4	62	45.6	75	40.5
Ro-ro	2	16.7	13	65.0	2	11.8	9	6.6	26	14.1
Containter/ro-ro	4	33.3	-	-	1	5.9	3	2.2	8	4.3
Bulk carrier	-	-	-	-	3	17.6	13	9.6	16	8.6
Others	3	25.0	-	-	-	-	7	5.1	10	5.4
Total	12	100.0	20	100.0	17	100.0	136	100.0	185	100.0

a. Countries include Albania, Bulgaria, Czechoslovakia, East Germany, Poland, USSR, Yugoslavia and China.
b. Ships registered in Bahamas, Bermuda, Costa Rica, Liberia and Panama.

\- Nil or rounded to zero.

Source Prepared by BTE.

TABLE 5.12 NOMINAL TEU AND DWT CAPACITY OF SHIPS SERVING THE AUSTRALIAN LINER TRADES, BY SHIP TYPE, 1983-84

	TEU capacity										
	Dry		*Reefer*		*Total*		*DWT capacity*		*Number*	*Average size*
Flag	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(tonnes)*	*(per cent)*	*of ships*	*(average DWT)*
Australian	8 262	7.1	3 522	9.7	11 784	7.7	226 695	6.7	12	18 891
Centrally planned countries[a]	12 443	10.6	1 518	4.2	13 961	9.1	295 051	8.7	20	14 753
Flag of convenience[b]	3 361	2.9	4 365	12.0	7 726	5.0	219 568	7.9	17	12 915
Others	92 827	79.4	27 037	74.2	119 864	78.2	2 666 790	76.8	136	19 609
All flags	116 893	100.0	36 442	100.0	153 335	100.0	3 408 104	100.0	185	18 422

a. Centrally planned countries are Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, USSR, Yugoslavia and China.
b. Flag of convenience ships are those registered in Bahamas, Bermuda, Costa Rica, Liberia and Panama.

Note Due to rounding figures may not add to totals.

Source Prepared by BTE.

Table 5.13 indicates that Australian flag ships in the liner trades tend to be older than the fleet as a whole with an average age of 13 years. Flag of convenience ships engaged in the liner trade in 1983-84 had a similar age profile to the fleet as a whole, however, 11.8 per cent of flag of convenience ships were older than 20 years.

Tables 5.11 and 5.12 indicate that the ships of centrally planned countries were more significant in the market than flag of convenience ships. They accounted for a higher proportion of ships and TEU capacity than both Australian flag and flag of convenience ships. Because the ships of centrally planned countries have not yet achieved a share of the market commensurate with their capacity (see Table 5.14) they are likely to continue to compete for a greater market share in an endeavour to improve the utilization of their ships.

MARKET CONCENTRATION

The technique used to examine concentration is to rank operators by their market share (measured in cargo value terms) and then compare the cumulative market shares against the proportion of operators that hold that share, commencing with the operators with the greatest market share.

Tables 5.15 and 5.16 present the information on concentration ratios for the carriage of imports and exports respectively in the major trades. According to this measure of concentration, there is a high degree of concentration in the trades with 10 per cent of the operators carrying more than 48 per cent of the cargo (exports). The Australia/New Zealand trade had the greatest concentration ratio and the Australia/Japan trade had the least degree of concentration (averaging the inward and outward trades).

Market power derived from concentration can potentially be used to influence the market and earn super-normal profits, however, market concentration in the liner industry does not in itself imply market power. Concentration in liner shipping is partly the outcome of attempts by some operators (usually by forming conferences, consortia and other joint trading arrangements) to rationalize their operation to enhance technical and operating efficiency. Competition can, however, exist between operators or consortia in a highly concentrated market thereby diminishing the incumbent's market power.

As suggested in Chapter 4, shippers cannot exercise any potential countervailing market power they might have unless there is

TABLE 5.13 AGE DISTRIBUTION OF SHIPS SERVING THE AUSTRALIAN LINER TRADES, BY FLAG, 1983-84

	Age range												
	0-5 years		*6-10 years*		*11-15 years*		*16-20 years*		*Over 20 years*		*Total*		
Flag	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*(number of ships)*	*(per cent)*	*Average age (years)*
Australia	-	-	5	41.7	4	33.3	3	25.0	-	-	12	100.0	13
Centrally planned countries[a]	9	45.0	9	45.0	2	10.0	-	-	-	-	20	100.0	6
Flag of convenience[b]	3	17.6	8	47.1	3	17.6	1	5.9	2	11.8	17	100.0	10
Other flags	31	22.8	48	35.3	40	29.4	14	10.3	3	2.2	136	100.0	9
All flags	43	23.2	70	37.8	49	26.5	18	9.7	5	2.7	185	100.0	9

a. Centrally planned countries are Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, USSR, Yugoslavia and China.
b. Includes ships registered in Bahamas, Bermuda, Costa Rica, Liberia and Panama.

\- Nil or rounded to zero.

Note Due to rounding, figures may not add to totals.

Source Prepared by BTE.

competition for market shares. Table 5.17 shows the ratio of non-conference and conference:

- ships
- nominal TEU capacity
- nominal reefer capacity
- nominal deadweight capacity

in the major trades.

The ratios presented in Table 5.17 indicate that currently there is the potential for competition for market shares in all of the major trades. The potential for competition in dry cargo is greater than that for reefer cargoes.

The extent to which operators actually compete for market shares is difficult to assess. It is likely, however, that the greater the difference in the service capacity utilization between conference and non-conference operators the greater the potential for competition.

TABLE 5.14 SHARE OF THE INWARD AND OUTWARD AUSTRALIAN LINER TASK, BY FLAG, 1983-84
($ million and '000 tonnes)

	Inward				*Outward*			
Flag	*(value)*	*(per cent)*	*(tonnes)*	*(per cent)*	*(value)*	*(per cent)*	*(tonnes)*	*(per cent)*
Australian	1 557	12.5	545	10.6	851	11.1	562	9.9
Centrally planned countries[a]	950	7.6	407	7.9	651	8.5	328	5.7
Flag of convenience[b]	810	6.5	278	5.4	471	6.1	399	7.0
Other flags	9 151	73.4	3 904	76.0	5 703	74.3	4 407	77.4
Total	12 468	100.0	5 134	100.0	7 676	100.0	5 696	100.0

a. Centrally planned countries are Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, USSR, Yugoslavia and China.
b. Flag of convenience ships are registered in Bahamas, Bermuda, Costa Rica, Liberia and Panama.

Note Due to rounding figures may not add to totals.

Source Prepared by BTE.

TABLE 5.15 CUMULATIVE SHARE OF THE VALUE OF INWARD CARGO CARRIED BY OPERATORS SERVING THE AUSTRALIAN LINER TRADES, 1983-84

Per cent of lines on each trade	*Per cent of cargo carried*								
	Trade area[a]								
	1a	*2a*	*3a*	*3b*	*4a*	*4b*	*8*	*9*	*10a*
10	60.5	76.8	50.0	63.5	87.1	75.8	55.3	93.9	55.3
20	83.0	94.0	84.6	77.1	97.1	93.3	81.6	98.8	91.4
30	97.1	97.9	98.0	85.2	98.7	98.3	93.6	99.2	98.3
40	99.0	99.4	99.4	91.6	99.4	99.1	98.0	99.5	99.5
50	99.6	99.7	99.8	95.4	99.6	99.5	98.8	99.7	99.9
60	99.9	99.8	99.9	97.9	99.7	99.8	99.5	99.8	99.9
70	99.9	99.8	99.9	98.7	99.8	99.9	99.9	99.9	99.9
80	99.9	99.9	99.9	99.4	99.9	99.9	99.9	99.9	99.9
90	99.9	99.9	99.9	99.7	99.9	99.9	99.9	99.9	99.9
100	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a. Trade area 1a is Europe and North Mediterranean
2a is Philippines, Hong Kong and Taiwan
3a is Japan
3b is South Korea
4a is West Coast North America
4b is East Coast North America
8 is South East Asia
9 is New Zealand
10a is Papua New Guinea and Solomon Islands.
Trade areas are defined in Appendix I.

Source Prepared by BTE.

TABLE 5.16 CUMULATIVE SHARE OF THE VALUE OF OUTWARD CARGO CARRIED BY OPERATORS SERVING THE AUSTRALIAN LINER TRADES, 1983-84

Per cent of lines in each trade	*Per cent of cargo carried*								
	Trade area[a]								
	1a	*2a*	*3a*	*3b*	*4a*	*4b*	*8*	*9*	*10a*
10	60.3	71.7	48.6	57.4	68.3	67.9	53.5	94.3	44.6
20	84.5	90.0	82.5	72.6	87.0	92.3	79.8	98.1	79.2
30	93.4	97.1	96.0	84.4	91.9	99.4	90.7	99.7	97.0
40	98.3	99.3	99.2	93.2	94.9	99.7	96.2	99.9	99.2
50	99.9	99.8	99.6	97.7	96.5	99.9	98.5	99.9	99.6
60	99.9	99.9	99.7	98.8	97.8	99.9	99.5	99.9	99.7
70	99.9	99.9	99.9	99.9	99.0	99.9	99.8	99.9	99.8
80	99.9	99.9	99.9	99.9	99.8	99.9	99.9	99.9	99.9
90	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
100	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a. Trade area 1a is Europe and North Mediterranean
2a is Philippines, Hong Kong and Taiwan
3a is Japan
3b is South Korea
4a is West Coast North America
4b is East Coast North America
8 is South East Asia
9 is New Zealand
10a is Papua New Guinea and Solomon Islands.
Trade areas are defined in Appendix I.

Source Prepared by BTE.

Information on service capacity utilization is presented in Chapter 6 and its affect on competition is discussed in more detail in Chapter 9.

TABLE 5.17 VARIOUS MEASURES OF THE NOMINAL CAPACITY OF NON-CONFERENCE SHIPS SERVING THE MAJOR AUSTRALIAN LINER TRADES BY TRADE, 1983-84

(per cent)

	Measure			
		TEU capacity		*DWT*
Trade area[a]	*Ships*	*Total*	*Reefer*	*capacity*
Europe and North Mediterranean	33	29	17	29[b]
Philippines, Hong Kong and Taiwan	52	41	23	41
Japan	29	29	9	23
South Korea	38	23	9	17
West Coast North America	47	33	9	47
East Coast North America	33	29	17	38[b]
South East Asia	44	33	23	33
New Zealand	41	23	9	23
Papua New Guinea and Solomon Islands	17	17	50	17

a. Trade areas are defined in Appendix I.
b. DWT capacity is high because the deadweight of the non-conference ABC Containerline con-bulk ships was significantly larger than the deadweight of conference ships.

Source Prepared by BTE.

CHAPTER 6 CONFERENCE AND NON-CONFERENCE CAPACITY, MARKET SHARES AND SERVICE LEVELS

The early part of this chapter provides information on the capacity offered in the Australian liner trades, and non-conference shares of capacity provided and task performed in the various trades. The Australian flag share of capacity and task is also identified and information provided about commodity specialization of operators and the extent to which operators concentrate in high-valued or high-rated commodities.

Information on the quantity of freight shipped and the capacity provided by operators can, in principle, be brought together to estimate the degree to which capacity is being matched to the total task in the various trades. Such an analysis would help identify excess capacity in trades and the scope for capacity reductions (thereby allowing improvements in cost efficiency without having a serious impact on service levels). There are, however, a number of practical difficulties in developing satisfactory measures of capacity utilization. Notwithstanding these problems, some results are presented which provide a basis for a comparison of the major trades.

It is frequently suggested that non-conference operators provide a service to shippers which is lower in price, but inferior in quality, to that provided by conference operators. Large changes in the penetration of non-conference operations might therefore have important consequences for service quality. To assist with the examination of these issues, information is presented on various aspects of the service provided by conference and non-conference operators from records of sailing dates and voyage itineraries, and also from a survey of shipper perceptions.

CAPACITY IN THE AUSTRALIAN LINER TRADES

Estimates of the nominal capacity of the fleet serving the Australian liner trades were provided in Chapter 5 based on information about the number and size of ships. Measures of the service capacity provided for shippers in 1983-84 are presented in this chapter by taking into account the number of voyages made by each ship.

The total deadweight capacity for all trades (inward or outward) in 1983-84, is estimated to have been 14 million tonnes, with non-conference operators providing 26 per cent of the total. The capacity provided varied among trade areas as shown in Table 6.1. Calculating deadweight capacity for individual trades was complicated by the tendency for ships to serve several different trade areas in a single voyage. For this reason some trade areas receiving joint services were combined into 'trade routes' for the purpose of measuring capacity and service levels. However, the problem of allocating capacity remained for some ships. Where ships served two or more trade routes, capacity was allocated in proportion to the quantity of cargo carried on each trade route.

These allocations were based on the carriage of Australian inward and outward cargo only. There were, however, circumstances where the capacity of ships calling at Australian ports was not available for Australian cargo (inward and outward) but was reserved for other trades. For this reason some of the figures reported in Table 6.1 may overstate the capacity actually available on various Australian trade routes. This question is examined further in the section on capacity utilization.

The 1983-84 inward and outward service capacities shown in Table 6.1 differ significantly for some routes reflecting the response of shipping operators to the complex pattern of demand. For example, in the Australia/West Coast North America trade (which often includes complex itineraries involving the Pacific Islands) more capacity was provided inward to Australia than outward from Australia, with some ships also providing capacity to the Pacific areas on outward voyages. These ships often returned direct to Australia, there being much less cargo from the Pacific Islands than to these Islands. Non-conference ships frequently served Asia and Europe, or Europe and East Coast North America jointly, resulting in differences in inward and outward service capacity in some of these trades. Ships operated by Eagle Container Line for example, served South East Asian ports *en route* to Europe and returned direct to Australia, contributing to an excess of inward over outward capacity on its Australia/Europe and North Mediterranean trade, and an excess of outward over inward capacity on the Australia/South East Asia trade.

AUSTRALIAN-FLAG AND NON-CONFERENCE MARKET SHARES

Market shares in terms of the percentage of tonnes of cargo carried by the non-conference operators and by Australian-flag ships are presented in Table 6.2 for each of the major trades in 1983-84, and in

TABLE 6.1 DEADWEIGHT CAPACITY AND AUSTRALIAN-FLAG AND NON-CONFERENCE CARGO SHARES, BY TRADE ROUTE, 1983-84

Trade route[a]	*Deadweight capacity ('000 tonnes)*		*Share of deadweight capacity*[b] *(per cent)*			
			Australian-flag[c]		*Non-conference*[d]	
	Inward	*Outward*	*Inward*	*Outward*	*Inward*	*Outward*
Europe, Mediterranean and Red Sea ports	3 710	3 140	7	5	27	16
East Asia	1 350	1 290	17	18	33	33
Japan and South Korea	2 130	2 420	17	14	12	19
West Coast North America	1 660	1 070	6	6	32	31
East Coast North America, Latin Americ and Caribbean	1 980	1 900	4	6	18	31
Africa	280	270	0	0	74	98
South Asia	530	380	0	1	2	6
Middle East Gulf	60	300	0	0	0	4
South East Asia	1 160	1 390	12	11	15	24
New Zealand	1 000	1 080	21	26	72	63
Papua New Guinea and Solomon Islands	520	580	0	0	41	32
Pacific Islands	500	950	0	3	75	46
All trades	14 270	14 160	10	10	26	26

a. Trade areas are defined in Appendix I.
b. The figures reported here, for the Australian-flag and non-conference operations are the per cent shares of total operations in each case.
c. Australian-flag operations are predominantly but not entirely conference.
d. See Appendix III for a list of the non-conference operators in the various trades.

Source Prepared by BTE.

Table VIII.I for the smaller trades. These shares are generally in accord with those for capacity reported in the previous section. The variations that do occur are primarily because of the types of commodities carried. For example, the high non-conference cargo to East Coast North America (47 per cent of the total) was due to

TABLE 6.2 AUSTRALIAN-FLAG AND NON-CONFERENCE SHARES OF THE TOTAL LINER TASK IN THE MAJOR AUSTRALIAN TRADES, 1983-84[a]

(per cent)

	Australian-flag share[c]		*Non-conference share*	
Trade area[b]	*Inward*	*Outward*	*Inward*	*Outward*
Europe and North Mediterranean	5[d]	3[d]	23	19
Philippines, Hong Kong and Taiwan	17	17	26	31
Japan	15	8	12	19
South Korea	31	28	17	20
West Coast North America	9	11	30	16
East Coast North America	5	6	15	47[e]
Middle East Gulf	0	0	0	3
South East Asia	19	14	17	26
New Zealand	20	26	77	66
Papua New Guinea and Solomon Islands	2	0	31	33
Other trades[f]	1	3	77	40
All trades	10	9	34	29

a. Task shares relate to the tonnes of cargo shipped.
b. Trade areas are defined in Appendix I.
c. Australian-flag operations are the operations of ships registered in Australia. Australian-owned operators may however register ships elsewhere and charter space on ships owned by foreign operators.
d. As a result of slot swapping or chartering arrangements, Australian flag slot shares are higher than indicated in this table.
e. This figure is high because of shipments of high-density mineral sands in con-bulk ships.
f. Table VIII.1 in Appendix VIII has detailed information for these trades.

Source Prepared by BTE.

shipments of high-density low-valued mineral sands in con-bulk ships. The low non-conference share to the West Coast North America (16 per cent) may be abnormal (in 1982-83 the non-conference share was around 40 per cent). The non-conference share of the Australia/Japan trade was lower than other major trades. This was consistent with the practice of important Japanese trading companies, particularly exporters, directing their cargoes towards conference operators which included affiliated companies (see Chapter 3).

The Australian flag share relates to the tonnes of cargo carried in ships registered in Australia. The share when measured in terms of slots may, however, differ because of 'slot swapping' and chartering arrangements. For example, some of the large reefer capacity of ANL ships was chartered by ACT(A) to serve the New Zealand/Europe trade, with ANL in turn chartering slots on ACT(A) ships in the Australia/Europe and North Mediterranean trade.

Table 6.3 shows the trend in the overall non-conference shares of the inward and outward cargo since 1979-80. There appears to have been a reasonable degree of stability over this period with market shares in the range 25 to 30 per cent. However, the data sources suggest that there was less stability in some of the market shares for individual trades. This is probably due to the influence of fluctuating economic conditions and changing marketing strategies. Therefore, the 1983-84 figures contained in Table 6.2 should be interpreted in this light.

A number of commodities were identified in Chapter 4 as being of major significance in Australia's inward and outward liner trades. Tables 6.4 and 6.5 reveal some of the differences in the commodity composition of the task of conference, non-conference and Australian-flag operators.

In the inward trades, conferences concentrated more on high-valued commodities such as machinery, vehicles and transport equipment (which together accounted for 38 per cent by value of the total conference trade) than did the non-conference operators (where the above items accounted for 26 per cent). In the outward trades, high-valued wool accounted for a relatively high proportion of the non-conference task compared with both conference and Australian-flag operations. On the other hand, the non-conference operators carried large volumes of low-valued metal ores and cereals. Furthermore, non-conference operators carried only modest quantities of high-valued meat.

Table 6.6 presents total quantities and values of cargo carried by conference, non-conference and Australian-flag operators in the inward

TABLE 6.3 RECENT TRENDS IN THE NON-CONFERENCE SHARE OF THE AUSTRALIAN LINER TASK, 1979-80 TO 1983-84[a]

(per cent)

Year	*Inward trades*	*Outward trades*
1979-80	21	28
1980-81	28	29
1981-82	26	26
1982-83	27	29
1983-84	28	26

a. Task share related to tonnes of cargo shipped.

Notes 1. The discrepancy between figures in this table and Table 6.2 is the result of slightly different definitions of conference and non-conference operators.
2. There may be a discontinuity between figures for 1981-82 and 1982-83 because two different sources were used to derive this table,

Sources ABS, Shipping and Cargo Australia, annual issues from 1979-80 to 1981-82. ABS, Shipping and Air Cargo Commodity Statistics, 1982-83 and 1983-84 issues.

TABLE 6.4 SHARES OF MAJOR INWARD COMMODITIES CARRIED BY CONFERENCE, NON-CONFERENCE AND AUSTRALIAN-FLAG OPERATORS IN THE AUSTRALIAN TRADES, 1983-84

(per cent, by value)

	Task share		
Commodity[a]	*Conference*	*Non-conference*	*Australian-flag*
Machinery and equipment	31	23	28
Textile yarns and fabrics	8	10	12
Road vehicles and transport equipment	7	3	6
Paper and paper articles	4	3	2
Chemicals	3	4	2
Manufactures of metal	3	4	4
Other	44	53	46
Total	100	100	100

a. Some commodities are affected by confidentiality embargoes for trade purposes and are excluded from their ATFCC category, however, they are included in the 'Other' category.

Source Derived from ABS Shipping and Air Cargo Commodity Statistics, 1983-84.

and outward trades in 1983-84. The data show that, overall, conference operators (and Australian-flag operators) specialized in high-valued commodities more than non-conference operators. This was particularly true for the inward trades where the average dollar value per tonne for conference cargo was nearly twice that for non-conference cargo. This suggests that, in developing their markets, non-conference operators did not necessarily direct their efforts towards high-valued commodities which tended to attract high rates. Rather they may have tailored their service for some of the lower-valued commodities where competition with conferences may have been less intense. The distributions of conference and non-conference scheduled rates reported in Appendix IX supports this conclusion for the outward trades, but the situation is much less clear for the inward trades.

TABLE 6.5 SHARES OF MAJOR OUTWARD COMMODITIES CARRIED BY CONFERENCE, NON-CONFERENCE AND AUSTRALIAN-FLAG OPERATORS IN THE AUSTRALIAN TRADES, 1983-84

(per cent, by value)

	Task share		
Commodity[a]	*Conference*	*Non-conference*	*Australian-flag*
Textile fibres[b]	22	27	15
Meat	17	6	16
Machinery and equipment	6	5	5
Non-ferrous metals	5	5	4
Metalliferrous ores and metal scrap	4	13	7
Dairy products	5	2	5
Cereals	3	5	3
Hides and skins	3	5	2
Fruit and vegetables	2	1	3
Iron and steel	2	1	2
Other	31	30	38
Total	100	100	100

a. Some commodities are affected by confidentiality embargoes for trade purposes and are excluded from their ATFCC category, however, they are included in the 'Other' category.
b. Mostly wool.

Source Derived from ABS Shipping and Air Cargo Commodity Statistics, 1983-84.

TABLE 6.6 QUANTITY AND VALUE OF CARGO CARRIED BY CONFERENCE, NON-CONFERENCE AND AUSTRALIAN-FLAG OPERATORS IN THE AUSTRALIAN TRADES, 1983-84

	Conference			*Non-conference*			*Australian-flag*		
	Quantity ('000 tonnes)	*Value ($m)*	*Average value ($ per tonne)*	*Quantity ('000 tonnes)*	*Value ($m)*	*Average value ($ per tonne)*	*Quantity ('000 tonnes)*	*Value ($m)*	*Average value ($ per tonne)*
Inward	3 751	10 443	2 784	1 932	2 776	1 437	568	1 586	2 790
Outward	4 656	6 889	1 479	1 660	1 541	928	568	927	1 631

Source Derived from ABS (1985e).

CAPACITY UTILIZATION

The proportion of service capacity provided which is actually used for the shipment of commodities has an impact on both the cost and the quality of service provided. For example, increasing capacity utilization by reducing the frequency of service (removing a ship from the trade) or replacing existing ships with the same number of smaller ones would reduce total shipping costs but would also reduce the quality of service to some extent. If existing capacity utilization was already quite high, the impact on service could be serious with some shippers unable to obtain shipping space when required.

Measures of capacity utilization

Capacity utilization of ships can be measured in terms of DWT (weight) or TEU (numbers of containers).[1] The more appropriate of these two measures in a particular trade is the one which is closer to 100 per cent. Where a trade consists mainly of bulky commodities then the TEU capacity of the ships employed is likely to be reached before the limits on DWT, and vice versa for a trade with predominantly high-density commodities. Both the DWT and TEU utilization of container and ro-ro ships in the inward and outward trades are therefore examined separately.

The TEU utilization measures were calculated using estimates of numbers of equivalent full containers derived for each commodity from the SACCS information on tonnes of cargo carried and estimates of the commodity stowage factors on the following basis (see Chapter 4).[2]

Dry container numbers were estimated as follows:

- If the stowage factor for a commodity is greater than 1.7,

  $$\text{number of containers} = \frac{\text{tonnes x stowage factor}}{31}$$

  (31 cubic metres representing an average volumetric capacity of a dry container)

---

1. $$\text{DWT utilization} = \frac{\text{tonnes carried + weight of containers carried}}{\text{nominal DWT capacity - weight of fuel}}$$

   $$\text{TEU utilization} = \frac{\text{full TEU carried}}{\text{nominal TEU capacity}}$$

2. The stowage factors allow for 'broken space' which includes pallets and space not utilized because of irregular shapes.

- If the stowage factor for a commodity is less than 1.7,
  number of containers = $\frac{\text{tonnes}}{18}$
  (18 tonnes representing an average weight capacity of a dry container)

Reefer containers numbers were estimated as follows:

- If the stowage factor for a commodity is greater than 1.5,
  number of containers = $\frac{\text{tonnes x stowage factor}}{26}$
  (26 cubic metres representing an average volumetric capacity of reefer containers)
- If the stowage factor for a commodity is less than 1.5,
  number of containers = $\frac{\text{tonnes}}{17}$
  (17 tonnes representing an average weight capacity of reefer containers).

In reality, containers may not be fully loaded and the utilization of slots by partially filled containers would of course be higher than the measures derived by this procedure. The utilization of slots by all containers including empties (commonly called slot utilization) is higher again.

The calculation of capacity utilization relied on the records of the nominal capacity of ships reported in Lloyd's Register of Shipping. However, the actual capacity of the ships used in particular trades may vary from these figures because of operating restrictions such as draught limitations in certain ports and ship stability considerations. Furthermore, TEU capacity is constrained by the high costs of re-positioning containers on board ship when unloading and loading.

The utilization of ships fluctuates over time because of both random and seasonal variations in demand, although the supply of shipping capacity can respond to anticipated demand variations to some extent. For example, extra ships may be chartered to cope with seasonal peaks. However, the provision of a service which is stable and regular in the presence of short term changes in demand usually implies that a significant proportion of voyages must be operated at utilization rates well below 100 per cent. The average utilization measured over a year must therefore also be below 100 per cent.

It was mentioned early in this chapter that some of the capacity of ships calling at Australian ports was not always available for Australian cargo because of requirements for space to be allocated for cargo carried between other ports. An average measure of the capacity utilization of the ships used in the Australian trades over the whole of their itineraries would therefore be desirable. However, incomplete information about the quantities of cargo loaded and discharged at different ports in the itineraries prevented this calculation. Capacity utilization rates were determined initially on the basis of the quantities of Australian inward and outward cargo only, without taking into account the cargo carried between the other countries by the same ships. Later in the chapter, utilization rates, adjusted approximately to account for New Zealand freight, are presented for the Australia/Europe North Mediterranean and North America trades.

Utilization of ships by Australian imports and exports

Table 6.7 shows the utilization of container and ro-ro ships with Australian inward and outward cargo in 1983-84. Details are provided for the ships dedicated to particular trade routes, and for ships serving several trade routes. Dedicated ships are defined as those for which a single trade route accounted for more than 75 per cent of their Australian cargoes, both inward and outward.[3] The degree to which each ship is dedicated to a particular trade route is shown in Appendix IV.

The utilization rates in Table 6.7 underestimate the overall utilization rates of ships in the Australian trades because of the contributions from cargoes loaded and discharged in New Zealand and Asia destined for and received from Europe and North America. The New Zealand cargoes had a large impact on conference utilization, and Asian cargoes on non-conference utilization.

The measures in Table 6.7 show that the effective utilization of conference and non-conference ships with Australian inward and outward cargo were quite similar despite the differences in the relative bulkiness of commodities carried. Ships in the dedicated trades were utilized more fully with Australian commodities than ships serving

3. Most of the conference ships used in the Australia/Europe and East Coast North America trade routes served Australia and New Zealand simultaneously. However, because they did not carry significant quantities of trans-Tasman trade, they were classified as 'dedicated' to the Australia/Europe or East Coast North America trade routes.

several trade routes. There were, however, generally more opportunities for the latter to achieve higher utilization rates by cross-trading.

The capacity utilization measures reported for 1983-84 are not necessarily typical because of year-to-year variations in the demand for and supply of service capacity. Table 4.3 showed that the volume of outward liner trade decreased and inward trade increased in 1983-84 compared to 1982-83, suggesting that changes occurred in capacity utilization and more especially in the inward-outward pattern of utilization.

Capacity utilization rates for a number of important Australian trade routes are shown in Table 6.8. The table indicates: higher inward

TABLE 6.7 CAPACITY UTILIZATION OF CONTAINER AND RO-RO SHIPS CARRYING AUSTRALIAN INWARD AND OUTWARD CARGO[a], 1983-84

(per cent)

Operational characteristic	*Utilization of DWT*		*Utilization of TEU capacity*	
	Inward	*Outward*	*Inward*	*Outward*
Ships dedicated primarily to a single trade route				
Conference	47	49	50	47
Non-conference	59	41	69	47
Ships serving several trade routes				
Conference	42	37	44	36
Non-conference	43	37	48	36
All ships				
Conference	46	46	49	45
Non-conference	53	40	61	43

a. The various assumptions employed to calculate capacity utilization rates are explained in the text. It is important to recognise that cargo carried between countries other than Australia has been excluded in the calculation of these utilization rates.

Source Prepared by BTE.

utilization on the Australia/Europe, Mediterranean and Red Sea ports East Asia, West Coast North America and New Zealand trades; approximate balance in the Austalia/East Coast North America and Latin America trades; and higher outward utilization in the other trades.

The DWT and TEU measures of capacity utilization are quite similar for

TABLE 6.8 CAPACITY UTILIZATION OF DEDICATED CONFERENCE AND NON-CONFERENCE CONTAINER AND RO-RO SHIPS CARRYING AUSTRALIAN INWARD AND OUTWARD CARGO, BY TRADE ROUTE, 1983-84

(per cent)

Trade route[a]	*Utilization of DWT*		*Utilization of TEU capacity*[b]	
	Inward	*Outward*	*Inward*	*Outward*
		Conference ships		
Europe, Mediterranean and Red Sea ports	51	35	51	35
East Asia	67	62	81	58
Japan and South Korea	40	64	45	57
West Coast North America	52	40	46	34
East Coast North America and Latin America	32	35	34	36
South East Asia	52	61	54	57
New Zealand	31	32	65	68
Papua New Guinea and Solomon Islands	10	59	11	63
		Non-conference ships		
Europe, Mediterranean and Red Sea ports	65	77	63	43
East Asia	59	47	74	50
New Zealand	52	35	72	49

a. Trade routes are defined in Appendix I.
b. The various assumptions employed to calculate capacity utilization rates are explained in detail in the text. It is important to recognise that cargo carried between countries other than Australia has been excluded in the calculation of these utilization rates.

Source Prepared by BTE.

a number of trade routes implying that a ship operated at the deadweight limit would also be operating quite close to TEU capacity, or vice versa. However, this was not always the case and a mismatch in the two measures is of particular interest when it occurs in the high utilization leg of a trade route because this is the leg which is more likely to experience capacity constraints.

In the highly utilized East Asia to Australia trade, the TEU utilization was much greater than DWT utilization, suggesting that ships might sometimes have sailed at full TEU capacity but with spare capacity in terms of DWT capacity. In each of the Australia/Japan, Korea, West Coast North America and South East Asia trades, deadweight limitations would have applied before the TEU limits in the more highly utilized leg. It follows that the capacity characteristics of the ships used in these trades may not be ideally matched to the commodity characteristics of the trades.

The impact of demand fluctuations could be important for these conclusions. An increase in shipments of commodities with low stowage factors, for example, would increase the DWT measure of capacity utilization in relation to the TEU measure. Demand for individual commodities is the result of a complex set of market factors affected by international trading relationships as well as domestic conditions, and the commodity structure of the task may be more volatile than the aggregate task.

Utilization of ships including New Zealand cargo

Although New Zealand trade with Asia is carried on direct services which do not call at Australia, most New Zealand trade with Europe and North America goes on ships which also serve Australia.[4] To obtain a more realistic picture of capacity utilization on the conference operations in the Australia/Europe, Mediterranean and Red Sea Ports and North America trades, estimates were made of the contribution of New Zealand's liner cargo in these trades. The adjusted measures of capacity utilization including the New Zealand task reported in Table 6.9, must be regarded as very approximate because of the many assumptions involved in their estimation.

The New Zealand outward task exceeded the inward task in these trades (measured in DWT or TEU). The effect in the Australia/Europe, Mediterranean and Red Sea Ports and West Coast North America trades

4. This was confirmed by the Ministry of Transport, New Zealand.

was to promote a better overall balance in capacity utilization. In the Australia/East Coast North America and Latin America trade the effect was to raise the utilization rates in the outward trade above those of the inward trade.

Table 6.10 summarises information from Tables 6.8 and 6.9 to facilitate capacity utilization comparisons of the various trades, based on Australian and New Zealand cargoes carried in dedicated container and ro-ro conference ships. The utilization measures are in terms of either TEU or DWT whichever is greater. The comparisons must be treated with caution because of the incomplete picture of cargo flows and the impact of seasonal variations. On the information available, conference operations in the Australia/South East Asia and Papua New Guinea trades had the most opportunity for improved utilization of capacity in 1983-84. The better utilized Australia/Europe, Mediterranean and Red Sea Ports, West Coast North America and East Asia trades had less scope for reducing capacity without affecting service quality.

The discussion in this section has focussed on the utilization of ship capacity. The utilization of containers is another factor affecting the economics of liner shipping. As with ships, both weight and volume constraints apply, and optimum utilization depends on the

TABLE 6.9 ESTIMATES OF CAPACITY UTILIZATION OF DEDICATED CONTAINER AND RO-RO CONFERENCE SHIPS INCLUDING NEW ZEALAND CARGO BY TRADE ROUTE, 1983-84[a]

(per cent)

Trade route[b]	*Utilization of DWT*		*Utilization of TEU capacity*	
	Inward	*Outward*	*Inward*	*Outward*
Europe, Mediterranean and Red Sea ports	72	72	71	68
West Coast North America	70	75	63	65
East Coast North America	48	66	49	65

a. The various assumptions employed to calculate capacity utilization rates are explained in the text.
b. Trade routes are defined in Appendix I.

Source Prepared by BTE.

commodity characteristics in a trade and the design features of the standard containers in use. It was observed in Chapter 4 that the stowage factors in the Australian outward trades tended to be less than those in the inward trades. This would suggest heavier container loads in the outward trades with the possibility of some containers reaching maximum weight before cubic capacity was fully utilized. This applies to commodities such as iron and steel, non-ferrous metals, metalliferous ores and canned fruit with stowage factors less than about 1.6 cubic metres per tonne, and could be acting to reduce the extent of containerization of these commodities. For example, most shipments of iron and steel to the West Coast of North America were not containerized.[5]

TABLE 6.10 SUMMARY OF CAPACITY UTILIZATION OF DEDICATED CONTAINER AND RO-RO CONFERENCE SHIPS, BY TRADE ROUTE, 1983-84[a]

	Capacity utilization	
Trade route[b]	*Inward*	*Outward*
Europe, Mediterranean and Red Sea ports	72	72
East Asia	80	62
Japan and South Korea	45	65
West Coast North America	70	75
East Coast North America and Latin America	50	66
South East Asia	55	60
New Zealand	65	68
Papua New Guinea	10	60

a. The utilization measures in this Table are in terms of either TEU or DWT whichever is the greater figure for the particular trade route. The measures include Australian cargoes and estimates of New Zealand cargoes. The various assumptions employed in the calculation of the capacity utilization rates are explained in the text.
b. Trade routes are defined in Appendix I.

Source Prepared by BTE.

5. Iron and steel was a major contributor to the low average stowage factor for the outward West Coast North America trade (see Tables 4.9 and 4.14).

CONFERENCE AND NON-CONFERENCE LEVELS OF SERVICE

Liner operators seek to satisfy the needs of exporters and importers who require frequent, reliable and economic services to and from many overseas areas. The quality of service to a region is affected by the frequency of departures, the time taken to reach the destination, the ability to keep to sailing schedules and the proximity or convenience of the nearest port of call to the ultimate destination. These factors can be measured by analysing information on ship movements. There are other factors affecting the quality of service, such as efficiency of bookings and documentation services, but they are generally less important and also more difficult to measure in an objective manner.

Measures of service from sailing schedules

Table 6.11 presents measures of frequency and transit time and Table 6.12 presents measures of arrival delay and numbers of ports of call for both conference and non-conference operators for each trade route.

Departure frequencies were derived from the total number of departures for each ship in 1983-84 (recorded in Appendix IV). For ships serving several trades, estimates were made of the number of times the trade areas were visited by examining itineraries published in the Lloyd's Voyage Records (LVR). Generally, the conferences provided a greater frequency of direct services than the combined non-conference operators, although the reverse was true in the Australia/East Asia and New Zealand trades (and also in the smaller Australia/African and Pacific trades).[6]

The arrival and departure dates at all ports contained in the LVR were used to determine transit times for a sample of voyages. Transit time was defined as the elapsed time between Sydney (or Melbourne) and a representative major overseas port in the relevant trade area. The same port, or nearby ports, were used for the conference and non-conference measures. The inward and outward transit times shown in Table 6.11 vary because they depend on the position of the selected ports in the calling patterns of ships. Transit times for conference operators tended to be less than for non-conference operators.

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6. 'Direct' services exclude transhipment services but not those services which may follow a rather circuitous route, for example to Europe via East Asia.

TABLE 6.11 MEASURES OF AVERAGE DEPARTURE FREQUENCY AND TRANSIT TIME FOR CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE ROUTE, 1983-84

	Number of services per month		*Inward transit time[b] (days)*		*Outward transit time[b] (days)*	
Trade route[a]	*Conference*	*Non-conference[c]*	*Conference*	*Non-conference*	*Conference*	*Non-conference*
Europe, Mediterranean and Rea Sea Ports	11	7	32	40	42	49
East Asia	6	8	15	18	25	28
Japan and South Korea	10	5	17	26	22	23
West Coast North America	5	4	18	32	34	43
East Coast North America, Latin America and Caribbean	7	3	39	38	37	45
Africa	..	4	..	27	..	27
South Asia	4	1	41	..	23	..
Middle East Gulf	2	1	36	..	18	..
South East Asia	8	6	20	21	21	26
New Zealand	3	5	9	8	10	9
Papua New Guinea and Solomon Islands	4	3	17	20	9	9
Pacific Islands[d]	4	4	..	21	19	13

a. Trade routes are defined in Appendix I.
b. Transit times were calculated between Sydney (or Melbourne in a few cases) and the following major overseas ports: Hamburg, Hong Kong, Osaka, Los Angeles, Philadelphia, Durban, Bombay or Madras, Bahrain, Singapore, Auckland, Port Moresby, Suva. For each trade route, average times for a sample of voyages were calculated.
c. Combined non-conference operators.
d. Conference operators provided an outward service only.

.. not applicable

Source Prepared by BTE.

TABLE 6.12 MEASURES OF AVERAGE ARRIVAL DELAY AND NUMBERS OF PORTS SERVED FOR CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE ROUTE, 1983-84

	Average arrival delay at major overseas ports (days)		*Number of Australian ports with at least two visits per month by ships serving the trade route*		*Number of overseas ports with at least two overseas visits per month*	
Trade route[a]	*Conference*	*Non-conference*	*Conference*	*Non-conference*	*Conference*	*Non-conference*
Europe, Mediterranean and Red Sea ports	7.6	8.2	6	6	18	18
East Asia	9.1	7.2	6	6	4	4
Japan and South Korea	5.1	5.0	6	3	7	3
West Coast North America	5.7	7.2	)	)	6	8
East Coast North America,			7)	11)		
Latin America and Caribbean	6.1	6.0	)	)	12	11
Africa	..	6.2	..	8	..	4
South Asia	7.6	*)	)		5	..
Middle East Gulf	5.8	*)	5)	..	4	..
South East Asia	10.3	5.6	8	5	5	2
New Zealand	6.4	4.1	1	3	4	6
Papua New Guinea and Solomon Islands	2.3	7.8)	)	)	5	4
Pacific Islands	3.9	2.3)	3)	3)	1	5

a. Trade routes are defined in Appendix I.

.. not applicable
* insufficient sample

Source Prepared by BTE.

However, transit times varied considerably about the average measures, particularly for the non-conference operators (some of which had quite extensive itineraries jointly serving a number of trades).[7]

Reliability was measured by comparing the expected date of arrival of a ship at a major overseas port as advertised in the Daily Commercial News (DCN) one month ahead of departure from Australia, with the actual arrival date indicated in the LVR. Average arrival delays (in days) were derived from the measured delays experienced by all ships which departed Australia during the months of December 1983 and February and April 1984. The evidence in Table 6.12 suggests that, in most of the trades, differences in arrival delays between conference and non-conference ships were small. For all trades taken together, delays of about 6.5 days for conference ships and six days for non-conference ships were measured. Individual ships delays varied widely around the average measures and this variation, as much as the average delays, would have created problems for the quality of service.[8] The overall extent of the variation in delays was estimated to be slightly less for non-conference operators than for the conferences.

Itineraries from the LVR were also used to analyse the ports of call by conference and non-conference ships. Appendix V shows the full range of ports visited and identifies those receiving frequent service. Table 6.12 gives the numbers of ports receiving at least two visits per month for each of the trade routes (based on data for the months of December 1983 and July 1984). The analyses indicates little difference in the geographical coverage provided by the conferences and the combined non-conference operators.[9]

Transhipment to locations beyond the ports of call is a further element in the overall service provided by liner operators. This is a difficult factor to measure, but Table 6.13 presents information for 1983-84 on the extent of transhipment through overseas ports to or from other countries by conference and non-conference operators (the extensive landbridge operations across the US have not been identified as transhipment). There appeared to be more transhipment and

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7. A standard deviation of 40 per cent or more of the mean was measured on several routes. Standard deviations were however more commonly in the vicinity of 20 to 30 per cent of the means.
8. Standard deviations of about six days and 7.5 days were calculated for the non-conference operators and conferences respectively.
9. The fact that the analysis included ports which were very close to each other (for example, Sydney and Botany Bay; Kobe and Osaka; Bremen and Bremerhaven) is unlikely to have a significant effect on the general conclusion.

geographical diversity in the inward services than the outward services. There was little difference in the extent of conference and non-conference transhipment in the outward trades. However, conferences had more inward transhipment, particularly on the East Asia trade route.

Overall, the extent of transhipment of Australia's inward and outward cargo appeared to be limited. The recent trend towards round-the-world services calling at a few strategic ports and operated with very large ships could ultimately result in some increase of transhipment of Australian cargoes through Asian ports.

TABLE 6.13 EXTENT OF TRANSHIPMENT AT OVERSEAS PORTS BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE ROUTE, 1983-84[a]
(per cent of tonnes loaded or discharged)

Trade route[b]	*Inward*		*Outward*	
	Conference	*Non-conference*	*Conference*	*Non-conference*
Europe, Mediterranean and Red Sea ports	31	27	20	25
East Asia	35	13	4	4
Japan and South Korea	3	1	0	1
West Coast North America	3	1	1	0
East Coast North America, Latin America and Caribbean	10	9	3	0
Africa	8	11	24	3
South Asia	5	26	3	0
Middle East Gulf	49	0	9	1
South East Asia	25	30	5	5
New Zealand	2	0	1	0
Papua New Guinea and Solomon Islands	4	2	0	0
Pacific Islands	6	0	1	4
All trades	18	11	5	5

a. Transhipment is defined to occur where country of origin or destination differs from the country in which the port of loading or discharge is located.
b. Trade routes are defined in Appendix I.

Source Prepared by BTE.

Shipper perceptions of service

Individual shippers have their own perceptions of the service performance of conference and non-conference operators. Their choice of service will be influenced by these perceptions as well as differences in scheduled rates, although their freedom of choice may be restricted in the short run.

Shipper bodies including the ASC, statutory commodity boards and associations of exporters have stressed that there are further factors, in addition to those examined in the previous section, which affect the overall quality of transport service. Some of these, for example the efficiency of terminals and consolidation services, are related to shore-based activities and may not be a direct responsibility of the liner operators. Others, in particular the availability of shipping space when required and the adequacy of booking and handling procedures, documentation and financial services, are factors which may influence a shipper's choice between a conference and a non-conference operator.

The BTE carried out a telephone survey of shippers to evaluate shipper perceptions of service and to examine the link between service and price. The shipper associations and commodity boards provided lists of exporters from which a survey sample was selected. A very small sample of importers was also surveyed.

Survey of exporters

The information sought from exporters is given in Table VIII.2. The following type of information was requested:

- commodity, trade region, and quantity of annual shipment;
- proportion of cargo shipped non-conference;
- price difference between conference and non-conference;
- comparison of the performance of the conference and non-conference operators for each of six service factors;
- a ranking of the six service factors in order of their importance to the overall quality of service.

In contrast with the more objective measures of service factors discussed in the previous section, shippers were asked to provide a subjective evaluation of performance (making it possible for service factors which are difficult to quantify to be included). Based on advice from the shipper groups and a pilot survey, the six components of service selected were:

- transit time;
- number of ports of call, quality of transhipment services;
- reliability of sailings;
- bookings, handling, financial, documentation services provided;
- frequency of sailings; and
- availability of space when required.

A comparison of the overall service performance of conference and non-conference operators depends on the contributions from the six separate service components. The weight given to the performance comparison for a particular component depends on its importance in relation to the other components. Shippers were therefore asked to rank the factors in order of importance.

A sample of 259 exporters were surveyed, including exporters of meat, wool, dairy products, fruit, metals and minerals, and manufactured products. Either a complete coverage or a random sample of exporters was selected for each commodity group. The total sample, however, cannot be considered truly representative of the whole population of exporters, and care must be exercised in drawing general conclusions from the sample results.

One quarter of those exporters surveyed used a forwarder or broker, and were unable to provide any further information on service performance. Of the remainder, about half used non-conference operators for at least part of their shipments.

Table 6.14 summarises shippers' comparisons of conference and non-conference operators for the six service factors for five selected trade routes, and in all trades combined. The comparisons were based on 117 responses, with many shippers, particularly those using the conference exclusively, expressing an inability to make a judgement. In regard to 'booking, handling, documentation, financial services' and 'reliability of sailings', there was not a significant overall difference between the conference and non-conference operators, although in several trades the conference performance was perceived to be a little better. In regard to 'space availability', 'ports of call/quality of transhipment services' and 'transit time', the conference operators were perceived to have a modest advantage over the non-conference operators in most of the trades.

Shippers indicated that the conferences had a clear superiority in frequency. It was noted in the previous section that conferences

TABLE 6.14 SHIPPER PERCEPTIONS OF THE LEVEL OF OUTWARD SERVICE PROVIDED BY CONFERENCE OPERATORS COMPARED WITH NON-CONFERENCE OPERATORS, BY TRADE ROUTE

Trade route[a]	*Frequency*	*Space availability*	*Reliability*	*Transit time*	*Ports, transhipment services*	*Booking, handling, financial services*
Europe, Mediterranean and Red Sea ports	+5.2	+1.3	+1.1	+2.0	+1.8	*
East Asia	+3.4	-1.5	*	+1.7	*	*
Japan and South Korea	+3.9	+1.8	+1.8	+2.5	*	*
East Coast North America	+4.4	+2.5	+2.5	+3.5	+2.5	+1.6
South East Asia	+2.3	*	+1.9	*	+1.3	*
All trades	+3.6	+0.7	*	+1.6	+1.6	*

a. Trade routes are defined in Appendix I.

Note A plus sign indicates that the conferences are perceived to provide a superior service. Unanimous agreement that the conference service was much better would result in a measure of +10. An asterisk indicates that the difference in performance is not statistically significant at the 95 per cent level of confidence.

Source BTE survey of attitudes of overseas shippers.

generally operated a higher frequency than the combined non-conference operators in the major Australian trades. However the strength of the shipper perceptions indicated that they tended to compare the conference frequency with the frequency of an individual non-conference operator.

Table 6.15 presents the results of shippers' rankings of the relative importance of the service factors, based on 195 responses. Analysis of the rank scores suggests that 'ports, transhipment' and 'bookings, documentation' were clearly the least important, but there was less consensus about the rankings among the other factors.

It was possible to analyse the impacts of price and service on the shippers' choice where the survey respondents provided information on the price difference as well as the service comparisons between the conference and non-conference options for a specific trade. The probability of a shipper choosing non-conference is expected to be greater, the greater is the price reduction below the conference rate, and the less is the service superiority of the conference. To confirm this hypothesis and measure the extent of the price and service impacts, the following least squares regression was estimated on a data set containing 70 observations:

$$\begin{aligned} N = {} & 43.43 + 0.69(\Delta P) - 6.03(\Delta FRE + \Delta SPA + \Delta REL + \Delta TRA) \\ & - 4.85(\Delta PTS) - 2.06(\Delta DOC) \end{aligned}$$

where N = percentage of an exporter's cargo shipped non-conference
ΔP = price discount for non-conference, in percentage terms
ΔFRE = perceived frequency advantage of conference
ΔSPA = perceived space availability advantage of conference
ΔREL = perceived reliability advantage of conference
ΔTRA = perceived transit time advantage of conference
ΔPTS = perceived ports, transhipment advantage of conference
ΔDOC = perceived booking, documentation advantage of conference

The signs of the estimated coefficients and their statistical significance support the general hypothesis of the links between the 'causal' price and service variables and the choice of operator.[10] The

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10. The equation with its statistical properties is:

$$\begin{aligned} N = {} & 43.43 + \underset{(2.0)}{0.69}\,(\Delta P) - \underset{(3.2)}{6.03}\,(\Delta FRE + \Delta SPA + \Delta REL + \Delta TRA) \\ & - \underset{(0.9)}{4.85}\,(\Delta PTS) + \underset{(0.3)}{2.06}\,(\Delta BKG) \quad R^2 = 0.12. \end{aligned}$$

The figures in brackets are 't' statistics.

This equation is a linear approximation of the true relationship in which N is bounded by 0 and 100.

TABLE 6.15 SHIPPER PERCEPTIONS OF THE RELATIVE IMPORTANCE OF VARIOUS ASPECTS OF OUTWARD SERVICE

	Frequency	*Space availability*	*Reliability*	*Transit time*	*Ports, transhipment services*	*Booking, documentation, financial services*
Rank	1	2	3	4	5	6
Relative importance in comparison with frequency	100	95	94	87	66	47

Source BTE survey of attitudes of overseas shippers.

constant term of 43.4 represents the average of the percentages of shippers' cargo which would be shipped non-conference if there were no differences in price or service. This suggests a possible bias towards conference services not accounted for by price and service factors.[11]

Substituting average values of the causal variables ΔP, ΔFRE and so on in the above equation gives an indication of their relative contributions to the average decision for the sample of shippers.

$$N = 43.43 + KP - KFRE - KSPA - KREL - KTRA - KPTS - KDOC$$

$$= 43.43 + 7.76 - 4.40 - 0.78 - 0.60 - 2.05 - 1.50 - 0.29$$

$$= 41.57 \text{ per cent}$$

where KP is the contribution of the price discount for non-conference towards the average decision to ship non-conference.

and KRFE, KSPA, KREL, KTRA, KPTS, KDOC are the contributions of the perceived conference advantage with respect to frequency, space availability, reliability, transit time, ports/transhipment, and bookings/documentation.

These results suggest that the effect of the price advantage of the non-conference operator, is to increase the average percentage of an exporters cargo shipped non-conference by 7.8 points.

The price advantage of the non-conference operators therefore is marginally offset by the service advantage of the conferences. Slightly less than half the service advantage of the conferences resulted from their frequency advantage.

