

## **Australian Shipping and the Balance of Payments**

### **Occasional Paper**

This report discusses the effect of Australian flag shipping on the balance of payments (the external account). In preparing the report, the BTCE estimated the 1986-87 contribution to the external account from all Australian shipping operations and evaluated 17 case studies of hypothetical Australian ships in international trades. The case studies were carried out using a ship costing model called BTESHIP and were based on hypothetical new vessels operating with the crew costs and conditions negotiated by the Shipping Reform Task Force (so-called MIDC ships). The case study data were also used to evaluate efficiency in earning foreign exchange with domestic resource cost analysis.

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# **Australian Shipping and the Balance of Payments**

Bureau of Transport and Communications Economics

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## **FOREWORD**

This paper was prepared when the question of Australian shipping's contribution to the balance of payments became a matter of public discussion. The report presents estimates showing the industry's historical contribution to the external account and discusses its potential to earn foreign exchange in the future with the new ships and smaller crews being introduced under the government's restructuring program.

The Bureau would like to acknowledge the assistance and advice it received while preparing this report from various private sector firms and organisations and from government departments, including the Australian Bureau of Statistics and the Maritime Policy Division of the Department of Transport and Communications.

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## **ABSTRACT**

This report discusses the effect of Australian flag shipping on the balance of payments (the external account). In preparing the report, the BTCE estimated the 1986–87 contribution to the external account from all Australian shipping operations and evaluated 17 case studies of hypothetical Australian ships in international trades. The case studies were carried out using a ship costing model called BTESHIP and were based on hypothetical new vessels operating with the crew costs and conditions negotiated by the Shipping Reform Task Force (so-called MIDC ships). The case study data were also used to evaluate efficiency in earning foreign exchange with domestic resource cost analysis.

## **CHAPTER 1 INTRODUCTION**

### **THE AUSTRALIAN TRADING FLEET**

In 1986–87 the Australian merchant fleet comprised 88 vessels totalling 3.5 million deadweight tonnes and employing about 5300 officers and seamen when fully operational. Over recent years, the number of ships in the fleet has remained about constant but there has been a trend to larger ships and integrated coastal–international services with perhaps a slight fall in the number of ships dedicated only to foreign routes. In 1986–87, there were 16 vessels, totalling 1 million tonnes, dedicated to international operations, 55 vessels (1.24 million tonnes) operating only on the coast, and the remaining 17 vessels (1.25 million deadweight tonnes) were employed on both coastal and overseas routes. Revenue received by Australian ships in that year totalled just under \$1.2 billion, comprising \$600 million from coastal trade and \$560 million from international operations. This comprised virtually all the revenue on domestic sea cargo but less than 10 per cent of the \$6.2 billion freight bill for the nation's international trade.

### **SHIPPING REFORM IN AUSTRALIA**

The general level of economic efficiency in Australian shipping has long been a subject of criticism. In the coastal trades, the major problem is the inefficient work practices on the Australian waterfront which, as the Industries Assistance Commission (1988b) pointed out, reduce shipping's competitiveness with rail and road. In addition, Australian shipping's blue water costs (total expenses net of shore-based cargo costs) — in both international and coastal trades — have usually been higher than those of other OECD flag ships mainly due to larger crew sizes and better conditions of service.

In recent years there have been a number of reforms in the shipping industry to reduce crew costs, both on coastal and international vessels. The current program of reductions was developed by the Maritime Industry Development Committee (MIDC) and is based on the concept of 'multi-skilled' crews and 'integrated' ships. In the early 1980s, Australian ships generally carried a crew of over 30 but the initial MIDC reductions cut this to 21 for new ships (23 for coastal tankers). Further changes negotiated by the Shipping Reform Task Force (1989) within the MIDC framework will allow future reductions on new ships to 17 or 18.

Reductions below 16 would be possible but would require investment in additional equipment on ships and training so that individual officers could perform both deck and engine-room duties. Crew reductions were also negotiated on pre-MIDC ships, with crews on Crawford ships to come down to about 21 while pre-Crawford ships will carry a crew of about 26. (Crawford ships are vessels introduced under a previous industry scheme; see Committee on Revitalisation of Australian Shipping 1982.)