The price discount, ΔP^*, which is equivalent to the service advantage of the conferences for this sample of shippers is given by:

$$0.69\ (\Delta P^*) = 9.62$$

$$\Delta P^* = 13.94 \approx 14 \text{ per cent}$$

11. The purpose of the model is to explain the conference/non-conference choice of shippers irrespective of the quantities of cargo they ship. The 43.4 per cent is not an estimate of the overall percentage of total cargo for this sample of exporters which would be shipped non-conference under conditions of no price and service differences.

This discount is a little greater than the average price discount of 11 per cent offered by the non-conference operators recorded by this sample of shippers.

The service advantage provided by the conferences appears to be quite modest when measured in terms of equivalent price reductions. The conference advantage is most significant in regard to frequency and transit time. The frequency advantage of the conference is equivalent to about a 6 or 7 per cent price reduction, and the transit time advantage about 3 per cent.

The significance of frequency seems to indicate the presence of restrictions on a shipper's freedom of choice of operator. The negotiation of rate agreements between an outsider or conference operator and a shipper may imply a commitment to ship with that operator in which case a frequent service would presumably be desirable. Even if there was no such long-term commitment, a conference providing a frequent service may have advantages. For example, a shipper usually books space some weeks in advance of the expected date of shipment. However, the cargo may become available at an earlier or later date, and the shipper would value being able to switch to another departure date without the inconvenience of changing operators.

Survey of importers

Consideration was given to a survey of importers to obtain their perceptions of the quality of shipping service. It was more difficult to develop a suitable sample frame for this group because of the limited time available and the large number and diversity of importers. Thirty-five importers were contacted, most of them relatively large and importing manufactured commodities. About 70 per cent imported FOB, with some of these using an agent to consolidate orders and make shipping arrangements. The sample was too small to draw a general conclusion about the share of FOB shipments.

About 40 per cent of the importers contacted indicated that non-conference operators were used for all or part of their shipments. In general, the importer perceptions of service comparisons between conference and non-conference operators were slightly more favourable towards conferences than the exporters. This was most noticeable in relation to reliability of service. As regards the relative importance of service factors, reliability was given a higher rank and availability of space a lower rank than given by exporters.

Although no general conclusions can be drawn, for the small samples of shippers surveyed there appeared to be some common ground between the importers and exporters concerning their perceptions of shipping services.

CHAPTER 7 LINER SHIPPING SHORE-BASED OPERATIONS

A number of liner operators have an involvement in terminals, stevedoring and depots which is generally designed to complement their ocean operations. An examination of these activties provides further understanding of the structure of the liner shipping industry and of the market power of the various operators. The discussion here is not intended to cover the wide range of issues currently being investigated by the Task Force on Shore-Based Shipping Costs.

This chapter begins with a brief discussion of the introduction of containerization to the Australian trades. This is followed by an examination of the ownership of terminals and stevedoring operations in Australia, with particular consideration of the involvement of shipping operators in these activities. Some theoretical questions relating to vertical integration are then examined and the potential opportunities that vertical integration provide are also discussed. The chapter concludes with a brief outline of centralization arrangements and some consideration of their role in the cost of moving cargo into and out of Australia.

CONTAINERIZATION

The most significant technological development in liner shipping operations in the last 50 years has been the introduction of unit-load ships, and particularly cellular container vessels. Although the possible use of containers to unitize cargo is an old concept (Tabak 1970) it was first adopted in practice in the late 1950s. The first regular overseas container shipping services to Australia commenced in 1969.

An important advancement resulting from containerization is the significant reduction in cargo handling while a vessel is in port. Container ships are also able to operate with smaller crews. On the other hand, a very large investment is required not only for container ships, but also for terminal and handling facilities at ports, distribution systems and for the containers themselves. As a result of these factors, containerization has led to a substantial increase in the capital intensity of the liner shipping industry. Furthermore, it has resulted in many mergers of shipping lines, or the joining of consortia to take advantage of the economies of scale and technological gains which containerization provided. A practical consequence of this appears to have been a considerable tightening of the institutional structure, and an increase in the economic influence of conferences.

The introduction of containerization into Australia was heralded as an opportunity to provide 'total through-transport from Birmingham to Bourke' (Brown 1984). Shipping companies saw this door-to-door concept as an opportunity to greatly increase the operational efficiency of the industry, and of course to obtain the economic advantages which accompany control of a number of steps in the transport chain. However, although shipping companies have maintained involvement in terminals, stevedoring and depots in Australia, many quickly withdrew from a number of elements of the concept, such as insurance.

OWNERSHIP OF CONTAINER TERMINALS AND STEVEDORES

The co-ordinated door-to-door transport service made possible by vertical integration into associated transport activities provides considerable potential for improving operational efficiency. Certainly, in Europe and Japan there is evidence that common ownership of terminals, ships and other elements in the transport chain has brought about rationalization and efficiency in transport systems. However, there is danger in the accompanying concentration of shipping and terminal operations in the hands of a small number of vertically integrated firms. Shippers will only benefit from such an arrangement if there is competition throughout the transport chain. Otherwise, vertically integrated firms can set tariffs in such a way as to extract maximum profits at whatever point in the chain they hold special market power, including monopoly power.

Since the advent of containerization, the ownership of container terminal operations in Australia has become highly concentrated. Table 7.1 schedules the operators and owners of the major container terminals. Ownership of Australian container terminals is dominated by five groups, Australian National Line, P&O Australia, Overseas Containers Australia, Patrick Operations and Associated Container Transportation (Australia). Four of these groups are controlled by shipping interests, whilst the fifth is owned by a diverse company with, inter alia, stevedoring and shipping interests. The companies controlled by shipping interests are almost exclusively members of the

TABLE 7.1 OWNERSHIP OF MAJOR AUSTRALIAN CONTAINER TERMINALS, 1984

Terminal	*Operator*	*Owner(s)*
Melbourne		
Webb Dock	Australian National Line (ANL)	ANL
Swanson Dock West	Seatainer Terminals Ltd	OCAL (50 per cent) P&O Aust Ltd (50 per cent)
Swanson Dock East	Patrick Stevedoring Co	Patrick Operations Pty Ltd (Howard Smith Ltd)
Swanson Dock East	Trans Ocean Terminals Pty Ltd	ACT(A) Ltd (66.67 per cent) ANL (33.33 per cent)
Swanson Dock East	F.G. Strang Pty Ltd	F.G. Strang Pty Ltd
Sydney		
Glebe Island	Glebe Island Terminals Pty Ltd	Patrick Operations Pty Ltd (Howard Smith Ltd)
Botany Bay	ANL	ANL
Botany Bay	Container Terminals Australia Ltd	OCAL (51.0 per cent) Mitsui OSK (10.46 per cent) Nippon Yusen Kaisha (9.63 per cent) Yamashita - Shinnihon (4.41 per cent) Hapag - Lloyd (7.96 per cent) Lloyd Triestino (4.28 per cent) Compagnie Generale Maritime (6.13 per cent) Nedlloyd (6.13 per cent)
Brisbane		
Newstead	ANL	ANL
Fisherman Islands	Brisbane Amalgamated Terminals Ltd	P&O Aust Ltd (74 per cent) ANL (26 per cent)

TABLE 7.1 (Cont.) OWNERSHIP OF MAJOR AUSTRALIAN CONTAINER TERMINALS, 1984

Terminal	*Operator*	*Owner(s)*
Fremantle		
North Quay	Fremantle Terminals Ltd	Seatainer Terminals (OCAL (50 per cent), P&O Aust (50 per cent)) (60 per cent) Fremantle Cargo Services (P&O Aust (75 per cent), Knutsen Line (25 per cent)) (40 per cent)
Adelaide		
Outer Harbour	Trans Ocean Terminals Pty Ltd	ACT(A) Ltd (66.67 per cent) ANL (33.33 per cent)

Source Prepared by BTE.

various shipping conferences serving Australia. Three of the groups which own the major terminals are controlled by overseas companies whilst the remaining two are Australian owned.

ANL operates a fleet of container ships and bulk carriers in coastal and overseas trades, including the Australia/Europe and North Mediterranean, North America, Asia and New Zealand, as well as Australian coastal services.[1] ANL is also Australia's largest terminal operator with significant land based investments in Sydney, Melbourne, Brisbane and Adelaide.

The ultimate holding company of P and O Australia was the Peninsular and Oriental Steam Navigation (P and OSN) Company, incorporated in the United Kingdom. P and OSN Co was the largest shareholder (47.4 per cent) of Overseas Containers Limited (OCL) which was the parent company of Overseas Containers Australia Limited (OCAL). Figure 3.5 sets out details of the structure of the P and O group, its involvement in OCL, and OCL's related interests in Australia. OCL is

1. North American services were curtailed in 1985.

an important member of the Australia/Europe conferences and also operates on a number of other Australian services, P and O Australia is the major shareholder of the Brisbane Amalgamated Terminals Ltd (BATL) terminal at Fisherman Islands in Brisbane. P and O Australia and OCAL each own 50 per cent of Seatainer Terminals, which operates terminals at Swanson Dock West in Melbourne and North Quay in Fremantle, the latter one in conjunction with Fremantle Cargo Services, which is now 75 per cent owned by P and O Australia. In addition, Seatainer Terminals operates depots and warehouses in South Australia, New South Wales and Victoria. OCAL also holds 51 per cent of the shares in the Container Terminals Australia Limited (CTAL) terminal at Port Botany in Sydney. In addition to its ownership of terminals, P & O Australia has interests in stevedoring, mainly through the Conaust Companies.

Patrick Operations Pty Ltd is 100 per cent owned by James Patrick and Co Pty Ltd which in turn is 72.7 per cent owned by Howard Smith Ltd. Howard Smith is a diverse company with interests in coal, industrial supplies, sugar and engineering as well as stevedoring and coastal and overseas bulk shipping. The Patrick Group has the largest stevedoring operation in Australia. In addition, Patrick Operations Pty Ltd now owns two major container terminals in Australia, Glebe Island in Sydney (Port Jackson) and Swanson Dock East in Melbourne.

The ACT(A) consortium is a member of the Australia/Europe conferences and also operates in other trades such as the Australia/East and West Coast North America and Sri Lanka, often in partnership with ANL. Individual companies in the consortium operate on a number of other routes out of the UK. ACT(A) holds two-thirds of the shares in Trans Ocean Terminals Pty Ltd, with ANL holding the remaining one-third. Trans Ocean Terminals operates terminals at Swanson Dock East in Melbourne and Outer Harbour in Adelaide. ACT(A) also owns depots and warehouses in Sydney and Melbourne.

Concentration of container terminal ownership in Australia has strengthened in recent years. In particular, Patrick Operations and P and O Australia have increased their participation in terminal activities. On the other hand, Liner Services Pty Ltd, which was 75 per cent owned by Wilh. Wilhelmsen Agency Pty Ltd and 25 per cent by Farrell Lines Inc, has divested itself of its interests in terminals. Prior to 1982, Liner Services held 25 per cent of Glebe Island Terminals Pty Ltd and owned a terminal at Swanson Dock East. In 1982, Patrick Operations acquired the 25 per cent holdings of Liner Services, Farrell and Columbus, and now has 100 per cent ownership of Glebe Island Terminals. Patrick Operations also acquired the Liner Services terminal at Swanson Dock East in 1984.

Seatainer Terminals Ltd has been a major terminal, depot and warehousing operator in Australia since the late 1960s. Until 1975, OCAL and Associated Steamships Pty Ltd (ASP) were equal partners in Seatainers. In 1975, ASP ceased its Australian coastal operations and transferred its 50 per cent share to its parent company, TNT Bulkships Ltd, which is owned 62.5 per cent by Thomas Nationwide Transport Ltd (TNT) and 37.5 per cent by McIlwraith McEachern Ltd. P and O Australia acquired the TNT group's 50 per cent holding in Seatainers in October 1984. Seatainers submitted an application for the development of a container terminal at Port Botany in May 1974. However, TNT Bulkships decided that it did not wish to be involved in the terminal. Subsequently, OCAL formed a new consortium (CTAL) with its partners in the Australia/European and Japan trades to establish a new terminal at Botany Bay. As a result of a fall off in trade following the opening of the CTAL terminal, Seatainers announced the closure of its White Bay (Port Jackson) operation in May 1983.

VERTICAL INTEGRATION

Vertical integration is a management strategy employed by firms in a number of industries, which is designed to reduce costs and minimise uncertainty and risk and can be considered as a form of diversification. Manufacturing firms, for example, may integrate 'upstream' or 'backwards' by producing raw materials or other inputs to their production process, or may integrate 'downstream' or 'forwards' by moving into distribution or transportation. In the transport industry, firms vertically integrate by extending their involvement to additional links in the door-to-door transport chain.

A classic example of vertical integration to bring about reduced costs is in the steel industry where the integration of blast furnaces, converters and primary reduction mills reduces handling and the need for reheating. Successful integration of the movement of goods through a number of steps in the transport chain leads to gains in operational efficiency and hence reductions in cost. Vertical integration may also provide firms with greater control over their economic environment, and hence lead to reduced risk. Upstream integration, for example, can ensure that supplies of raw materials are available to a manufacturer in times of shortage and, in some cases, may protect the firm from a price squeeze by suppliers. A shipping operator which owns a container terminal may be able to ensure that it has access to a suitable berth and loading/unloading services, in particular at times of high demand, and also that the rates charged for terminal use are reasonable.

Vertically integrated firms have the opportunity of controlling markets and hence limiting competition. This opportunity is exploited in different ways and, to a greater or lesser extent, by different firms. Manufacturers who are vertically integrated may keep raw materials out of the hands of rivals or establish a price structure (relating the prices of raw materials to intermediate and end product prices) which squeezes profit margins of less integrated competitors. In this context it has been suggested that the ownership of container terminals by operators may be a barrier to entry as the ownership may be used in some circumstances to inhibit the access of entrants to terminals. Alternatively potential entrants may be concerned that they might suffer from the pricing policy instituted by vertically integrated terminal/liner operators.

In addition to allowing firms to better manage uncertainty by being able to control critical supplies and to limit competition, vertically integrated firms can reduce uncertainty by modifying the environment in which they operate. In the liner shipping industry this is accomplished through industrial negotiations, and controlling technological developments.

Opportunities arising from vertical integration

Large diversified companies which have interests in shipping, terminal and stevedoring operations, depots and warehouses, have flexibility in recording the revenues from and the costs of their activities between the various companies within the group. This flexibility can be used to maximise overall profits of the group or pursue some other corporate objective. Examples are the granting of rebates or the charging of special prices to companies within the group and the use of a variety of accounting practices.

In 1977 the Prices Justification Tribunal (PJT) reported on their investigations of two major Australian cargo handling companies, Seatainer Terminals Ltd and James Patrick and Co Pty Ltd. Goss (1982) summarised the PJT reports and provided some relevant comment. The PJT found that Seatainers gave discounts to their own shareholders and also to clients with very large volumes of containers and those prepared to give all their custom to Seatainers. The Australian Shippers' Council (ASC) was not aware of this practice, and hence it was not taken into account in negotiating rates with relevant conferences. It has not been possible to establish whether such rebating still occurs, however, it has been suggested to the BTE by liner operators that discriminatory pricing by terminal authorities no longer occurs in an overt way because of the negative connotations of the practice.

Terminal companies usually make a loss in their early years of operation because of the large capital investment requirement to set up a container terminal. During the 1970s, terminals in Australia appeared, generally, to operate profitably after the initial establishment period. However, in more recent times, with the world-wide economic recession and some degree of excess capacity, profits (if any) seem to have been quite small and losses have not been uncommon. As a result, the opportunities for secret rebating or discounting appear to have been limited in recent years.

If a liner operator owns a container terminal (or, of course, if a terminal operator is also involved in a shipping operation) it may be in a position to give preference for berth space and associated loading and unloading services to its own ships, or those of related or associated operators, particularly at times when there is a shortage of berth space or delays in providing stevedoring services. However, in the current circumstances in Australia where there is generally an excess of terminal space, it would seem that such ownership would only lead to an occasional advantage in that a preference could be obtained at peak or congested times.

It is often suggested that vertical integration by operators, which results in possible berth preference and pricing advantage, is a barrier to the entry of new companies to the liner shipping trade, given the large capital cost of terminals and other factors such as the shortage of suitable land for terminals at convenient locations. The shipping companies which also operate container terminals are almost exclusively members of shipping conferences. Therefore, in contemplating entry to the liner shipping industry, a potential operator has the knowledge that there will be competition from established conference operators who may also be terminal operators.

Another aspect of vertical integration is related to its impact on industrial relations. There are indications that terminal operators, guided by the strong desire of their parent companies to avoid shipping delays, may be in a weakened position when it comes to labour negotiations. In addition, shippers who negotiate with vertically integrated shipping/terminal operators, may be at a disadvantage because they generally have a lack of detailed knowledge about the costs associated with the various steps in the transport chain.

Vertically integrated firms also have advantages in regard to the control of technological developments. Since cargo carried must be loaded onto and unloaded from a ship, generally through a terminal of some kind, it is clearly important for the cargo handling technology at the terminal to be compatible with that on the ship. A firm which controls both the terminal and the ship clearly has greater scope to keep technological developments on the ship in harmony with those at the terminal.

CARGO CENTRALIZATION

Prior to the introduction of containerized cargo handling in overseas liner shipping trades, a large number of Australian ports had direct services from overseas cargo ships. As a result of containerization, the number of calls into ports was significantly reduced in order to maximize utilization of the specially constructed and expensive port facilities and to minimise the overall in-port time (and hence cost) of expensive container ships. Sydney, Melbourne, Fremantle and, to a lesser extent, Brisbane have developed as the key centralized ports in Australia.

An important characteristic of outward conferences serving Australia which has been maintained under centralization, is the uniform or 'pan-Australian' rate system. Rates for a given cargo, with few exceptions, are identical from all Australian ports of shipment to a particular overseas destination. Similar arrangements also exist regarding destination ports for the majority of inward conferences.

Under centralization arrangements, overseas cargo moving to and from traditional ports is shipped to a central port by alternative means of transport (mainly rail), with the liner shipping operators meeting the transportation costs from the traditional port to the centralized port. The conferences, at the time centralization arrangements were introduced, undertook to meet this cost only for existing cargoes and customers. Whether or not new cargoes and customers have their centralization costs paid is subject to commercial negotiation (both conference and non-conference lines have met these costs in some cases). While centralization arrangements were an important aspect of the introduction of containerization and are in most cases an integral part of the current process of negotiating rates under the auspices of Part X of the Trade Practices Act, the arrangements are essentially a commercial matter for negotiation between shipping companies and shippers.

The decision to introduce centralization arrangements into Australia was made by liner operators because they determined that the cost to them of these arrangements would be less than costs associated with providing the necessary container handling equipment at the 'non-centralized' ports and with making a larger number of port calls. Centralization arrangements allow a reduction in the number of port calls and have been an important factor in allowing conference operators to use larger ships, and hence achieve lower unit operating costs while maintaining high levels of service.

A justification for the introduction of centralization and retention of pan-Australian rates (rates which are the same for each port of call in Australia) was to achieve the distributional objective of allowing all exporters to compete on essentially uniform terms (BAE 1981). However, it is clear that the cost of transporting goods from the Brisbane hinterland, which are railed to Sydney before being put on a ship for their overseas destination, is greater than the cost of transporting those same goods from the Sydney region to the same overseas destination (the difference being the cost of sending the goods from Brisbane to Sydney by rail or road). Yet the total freight charge for sending the goods from Brisbane or Sydney to the overseas destination is the same (pan-Australia rates). Centralization combined with pan-Australia rates therefore tends to obscure the actual cost of transportation. Producers close to centralized ports bear a higher freight rate than they might otherwise expect, and conversely those distant from the port are charged a lower rate. This almost certainly affects the allocation of resources over time and may have implications for wider government policy, particularly in relation to trade.

Pan-Australia rates together with cargo centralization may also affect locational efficiency as there is little incentive to locate production plants, storage depots and so on in localities which will minimise transportation costs. It also has an impact on decisions such as whether to slaughter animals in the area where they are located or to transport live animals to an abattoir close to an appropriate port. In addition, as these arrangements do not encourage producers to send their product through the port which will result in the minimum total cost of transportation, they are likely to affect the pattern of port utilization.

It is also relevant to ask what effect pan-Australia and centralization arrangements rates might have on competition between conference operators and non-conference operators (who are not usually tied to centralization agreements) or on Non-vessel Operating Common Carriers (NVOCCs). First, it should be recognised that centralization costs (that is the land component of the cost) are a relatively small part, about 5 to 8 per cent, of the total cost of moving cargo from an Australian origin to an overseas destination, or from an overseas origin to an Australian destination. In addition, whilst the effect of centralization on transportation costs can be examined, it must be borne in mind that scheduled rates do not closely reflect costs. This aspect is discussed in Chapter 8.

In the case of cargo moved from an outer or feeder port, the actual cost of the movement for a conference operator will be higher than the cost that is attributed to movements from the outer port, since the land component of the cost is averaged over all (including centralized) ports. Another shipping company which wished to operate from such a port and which is not involved with centralization arrangements probably would also be faced with higher costs on the land leg of the trip because conference operators with a large volume of centralized cargo are in a position to secure favourable train load rates for the land sector of the movement.

Given the relatively small component of total cost which land transport costs represent it is probably difficult for non-conference operators to compete with centralized services by direct calls because conference ships tend to be larger and hence have lower per unit operating costs (see Table VI.4) than those of non-conference operators. This disadvantage may, however, be partially offset because the additional per unit cost of making an extra port call is generally lower for the non-conference operator than for the conference one, where non-conference operators deploy smaller ships.

In regard to the movement of cargo from a centralized port by conference operators, there is a component of the per unit cost which arises because of centralization. In other words a land transport component is notionally attributable to the movement of cargo from the central port even though it is not incurred. It is sometimes argued that this provides a cost advantage to a non-conference operator who is not a party to the centralization arrangements. However, once again, because of the relatively small proportion of the cost attributable to centralization, a non-conference operator would need to have similar ship operating costs to those of the conference operators, in order to achieve lower overall transportation costs. It should be recognised, however, that if non-conference operators were to obtain a significant proportion of the trade from centralized ports this would lead to an increase in the per unit centralization cost attributed to the remaining conference cargo as the relative share of cargo moved from outer ports increased in relation to cargo moved from centralized ports. This would shift the cost structure in favour of non-conference operators moving freight from a centralized port.

Centralization agreements generally only apply to those ports and cargoes affected at the time container services were introduced. Therefore it would be expected that, as new operators enter the various trades and new commodities are exported and imported, a smaller proportion of all goods moved would be subject to centralization arrangements. Hence centralization is likely to decline in importance as an issue in aggregate. Also outer ports, particularly Adelaide, have made substantial efforts to attract direct services, and especially conference operators, to their ports. Arrangements have recently been made, for example, for members of the Australia/Northbound Shipping Conference to call at Adelaide. With regard to particular cargoes, for example, meat, centralization is likely to remain a sensitive issue, particularly if the commodity markets remain tight.

A number of more detailed investigations of centralization issues have been carried out. A study of the efficiency aspects of cargo centralization in the overseas liner trades was carried out by the BTE (1982). Trebeck (1982) looked specifically at centralization questions in relation to wool, and the arrangements in respect of meat and livestock are considered in BAE (1981), IAC (1983) and Coleman, Trewin and Macaulay (1985).

CHAPTER 8 LINER SHIPPING RATE STRUCTURES

The examination of output prices is a key element in a study of industry conduct because, in conjunction with information on costs, it provides a means of assessing industry efficiency and the degree of competition. In the context of this study, rate structures also provide indications of the balance of market power between ship operators and shippers.

This chapter commences with a description of the rating practices applying in the liner shipping industry. The structure of conference scheduled rates is then analysed, followed by a comparison of current rates for both conference and non-conference operators, for both inward and outward trades. The trends in these rates and their components for the period 1973 to 1985 is then examined and the incidence of charges for Australia's imports and exports estimated.

Finally, explanation of the economic rationale underlying rating practices in the industry is provided, including a discussion of the economic implications of price discrimination. Emphasis in that section is placed on the effect of market power on the level and distribution of rates.

Shipping rates are published in the tariff schedules on a per kilogram, per cubic metre or per TEU basis. To analyse rate structures it was necessary to express tariffs in a common unit. With the exception of the analysis of rate trends, rates were estimated and are reported on a per TEU basis.

LINER RATES

For the purpose of this report the description of freight charges is confined to three types of rates; namely scheduled rates, open rates and FAK rates.

Scheduled freight rates refer to the tariffs recorded in liner shipping rate schedules. The rate schedules also stipulate the conditions under which cargo will be transported. The scheduled rates form the basis of the tariffs most commonly applying throughout the liner trades.

The scheduled rates for conference and non-conference liner services are usually the maximum tariffs applying to a shipper who has entered into a contract to exclusively use the shipping services of that conference or non-conference operator. It is usual for commodity boards, particularly those representing major commodities such as meat and wool, to negotiate contracts separately from the Australian Shippers' Council in order to achieve lower rates and/or better conditions for conference services. Another less commonly used method of negotiating lower contract rates involves deferred rebating. An example of this system is when a shipper is given a refund on scheduled rates for one period of loyalty, which is paid at the end of the succeeding period by a ship operator or conference provided that the shipper exclusively used their ships during both periods of the agreement. For non-contract cargo, conference operators typically apply a 10 to 15 per cent surcharge to contract rates across all commodities.[1]

A common practice of non-conference liner operators is to structure rates 10 per cent below the scheduled or contract conference rates. However, there is evidence available that in some instances the reduction in non-conference rates is greater than 10 per cent.[2]

The BTE was advised by shippers that the practice of individual conference members giving rebates on scheduled rates to either maintain or increase their market share has generally been phased out over the past few years. Self regulatory controls, such as monitoring by accredited accountants and financial penalties for discounting, are employed by the conferences to prevent this form of discounting by their members. However, it is reported to be not uncommon for members of a conference to give rebates in relation to on-shore costs, thus giving effective discount on the pier to pier rate (as distinct from the scheduled rate), thereby circumventing these controls.

The 'open rate' tariff category refers to rates charged by members of a conference for commodities not specifically defined in conference rate schedules. Open rates are set by negotiation between the shipping operator and the shipper, but are subject to an unpublished minimum level agreed to by conference members. Under this system

1. Personal communication with ASC.
2. The survey of exporters reported in Chapter 6 found that the price discount offered by non-conference operators varied around an average figure of 11 per cent.

other conditions pertaining to the carriage of the cargo are normally set by the shipping operator and not the conference.

FAK rates refer to the category of freight rates applying in the liner trade which are not contingent on the commodity being shipped. That is, the rates are the same for a service irrespective of the value or demand characteristics for the commodity being carried.

Rates may include centralization costs from outports to the main ports of call. As outlined in Chapter 5, at the time containerized services were introduced in the late 1960s the conferences agreed to absorb the costs of transporting cargoes to and from outlying ports in Australia previously served by conference ships. Subsequently, with the development of new markets, the incidence of centralization costs in Australia has been subject to commercial negotiation between shippers and the conferences.

Components of conference scheduled freight rates

The current structure of scheduled rates for conference services to and from Australia comprise three elements: a basic service rate (BSR); a bunker adjustment factor (BAF); and a currency adjustment factor (CAF). There are also extra charges, 'additionals', which apply in certain situations. 'Additionals' include heavy lift surcharge, long length surcharge, and basic service rate addition (wharfage).

The BSR is the base rate for the ocean leg of the service. BAF and CAF are adjustments (either positive or negative) applied to the BSR to take account of changes in bunker fuel prices and currency exchange fluctuations respectively. Prior to 1973, there were no specific adjustments made in the negotiations of rates to account for fluctuations in bunker fuel prices. The cost of bunker fuels was treated as being similar to any other costs of operating ships. Historically, adjustments to rates to cover the risk to shipowners arising from currency fluctuations predate containerization. The current CAF agreements, however, date from 1973 when the Australian Shippers' Council (ASC) was formed.

The current CAF agreements were introduced in response to the revaluation of the $A in December 1972 and the devaluation of the US$ in February 1973.[3] The rationale for applying a CAF is that the

3. ASC first Annual Report for period ended 30 June, 1973 (ASC 1974, 9).

operating costs of conference ships are often incurred in different currencies to the revenue received from tariffs. For example, in the Australia/Europe trade the costs of operating ships are predominantly incurred in £Sterling, US$ and other European currencies and the tariffs are paid outward in $A and inward in US$.

The CAF is based on a weighted average of a basket of currencies which comprise all currencies in which the conference operators incur their costs. The CAF is set annually, however, adjustments are made throughout the year if the average of the basket of currencies fluctuates by more than 2 per cent.

At the end of each year, the CAF is normally incorporated into the BSR. However, if the date of incorporation is the same as the expiry of an existing freight rate agreement then any adjustment to the existing BSR as a result of negotiations is made before the CAF is incorporated into the new BSR. While the current value of the CAF is usually incorporated in the BSR, this is not always the case. For example, in the case of the Australia to Europe Shipping Conference the value of the CAF to be incorporated is determined on 1 April each year, while the actual incorporation does not take place until 1 October. Hence, it is likely that the CAF which is incorporated into the BSR is different to that prevailing at 1 October.

The BAF was originally introduced in response to rising world bunker prices which occurred when the OPEC members increased crude oil prices in 1973. The method used to set the BAF for a conference is based on a weighted average of the bunker costs of the operators as each member purchases bunkers from different sources. In most trades adjustments to the BAF are made when the average bunker costs vary by more than plus or minus 2 per cent. The 2 per cent trigger point is designed to stabilize the freight rates against minor bunker price fluctuations. In the Australia to North America trades the trigger point is 1 per cent.

There are two methods by which the CAF and the BAF are applied to the BSR to calculate the scheduled rate, namely, cumulative and non-cumulative. The Australia/Eastern USA Shipping Conference uses the cumulative basis. In this case the BAF is added (or subtracted) to the BSR before the CAF is applied to the cumulative total of the BSR plus BAF. That is, (BSR + percentage BAF) + percentage CAF equals the rate for the ocean leg of the service.[4]

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4. Excludes 'additional' charges, for example wharfage.

The Australia to Europe Shipping Conference uses the non-cumulative method. In this situation the BAF and the CAF are both applied as percentages of the BSR. That is, BSR + (percentage BAF + percentage CAF) equals the rate.[5]

Where applicable, FCL and LCL rates are specified in the schedules. The FCL rate is often quoted as a rate per tonne based on a stipulated minimum load factor for the container. An FCL rate expressed as a rate per container is commonly referred to as a box rate and normally applies to a commodity group but may also apply across a number of commodities. The FAK rate is an extension of the box rate in the latter situation.

CURRENT LINER RATES

In this section comparisons are made between the weighted average inward and outward rates for conference and non-conference liner services on selected trades.

To undertake these analyses, conference scheduled rates applying at 1 January 1985 were weighted on a commodity basis by the estimated number of containers shipped in the 1983-84 financial year. Due to lack of detailed information on non-conference schedule rates the rates were set at 10 per cent below the corresponding conference scheduled rates for all commodities except meat.[5]

Comparison of inward and outward scheduled rates

The distribution of inward and outward scheduled rates for the selected trades is presented in graphical form in Appendix IX. Table 8.1 illustrates the parameters of these distributions, that is, the weighted average rate and the measure of relative dispersion (coefficient of variation) of rates about the mean.

A comparison of the inward and outward rate statistics for the selected trades in Table 8.1 shows that outward rates were, on average, lower than inward rates for the same type of service on corresponding trades. The relative dispersion of outward rates (as indicated by the coefficients of variation), were greater than inward rates with the exception of the Australia/New Zealand and East Coast North America trades. There was significant variability in the rates

5. The estimated distribution of conference and non-conference freight rates together with a description of their derivations are presented in Appendix IX.

TABLE 8.1 CHARACTERISTICS OF CONFERENCE AND NON-CONFERENCE SCHEDULED RATES FOR SELECTED TRADES, JANUARY 1985

	Inward					*Outward*				
	Conference		*Non-conference*			*Conference*		*Non-conference*		
Trade area[a]	*Weighted average rate*[b] *($ per TEU)*	*Coefficient of variation (per cent)*	*Weighted average rate*[b] *($ per TEU)*	*Coefficient of variation (per cent)*	*Conference as a percentage of non-conference weighted average rate (per cent)*	*Weighted average rate*[b] *($ per TEU)*	*Coefficient of variation (per cent)*	*Weighted average rate*[b] *($ per TEU)*	*Coefficient of variation (per cent)*	*Conference as a percentage of non-conference weighted average rate (per cent)*
Europe and North Mediterranean	3 320	34	3 481	31	95.4	1 984	58	1 610	57	123.2
	(1 132)		(1 066)			(1 151)		(916)		
Japan	4 027	25	3 499	22	115.1	2 495	35	1 559	43	160.0
	(1 012)		(779)			(1 236)		(670)		
East Coast North America	6 410	45	5 319	47	120.5	4 782	37	2 486	37	192.4
	(2 908)		(2 479)			(1 786)		(928)		
West India	5 015	24	4 633	18	108.2	2 300	41	1 832	35	125.5
	(1 194)		(846)			(948)		(637)		
New Zealand	2 051	23	1 826	16	112.3	2 031	10	1 940	4	104.7
	(464)		(299)			(196)		(87)		

a. Trade areas are defined in Appendix I.
b. Standard deviations are shown in brackets.

Source Prepared by BTE.

in terms of the absolute dispersion. For example, in the Australia/East Coast North America trades the standard deviations of the scheduled rates per TEU ranged from $928 to nearly $2980.

Direct comparisons of inward and outward rates at the commodity level could only be undertaken on a limited scale due to the absence of similar commodities, that is, with the same characteristics, being carried both inward and outward. Time series data of scheduled rates were used for the comparison.

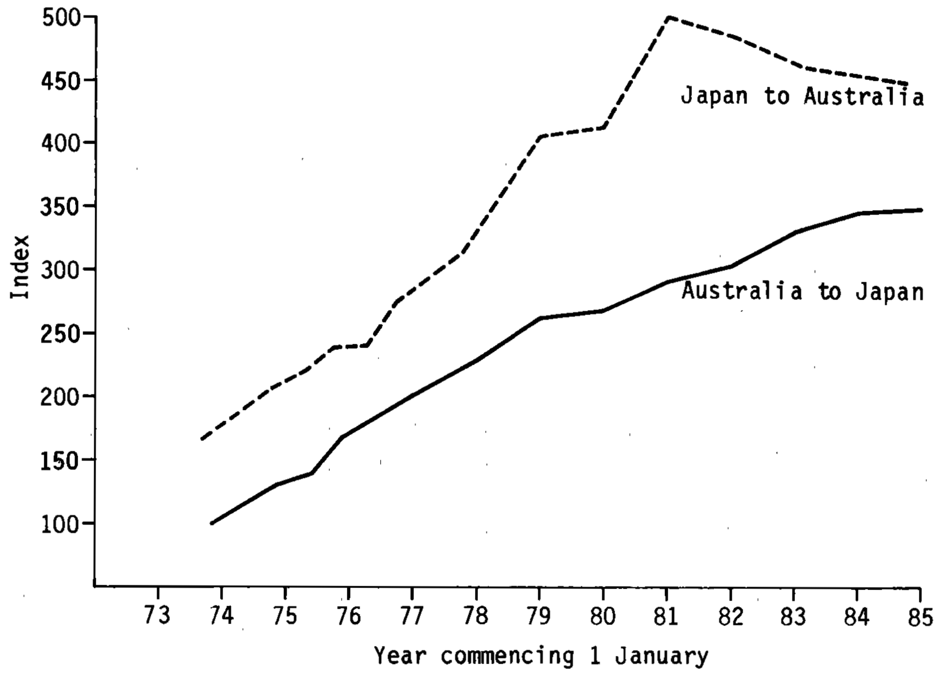
Of the commodities selected, there was no apparent pattern to the relationship between the inward or outward rates. However, there was a similar general upward trend for both inward and outward rates over time. These points are illustrated in Figures 8.1 and 8.2 which show a comparison of inward and outward conference rates for general cargo in the Australia/Japan trade and for household goods and effects in the Australia/East Coast North America trade.

The inward rates for household goods and effects in the Australia/East Coast North America trade were significantly higher than outward rates prior to 1980. The BTE has been advised that the sharp decrease in rates from around 1980 was due to competition from NVOCCs. After mid-1980 inward and outward rates followed the same general upward trend as other commodities examined.

Comparison of conference and non-conference average freight rates

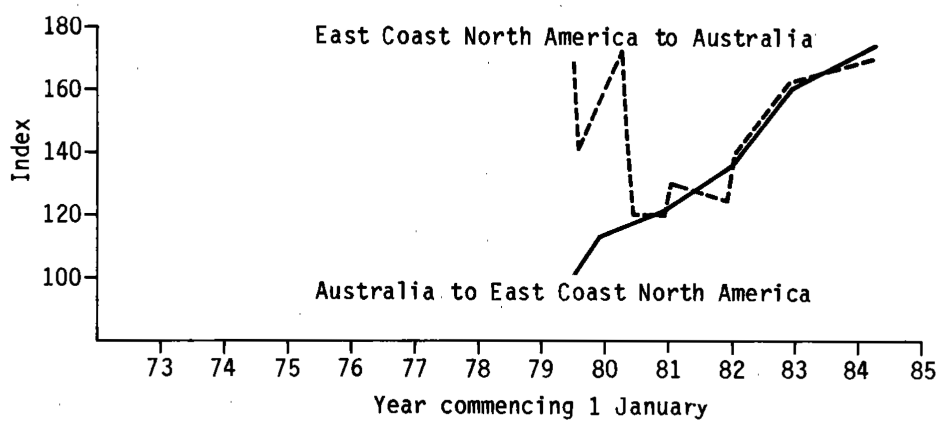
In respect of inward rates, Table 8.1 shows that in the Australia/Europe and North Mediterranean trade, the average scheduled rate for conference services is lower than for non-conference services, implying that the non-conference operators carried higher rated cargoes on this trade. In the other inward trades, the average rates are higher for the conference operators, although the difference is generally less marked than for the outward trades.

In respect of outward rates, the average scheduled rate for conference services was higher than the rate for the corresponding non-conference services. In the Australia to Europe and North Mediterranean, Japan and East Coast North America and West India trades, the difference between the weighted average conference and non-conference outward scheduled rate is significantly greater than the 10 per cent differential assumed for individual rates, suggesting that in these outward trades, non-conference operators carry comparatively lower rated cargoes.



Source BTE estimates.

Figure 8.1 Comparison of inward and outward scheduled rates: general cargo, Australia/Japan trade, 1973-85 (1984 prices)



Source BTE estimates.

Figure 8.2 Comparison of inward and outward scheduled rates: household goods and personal effects, Australia/ East Coast North America trade, 1979-84 (1984 prices)

Finally, comparison of the lowest conference commodity rate levels on the selected trades with the estimated short run avoidable cost of transporting a TEU on each trade, suggests that conference operators set rates down to or below avoidable costs (refer to Table 8.2).[6] For example, the minimum freight rate of $1073 per TEU in the Australia to Europe and North Mediterranean trade was above the avoidable cost of $968, while the minimum rate in the Australia to Japan trade of $780 was marginally below the avoidable cost of $816.

PRICE DIFFERENTIATION IN LINER RATES

The pricing strategy of liner operators results in a regime of differential rates comprising different rates for different cargoes as well as different rates for similar cargoes.

TABLE 8.2 COMPARISONS OF THE LOWEST MINIMUM CONFERENCE SCHEDULED RATES WITH CONFERENCE AVOIDABLE COSTS, JANUARY 1985

	Inward		*Outward*	
Trade area[a]	*Lowest minimum rate per TEU*	*Avoidable TEU cost*[b]	*Lowest minimum rate per TEU*	*Avoidable TEU cost*[b]
Europe and North Mediterranean	1 731	968	1 073	968
Japan	1 286	838	780	816
East Coast North America	2 801	1 129	1 609	1 085
West India	2 342	762	1 268	654
New Zealand	1 526	719	1 469	799

a. Trade areas are defined in Appendix I.
b. Includes container repair and maintenance, wharfage, cargo stevedoring, container cleaning and cargo agency fees at both ends of the trip. See Appendix VI for details.

Source Prepared by BTE.

6. An example of the avoidable costs in liner shipping operations are those costs directly associated with the loading of each container, such as on-shore labour and loading equipment costs. The non-avoidable or common costs of operation, which constitute the greater proportion of total costs, include interest on capital, depreciation, maintenance, port costs, crew and fuel costs (See Appendix VI).

Price differentiation, in the form of different rates for similiar cargoes is referred to as price discrimination when the difference in prices cannot be explained by the difference in production costs. It follows that, in the context of liner shipping, rates are not discriminatory if the difference in rates charged for dissimilar cargoes can be explained fully by the difference in transport requirements, (for example if price differentials reflect the difference in the cost of transporting refrigerated and non-refrigerated cargoes).

Evidence of price discrimination in the liner trade can be gleaned from a perusal of conference rate schedules. These schedules set out rates according to commodity classifications with each classification normally comprising a range of rates. For example, in the rate schedule for the Australia/Eastern USA Shipping Conference there are 186 different commodity classifications but 440 rates. To illustrate the number of rates applying to commodity classifications, there are 10 different rates for aluminium and 10 for machinery.

Discrimination within commodities is also apparent. For example, in the Australia to Eastern USA Shipping Conference the scheduled rates for hides in 1985 ranged from $2285 when the value of hides did not exceed $350 FOB per tonne, to over $2700 when the value of hides was in excess of $350 FOB per tonne.

The use of pan-Australian rates represents a more subtle form of price discrimination. This is a system of rates which do not vary according to the port of origin in Australia. Shippers in Western Australia, therefore, pay the same rate for cargo shipped to North America as their competitors in the eastern States, despite the longer distance. Hence, the uniformity in the rate structure masks the discrimination with respect to variations in distance over trade routes. This form of price discrimination may impact on the misallocation of resources through its effects on industry location decisions (see Chapter 7).

Loyalty agreements and some other types of rate discounting practices of conference members and non-conference operators alluded to earlier, are further illustrations of price discrimination in the liner industry.

The degree to which liner operators can set discriminatory rates depends largely on the extent of competition in the market place. It might be expected that the greater the degree of competition, the greater will be the tendency for rates to converge towards a system of FAK rates.

TRENDS IN CONFERENCE SCHEDULED FREIGHT RATES

Conference scheduled rates for outward cargo from Australia were examined for the period 1973 to 1985 to gain an indication of trends over time. One or two commodity rates were studied for each of the five selected trades.[7] Trend information for a selection of at least one commodity for each trade area is presented in Table 8.3 to indicate the general pattern of rate changes.

TABLE 8.3 TRENDS IN REAL OUTWARD CONFERENCE SCHEDULED RATES FOR SELECTED TRADES, 1973 TO 1985[a]

(per cent)

		Increase in rates 1973-85		*Decrease in rates from the peak rate to 1985*	
Trade area[b]	*Commodity*	*Overall*	*Annual compound rate*	*Overall*	*Annual compound rate*
Europe and North Mediterranean	Hides	5.7	0.5	30.0	5.8
	Greasy wool	-63.5	-8.1	75.4	18.1
Japan	Malt	26.2	2.0	9.6	1.7
	Greasy wool	44.1	3.1	19.3	3.5
East Coast North America	Boneless beef	-4.0	-0.3	23.8	3.3
	Greasy wool	50.4	3.5	9.2	1.2
West India	Motor vehicles	37.4	2.7	9.3	1.6
New Zealand	Hides	88.4	6.0	8.1	1.8

a. The OECD consumer price index was used to adjust rates to 1984 prices.
b. Trade areas are defined in Appendix I.
c. The peak in freight rates occurred between 1976 and 1980.

Source Prepared by BTE.

7. Commodities examined were boneless beef, greasy wool, malt, motor vehicle parts and components and hides, skins and pelts.

Scheduled rates may not always reflect the actual rates paid by shippers, as lower rates, for example in the form of promotional rates, may at times be offered by conferences. The lack of comprehensive information on these rates, however, precluded them being accounted for in this analysis.

All rates and their components are expressed in terms of constant 1984 prices using OECD consumer price index. This index was preferred to others on the grounds that it had more validity in terms of assessing real changes in rates paid by Australians relative to our major international competitors.

The analysis of trends in scheduled rates, was facilitated by breaking down the total rate for each commodity into its component parts; that is, the BSR, the CAF and the BAF. Where possible, rates per TEU have been used; otherwise rates are expressed as a rate per tonne or per cubic metre.[8] Sufficient data were not available to enable BAFs and CAFs to be isolated from the total freight rate prior to September 1977 for the Australia/Europe and North Mediterranean trade. For the purpose of calculating the BSR, it was assumed that no incorporations of the CAF or BAF occurred prior to this date.

Figures 8.3 to 8.10 present the trends from 1973 to 1985 in conference scheduled rates for the five trades examined. Except for the Australia to Europe and North Mediterranean wool trade, the graphs are based on information obtained from the Australian Shippers' Council and conference operators. For the Australia to Europe and North Mediterranean wool trade (Figure 8.4), the graph is based on information obtained from the Australian Wool Corporation.

These graphs illustrate trends, in real terms, in total rates, the BSR and CAF and, where applicable, the BAF. For two trades, Australia to New Zealand and West India, only the trend in the rate for one commodity is presented. For the remaining three trades, Australia to Europe and North Mediterranean, Japan and East Coast North America, trends in rates for two commodities are presented, one to illustrate the trend for either wool or boneless beef the other for some other commodity. The difference in the trends for each trade arises because rate negotiations for wool and boneless beef are conducted separately from those for other commodities.

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8. For an explanation of the derivation of the breakdown of the total scheduled rate into component parts, as well as tables giving the nominal rates by commodity and trade underlying the analysis in this section, refer to Appendix IX.

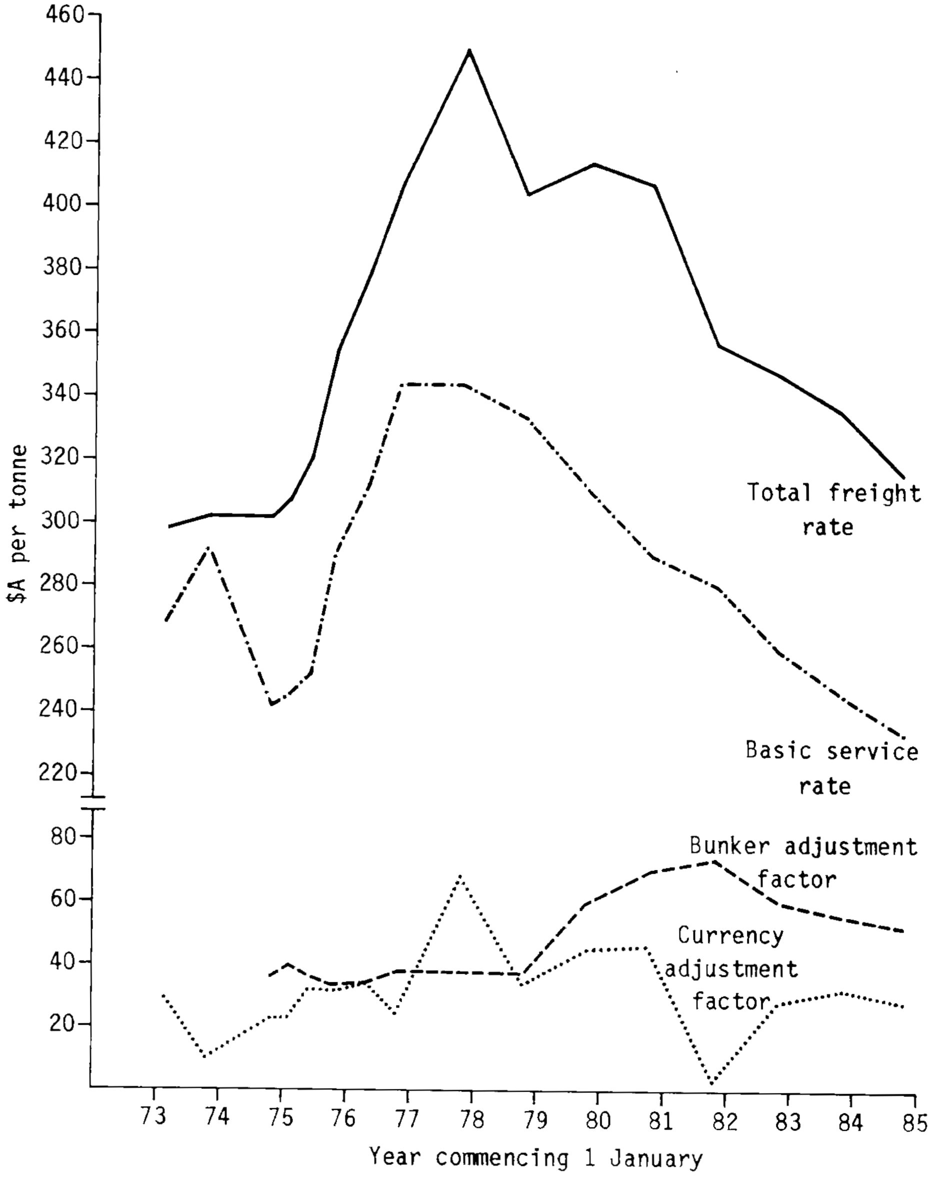
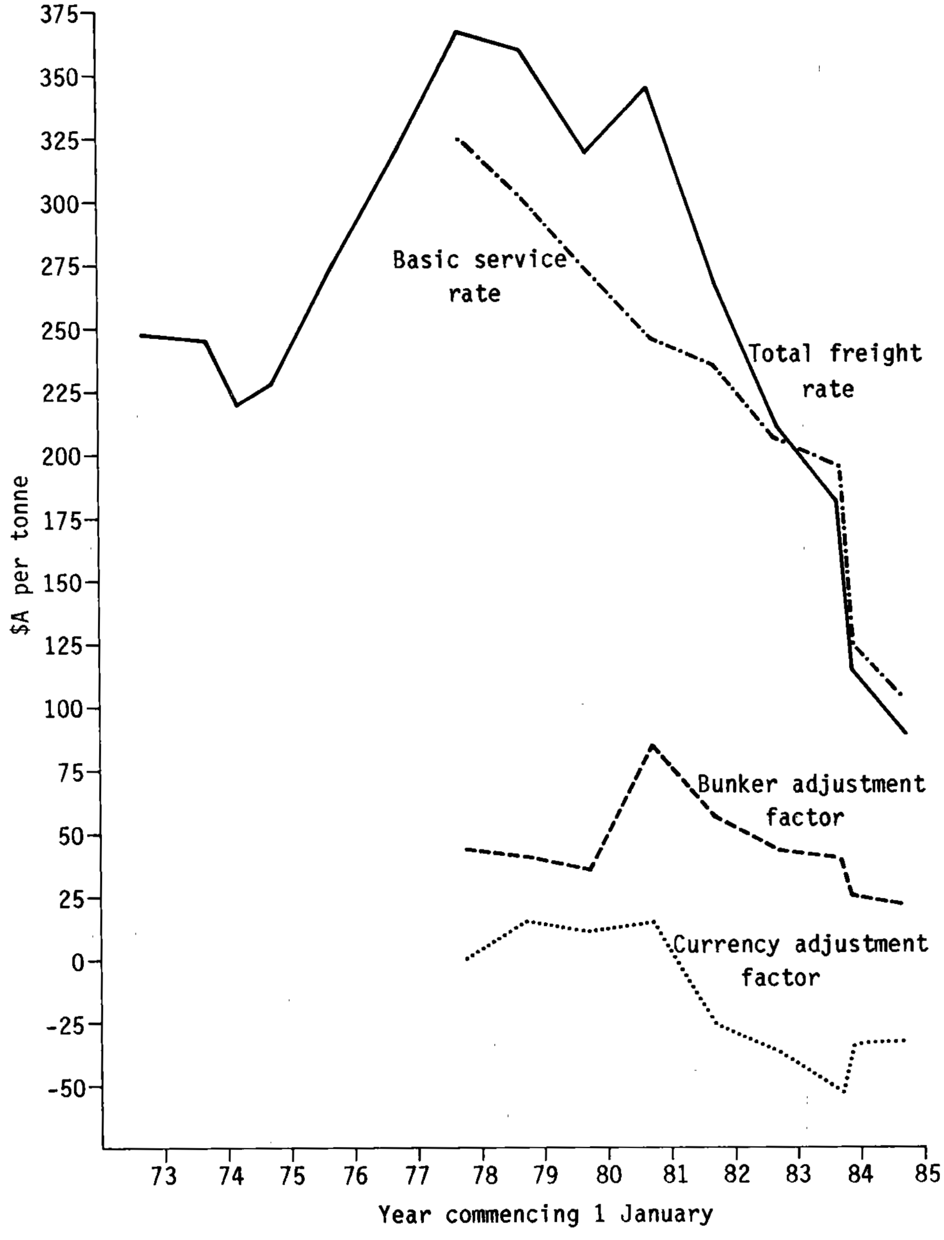


Figure 8.3 Trends in conference scheduled rates: hides, skins and pelts, Australia to Europe and North Mediterranean trade, 1973-85 (1984 prices)



Notes 1. Basic service rate prior to 1.9.82 includes on-shore charges.
2. The box rates which have applied since 1.9.82 have been converted to a rate per tonne on the assumption that each TEU carries 16 tonnes.

Figure 8.4 Trends in conference scheduled rates: greasy wool, Australia to Europe and North Mediterranean trade, 1973-85 (1984 prices)

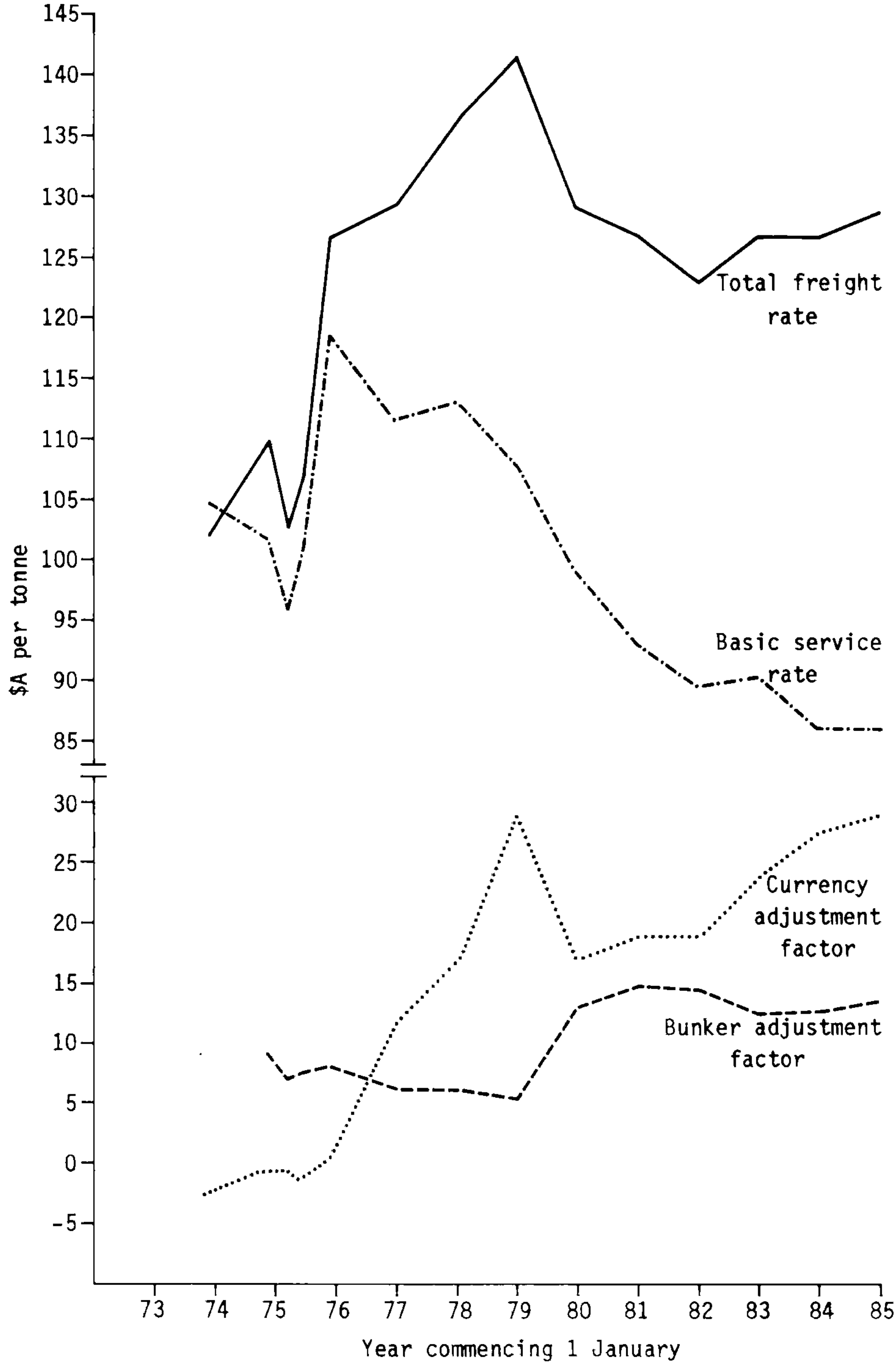
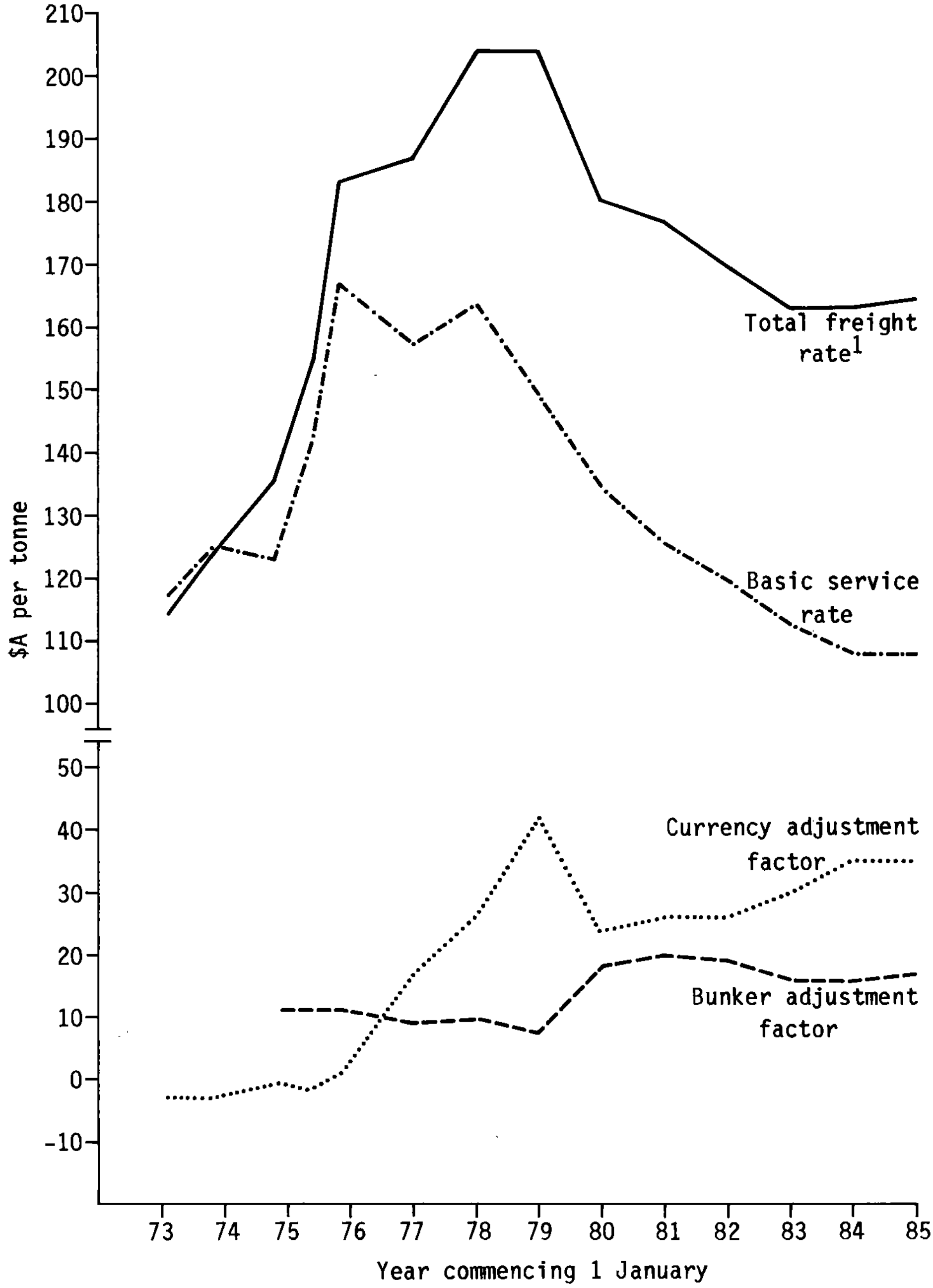


Figure 8.5 Trends in conference scheduled rates: malt, Australia to Japan trade, 1973-85 (1984 prices)



1. Total rate includes a pre-shipment fee which is not presented here.

Figure 8.6 Trends in conference scheduled rates: greasy wool, Australia to Japan trade, 1973-85 (1984 prices)

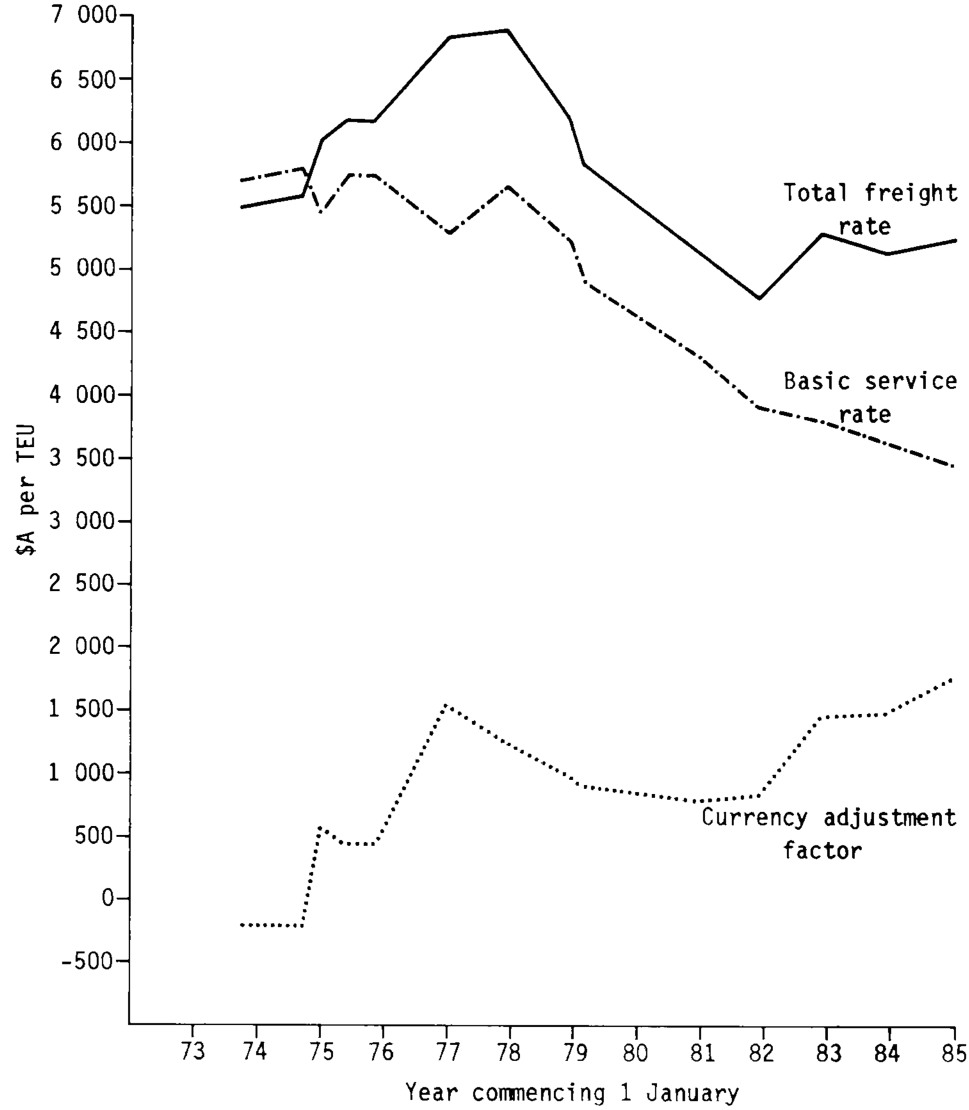


Figure 8.7 Trends in conference scheduled rates: boneless beef, Australia to East Coast North America trade, 1973-85 (1984 prices)

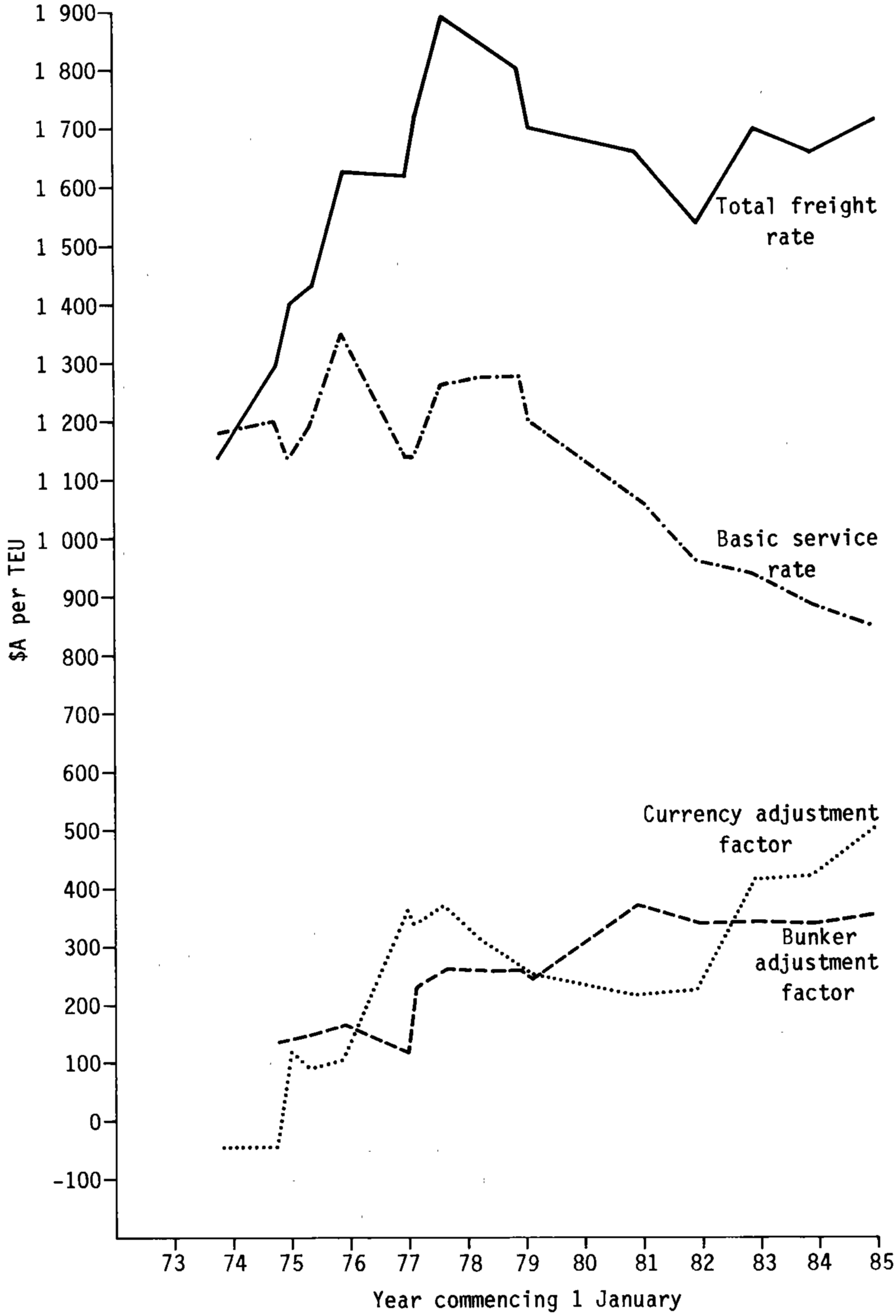


Figure 8.8 Trends in conference scheduled rates: greasy wool, Australia to East Coast North America trade, 1973-85 (1984 prices)

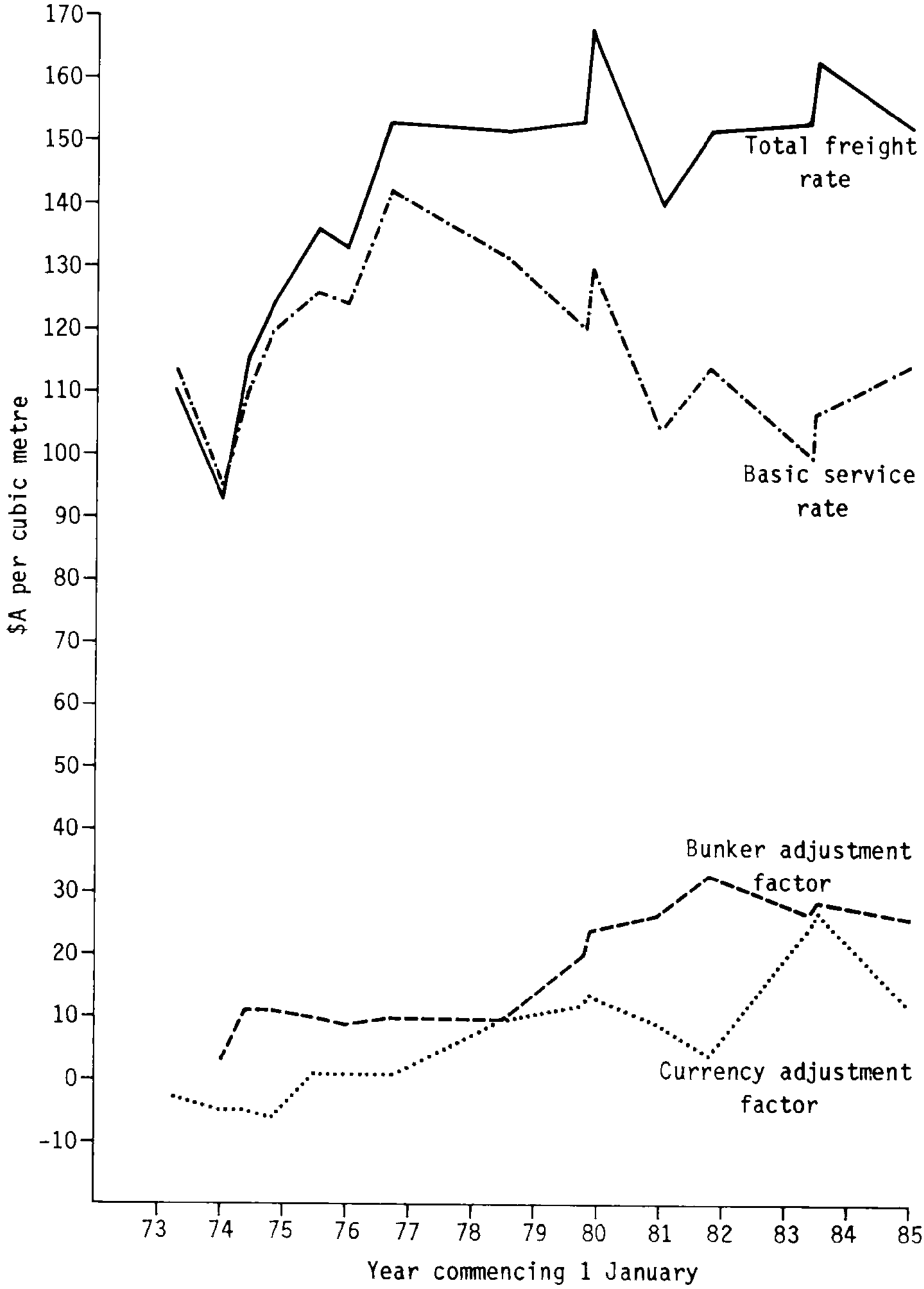


Figure 8.9 Trends in conference scheduled rates: motor vehicles, Australia to West India trade, 1973-85 (1984 prices)

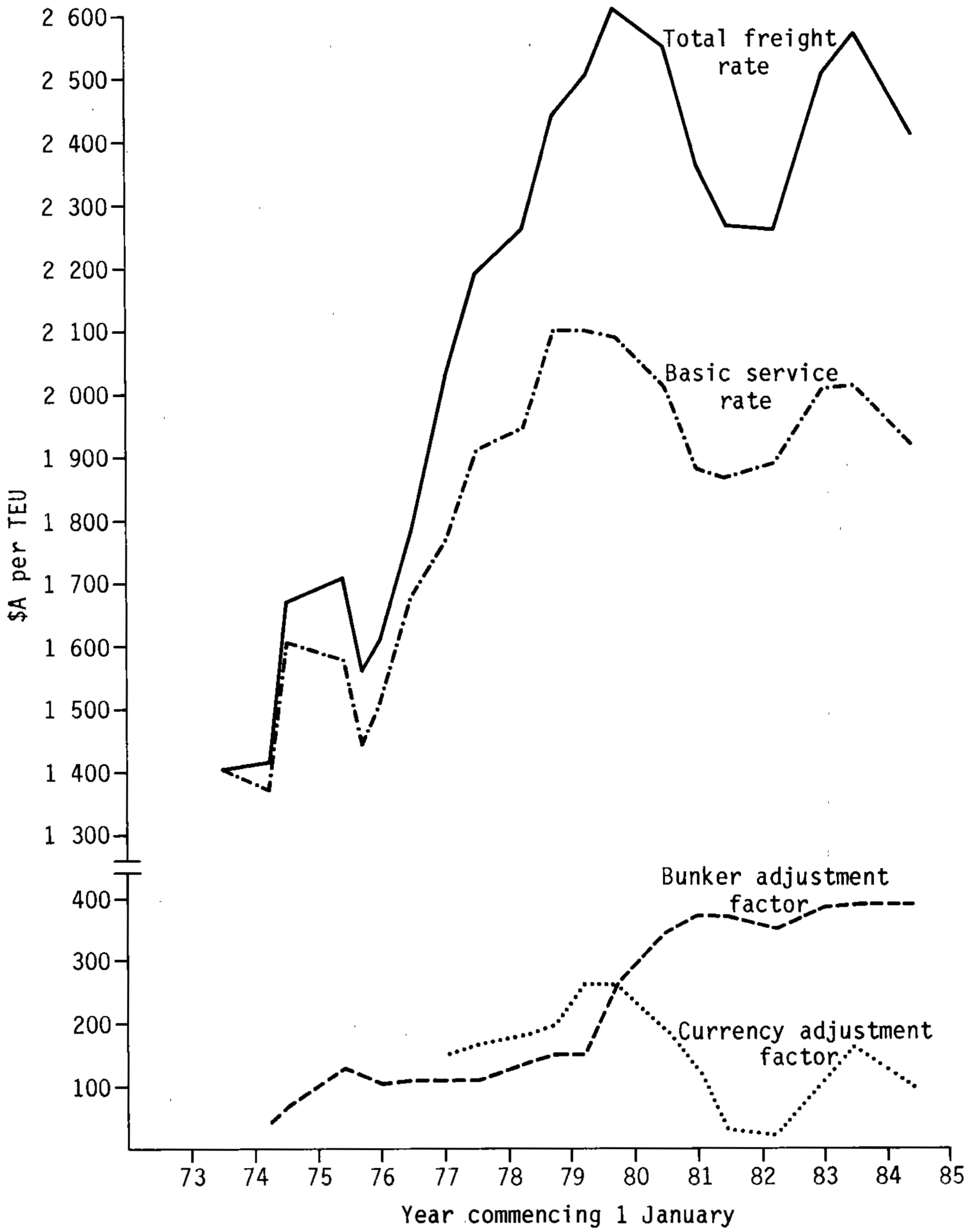


Figure 8.10 Trends in conference scheduled rates: hides, skins and pelts, Australia to New Zealand trade, 1973-85 (1984 prices)

In all trades there was a general upward trend in the real level of total rates from the early to late 1970s followed by a general decline. For trades other than the Australia to Europe and North Mediterranean trade, the decline in total rates was arrested around 1982 to 1984, when rates rose again. In the Australia to New Zealand and West India trades, rates began to decline again from 1984 and 1985 respectively.

The variations in the trends in scheduled rates between trade areas are summarised in Table 8.3. The variation in total rates for the period 1973 to 1985 ranged from minus 63.5 per cent for wool transported to Europe to plus 88.4 per cent for hides shipped to New Zealand. The corresponding annual compound growth rates ranged from minus 8 per cent to plus 6 per cent. The decrease in rates from the late 1970s to around the mid 1980s ranged from 75 per cent for wool shipped to Europe and North Mediterranean trade area to 8 per cent for hides shipped to New Zealand. The former rate declined by an average 18 per cent per annum.

The influence of the various components of outward total scheduled rates on the trend in total rates is also illustrated in the graphs. Whereas the decline in BSRs began around the mid 1970s in all trades, except the New Zealand trade, the increase in total rates continued until the late 1970's. The continuing upward trends of the outward total scheduled rates reflected the increase in CAFs from the mid to late 1970s. In the New Zealand trade the trend in total scheduled rates throughout the 1970s was coincident with the trend in BSRs, although the rate of increase in total rates was greater than the BSRs due to the upward trend in the CAFs. While there was a general decline in both the total scheduled rates and BSRs in all trades from the late 1970s the slower rate of decline in total rates reflected the rising trends in either or both the BAFs and CAFs.

There are a number of possible explanations underlying the general trend in scheduled rates. During the period of general rate increases up to the mid to late 1970s conferences faced little, if any, competition from independent operators. Furthermore, throughout the 1970s the economies achieved by some conference operators (through the introduction of new technology in the form of cellular and ro-ro vessels) were, to some extent, offset by conference operators continuing to operate higher cost conventional cargo ships. The phasing out of obsolete technology towards the end of the 1970s with the concomitant reduction in costs, as well as the advent of competition from non-conference operators from about this time, are probably the main reasons for the general decline in rates from the late 1970s onwards.

Information is not available to the BTE to provide a detailed explanation of relatively minor fluctuations in trends in scheduled rates. However, a comparison was made between the trend in rates and the trends in the quantity and the total value of each commodity exported to assess the possible effects of underlying market conditions on freight rates. The trends in the quantity and the total value of exports were similar for each commodity and thus, for simplicity, reference is made below only to the relationship between the trends in rates and the value of the commodities.

In general, there was a tendency for freight rates to move in line with the value of exports for at least part of the time, although on the Australia to Europe and North Mediterranean and to East Coast North America trades there was a time lag of approximately one year. In general, this relationship between rates and values was evident from around the late 1970s and early 1980s onwards (in the Europe and North Mediterranean trade the pattern for general cargo developed around the mid-1970s). Thus the underlying market for commodities appears to have exerted some influence on liner scheduled freight rates in most trades, particularly in more recent times.

INCIDENCE OF TRANSPORT COSTS

The distribution of transport costs between commodity suppliers, the ultimate consumers and the providers of transport services, which has important national welfare implications, is often referred to as the incidence of transport costs and is discussed in this section. The degree to which transport costs are borne by suppliers and consumers theoretically depends on the relationship between the own price elasticity of demand and supply for the commodities being traded. If the elasticity of supply is low relative to the elasticity of demand, then in international trade exporters bear the larger proportion of the costs of transport. Conversely, if the elasticity of demand is low relative to the elasticity of supply, importers will bear the greater burden of a freight tariff. The analysis of the incidence of transport costs borne by Australian importers and exporters is presented in Appendix IX.

Despite the inadequacies surrounding the elasticity estimates underlying the analysis of the incidence of transport costs, the results indicate that, in general, the major burden of the costs of transporting Australia's international trade by liner shipping services is borne by Australian residents. For imports, the incidence ranges from 50 per cent to 80 per cent and for exports the range extends from 47 to 71 per cent.

It follows that the benefits from the significant reduction in liner shipping rates in most trades since the late 1970s should have accrued mainly to Australian residents.

ECONOMIC AND COMMERCIAL ASPECTS OF THE OBSERVED RATE STRUCTURE

In this section the economic basis and implications of liner shipping rating practices are examined. The influence of market power on rate setting is discussed to provide insight into the effect on rates. These insights and implications are used in Chapter 9 to assess the current degree of conference/non-conference competition.

Rating strategy

A common feature of the majority of commercial enterprises is that as a result of their production process they produce more than one product or service. Liner shipping operations also display this feature. For instance, the provision of services from Australia to Europe gives rise to marketable services in the opposite direction, even though it may be by an indirect route. Furthermore, on either leg of a round voyage, liner shipping operations include a range of services, for example, refrigerated and non-refrigerated services.

Where a firm produces differentiated products and intends to market more than one of the outputs it is convenient to classify the total costs of production into avoidable and non-avoidable costs.[9] The reason for this is that the avoidable costs are those which can be directly attributable to each output, while the remaining costs, the non-avoidable costs, are common to all outputs.

From the viewpoint of price determination, the avoidable cost of each product or service sets the lower limit to price. Clearly if prices are set below the avoidable costs of production then the firm would incur losses, as the increase in the total costs from the production of the additional output would be greater than the increase in total

9. Avoidable costs are those costs of production which would not be incurred if a given output were not produced. These cost categories are also often referred to as separable and non-separable costs respectively.

revenue from the sale. The comparison of conference minimum rates to estimated avoidable costs presented in Table 8.2 is based on this aspect of price setting. The common cost component of production is usually recovered by setting the price for ech product according to managerial assessment of what the market will bear.

Economic theory suggests that the long-term objective of multi-product firms is to at least equate total revenue from production to total costs. Structuring price on the principle of charging what the market will bear affords the opportunity to maximise revenue contributions from each product or service to the common costs of production. Thus, in the short term, the 'economic' price of the output is determined by demand subject to a lower limit set by the avoidable costs associated with each output or service. Rates are then both cost and market oriented in that they are related to relevant costs and to demand elasticities; in the former case to cover short-run avoidable costs and in the latter to contribute towards recouping the non-avoidable costs and making a profit.

Thus discriminatory pricing by multi-product firms is a rational economic pricing strategy. For liner shipping to achieve the benefits of scale economies in ship size for all users of the services, charging a relatively low price for the carriage of commodities with highly elastic demand for shipping services generates cargo which would not otherwise be transported.[10] In other words, setting prices below the average cost of providing the services (but subject to a lower limit set by the avoidable costs) for this class of cargo will, when capacity is available, generate traffic which contributes to the common costs of joint production.

It is erroneous to claim that discriminatory pricing, structured within the framework described above and in the absence of barriers to entry, necessarily results in higher rated cargoes subsidising lower rated cargoes. One fallacy of this claim is the failure to recognise the potential benefits to the higher rated cargo from scale economies in ship size. Excluding the lower rated cargo by setting rates too high can lead to still higher rates for the cargo with less elastic demand for the same level of services.

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10. The class of cargo referred to has a low value to weight ratio, such as iron and steel. On the other hand, for a class of cargo which has a high value to weight ratio, for example seafood delicacies, demand for shipping services is also highly elastic because of operators competition from airlines.

The economic significance of basing price on these criteria is that, in the short term, the strategy encourages a more efficient utilization of existing assets while in the longer term the strategy indicates whether replacement of assets or expansion of capacity is justified.

Influence of market power on rate levels

Under the above pricing strategy, the level of rates set by an operator for given cost and demand conditions will depend on their market power. The expected influence on rates of the balance of market power between ship operators and shippers is outlined below.

Ship operators having a high degree of market power are in a position to set relatively high rates to extract higher than normal profits. If the market power of ship operators is reduced through the presence of actual competition or a credible threat of competition for market shares, then their assessment of the level at which rates can be set will be modified. The level of rates which maintain a market share will be lower if shippers are able to bid down rates by using a, or threatening to use, alternative shipping services. In these situations cargoes, which offer consistent returns in the long-run could be expected to become more attractive to ship operators attempting to retain a market share.

Where a particular commodity shipper or group has significant market power compared to other shippers, the rates for the commodity may be forced down below average costs toward avoidable costs. The cargo will be carried provided that total average revenue at least equals long-run average costs (with avoidable costs setting the lower limit to individual rates).

Where there is intense competition for market shares ship operators will be unable to earn super-normal profits through rate discrimination. Average rates can be expected to fall towards long run average costs. In the short-run, they may even fall below long run average cost, however, ship operators will not be able to continue to offer services at these rate levels.

CHAPTER 9 COMPETITION IN AUSTRALIAN LINER TRADES

This chapter examines the extent of competition among shipping operators in some of the Australian liner trades and evaluates the consequences for the level and structure of freight rates. The trades studied were selected with the purpose of identifying factors which are responsible for different competitive environments.

Some of the institutional and structural features and commercial arrangements of the liner shipping industry in the selected trades which are likely to affect the degree of competition are identified in the early part of the chapter. These features include the type of conference operating in the trade and the extent of non-conference competition. Information about the intensity of competition in the various trades as perceived by shippers is also presented.

The implications of competition for the level of scheduled rates are assessed using 'synthesised' revenue/cost ratios for the selected trades. These ratios are designed to illustrate differences in the levels of rates which may be attributable to differences in the competitive environment.

As discussed in Chapter 8, scheduled rates vary considerably in a given trade. The distribution of rates in a trade is the result of a complex interplay between the competitive environment among the shipping operators and the market power of shippers. Although a comprehensive discussion of these issues is not attempted, some of the consequences of shipper power in various competitive environments are highlighted.

Competition may have an impact on service levels as well as rates. If increased competition from non-conference operators reduces the level of rates and the quality of service, the question of assessing the relative significance of these effects becomes important. The chapter concludes with a consideration of these issues.

INDUSTRY STRUCTURE AND COMPETITION

Competition in the liner trades is likely to occur where a number of operators are providing similar services and are acting independently of one another in their efforts to attract business and earn profits. In these circumstances, rates are likely to be kept at levels just sufficient to encourage operators to remain in the trade.

It might be expected that the greater the number of operators in a trade, the greater the probability of a competitive environment. However, as discussed in Chapter 3, it is very common in the liner trades for shipping operators to group themselves into organisations such as joint ventures, consortia and conferences in order to co-ordinate their service schedules, rationalize capacity, agree on rate schedules and co-operate in various other ways such as revenue and cost pooling arrangements. As a result of this kind of co-operation, opportunities for independent action by operators are reduced and competition is restricted.

Table 9.1 gives the numbers of conference operators in each of the selected outward trades in 1983-84. Although the numbers were quite large for some of the trades, the table indicates that most of the operators were involved in consortia or joint operation agreements. Furthermore, co-operative agreements generally extended in varying degrees to all the operators within each conference. The conference serving the East Coast of North America differed from the others in that membership was open to any line wishing to belong and there were, until recently, US Government restrictions on pooling arrangements, slot sharing and co-ordination of capacities among the operators.

In its effect on competitive pressures, the most important feature of all the conferences (including the North American conference) was the agreement to charge the same cargo rates for the same commodities.[1] This agreement generally removes the pressure on members to compete with each other for cargo by charging a lower rate.

Most of the competitive pressures in a trade must come from the non-conference operators because of the severe limits on competition within the conferences. Table 9.1 also shows the number of non-conference operators and their share of the task value for each of the selected trades. This information indicates that the Australia to

1. North American conference agreements cannot rule out the possibility for independent action of rates.

TABLE 9.1 STRUCTURE OF SELECTED OUTWARD TRADES, 1983-84

Selected trade area[a]	*Number of different operators in conferences*[b]	*Number of consortia/ joint operations*	*Number of operators involved in consortia/ joint operations*	*Number of non-conference operators*[b]	*Non-conference share of task value (per cent)*
Europe and North Mediterranean	10	2	7	7	22
Japan	10	3	7	3	6
Each Coast North America	4	1	2	2	14
West India	2	1	2	2	4
New Zealand	2	1	2	3	64

a. Selected trade areas are defined in Appendix I.
b. Includes operators making more than two trips for which the relevant trade route accounted for 75 per cent or more of Australian cargo carried by that ship; excludes operators providing a transhipment service to the trade area.

Source Prepared by BTE.

Europe and North Mediterranean trade was more competitive than the Australia to East Coast North America and Japan trades. The small non-conference share (by value) of the Japan trade suggests that this trade was the least competitive of these three major trades. This conclusion is reinforced by the existence of 'accords' or agreements between the conference and the non-conference operators in the Australia/Japan trade. These accords, restored stability to the associated East Asia trade, restricted the non-conference rate for a commodity to within 10 per cent of the conference scheduled rate, and also restricted the quantity of cargo which could be carried by the non-conference operators.

The Australia to West India trade appears to have the least competition with non-conference services accounting for only 4 per cent of the task. However, because of the proximity of West India to other trade routes, there may be competition from transhipment services.

The largest operator in the Australia to New Zealand trade was a non-conference line. The conference service commenced in April 1983 and competition in the trade should have increased as a result.[2] The potential for competition from foreign operators in this trade is limited by industrial agreements requiring that ships must be operated by Australian or New Zealand crews.

The industry structures of the inward trades appear to be similar to those of outward trades, in terms of numbers of non-conference operators and shares of the task.

SHIPPER PERCEPTION OF COMPETITION

During the course of this study, BTE officers visited a large number of organisations involved in the liner shipping industry. The information obtained during interviews with industry personnel provided some useful insights into shipper perception of competition during 1983-84.

Rates were generally established by negotiation between shipper representatives and conferences or non-conference operators, and applied for a period of several years. The rate contracts frequently included an escalation clause and a loyalty requirement. In the

2. The conference (in the general sense of an agreement on rates among operators) comprises the ANL and the Shipping Corporation of New Zealand.

negotiations, shippers attempted to exploit competitive pressures in order to extract low rates from the operators. At the same time the shippers also required a high quality service. Once agreement is reached, the competitive pressures tended to subside until the next round of negotiations.

As discussed in Chapter 4, the bargaining power of the shippers of a commodity depends on the importance of the commodity in the total trade task and the seasonality and predictability characteristics of its cargo offerings, as well as the availability of competitive shipping operators or competitive sources of supply of the commodity to the same destination. Shippers' perceptions of competition in a particular trade therefore tended to vary somewhat among the commodity groups. Nevertheless, a generally consistent conclusion regarding the comparative strengths of the competitive pressures in the trades was apparent.

In the Australia to Europe/North Mediterranean trade, shippers of wool, meat, hides, dairy products, fruit, manufactured items and metals and minerals emphasised that the impact of non-conference competition had become very significant in recent years. This is reflected in the decline in rates, reported in Chapter 8, which had occurred in this trade since 1980. An increase in the confidence of shippers in the quality and stability of service provided by non-conference operators such as Polish Ocean Lines had been a contributing factor in this development.

Cotton was an example of a commodity where the competition had come from other trades rather than non-conference operators in the same trade. Low conference rates for the shipment of Australian cotton to Europe had been established to meet competition from United States and Middle East producers.

In the Australia to East Coast North America trade, there was competition within the conference in terms of service quality, as a consequence of the restrictions on the co-ordination of capacity. The ABC Containerline and transhipment from West Coast North America services provided some price competition for the conference. Wool shippers regarded the trade as very competitive. In the case of meat, which accounted for half of the outwards trade by value, shipping operators (including ABC Containerline) were designated as meat carriers by the AMLC and common rates were established following joint discussions between shippers and operators.

Nearly all shippers contacted by the BTE regarded the Australia to

Japan trade as the least competitive of the major trades because of the effect of the 'accords' which greatly limited their bargaining power. Competition from non-conference operators was also restricted by the close links between Japanese importers (and exporters) and some of the conference operators. Japanese importers frequently purchased commodities from Australia on an FOB basis or directed Australian shippers to use a particular operator.

COMPETITION AND THE LEVEL OF RATES

Having examined the various industry factors and commercial arrangements which affect the extent of competition in selected trades, this section addresses the implications for scheduled rates. The analysis is directed towards answering the following questions:

- How much of the variation in the level of rates among the trades is attributable to differences in the competitive environment?
- What are the links between the commercial arrangements, the competitive environments and the level of rates?

Table 9.2 shows estimates of the average inward and outward conference scheduled rates per TEU for selected trades. The rates are weighted averages of the commodity rates listed in the tariff schedules at January 1985, as described in Appendix IX. Embodied in the estimates

TABLE 9.2 AVERAGE SCHEDULED CONFERENCE RATES AND COSTS FOR SELECTED TRADES, JANUARY 1985

Selected trade area[a]	*Average scheduled rate ($A per TEU)*		*Index of the ratio of estimated revenue to synthesised cost*	
	Inward	*Outward*	*Inward*	*Outward*
Europe and North Mediterranean	3 320	1 985	1.2	0.7
Japan	4 027	2 491	2.2	1.4
East Coast North America	6 371	4 743	2.0	1.5
New Zealand	2 051	2 031	1.3	1.3
West Coast India	5 016	2 705	1.5	0.7

a. Selected trade areas are defined in Appendix I.

Source Prepared by BTE.

are the assumptions used in associating data on commodity quantities with rates in the tariff schedules, and the assumptions required to translate rates per kilogram and rates per cubic metre into rates per TEU. No allowance has been made for 'hidden' rebates. Freight forwarder operations would also have an impact on the actual rates paid by shippers.

A major source of variation in rates from one trade to another is the difference in cost due to differences in distance, typical ship size and type, price of fuel, numbers of ports of call, and so on. The contributions of these kinds of factors to differences in rates was investigated using a cost model (described in Appendix VI). This model provided 'synthesised' measures of average shipping costs per TEU for each of the selected trades. The costs were 'synthesised' in the sense that they were based on typical ships operated over simplified itineraries for the various trades at specified levels of capacity utilization, with crew costs based on Australian manning standards and pay scales. The differences in assessed costs between trades are due primarily to differences in geographical characteristics of the trade flows, and are not responsive to differences in the competitive environment or in commercial arrangements established in the trades. It was not possible to indicate differences in centralization costs between the trades because of measurement difficulties.

An index of the ratio of estimated revenue (or rate) to synthesised cost for each of the selected trades, both inward and outward, is given in Table 9.2.[3] This index indicates the extent of the variation in rates among trades which is due to factors other than those incorporated in the synthesised costs. Although differences in centralization costs probably contributed to the variation in the index, most of the variation is a reflection of the impact of competition amongst incumbents, the threat of entry, and the ability of shippers to exert their market power in the negotiation of rates. The index does not indicate the level of profitability in a trade. Although a high index for a trade may be indicative of relatively high profitability in comparison with other trades, another explanation may be that actual costs in the trade were high in relation to the

3. The ratio was calculated by dividing the average rate per TEU by the synthesised cost per TEU. The same cost per TEU was used for both the inward and outward legs, and was calculated for a capacity utilization of 80 per cent on the more utilized leg and proportionately less on the other leg (based on 1983-84 freight volumes).

synthesised costs. Either of these effects could result from the competitive conditions which exist in the trade.

For each of the selected trades, except Australia/New Zealand trade, the average scheduled conference rates and revenue/cost indices are larger for the inward trade than the outward trade.[4] It is difficult to provide an explanation of this phenomenon in terms of higher capacity utilization or less competition among shipping lines in the inward trades on the basis of the limited evidence available. One plausible explanation is that the market power exercised by Australian exporters is greater than that exercised by overseas shippers to Australia. On most trades, Australian shippers were dominated by large commodity groups with considerable negotiating power (Chapter 4). Australian import commodities, on the other hand, were more diverse and the shippers may be less able to co-ordinate their negotiating efforts (freight forwarders serving inward shippers may, however, have considerable market power but the rates they receive are not reflected in the scheduled rates). Furthermore, imports tended to be high valued commodities with their demand less affected by high rates. The Australia to New Zealand trade differed from the other trades in these respects and there is less reason to expect differences in the market power of shippers between the inward and outward trades.

It was noted above that the Australia/Europe and North Mediterranean trade was much more competitive than the Australia/Japan trade. This is borne out in Table 9.2 which shows the revenue/cost indices for the Australia/Europe and North Mediterranean to be 40 to 50 per cent below the indices for the Australia/Japan trade (both inward and outward). The government-owned Polish Ocean Lines (POL) was the largest non-conference operator in the trade, and the competition provided by POL appears to be an important factor in reducing rates in the Australia/Europe and North Mediterranean trade.

The indices for the Australia/East Coast North America trades are high, suggesting that price competition was not very effective in either the inward or outward trades. The outward trade was dominated by the reefer commodity meat and had a higher index than the other

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4. It is possible that the assumptions employed in deriving the estimates of average scheduled rates (see Appendix IX) may have slightly biased inward rates upward in comparison with outward rates.

outward trades examined.[5] Centralization costs, which were sometimes incurred at both ends of a trade and absorbed in the rates, were not taken into account in the calculation of the revenue/cost index. Consequently, because these costs were probably greater for the outward Australia/East Coast North America trade than the other trades, its index may be overstated.

The indices for the Australia/New Zealand trade indicate that competition for market shares in this trade was more effective in reducing rates than in the Australia/Japan and East Coast North America trades, but less effective than in the Australia/Europe and North Mediterranean trade.

The Australia/West Coast India trade was smaller than the other selected trades, and served primarily by the government-owned Shipping Corporation of India using small and therefore relatively high cost ships. The low revenue/cost indices for this trade (especially outward) were affected by the high cost of providing a direct service with adequate frequency, but also may reflect the actual and potential competition from transhipment services.

The above can be summarised as follows. Low rates were achieved in the Australia/Europe and North Mediterranean trade, where the closed conference system was subjected to significant independent non-conference competition. The accords between conference and non-conference operators and other restrictions on competition resulted in high rates in the Australia/Japan trade. High rates were also experienced in the Australia/East Coast North America trade where there was an open conference system with rate agreements, and limited non-conference competition. Rates were at moderate levels in the Australia/New Zealand trade which was characterised by competition among existing operators and barriers to entry by operators with non-Australasian crews.

COMPETITION AND THE DISTRIBUTION OF RATES

In Chapter 8, it was reported that commodity rates, expressed in dollars per TEU, varied considerably within each trade. Differences in the rates for reefer commodities and dry commodities could be expected on the basis of cost considerations. In the Australia/East Coast North America trade, for example, the extra cost for reefer

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5. The extra cost of carrying reefer cargo was taken into account in the calculation of the index.

cargo could be between $1500 and $2000 per TEU, primarily because of the much higher capital cost of reefer containers.[6]

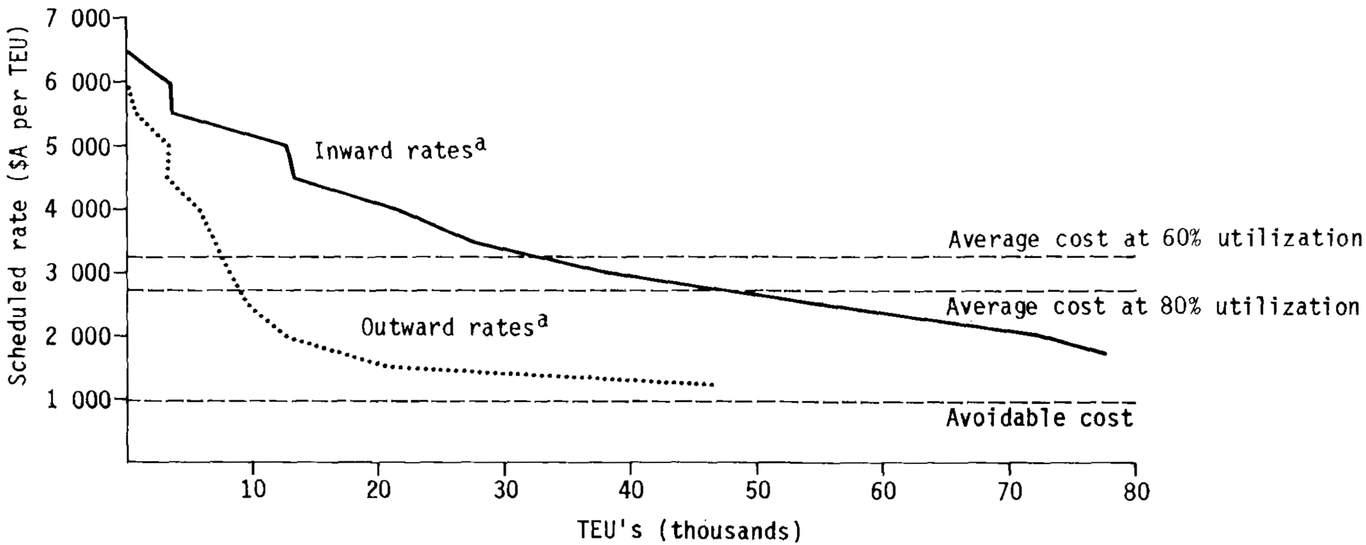
It is not possible, however, to explain the full extent of the variations in rates within the trades in terms of cost differences. This is particularly true of the inward trades, where the range in rates tended to be at least as great as the corresponding outward trade, despite the absence of reefer commodities.

Probably the more important underlying cause of variations in rates relates to the supply and demand characteristics of the commodities being shipped and the impact of these characteristics on the demand for shipping services. Shipping operators seek to exploit varying demand elasticities in order to extract the maximum revenue from each shipper. The ability of shipping operators to charge a high rate for a commodity is limited in situations where shippers can use, or threaten to use, competitors or if importers can use competing sources of supply. Shippers can further strengthen their position by co-ordinating their bargaining strategies. This is particularly effective where a shipper body, representing a group of commodity shippers, has a strong influence over the choice of operator and can negotiate rates independently with competing lines.

The range of scheduled rates in the selected trades and the pattern of freight revenue contributions made by the differentially rated commodities are illustrated in Figures 9.1 to 9.5.[7] Each point on a graph represents the freight rate of a commodity and the total quantity of commodities shipped at this rate or at a greater rate. The area under a segment of a graph represents the freight revenue contributed by commodities with rates between the segment rate levels. A graph sloping gently down to the right indicates a narrow range of rates, a steeply sloping graph a wide dispersion of rates.

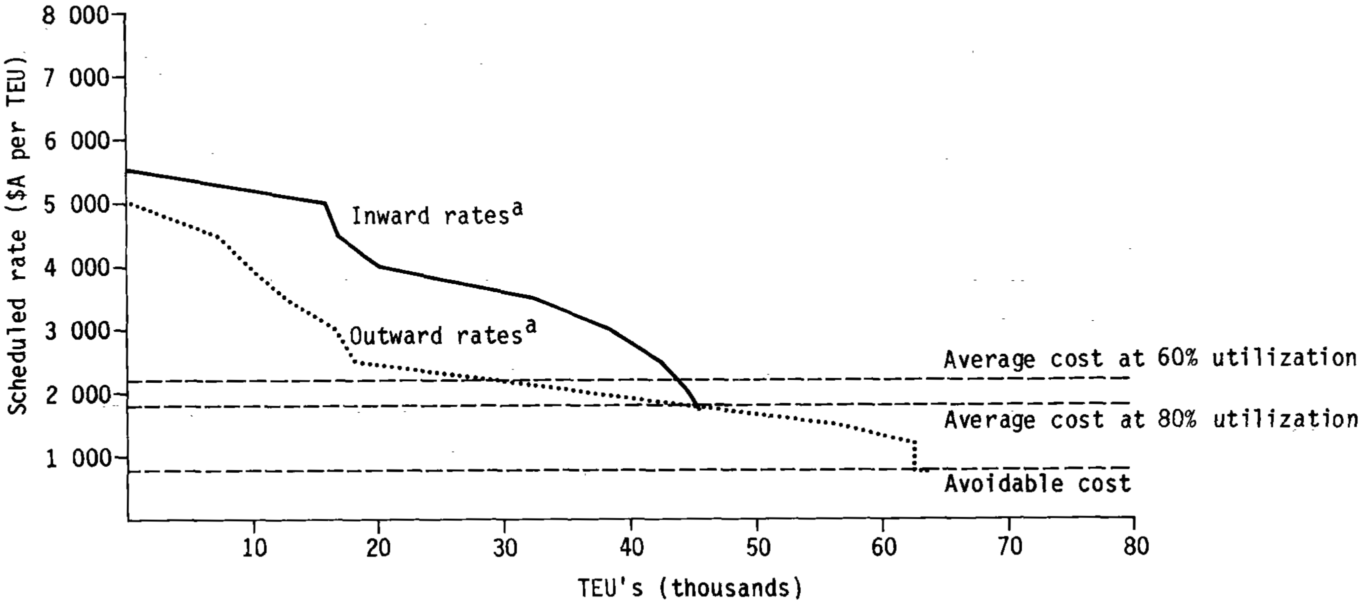
The figures also show the synthesised average costs per TEU, at 80 per cent and 60 per cent utilization, and the avoidable cost per TEU. The avoidable cost (see Chapter 8) represents a lower limit for the freight rate, since a commodity rate must be above this limit in order to make a contribution to common voyage costs.