Since the MIDC scheme was introduced, Australian ship owners have purchased 11 new ships and announced orders for a further 16 (as at July 1990).

## **EXISTING FLEET AND THE BALANCE OF PAYMENTS**

The balance of payments (also known as the external account) is a record of all economic transactions between residents of Australia and other countries. It comprises two parts: current account and capital account. Current account is a record of transactions involving income or expenditure while capital account is a summary of transactions in liabilities. (Appendix I gives further details on the balance of payments including an outline of how transport entries are recorded.)

The balance of payments implications of national merchant fleets have frequently been examined in debates on maritime policy. Major overseas inquiries into the subject resulted in the Rochdale Report (Committee of Inquiry into Shipping 1970) in Britain and the Sletmo Report (Task Force on Deep-Sea Shipping 1985) in Canada. Other overseas work has been carried out by Goss (1968) and Blumenhagen (1981). More recently the issue has been examined by the Australian National Maritime Association (Apelbaum 1988) and by the Centre for Transport Policy Analysis (Trace, Meyrick & Robinson 1989). (The parallel question of Qantas's effect on the balance of payments is discussed by Price Waterhouse Urwich 1988).

The measurement of the Australian shipping industry's actual contribution to the external account presents a number of conceptual problems. These problems will be explored and estimates of shipping's contribution to the 1986-87 external account will be presented in chapter 2. (The estimates are partly based on data for 1986-87 published in the Industries Assistance Commission's 1988 report on coastal shipping, which are not available for other years.)

It has sometimes been argued that this type of study is irrelevant to policy. For a developed economy in long-run general equilibrium, no special interest attaches to foreign exchange earnings; a dollar is a dollar, whether it is earned in shipping, in other trade-exposed activities, or in the non-traded sector of the domestic economy. It is a matter for debate whether this view is appropriate in contemporary Australia where, for at least five years, the current account deficit has been widely (though not unanimously — see Pitchford 1989) perceived as unacceptably large.

In the current economic circumstances, policies likely to contract inefficient industries should therefore be evaluated to determine their effect on the balance of payments. In particular, the eventual benefits of contracting less efficient industries must be weighed against the immediate effects on the current account. A better alternative would be to investigate ways of improving these industries to make them efficient contributors to the external account.

The estimates of shipping's aggregate effect on the balance of payments in chapter 2 relate to the short to medium term since, in the long term, the real exchange rate will adjust to bring about equilibrium in an open economy.

### **POTENTIAL COMPETITIVENESS OF NEW AUSTRALIAN SHIPS**

Foreign exchange earnings are not an end in themselves. Rather the relevant question is whether, with new ships and the smaller, multi-skilled crews now coming into service under the MIDC scheme, Australian shipping can be competitive on international routes. Available evidence suggests that the MIDC initiative will reduce, but not eliminate, the cost disadvantage of Australian ships relative to foreign ships. In 1989 the Shipping Reform Task Force estimated that the daily cost disadvantage of 'best practice' Australian ships relative to comparable OECD vessels could be cut from \$2700 to \$1300 by reducing crews to 18 and the crew-to-berth ratio to 2.0 (assuming relative rates of pay remained the same).

On average, the cost disadvantage will remain, although its actual size will be sensitive to changes in exchange rates, freight rates and the respective fiscal regimes (taxes and subsidies) facing Australian ship operators and their OECD competitors. The disadvantage would be greater relative to ships sailing under tax-avoiding offshore flags and flag of convenience ships with low cost crews.

No-one therefore expects Australian flag vessels to be broadly competitive on all international routes. However, since only 4 per cent of Australia's trade volume is currently carried by Australian ships, the real question is whether market niches exist where the Australian shipping industry could expand its market share without loss of economic efficiency. For example, the Australian industry might be competitive on routes where it can reduce or offset its crew cost disadvantage by better vessel utilisation. This is already being achieved by some BHP bulk ships which carry cargoes on two legs of a triangular course so that they earn revenue on well over 50 per cent of their sailing distance. With crews of 18 or fewer, these large and sophisticated vessels are capital intensive operations. High wage rates alone would not exclude Australian (or other OECD) ships from services where other cost and revenue factors are favourable.