6. There are also extra fuel costs and costs of monitoring the refrigeration. Although the reefer container can be used for dry cargo on the return trip, its capacity is less than the capacity of a dry container and it is commonly returned empty.
7. Graphs of this type have been used by Deakin and Seward (1973), Zerby and Conlon (1978), and Stubbs (n.d.).



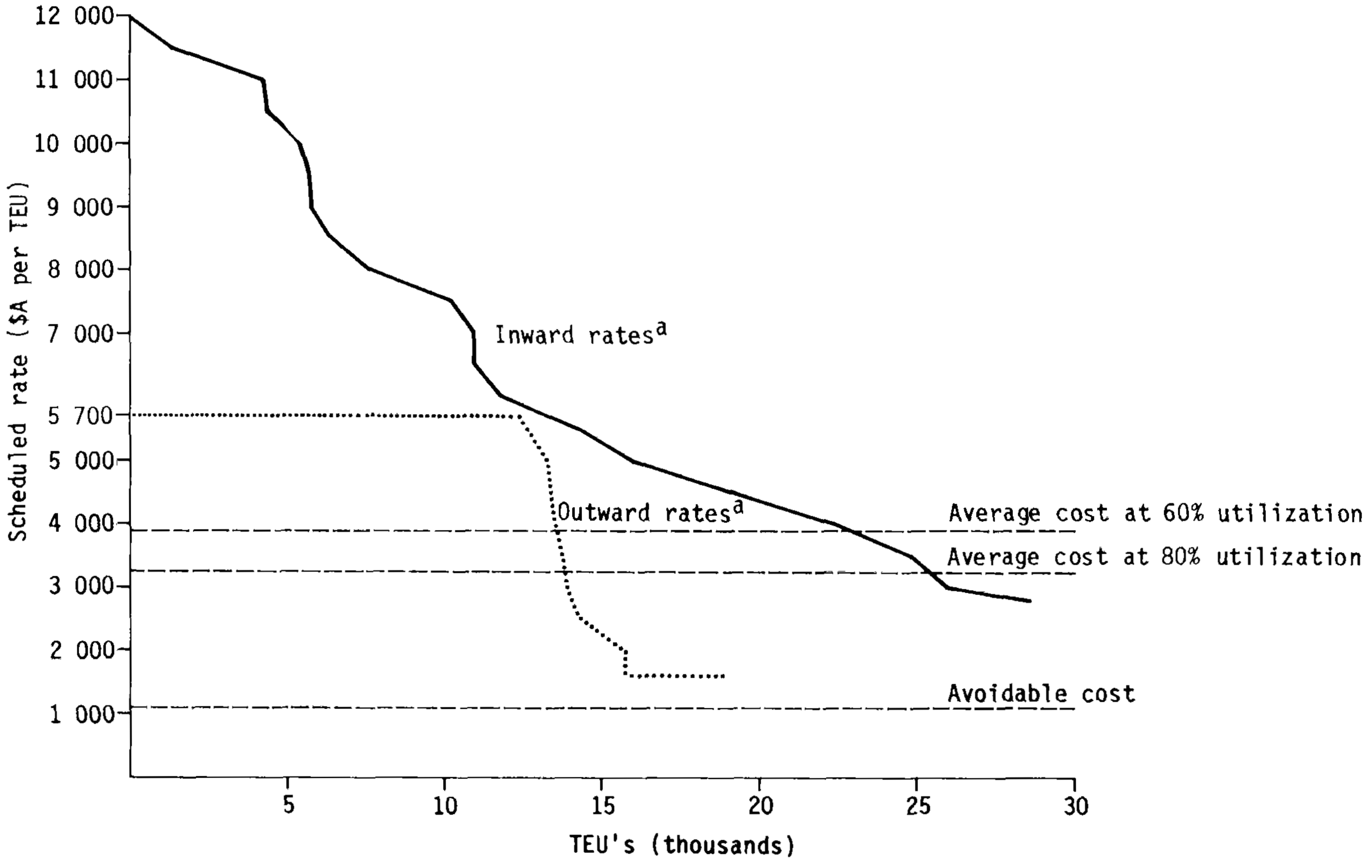
a. The graphs are cumulative distributions of conference scheduled rates. See text for a complete explanation.

Figure 9.1 Distribution of conference scheduled rates: Australia/Europe and North Mediterranean trade



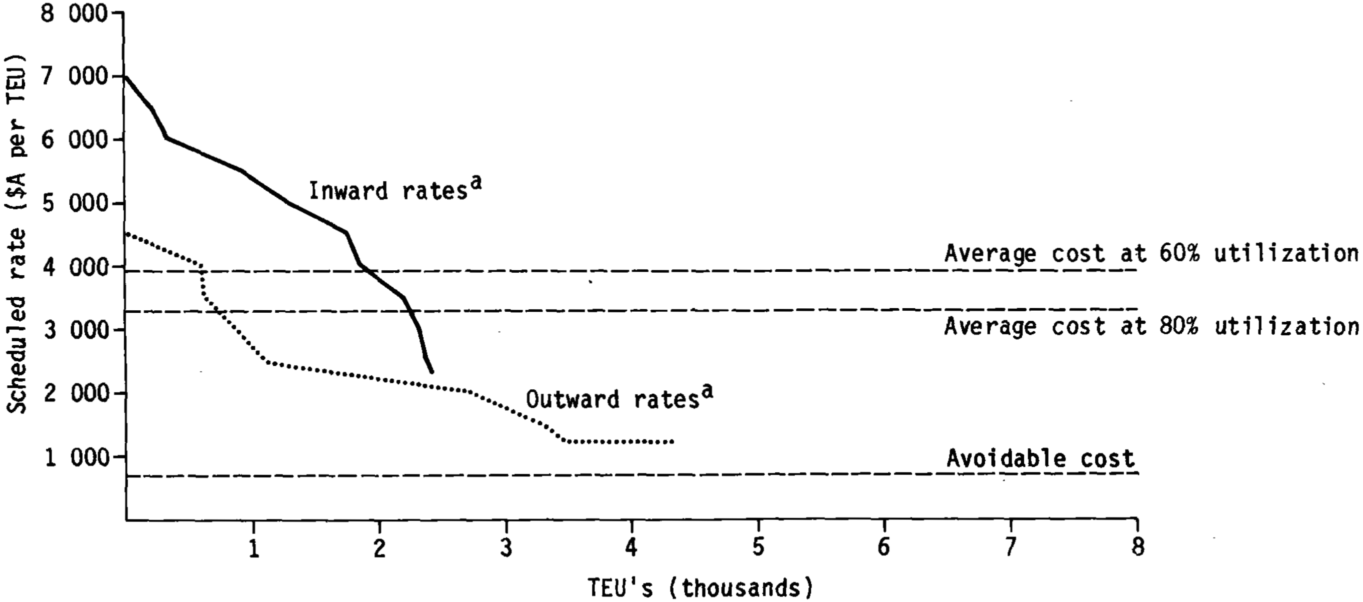
a. The graphs are cumulative distributions of conference scheduled rates. See text for a complete explanation.

Figure 9.2 Distribution of conference scheduled rates: Australia/Japan trade



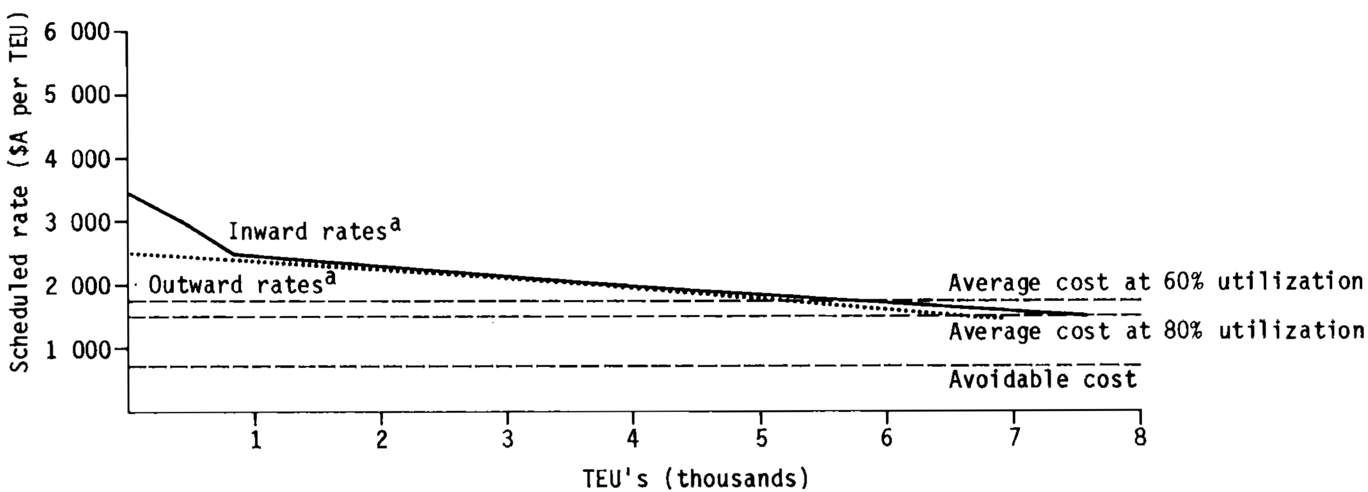
a. The graphs are cumulative distributions of conference scheduled rates. See text for a complete explanation.

Figure 9.3 Distribution of conference scheduled rates: Australia/East Coast North America trade



a. The graphs are cumulative distributions of conference scheduled rates. See text for a complete explanation.

Figure 9.4 Distribution of conference scheduled rates: Australia/ West India trade



a. The graphs are cumulative distributions of conference scheduled rates. See text for a complete explanation.

Figure 9.5 Distribution of conference scheduled rates: Australia/ New Zealand trade

The initial steep portion of the rate graph for the Australia to Europe and North Mediterranean trade includes the high rating reefer commodities. Notwithstanding the extra costs associated with reefer cargo, the level of rates suggests that the competition provided by non-conference operators for these commodities appears to be less than for dry cargo. The large relatively flat segment of the graph represents some of the important dry commodity groups, such as wool, which have managed to exploit the vigorous competition between the conference and non-conference operators for dry commodities. The rates negotiated for these commodities are very low in relation to the synthesised average costs.

In the Australia to Japan trade, the graph shows a steady decline, with a much smaller segment of the graph representing rates below the average cost measures than was the case for the Australia to Europe and North Mediterranean trade. In the case of cotton, rates in the Australian to Japan trade are close to avoidable cost because of the availability of the commodity at low prices from other countries.

The flat portions of the Australia/East Coast North America outward graph correspond to meat (the high rate) and wool (the low rate). The difference in the meat and wool rates of $4300 per TEU was greater than in the other selected trades, and much greater than the difference in the cost of shipping reefer and dry commodities (probably less than $2000). Centralization costs for meat are higher than for wool, but it is unlikely that they account for more than one-half of the remaining difference, leaving over $1000 unaccounted for by cost factors. Although meat is the major commodity of the trade, the negotiation procedures (including carrier designation) has not fully exploited the competitive possibilities to the same degree as the procedures used by wool interests. However the special characteristics of the meat trade require a high frequency service, and this has probably been a significant factor in determining this strategy of the AMLC. A factor which probably affected the competitive conditions in the Australia to East Coast North America reefer trade (and also in Australia's other reefer trades), is Australia's isolation from reefer trades elsewhere in the world. This has meant that the threat of competition from operators outside the Australian trades was less for reefer than for dry cargoes.

The distributions of rates in the Australia/New Zealand trade, inward and outward, was much narrower than in the other selected trades. The presence of freight forwarders and FAK rates have been a prominent feature of the trade since the introduction of the Union Steamship Company's ro-ro services in 1969, and well before the period of increased competition following the introduction of the joint service provided by ANL and the Shipping Corporation of New Zealand. Therefore there is no clear link between the competitive conditions in the trade and the distribution of the rates. The rates on the Australia/West India trade, the other smaller trade, show a wide dispersion similar to the larger trades.

COMPETITION AND SERVICE QUALITY

In Chapter 6 it was concluded that the non-conference operators offered shippers a service which was generally lower in quality, particularly frequency of service, than that offered by the conference operators. The difference in service quality was estimated to be equivalent to an average price difference of about 14 per cent, based on an analysis of responses from a sample of exporters. The valuations of the individual shippers were, of course dispersed around this average figure.

By providing a service which was not greatly inferior in quality to the conference service, the non-conference operators were able to attract their share of freight by offering rates which are generally believed to be about 10 per cent below the conference rates on average. Sometimes non-conference operators have focused on providing specialized services and developing new markets rather than competing directly with conferences for established markets. Overall, their presence has probably resulted in a greater range of price-service options for meeting diverse shipper requirements.

It was argued earlier that competition provided by non-conference operators has resulted in lower rates. Since market penetration by non-conference operators can have some adverse implications for service quality, an assessment of the overall impact of non-conference competition is desirable. This assessment involves a judgement about the relative significance of any reduction in the quality of service and the reduction in rates which are the likely consequences of the competition. Although such a judgement would depend on many factors related to the particular trade, it is interesting to recall that rates in the Australia/Europe and North Mediterranean trade appeared to be at least 40 per cent below rates in the less competitive Australia/Japan trade, taking into account the cost differences which would be unaffected by the competitive environment. Based on the analysis of conference and non-conference service levels in Chapter 6, rate discounts of this magnitude would outweigh the service penalty in the Australia/Europe and North Mediterranean trade which results from the current levels of non-conference penetration of the market.

CHAPTER 10 TECHNOLOGICAL AND OPERATIONAL DEVELOPMENTS AND THEIR FUTURE IMPLICATIONS

A number of technological developments have affected and will continue to affect the future structure of shipping services. In this chapter an analysis of the potential of each development is provided on the basis of its anticipated effects on shipping and associated costs.

Costs related to these developments were assessed by estimating incremental changes from the cost related to a typical ship currently in use. Although the present fleet may not be optimal for the task on a particular trade, cost changes which could arise from technological developments were assessed against the existing fleet rather than for a fleet servicing the trade under ideal (but unrealistic) conditions to facilitate comparisons with present costs.

Technological developments of ships affect both operating costs incurred by carriers and the service received by the customer. For this reason separate estimates were made of the cost to the customer of inventory investment and insurance of cargo whilst in transit. These costs have been used as a proxy for level of service in the analysis.

The consideration of level of service led to an examination of its main determinants, which are the number of ships on the trade, their size and speed. This in turn provided an insight into the cost effects of varying levels of service on a trade and the implications of fleet selection.

To assess the relative influence on costs of route length, the analysis was applied to three specific trades. The Australia/Europe and North Mediterranean, Japan and New Zealand trades were chosen as representative of long, medium and short haul routes respectively.

Analytical approach

The effects of technological changes on ship costs and operations to the year 2000 were assessed with the aid of a simulation model. This is described in more detail in Appendix VI. The model synthesised average times at sea and in port, fuel usage and other voyage characteristics for a typical ship in the fleet deployed on a particular trade. Inputs to the model included details of the freight task, the ships, the ports and the route, and estimates of container utilization and loading rates.

Costs to the ship operator (carrier) were calculated using the synthesised voyage data and using unit cost inputs for fuel, supplies, crew, wharfage, loading, agency fees and other operating costs and charges. The annual costs of the capital invested in ships and containers were also determined.

The model also included the calculation of the cost of insurance by the customer, and of the implied inventory cost to the customer, consequent on the transit time of the goods at and between ports and also time between shipments.

Sensitivity analyses were conducted with alternative values of interest rate, analysis period, ship life, container utilization, fuel and ship cost and exchange rate. Details of the model and of the input data are given in Appendix VI, which also includes a description of the typical ship for each trade against which the effect of each technological change was assessed.

Costs were adjusted to 1984-85 prices. Conversions to $A were based on exchange rates prevailing in the relevant year (and month where available) for historical data and at January 1985 for costs over the period to the year 2000 (Reserve Bank, 1985a). Since January 1985, $A exchange rates have varied substantially and the effect of such variation on costs was examined to identify the components most affected and to indicate the sensitivity of costs to exchange rates.

Outline of the chapter

The developments discussed in the chapter are:

- Ship and service developments
  - ship propulsion system including engine, ship speed, hull and propeller and the use of windpower;
  - fuel type;
  - crew size and automated controls;
  - container dimension and weight limitations;
  - loading system; and
  - ship type.

- Service characteristics
  - ship route and trade arrangement; and
  - ship capacity, number of ships and service frequency.

Each development is examined separately, followed by an examination of combined effects of technological developments. Further detail on the technological developments considered below and their related cost characteristics is provided in Appendix X.

SHIP AND SERVICE DEVELOPMENTS

Propulsion system

The principal objective of propulsion improvements is the reduction in fuel consumption, since fuel costs represent approximately 20 per cent of shipping costs. The efficiency of propulsion depends on the efficiency of the power source, the transmission system, the propeller, and the ship's hull resistance.

Propulsion system developments are discussed under the following headings:

- fitting of new generation diesel technology
- reduction in operating speed
- underwater hull design
- propeller design
- wind assistance.

Fitting of new generation diesel technology

The design of diesel engines has advanced dramatically over the past 10 to 15 years. In *Motor Ship* (1984a) it was shown that there nad been approximately 12.5 per cent improvement in diesel engine efficiency between 1972 and 1984 and a similar improvement was predicted in the next five years. Although improvements have also been made in other engines (such as steam turbines), the economies of low speed diesel engines (using lower grade fuels) are superior to turbines and conventional diesels. With direct drive systems and low engine speeds the scope for lower (and generally more efficient) propeller speeds is increased.

Taking factors such as the age of ships operating in particular trades into account, the analysis outlined in Appendix X suggests that generally, replacement of the ship is a better investment than conversion to diesel engine propulsion. The available evidence also indicates that other engine improvements result in little or no savings.

Reduction in operating speed
Fuel savings achieved by reducing ships operating speeds have been found to be economically viable in many circumstances despite the increase in voyage time and the loss of engine and propellor efficiency in some cases. *Motor Ship* (1982b) reported that a fuel saving of 24.4 per cent was obtainable by reducing speed by 15 per cent.

The effect of varying ship operating speed, and hence frequency of service, fuel consumption and other voyage characteristics, should desirably be assessed for each individual ship. The cost effects of varying speed are sensitive to ship type, age, size, route length and engine type. The analysis presented in Appendix X shows that for the Australia/Europe and North Mediterranean trade existing speeds are close to the optimum, taking account of both carrier and customer costs. Reduction in operating speed would effect savings in carrier costs but increase customer costs. For the Australia/Japan and New Zealand trades a reduction in the combined carrier and customer costs of up to 3 per cent could be achieved by a speed reduction from the current 19 knots to approximately 15 knots.

Underwater hull design
Changes in hull design include all variations to the shape of the submerged hull and external fixed underwater attachments other than the propeller. The principal purpose of changes to hull design are to reduce water resistance and hence the required power for propulsion.

The nature of some of the changes which can be made to ships hulls are detailed in Appendix X.

Appendix X indicates that small savings of perhaps 1 per cent of carrier costs are attributable to the use of self polishing protective coatings. Even smaller savings in carrier costs of less than 1 per cent can be achieved with improvements to hull design. Improvements in hull design were found to have a recoupment period of four to ten voyages.

Propeller design
Propeller design includes the propellers and any attachments to the hull which surround the propeller (such as nozzles or ducts) or which are located behind the propeller (such as vane wheels). The

innovations are either alternatives or are inter-related, so that the savings attributed to any one modification may preclude the possibility of any savings from other modifications.

Many devices are currently being marketed and some of the more publicised designs are discussed in Appendix X. Most of these devices are claimed to be suitable for retro-fitting depending on propeller clearance from the hull.

Appendix X shows that savings to operators of up to 1 per cent can be obtained by propeller related improvements. However retro-fitting of such improvements may not be economically viable for ships with a remaining service life of less than three years.

Wind assistance

Sails have been used for some years to provide supplementary power for certain smaller diesel engine tankers. Modern shaped sail technology is however being introduced currently in larger ships of over 30 000 DWT. The cost of the sail system has been reported to increase the capital cost of the ship by 10 per cent, with fuel savings of between 13 and 18 per cent where consistent winds are available (Prescott 1983). Savings of up to 40 per cent have been claimed in *Motor Ship* (1984h). Because of the frequency of heavier winds, the use of sails is particularly appropriate for regions such as the north and south Atlantic and north and south Pacific areas ('roaring forties'). In designing sail ships, port height limitations and ship stability, need to be taken into consideration.

The data presented in Appendix X are based on the assumption that a fuel saving of 18 per cent can be achieved, and indicate that savings in carrier costs of nearly 2 per cent can be achieved by investment in shaped sails. However, these are not economically justifiable on ships which are older than about 10 years. Since modern sail technology is still under trial on larger bulk ships, it may be some years before sail assistance is introduced on container ships and then their route and ports of call will impose some limitations.

Fuels

Fuel options include combinations and additives of petroleum derivatives and coal. Nuclear fuel is not considered as an option for commercial shipping because of the adverse public attitude to nuclear powered ships.

The analysis has shown that savings of up to 3 per cent can be achieved by using coal-fired steam turbines given the current relative costs of coal versus diesel fuel and the extra capital cost involved. The widespread use of coal-fired turbine ships is unlikely to occur within the next 10 years, largely because of the lack of coal bunkering facilities. Small savings can be achieved by using emulsions, because the capital investment is small and can be recouped in less than two voyages.

Crew size and automated controls

With the increasing availability of computer controlled systems, pressure for a reduction in crew sizes by the incorporation of more labour saving equipment has been increasing in recent years.

Crew sizes, based on overseas practices, could be generally reduced in existing ships to approximately 24 without the installation of additional automated equipment. To operate with smaller crews, the installation of automated systems would be required. These automated systems are expected to increase the cost of shipbuilding by approximately 10 per cent (Scott 1984). Crew size can be reduced to as low as 12 or 13 with systems currently being introduced. West Germany and Japan are well advanced in the installation of this technology.

Crew sizes are generally greater for Australian manned ships than for ships from other countries. On newer ships (say less than five years old), Australian crew sizes are about 26 to 28 compared with crews as low as 18 for other countries. The additional capital cost of ship's accommodation facilities for each extra crew member is of the order of $100 000 according to informal advice from ANL staff. Furthermore, the cost per crew member is generally greater for Australian crews because of better general conditions of employment such as provisions for leave.

Appendix X presents carrier costs at various crew levels for the typical ship and for a new ship. Carrier costs could be reduced by up to 6 per cent by the reduction in crew size to 24, the greatest savings being for the Australia/Europe trade. The savings achieved by crew reduction would not justify the replacement of the typical ship with a new ship unless crew size was reduced to 24 or less on all three trades. Although not shown in Appendix X calculations suggest the use of a European crew on the Australia/Europe trade would result in a small saving perhaps of the order of 1 per cent lower than that attainable with an Australian crew. While the use of an Asian crew is estimated to give savings of around 5 per cent. The savings would be somewhat less on the Australia/Japan and New Zealand trades. However the assessments are very dependent on the respective currency exchange rates of the Australian currency in terms of the European and Asian currencies.

Within five to ten years it could be expected that the ships operated with crew levels approaching 12 will not be uncommon.

Containers

The following changes to containers are considered:

- dimensions
- weight limitations.

Technical considerations associated with these factors are discussed in more detail in Appendix X. However, no detailed cost implications are drawn from these changes.

Loading systems

During terminal operations most containers are moved by crane, straddle carrier, fork lift or trailer. Loading rates can be increased by improvement of loading equipment (generally through increased investment by the terminal operator), improvement in the productivity of the loading equipment, or by moving larger unit loads (or containers). There are various capital intensive systems for storage and retrieval of containers, designed to maximise terminal capacity and ship loading/unloading rates. Such systems embrace automated components and employ various types of overhead and surface facilities designed to suit the size and other characteristics of individual terminals. The costs and outputs of the systems vary and no general conclusions can be drawn about their cost effectiveness.

The following options were considered:

- the use of additional cranes or ramps for each ship
- increased capacity of cranes
- increased utilisation of cranes and ramps
- use of 40 foot containers
- improved loading of bulk and general cargo ships.

Appendix X discusses the above factors and shows the cost effects of the developments of the loading systems discussed above. By far the most cost effective development in loading systems is the use of the

40 foot container which can result in savings of between 6 and 13 per cent where full advantage can be taken of the space without exceeding the weight limit. The use of multi-container trailer loading of ro-ros could result in carrier cost savings of up to 7 per cent. If the trailer were retained on board no savings would result.

Use of an additional crane or ramp would effect a savings in carrier costs of about 1 per cent.

Ship type

The type of ship appropriate to a trade depends on the nature of the cargo and on the available loading facilities. Ships most commonly used for carrying break-bulk cargo are container ships, ro-ro, combination container ro-ro (con-ro), general cargo ships, combination general cargo - container ships and combination container-bulk ships (con-bulk). The distribution of the ship types in the liner fleet serving Australia is presented in Table 5.1, and the distribution by capacity is given in Table 5.5.

Appendix X presents the relative costs for various types of ships representative of those currently in use on Australian trades.

Container ships have the lowest cost on all three trades followed by con-bulk ships. For the Australia/Europe and North Mediterranean and Japan trades, the general cargo ship has the highest cost. Since the proportions of cargo not containerized were approximately 10, 6 and 57 per cent of revenue tonnes on the Australia/Europe and North Mediterranean, Japan and New Zealand trades respectively (DoT, 1984b), there may be scope for the replacement of some general cargo ships.

SERVICE CHARACTERISTICS

Route and trade variations

Details of the effects on costs of a number of changes to current route and trade arrangements are indicated in Appendix X.

For the Australia/Europe and North Mediterranean trade, carrier costs for the typical ship appear to be slightly higher if ships travel via the East Coast of North America through the Panama Canal to combine the two trades. However, this conclusion makes no allowance for the carriage of cargo between Europe and North America, which could be carried at a relatively small additional cost.

The operation of a feeder service to Singapore for transhipment of inward and outward cargo to connect with the round the world service from and to Europe and the North Mediterranean trade area is estimated to result in an increase in shipping costs of nearly 10 per cent and an increase of about 53 per cent in customer costs. The costs of a direct round the world service were also assessed for a synthesised route. Carrier costs for this route would be reduced by 10 per cent and customer costs would be increased by 14 per cent. In both cases the impact of the increased transit time on inventory costs is a significant element of the increase in customer costs. These results do not however necessarily demonstrate the cost implications of such a service to Australia in competition with conventional services. For example, the round the world service would tend to carry commodities of lower average value than conventional services, and the route based on the maximisation of the capacity utilization for these commodities could differ somewhat from that assumed for the present analysis.

For the Europe and North Mediterranena trade, the inclusion of an extra port of call in Australia is estimated to result in an increase in carrier costs of the order of 2 per cent on all cargo, but potential savings brought about by reducing centralization costs would offset this to some extent.

If the Australia/Japan trade were combined with the East Asian trades, the models suggest a slightly lower carrier cost for the typical ship, but with a much higher customer cost. Although not considered in the current analysis, cross trading between Japan and Korea could be engaged in at relatively little additional total carrier costs, and the carrier costs per TEU for the Australia/Japan trade could probably be reduced.

If New Zealand was served from Australia by ships on the Australia/ Europe and North Mediterranean and North American trades, it is estimated that costs would be lowered by at least 4 per cent for the New Zealand trade with lower costs per TEU for those ships and a service frequency of two to three days. Analysis also suggests a cost increase of about 4 per cent would occur by the inclusion of an additional port of call for Australia on the New Zealand trade.

Current restrictions in regard to the crewing of ships on the Australia/New Zealand trade preclude shippers from using the capacity available on foreign-crewed ships currently crossing the Tasman.

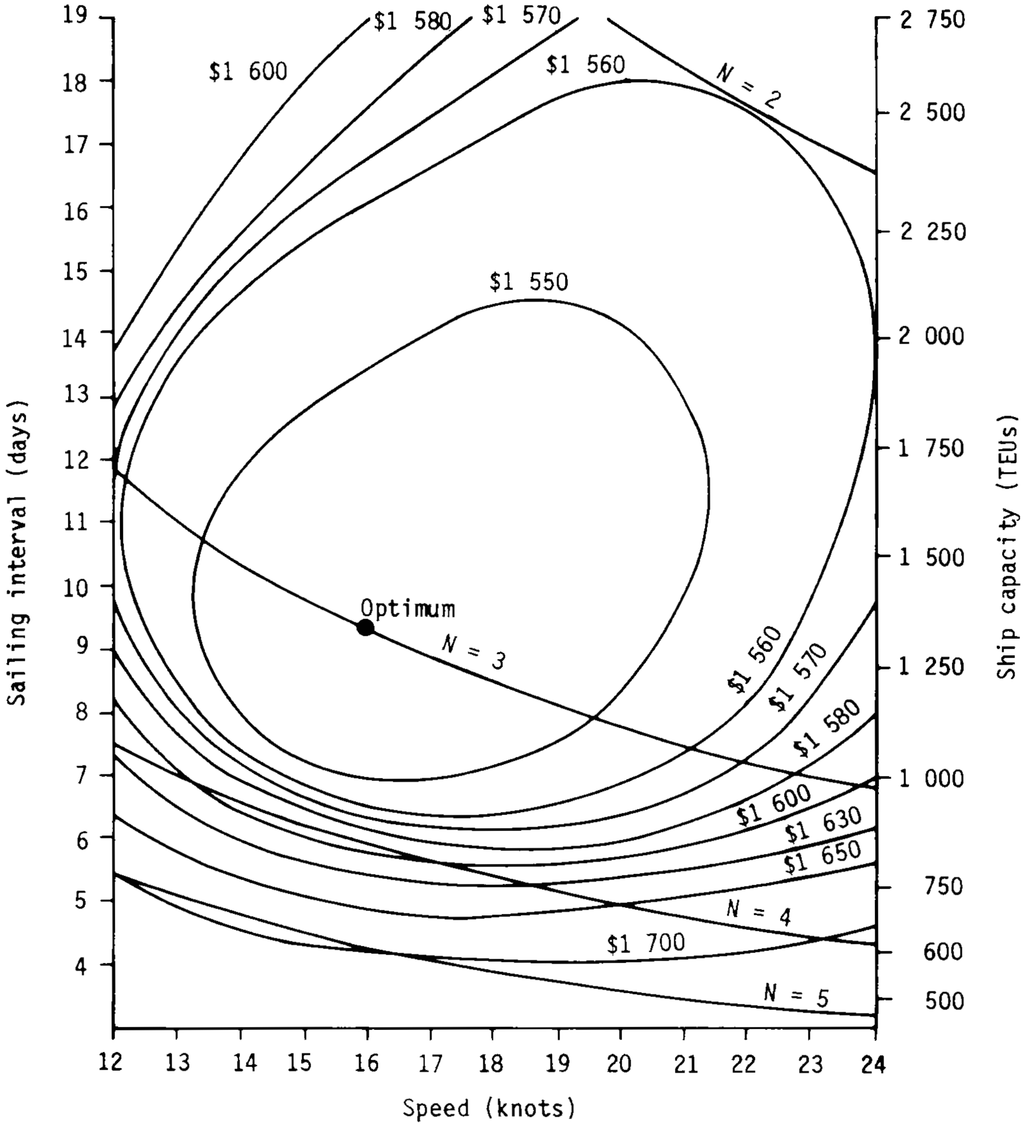
Ship capacity, number and service frequency

For any given trade and route, the optimum ship size depends primarily on the task and the number of ships. Other important considerations are fuel consumption, ship type and cost, ship speed and loading/unloading time (and hence frequency of service).

In practice, the choice of ship capacity and frequency of service is influenced by marketing strategies since the share of the task and nature of the cargo obtainable are influenced by the frequency of service and transit time. In this analysis, the effects of marketing and ownership of the ships and seasonal and random fluctuations in loading are ignored with a view to determining the optimum supply conditions under which costs of meeting the task are minimised. The cost effects of serving the three trades with ships of varying fleet size and capacity are presented in Appendix X. The relationship between the number of ships, ship capacity and speed, frequency of service and carrier cost per TEU per voyage, is illustrated for the New Zealand trade in Figure 10.1. The figure is based on a capacity utilization of 70 per cent in the direction of heavier flow which is somewhat higher than the 1983-84 average capacity utilization of between 44 and 58 per cent. Minimum cost conditions are obtained by a fleet of three ships of 1370 TEU capacity operating at an average speed of 15.75 knots and providing a sailing interval of 9 1/2 days. This point is shown on Figure 10.1 and represents a cost of approximately $1549 per TEU.

On the Australia/Europe and North Mediterranean trade, the minimum (100 per cent utilization) carrier cost is obtained with 12 ships of about 3500 TEU[1] capacity. For the Australia/Japan trade the minimum cost is obtained with four ships of about 2300 TEU capacity. On the Australia/New Zealand trade the minimum cost is obtained with 3 ships of about 970 TEU capacity (if ship size of 1370 TEU for a 70 per cent utilization level in the New Zealand/Australia trade) If these reductions in number of ships were feasible (bearing in mind the practical impossibility of operating at 100 per cent utilization) it would result in reductions in carrier costs of about 22, 38 and 18 per cent for the Australia/Europe and North Mediterranean, Japan and New Zealand trades respectively. The increase in customer costs, associated with the reduced frequency of service of the larger ships, is much lower than the savings of carrier cost.

1. This size of ship may not be capable of being accommodated at some ports, given their current limitations on ship displacements.



Notes 1. N = Number of ships.

2. Costs are based on 70 per cent average capacity utilization and 1983-84 loadings and are expressed in $A per TEU.

Figure 10.1 Frequency/speed/carrier cost relations: Australia/New Zealand trade

EXTERNAL FACTORS AND ANALYSIS PARAMETERS

In analysing overall costs, a number of different factors have been considered. These factors have been represented by a number of variables which were assigned particular numerical values regarded at least as being plausible in a theoretical sense. However, it is important that some examination be made of the sensitivity of the results to the values assumed for these variables.

The values of the inputs to the model used for the analysis are listed in Appendix VI. The effects on costs of changes to the values used for the more significant factors and parameters are discussed below. Further details are shown in Appendix X.

A comment is also made regarding government subsidisation of ship construction.

Discount rate and period of analysis

The use of a interest rate of 13 per cent for the cost of capital over time instead of the 10 per cent used in the analysis significantly increases capital costs, total carrier costs and also customer costs. A reduction of the interest rate from 10 to 7 per cent similarly reduces these costs appreciably. Other cost components are little affected by changes to the interest rate.

Costs are fairly insensitive to an increase in the amortization period from 15 to 20 years.

Ship life

The analyses were based on a ship life of 15 years. This age was derived on the basis of discussion with industry representatives and a literature review. The effect of increasing the assumed ship life to 20 years is to reduce ship capital cost and overall carrier costs by several per cent, and the reverse effect is obtained by reducing ship life to 10 years.

Loading rate

An increase in the loading rate of 20 per cent (by increasing the productivity of stevedores) is estimated to reduce carrier costs by up to 8 per cent.

Container utilization

The effect on costs of increasing the utilization of containers by 20 per cent is to increase carrier costs per TEU per voyage by about 11 to 16 per cent and to increase customer costs by up to 16 per cent. This apparent anomaly occurs because the reductions in container loading costs are insufficient to overcome the reduced number of containers over which the carrier costs are spread. On a costs per tonne basis however, the models suggest the effect of increasing container utilisation by 20 per cent is to reduce the carrier cost per tonne by 3 to 5 per cent, and the customer cost by 3 to 7 per cent.

Freight task

If the freight task were reduced by 25 per cent, carrier costs is estimated to increase by nearly 19 per cent for the Australia/Europe and North Mediterranean trade, 13.5 per cent for the Australia/Japan trade and 13 per cent for the Australia/New Zealand trade provided that the number of ships was not reduced.

Fuel and ship price

The analysis shows that if fuel prices are increased by 20 per cent, carrier costs are increased by between 3 and 5 per cent. If ship prices are increased by 20 per cent, carrier costs are also increased by between 3 and 5 per cent.

Exchange rate

The costs generally used in this chapter are effective at 1 January 1985 with exchange rates applicable at that date (see Reserve Bank 1985a). A large proportion of costs however, are affected by exchange rates, particularly the costs of ships, containers, fuel and also the overseas port and stevedoring costs. Between 1 January 1985 and 7 June 1985 the $A depreciated by 19 per cent against the US$ and by varying amounts against a number of other currencies (*Australian Financial Review* 1985). The analysis suggests that carrier costs rose by between 11 and 17 per cent and customer costs by between 10 and 20 per cent for the three trades. In some trades where freight rates are paid in US$ or Japanese Yen there would be an offsetting revenue increase.

Ship's age

Although not detailed in this report, a limited analysis was made of the effects of varying the age of the ship at the start of the analysis period. The analysis indicated that the ship's age which minimises costs is of the order of seven to eight years for all three trades. This is a consequence of the relatively low market value of ships of this age.

Construction subsidies

The governments of some countries provide financial assistance in various forms to either shipowners or shipbuilders. This has the effect of reducing shipping costs for the individual operators using the flags of those countries or of reducing the cost of construction of new ships. The extent and impact of these reductions depend on the nature of the subsidies. Subsidisation is a complex matter and its precise identification could involve comparison of taxation arrangements in the various shipbuilding countries. The direct and indirect effects of subsidies on carrier and customer costs and on the level of the task have not been addressed.

OVERVIEW OF THE LIKELY DEVELOPMENTS

The developments found to result in appreciable reductions in carrier costs on at least one of the three trades are summarised in Table 10.1. Developments which apply to new ships are separately grouped.

Existing fleets

The changes which are shown to have the largest impact on carrier costs are the greater use of the 40 foot container, the reduction in the speed of ships and increased utilization of containers.

The use of 40 foot containers in Australian trades as a percentage of the movement of all container sizes is increasing steadily. Nevertheless it is still substantially lower than in trades in other parts of the world. A preliminary examination of commodities currently carried in 20 foot containers indicates that there is considerable scope for greater use of 40 foot containers, while remaining within the existing limits of road vehicle loadings.

The analysis also suggested that the use of container ships where feasible achieves a carrier cost saving of the order of 5 per cent over the cost of ro-ro ships.

Replacement ships

A reduction in crew size offers substantial savings on all three trades. A small saving can also be obtained with the use of sail assisted ships, and also for coal fired ships (especially for the Australia/New Zealand trade).

Table 10.1 also includes the cost levels achievable by combining some of the more effective developments which can be introduced on new

TABLE 10.1 ESTIMATED CARRIER COST REDUCTIONS RESULTING FROM VARIOUS DEVELOPMENTS

	Carrier costs per voyage								
	Europe and North Mediterranean trade			*Japan*			*New Zealand*		
Change	*Per TEU ($)*	*Per tonne ($)*	*Reduction (per cent)*	*Per TEU ($)*	*Per tonne ($)*	*Reduction (per cent)*	*Per TEU ($)*	*Per tonne ($)*	*Reduction (per cent)*
Existing fleet									
Typical ship	2 697	191.0	..	1 999	151.2	..	1 558	123.0	..
Speed reduction	2 605	184.5	3.4	1 808	138.3	9.6	1 483	117.4	4.8
FEU[a]	2 442	172.9	9.5	1 748	132.2	12.6	1 375	108.5	6.5[b]
Increased container utilization - (20 per cent)	3 139	184.4	3.0[c]	2 248	149.0	6.3[c]	1 739	116.2	7.0[c]
Self polishing paint	2 658	188.2	1.5	1 976	149.5	1.2	1 541	121.6	1.1
Container ships	..	..	..	..	..	..	1 470	116.0	5.7
New ship									
New typical ship[d]	2 796	198.0	..	2 063	156.1	..	1 638	129.3	..
Wind sail	2 746	194.5	1.8	2 037	154.1	1.3	1 627	128.4	0.7
Coal fuel	2 758	195.3	1.4	2 030	153.6	1.6	1 583	125.0	3.3
24 Crew	2 662	188.5	4.8	2 032	153.8	1.5	1 605	126.8	2.0
12 Crew	2 606	184.6	6.8	1 980	149.9	4.0	1 552	122.6	5.2
Technology combination[e]									
- Type A	2 496	176.8	10.7	1 922	145.4	6.8	1 353	106.8	17.4
- Type B	2 493	176.6	10.8	1 927	145.8	6.6	1 358	107.2	17.1
- Type C	2 286	161.7	18.2	1 724	130.4	16.4	1 322	104.4	19.3

TABLE 10.1 (Cont.) ESTIMATED CARRIER COST REDUCTIONS RESULTING FROM VARIOUS DEVELOPMENTS

	Carrier costs per voyage								
	Europe and North Mediterranean trade			*Japan*			*New Zealand*		
Change	*Per TEU ($)*	*Per tonne ($)*	*Reduction (per cent)*	*Per TEU ($)*	*Per tonne ($)*	*Reduction (per cent)*	*Per TEU ($)*	*Per tonne ($)*	*Reduction (per cent)*
Ideal fleet									
Modified typical ship[f]	3 687[g]	261.1	..	2 997	225.5	..	1 762	137.5	..
Optimum size[h]	2 883[g]	204.1	21.8	1 856	140.0	38.1	1 450	113.1	17.7
Optimum size[h i] with technology combination[e]									
- Type A	2 922[g]	207.0	20.7	1 851	140.0	38.0	1 341	105.9	23.0
- Type B	2 803[g]	198.5	24.0	1 803	136.4	39.8	1 266	99.9	28.1
- Type C	2 536[g]	179.6	31.2	1 675	126.7	43.8	1 213	95.8	30.4

a. Forty foot equivalent unit container carried on a container ship.
b. This figure applies to the cost reduction achievable when compared with equivalent typical container ship.
c. Applies only to cost per tonne.
d New ship based on existing design.
e. Technological combinations Type A - Container ship with stern bulb, asymmetric stern, vane wheel, self polishing paint, wind assisted, emulsified fuel with 12 man crew.
Type B - Type A with extra crane and cranes with increased utilization.
Type C - Type A with forty foot containers.
f. Based on 1983-84 loadings for container, con-ro and ro-ro ships only.
g. Based on combined loadings of Australia and New Zealand cargo.
h. Ship size and number modified to give minimum shipping costs.
i. Loading at 80 per cent capacity utilization for Australia/Europe and North Mediterranean trade and 80 per cent capacity utilization on the main leg of the Australia/Japan and Australia/New Zealand trades.

.. not applicable

Source Prepared by BTE.

ships. This illustrates the costs resulting from the interaction of the individual effects of the various technologies. A study of the best combination for each trade was not made because this would require an extensive analysis of all of the limitations of, and inter-relationship between, the various developments.

Ideal fleets

The use of fewer, but larger ships is shown to result in substantially lower carrier costs on all three trades. The estimated reduction in carrier costs on the Australia/Japan trade is greatest, amounting to about 38 per cent, and is only partly offset by increased costs to customers. The cost advantage of larger ships may only be obtainable where consortia carry a significantly large proportion of cargo under contract and are unlikely to suffer a significant loss of market share as a result of the associated reduced service frequency. For the Australia/Europe and North Mediterranean trade the difference in cost of the typical ship and the ideal ship is due to the fact that the task for the ideal ship includes twice as many empties due to the inclusion of New Zealand - European cargo. This illustrates the sensitivity of costs to the ratio of empty to loaded containers.

IMPLICATIONS

Replacement of ships

- A greater use of automation is expected in all aspects of ship, terminal and cargo management particularly in regard to navigation, communication and ship management. Consequently pressure for reduced crew sizes is likely to continue.
- Progressively, the smaller old ships will be replaced by fewer, but larger ships. These ships are expected to be capable of accommodating a higher proportion of FEUs.
- Greater use is likely to be made of con-bulk and con-ro ships and less use of ro-ro ships.
- With the exception of Port Botany, draught and length limitations in Australian ports are likely to constrain the ability to take advantage of the economies of plant size associated with ships.
- The replacement of some older ships with seven to eight year old ships of greater capacity is likely to be a preferred option for many operators.
- New ships will be more fuel efficient, using many of the types of technological developments described earlier.

Shipping services

The following comments summarise the main effects changes in ship technology and levels of service will have on the structure of Australia's shipping services.

- The use of larger ships is expected to lead to the amalgamation of consortia in order to maintain frequency of service.
- It appears likely that more round the world services will be introduced to Australian trades, probably by large consortia.
- Loading methods at terminals can be expected to undergo further development to speed up loading and unloading operations. This may lead to further centralization of terminals.
- A greater degree of computerised control of container movement aimed at improving container management in terminals and aboard ships is expected.
- Container utilization can be expected to improve with a greater use of 40 foot containers, particularly with any increase in road vehicle limits.

APPENDIX I DEFINITION OF STUDY TRADE AREAS, CATEGORIES OF TRADE AREAS AND TRADE ROUTES

The Department of Transport's system of referencing trade areas has been used throughout this study. This system reflects the geographical areas currently served by liner shipping and in particular conference shipping. The system is also used by the Australian Shippers' Council and is consequently familiar to industry participants.

The system has 10 geographical regions:

1. Europe/Mediterranean
2. East Asia
3. Japan/Korea
4. North America
5. Latin America
6. Africa
7. South Asia/Middle East Gulf
8. South East Asia
9. New Zealand
10. Pacific Islands/Papua New Guinea

The trade areas within each of these regions, identified by the geographical region number and an alphabetical letter, are shown in Figures I.1 to I.10, together with typical shipping services.

TRADE AREAS

For the purpose of analysing the Australian Bureau of Statistics (ABS) Sea and Air Cargo Commodity Statistics (SACCS) and defining shipping trades, countries have been grouped into trade areas as in Table I.1. Although variations exist between the Department of Transport's groupings used in this study and those used by the ABS, these are minor and the published statistics are comparable given that the differences are well within the accuracy of the statistics.

MAJOR AND SMALLER TRADES

The trade areas defined in Table I.2 are conveniently subdivided into major and smaller trades on the basis of the significance of the level of cargo movement. This division is used in the study to limit the reporting of trade information to a manageable number of areas in the body of the report.

SELECTED TRADES

For the purpose of examining the influence of competition on rates and services, six trades encompassing a range of competitive situations have been selected. These selected trades comprising services to or countries within trade areas are scheduled in Table I.3.

TRADE ROUTES

Liner operators often service more than one of the trade areas defined in Table I.1 as part of normal operational itineraries. For instance, ships may call at the Red Sea Ports in transit to Europe and Northern Mediterranean Ports. Several trade areas have therefore been grouped into 'trade routes' to reflect the trading pattern of ships to minimise the problems associated with allocating ship cargo space to a particular trade area in these situations. These trade routes are used in the examination of capacity and the utilization of ships to minimise what would otherwise be arbitrary assignment of ship capacity. Table I.4 defines the trade routes identified in terms of trade areas.

TABLE I.1 TRADE AREAS BY COUNTRY

Trade area number	*Trade area*	*Countries*
1a	Europe and North Mediterranean	Albania
		Austria
		Belgium-Luxembourg
		Bulgaria
		Czechoslovakia
		Denmark
		Federal Republic of Germany
		Finland
		France
		German Democratic Republic
		Gilbraltar
		Greece
		Hungary
		Iceland
		Ireland
		Italy
		Netherlands
		Norway
		Poland
		Portugal
		Romania
		Spain
		Sweden
		Switzerland
		Union of Soviet Socialist Republics (Western Ports)
		United Kingdom
		Yugoslavia
1b	North Africa and East Mediterranean	Algeria
		Cyprus
		Egypt
		Israel (Mediterranean Ports)
		Lebanon
		Libya and Jamahiriya
		Malta
		Morocco
		Syria
		Tunisia
		Turkey

TABLE I.1 (Cont.) TRADE AREAS BY COUNTRY

Trade area number	*Trade area*	*Countries*
2a	Philippines, Hong Kong and Taiwan	Hong Kong Macau Philippines Taiwan
2b	China	China Democratic Peoples Republic of Korea Mongolia
2c	Eastern USSR	Union of Soviet Socialist Republics (Eastern Ports)
3a	Japan	Japan
3b	South Korea	Republic of Korea
4a	West Coast North America	Canada (West Coast Ports) United States of America (West Coast Ports)
4b	East Coast North America	Canada (East Coast Ports) St Pierre and Miquelon United States of America (East Coast Ports)
5	Latin America and Caribbean	Anguilla Antigua Argentina Bahamas Barbados Bermuda Bolivia Brazil Belize Cayman Island Chile Colombia Costa Rica Cuba

TABLE I.1 (Cont.) TRADE AREAS BY COUNTRY

Trade area number	*Trade area*	*Countries*
5 (Cont.)	Latin America and Caribbean	Dominica
		Dominican Republic
		Ecuador
		El Salvador
		Falkland Islands
		French Antilles
		French Guiana
		Grenada
		Guatemala
		Guyana
		Haiti
		Honduras
		Jamaica
		Mexico
		Montserrat
		Netherlands Antilles
		Nicaragua
		Panama
		Paraguay
		Peru
		Puerto Rico
		St Kitts-Nevis
		St Lucia
		St Vincent
		Suriname
		Trinidad and Tobago
		Turks and Caicos Islands
		United States Virgin Islands
		Uruguay
		Venezuela
		Virgin Islands
6a	West Africa	Benin
		Cameroon
		Cape Verde
		Central African Republic
		Chad
		Congo
		Equatorial Guinea Republic
		Gabon

TABLE I.1 (Cont.) TRADE AREAS BY COUNTRY

Trade area number	*Trade area*	*Countries*
6a (Cont.)	West Africa	Gambia
		Ghana
		Guinea
		Guinea-Bissau
		Ivory Coast
		Liberia
		Mali
		Mauritania
		Niger
		Nigeria
		Sao Tome and Principe
		Senegal
		Sierra Leone
		Togo
		Western Sahara
		Zaire
6b	South Africa, Mauritius and Reunion Islands	Angola
		Botswana
		Lesotho
		Mauritius
		Mozambique
		Namibia
		Reunion
		St Helena
		South Africa
		Swaziland
		Zimbabwe
6c	East Africa and Seychelles	British Indian Ocean Territory
		Burundi
		Comoros
		Kenya
		Madagascar
		Malawi
		Rwanda
		Seychelles
		Somalia
		Tanzania
		Uganda
		Zambia

TABLE I.1 (Cont.) TRADE AREAS BY COUNTRY

Trade area number	*Trade area*	*Countries*
6d	Red Sea Ports	Djibouti
		Egypt (Red Sea Ports)
		Ethiopia
		Israel (Red Sea Ports)
		Jordan
		People's Democratic Republic of Yemen
		Saudi Arabia (Red Sea Ports)
		Sudan
		Yemen Arab Republic
7a	West India and Sri Lanka	India (West Coast Ports)
		Maldives
		Sri Lanka
7b	East India and Bangladesh	Bangladesh (East Coast Ports)
		Bhutan
		Burma
		India (East Coast Ports)
		Nepal
7c	Pakistan	Afghanistan
		Pakistan
7d	Middle East Gulf	Bahrain
		Iran
		Iraq
		Kuwait
		Oman
		Qatar
		Saudi Arabia (Gulf Ports)
		United Arab Emirates
8	South East Asia	Brunei
		Christmas Island
		Cocos Island
		Indonesia
		Kampuchea
		Laos
		Malaysia

TABLE I.1 (Cont.) TRADE AREAS BY COUNTRY

Trade area number	*Trade area*	*Countries*
8 (Cont.)	South East Asia	Singapore Thailand Vietnam
9	New Zealand	New Zealand Ross Dependency
10a	Papua New Guinea and Solomon Islands	Papua New Guinea Solomon Islands
10b	South Pacific	Cook Islands Fiji French Polynesia New Caledonia Niue Pitcairn Island Samoa (American) Tokelau Tonga Vanuatu Wallis and Futuna Islands Western Samoa
10c	Micronesia, Mariana Islands, Marshall Islands and Nauru	Kiribati Guam Johnston Island Midway Islands Nauru Trust Territory of Pacific Islands Tuvulu USA Pacific Islands Wake Island
10d	Australian Island Territories	Norfolk Island

Source Federal Department of Transport.