The potential viability of new Australian ships in overseas trades has recently been evaluated in studies carried out by Apelbaum (1988) and Trace, Meyrick and Robinson (1989). Both studies modelled the costs and revenues of three hypothetical Australian ships operating under MIDC conditions with crews of 21 and used the results to estimate their effect on the balance of payments. They

arrived at mutually opposing conclusions because of differing assumptions concerning costs, revenues and operating conditions.

In chapter 3, the Bureau has followed a similar method to study the effect of MIDC ships operating with crews of 18 under the conditions negotiated by the Shipping Industry Reform Task Force. The BTCE work also investigates the type of market niches where Australian ships could operate efficiently and hence a wider range of case studies was evaluated.

## **CHAPTER 2 AUSTRALIAN SHIPPING AND THE EXTERNAL ACCOUNT**

### **BALANCE OF PAYMENTS STATISTICS**

What contribution does Australian flag shipping make to Australia's balance of payments? Superficially, this could be treated as a 'national accounting' question and as such it is almost answered by the official balance of payments statistics (see appendix I). In preparing these figures the Australian Bureau of Statistics follows international convention in treating:

- the freight revenues earned by Australian ships in carrying export cargoes as a current account credit, that is, as foreign exchange earnings (their income from carrying imports is not counted for reasons explained in appendix I); and
- the overseas expenditure incurred by these same ships as a current account debit.

For reasons of confidentiality these figures are merged with the corresponding overseas transactions of Australian air carriers. However, an informed estimate (Apelbaum 1988, 30) is that Australian ships earned credits of \$395 million in 1986–87 for carrying exports. From the viewpoint of the official balance of payments approach, Australian shipping's contribution to the external account was therefore approximately \$395 million, less the industry's overseas expenditures.

This answer, based on standard balance of payments accounting convention, is far from adequate from the economics viewpoint. Rather it would make better economic sense to ask how the external account would be affected if the Australian merchant fleet did not exist. Probably the most thorough analysis of such a question is that reported for British shipping by the Rochdale Inquiry. But there is more than one answer to the question and in this chapter the analysis is taken somewhat further.

### **FOREIGN EXCHANGE EARNINGS AND SAVINGS**

If there were no Australian fleet, it seems plausible to assume that Australia's international sea trade would be virtually unchanged, but with the cargoes that now go on Australian ships being carried instead in foreign vessels. (A similar assumption was made by Rochdale.) The revenues earned by Australian ships

from carrying import cargoes are therefore foreign exchange 'savings' which make just as much a contribution to the external account as the earnings from carrying export cargoes. They are a saving of foreign exchange because the cargoes now moved in Australian ships would have to be consigned on foreign vessels if the Australian fleet did not exist.

BTCE estimates that in 1986-87 Australian ships earned \$562 million from carrying imports and exports. Against this must be offset an estimated \$174 million in overseas expenditures for items such as bunkers (fuel), port dues, stevedoring, canal charges and charter payments. After deducting these costs, the net contribution of Australian ships to the external account was about \$388 million (table 2.1). (Appendix II shows the calculations underlying figures given in this chapter and supporting details are in appendices III and IV.)

TABLE 2.1 ESTIMATED CONTRIBUTION OF AUSTRALIAN FLAG SHIPPING TO THE EXTERNAL ACCOUNT IN 1986-87  
(\$ million)

	<i>International trading</i>	<i>Coastal trading</i>	<i>Total</i>
(A) Gross freight revenue	562	600	1 162
Less overseas expenditures	174	2	176
(B) Subtotal	388	598	986
Less forgone foreign exchange			
Bunkers <sup>a</sup>	29	67	96
'Displaced' expenditures <sup>b</sup>	94	75	169
(C) Subtotal	265	456	721
Less price distortions <sup>c</sup>	25	120	145
(D) Subtotal	240	336	576
Less capital charges	59	77	136
(E) Total	181	259	440

- a. Fuel purchases in Australian ports by Australian ships.
- b. The reduction in spending by foreign ships in Australian ports due to Australian shipping operations.
- c. The premium in coastal and trans-Tasman freight rates due to the restrictions on competition in these trades.

*Note* Appendix II gives a detailed description of these calculations and supporting information is given in appendix III (on capital and charter costs) and appendix IV (on displaced expenditure, bunkers and distortions).

*Source* BTCE estimates.



## FOREIGN EXCHANGE FORGONE

As Rochdale pointed out, further costs must be deducted from revenues to reach a more meaningful assessment of the national shipping industry's contribution to the external account. Purchases of tradeable goods by Australian ships in Australian ports should be deducted since such transactions have either:

- added to the nation's imports of goods, or
- reduced the nation's exports of goods.

Fuel purchases in Australian ports are an obvious example.

Furthermore, a deduction should be made for the costs of goods and services which, if there were no Australian ships, would be sold in Australian ports to the foreign ships replacing them. This deduction, termed 'displaced foreign shipping expenditure' would include port charges, towage, pilotage, light dues and ships' stores.

Bunkers purchased in Australia in 1986–87 are estimated at about \$29 million and displaced foreign shipping expenditure at about \$94 million (see appendix IV). After these further deductions the apparent net contribution of Australian shipping to the external account in 1986–87 would come down to only \$265 million.

## COASTAL SHIPPING

In its analysis of British shipping, the Rochdale Committee apparently decided that coastal shipping is a 'non-tradeable' activity that does not contribute to the external account. This probably did not greatly affect the inquiry's findings as the vast majority of United Kingdom shipping activity involves international services. In the Australian case the coastal trade is more important to the national merchant fleet. An opposite view was taken by the Industries Assistance Commission (1988b) which, in advocating an end to cabotage, asserted that coastal shipping is in principle a tradeable service.

If coastal shipping is regarded as a tradeable service its contribution to the external account can be defined by asking almost the same question as before, that is, if there were no Australian coastal fleet, what would be the effect on the external account?

The Industries Assistance Commission (1988b) has estimated that, in 1986–87, Australian shipping's wharfgate-to-wharfgate revenue from coastal services totalled \$920 million. After deducting estimated stevedoring charges, blue water revenues (wharfgate-to-wharfgate revenue less shore-based cargo handling costs) were about \$600 million (see appendix table II.7). As with international operations, foreign exchange forgone should be deducted to give the net contribution to the external account. BTCE estimates these costs, including bunkers and displaced foreign shipping expenditure, totalled \$142 million leaving net earnings of \$456 million.

## **PRICE DISTORTIONS**

This estimate of earnings overstates the hypothetical 'foreign exchange saving' generated by Australian coastal vessels because it includes some price distortions. If Australian vessels were replaced by foreign ships they would carry most coastal cargo at lower freight rates. That is, the actual earnings of Australian coastal shipping include some premium above the value of the service at 'world prices'. The premium would vary between different segments of the coastal trade, but the Department of Transport and Communications (1987b) has estimated it at, on average, approximately 20 per cent of the blue water freight revenue. (This figure is not at odds with the conclusions drawn by the Industries Assistance Commission 1988b).

A further amount of about \$120 million should be deducted from Australian shipping's coastal earnings in order to estimate its foreign exchange savings. If Australian coastal shipping is regarded as a tradeable activity, its contribution to the external account in 1986-87 was therefore about \$336 million.

An analogous adjustment needs to be made to that part of the international earnings of Australian shipping which comes from trans-Tasman operations. Third-country ships are effectively excluded from this trade, so that here too freight rates are on average at a premium above world rates. Subtracting a rough estimate of \$25 million for this premium would correct the estimated contribution to the external account of international shipping downwards from \$265 million to \$240 million.

## **CAPITAL CHARGES**

The discussion so far has addressed the hypothetical question of what would happen to the external account if the Australian merchant fleet did not exist. This is the line of inquiry first explored by the Rochdale Inquiry in Britain. However, in one respect such a question is not well defined because it does not specify how the Australian fleet would be removed from the scene.