TABLE I.2 MAJOR TRADES[a]

Major trades	*Trade area number*[b]
Europe and North Mediterranean	1a
Philippines, Hong Kong and Taiwan	2a
Japan	3a
South Korea	3b
West Coast North America	4a
East Coast North America	4b
Middle East Gulf	7d
South East Asia	8
New Zealand	9
Papua New Guinea and Solomon Islands	10a

a. All other trade areas are categorised as 'smaller trades'.
b. See Table I.1 for countries included in each trade area.

Source Prepared by BTE.

TABLE I.3 SELECTED TRADES

Selected trade area	*Trade area number*[a]
Europe and North Mediterranean	1a
Japan	3a
East Coast North America	4b
West India	7a[b]
Indonesia	8[c]
New Zealand	9

a. See Table I.1 for countries included in each trade area.
b. Services to the named country region within trade area 7a only.
c. Services to the named country within trade area 8 only.

Source Prepared by BTE.

TABLE I.4 TRADE ROUTES BY TRADE AREA

Trade route number	*Trade route*	*Trade area number*[a]
1	Europe, Mediterranean and Rea Sea Ports	1a, 1b, 6d
2	East Asia	2a, 2b, 2c
3	Japan and South Korea	3a, 3b
4	West Coast North America	4a
5	East Coast North America, Latin America and Caribbean	4b, 5
6	Africa	6a, 6b, 6c
7	South Asia	7a, 7b, 7c
8	Middle East Gulf	7d
9	South East Asia	8
10	New Zealand	9
11	Papua New Guinea and Solomon Islands	10a
12	Pacific Islands	10b, 10c 10d

a. See Table I.1 for countries included in each trade area.

Source Prepared by BTE.

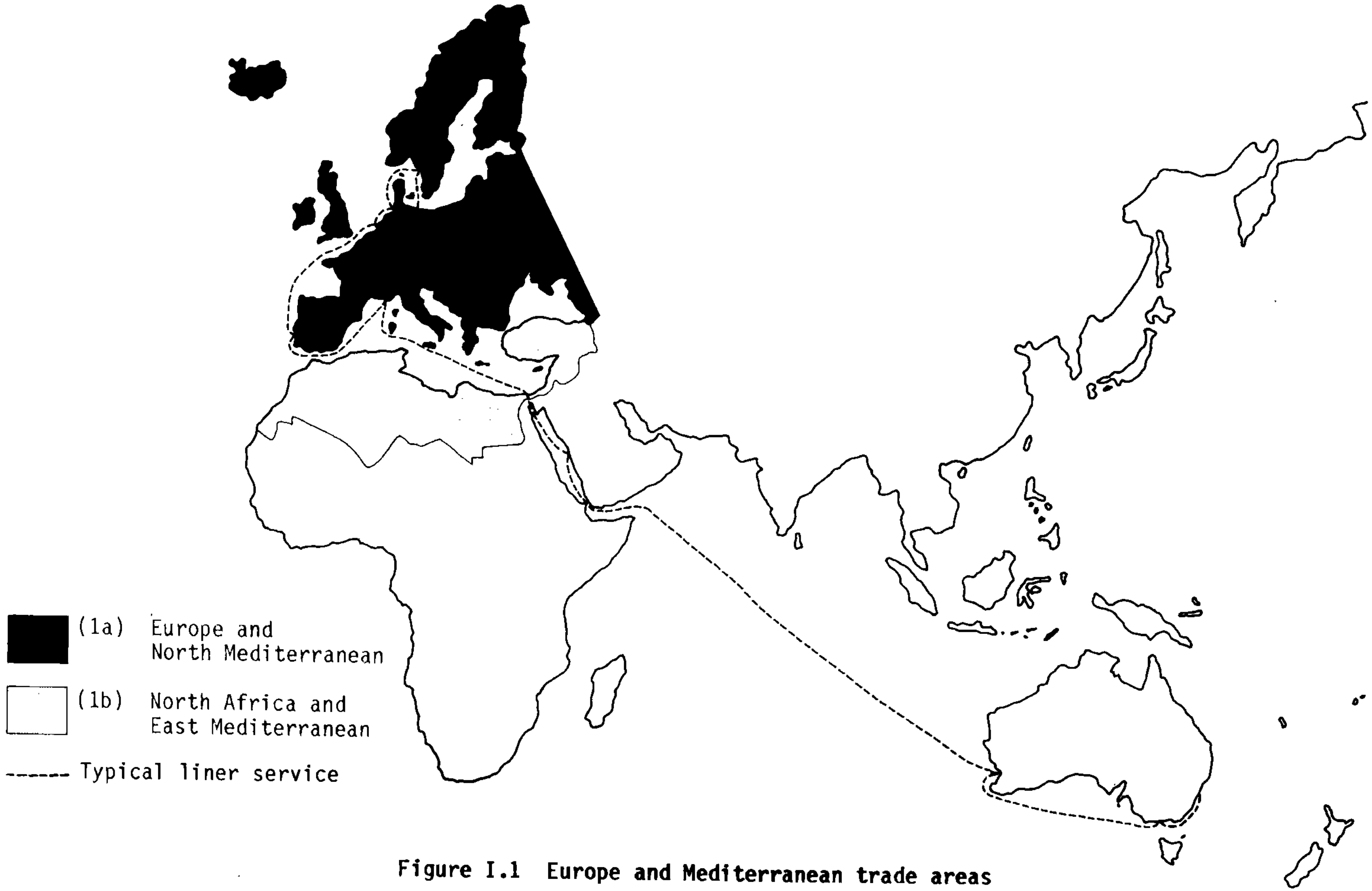


Figure I.1 Europe and Mediterranean trade areas

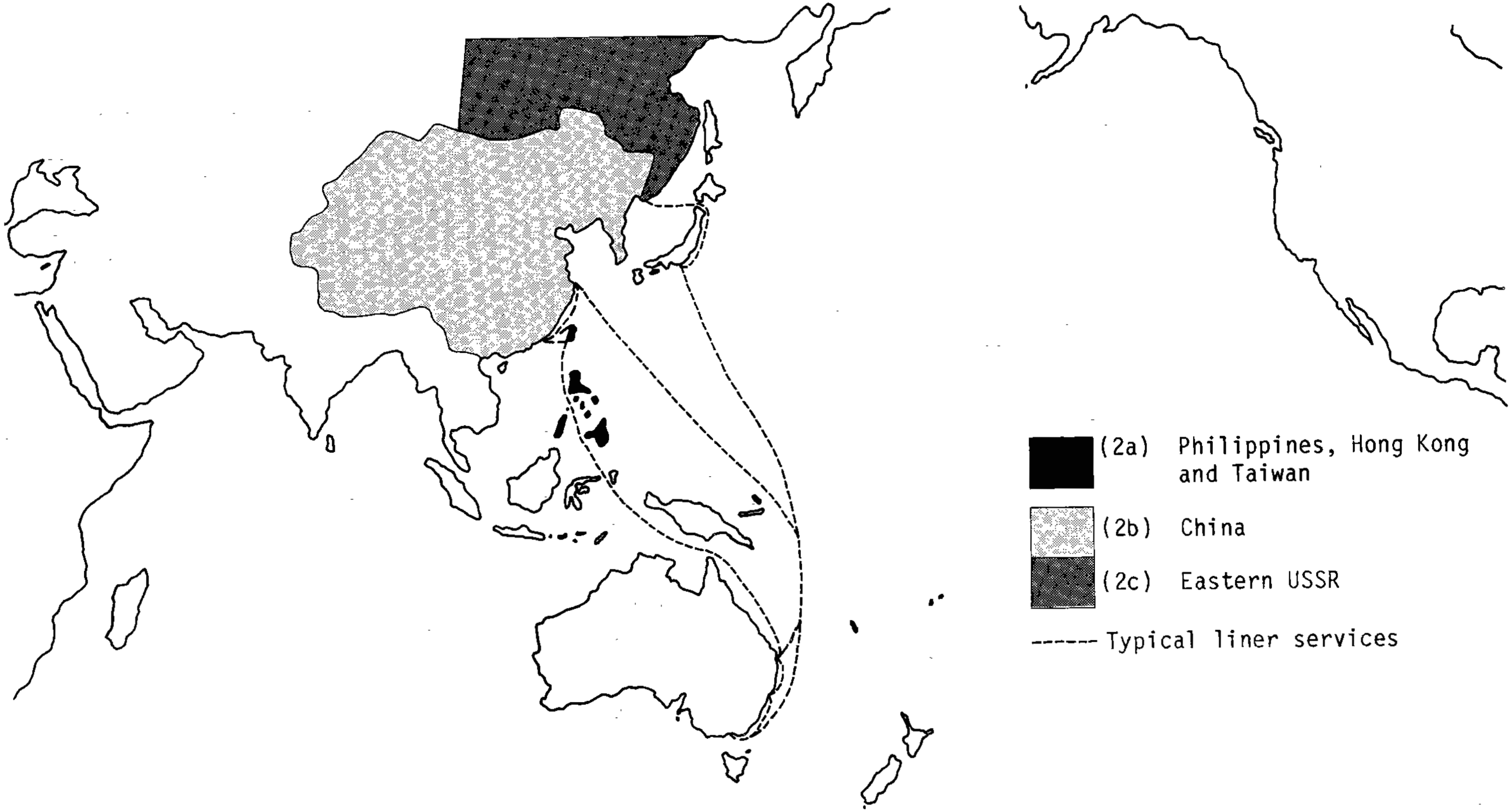


Figure I.2 East Asia trade areas

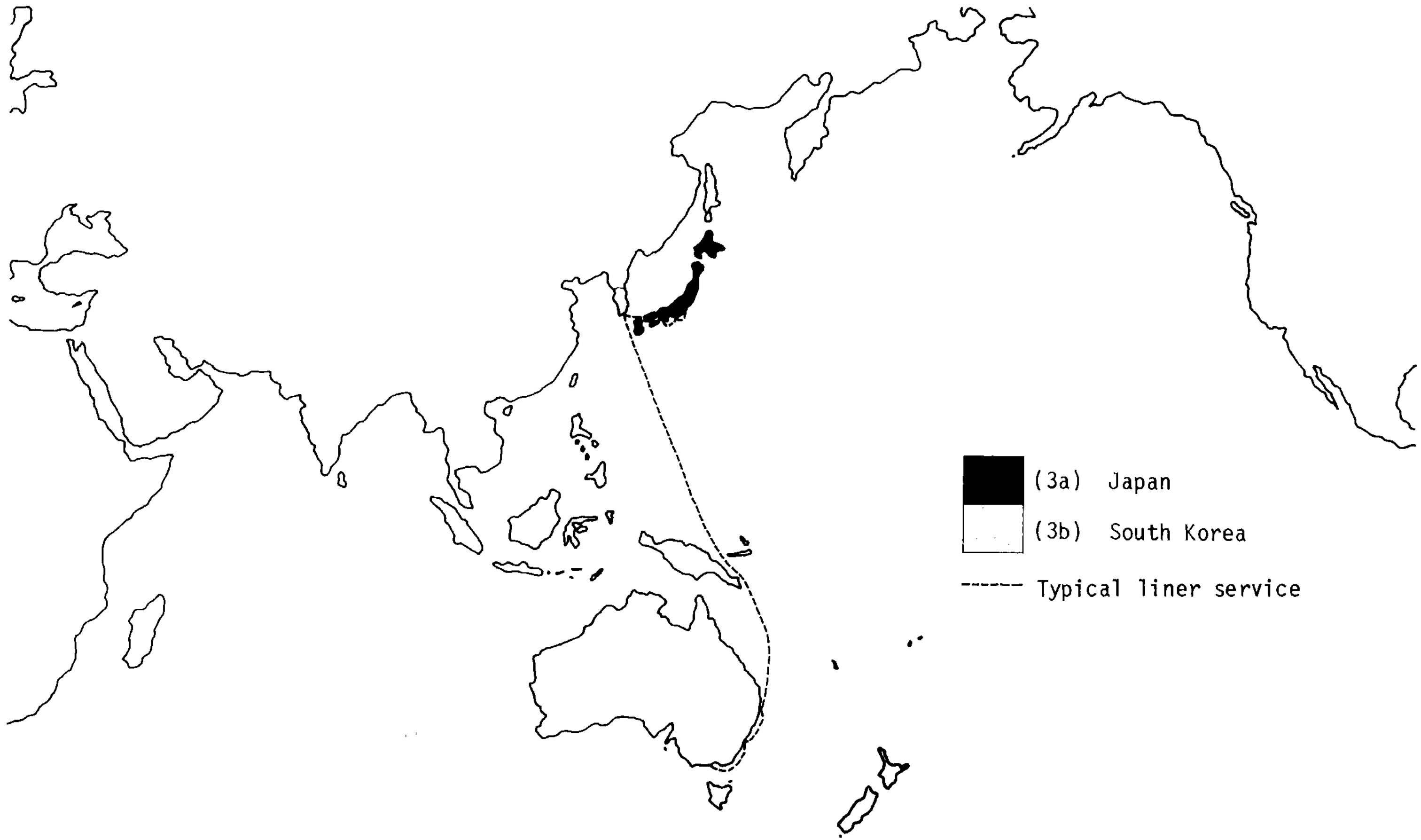


Figure I.3 Japan and Korea trade areas

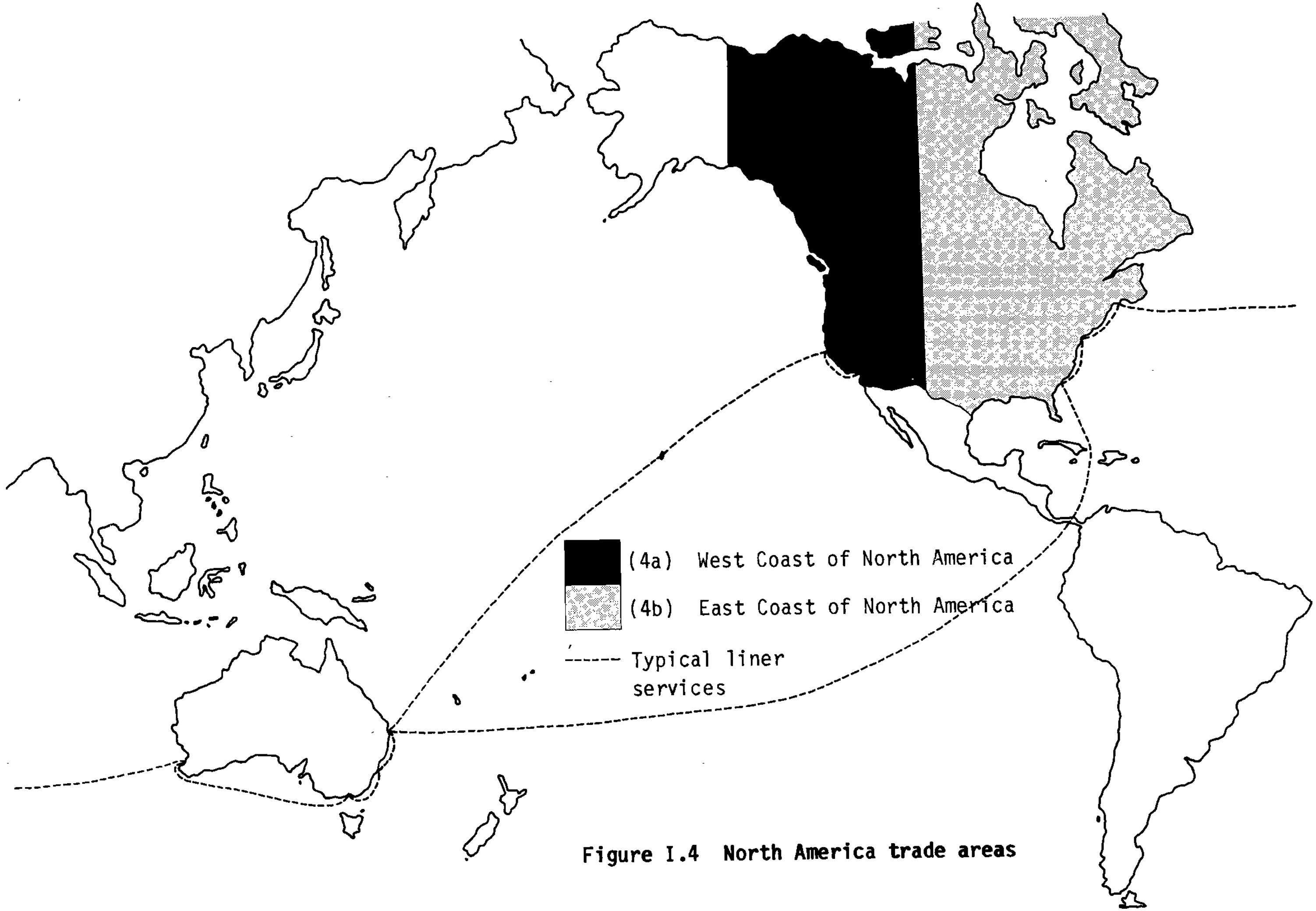


Figure I.4 North America trade areas

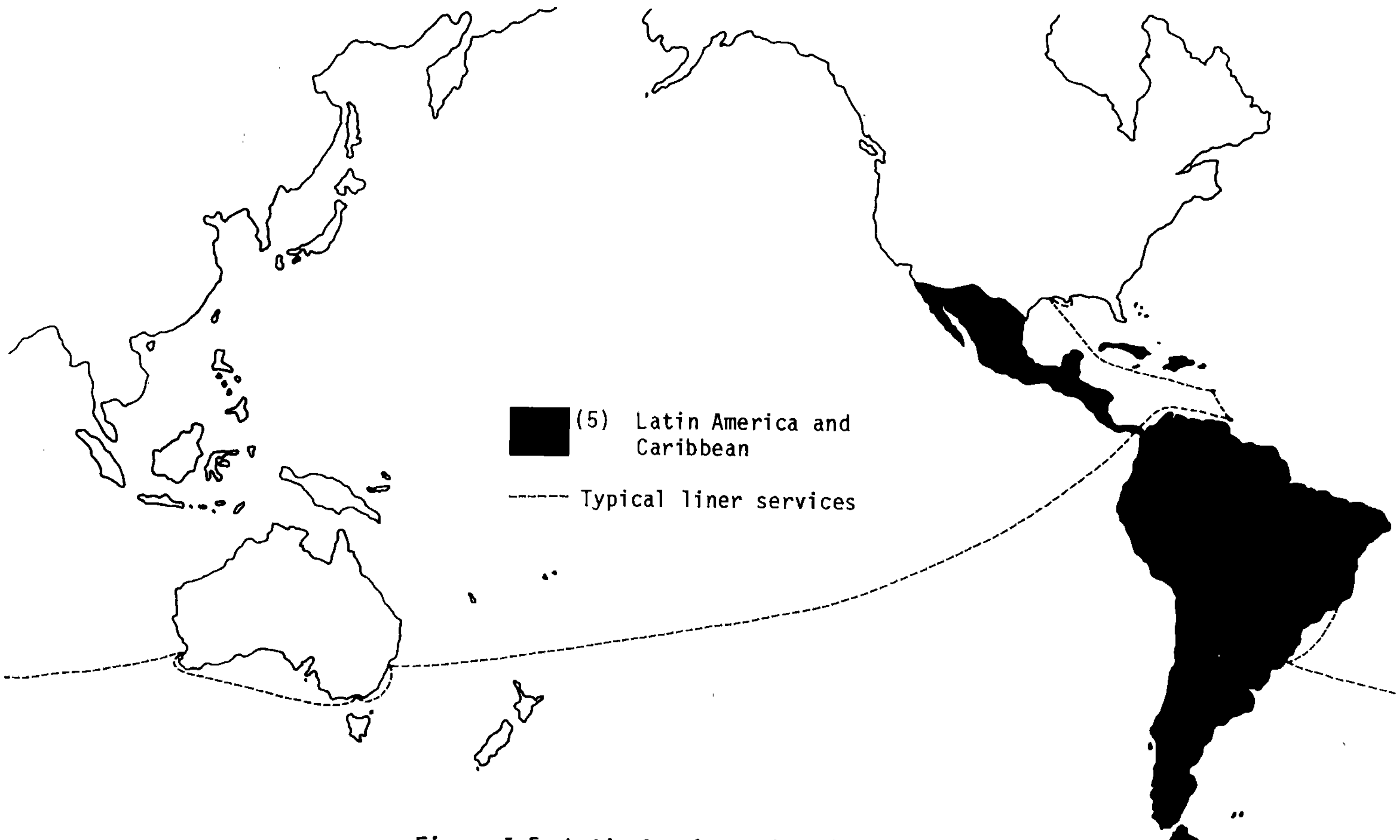


Figure I.5 Latin America and Caribbean trade area

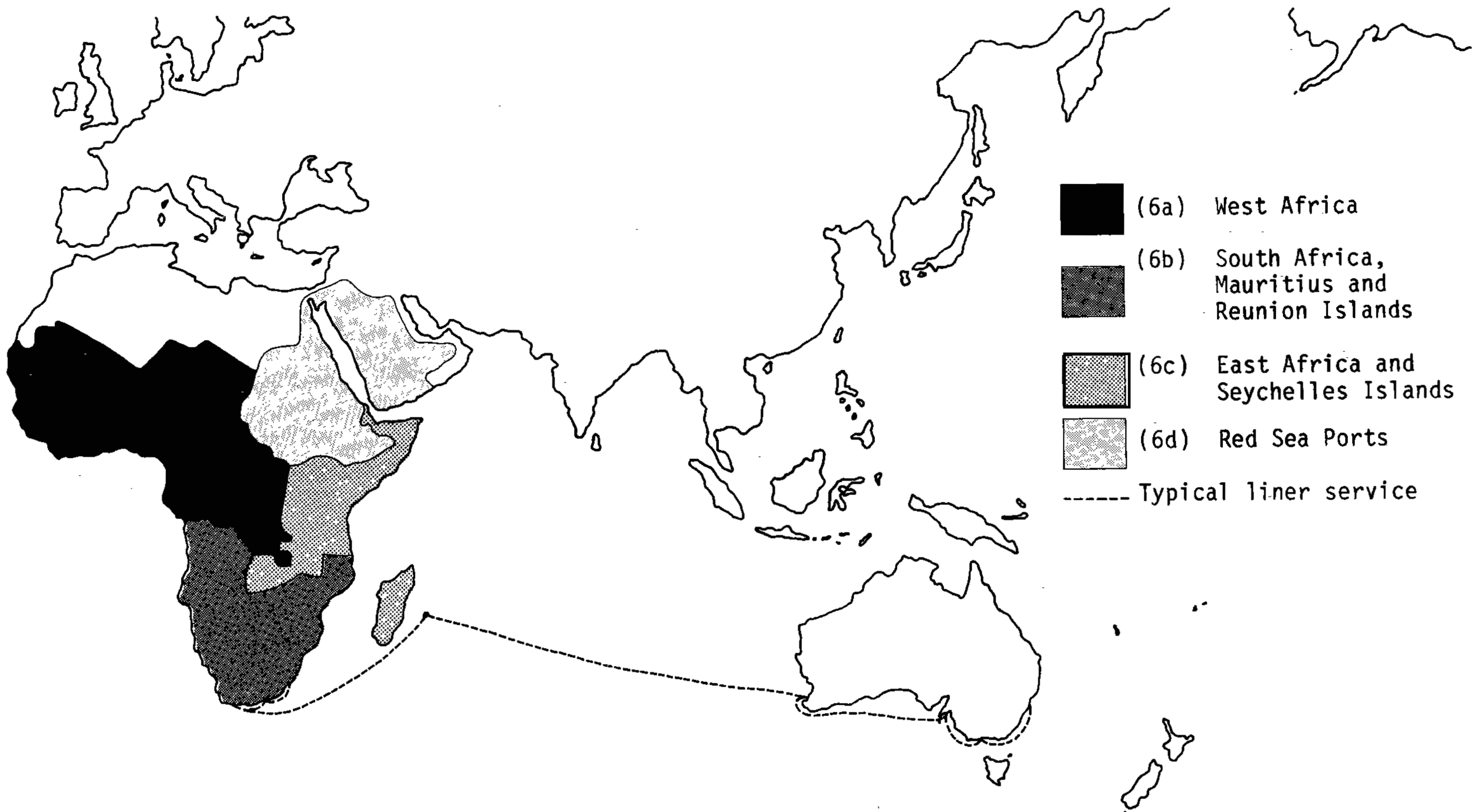


Figure I.6 African trade areas

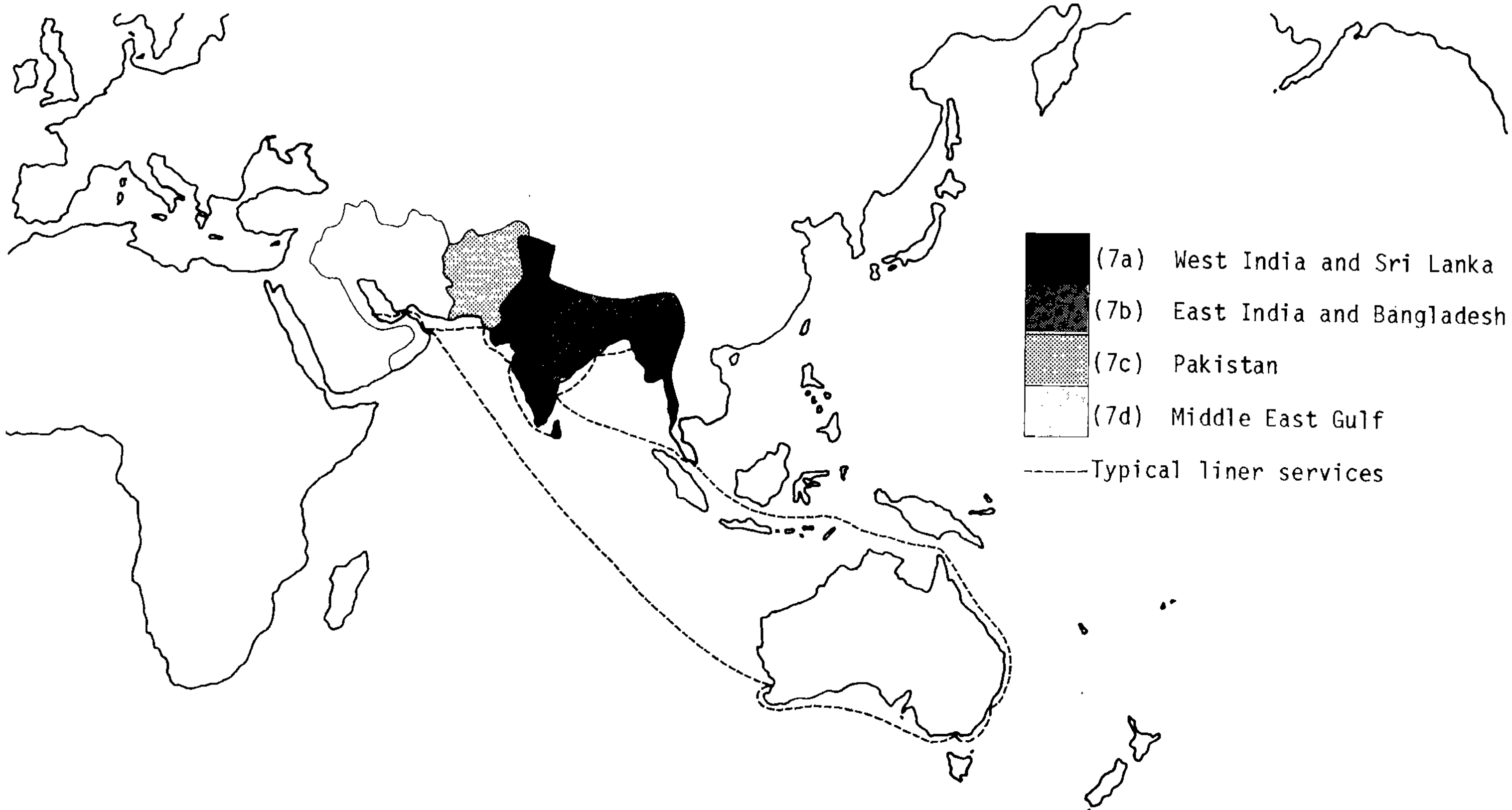


Figure I.7 South Asia and Middle East Gulf trade areas

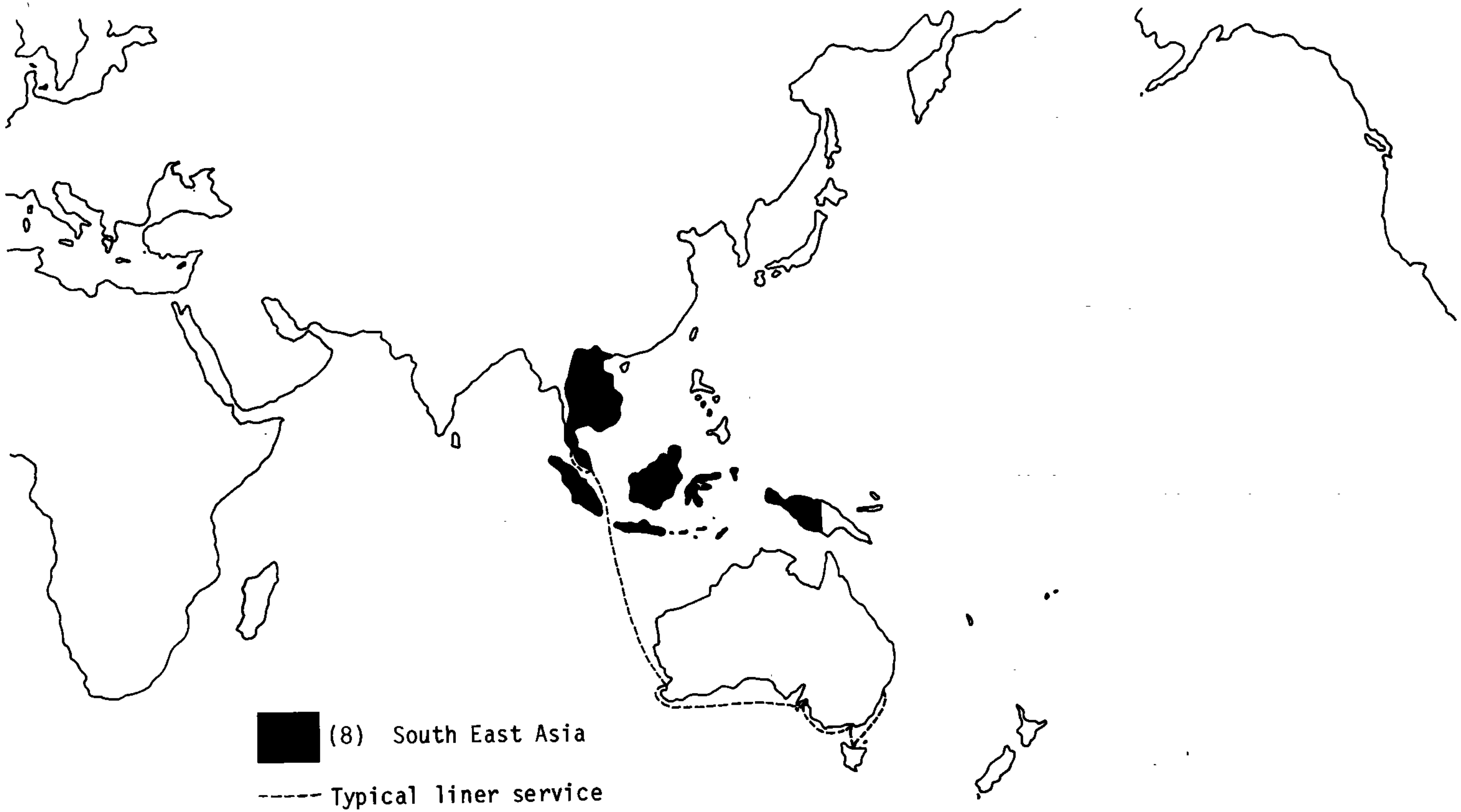


Figure I.8 South East Asia trade area

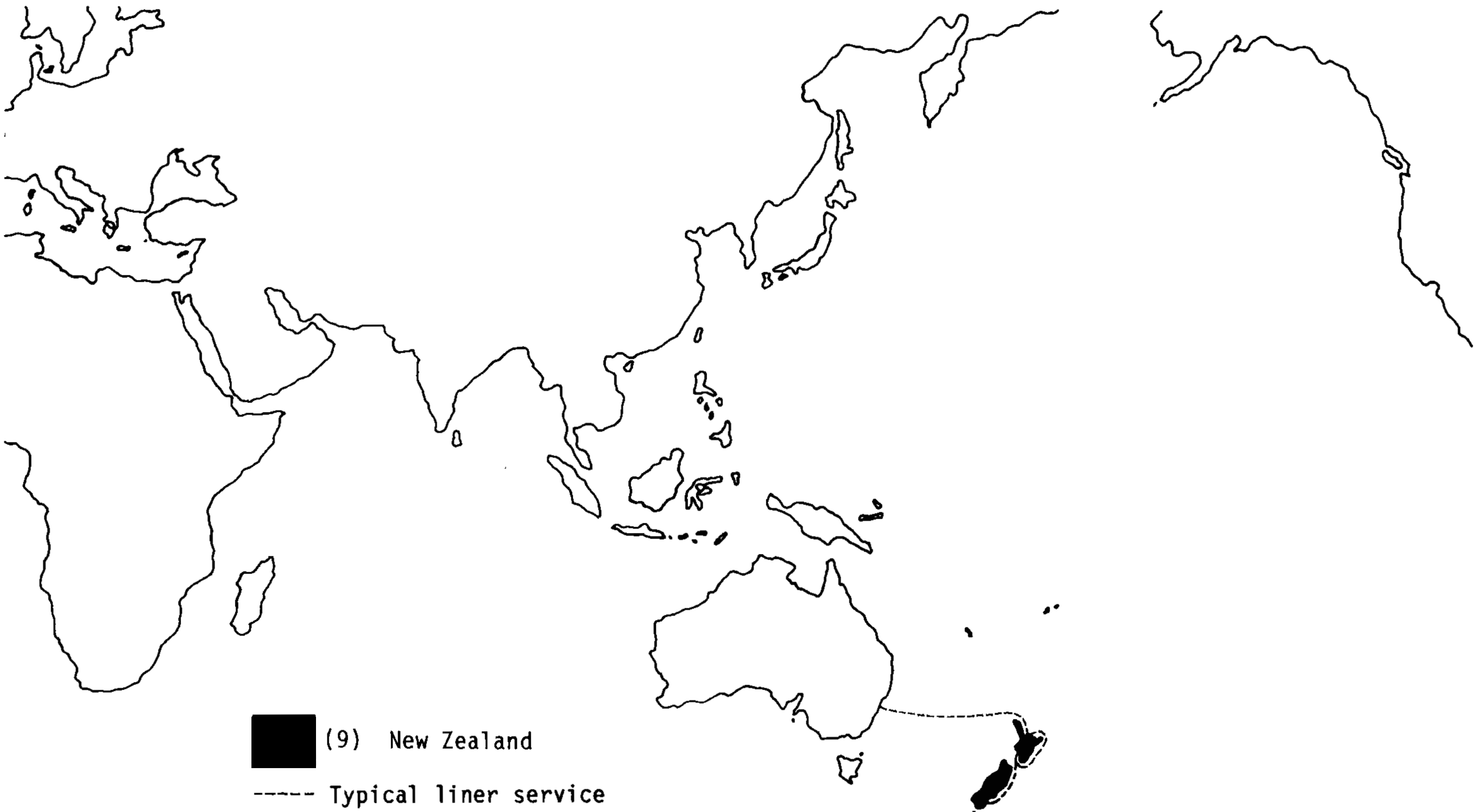


Figure I.9 New Zealand trade area

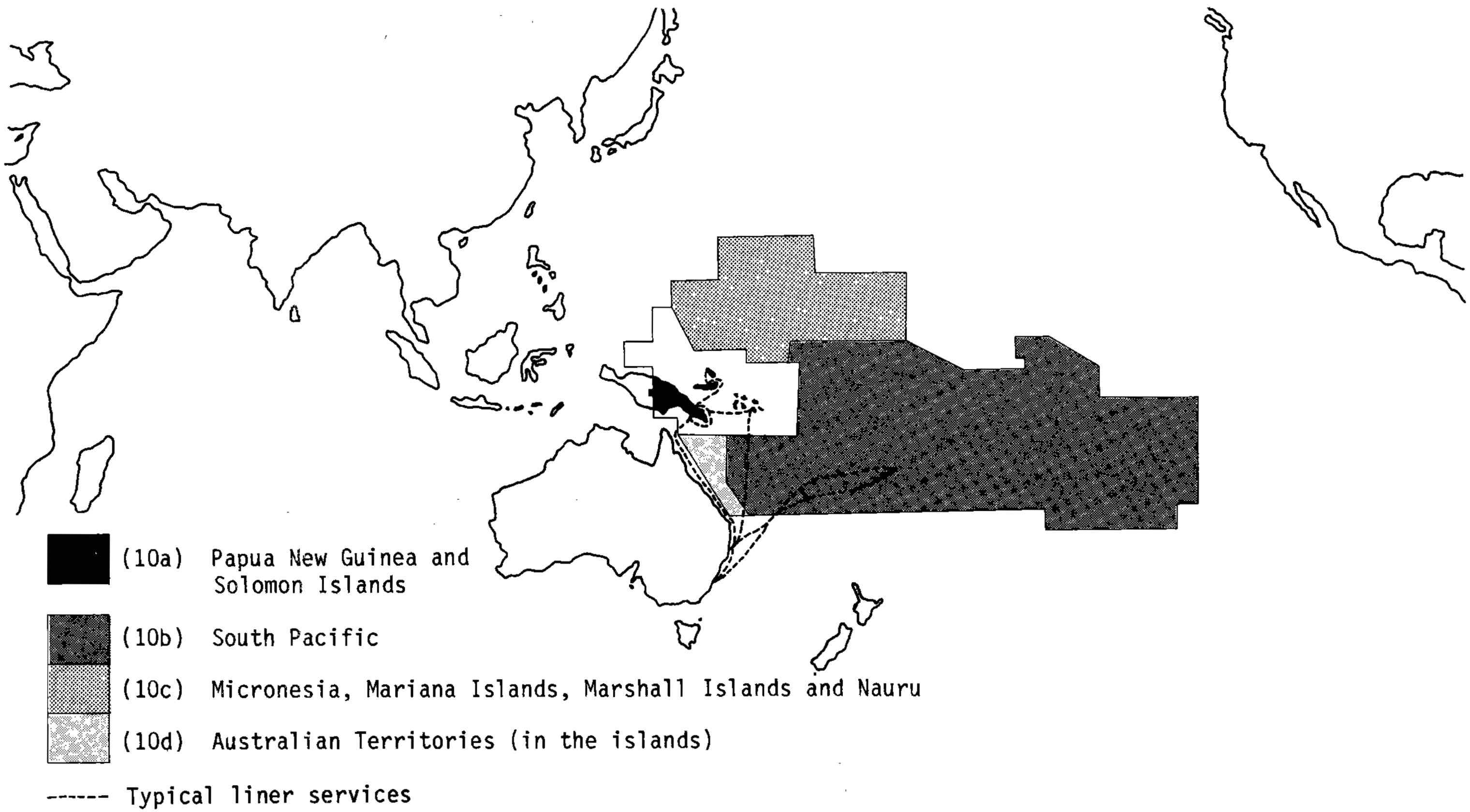


Figure I.10 Pacific Islands and Papua New Guinea trade areas

APPENDIX II INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

For the purpose of this study, the term conference is applied to any voluntary rate agreement between ship owners. Table II.1 schedules the inward and outward conferences serving Australia in the 1983-84 financial year for each of the study trade areas.

The following information sources were used to identify the inward and outward conferences:

Inward
Croner's World Directory of Freight Conferences

Outward
Conference agreements filed pursuant to Part X of the *Trade Practices Act 1974* (see Department of Transport 1984c Appendix F).

TABLE II.1 INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
1a	Europe and North Mediterranean	Continent to Australia Conference	Australian National Line Baltic Shipping Company Blue Star Line (ACT(A) Compagnie Generale Maritime Compania Naviera Marasia SA The East Asiatic Company Ltd (SCAN) Ellerman Lines PLC (ACT(A) Hapag-Lloyd (ANZECS) Jadranska Slovodna Plovidba (Yugoslav Line) Lloyd Triestino (ANZECS) Nedlloyd Lines (ANZECS) Overseas Containers Ltd (ANZECS) Port Lines Ltd (ACT(A) Rederiaktiebolaget Transatlantic (SCAN) Wilh Wilhemsen (SCAN)	Australia to Europe Shipping Conferencee	Australian National Line Baltic Shipping Company Blue Star Line (ACT(A) Compagnie Generale Maritime Compania Naviera Marasia SA The East Asiatic Company Ltd (SCAN) Ellerman Lines PLC (ACT(A) Hapag-Lloyd (ANZECS) Jadranska Slovodna Plovidba (Yugoslav Line) Lloyd Triestino (ANZECS) Nedlloyd Lines (ANZECS) Overseas Containers Ltd (ANZECS) Port Lines Ltd (ACT(A) Rederiaktiebolaget Transatlantic (SCAN) Wilh Wilhemsen (SCAN)
		United Kingdom to Australia Conference	Associated Container Transportation Ltd Australian National Line Overseas Container Ltd	Darwin to Europe and Singapore Agreement	Bank Line Ltd Columbus Line

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
1b	North Africa and East Mediterranean	a		a	
2a	Philippines, Hong Kong and Taiwan	Australia and New Zealand/Eastern Shipping Conference	Asia Australia Express Ltd Australia Japan Container Line Ltd Australian National Line China Navigation Company Ltd Crusader Swire Container Service Ltd Japan Line, Ltd Kawasaki Kisen Kaisha Ltd Knutsen Line A/S Mitsui OSK Lines Ltd Nippon Yusen Kaisha Orient Overseas Container Line Ltd Shipping Corporation of New Zealand Ltd Yamashita-Shinnihon Steamship Co Ltd Yang Ming Line	Australia Northbound Shipping Conference (East Asia Section)	Asia Australia Express Ltd Australian National Line Kawasaki Kisen Kaisha Ltd Knutsen Line A/S Mitsui OSK Lines Nippon Yusen Kaisha Orient Overseas Container Line Yamashita-Shinnihon Steamship Co Ltd

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
2b	China	a		a	
2c	Eastern USSR	a		a	
3a	Japan	Australia and New Zealand/Eastern Shipping Conference	Australia Japan Container Line Australian National Line Cho Yang Shipping Co Ltd Crusader Swire Container Service Ltd Japan Line Ltd Kawasaki Kisen Kaisha Ltd Knutsen Line A/S Mitsui OSK Lines Ltd Nedlloyd Line Nippon Yusen Kaisha Orient Overseas Container Line Ltd Shipping Corporation of New Zealand Ltd Yamashita-Shinnihon Steamship Co Ltd	Australia Northbound Shipping Conference (Japan/Korea section)	Australia Japan Container Line Australian National Line Cho Yang Shipping Co Ltd Kawasaki Kisen Kaisha Ltd Knutsen Line A/S Mitsui OSK Lines Nedlloyd Line Nippon Yusen Kaisha Orient Overseas Container Line Yamashita-Shinnihon Steamship Co Ltd

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
3b	Korea	Australia and New Zealand/Eastern Shipping Conference	Australia Japan Container Line Australian National Line Cho Yang Shipping Co Ltd Crusader Swire Container Service Ltd Dong Young Shipping Co Ltd Japan Line Ltd Mitsui OSK Lines Nippon Yusen Kaisha Orient Overseas Container Line Shipping Corporation of New Zealand Ltd Yamashita-Shinnihon Steamship Co Ltd	Australia Northbound Shipping Conference (Japan/Korea section)	Australia Japan Container Line Australian National Line Cho Yang Shipping Co Ltd Dong Young Shipping Co Ltd Kawasaki Kisen Kaisha Ltd Knutsen Line A/S Mitsui OSK Lines Nedlloyd Line Nippon Yusen Kaisha Orient Overseas Container Line Yamashita-Shinnihon-Steamship Co Ltd
4a	West Coast North America	Pacific/Australia-New Zealand Conference	Blue Star Line Ltd Columbus Line Pacific Australia Direct Line	Australia/Pacific Coast Rate Agreement	Columbus Line Pacific Australia Direct Line

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
4b	East Coast North America	Eastern Canada/ Australia-New Zealand	ABC Containerline Associated Container Transportation (Aust) Ltd (PACE Line) Australian National Line (PACE Line) Columbus Line Trader Navigation Co Ltd	Australia/Eastern Canada Shipping Conference	Associated Container Transportation (Aust) Ltd (PACE Line) Australian National Line (PACE Line) Columbus Line Trader Navigation Co Ltd
		US Atlantic and Gulf/Australia-New Zealand Conference	ABC Containerline Associated Container Transportation (Aust) Ltd (PACE Line) Australian National Line Bank and Savill Line Columbus Line Farrell Lines Incorporated Shipping Corporation of New Zealand Trader Navigation Co Ltd	Australia/Eastern USA Shipping Conference	Associated Container Transportation (Aust) Ltd (PACE Line) Australian National Line (PACE Line) Columbus Line Trader Navigation Co Ltd

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
6	Latin America and Caribbean	a		Australia Carribbean Trade Conference Agreement	Bank and Savill Line Columbus Line
6a	West Africa	a		a	
6b	South Africa, Mauritius and Reunion Islands	a		a	
6c	East Africa and Seychelles	a		a	
6d	Red Sea Ports	a		Australia/Jeddah Agreement for Common Tariff and/or Freighting Schedule	Compagnie Generale Maritime (ANZECS) Hapag-Lloyd (ANZECS) Lloyd Triestino (ANZECS) Nedlloyd Lines (ANZECS) Overseas Containers Ltd (ANZECS) Scan Carriers A/S

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
7a	West India and Sri Lanka	Ceylon/Australia Conference	Nedlloyd Lines Overseas Containers Ltd The Shipping Corporation of India Ltd	Australia/Sri Lanka Outward Shipping Conference	Nedlloyd Lines The Shipping Corporation of India Ltd
		West Coast of India-Australia Freight Agreement	Blue Star Lines Nedlloyd Lines Overseas Containers Ltd The Shipping Corporation of India Ltd	Australia/West India Outward Shipping Conference	Nedlloyd Lines The Shipping Corporation of India Ltd
7b	East India and Bangladesh	a		a	
7c	Pakistan	a		a	
7d	Middle East Gulf	a		Australia Middle East Gulf Conference	Blue Star Line Ltd Nippon Yusen Kaisha Line Overseas Containers Ltd Scan Carriers A/S
				Australia/Persian-Arabian Gulf Trade Agreement	C Clausen Steamship Co Ltd P&O Steam Navigation Co

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
8a	South East Asia	Indonesia-Australia Conference	Australian National Line Australia Straits Container Line Pty Ltd Nedlloyd Lines Neptune Orient Lines Ltd P T Djakarta Lloyd	Australia-Indonesia Shipping Conference	Australian National Line Australia Straits Container Line Pty Ltd Nedlloyd Lines Neptune Orient Lines Ltd P T Djakarta Lloyd The Shipping Corporation of India Ltd
		Straits-Australia Conference	Australian National Line Blue Funnel Line Ltd Malaysian International Shipping Corporation Nedlloyd Lines Neptune Orient Lines Ltd Overseas Containers Ltd Southern Shipping Lines The Shipping Corporation of India Ltd	Australia-Singapore and West Malaysia Outward Shipping Conference	Australian National Line Australia Straits Container Line Pty Ltd Blue Funnel Line Ltd Kawasaki Kisen Kaisha Malaysian International Shipping Corporation Nedlloyd Lines Neptune Orient Lines Ltd P&O Steam Navigation Co The Shipping Corporation of India Ltd

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
8a (Cont.)	South East Asia			Darwin to Europe and Singapore Agreement	As for 1a
				Australia/ Thailand Outward Shipping Conference	Australian National Line Australia Straits Container Line Pty Ltd Malaysian International Shipping Corporation Nedlloyd Lines Neptune Orient Lines Ltd
9	New Zealand	a		Tasman Searoad Service Agreement	Australian National Line Shipping Corporation of New Zealand
10a	Papua New Guinea and Solomon Islands	a		Australia/Papua New Guinea Solomon Islands Oral Understanding followed by the Australia/ Papua New Guinea Trade Rationalization Agreement	Australian West Pacific Line (NG) Pty Ltd K (Asia-Pacific) Pty Ltd New Guinea Australia Line Pty Ltd New Guinea Express Line Papua New Guinea Shipping Corporation Pty Ltd

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
10b	South Pacific	a		South Pacific Shipowners Association Agreement	Compagnie des Chargeurs Caledoniens SA Compagnie Generale Maritime KKL (Kangaroo) Line Pacific Australia Direct Line Sofrana Unilines Warner Pacific Line
				Australia/Tahiti Service Pooling Agreement	Compagnie Generale Maritime K (Asia-Pacific) Pty Ltd
				Australia/New Caledonia Agreement	Compagnie de Chargeurs Caledoniens SA Sofrana-Unilines SA
				Australia/New Caledonia, Vanuatu Joint Service Agreement	Compagnie Generale Maritime Pacific Australia Direct Line Sofrana-Unilines SA
				Australia/Fiji and New Hebrides Joint Service Agreement	Pacific Australia Direct Line Sofrana-Unilines (Aust) Pty Ltd

TABLE II.1 (Cont.) INWARD AND OUTWARD CONFERENCES SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Inward*		*Outward*	
		Conference	*Member lines*	*Conference*	*Member lines*
10b (Cont.)	South Pacific			Australia/Fiji Trade Agreement	KKL (Kangaroo) Line Sofrana-Unilines (Aust) Pty Ltd
10c	Micronesia, Mariana Islands, Marshall Islands and Nauru	a		South Pacific Shipowners Association Agreement	As for 10b
10d	Australian Islands Territories	a		South Pacific Shipowners Association Agreement	As for 10b

a. No conference or rate agreement.

Sources Croner's (1984). Department of Transport (1984c).

APPENDIX III NON-CONFERENCE OPERATORS SERVING AUSTRALIA, 1983-84

Table III.1 schedules the non-conference operators serving Australia in the 1983-84 financial year for each of the study trade areas.

Only the non-conference operators which are known to be providing a regular service are included. This criterion excludes operators:

- for which the frequency of services is insufficient to be considered liner; and
- which are operating on a trade which does not have a known conference agreement but are nevertheless considered to be conference because they operate within a conference on the return trade.

The operators of some of the ships listed in Appendix IV do not appear in Table III.1 because of the above criterion.

Some of the services operated involve transhipment, that is, they are not directly served by ships serving Australia. An indication of whether non-conference operators provide direct services can be obtained by examining the list of ports served in Table V.1.

TABLE III.1 NON-CONFERENCE OPERATORS SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Name of line*
1a	Europe and North Mediterranean	ABC Containerline Bank Line Columbus Line Eagle Container Line Polish Ocean Lines Trader Navigation Co Ltd Zim Israel Navigation Company Ltd
1b	North Africa and East Mediterranean	Algerian National Line Eagle Container Line Trader Navigation Company Ltd Zim Israel Navigation Company Ltd
2a	Philippines, Hong Kong and Taiwan	China Ocean Shipping Company East Asiatic Company Far Eastern Shipping Company Hong Kong Islands Line K (Asia-Pacific) Pty Ltd[b] National Shipping Company of Iran Zim Israel Navigation Company Ltd
2b	China	Asia Australia Express[a] China Ocean Shipping Company Orient Overseas Container Line[a]
2c	Eastern USSR	Far Eastern Shipping Company
3a	Japan	Far Eastern Shipping Company Zim Israel Navigation Company Ltd
3b	Korea	Far Eastern Shipping Company Zim Israel Navigation Company Ltd

TABLE III.1 (Cont.) NON-CONFERENCE OPERATORS SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Name of line*
4a	West Coast North America	Australia New Zealand Container Line East Asiatic Company Hyundai Line KKL (Kangaroo) Line National Shipping Company of Iran Nedlloyd Lines Sofrana Unilines
4b	East Coast North America	ABC Containerline Australia New Zealand Container Line East Asiatic Company[a] Hyundai Line[a] KKL (Kangaroo) Line[a] Nedlloyd Lines[a]
5	Latin America and Caribbean	Lloyd Brasileiro Nedlloyd Lines
6a	West Africa	Nil
6b	South Africa, Mauritius and Reunion Islands	Australia Mauritius Line Lloyd Brasileiro Nedlloyd Lines Safocean (Pty) Ltd
6c	East Africa and Seychelles	Lloyd Brasileiro Nedlloyd Lines[a]
6d	Red Sea Ports	Eagle Container Line Jabranska Slovodna Plovidba (Yugoslav Line) Polish Ocean Lines Zim Israel Navigation Company Ltd

TABLE III.1 (Cont.) NON-CONFERENCE OPERATORS SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Name of line*
7a	West India and Sri Lanka	Blue Star Line Nedlloyd Lines Overseas Container Ltd
7b	East India and Bangladesh	Shipping Corporation of India
7c	Pakistan	Blue Star Line Overseas Container Ltd
7d	Middle East Gulf	Nil
8	South East Asia	Columbus and Bank Line Eagle Container Line East Asiatic Company K (Asia-Pacific) Pty Ltd Mitsui O.S.K. Lines Ltd National Shipping Company of Iran Nauru Pacific Line Nippon Yusen Kaisha Line Tropic Island Shipping Company V.B. Perkins Zim Israel Navigation Company Ltd
9	New Zealand	Australia New Zealand Container Line Maritime Corporation of New Zealand Pacific Forum Line Union Steamship Company of New Zealand

TABLE III.1 (Cont.) NON-CONFERENCE OPERATORS SERVING AUSTRALIA, 1983-84

Trade area number	*Trade area*	*Name of line*
10a	Papua New Guinea Solomon Islands	Chief Container Service Mason Shipping Line Pacific Forum Line Sofrana - PNG Line Warner Pacific Line K (Asia Pacific) Pty Ltd
10b	South Pacific	Nauru Pacific Line Pacific Forum Line Warner Pacific Line K (Asia Pacific) Pty Ltd
10c	Micronesia, Mariana Islands, Marshall Islands and Nauru	Nauru Pacific Line
10d	Australian Island Territories	Nil

a. Transhipment service only.

Source Prepared by BTE.

APPENDIX IV THE LINER FLEET SERVING AUSTRALIAN TRADES, 1983-84

Table IV.1 schedules by name and Lloyd's number the ships deployed in the Australian liner trades. Also listed is a conference/non-conference classification, the number of departures in the 1983-84 financial year and the predominant trade areas served by the ship.

The ships were identified by examining:

- the DoT Liner Service Sheets;
- records of ships and departures from both the DoT AUSREP and DoT Stevedoring, Cargo and Labour Statistics (SCALS); and
- service records from the ABS Sea and Air Cargo Commodity Statistics (SACCS).

The conference/non-conference classification reported in SACCS has been used as the basis of the categorisation in Table IV.1 and all of the tables in this report which list conference and non-conference characteristics or performance. Multiple classifications signify that the classification was changed by the ABS in the 1983-84 period. Ships which operated as conference and non-conference simultaneously were classified in SACCS (and consequently in this report) as conference. There are some instances of inconsistent classification between the information presented in Table IV.1 and Appendixes II and III; all the identified inconsistencies are indicated.

Where ships called at Australia and New Zealand and returned to Australia before departing for more distant trade areas such as Europe, only one call to Australia was recorded if the voyage to New Zealand did not involve trans-Tasman cargo movement.

The predominant trade routes served were identified by determining the trade routes on which 75 per cent or more of Australian cargo was carried by each ship.

TABLE IV.1 LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)*	
				Inward	*Outward*
ACE Pioneers	7530391	C[e]	2	1	9, 3
ACT 1	6901426	C	3	5	5, 1
ACT 2	6913077	C	2	5	5, 1
ACT 3	7052909	C	4	5	5
ACT 4	7108162	C	4	5	5
ACT 5	7123382	C	4	5	5
ACT 6	7226275	C	4	5	5
ACT 7	7416923	C	3	1	1, 5
Albany	7400998	N	2	11	11
Allunga	7041211	C	5	4	4, 12
Ambrosia	7909516	N	3	1, 5	1, 5
Anna Bakke	7129362	C	6	3	3
Annie Johnson	6916885	C[e]	6	2, 9, 4	9, 2, 4
Anro Asia	7631456	C	9	9	9
Anro Australia	7619410	C	8	9	9
Anro Temasek	7619422	C	8	9	9
Antwerpen[b]	7802952	N	3	1, 5	..
Arafura	7015913	C	6	3	3
Ariake	7417551	C	7	3	3
Aristagelos[a c]	7529225	C[e]	1	..	9
Asia No. 14	7917147	N	4	4	4

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)* *Inward*	*Outward*
Asian Eagle	8214384	C[e]	2	d	d
Asian Jade	7718046	C	8	2	2
Asian Pearl	7718034	C	7	2	2
Australia Star	7636676	C[e]	6	7	8, 7
Australian Eagle	8104474	N	4	1	9
Australian Emblem	7373171	C	9	3	3
Australian Endeavour	6916110	C	4	1	1
Australian Enterprise	6917750	C	8	2	2
Australian Escort	7373391	C	10	3	3
Australian Explorer	7015389	C	7	2	2
Australian Exporter	7211335	C	4	5	5
Australian Searoader	6926529	C	9	3	3
Australian Venture	7416911	C	4	1	1, 5, 10
Bai He Kou	7822184	N	6	2	2
Barranduna	7208297	C	5	1	1
Boogabilla	7705934	C	4	1	1
Botany Bay	6907016	C	3	1	1
Brussel	7817608	N	3	1	5
Bunga Angsana	7227243	C	10	9	9
Bunga Kantan	8001543	C[e]	2	1	1
Bunga Teratai	7129051	C	10	9	9

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)*	
				Inward	*Outward*
Canberra Maru	7820095	C	6	3	3
Capitaine Tasman	6400836	N	9	11	11
Capitaine Wallis	6406488	C	10	12	12
Cattleya	7512698	C[e]	4	3	2, 3, 9
City of Durban	7510896	C	2	1	1
Clydebank	7341362	N	2	11	1
Columbus America	7109374	C	5	5	5
Columbus Australia	7052947	C	4	5	5
Columbus Canterbury[c]	7800162	C	1	5	5
Columbus Louisiana	7800150	C	4	5	5
Columbus New Zealand	7039610	C	4	5	5
Columbus Queensland	7800174	C	5	5	5
Columbus Victoria	7508702	C	7	4	4
Columbus Virginia	7508726	C	7	4	4
Columbus Wellington	7508714	C	7	4	4
Coral Chief	7622120	C[f]	13	11	11
Cornelis Verolme	7925508	N	2	1	5
Darwin Trader	7010987	C	18	10	10
Deloris	7531448	N	2	1	5
Diamond Star[a c]	7520217	N	1	..	3, 9
Dilkara	7107766	C	6	4	4

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)*	
				Inward	*Outward*
Don Antonio Botelho	7632670	N	3	12, 9	12
Duke Star	7627314	C[e]	5	5	9, 3, 2
Dunedin	7820461	C[e]	5	5	5
Eigamoiya	6904507	N	7	12	12
Eigigu	7221354	N	4	9	12
Elbeland[c]	7720908	N	1	5	6
Elizabeth Bakke	7117541	C	8	3, 2	3, 2
Ellen Hudig	7925493	N	3	1	5
Encounter Bay	6818461	C	4	1	1
European Eagle[c]	8104498	N	1	1	9
Falstria	7105926	C[e]	4	4, 9	9, 4
Family Irini[b] [c]	8120820	N	1	6	..
Far East Bridge	8211344	C	4	3, 2	3
Fjord Star	8028876	C, N	7	4	12
Flinders Bay	6822541	C	3	1, 9, 5	1
Forthbank[c]	7320227	C[f]	1	11, 1	1, 5
Forum New Zealand	7725283	N	11	10	10, 11
Fremantle Enterprise	7718917	C	7	3, 2	3
Fremantle Venture	7718905	C	5	3	3
Fua Kavenga	7820538	N	13	12	12
Gamzat Tsadasa	7025994	N	2	3, 2	3, 2

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)*	
				Inward	*Outward*
Gdansk II	7931777	N	5	1	1
Georgiy Piasetskiy	8107282	C	3	1	1
Grand Wood[a c]	8103470	N	1	..	3, 9
Hakuba Maru	7900699	C	8	3, 4	3
Haruna Maru	6820141	C[f]	7	9	9, 8
Helen	7531450	N	3	1, 5	5
Heroj Kosta Stamenkovic	7734038	C[f]	3	1, 6	1
Heroj Paic	7644609	C[f]	2	6, 1	1
Hyogo Maru	7320435	C	9	3	3
Hyundai No. 11	7917123	N	2	4	4
Hyundai No. 15	8022523	N	2	4	4
Ile De Lumiere	5086217	C	9	12	12
Incotrans Progress	7811111	C	2	9, 5	1, 9
Island Container	6409715	N	6	2	2
Ivybank	7341374	N	2	11	1
Jayakarta	7920560	C	2	9	9
Jewon[c]	7621188	C[e]	1	4	4, 2
Kabirdas	7911222	C[f]	5	7, 9	7, 9
Kangourou	7016931	C	5	1	1
Katowice II	7931753	N	4	1	1
Khudozhnik Ioganson[b]	7532765	N	6	3, 2	..

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)* Inward	Outward
Khudozhnik Zhukov	7614317	N	6	3, 2	3
Kolle D[g]	7235082	N	7	12	3
Konstantin Paustovskiy	7019799	N	3	3, 2	3, 2
Korean Loader	7211878	C	10	3	3
Kumul Express	8126159	C, N	11	11	11
Lakes Star	8028864	C, N	7	4	12
Lalandia	7228089	C	5	1	1
Lillooet	7720415	C	6	4	4, 12
Lily Star[c]	8220072	N[e]	1	4	12
Lloyd Australia[c]	7822770	N	1	5	5
Lloyd Bakke[c]	5210038	C	1	2, 3	3, 2
Lloydiana	7218371	C	5	1	1
Logistic Ace	7401930	C[f]	7	9	11
Macassar Maru[c]	7036797	C	1	3	3
Mairangi Bay	7417563	C	4	1	1
Maksim Mikhaylov	7614379	N	6	3, 2	3, 2
Malmros Monsoon	7347512	C[e]	3	5	5, 1
Margaret Johnson	6929258	N	2	4, 9, 2	9, 4
Meadowbank	7233759	C	2	1	1
Mediterranean Eagle	8027729	N	4	1	9
Meonia	7125718	N	2	4, 9	9, 4

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)* *Inward*	*Outward*
Messaria[c]	7125328	N	1	d	d
Moreton Bay	6825880	C	4	1	1
Mosman Star	7921954	C, N	6	4	12
Muscat Bay	7413608	C[e]	7	7	8, 7
Nagara	7347524	C[f]	4	5	5, 1
Neckar Express	7121671	C	2	1	1
Nedlloyd Kembla	7046039	N	3	5	6
Nedlloyd Kimberley	7036022	N	4	4, 6	6, 4
Nedlloyd Kingston	7046924	N	3	5	6
Nedlloyd Kyoto	7024275	C[e]	3	7	7
New Zealand Caribbean	7817115	C[e]	4	5, 10, 4	5, 4, 10
New Zealand Pacific	7417587	C[e]	5	1	1, 10
New Zealand Star	7636688	C[e]	6	7, 8	8, 7
New Zealand Trader	7813822	C	7	10	10
Nichigoh Maru	7908548	C	8	3	3
Nimos	7640005	C	13	11	11
Ocean Fame	8109888	N	3	4	4
Oriental Premier	7722255	C	4	2	2
Oriental Prince	7722243	C	4	2	2
Papuan Chief	7622118	C	13	11	11
Paralla	7027576	C	5	4	4

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)* *Inward*	*Predominant trade route (number)* *Outward*
Pearl Island	7026338	N	4	2, 3	2
Pera	6928113	N	3	11	11
Plata	7726914	C, N	6	9	8, 9
Potoi Island	6809123	N	6	2	2
Poznan	7931765	N	4	1	1
Prestigious[c]	7609714	N	1	1, 5	3
Pyotr Masherov	8030893	C	2	d	d
Ragna Bakke	5289132	C	2	3, 2	9, 3, 2
Ramdas	7729617	C[e]	4	7	7
Ravidas	7729588	C[e]	4	7	7, 9
Remuera Bay[c]	7218383	C	1	1	5
Resolution Bay	7417575	C	4	1	1
Rosie D[g]	7615165	N	3	12	9, 12
Safocean Mildura	6728020	N	7	6	6
Safocean Nederburg	6714794	N	5	6	6
Samoa[c]	7602182	N	1	4, 9	9, 4
Sargodha[c]	7602194	N	1	4, 9	9, 4
Saxon Star[c]	7427697	C	1	4	4
Sea King No. 1[c]	7372505	C[e]	1	3	3, 2
Sea Queen No. 1[c]	7509861	N	1	3	9
Shinkawa Maru	7302287	C	6	3	3

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)* *Inward*	*Outward*
Siena[c]	7602223	N	1	4, 9	9, 4
Simba	7602211	N	2	4, 9	9, 4, 2
Sinaloa[c]	7602209	N	1	4, 9	9, 8, 4
Singapore Eagle	8104486	N	4	1	9, 1
Skulptor Konenkov	7383865	C	4	1	1
Skulptor Vuchetich	7383853	C	4	1	1
Skulptor Zalkalns	7500841	C	2	1	1
Sloman Najade	7619305	N	3	5	5
Sloman Nereus	7619317	N	4	5	5, 6
Stubbenhuk	7619331	N	2	5	5
Sydney Express	7011137	C	5	1	1
Tackler Dosinia[c]	7815686	N	1	10	9
Tai Chun[c]	7639513	N	1	11	2
Tai Ping Kou	7822172	N	5	2	2
Tamara	7320253	C[f]	4	5	1, 5
Tarago	7229423	C	5	1	1
Taufau[a c]	7427702	N	1	..	1
Tolaga Bay	7510901	C	4	1	1
Tourcoing	7705946	C	4	1	1
Tropic Dawn	7119692	N	8	6	6
Tropic Star	7220116	N	8	9	9

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	*Lloyd's No.*	*Conference or non-conference*	*No. of departures*	*Predominant trade route (number)*	
				Inward	*Outward*
Tyrusland[c]	7718503	C[f]	1	5	5, 1
Union Dunedin	7722621	N	8	10	10
Union Rotoiti	7366233	N	17	10	10
Union Sydney	7718450	N	12	10	10
Venture Star	7915967	C[f]	5	4	12
Vili	6700925	N	5	12	12
Vishva Kaumudi	7617864	C[f]	5	7	7
Vishva Nandini	7617852	C[f]	5	7	7
Waalekerk[c]	6803325	N	1	6	6, 7
Waitaki	7218498	N	7	10	10
Westermuhlen	7724174	N	2	2, 9, 1	2, 3, 9
Western Link[a, c]	7808413	N	1	..	2, 3
Willowbank	7817103	C[e]	6	5	5
Wissekerk	6713075	N	2	7	7
World Katori[a, b]	7619604	N	3	..	..
Wroclaw	7931789	N	4	1	1
Xiao Shi Kou	7822160	N	5	2	2
Zhi Jiang Kou	7822158	N	6	2	2
Zim Brisbane	8209602	N	4	2, 1, 9	2, 3
Zim Eilat	8100662	N	3	2, 1, 9	2, 9, 3
Zim Houston[c]	7713709	N	1	2, 1	1, 2, 3

TABLE IV.1 (Cont.) LINER SHIPS SERVING AUSTRALIAN TRADES, 1983-84

Ship	Lloyd's No.	Conference or non-conference	No. of departures	Predominant trade route (number) Inward	Outward
Zim Kaohsiung	8128860	N	3	2, 9, 3	2, 9, 3, 1
Zim Melbourne	8203581	N	3	2, 1, 9	2, 3
Zim Singapore	8100650	N	4	2, 1, 9	2, 1, 3
Zim Sydney	8203593	N	2	2, 1, 9	3, 2, 9
Zim Trieste	8128872	N	3	2, 1, 9	3, 2, 9

a. No inward cargo.
b. No outward cargo.
c. Excluded from the 'fleet' analysed in this report.
d. Not assigned to a trade route because cargo not recorded in the ABS Sea and Air Cargo Commodity Statistics.
e. Inconsistent classification between SACCS and that implied in Appendix II and III.
f. Inconsistent classification in SACCS because ship is simultaneously non-conference to or from some trade areas.
g. Operated mainly as a non-liner ship.

C Conference
N Non-conference

.. Not applicable.

Source Prepared by BTE.

APPENDIX V PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS BY TRADE AREA, 1983-84

The ports served by operators were identified by examining Lloyd's Voyage Record listings of the ports of call for the liner ships scheduled in Table IV.1. Table V.1 schedules the ports served by conference and non-conference ships in the 1983-84 financial year.

The list of ports is cumulative and should not be interpreted as applying to each individual conference or non-conference operator. In addition, some of the ports may be served only on inducement and therefore are not visited on a regular basis.

An indication of the frequency of visits at these ports was obtained from a detailed analysis of ship itineraries for two months of the 1983-84 year. Ports having (on average) four or more visits a month are indicated with a double asterisk and ports having at least two but less than four visits are indicated with a single asterisk.

The same system is used to indicate the frequency of calls by conference and non-conference operators at Australian and overseas ports. The number of visits, however, relates to all services by a ship and in the case of Australian ports may cover more than one trade area. Therefore the Australian ports connected could only be listed by Geographical Region.

TABLE V.1 PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

Geographical region	*Australian ports connected*		*Overseas ports*			
	Conference	*Non-conference*	*Trade area number*	*Trade area*	*Conference*	*Non-conference*
Europe/Mediterranean	*Adelaide	Adelaide	1a	Europe and North	Antwerp	Amsterdam
	**Botany Bay	**Botany Bay		Mediterranean		*Antwerp
	*Brisbane	**Brisbane			*Barcelona	*Barcelona
	*Burnie	Bunbury			Bilbao	Bremerhaven
	Fremantle	**Fremantle			*Bremen	Cadiz
	Geraldton	*Geraldton			*Bremerhaven	Dunkirk
	Hobart	**Melbourne			*Dunkirk	Emden
	Launceston	**Sydney			*Flushing	*Felixstowe
	**Melbourne				**Fos	*Fos
	Newcastle				Gdansk	*Genoa
	Portland				**Genoa	Greenock
	**Sydney				*Gothenburg	**Hamburg
	Townsville				**Hamburg	Havre
	Weipa				Havre	Hoboken
					Koper	Hull
					Kotka	*Koper
					Leghorn	*Leghorn
					*Leningrad	*Lisbon
					*Lisbon	Liverpool
					**London	*Marseilles
					Marseilles	*Piraeus
					*Oslo	Port Jerome
					*Piraeus	*Rotterdam
					Rostock	Rouen

TABLE V.1 (Cont.) PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

Geographical region	*Australian ports connected*		*Overseas ports*			
	Conference	*Non-conference*	*Trade area number*	*Trade area*	*Conference*	*Non-conference*
Europe/Mediterranean (Cont.)			1a (Cont.)	Europe and North Mediterranean	*Rotterdam	*Salerno
					St Louis du Rhone	*Southampton
					St Nazaire	*Spezia
					Southampton	Temse
					Szczecin	*Trieste
					Trieste	*Venice
					Venice	Zeebrugge
					*Verdon	
					*Zeebrugge	
			1b	North Africa and East Mediterranean	Izmir	Alexandria
						*Limassol
						Port Said
East Asia	**Botany Bay	*Botany Bay	2a	Philippines, Hong Kong and Taiwan	**Hong Kong	**Hong Kong
	*Brisbane	**Brisbane			**Kaohsiung	*Kaohsiung
	Bunbury	*Fremantle			**Keelung	*Keelung
	*Burnie	*Hobart			**Manila	*Manila
	**Fremantle	**Melbourne				
	Geraldton	Newcastle				
	**Melbourne	**Sydney				
	Port Hedland					
	Port Kembla					
	*Sydney					
	Townsville					

TABLE V.1 (Cont.) PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

Geographical region	Australian ports connected: Conference	Australian ports connected: Non-conference	Trade area number	Trade area	Overseas ports: Conference	Overseas ports: Non-conference
East Asia (Cont.)	Nil		2b	China	Nil	*Shanghai *Xingang
	Nil		2c	Eastern USSR	Nil	Vladivostok *Vostochny
Japan/Korea	**Botany Bay **Brisbane Bunbury **Fremantle Geraldton **Melbourne Newcastle *Port Hedland Port Kembla Sydney *Townsville	*Brisbane Botany Bay Hobart *Melbourne Newcastle *Sydney	3a	Japan	Kashima *Kobe Mizushima *Moji Nagasaki **Nagoya Niihama **Osaka Sakai Tsuenishi **Yokkaichi **Yokohama	*Kobe *Nagoya Osaka Shimizu *Yokohama
			3b	South Korea	*Busan	Busan
North America	*Adelaide **Botany Bay **Brisbane Burnie *Fremantle	*Adelaide *Botany Bay **Brisbane Bunbury *Burnie	4a	West Coast North America	*Columbia River Coos Bay *Honolulu **Los Angeles *New Westminster	**Columbia River **Coos Bay *Crofton Duncan Bay Honolulu

TABLE V.1 (Cont.) PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

	Australian ports connected		*Overseas ports*			
Geographical region	*Conference*	*Non-conference*	*Trade area number*	*Trade area*	*Conference*	*Non-conference*
North America	Launceston	Exmouth	4a	West Coast North	**San Francisco	Kitimat
(Cont.)	**Melbourne	**Fremantle	(Cont.)	America	*Tacoma	**Los Angeles
	*Newcastle	*Geraldton			Vancouver	Nanaimo
	**Sydney	*Hobart			Victoria	Newport
		*Launceston				New Westminster
		**Melbourne				Olympia
		Newcastle				*Port Alberni
		Port Hedland				Powell River
		**Sydney				San Diego
		Thevenard				**San Francisco
		*Westernport				Seattle
						*Tacoma
						Tahsis
						*Vancouver
			4b	East Coast North	*Baltimore	*Charleston
				America	*Charleston	Galveston
					*Halifax	*Gulfport
					**Hampton Roads	*Hampton Roads
					*Houston	*Houston
					*New Orleans	Jacksonville
					**New York	*New Orleans
					**Philadelphia	New York
					*Port Everglades	*Philadelphia
					*Saint John	*Tampa
					*Savannah	

TABLE V.1 (Cont.) PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

	Australian ports connected		*Overseas ports*			
Geographical region	*Conference*	*Non-conference*	*Trade area number*	*Trade area*	*Conference*	*Non-conference*
Latin America Caribbean	Botany Bay	Botany Bay	5	Latin America and Caribbean	Barbados	*Paranagua
	Brisbane	Brisbane			*Fort de France	*Rio de Janeiro
	Launceston	Burnie			Maracaibo	*Rio Grande
	*Melbourne	Fremantle			Montevideo	*Santos
	*Sydney	Launceston			Port of Spain	
		*Melbourne			Rio de Janeiro	
		*Sydney			Rio Grande	
					St Anna Bay	
					Santos	
Africa	Adelaide	*Adelaide	6a	West Africa	Las Palmas	Las Palmas
	*Botany Bay	Botany Bay			Tenerife	
	*Brisbane	Brisbane				
	*Burnie	Burnie				
	**Fremantle	Darwin				
	Hobart	**Fremantle				
	Launceston	Hobart				
	*Melbourne	Launceston				
	Newcastle	**Melbourne				
	*Sydney	Port Kembla				
	*Townsville	**Sydney				
		Weipa				
			6b	South Africa Mauritius and Reunion Island	Cape Town	*Cape Town
					Durban	**Durban
					Port Elizabeth	*Mauritius

TABLE V.1 (Cont.) PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

Geographical region	*Australian ports connected*		*Overseas ports*			
	Conference	*Non-conference*	*Trade area number*	*Trade area*	*Conference*	*Non-conference*
Africa (Cont.)			6b (Cont.)	South Africa Mauritius and Reunion Island		*Port Elizabeth Reunion Island Richards Bay
			6c	East Africa and Seychelles	Beira Dar-es-Salaam Mombasa	Dar-es-Salaam Mombasa
			6d	Red Sea Ports	Dammam **Jeddah	Aden Aqaba Dammam Hodeidah *Jeddah Port Sudan
South Asia/ Middle East Gulf	Adelaide Botany Bay Brisbane Burnie **Fremantle **Melbourne Newcastle *Port Pirie Sydney Townsville	*Adelaide **Fremantle Hobart *Melbourne *Port Pirie *Sydney	7a	West India and Sri Lanka	*Bombay *Cochin *Colombo Kandla	Cochin Colombo

TABLE V.1 (Cont.) PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

	Australian ports connected		*Overseas ports*			
Geographical region	*Conference*	*Non-conference*	*Trade area number*	*Trade area*	*Conference*	*Non-conference*
South East Asia/Middle East Gulf (Cont.)			7b	East India and Bangladesh	Madras *New Tuticorin	Calcutta *Chalna *Chittagong *Haldia Kakinada *Madras Madras Roads New Tuticorin Tuticorin
			7b	Pakistan	*Karachi	Nil
			7d	Middle East Gulf	*Bahrain *Dubai *Kuwait *Mina Qaboos	Nil
South East Asia	**Adelaide **Botany Bay **Brisbane **Burnie **Fremantle	**Botany Bay *Brisbane Darwin *Fremantle Geraldton Geelong Hobart	8	South East Asia	*Jakarta **Penang **Port Kelang *Singapore **Singapore Roads	Brunei Jakarta Johore Bahru Kota Kinabalu Kuching

TABLE V.1 (Cont.) PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

	Australian ports connected		*Overseas ports*			
Geographical region	*Conference*	*Non-conference*	*Trade area number*	*Trade area*	*Conference*	*Non-conference*
South East Asia	**Melbourne	*Melbourne	8	South East Asia	Surabaya	Muara Harbour
(Cont.)	Newcastle	Newcastle	(Cont.)			Pasir Gudang
	*Port Pirie	Port Kembla				*Port Kelang
	**Sydney	*Sydney				Singapore
						**Singapore Roads
New Zealand	**Botany Bay	Adelaide	9	New Zealand	*Auckland	*Auckland
	Fremantle	Botany Bay			*Dunedin	*Dunedin
	Melbourne	*Brisbane			*Lyttelton	**Lyttelton
		*Hobart			*Wellington	*Mount Maunganui
		Melbourne				*Napier
		**Sydney				*Nelson
						Wellington
Pacific Islands/	Adelaide	Adelaide	10a	Papua New Guinea	Alotau	Honiara
Papua New Guinea	Albany	Albany		and Solomon	*Honiara	Kimbe
	Botany Bay	Botany Bay		Islands	*Kavieng	*Lae
	**Brisbane	**Brisbane			Kimbe	*Madang
	Cairns	Bunbury			*Lae	**Port Moresby
	Geelong	*Geelong			Madang	*Rabaul
	Hobart	Geraldton			Oro Bay	Tulagi
	Mackay	Hobart			*Port Moresby	
	**Melbourne	Melbourne			*Rabaul	
	Newcastle	Newcastle			Wewak	

TABLE V.1 (Cont.) PORTS SERVED BY CONFERENCE AND NON-CONFERENCE OPERATORS, BY TRADE AREA, 1983-84

Geographical region	*Australian ports connected*		*Overseas ports*			
	Conference	*Non-conference*	*Trade area number*	*Trade area*	*Conference*	*Non-conference*
Pacific Islands/	Port Kembla	Portland				
Papua New Guinea	**Sydney	**Sydney				
(Cont.)	Thursday Island	Thursday Island				
			10b	South Pacific	Apia	Apia
					Funafuti Island	Funafuti Island
					*Kieta	*Lautoka
					Lautoka	*New Caledonia
					New Caledonia	*Nukualofa
					Nukualofa	Pago Pago
					Pago Pago	Papeete
					Port Vila	*Port Vila
					Suva	*Suva
					Vavau	Tarawa Island
	Nil		10c	Micronesia, Mariana Islands, Marshall Islands and Nauru	Nil	Guam
						Majuro
						Nauru
						Saipan Island
						Truk
		Nil	10d	Australian Island Territories	Norfolk Island	Nil

* Two but less than four visits during a two month analysis period.
** Four or more visits during a two month analysis period.

Source Prepared by BTE.

APPENDIX VI TYPICAL CARRIER AND CUSTOMER COSTS

In this appendix the method of determining carrier and customer costs associated with liner shipping operations is outlined, and details of typical costs are presented. The costs are expressed in terms of the unit cost of moving a 20 foot container (TEU) from a stevedoring terminal between Australia and a stevedoring terminal in another trade area by a direct route. The synthesised costs are used in Chapters 8 and 9 as indicative average costs and in Chapter 10 as reference costs of typical ships for comparison with estimated costs after technological and service developments.

The carrier costs are those costs incurred by the shipping company, including the capital and operating costs of the ship and the loading, voyage and agency charges levied. Customer costs are the additional costs incurred by the customer at and between ports for inventory investment and cargo insurance.

COSTING MODEL

The operational characteristics of the shipping route selected for analysis, the component costs and the costs per unit of cargo, are estimated using the BTE's model for simulation of ship operations. The general nature of the model and its inputs and outputs are described in the following paragraphs.

Information on ships, cargo, loading rates, ports, fuel and supplies are used to calculate the costs per container, or per tonne of bulk cargo for a round voyage.[1] All capital and operating costs and charges borne by the ship operator are examined for a specified analysis period, allowing for ship and container replacement as necessary. All costs incurred over the analysis period and the initial and salvage values of the ships and containers are discounted to the base year (start of the analysis period) and allocated across

1. The term 'voyage' in this study refers to the combined inward and outward leg of a ship's journey.

all voyages according to their durations. The cost of inventory is calculated using the same interest rate.

The quantities of cargo and stowage factors are used to derive the average costs per TEU per voyage for each selected trade. All costs are in financial terms and no attempt is made to segregate transfer payments.

Model input

Inputs to the model include ship characteristics, costs, route characteristics and the freight task.

Input ship characteristics include the number of ships on a trade and in each consortia. The parameters used to describe a ship in the model are those relating to the characteristics of a so called 'typical' ship for that trade. The 'typical' ship type was generally taken to be that which was most common on the trade, and its characteristics were medians of the characteristics of those ship types. These characteristics included capacity and age. The operating speed of typical ships on all trades was taken to be 19 knots.

Input costs include the market value of ships (of each type, capacity and age) and of containers, costs of stevedoring, usage of ports and the value of cargo carried (for determining insurance and inventory costs). Route details include distances, number of ports visited and the use of canals. Input cargo data include the inward and outward tonnages, the proportions requiring refrigeration and any requirement for transhipping.

Model output

The output of the model includes total costs and cost components, voyage details and cargo details. Sub-total costs per TEU and per tonne of bulk cargo per voyage are given for the broad component categories of fuel costs, loading costs, capital costs, agency charges, voyage charges and operating costs.[2] Separate data are also available for the many components of these costs including capital costs for ships and containers, voyage charges for wharfage and separate operating costs for crew and for administration and management.

2. Voyage charges comprise port and light dues, canal and tug charges.

Output cargo details include the number of loaded and empty containers, and the quantity of bulk cargo carried on each voyage. Output voyage details include the number of voyage days, ship operating speed and the number of days at sea and at port.

APPLICATION OF THE MODEL

The following paragraphs explain the principles adopted in the application of the model for the purposes of this report. The fleet characteristics were based on information contained in Lloyd's Register of Ships. For the ANL consortia, the principal changes announced in July 1984 (On Watch, July 1984) were assumed to occur in the years nominated by ANL as part of their rationalization program. It was assumed that no future changes would occur in the general composition of the fleets of the other operators. Appendix IV shows details of the fleets by trade. The number of ships in a trade and in each consortia was kept constant over the analysis period by assuming progressive replacement with new ships of the equivalent size and type, as ships reached the end of their life. A life of 15 years was adopted for all ship types.

For each selected trade other than New Zealand, the typical ship was based on the conference fleet. For the New Zealand trade, the typical ship was based on the non-conference fleet, since the major shipping company on this trade is a non-conference operator.

Except where otherwise noted, the characteristics of the typical ship assumed to be representative of the fleet in each trade are presented in Table VI.1. The corresponding typical ship characteristics for ships used by ANL consortia are given in Table VI.2.

The values of parameters used in the determination of costs are presented in Table VI.3. Some of the main assumptions used to establish the parameters are discussed below.

Route lengths and itineraries were based on those most commonly used as indicated in Lloyds Voyage Record (1983 a to d) and the *Daily Commercial News*.

For the Australia/Europe and North Mediterranean trade, a synthesised route which excluded New Zealand was used, despite the fact that conference ships also trade between Europe and New Zealand, because of the uncertainty about the contribution of New Zealand cargoes.

TABLE VI.1 CHARACTERISTICS OF TYPICAL SHIPS

Trade area	*Number of ships in trade*	*Characteristics* *Type*	*Capacity (TEUs)*	*Age (years)*	*Crew size*[a]
Europe and North Mediterranenan	31	Container	1 530	7	36
Japan	15	Container	1 258	8	28
East Coast North America	13	Container	1 300	8	39
West India	5	General cargo	300	8	32
New Zealand	7	Ro-ro	510	7	28

a. Australian crew costs assumed in the analysis.

Note All typical ships were assumed to have slow speed diesel engines and an operating speed of 19.0 knots. Typical ships are representative of conference fleets on each trade except for New Zealand where the typical ship is representative of non-conference ships.

Sources ANL personal communication. DoT (1984a). Lloyds Register of Shipping (1983).

TABLE VI.2 CHARACTERISTICS OF TYPICAL ANL SHIPS

Trade area	*Characteristics* *Type*	*Capacity (TEUs)*	*Age (years)*	*Crew size*
Europe and North Mediterranean	Container	1 700	8	36
Japan	Con-ro	1 453	10	28
New Zealand	Container	410	7	28

Note All ships were assumed to have slow speed diesel engines and an operating speed of 19.0 knots.

Sources ANL, personal communication. DoT (1984a). Lloyds Register of Shipping (1983).

TABLE VI.3 INPUT PARAMETER VALUES USED TO ESTIMATE TYPICAL COSTS

Parameter	*Values common to all selected trades*	*Selected trades*					*Comments and references*
		Europe and North Mediterranean	*Japan*	*East Coast North America*	*West Coast India*	*New Zealand*	
Voyage							Distances from Caney and Reynolds (1981).
Voyage length (nautical miles)	..	24 985	10 578	23 162	12 299	4 299	Route determined by analysis of ship movements from Lloyds Voyage Record (1983a,b,c and d). ANL, personal communication.
Number of ships							
On routes	..	31	15	17	3	7	DoT (1984a)
In consortia	..	5	5	5	4	3	DoT (1984a)
Number of ports visited							
Australia	..	5	3	3	3	1	Lloyds Voyage Record
Overseas	..	7	4	6	2	6	(1983a,b,c,d and e)
Speed (knots)	19						ANL, personal
Ships							
Ship work days per year	359						
Crew	..	36	28	28	32	28	Personal communication

TABLE VI.3 (Cont.) INPUT PARAMETER VALUES USED TO ESTIMATE TYPICAL COSTS

Parameter	*Values common to all selected trades*	*Selected trades*					*Comments and references*
		Europe and North Mediterranean	*Japan*	*East Coast North America*	*West Coast India*	*New Zealand*	
Ships (Cont.)							
Fuel ($/tonne)							Lloyds Ship Manager (1985), Shell International Trading Company Marine fuels
Main engine (380 cst)	..	192	188	167	185	217	
Auxiliary (MDO)	..	221.00	243.00	247.00	294.25	339.00	
Fuel consumption rates	185[b]						
Crew cost/crew member/year ($A)	85 000						ANL, personal communication
Cargo							
Percentage of outward container cargo							
Empty containers							
Australia	..	9.20	15.77	12.70	5.20	12.44	DoT (1984b)
Overseas	..	3.16	12.46	12.70	-	4.12	DoT (1984b)
Reefers							
Australia	..	8.90	19.27	50.30	-	9.67	Based on data from Chapter 3
Overseas	..	7.59	13.10	-	-	9.19	

TABLE VI.3 (Cont.) INPUT PARAMETER VALUES USED TO ESTIMATE TYPICAL COSTS

Parameter	*Values common to all selected trades*	*Selected trades*					*Comments and references*
		Europe and North Mediterranean	*Japan*	*East Coast North America*	*West Coast India*	*New Zealand*	
Cargo (Cont.)							
Value of outward cargo ($A per TEU)							
Australia	..	32 410	22 320	30 781	16 970	27 320	Based on data
Overseas	..	34 490	53 230	50 665	29 285	33 170	from Chapter 3
Weight of outward cargo (tonnes per TEU)							
Australia	..	14.25	14.84	13.76	13.00	14.34	Based on data
Overseas	..	13.99	11.33	13.58	14.60	10.80	from Chapter 3
Revenue from outward cargo ($A)							
Australia	..	3 222	2 881	5 112	2 604	2 189	Based on data
Overseas	..	3 679	3 335	5 565	4 796	2 057	from Chapter 8
Agency rates as percentage of freight rate							ANL personal communication
Inward cargo	2.5						
Outward cargo	5						
Transhipped outward cargoes	1.34						
Transfered inwards cargo	1						
Light dues	0.55[c]	0.553[d]	-	-	-	0.0631[d]	ANL personal communication and Galbraith (1981)

TABLE VI.3 (Cont.) INPUT PARAMETER VALUES USED TO ESTIMATE TYPICAL COSTS

Parameter	*Values common to all selected trades*	*Selected trades:* *Europe and North Mediterranean*	*Japan*	*East Coast North America*	*West Coast India*	*New Zealand*	*Comments and references*
Cargo (Cont.)							
Container movements (TEUS)							
Full dry							
Inward	..	1 168	802	794	122	330	Based on data from
Outward	..	1 104	725	451	240	405	Chapter 4
Empty dry							
Inward	..	-	-	116	-	16	Based on data from
Outward	..	124	176	154	13	-	Chapter 4
Full reefers							
Inward	..	56	6	4	-	36	Based on data from
Outward	..	120	215	613	-	3	Chapter 4
Empty reefers							
Inward	..	40	115	-	-	-	Based on data from
Outward	..	-	-	-	-	42	Chapter 4
Ports							
Days not stevedoring							
Australia	..	0.64	0.80	1.10	0.69	0.43	DoT (1984b)
Overseas	..	0.64	0.80	1.10	0.69	0.43	Assumed identical to Australia
Loading/unloading							
Gross tonnes/day							DoT (1984b)
Australia	..	3 400	3 600	3 000	1 200	2 600	
Overseas	..	6 800	7 200	6 000	1 200	2 600	

TABLE VI.3 (Cont.) INPUT PARAMETER VALUES USED TO ESTIMATE TYPICAL COSTS

Parameter	*Values common to all selected trades*	*Selected trades* Europe and North Mediterranean	*Japan*	*East Coast North America*	*West Coast India*	*New Zealand*	*Comments and references*
Ports (Cont.)							
Stevedoring, ($/TEU)							
General							ANL personal communication
Australia	220						
Overseas		200	200	200	100	150	
Storage of reefer/ day ($/TEU)	18.70						Trans-Ocean Terminals, personal communication[a]
Stores loading ($/tonne)	50.00						
Fuel ($/tonne)	6.86						BP Australia, Ltd (1984)
Container cleaning, ($/TEU)							
Dry	35.00						Trans-Ocean Terminals, personal communications
Reefer	35.00						
General							
Period of anaysis (years)	15						
Interest rate (per cent)	10						
Ship life (years)	15						Stubbs (undated)
Container life (years)	12						Stubbs (undated)
Exchange rate (US$/$A)	0.815						Reserve Bank of Australia (1985a)

TABLE VI.3 (Cont.) INPUT PARAMETER VALUES USED TO ESTIMATE TYPICAL COSTS

Parameter	Values common to all selected trades	Selected trades: Europe and North Mediterranean	Japan	East Coast North America	West Coast India	New Zealand	Comments and references
Insurance costs on cargo as percentage of value of cargo per day of voyage	0.0002						

a. Data from Trans-Ocean Terminals obtained for 1.6.80 and inflated to 1985 prices using the private final consumption expenditure implicit price deflator (ABS 1984).
b. Consumption rates (g/kw hr), used for diesel ships 0 to 15 years old were 185, 192, 194, 195, 197, 198, 200, 201, 202, 203, 206, 209, 212, 214, 215, 216 respectively (Motor Ship 1984a).
c. Light dues in Australian dollars per net registered tons per 3 months.
d. Light dues in Australian dollars per net registered tons per 1 month.
e. Light dues in Australian dollars per gross registered tons per 3 months.

\- Nil or rounded to zero.
na Not applicable.

Note Input data for port and canal dues were based on information provided by ANL and also drawn from Galbraith (1981). This data was too extensive for inclusion in this Table.

Source Prepared by BTE.

The irregular and seasonal fluctuations in the liner task which have occurred in recent years are discussed in Chapter 4 and illustrated in Table 4.10. These variations in the magnitude and the pattern of the task govern the extent to which the capacity of a fleet can be utilized, and directly influence the costs per unit of freight. In selecting the capacity utilization for the typical ship, the use of some average of the historical task patterns was rejected. Instead, in order to avoid possible misrepresentation of future conditions which might have been caused by use of an unrepresentative average, it was decided to undertake the analyses using a fixed proportion (of 80 per cent) for the level of capacity utilization on all trades. This was accompanied by an assessment of the effect of varying the level of capacity utilization and a comparison with the capacity utilization levels which occurred in 1983-84.

The capacity utilization of the typical ship used was 80 per cent (or a weight utilization of 80 per cent where necessary to avoid exceeding the weight capacity of a ship) for the direction of the heavier cargo flow. The capacity utilization for the return direction was based on the ratio of capacity utilization between directions in 1983-84 using the data presented in Chapter 4. The per cent of reefer trade for each direction was also based on data in Chapter 4 and the proportion of empty container was based on DoT (1984b). Because of the basis used to determine typical current utilization, the values presented in Table VI.4 are not directly comparable with those in Chapter 6.

For the analysis of the effect of varying ships speed, voyage time was kept constant and hence level of service and acount of cargo carried also remained fixed. Increased ship speed effectively allowed greater time in port or additional ports of call to be included in a voyage. If the capacity utilization had not been kept constant, the effects of speed change would have been masked by the effects of changes in the share of the task on the capacity utilization. Care should be taken in the interpretation of the results of this analysis where a change in speed is likely to affect the share of the task.

For the analysis of ship number, size and frequency of service, 1983-84 loadings (cargo quantities, directional split, per cent of reefers, and per cent of empties) the data presented in Chapter 3 were used.

For the analyses of those developments which had the effect of reducing time in port, voyage time was kept constant. This had the effect of altering ship speed and costs at sea.

TABLE VI.4 COSTS AND LOADINGS FOR TYPICAL AND AVERAGE SHIPS

	Europe and North Mediterranean Trade					*Japan Trade*					*New Zealand Trade*[a]				
	Capacity utilization (per cent)		*Slot utilization (per cent)*		*Carrier cost ($)*	*Capacity utilization (per cent)*		*Slot utilization (per cent)*		*Carrier cost ($)*	*Capacity utilization (per cent)*		*Slot utilization (per cent)*		*Carrier cost ($)*
Case analysed	*Inward*	*Outward*	*Inward*	*Outward*		*Inward*	*Outward*	*Inward*	*Outward*		*Inward*	*Outward*	*Inward*	*Outward*	
Typical ship	80.0	80.0	82.6	88.1	2 697[b]	64.2	74.7	73.4	88.7	1 999	71.6	80.0	74.7	88.2	1 558
Typical ship using average 1983-84 loading[c]	52.8	54.9	69.2	68.4	3 617[b]	32.9	41.7	37.6	49.5	2 708	44.0	58.1	45.9	64.1	1 866
Average 1983-84[d]	52.8	54.9	69.2	68.4	4 149	32.9	41.7	37.6	49.5	3 048	44.0	58.1	45.9	64.1	1 864
ANL typical ship	80.0	80.0	82.6	88.1	2 724	64.2	74.7	73.4	88.7	1 985	71.6	80.0	74.7	88.2	1 560
ANL typical ship using average 1983-84 loading	52.8	54.9	69.2	68.4	3 787	32.9	41.7	37.6	49.5	2 879	44.0	58.1	45.9	64.1	1 947
ANL typical ship using average ANL 1983-84 loading	36.6	44.0	48.1	54.7	4 676	45.9	40.7	52.5	48.4	2 681	..	..	..	..	..
Average ANL 1983-84[d]	36.6	44.0	48.1	54.7	5 117	45.9	40.7	52.5	48.4	2 730	..	..	..	..	..

a. ANL, Shipping Corporation of New Zealand and Union Steamship Company of New Zealand ships only.
b. Synthesised route excluding New Zealand.
c. The 1983-84 task shared between ships in proportion to their capacity.
d. Average for all container, con-ro and ro-ro conference ships serving a trade as distinct from the typical ship used for the base case (except for New Zealand).

.. Not applicable.

Note Routes are based on the adopted itineraries except where otherwise noted.

Source Prepared by BTE.

When analysing the effects for ANL, a similar approach was used except that the ship characteristics were based on those of ANL rather than the whole conference fleet.

TYPICAL COSTS

Typical costs are representative of January 1985 price levels and are presented for the five selected trades in Table VI.5.

Details of carriers costs, capacity utilization and slot utilization are given in Table VI.4 for each trade for the typical ship and for other ship and loading cases including those of ANL. The differences between the ANL data and that for the ship chosen as representative of each trade are due not only to the ship sizes and ages but also to the routes followed.

TABLE VI.5 TYPICAL COSTS FOR THE SELECTED TRADES

	Cost per TEU per voyage ($)								
	Carrier								
				Voyage	*Operating*		*Agency*	*Total*	
Selected trade	*Fuel*	*Loading*	*Capital*	*charges*[a]	*Crew*	*Other*	*charges*	*Carrier*	*Customer*
Conference									
Europe[b] and North Mediterranean	598	474	441	338	314	273	259	2 697	867
Japan[b]	335	514	283	274	168	193	232	1 999	501
East Coast North America	639	539	756	196	429	309	398	3 266	961
West India[b]	961	360	381	140	917	332	251	3 342	293
New Zealand	315	411	144	176	207	147	160	1 560	276
Non-conference[c]									
Europe and North Mediterranean	688	477	509	358	358	303	259	2 952	798
Japan	424	516	275	271	223	200	212	2 121	426
East Coast North America	531	535	517	204	259	266	398	2 710	1 052
West India	..	..	..	..	..	..	..	..	..
New Zealand	262	410	222	169	175	161	160	1 558	231

a. Voyage charges comprise port and light dues, canal and tug charges.
b. Typical ships as defined previous except for those on New Zealand trade which are shown under non-conference classification (see text).
c. Simulated ships based on median characteristics of non-conference ships.

.. Not applicable.

Source Prepared by BTE.

APPENDIX VII DETAILED LISTING OF FLEET COMPOSITION AND CAPACITY

Tables VII.1 and VII.2 provide detailed information on the composition by ship type and nominal TEU, reefer and deadweight capacity respectively for the conference and non-conference ships serving Australia's major trades in 1983-84.

This information is summarised in Tables 5.3 and 5.6 respectively.

TABLE VII.1 DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING MAJOR AUSTRALIAN TRADES, BY SHIP TYPE, 1983-84

	Ship type																
	General cargo		*General cargo/ container*		*Ro-ro*		*Ro-ro/ container*		*Container*		*Bulk carriers*		*Others*		*Total*	
Trade area	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*
Europe and North Mediterranean																
Conference	3	7.3	2	4.9	9	22.0	3	7.3	23	56.1	1	2.4	-	-	41	100.0
Non-conference	2	10.5	1	5.3	4	21.0	-	-	7	36.8	2	10.5	3	15.8	19	100.0
Philippines, Hong Kong and Taiwan																
Conference	2	10.5	-	-	1	5.3	5	26.3	10	52.6	-	-	1	5.3	19	100.0
Non-conference	4	19.0	2	9.5	4	19.0	-	-	11	52.4	-	-	-	-	21	100.0
Japan																
Conference	4	20.0	1	5.0	1	5.0	2	10.0	9	45.0	2	10.0	1	5.0	20	100.0
Non-conference	1	12.5	1	12.5	-	-	-	-	6	75.0	-	-	-	-	8	100.0
South Korea																
Conference	3	25.0	-	-	-	-	3	25.0	6	50.0	-	-	-	-	12	100.0
Non-conference	3	42.9	1	14.3	-	-	-	-	3	42.9	-	-	-	-	7	100.0

TABLE VII.1 (Cont.) DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING MAJOR AUSTRALIAN TRADES BY SHIP TYPE, 1983-84

	Ship type																
	General cargo		*General cargo/ container*		*Ro-ro*		*Ro-ro/ container*		*Container*		*Bulk carriers*		*Others*		*Total*	
Trade area	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*
West Coast North America																
Conference	-	-	2	13.3	4	26.6	-	-	7	46.7	1	6.7	1	6.7	15	100.0
Non-conference	3	23.1	1	7.7	-	-	-	-	2	15.4	7	53.8	-	-	13	100.0
East Coast North America																
Conference	2	7.4	5	18.5	-	-	1	3.7	17	63.0	2	7.4	-	-	27	100.0
Non-conference	1	7.7	-	-	-	-	-	-	1	7.7	8	61.5	3	23.1	13	100.0
Middle East Gulf																
Conference	-	-	-	-	4	40.0	-	-	6	60.0	-	-	-	-	10	100.0
Non-conference	-	..	-	..	-	..	-	..	-	..	-	..	-	..	-	..
South East Asia																
Conference	5	22.7	1	4.5	1	4.5	3	13.6	9	40.9	2	9.1	1	4.5	22	100.0
Non-conference	6	35.3	2	11.8	-	-	-	-	8	47.1	1	5.9	-	-	17	100.0

TABLE VII.1 (Cont.) DISTRIBUTION OF CONFERENCE AND NON-CONFERENCE SHIPS SERVING MAJOR AUSTRALIAN TRADES BY SHIP TYPE, 1983-84

	Ship type																
	General cargo		*General cargo/ container*		*Ro-ro*		*Ro-ro/ container*		*Container*		*Bulk carriers*		*Others*		*Total*	
Trade area	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*	*Number of ships*	*(per cent)*
New Zealand																
Conference	-	-	1	14.3	-	-	-	-	5	71.4	-	-	1	14.3	7	100.0
Non-conference	1	20.0	-	-	1	10.0	3	60.0	-	-	-	-	-	-	5	100.0
Papua New Guinea and Solomon Islands																
Conference	3	33.3	-	-	-	-	-	-	4	44.4	2	22.2	-	-	9	100.0
Non-conference	1	50.0	-	-	-	-	1	50.0	-	-	-	-	-	-	2	100.0

\- Nil or rounded to zero.
.. Not applicable.

Note Per cent figures do not add up to 100.0 exactly because of rounding.
Number of ships cannot be added across trade areas because some ships served more than one trade area.

TABLE VII.2 NOMINAL TEU, REEFER AND DWT CAPACITY OF CONFERENCE AND NON-CONFERENCE OPERATORS SERVING THE MAJOR AUSTRALIAN TRADES, 1983-84

	TEU capacity		*Reefer capacity*		*DWT capacity*	
Trade area	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*
Europe and North Mediterranean						
Conference	53 519	73.7	13 622	81.7	1 065 242	73.3
Non-conference	19 062	26.3	3 060	18.3	388 165	26.7
Total	72 581	100.0	16 682	100.0	1 453 407	100.0
Philippines, Hong Kong and Taiwan						
Conference	17 549	58.7	2 784	74.9	339 877	59.3
Non-conference	12 384	41.3	933	25.1	233 721	40.7
Total	29 933	100.0	3 717	100.0	573 598	100.0
Japan						
Conference	16 127	73.8	4 753	90.1	360 943	78.1
Non-conference	5 716	26.2	520	9.9	101 475	21.9
Total	21 843	100.0	5 273	100.0	462 418	100.0
South Korea						
Conference	13 632	77.7	4 375	94.7	267 993	80.3
Non-conference	3 920	22.3	245	5.3	65 935	19.7
Total	17 552	100.0	4 620	100.0	333 928	100.0

TABLE VII.2 (Cont.) NOMINAL TEU, REEFER AND DWT CAPACITY OF CONFERENCE AND NON-CONFERENCE OPERATORS SERVING THE MAJOR AUSTRALIAN TRADES, 1983-84

	TEU capacity		*Reefer capacity*		*DWT capacity*	
Trade area	*(number)*	*(per cent)*	*(number)*	*(per cent)*	*(number)*	*(per cent)*
West Coast North America						
Conference	16 802	65.7	4 202	94.7	323 758	53.1
Non-conference	8 778	34.3	236	5.3	286 216	46.9
Total	25 580	100.0	4 438	100.0	609 974	100.0
East Coast North America						
Conference	30 235	70.3	10 819	85.0	629 808	62.3
Non-conference	12 796	29.7	1 914	15.0	381 356	37.7
Total	43 031	100.0	12 733	100.0	1 011 164	100.0
Middle East Gulf						
Conference	10 224	100.0	1 550	100.0	188 678	100.0
Non-conference	-	-	-	-	-	-
Total	10 224	100.0	1 550	100.0	188 678	100.0

TABLE VII.2 (Cont.) NOMINAL TEU, REEFER AND DWT CAPACITY OF CONFERENCE AND NON-CONFERENCE OPERATORS SERVING THE MAJOR AUSTRALIAN TRADES, 1983-84

Trade area	*TEU capacity* (*number*)	*TEU capacity* (*per cent*)	*Reefer capacity* (*number*)	*Reefer capacity* (*per cent*)	*DWT capacity* (*number*)	*DWT capacity* (*per cent*)
South East Asia						
Conference	16 927	65.4	1 785	75.4	392 647	65.9
Non-conference	8 941	34.6	581	24.6	203 046	34.1
Total	25 868	100.0	2 366	100.0	595 693	100.0
New Zealand						
Conference	7 527	79.1	3 394	93.1	166 350	76.6
Non-conference	1 983	20.9	252	6.9	50 743	23.4
Total	9 510	100.0	3 646	100.0	217 093	100.0
Papua New Guinea and Solomon Islands						
Conference	2 885	85.9	213	49.2	106 514	84.3
Non-conference	472	14.1	220	50.8	19 865	15.7
Total	3 357	100.0	433	100.0	126 379	100.0

\- Nil or rounded to zero.

Note TEU, Reefer and DWT capacity canot be added across trade areas because some ships served more than one trade area.

APPENDIX VIII FURTHER INFORMATION ON MARKET SHARES OF SHIPPING LINES AND SHIPPER CHARACTERISTICS

The information in this appendix relates to the analysis of conference and non-conference market shares and service levels in Chapter 6.

AUSTRALIAN-FLAG AND NON-CONFERENCE MARKET SHARES IN THE SMALLER TRADES

In Chapter 6, the Australian-flag share and non-conference share of the liner shipping task were presented for the major trade areas (Table 6.2). Table VIII.1 presents similar information for the smaller trades. A comparison of Tables 6.2 and VIII.1 reveals that the Australian-flag share of the liner task was smaller in the smaller trades than in the major trades. The non-conference share of the task was generally higher for the smaller trades than for the major trades, and frequently greater than 50 per cent.

Survey of shippers

As described in Chapter 6, a survey of shippers was conducted for the purpose of evaluating their perceptions of the quality of service provided by conferences and non-conference lines.

This appendix presents additional details about the information sought from the shippers (Figure VIII.1) and presents some characteristics of the sample of shippers (Tables VIII.2 and VIII.3). Since the survey was primarily directed towards exporters, this further information applies specifically to exporters.

Table VIII.2 indicates that the proportion of shippers using a forwarder or broker was higher for the manufacturing commodity group than for the other commodity groups. The manufacturers were also smaller exporters, measured in terms of the numbers of containers shipped per annum.

Table VIII.3 has some information about the shippers in the sample who did not use a forwarder or broker and who therefore made their own shipping arrangements. The percentage of shippers who used non-conference operators varies from 32 per cent to 59 per cent depending on the commodity group. A comparison of Tables VIII.2 and VIII.3 indicates that shippers not using a forwarder or broker were generally larger exporters than those that do.

TABLE VIII.1 AUSTRALIAN-FLAG AND NON-CONFERENCE SHARES OF THE TOTAL TASK IN THE SMALLER AUSTRALIAN LINER TRADES, 1983-84[a]

(per cent)

	Australian-flag task share[b]		*Non-conference task share*	
Trade area	*Inward*	*Outward*	*Inward*	*Outward*
North Africa and East Mediterranean	2	3	81	48
China	8	1	55	55
Eastern USSR	0	2	100	98
Caribbean, Mexico, Central and South America	1	1	88	47
West Africa	1	5	3	7
South Africa, Mauritius and Reunion Islands	0	0	79	100
East Africa and Seychelles	6	4	11	54
Red Sea Ports	0	0	98	23
West India, Sri Lanka	0	0	4	7
East India, Bangladesh	2	1	2	3
Pakistan	0	3	0	1
South Pacific	0	8	35	26
Micronesia, Mariana Islands, Marshall Islands and Nauru	0	0	100	88
Australian Territories	5	1	0	0
All smaller trades	1	3	77	40

a. Task shares relate to tonnes of cargo shipped.
b. Australian flag operations are the operations of ships registered in Australia. Australian-owned operators may operate ships registered elsewhere and charter space on ships owned by foreign lines.

Source Prepared by BTE.

TABLE VIII.2 SOME CHARACTERISTICS OF THE SAMPLE OF SHIPPERS SURVEYED

Commodity group	*Number of shippers*	*Shippers using forwarder/broker (per cent)*	*Shippers exporting more than 10 containers per annum (per cent)*
Meat	62	23	89
Wool	54	7	100
Manufactures	62	55	32
Dairy	15	7	87
Metals and minerals	25	12	92
Fruit	39	13	92
Total	257	24	78

TABLE VIII.3 SOME CHARACTERISTICS OF THE SAMPLE OF SHIPPERS NOT USING A FORWARDER OR BROKER

Commodity group	*Number of shippers*	*Shippers exporting more than 10 containers per annum (per cent)*	*Shippers using non-conference lines (per cent)*
Meat	48	90	40
Wool	50	100	50
Manufactures	28	54	61
Dairy	14	93	57
Metals and minerals	22	100	32
Fruit	34	97	59
Total	196	90	49

Bureau of Transport Economics

LINER SHIPPING STUDY
- SURVEY OF ATTITUDES OF OVERSEAS SHIPPERS

The purpose of this survey is to assess shippers' perceptions of the relative performance of conference and non-conference shipping lines in various Australian trades. The individual responses will be treated as confidential.

A. RELATIVE PERFORMANCE OF CONFERENCE COMPARED WITH NON-CONFERENCE LINES

1. Commodity ____________
2. Overseas trade area ____________
3. Approximately how many containers do you ship to this trade area over a year? ____________
4. Which non-conference lines have you used over the last 12 months? ____________
5. Approximately what proportions of your cargo have been shipped on these lines? ____________
6. If you have not used a non-conference line, which non-conference line do you think would provide the most viable alternative to the conference service? ____________

If the answer to question 6 is "don't know", go straight to Part B.

---

7. What is the difference between the conference rate and the rate of the preferred non-conference operator? ____________
8. Please tick the appropriate box for each of the service factors listed below :

	Conference much better		No difference		Non-conference much better
Transit time	☐	☐	☐	☐	☐
Number of ports of call/quality of transhipment services	☐	☐	☐	☐	☐
Reliability of sailings	☐	☐	☐	☐	☐
Booking, handling, financial, documentation services provided	☐	☐	☐	☐	☐
Frequency of sailings	☐	☐	☐	☐	☐
Availability of space when required	☐	☐	☐	☐	☐

B. RELATIVE IMPORTANCE OF SERVICE FACTORS

Commodity ____________

Could you please rank the following factors in order of their importance to the overall quality of service provided by shipping lines. Place a number in the box for each factor, a 1 indicating the most important factor, a 2 the second most important factor, etc.

	Rank
Transit time	☐
Number of ports of call/quality of transhipment services	☐
Reliability of sailings	☐
Booking, handling, financial, documentation services provided	☐
Frequency of sailings	☐
Availability of space when required	☐

Note: Survey control information was entered elsewhere.

Figure VIII.1 Survey of overseas shippers: data entry form

APPENDIX IX DETAILS OF THE EXAMINATION OF HISTORICAL AND CURRENT RATES

In this appendix the supporting data used for the analyses discussed in Chapter 8 are presented. Included are the:

- estimated distribution of conference and non-conference inward and outward freight rates for the selected trades;
- nominal value of historical freight rates for selected trades; and
- results of the analyses on the incidence of transport costs.

DISTRIBUTION OF CURRENT CONFERENCE SCHEDULED RATES FOR SELECTED TRADES

This section presents the methodology used to examine the distribution of scheduled rates. The rate distributions presented both here and in Chapter 9, are used as an input to the analyses of the level and dispersion of rates in Chapter 8.

Conference scheduled rates were obtained from the conference rate schedules current as at 1 January 1985. A representative rate was obtained for each of the 312 four digit commodity categories in the ATFCC system. These rates were expressed as a rate per TEU using representative stowage factors (see Chapter 4) assuming a TEU carries 18 tonnes (17 for a reefer) or 26 cubic metres (22.5 for a reefer). All rates were taken on an FCL (house-to-house) basis where the shipper is responsible for packing and unpacking the container. FCL allowances as well as BAFs and CAFs were applied but long length and heavy lift surcharges were excluded. Rates were converted to Australian dollars using January 1985 exchange rates.

On each of the selected trades, the number of TEUs carried by all ships was determined for each four digit ATFCC commodity category from the number of tonnes given in the ABS SACCS. Again, the representative stowage factors, mentioned above, were used. All containers were assumed to be full, either in cubic or weight terms, and all commodities were assumed to be containerized.

The freight rate and number of TEUs carried for each four digit ATFCC commodity category were used to calculate the distribution of scheduled rates and the weighted average rate per TEU for both inward and outward conference services. Non-conference services were calculated in the same way except that nominal freight rates were established by assuming each rate, except for beef, was 10 per cent below the corresponding conference scheduled rate. This assumption is consistent with the results of the survey of shippers (see Chapter 6), which revealed an average rate differential of 11 per cent. In the case of beef, the non-conference rate was assumed equal to the conference rate.

The scheduled rates are very detailed, often containing many different rates for commodities within the one ATFCC category. The selection of a single representative rate for each item may have introduced a slight upward bias as there was a tendency for the rates which were specific to a single ATFCC item to be lower than the non-specific rates. The problem was more pronounced for the inward trades because the manufactures which predominate are more heterogeneous. In addition, the rates per TEU were calculated assuming that there is a charge for all the contents of a container. This may not be always the case as some conferences claim they charge on minimum utilization, regardless of how much cargo a shipper manages to fit in a container.

Figures IX.1 to IX.5 show the distribution of scheduled rates for both conference and non-conference operators for inward and outward liner shipping services in the selected trades. The bars on the graphs show the relative volume of trade which falls into each of the rate ranges. For example, in the Australia to Europe trade, 52 per cent of the TEUs carried by conference operators attract freight rates in the range of $1000 to $1500 per TEU, whereas 73 per cent of TEUs carried by non-conference operators have freight rates in the same range.

NOMINAL VALUE OF HISTORICAL RATES FOR SELECTED TRADES

The nominal rates presented in Tables IX.1 to IX.7 apply to a sub-set of the study's selected commodities and form the basis of the time series analysis of scheduled rates presented in Chapter 8. As indicted in Chapter 8, to facilitate this analysis, the scheduled rate was broken down into its component parts, that is, the Basic Service Rate (BSR), Bunker Adjustment Factor (BAF) and Currency Adjustment Factor (CAF).

The BSR contained in the rate schedules includes incorporations of previous BAFs and CAFs. In order to isolate the effects of each component of the rate, the BSR was calculated by taking the earliest known BSR available to the BTE, and only adding changes ignoring CAF and BAF incorporations. Hence the BSR shown in the graphs in Chapter 7 can not be directly compared with those contained in conference rate schedules.

TABLE IX.1 CONFERENCE SCHEDULED RATES: AUSTRALIA TO EUROPE AND NORTH MEDITERRANEAN TRADE, 1972 TO 1984[a]

	Commodities				
Year[b]	*Wool*[c] *($ per tonne)*	*Boneless beef ($ per TEU)*	*Hides ($ per tonne)*	*Malt ($ per tonne)*	*Motor vehicles ($ per tonne)*
1.9.72	105	na	na	na	na
1.2.73	na	1 517	107	66	45
1.10.73	125	1 539	109	66	45
23.10.74	146	1 853	131	80	55
20.1.75	na	2 101	148	91	62
1.6.75	na	2 191	155	95	65
1.10.75	170	2 418	171	104	71
1.4.76	na	2 823	199	122	83
1.10.76	208	3 012	212	130	89
1.10.77	231	3 631	256	157	107
1.9.78	254	3 493	238	146	100
1.10.78	na	3 493	249	152	104
1.10.79	243	3 921	279	171	117
1.10.80	307	4 107	310	190	130
1.10.81	259	3 759	302	195	126
1.10.82	185	3 942	315	213	145
1.10.83	151[d]	4 001	320	216	148
29.11.83	100	4 001	320	216	148
1.10.84	77	3 937	315	203	145

a. The rates shown are the total rates for the ocean leg of the service including BAF and CAF adjustments but excluding additional charges such as wharfage.
b. Dates indicate the timing of changes in scheduled rates.
c. Wool rates are effective from 1 September each year.
d. Introduction of a box rate for wool. The box rate has been converted to a rate per tonne on the assumption that each TEU carries 16 tonnes.

na Not available.

Source Prepared by BTE.

Table IX.6 illustrates this procedure by presenting the calculations for boneless beef exports to East Coast North America.

INCIDENCE OF TRANSPORT COSTS

This section presents the methodology and results used in Chapter 8 for the analysis of the incidence of transport costs.

Indicative elasticities of demand and supply for Australian imports and exports were required to assess the incidence of transport cost

TABLE IX.2 CONFERENCE SCHEDULED RATES: AUSTRALIA TO JAPAN TRADE, 1973 TO 1985[a]

	Commodities				
Year[b]	*Wool ($ per tonne)*	*Boneless beef ($ per tonne)*	*Hides ($ per tonne)*	*Malt ($ per tonne)*	*Motor vehicles ($ per cubic metre)*
26.1.73	41	100	159	34	28
1.11.73	45	107	169	37	30
1.11.74	49	139	221	48	39
11.11.74	59	139	221	48	39
1.3.75	58	144	228	49	40
1.5.75	74	143	228	49	40
1.6.75	72	149	238	51	42
1.11.75	88	151	282	61	50
1.10.76	88	161	287	62	51
1.1.77	107	189	341	74	60
1.1.78	125	215	388	84	68
1.1.79	137	241	444	96	78
1.1.80	138	244	454	98	80
1.1.81	149	265	493	107	87
1.1.82	154	256	515	111	91
1.1.83	157	277	538	121	98
1.1.84	163	290	563	127	103
1.1.85	164	292	567	129	104

a. The rates shown are the total rates for the ocean leg of the service, including BAF and CAF adjustments but excluding additional charges such as wharfage.
b. Dates indicate the timing of changes in scheduled rates.

Source Prepared by BTE.

for Australia's international trade carried on liner ships. The range of values used for the elasticities of demand and supply for imports were -0.5 to -1.5 and 1.5 to 2.0 respectively. Similarly, for exports, the range of values used for the clasticites of demand were -0.9 to -2.0 and supply 0.8 to 1.0.[1]

The results from the analysis are summarised in Table IX.7.

TABLE IX.3 CONFERENCE SCHEDULED RATES: AUSTRALIA TO EAST COAST NORTH AMERICA TRADE, 1973 TO 1985[a]

	Commodities				
Year[b]	*Wool ($ per TEU)*	*Boneless beef ($ per TEU)*	*Hides ($ per TEU)*	*Malt ($ per tonne)*	*Motor vehicles ($ per TEU)*
27.9.73	409	1 968	408	57	456
1.9.74	560	2 411	559	78	625
1.1.75	672	2 901	670	94	749
1.5.75	691	2 976	690	96	770
13.11.75	782	2 976	780	109	872
3.1.77	923	3 895	920	129	1 029
1.2.77	976	3 791	1 095	135	1 224
1.8.77	1 074	3 791	1 095	135	1 224
4.12.77	1 039	3 926	1 161	163	1 297
1.3.78	1 138	3 926	1 161	163	1 297
1.12.78	1 108	3 823	1 181	165	1 320
1.2.79	1 147	3 823	1 181	165	1 320
1.12.79	1 290	3 938	1 438	201	1 608
1.12.80	1 262	3 934	1 552	217	1 734
1.12.81	1 295	4 024	1 712	240	1 913
1.12.82	1 539	4 808	2 034	285	2 274
1.12.83	1 581	4 905	2 089	293	2 335
1.1.85	1 713	5 260	2 263	317	2 530

a. The rates shown are the total rates for the ocean leg of the service, including BAF and CAF adjustments but excluding additional charges such as wharfage.
b. Dates indicate the timing of changes in scheduled rates.

Source Prepared by BTE.

1. Refer to BTE (1981), Taplin (1981) and Saad et al. (1985).

TABLE IX.4 CONFERENCE SCHEDULED RATES: AUSTRALIA TO WEST INDIA TRADE, 1973 TO 1985[a]

	Commodities				
Year[b]	*Wool ($ per tonne)*	*Boneless beef ($ per tonne)*	*Hides ($ per tonne)*	*Malt ($ per tonne)*	*Motor vehicles ($ per cubic metre)*
1.4.73	53	..	76	44	39
1.5.74	67	..	96	56	50
7.10.74	73	..	104	61	54
1.7.75	89	..	127	74	66
5.1.76	95	..	136	79	70
15.8.76	109	..	156	91	80
15.5.78	125	..	165	96	85
1.7.78	125	..	160	93	94
1.10.79	141	..	180	105	104
19.11.79	154	..	198	115	113
1.1.81	160	..	205	119	118
7.10.81	172	..	219	129	128
1.5.83	199	..	255	148	146
7.5.83	211	..	271	157	155
1.1.85	207	..	266	155	153

a. The rates shown are the total rates for the ocean leg of the service, including BAF and CAF adjustments but excluding additional charges such as wharfage.

b. Dates indicate the timing of changes in scheduled rates.

.. Not applicable.

Source Prepared by BTE.

TABLE IX.5 CONFERENCE SCHEDULED RATES: AUSTRALIA TO NEW ZEALAND TRADE, 1973 TO 1984[a]

	Commodities				
Year[b]	*Wool ($ per TEU)*	*Boneless beef ($ per TEU)*	*Hides ($ per TEU)*	*Malt ($ per TEU)*	*Motor vehicle parts ($ per TEU)*
16.7.73	435	879	505	413	484
1.4.74	527	1 065	612	500	586
1.7.74	624	1 260	723	591	693
5.6.75	708	1 431	822	672	788
1.9.75	649	1 310	752	615	721
1.1.76	728	1 470	844	690	809
1.7.76	808	1 632	937	766	898
17.1.77	997	2 015	1 157	945	1 109
1.7.77	1 073	2 168	1 245	1 018	1 194
1.4.78	1 197	2 419	1 389	1 135	1 331
1.10.78	1 291	2 608	1 497	1 224	1 435
1.4.79	1 456	2 942	1 689	1 381	1 619
1.10.79	1 518	3 067	1 761	1 439	1 688
29.10.79	1 523	3 077	1 767	1 444	1 694
1.7.80	1 673	3 379	1 940	1 586	1 860
1.1.81	1 720	3 475	1 995	1 631	1 913
1.7.81	1 648	3 329	1 912	1 562	1 833
1.4.82	1 766	3 568	2 049	1 674	1 964
1.1.83	2 060	4 160	2 389	1 953	2 290
1.7.83	2 115	4 272	2 453	2 005	2 352
7.5.84	2 078	4 197	2 410	1 970	2 311

a. The rates shown are the total rates for the ocean leg of the service, including BAF and CAF adjustments but excluding additional charges such as wharfage.
b. Dates indicate the timing of changes in scheduled rates.

Source Prepared by BTE.

TABLE IX.6 CALCULATION OF THE COMPONENTS OF THE SCHEDULED RATE: BONELESS BEEF, AUSTRALIA TO EAST COAST NORTH AMERICA TRADE

Date	*Change*	*Scheduled BSR (1)*	*BSR (2)*	*CAF incorp. (3)*	*CAF applied per cent of (1) (4)*	*Total CAF (3)+(4) (5)*	*Total freight rate (2)+(5) (6)*
29.9.73	CAF -3.7% not incorporated	2 043.76	2 043.76	-	-75.62	-75.62	1 968.14
1.9.74	Rate increase 22.5%; CAF -3.7% not incorporated	2 503.61	2 503.61	-	-92.63	-92.63	2 410.98
1.1.75	Rate increase 5%; CAF 10.37% incorporated	2 901.39[a]	2 628.79[b]	272.61[c]	nil	272.61	2 901.39
1.5.75	Rate increase 5%; CAF -2.3% not incorporated	3 046.46	2 760.23[d]	286.24[e]	-70.07[f]	216.17	2 976.40

a. 2503.61 x 1.05 x 1.1037 = 2901.39.
b. 2503.61 x 1.05 = 2628.79.
c. 2503.51 x 1.05 x 0.1037 = 272.61.
d. 2628.79 x 1.05 = 2760.23.
e. 272.61 x 1.05 = 286.24.
f. 3046.46 x -0.023 = -70.07.

Note The BAF is not applicable for this commodity in the trade area but is calculated in the same way as CAF.

Source Prepared by BTE.

TABLE IX.7 ESTIMATES OF THE AUSTRALIAN INCIDENCE OF TRANSPORT COSTS FOR IMPORTS AND EXPORTS[a]

Price elasticity		*Australian incidence*
Demand	*Supply*	*(per cent)*
Imports		
-0.5	1.5	75
	2.0	80
-1.0	1.5	60
	2.0	67
-1.5	1.5	50
	2.0	57
Exports		
-0.9	0.8	53
	1.0	47
-1.5	0.8	65
	1.0	60
-2.0	0.8	71
	1.0	67

a. Following the example presented in BTE (1980) the incidence of transport costs borne by Australian purchasers of imports was calculated by the following formula:

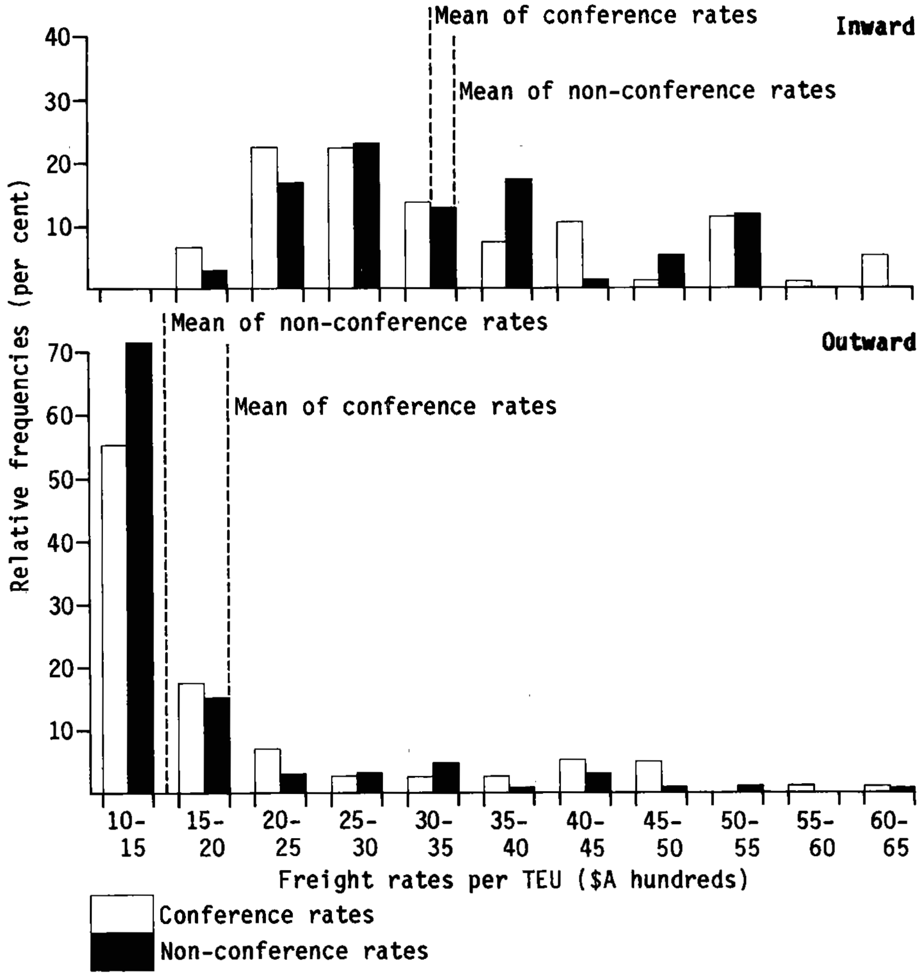
$$I = \frac{Es}{Es + /Ed/} \times 100$$

Similarly the incidence of transport costs borne by Australian exporters was calculated by the following formula:

$$I = \frac{/Ed/}{/Ed/ + Es} \times 100$$

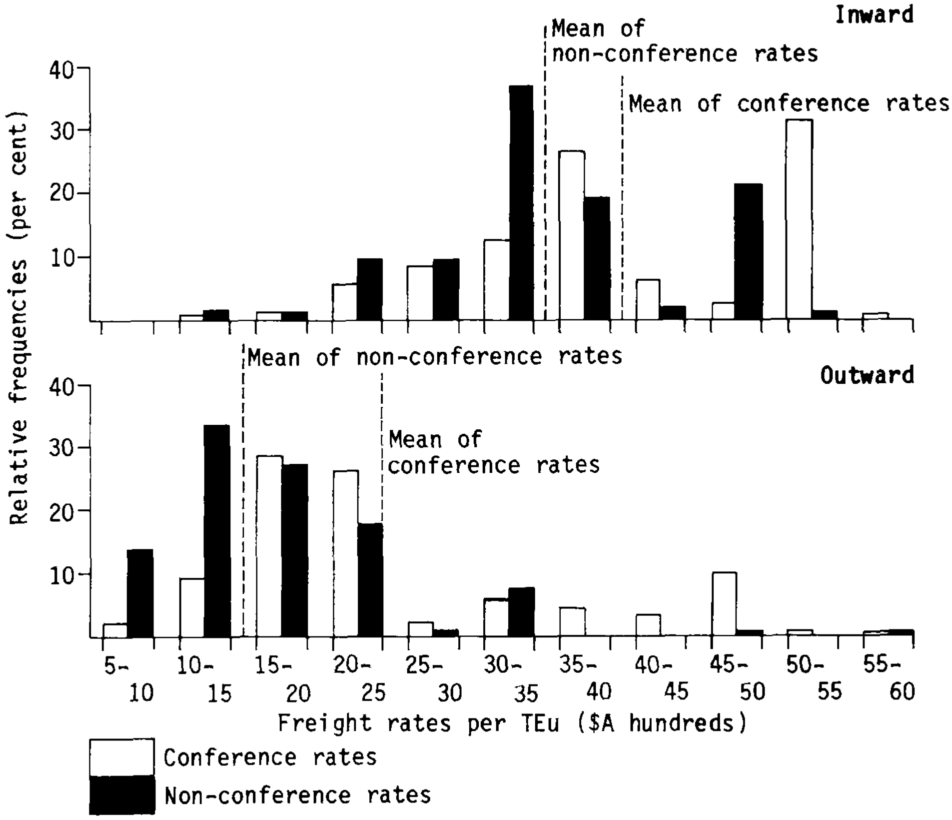
where Es = elasticity of supply
/Ed/ = magnitude of own price elasticity of demand.

Source Prepared by BTE.



Notes 1. Rate distributions are estimated from conference scheduled rates at January 1985 using 1983-84 cargo flows.
2. Frequency of extreme rate values are not always shown.

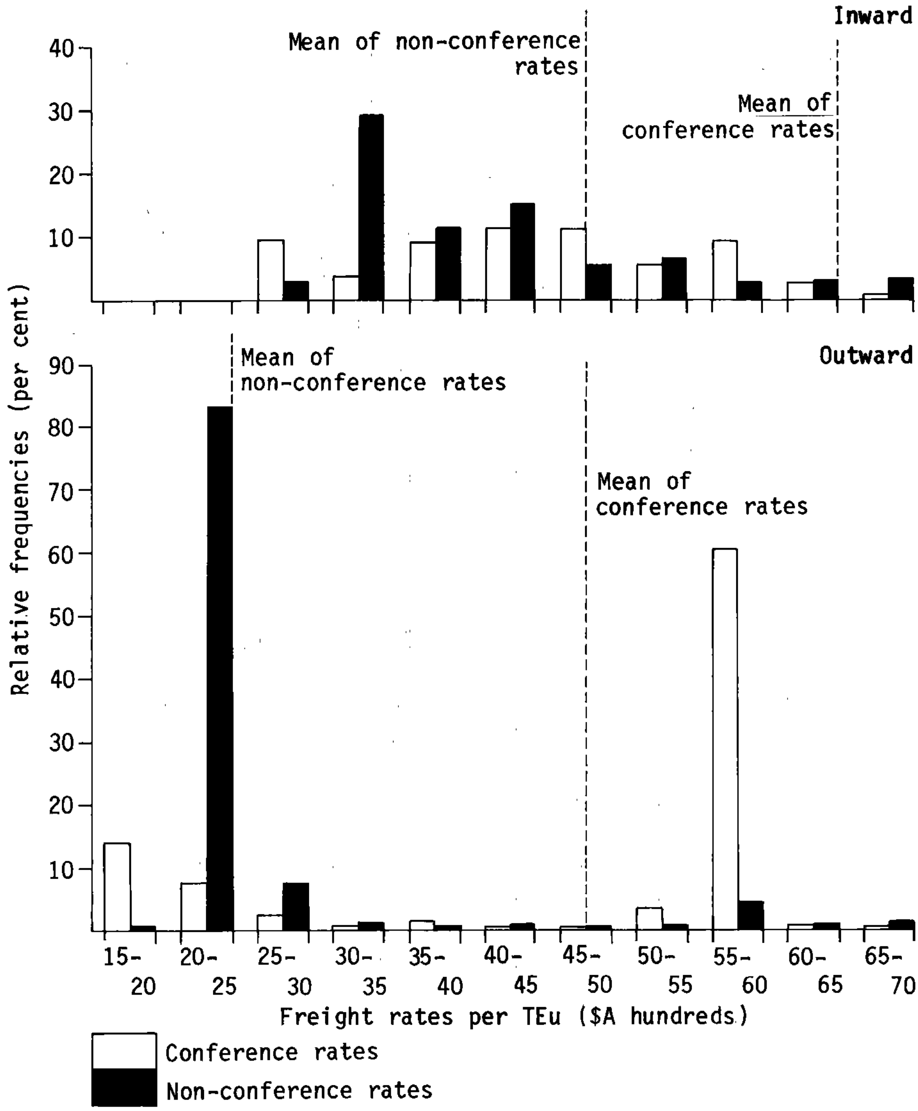
Figure IX.1 Estimated distribution of rates: Australia/Europe and North Mediterranean trade



Notes 1. Rate distributions are estimated from conference scheduled rates at January 1985 using 1983-84 cargo flows.

2. Frequency of extreme rate values are not always shown.

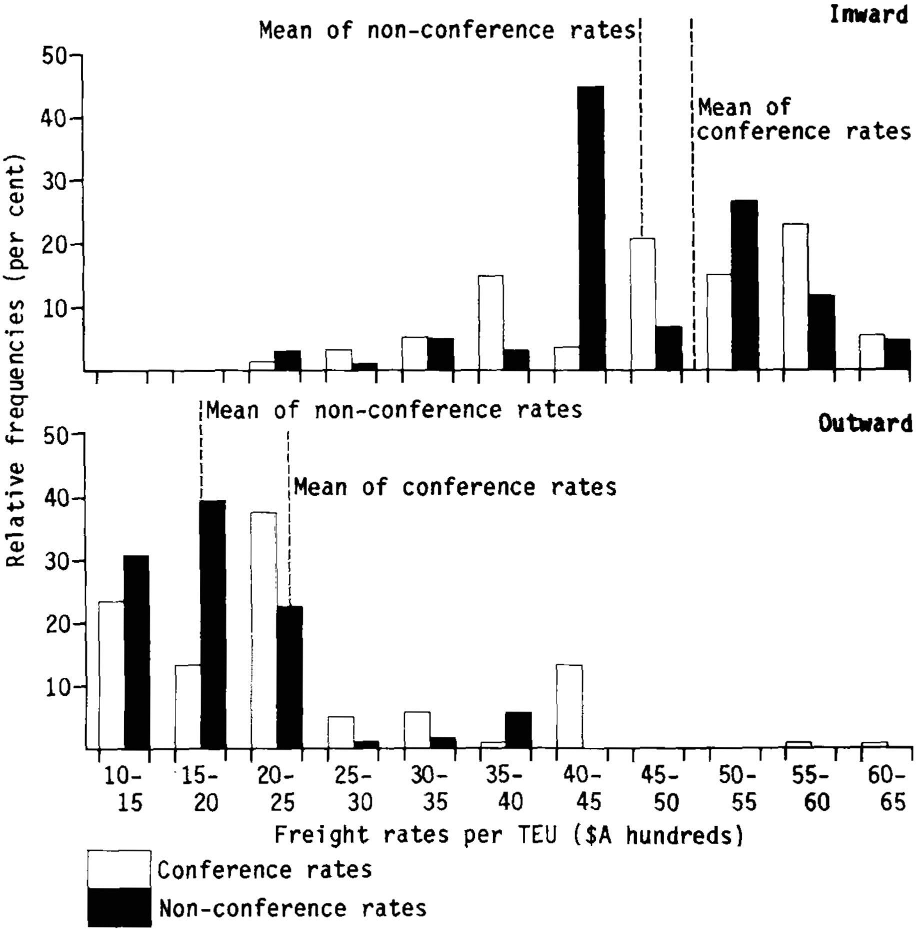
Figure IX.2 Estimated distribution of rates: Australia/Japan trade



Notes 1. Rate distributions are estimated from conference scheduled rates at January 1985 using 1983-84 cargo flows.

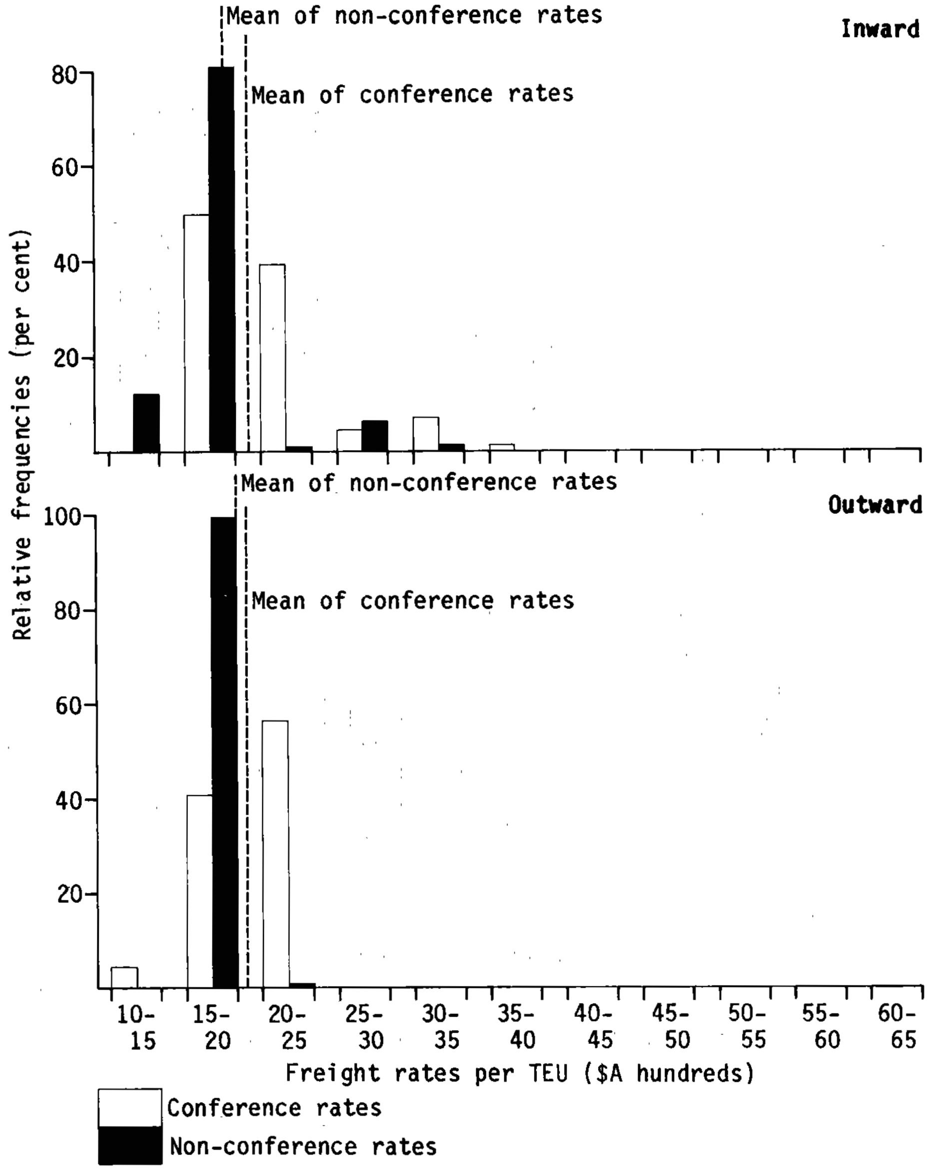
2. Frequency of extreme rate values are not always shown.

Figure IX.3 Estimated distribution of rates: Australia/East Coast North America trade



Notes 1. Rate distributions are estimated from conference scheduled rates at January 1985 using 1983-84 cargo flows.
2. Frequency of extreme rate values are not always shown.

Figure IX.4 Estimated distribution of rates: Australia/West India trade



Notes 1. Rate distributions are estimated from conference scheduled rates at January 1985 using 1983-84 cargo flows.
2. Frequency of extreme rate values are not always shown.

Figure IX.5 Estimated distribution of rates: Australia/New Zealand trade

APPENDIX X DETAILS AND COSTING ANALYSIS OF TECHNOLOGICAL DEVELOPMENTS AND SERVICE FACTORS

This appendix presents details of the technological developments considered in Chapter 10 and the results of the analyses of their cost implications.

SHIP AND SERVICE DEVELOPMENTS

Propulsion system

The propulsion system components include the power sources, and the propeller. Since the underwater resistance of the hull has a large bearing on the design of the propulsion system, discussion of the underwater hull form is also discussed under propulsion. Ship speed and fuel consumption, because they are similarly related, are also discussed under this heading.

Propulsion system developments are discussed under the following headings:

- fitting of new generation diesel technology
- reduction in operating speed
- underwater hull design
- propeller design
- wind assistance.

Fitting of new generation diesel technology

The design of diesel engines has advanced dramatically over the past 10 to 15 years. In *Motor Ship* (1984a) it was shown that there had been approximately 12.5 per cent improvement in diesel engine efficiency between 1972 and 1984 and a similar improvement was predicted in the next five years. The new generation low speed diesel has about a 5 grams/kilowatt hour (g/kw hr) fuel consumption advantage over the medium speed diesel (*Motor Ship* 1984a), despite the low speed diesel being larger and heavier. Although improvements have also been made in other engines (such as steam turbines), the economies of low speed diesel engines (using lower grade fuels) are superior to turbines and conventional diesels. With direct drive systems and low engine speeds the scope for lower (and generally more efficient) propeller speeds is increased.

The cost of refitting new generation diesel technology (with heat recovery systems) was estimated at:

- $540 per installed kilowatt[1] (ikw) for replacement of superseded diesel engines;
- $970 per ikw for conversion from steam machinery (*Ship Building and Marine Engineering International* 1984a, *Lloyd's Shipping Economist* 1981a);
- $620 per ikw for conversion from gas turbine systems (Marine Propulsion, 1984); and
- $50 per ikw for upgrading certain diesel engine types to improve fuel efficiency (*Motor Ship* 1984b).

The cost savings of installing the new generation diesels vary according to the remaining service life of the ship, trends in the costs of the various fuel types and other factors. Such installations are generally accompanied by improved engine room design which facilitates the fitting of other devices, such as waste heat recovery systems and main shaft drive generators. Published information on conversions from gas and steam turbine to diesel indicates that the reduction in power requirements through reduced design speed results in a net savings. It is difficult to separately identify the savings achieved by the conversion. Some older diesel engines are being extensively modified to improve fuel consumption. For example, the retro-fitting of a ten-year-old MAN KZ70/120E series two-stroke engine provides a fuel savings at optimum speed of approximately 8 per cent (*Motor Ship* 1984b). Figure X.1 illustrates this fuel saving and the variation of fuel consumption with engine speed.

As shown in Table X.1, gas and steam turbine powered ships are more expensive to operate than the diesel powered ships by between 6 and 20 per cent. For the Australia/New Zealand trade, a 10 per cent savings in shipping costs can be achieved by the conversion of gas turbine engines to diesel (conversions are presently being undertaken). Analysis of the effect of ship's age indicates that no savings occur for ships with a remaining service life of less than six to nine

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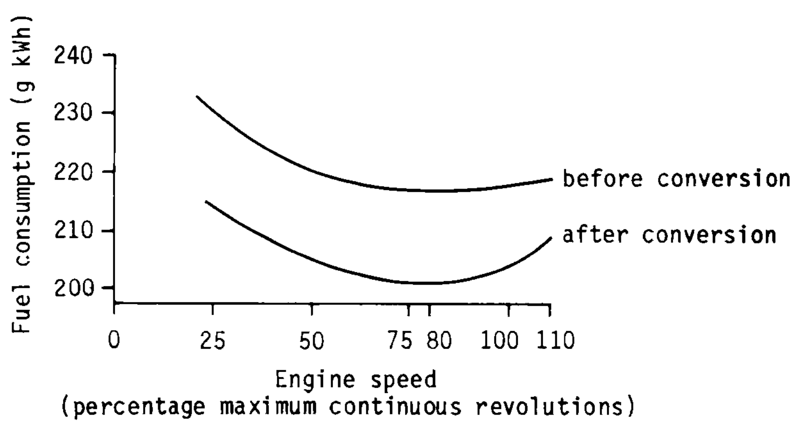
1. Installed kilowatt is the rated power of the propulsion unit.

years. However, the age and size of the typical ship used for the Australia/ New Zealand trade differ from that used for the Australia/Europe and North Mediterranean and Japan trades for which little or no savings can be achieved by engine conversion from gas turbine to diesel.

Generally, replacement of the ship is therefore a better investment than conversion to diesel engine propulsion. The available evidence indicates that other engine improvements result in little or no savings.

Reduction in operating speed
Fuel savings achieved by reducing operating speed have been found to be economically viable in many circumstances despite the increase in voyage time and the loss of engine and propeller efficiency in some cases. *Motor Ship*(1982b) reported that a fuel saving of 24.4 per cent was obtainable by reducing speed by 15 per cent.

The effect of varying ship operating speed, and hence frequency of service, fuel consumption and other voyage characteristics, should



Note MAN KZ 70/120E engine used to provide illustrative example.

Source Motor Ship (1984b).

Figure X.1 Typical specific fuel consumption before and after conversion to slow speed diesel

TABLE X.1 EFFECTS ON COSTS OF PROPULSION AND FUEL TECHNOLOGY DEVELOPMENTS

	Carrier costs[a] per TEU per voyage ($)											
	Europe and North Mediterranean trade				*Japan trade*				*New Zealand trade*			
Technology change	*Fuel*	*Capital*	*Other*[b]	*Total*	*Fuel*	*Capital*	*Other*[b]	*Total*	*Fuel*	*Capital*	*Other*[b]	*Total*
Typical ship (diesel)	598	441	1 658	2 697	335	283	1 381	1 999	262	222	1 074	1 558
Stern bulb	577	448	1 658	2 683	324	287	1 379	1 990	253	224	1 074	1 551
Fins	575	446	1 656	2 677	322	286	1 379	1 987	252	224	1 073	1 549
Coatings[c]	562	441	1 655	2 658	315	283	1 379	1 976	246	222	1 073	1 541
New diesel	574	659	1 700	2 933	321	394	1 402	2 117	250	285	1 085	1 620
Retrofitted diesel	583	461	1 661	2 705	321	294	1 381	1 996	250	228	1 074	1 552
Emulsions	582	442	1 657	2 681	326	284	1 380	1 990	255	223	1 073	1 551
Gas turbine typical ship	915	441	1 683	3 037	566	283	1 397	2 246	544	222	1 092	1 858
Conversion to diesel	574	833	1 736	3 143	321	482	1 421	2 224	250	234	1 096	1 680
Steam turbine typical ship	812	441	1 677	2 930	456	283	1 391	2 130	364	222	1 083	1 669
Conversion to diesel	574	691	1 707	2 972	321	411	1 405	2 137	250	334	1 087	1 631
New typical ship	574	550	1 672	2 796	321	353	1 389	2 063	250	301	1 087	1 638
Asymmetric stern	549	553	1 671	2 773	307	354	1 389	2 050	239	304	1 084	1 627
Stern bulb	554	555	1 672	2 781	310	356	1 389	2 055	241	304	1 085	1 630
Fins	551	553	1 672	2 776	308	355	1 389	2 052	240	303	1 085	1 628
Propulsion improvement[d]	524	581	1 675	2 780	293	371	1 391	2 055	228	313	1 086	1 627
Wind sail	483	589	1 674	2 746	270	377	1 390	2 037	210	329	1 088	1 627
Coal steam	344	673	1 741	2 758	191	414	1 425	2 030	134	345	1 104	1 583
Emulsions	559	550	1 672	2 781	313	353	1 389	2 055	243	303	1 085	1 631

a. Excludes customer costs of $867 for Europe and North Mediterranean trade, $501 for Japan trade and $231 for New Zealand trade.
b. Other costs comprise loading, crew and operating costs, and voyage and agency charges.
c. Self-polishing underwater paints.
d. This improvement is based on the vane wheel, but is considered representative of all of the alternatives discussed in Chapter 10.

Note Customer costs do not vary significantly.

Source Prepared by BTE.

desirably be assessed for each individual ship. The cost effects of varying speed are sensitive to ship type, age, size, route length and engine type. In Table X.2, an indication is given of the effect of changes in operating speed on each trade together with the corresponding service frequencies. For the Australia/Europe and North Mediterranean trade existing speeds are close to the optimum when considering both carrier and customer costs. Reduction in operating speed would effect savings in carrier costs but increase customer costs. For the Australia/Japan and New Zealand trades a reduction in the combined carrier and customer costs of up to 3 per cent can be achieved by a speed reduction from the current 19 knots to approximately 15 knots.

Underwater hull design

Changes in hull design include all variations to the shape of the submerged hull and external fixed underwater attachments other than the propeller. The principal purpose of changes to hull design are to reduce water resistance and hence the required power for propulsion. Some of the design aspects for which data are available are discussed under the following headings:

- asymmetric stern
- stern end bulb
- additional thrusting fins
- hull protective coatings.

Asymmetric stern

If the skeg of the hull is inclined to starboard at the stern for a clockwise turning propeller, the flow of water can be more closely matched to the centre of pressure of the screw, which moves to the side where the blades move downward. A 5 per cent reduction in fuel consumption was claimed in *Motor Ship* (1984d) for asymmetric sterns. The additional construction cost for new ships has been estimated to be approximately $10 per ikw.

Stern end bulb

A Stern bulb is positioned at the centre of the stern on the 'load water line'. It has the effect of reducing wave pattern resistance, particularly for higher speed ships which have smaller variations between loaded and unloaded draught. Reports in *Motor Ship* (1981b and 1981c) indicate that fuel consumption could be reduced by about 4 per cent by constructing ships with this type of bulb. The additional capital cost has been estimated to be approximately $17 per ikw.

TABLE X.2 EFFECTS ON COSTS OF CHANGES IN OPERATING SPEED

			Cost per TEU per voyage ($)						
			Carrier						
Trade area	*Operating speed (knots)*	*Service frequency[a] (days)*	*Fuel*	*Capital*	*Operating[b]*	*Other[c]*	*Total*	*Customer*	*Total*
Europe and	25.53	14.00	1 098	441	618	1 133	3 290	687	3 977
North	19.66	17.50	639	441	590	1 076	2 746	844	3 590
Mediterranean	19.00[d]	18.03	598	441	588	1 070	2 697	867	3 564
	15.70	21.00	461	475	617	1 052	2 605	1 001	3 606
Japan	25.38	7.00	596	283	375	1 043	2 297	410	2 707
	19.00[d]	8.86	335	283	560	821	1 999	501	2 500
	18.65	9.00	324	283	359	978	1 983	508	2 491
	16.46	10.00	260	284	355	1 006	1 905	557	2 462
	15.38	10.50	226	274	343	965	1 808	602	2 410
	14.44	11.00	224	298	367	1 002	1 891	618	2 509
New Zealand	22.36	6.00	354	222	340	744	1 660	210	1 870
	19.00[d]	6.80	410	222	335	591	1 558	231	1 789
	18.33	7.00	246	222	334	738	1 540	236	1 776
	15.36	8.00	186	227	336	734	1 483	262	1 745
	12.92	9.00	152	240	350	731	1 473	290	1 763

a. Service frequency based on five, five and three ships in consortia serving Europe, Japan and New Zealand respectively.
b. Operating costs include crew costs.
c. Other costs comprise loading costs, and voyage and agency charges.
d. Typical ship.

Source Prepared by BTE.

Additional thrusting fins
Thrusting fins are attached horizontally on each side of the rudder horn and set at an angle so that the direction of the water flow through and beyond the propeller is modified to increase the propulsion efficiency. Information in *Motor Ship* (1982a) indicated a power saving of between 4 and 5 per cent when fins are fitted. The cost of the fins could be expected to be of the order of $12 per ikw.

Hull self polishing protective coatings
Advances in protective coatings over the past decade have led to the use of self polishing polymer coatings which not only resist the growth of fouling material below the waterline but also maintain a smooth underwater hull finish. Fuel savings of the order of 7 per cent have been claimed by *Christie & French* (1980). The increased cost of the self polishing protective coatings above normal treatments has been estimated to be about 22 per cent (*Lloyds Ship Manager* 1984b).

Economic impact
As indicated in Table X.1, small savings of perhaps 1 per cent of carrier costs are attributable to the use of self polishing protective coatings. Also small savings in carrier costs less than 1 per cent can be achieved with improvements to hull design. Improvements in hull design were found to have a recoupment period of four to ten voyages.

Propeller design
Propeller design includes the propellers and any attachments to the hull which surround the propeller (such as nozzles or ducts) or which are located behind the propeller (such as vane wheels). The innovations are either alternatives or are inter-related, so that the savings attributed to any one modification may preclude the possibility of any savings from other modifications.

Propeller size and speed
One of the major considerations in propeller design is the compromise between propeller rotational speed and diameter. For a given ship speed, as propeller rotational speed decreases, the efficiency of the propeller increases. However, the scope for increased propeller diameter is restricted because of the shape of the aft underwater hull and the ship's draught. An increase in diameter also raises the propeller shaft further above the keel, causing problems for the engine room design. The optimal balance between the propeller size and rotational speed, shape of the aft underwater hull, and the propulsion machinery at a given ship speed, is therefore a

compromise. The compromise is between the power savings and the size of the propulsion machinery on one side, and the physical constraints on the design of the ship on the other. The increase in fuel costs, particularly those in 1973 and 1980 (see Figure X.2), has affected the balance of costs.

Therefore the scope for improving the performance of ships by propeller modification depends to a large extent on their age, as well as on their other characteristics. Information on the cost effects of variations in propeller size and speed was not available to enable the presentation of any general conclusions.

Vane wheel

This is a freely rotating propeller located in the wake of the engine-driven propeller and is driven by the movement of water from the engine-driven propeller. This vane wheel provides driving force at the outer extremities of its blades. This device was claimed to reduce fuel costs by 10 per cent (*Shipbuilding and Marine Engineering International* 1984b) and was estimated to cost over $100 per ikw.

Tip-vortex free propeller

This propeller has flat-ended blades with small extensions at right angles to the tips of the blades. This permits the end area to be fully loaded while impeding the jumping of water over the tip from the pressure face to the back of the blade so that a tip-vortex is avoided.

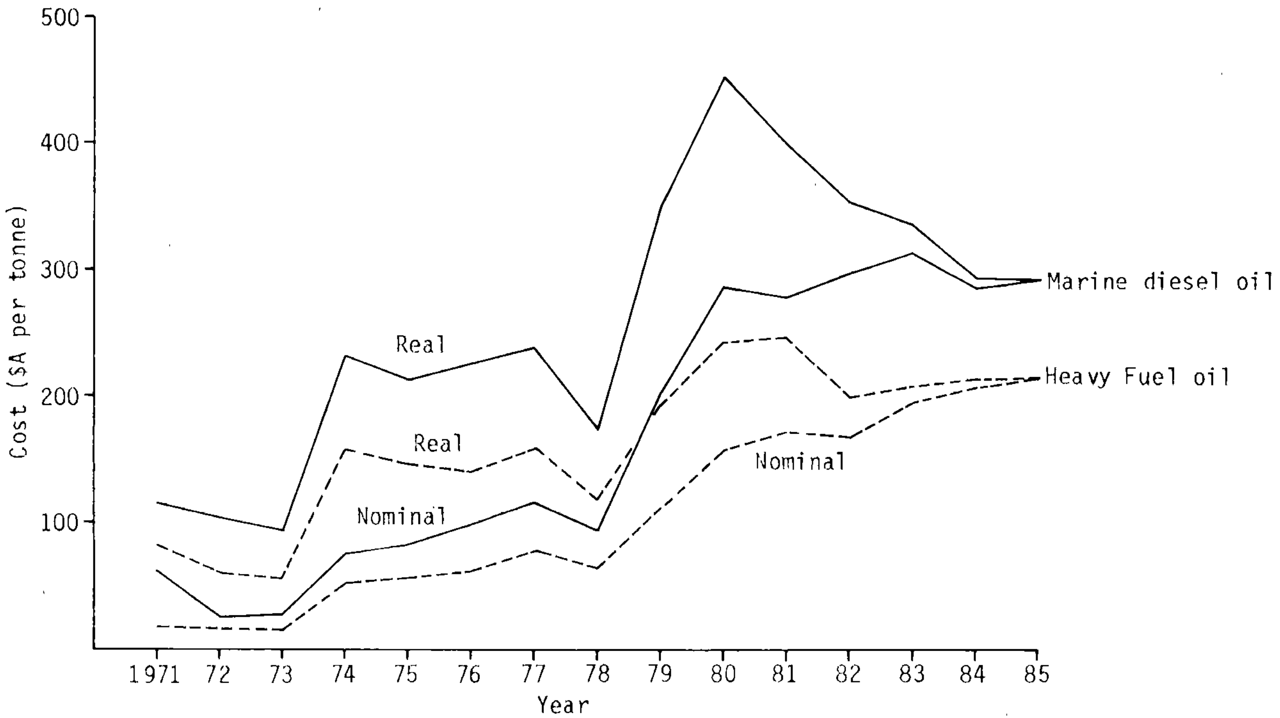
When a duct is fitted a fuel saving of about 15 per cent has been claimed at a cost of about $60 per ikw (*Motor Ship* 1983 and 1980c). However there are some doubts about these costs savings.

Mitsui integrated duct propeller

This is an annular duct located immediately to the fore of the propeller and secured to the hull. A 5 per cent fuel saving has been claimed (*Motor Ship* 1984f). The cost was estimated at $20 to $40 per ikw.

Economic impact

As indicated in Table X.1, savings in carrier costs of up to 1 per cent may be achieved by the installation of improved propulsion devices. However, the retrofitting of such devices may not result in savings for ships with a remaining service life of less than three years.



Note Heavy fuel oil at 380 kinematic centistokes (CST). Real prices in 1985 $A.

Figure X.2 Bunker prices: Singapore

Wind assistance
Sails have been used for some years to provide supplementary power for certain smaller diesel engine tankers. Modern shaped sail technology is however being introduced currently in larger ships of over 30 000 DWT. The cost of the sail system has been reported to increase the capital cost of the ship by 10 per cent, with fuel savings of between 13 and 18 per cent where consistent winds are available (Prescott 1983). Savings of up to 40 per cent have been claimed in *Motor Ship* (1984h). Because of the frequency of heavier winds, the use of sails is particularly appropriate for regions such as the north and south Atlantic and north and south Pacific areas ('roaring forties'). In designing sail ships, port height limitations and ship stability need to be taken into consideration.

Supplementary propulsion is also being obtained by the fitting of wind powered rotors on ships of up to 5000 DWT, with reported savings of up to 50 per cent of fuel at an installation cost of over $120 per ikw (*Motor Ship* 1984e).

The data presented in Table X.1 are based on the assumption that a fuel saving of 18 per cent can be achieved, and indicate that savings in carrier costs of nearly 2 per cent can be achieved by investment in shaped sails. However, it is not economically justifiable on ships which are older than about 10 years. Since modern sail technology is still under trial on larger bulk ships, it may be some years before sail assistance is introduced on container ships and then their route and ports of call will impose some limitations. The data available for wind powered rotors is considered to be somewhat uncertain and the effect on ship costs was not analysed.

Fuels

Fuel type options include combinations and additives of petroleum derivatives and coal.

Heavier fuel oils
The use of less costly, heavier diesel oils has been used to an increasing extent as a result of higher fuel costs, particularly in new generation engines as discussed earlier. The prices for both diesel and fuel oils shown in Figure X.2 illustrate the changes in the relative cost of fuel oil which have occurred over the past 15 years.

Coal
Very little information is available concerning the economic viability of coal-fueled diesels and hybrid coal/oil mixtures, and their use is

considered unlikely in the near future (*Motor Ship* 1980a, *Marine Propulsion International* 1980). The Australian reintroduction of coal burning steam turbine bulk ships has been the subject of studies by Kingsmill & Ellis (1984), Beggs (1980) and Ellis (1980). Construction costs for coal steam turbine ships are about 16 per cent higher than motor ships of the same deadweight capacity (Ellis 1980). For the same cargo capacity, the deadweight needs to be about 10 per cent higher however fuel costs are about 40 per cent lower (Ueda and Wilkinson 1980). Some additional costs, associated with the provision of coal bunkers, may be incurred. Initially coal-fired ships are likely to travel via ports used for the import or export of coal.

Emulsification of fuel
The emulsification of fuel is a process whereby water is added to diesel oil. An improvement in combustion has been experienced with the use of emulsified fuels in marine diesel engines. A savings of 3 per cent in fuel cost has been reported with an initial cost of approximately $3 per ikw for the modifications to engines (*Marine Propulsion International* 1984b).

Quality and quantity checking
Small savings in fuel consumption have been reported by introducing relatively inexpensive checking procedures for fuel contaminants and the quality and quantity taken onboard (*Motor Ship* 1984g). It is not possible to assess the cost effectiveness of such improved management practices due to the imprecision in quantifying the benefits.

Economic impact
As shown in Table X.1, savings of up to 3 per cent can be achieved by using coal-fired steam turbines given the current relative costs of coal versus diesel fuel and the extra capital cost involved. The widespread use of coal-fired turbine ships is unlikely to occur within the next ten years, largely because of the lack of coal bunkering facilities. Small savings can be achieved by using emulsions, because the capital investment is small and can be recouped in less than two voyages.

Crew size and automated controls

With the increasing availability of computer controlled systems, pressure for a reduction in crew sizes by the incorporation of more labour saving equipment has been increasing in recent years. Labour saving equipment includes automation of documentation, navigation, cargo and container slot management, ship controls (course and speed corrections for changing sea conditions), stock control, maintenance, administration, fuel economy and communication devices using satellite systems (*Lloyd's Ship Manager* 1984d).

Crew sizes, based on overseas practices, could be generally reduced in existing ships to approximately 24 without the installation of additional automated equipment. To operate with smaller crews, the installation of automated systems would be required. These automated systems are expected to increase the cost of shipbuilding by approximately 10 per cent (Scott 1984). Crew size can be reduced to as low as 12 or 13 with systems currently being introduced. West Germany and Japan are well advanced in the installation of this technology. Acceptance by maritime unions is, however, a hurdle being faced by owners in many countries (Meckel 1984). Agreement has been reached with unions in some Scandinavian countries for the introduction of ships with complements of 14 or 15.

Economic impact

Table X.3 presents carrier costs at various crew levels for the typical ship and for a new ship. Carrier costs could be reduced by up to 6 per cent by the reduction in crew size down to 24, the greatest savings being for the Australia/Europe trade. The savings achieved by crew reduction would not justify the replacement of the typical ship with a new ship unless crew size was reduced to 24 or less on all three trades.

Containers

The following changes to containers are considered:

- dimensions
- weight limitations.

There have been proposals to reduce the strength and weight of containers in order to reduce land transport costs (Woodbridge 1983). However the cost effectiveness of this proposal has not been demonstrated. It is considered unlikely that any change will occur in container strength in the foreseeable future.

Dimensions

Currently, the International Standards Organisation (ISO) standard containers are all 8 feet wide. The standard lengths are 10, 20, 30 and 40 feet. A standard height of 8 feet is prescribed for each of the standard lengths, and also a height of 8 feet six inches is prescribed for the 20, 30 and 40 feet lengths (Jane's 1983). At

TABLE X.3 EFFECTS ON COSTS OF CHANGES IN CREW SIZE

Crew size	*Carrier costs[a] per TEU per voyage ($)*											
	Europe and North Mediterranean trade				*Japan trade*				*New Zealand trade*			
	Capital	*Crew*	*Other[b]*	*Total*	*Capital*	*Crew*	*Other[b]*	*Total*	*Capital*	*Crew*	*Other[b]*	*Total*
Existing ship[c]												
36	441	314	1 942	2 697[d]	293	216	1 553	2 062	232	225	1 167	1 624
33	435	288	1 939	2 662	289	198	1 551	2 038	228	206	1 165	1 599
28	425	244	1 934	2 603	283	168	1 548	1 999[d]	222	175	1 161	1 558[d]
24	417	209	1 930	2 556	279	144	1 544	1 967	217	150	1 158	1 525
New ship												
36	540	314	1 943	2 797	361	216	1 548	2 125	311	225	1 166	1 702
33	545	288	1 930	2 763	358	198	1 546	2 102	308	206	1 164	1 678
28	537	244	1 926	2 707	353	168	1 542	2 063	301	175	1 162	1 638
24	531	209	1 922	2 662	348	144	1 540	2 032	298	150	1 157	1 605
18	586	157	1 930	2 673	375	108	1 543	2 026	327	112	1 161	1 600
12	577	105	1 924	2 606	369	78	1 533	1 980	320	75	1 157	1 552

a. Excludes customer costs of $867 for Europe and North Mediterranean trade, $501 for Japan trade and $231 for New Zealand trade.
b. Other costs comprise fuel, loading and operating costs, and voyage and agency charges.
c. Ship constructed initially to accommodate the crew sizes shown.
d. Typical ship.

Source Prepared by BTE.

present ships serving Australia do not use thirty foot containers but carry most of the other length and height combinations. The twenty foot containers comprise a high proportion of those carried on liner ships. For example, in 1983-84 20 foot containers comprised about 91 per cent of container movements recorded at Sydney, while 7 per cent were 40 foot containers. The remaining 2 per cent were either 10 feet long or non-standard (Maritime Services Board 1983 and 1985). Over the four years 1979-80 to 1983-84 there was a 55 per cent increase in the number of 40 foot containers at Sydney compared with a 12 per cent increase in 20 foot containers and an appreciable reduction in the use of ten foot and non-standard containers.

There has been an increase in the maximum size of non-standard containers in use between other countries overseas. At present few non-standard containers are used on Australian trades. Shipping lines, stevedores and customers generally prefer to keep to ISO standard sizes. However, for particular commodities on certain Australian trades, pressure could come from overseas industry for the introduction of non-standard sizes, particularly non-standard height containers.

The maximum ISO standard dimensions for containers may however, increase in future years, possibly resulting in a height of 9 feet six inches, a length of 45 feet or a width of 8 feet six inches (Hodd 1984). Any future increases in maximum length and width standards could not be accommodated within existing Australian legal road limits nor within the current legal limits of many other nations including most western European countries and Japan.

Due to the maximum height limit of 4 metres in Victoria (4.3 metres in all other States) (Prince 1984) a height increase to 9 feet would legally necessitate the use of low bed chassis vehicles (1.205 metres), (high bed chassis vehicles (1.34 metres) could still be used in other States). An increase in container height to 9 feet six inches would lead to an overall height of 4.1 metres which is within the existing limits in all States except Victoria. Increases in ISO standard dimensions provide some economic advantage due to economies of scale in unloading and in capital cost, as discussed below under loading systems.

The ISO has postponed for five years the consideration of a proposal to introduce a standard container 9 feet six inches high which has the support of the United States of America.

Weight limitations
The current maximum allowable gross weight of 25.4 tonnes for 20 foot containers can be accommodated by appropriate road vehicles without exceeding the allowable wheel and axle loadings on Australian roads. However, the allowable gross weight for 40 foot containers of 30.48 tonnes cannot be accommodated on Australian roads without exceeding current legal limits. Depending on the design of the truck, a container weighing up to 25 or 26 tonnes could be carried within legal limits. Similar limitations apply in many other countries.

Loading systems

The following options were considered:

- the use of additional cranes or ramps for each ship
- increased capacity of cranes
- increased utilization of cranes and ramps
- use of 40 foot containers
- improved loading of bulk and general cargo ships.

Additional cranes or ramps
The cost of an additional crane is approximately $8 million including back-up facilities. The additional crane may not be completely effective, however, due to interference with other cranes, particularly where three or more are used on a smaller ship. For ro-ro ships the cost of an additional ramp would be about the same as a crane, although the design of some terminals might need to be improved to cater for simultaneous loading on two ramps.

Increased capacity of cranes
Cranes which lift more than one container at a time have been installed in some of the newer terminals in Australia. There is scope for their greater use, particularly at ANL terminals. The cost of installation of higher capacity cranes has been reported as approximately $10 million per crane including back-up facilities (BTE (1985a).

However, multi-container loading does increase the likelihood of the need to re-stow containers aboard ship; therefore more careful planning of container stowage is required. Because of insufficient information no detailed analysis of this innovation was carried out.

Increased utilization of cranes and ramps
Industry representatives indicated that single lift cranes which have a maximum rated capacity of approximately 40 TEUs per hour are loading at an average rate of between eight and 16 TEUs per hour in Australia. This average loading rate is calculated by dividing the time between start and finish of a shift by the number of TEUs loaded. In BTE (1985b) a container working rate (a similar measure) is given for Port Jackson container terminals as approximately 14 TEUs per hour. A similar loading rate is achieved with ramps. The productivity of cranes can be increased by about 8 per cent by feeding the crane by means of tractors towing trailers carrying four or more TEUs. The increased cost would amount to about $13 000 per TEU capacity of trailer (Booth 1981), assuming that strengthening of the terminal pavement is not required. The savings would however be less than 1 per cent.

The use of trailers in lieu of forklift trucks achieves a higher loading rate at the cost of the provision of the trailers, the towing vehicle, higher cost ramps and the additional space required for manoeuvering. Ramps would have to be stronger to support the increased wheel load associated with the trailer load of at least four containers. The capital cost of the additional equipment would amount to approximately $3 to $5 per TEU movement and with almost double the loading rate (*Cargo Systems International* 1984a).

If the trailer is stowed on board the ship, then there would be an additional capital cost of approximately $13 000 per TEU ship capacity, however container loading rates would be approximately one and a half times that achieved by unloading the trailer on the ship.

Use of 40 foot containers
The loading rate of forty foot containers, expressed in TEU's per hour, is nearly double that of lifting single 20 foot containers and a 20 per cent increase in loading rate can be achieved over the loading rate for handling two 20 foot containers in pairs. All Australian and overseas terminals used for overseas liner trades have cranes capable of lifting 40 foot containers, but facilities for lifting pairs of 20 foot containers are not usually available in Australia. The capital cost of the 40 foot container is approximately 70 per cent higher than that of the 20 foot container.

The potential usage of 40 foot containers appears to be well above the current level. The potential for increased use in 1983-84 was greater for export than import cargoes on the Australia/Europe trade, but greater for imports in the Australia/Japan and New Zealand trades.

The records for 1983-84 of inward and outward container movements for liner ships show that the lowest proportion of loaded 20 foot containers accommodating less than 12.5 tonnes for the three trades was 26 per cent for outward cargo to Japan. The highest was 64 per cent for inward cargo from New Zealand. The same cargo packed in 40 foot containers would generally lead to container weights of no more than 25 tonnes, and therefore remain within current road limits. As mentioned earlier, only 7 per cent of the 1983-84 container movements for liner ships through Sydney were 40 foot containers.

Improved loading of bulk and general cargo ships
Some information is available concerning devices designed to improve the very slow loading rate of most ships of this type. One such device comprises removable cell guides which can be installed in the hull in an area directly below the hatches to improve the efficiency of the stowing and lashing of containers. Another device involves a system of cargo skidding which allows full utilization of under deck spaces. The system enables stacks of up to four containers to be moved either longitudinally or athwart the ship on a sliding frame which operates hydraulically and requires only one operator (*Cargo Systems International* 1983).

Economic impact
Table X.4 shows the cost effects of the developments of the loading systems discussed above. By far the most cost effective development in loading systems is the use of the 40 foot container which can result in savings of between 6 and 13 per cent where full advantage can be taken of the space without exceeding the weight limit. The use of multi-container trailer loading of ro-ros would result in carrier cost savings of up to 7 per cent. If the trailer were retained on board no savings would result.

Use of an additional crane or ramp would effect a savings in carrier costs of about 1 per cent.

Ship type

Ships most commonly used for carrying break-bulk cargo are container ships, ro-ro, combination container ro-ro (con-ro), general cargo ships, combination general cargo - container ships and combination container-bulk ships (con-bulk).

TABLE X.4 EFFECTS ON COSTS OF DEVELOPMENTS IN LOADING SYSTEMS AND CONTAINER SIZES

			Carrier costs per TEU per voyage[a] ($)						
Trade area	*Ship type*	*Loading system*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[b]	*Operating*[c]	*Agency charges*	*Total*
Europe and North Mediterranean	Container	Typical ship	598	474	441	338	588	259	2 697
		One extra crane	532	519	441	333	587	259	2 670
		Increase crane utilization	585	475	441	338	587	259	2 685
		FEUs	521	338	441	325	558	259	2 442
	Ro-ro	Equivalent typical ship[d]	773	478	653	314	648	259	3 127
		Trailer loading[e]							
		Type A	588	484	653	296	639	259	2 918
		Type B	563	473	945	296	643	259	3 353
		FEUs	622	342	653	311	615	259	2 801

TABLE X.4 (Cont.) EFFECTS ON COSTS OF DEVELOPMENTS IN LOADING SYSTEMS AND CONTAINER SIZES

			Carrier costs per TEU per voyage[a] ($)						
Trade area	*Ship type*	*Loading system*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[b]	*Operating*[c]	*Agency charges*	*Total*
Japan	Container	Typical ship	335	514	283	274	360	232	1 999
		One extra crane	379	563	283	265	359	232	1 981
		Increase crane utilization	324	516	283	271	359	232	1 985
		FEUS	271	366	283	266	330	232	1 748
	Ro-ro	Equivalent typical ship[d]	454	514	409	254	391	232	2 146
		Trailer loading[e]							
		Type A	302	525	408	251	388	232	2 106
		Type B	284	512	600	250	392	232	2 305
		FEUs	291	367	408	251	361	232	1 911

TABLE X.4 (Cont.) EFFECTS ON COSTS OF DEVELOPMENTS IN LOADING SYSTEMS AND CONTAINER SIZES

			Carrier costs per TEU per voyage[a] ($)						
Trade area	*Ship type*	*Loading system*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[b]	*Operating*[c]	*Agency charges*	*Total*
New Zealand	Container	Equivalent typical ship[d]	264	410	144	176	316	159	1 470
		One extra crane	205	456	144	172	315	159	1 451
		Increase crane utilization	251	412	144	175	315	159	1 457
		FEUs	197	408	144	173	294	159	1 375
	Ro-ro	Typical ship	262	409	222	169	335	159	1 558
		Trailer loading[e]							
		Type A	196	419	222	166	332	159	1 494
		Type B	180	408	302	165	337	159	1 561
		FEUs	195	408	222	167	313	159	1 465

a. Excludes customer costs of $867 for Europe and North Mediterranean trade, $501 for Japan trade and $231 for the New Zealand trade.
b. Voyage charges comprise port and light dues, canal and tug charges.
c Operating costs include crew costs.
d. Based on a ship type which is different from that of the typical ship for the trade.
e. Loading by trailer type A involves unloading aboard ship whereas type B involves retention of loaded trailer on board for the voyage.

Source Prepared by BTE.

Container ships

Container ships usually have all of the storage space divided into vertical cells with corner guides in which containers are stacked and supported at every fifth container. The advantages are rapid loading and discharge, and integration with inland transportation systems to reduce multiple handling and restorage of cargo with accompanying pilferage hazards. A disadvantage of this system is that all the containers must be of a uniform size, with uniform fittings for lifting, stacking and locking. A cellular container ship cannot be used for any other type of cargo or even another size or type of container without extensive conversion, although some ships have been built with the flexibility to accommodate a limited number of alternative container sizes.

Ro-ro ships

Ro-ros are loaded horizontally by forklift, straddle trucks and tow motors through openings in the stern or side. Usually only one ramp can be used for movement between ship and terminal, which governs the rate of loading and unloading. However, the internal design of the ship can also affect the loading rate. Ro-ro ships have several decks and are well suited to the loading of irregularly-sized cargo as well as containers. The design of the ship can facilitate the use of a wide variety of container sizes. However, simultaneous loading and discharge is usually a slower operation with a ro-ro ship than with a container ship (DoT 1984b). Con-ro ships usually have vertical container cells in the forebody. These ships can be loaded and discharged by the simultaneous use of cranes serving container cells, and of ramps to serve the ro-ro decks.

Container-bulk ships

There is a range of con-bulk ship designs which incorporate varying amounts of accommodation for containers. Some of these ships are purpose-built carriers which accommodate cargo such as forest products. Some bulk carriers have been converted to carry containers in some holds. Many of these ships can be used to carry bulk cargo in one direction, and containers (or a combination of containers and bulk cargo) in the opposite direction. A relatively small number of con-bulk ships have been engaged in regular container services (Cargo Systems Research Consultant 1981). One reason for the low use of con-bulk ships is that only a relatively small sector of the bulk carrier fleet can be accommodated at container ports, because of the large beam and draught of bulk ships. Furthermore, a high degree of managerial skill is required to successfully combine container and bulk operations. Nevertheless, the use of such ships is growing.

Relative costs
In Table X.5 the relative costs are presented for various types of ships representative of those currently in use on Australian trades.

SERVICE CHARACTERISTICS

Route and trade variations

The cost effects of a number of changes to current route and trade arrangements are indicated in Table X.6. These results were discussed further in Chapter 10.

Ship capacity, number and service frequency

For any given trade and route, the optimum ship size depends primarily on the task and the number of ships. Other important considerations are fuel consumption, ship type and cost, ship speed and loading/unloading time (and hence frequency of service).

The cost effects of serving the three trades with varying fleet sizes and ship capacities are indicated in Table X.7.

It is worth noting that from a practical point of view, the draught limitations at Fremantle, and to some extent Adelaide and Melbourne, would affect the selection of the optimum number and size of ships. The capacity of the largest ship which has been accommodated at Fremantle is about 2400 TEU, and the limit at Adelaide would be about 3000 TEU. These are based on draught displacements at approximately 70 per cent of deadweight.

It should also be noted that the analysis of the effects of varying the number of ships is based on the age of the typical ship. If the existing ships were to be replaced with new ships of the above sizes, reductions in carrier costs of about 19, 36 and 13 per cent would result for the Australia/Europe and North Mediterranean, Japan and New Zealand trades respectively.

EXTERNAL FACTORS AND ANALYSIS PARAMETERS

The values of the inputs to the model used for the analysis are listed in Table VI.3. The effects on costs of changes to the values used for the more significant factors and parameters are given in Table X.8. These are discussed in Chapter 10.

TABLE X.5 EFFECTS ON COSTS OF SHIP TYPE

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Ship type*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
Europe and North Mediterranean	Container[c]	598	474	441	338	588	259	2 597	867	3 564
	Ro-ro	687	476	702	314	684	259	3 124	928	4 052
	Con-ro	770	479	538	364	651	259	3 059	928	3 987
	Gen. cargo	789	479	981	382	886	259	3 777	1 172	4 949
	Con-bulk[d]	514	471	417	351	685	259	2 697	1 097	3 794
Japan	Container[c]	335	514	283	274	360	232	1 999	501	2 500
	Ro-ro	372	515	389	255	378	232	2 141	480	2 621
	Con-ro	411	516	302	279	360	232	2 100	480	2 580
	Gen. cargo	429	516	451	289	474	232	2 391	628	3 019
	Con-bulk[d]	297	513	287	284	418	232	2 031	629	2 660
New Zealand	Ro-ro[c]	262	410	222	169	335	160	1 558	231	1 789
	Container	264	410	145	176	316	160	1 470	231	1 701
	Con-ro	279	410	161	171	321	160	1 501	231	1 731
	Gen. cargo	289	410	167	183	388	160	1 599	285	1 884
	Con-bulk[d]	258	410	173	197	370	160	1 568	272	1 840

a. Voyage charges comprised of port and light dues and canal and tug charges.
b. Operating costs includes crew costs.
c. Typical ship.
d. Ship speed 15.0 knots compared with 19.0 knots for other ship types.

Source Prepared by BTE.

TABLE X.6 EFFECTS ON COSTS OF ROUTE VARIATIONS

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Route*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
Europe and North Mediterranean	Typical route	598	474	441	338	588	259	2 697	867	3 564
	Via East Coast North America	620	474	460	355	611	259	2 779	1 050	3 829
	Shuttle via Singapore[c]	444	703	590	406	565	259	2 953	1 327	4 280
	Round the world via Australia[d]	376	467	622	334	366	259	2 425	1 291	3 716
	Extra port of call[e]	616	474	441	362	590	259	2 741	867	3 608
Japan	Typical route	335	514	293	274	360	232	1 999	501	2 500
	Via East Asia	330	512	286	260	361	232	1 982	632	2 614
	Shuttle via Singapore[c]	519	774	519	407	583	232	2 843	830	3 673
	Extra port of call[e]	361	515	283	293	362	232	2 047	501	2 548

TABLE X.6 (Cont.) EFFECTS ON COSTS OF ROUTE VARIATIONS

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Route*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
New Zealand	Typical route	262	410	222	169	335	159	1 558	231	1 789
	Cross trading on Europe and North America trades	145	425	172	325	273	159	1 499	348	1 847
	Extra port of call[e]	305	411	222	182	338	159	1 618	231	1 849

a. Voyage charges comprise port and light dues, tug and canal charges.
b. Operating costs include crew costs.
c. Operation of typical ships as feeders to round the world service.
d. Round the world service via Australia, New Zealand, North America, Europe, Suez, Persian Gulf, Singapore, and thence back to Australia.
e. Inclusion of an additional Australian port of call without cost of centralization assessed.

Source Prepared by BTE.

TABLE X.7 EFFECTS ON COSTS OF VARIATIONS IN NUMBERS OF SHIPS, SERVICE FREQUENCY AND CAPACITY

Trade area	*Number of ships*	*Frequency (days)*	*Capacity (TEU)*	*Costs per TEU per voyage ($)* Carrier	*Customer*	*Total*	*Capacity utilization (per cent)* Inward	*Outward*
Europe and	29[a]	17.314	1 530	3 687	835	4 522	51.2	53.3
North Mediterranean	29	23.2	1 376	3 152	1 097	4 249	71.3	77.9
			1 562	3 211	1 098	4 309	67.2	70.0
			2 186	3 685	1 098	4 783	48.0	50.0
	25	20.0	1 376	3 096	954	4 050	70.0	76.5
			1 562	3 118	955	4 073	67.2	70.0
			2 186	3 560	955	4 515	48.0	50.0
	20	20.0	1 720	3 007	954	3 961	67.1	73.4
			1 952	2 992	955	3 947	65.9	70.0
			2 733	3 420	955	4 375	49.0	50.0
	15	21.0	2 408	2 929	999	3 928	64.2	70.2
			2 732	2 900	999	3 899	63.4	69.3
			3 826	3 310	1 000	4 310	48.0	50.0
	14	22.4	2 752	2 914	1 061	3 975	63.4	69.3
			3 123	2 884	1 061	3 945	62.7	68.6
			4 372	3 297	1 062	4 359	48.0	50.0
	13	23.4	3 096	2 904	1 106	4 010	63.0	68.8
			3 513	2 883	1 106	3 989	62.4	68.2
			4 912	3 295	1 107	4 402	48.0	50.0
	12	21.6	3 096	2 892	1 026	3 918	62.3	68.1
			3 513	2 876	1 026	3 902	61.9	67.6
			4 912	3 266	1 027	4 293	48.1	50.0

TABLE X.7 (Cont.) EFFECTS ON COSTS OF VARIATIONS IN NUMBERS OF SHIPS, SERVICE FREQUENCY AND CAPACITY

Trade area	*Number of ships*	*Frequency (days)*	*Capacity (TEU)*	*Costs per TEU per voyage ($)*			*Capacity utilization (per cent)*	
				Carrier	*Customer*	*Total*	*Inward*	*Outward*
Europe and	11	22.0	3 440	2 888	1 043	4 931	61.7	67.4
North Mediterranean			3 903	2 883	1 043	4 926	61.3	67.1
(Cont.)			5 465	3 282	1 044	4 326	48.0	50.0
Japan	12[a]	5.576	1 258	2 997	431	3 428	27.4	34.8
	12	12	822	2 191	643	2 934	66.5	82.4
			989	2 307	643	2 950	55.3	70.0
			1 385	2 583	643	3 226	39.5	50.0
	10	12	986	2 093	643	2 736	66.5	84.2
			1 187	2 210	643	2 853	55.3	70.0
			1 162	2 483	643	2 926	39.5	50.0
	7	11.2	1 316	1 948	605	2 553	66.5	84.2
			1 583	2 059	605	2 664	55.3	70.0
			2 216	2 322	605	2 927	39.5	50.0
	5	10	1 644	1 873	547	2 420	66.5	84.2
			1 979	1 980	547	2 527	55.3	70.0
			2 770	2 232	547	2 779	39.5	50.0
	4	14	2 302	1 856	623	2 479	66.5	81.2
			2 770	1 959	619	2 578	55.3	70.0
			3 878	2 231	619	2 850	39.5	50.0
	3	21	3 453	1 890	726	2 616	66.5	77.8
			4 155	1 999	714	2 713	55.3	70.0
			5 818	2 303	714	3 017	39.5	50.0

TABLE X.7 (Cont.) EFFECTS ON COSTS OF VARIATIONS IN NUMBERS OF SHIPS, SERVICE FREQUENCY AND CAPACITY

Trade area	*Number of ships*	*Frequency (days)*	*Capacity (TEU)*	*Costs per TEU per voyage ($)*			*Capacity utilization (per cent)*	
				Carrier	*Customer*	*Total*	*Inward*	*Outward*
New Zealand	5[a]	6.3	510	1 762	216	1 978	49.4	65.3
	5	8.3	486	1 576	268	1 844	68.6	90.6
			630	1 672	268	1 940	53.0	70.0
			882	1 830	268	2 098	37.8	50.0
	4	9.3	681	1 504	294	1 798	68.6	90.6
			881	1 600	294	1 894	53.0	70.0
			1 234	1 767	294	2 051	37.9	50.0
	3	10	973	1 444	311	1 755	68.6	90.6
			1 259	1 547	311	1 858	53.0	70.0
			1 763	1 723	311	2 034	37.8	50.0
	2	18	1 715	1 450	387	1 837	68.6	90.6
			2 267	1 574	387	1 961	53.0	70.0
			3 174	1 788	387	2 175	37.8	50.0

a. Modified typical ship based on 1983-84 loadings for container, con-ro and ro-ro ships only. This differs from the other analyses presented in this Appendix in which the outward capacity utilization was taken to be 70 per cent.

Note Frequency is based on five, five and three ships in consortia serving Europe, Japan and New Zealand respectively.

Source Prepared by BTE.

TABLE X.8 EFFECTS ON COSTS OF CHANGES IN OTHER VARIABLES

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Variable*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
Europe and North Mediterranean	Basic variables	598	474	441	338	588	259	2 697	867	3 564
	Discount rate									
	Increase to 13 per cent	601	474	477	338	594	259	2 741	1 031	3 772
	Reduce to 7 per cent	595	474	403	338	582	259	2 650	704	3 354
	Period of analysis									
	Increase to 20 years	596	474	436	338	587	259	2 689	867	3 556
	Ship life									
	Decrease to 10 years	574	473	485	338	597	259	2 746	867	3 613
	Ship life									
	Increase to 20 years	618	474	346	338	574	259	2 609	867	3 476
	Loading rate									
	Up by 20 per cent	570	473	441	338	586	259	2 666	867	3 533

TABLE X.8 (Cont.) EFFECTS ON COSTS OF CHANGES IN OTHER VARIABLES

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Variable*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
Europe and North Mediterranean (Cont.)	Container utilization									
	Increase by 20 per cent	743	478	531	380	696	311	3 139	1 006	4 145
	Freight task									
	Reduce by 25 per cent	742	471	590	387	760	259	3 208	867	4 075
	Fuel price									
	Increase by 20 per cent	718	474	441	338	594	259	2 823	867	3 690
	Ship price									
	Increase by 20 per cent	598	474	537	338	608	259	2 814	867	3 681
	Exchange rate as at 7.6.85	739	558	544	414	630	259	3 144	1 042	4 186

TABLE X.8 (Cont.) EFFECTS ON COSTS OF CHANGES IN OTHER VARIABLES

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Variable*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
Japan	Basic variables	335	514	283	274	360	232	1 999	501	2 500
	Discount rate									
	Increase to 13 per cent	336	514	303	274	363	232	2 023	596	2 619
	Reduce to 7 per cent	334	514	262	274	357	232	1 973	406	2 379
	Period of analysis									
	Increase to 20 years	334	514	281	274	360	232	1 995	501	2 496
	Ship life									
	Decrease to 10 years	326	514	315	274	364	232	2 025	501	2 526
	Increase to 20 years	341	514	236	274	353	232	1 950	501	2 451
	Loading rate									
	Up by 20 per cent	311	513	283	270	358	232	1 966	501	2 467

TABLE X.8 (Cont.) EFFECTS ON COSTS OF CHANGES IN OTHER VARIABLES

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Variable*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
Japan (Cont.)	Container utilization									
	Increase by 20 per cent	382	515	354	289	429	278	2 247	601	2 848
	Freight task									
	Reduce by 25 per cent	398	516	378	296	452	232	2 272	501	2 773
	Fuel price									
	Increase by 20 per cent	402	514	283	274	363	232	2 069	501	2 570
	Ship price									
	Increase by 20 per cent	335	514	334	274	371	232	2 060	501	2 561
	Exchange rate as at 7.6.85	414	576	350	307	385	232	2 263	588	2 841

TABLE X.8 (Cont.) EFFECTS ON COSTS OF CHANGES IN OTHER VARIABLES

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Variable*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
New Zealand	Basic variables	262	410	222	169	335	159	1 558	231	1 789
	Discount rate									
	Increase to 13 per cent	263	410	243	169	339	159	1 582	277	1 859
	Reduce to 7 per cent	261	410	201	169	332	159	1 532	186	1 718
	Period of analysis									
	Increase to 20 years	261	410	221	169	335	159	1 555	231	1 786
	Ship life									
	Decrease to 10 years	255	410	257	169	340	159	1 590	231	1 821
	Increase to 20 years	266	410	167	169	327	159	1 498	231	1 729
	Loading rate									
	Up by 20 per cent	237	409	144	175	314	159	1 439	231	1 668

TABLE X.8 (Cont.) EFFECTS ON COSTS OF CHANGES IN OTHER VARIABLES

		Costs per TEU per voyage ($)								
		Carrier								
Trade area	*Variable*	*Fuel*	*Loading*	*Capital*	*Voyage charges*[a]	*Operating*[b]	*Agency charges*	*Total*	*Customer*	*Total*
New Zealand (Cont.)	Container utilization									
	Increase by 20 per cent	322	411	260	173	382	191	1 739	264	2 003
	Freight task									
	Reduce by 25 per cent	299	411	296	174	422	159	1 762	231	1 993
	Fuel price									
	Increase by 20 per cent	314	410	222	169	338	159	1 613	231	1 844
	Ship price									
	Increase by 20 per cent	262	410	276	169	347	159	1 623	231	1 854
	Exchange rate as at 7.6.85	324	440	274	187	355	159	1 739	253	1 992

a. Voyage charges comprise port and light dues, canal and tug charges.
b. Operating costs include crew costs.

Source Prepared by BTE.

APPENDIX XI ORGANISATIONS CONTACTED IN THE COURSE OF THE STUDY

In addition to all of the inward and outward Conferences serving Australia (see Appendix II), officers of the Bureau of Transport Economics contacted the following organisations in connection with the study.

ABC Containerline Agency
Auscott Ltd
Australia-New Zealand Container Line
Australian Apple and Pear Corporation
Australian Canned Fruits Corporation
Australian Council of Wool Buyers
Australian Dairy Corporation
Aus-Marine Agencies Pty Ltd (Eagle Container Line)
Australian Meat and Live-stock Corporation
Australian Meat Exporters Federal Council
Australian National Line
Australian National Line Agency
The Australian Shippers' Council
Australian Wool Corporation
Barrett Burston (Australia) Limited
Chief Container Service
Columbus Line
D.S.T. Consultants Pty Ltd
David Jones Limited
Department of Transport Shipping Advisory Services Branch
East Asiatic Company (EAC Lines)
Freightbases & Actrans
General Motors-Holden's Ltd
Glebe Island Terminals Pty Ltd
Grace Bros International
Hong Kong Islands Shipping Agency
International Forwarders Association of Australia
K(Asia-Pacific) Pty Ltd
KKL (Kangaroo) Line Pty Ltd
McArthur Shipping and Agency (Hyundai)

Merchant Services Guild
Metals and Minerals Shippers' Association
Mitchell Cotts Freight (Aust) Pty Ltd
Nedlloyd Aust Pty Ltd
Opal Maritime Agencies Pty Limited (FESCO)
Pacific Forum Line
Ricegrowers' Co-operative Mills Limited
Sanger (Aust) Pty Ltd
Sealane
Sea Containers
H.C. Sleigh Shipping (Polish Ocean Lines)
SOFRANA New Guinea Line
The Victorian Maltsters Association
TNT Bulkships Ltd.
Union Steampship Company of New Zealand
Waterside Workers' Federation
Wills Shipping (Shipping Corporation of India)
Woolworths Limited
Zim Israel Navigation Co. Ltd

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GLOSSARY

Ad valorem	Freight charged in proportion to the estimated value of goods.
Basic Service Rate	The rate of freight payable by shippers to cover the service performed by the carrier between the depot/terminal at the loading port and the terminal at the discharge port.
Basic Service Rate Addition	Additional charge to the Basic Service Rate to include wharfage levied by port authorities and a proportion of the terminal and depot costs incurred by the carrier for LCL cargo.
Bill of Lading	A document given on a ship operator's behalf for goods shipped or received for shipment.
Bunker Adjustment Factor (or Bunker Surcharge)	Surcharge applied to freight rates to adjust for fluctuations in bunker prices.
Bunkers	Ship's fuels.
Capacity utilization	The percentage of ship or combined ship capacity, measured in slots or cargo mass, which the cargo carried, measured in fully loaded TEUs or mass tonnes, represents.
Cargo centralization	The liner shipping practice of transporting cargo to ports at which regular calls are made as an alternative to calling at a greater number of ports.
Carrier costs	Costs incurred by the shipping operator which comprise capital and operating costs of the ship and the loading, voyage and agency charges.

Centralized port	Ports at which regular calls are made by liner shipping operators.
Commodity box rate	The basic rate of freight per container which is applicable to a commodity for a given container type.
Common-user	Term used to describe port facilities operated to serve all port users and not restricted to particular ship operators.
Conference	An association between liner shipping operators to charge common rates for services on defined routes.
Consolidate	To combine more than one shipment in a container for more than one consignee.
Container	International Standards Organisation (ISO) shipping container.
Cross trades	Shipping routes served by ships of a nationality other than those of the countries at either end of the trading voyage.
Cube out	Term used to describe when the volumetric capacity of the container has been reached in advance of the permitted weight limit.
Customer costs	Cost of inventory and insurance of goods in transit from the time of arrival at port of origin to time of departure from port of destination.
Currency Adjustment Factor	Factor (either + or -) applied to freight rates to adjust for currency exchange fluctuations.
Deadweight Tonnage	The total load of cargo, fuel, stores and ballast which a ship can carry, that is, the difference between the displacement of a vessel loaded to its summer loadline and its light displacement.

Depot	A facility where LCL cargo is consolidated and containers are stuffed and stripped.
Draught	The vertical distance between the waterline and the keel.
Feeder movement	Movement of container between a port which had traditionally received a direct service (prior to cargo centralization) and the centralized ports.
Feeder service	Describes services designed to assemble or disperse cargo between major ports and other source or destination ports.
Flags of convenience	The flags of countries where registration requirements of ships are less stringent than in others, for example, Panama and Liberia, are referred to as flags of convenience.
Freight-all-kinds rate	The rate payable by shippers for the carriage of a container where there is no regard to the commodities it contains.
Freight forwarder	An enterprise which engages in the consolidation and door-to-door or door-to-terminal/depot delivery of freight.
Full Container Load	A quantity of cargo which allows a container to be loaded with the cargo of only one shipper.
Gross Registered Tonnage	The cubic capacity of permanently enclosed space in a ship.
Inventory cost	The cost of holding a stock of goods including the stock cost of goods in transit.
Kinematic centistokes	Units of measurement of fuel viscosity at 50°C.
Less than Container Load	A quantity of cargo which requires a container to be loaded with the cargo of more than one shipper.

Light dues	Dues paid for the provision of navigational aids.
Liner	A ship engaged in a regular service for passengers and/or cargo on given routes.
Liner service	A shipping service which is operated over a specific route and on a regular scheduled basis.
Liner operator	Shipping line, consortia or joint venture operating ships in a liner service.
Net Registered Tonnage	Net registered tonnage is the gross registered tonnage minus the space for crew accommodation, navigation, certain water ballast tanks and propulsion machinery.
One line conference	A single shipping line that provides the sole service on a route (sometimes called a 'Single Line Conference').
Operating costs	Ship costs comprising manning, insurance, repairs and maintenance, stores and administration.
Pan Australia rates	The term used to describe rates which are the same at each port of call in Australia.
Pilotage charges	These charges are levied on ships using the services of a pilot to negotiate approaches to berth.
Pooling	The apportioning of traffic and/or operating profits and losses in an agreed manner between members of a Conference.
Positioning movement	Relocation of empty overseas containers within Australia.
Received Bill of Lading	A Bill of Lading which acknowledges that cargo has been received for shipment.
Revenue tonne	The unit of measure on which shipping rates are applied.

Shipped Bill of Lading	A Bill of Lading which contains the statement that goods have been 'shipped'.
Shipper	A person or body having a contractual or other arrangement with a liner operator for the shipment of cargo.
Slot	Container position on-board a containership.
Slot utilization	The percentage of container slots on a ship or group of ships which are occupied by containers (loaded or empty).
Stowage factor	The number of cubic metres occupied by one tonne of a commodity, including an allowance for broken stowage.
Stripping	Unloading (devanning) containers.
Stuffing	Loading containers.
Terminal	A facility at which containers are loaded into or discharged from ships.
Through Bill of Lading	Bill of Lading covering receipt of goods, at the premises of the owner of the cargo for delivery to the ultimate consignee.
Tonnage or berthage rates	These rates are charges levied on ships for the use of port facilities, that is, wharfs and channels.
Twenty foot Equivalent Unit	The term is used to describe a 20ft X 8ft X 8ft ISO shipping container, or the number of equivalent twenty foot units.
Voyage costs	Ship costs comprising bunkers, port charges and canal charges, which are attributable to a voyage.
Wharfage charges	Charges paid to port authorities on the basis of the tonnage of cargo moving over them.

ABBREVIATIONS

AAO	Consortium, comprising 3 lines - Asia Australia Express Ltd (AAE), Australian National Line (ANL) and Orient Overseas Container Line (OOCL)
ABS	Australian Bureau of Statistics
ACFC	Australian Canned Fruits Corporation
ACT	Associated Container Transportation Ltd
ACT(A)	Associated Container Transport (Australia) Ltd
ACWB	Australian Council of Wool Buyers
ADC	Australian Dairy Corporation
AECS	Australia/Europe Container Services
AESC	Australia to Europe Shipping Conference
AEWL	Association of Employers of Waterside Labour
AGPS	Australian Government Publishing Service
AJCL	Australia Japan Container Line
AMLC	Australian Meat and Livestock Corporation
ANL	Australian National Line (Australian Shipping Commission)
ANRO	Consortium of ANL, NOL, Australia Straits Container Line and Nedlloyd on SE Asia trade
ANSCON	Australian Northbound Shipping Conference
ANZECS	Australia New Zealand Europe Container Service
AOTA	Australian Overseas Transport Association
ASC	Australian Shippers' Council
ASEAN	Association of South East Asian Nations
ASP	Associated Steamships Pty Ltd
ATFCC	Australian Transport Freight Commodity Classification
AWC	Australian Wool Corporation
BAF	Bunker Adjustment Factor (or Bunker Surcharge)
BATL	Brisbane Amalgamated Terminals Ltd
BL	Bill of Lading
Box	Shipping container
BSC	Bunker Service Charge
BSC	Baltic Shipping Company
BSR	Basic Service Rate
BSRA	Basic Service Rate Addition
BW & WD	Brisbane Wharves and Wool Dumping

BTE	Bureau of Transport Economics
C & F	Cost and Freight
CAF	Currency Adjustment Factor
CBU	Completely Built Up (motor vehicles)
CENSA	Committee of European National Shipowners' Association
CGM	Compagnie Generale Maritime
CIF	Cost, Insurance, Freight
CKD	Completely Knocked Down (motor vehicles)
CMI	Comite Maritime International
Con-bulk	Container bulk
Con-ro	Container Roll-on Roll-off
CSA	Clerk of Shipping Agreements
cst	Centistokes (kinematic)
CTAL	Container Terminals Australia Limited
DCN	Daily Commercial News
DoT	Department of Transport
DWT	Deadweight tonnes
EEC	European Economic Community
EIU	Economist Intelligence Unit
EOTC	Exporters' Overseas Transport Committee
ESC	European Shippers' Council
ESS	Eastern Searoad Service
FAK	Freight-all-kinds
FAS	Free alongside ship
FASC	Federation of ASEAN Shippers' Councils
FCL	Full Container Load
FCU	Federated Clerks Union
FESCO	Far East Shipping Company
FEU	Forty foot Equivalent Unit
FMC	Federal Maritime Commission (US)
FOB	Free-on-board
FOC	Flag of Convenience
g/kw hr	grams/kilowatt hour
GRT	Gross Register Tonnes
ICC	International Chamber of Commerce
IFAA	International Forwarders Association of Australia
ikw	installed kilowatt
IMF	International Monetary Fund
ISO	International Standards Organisation
ITF	International Transport Federation
ITJ	*International Transport Journal*
JSC	Japanese Shippers' Council
JWCGA	Japanese Wool Commodity Group of Australia
K line	Kawasaki Kisen Kaisha Line

LASH	Lighter Aboard Ship
LCL	Less than Container Load
Lo-lo	Lift-on lift-off
LSE	Lloyds Shipping Economist
LVR	*Lloyds Voyage Records*
MCR	Maximum Continuous Revolutions
MISC	Malaysian International Shipping Corporation
MNSC	Malaysian National Shippers' Council
MOL	Mitsui OSK Line
NEDO	National Economic Development Office
NOL	Neptune Orient Line
NRT	Net Register Tonnes
NSN	Norwegian Shipping News
NVOCC	Non-vessel Operating Common Carrier
NYK	Nippon Yusen Kaisha
OCAL	Overseas Containers Australia Ltd
OCL	Overseas Containers Ltd
OECD	Organisation for Economic Co-operation and Development
OPEC	Organisation of Petroleum Exporting Countries
P&O	Peninsular and Orient Australia Ltd
P&OSN	Peninsular and Oriental Steam Navigation Company (UK)
PACE	Pacific Australia Container Express
PAD	Pacific Australia Direct Line
PJT	Prices Justification Tribunal
POL	Polish Ocean Lines
PSF	Pre-shipment Fee
RBA	Reserve Bank of Australia
Reefer	Refrigerated
Ro-ro	Roll-on roll-off
RTW	Round-the-world
SACCS	Sea and Air Cargo Commodity Statistics
SCALS	Stevedoring Cargo and Labour Statistics
SITC	Standard International Trade Classification
SOTC	Shipowners' Overseas Transport Committee
SUA	Seamens' Union of Australia
TEU	Twenty foot Equivalent Unit
TNT	Thomas Nationwide Transport Ltd
TPA	Trade Practices Act
TWU	Transport Workers Union
UCP	Uniform Customs and Practices
UNCTAD	United Nations Conference on Trade and Development
WCA	Wool Council of Australia
WWF	Waterside Workers' Federation of Australia
YS	Yamashita-Shinnihon Steamship Co Ltd