A further refinement, which probably provides a more meaningful null hypothesis, is to contrast the contribution to the external account obtained from operating Australian flag shipping with that which might hypothetically be obtained from selling the fleet and investing the proceeds offshore. A charge for capital should therefore be deducted from shipping industry revenue to reflect the foreign exchange opportunity cost of capital tied up in ships.

Of course, the total value of ships imported from overseas is recorded as a debit in the current account figures published by the Australian Bureau of Statistics, but the amount of imports is volatile from year to year and not directly related to shipping's freight revenues in any particular year.

Since ships are tradeable commodities, it seems more logical to deduct an annual capital charge from earnings instead of the actual value of ship imports for the

year under study. This can be regarded as the foreign exchange revenue forgone by retaining a national merchant fleet instead of exchanging it for an offshore financial investment.

The BTCE estimated that the potential market value of the Australian owned trading fleet (including both coastal and international vessels) was approximately \$798 million in 1986–87 (see appendix III). The annual capital charge was imputed as 17 per cent of the valuation on a current-cost accounting basis, using a depreciation rate of 12 per cent (declining balance) and a real interest rate of 5 per cent. This gives an annual capital charge of \$77 million for coastal shipping and \$59 million for international shipping.

Deducting these charges reduces shipping's contribution to the external account in 1986–87 to an estimated \$440 million comprising \$181 million from international operations and \$259 million from coastal services.

This estimate of the contribution from coastal shipping exceeds that estimated by the Industries Assistance Commission (1988b) by about \$100 million. This appears to be because the Industries Assistance Commission has deducted a larger capital charge, based on an unduly high valuation of the coastal fleet.

It seems plausible to make this deduction from shipping earnings as a measure of the foreign exchange forgone by locking up capital in an Australian fleet. However, it should be pointed out that the Rochdale Inquiry did not adopt such a view.

The final estimates (line E) in table 2.1 might be regarded as the net revenue product, at world prices, of Australian crews, officers and management. Even this is not necessarily the end of the story. Crews, officers and management are, in the eyes of some economists, simply resources which could, in theory, be redeployed elsewhere in the Australian economy where they would continue to contribute, directly or indirectly, to the external account.

It does not seem wise to endorse any individual number in table 2.1 as a uniquely correct estimate of Australian shipping's contribution to the external account. First, the decision on whether to include revenue from coastal trading in the calculations depends on whether it is regarded as a domestic or a trade-exposed activity. Second, this analysis is in good company (Rochdale's) in deducting the overseas expenditure of Australian shipping and the forgone foreign exchange earnings of Australian suppliers, but this reduces the industry's contribution only as far as line C. There are also some plausible arguments for adjusting for freight rate distortions (line D) and deducting capital charges (line E), but not everyone would agree. Of course, those who envisage a distant time horizon, over which all of the resources now employed in shipping could be redeployed to other sectors, might argue that shipping's contribution to the external account would be much smaller. (Indeed, it might be negative if other sectors can use resources more efficiently than shipping.)

## **SENSITIVITY**

It is not possible to say from estimates for only one year if shipping's contribution to the external account is stable or volatile. On the one hand, the industry's contribution depends on the level of freight rates, foreign expenses and the exchange rate. Each of these items can be quite volatile and changes in one of them could, all else being equal, induce a large change in the industry's contribution to the external account.

On the other hand, some changes would tend to be self-cancelling. Higher freight rates would generate more earnings but could also increase capital costs by pushing up the market price of ships. Further, the shipping industry has adopted practices designed to stabilise its earnings. For example, in the liner trades, currency adjustment factors may be applied to offset changes in exchange rates while bunker adjustment factors offset variations in fuel costs. The use of these adjustment factors probably tends to stabilise a ship's net earnings as measured in foreign currency. Similarly, in the tanker and bulk trades, many ship owners protect themselves by signing long-term contracts and only ships operating in the spot market are fully exposed to short-term movements in freight rates.

## **IMPLICATIONS FOR TRADE**

In the long term the use of Australian ships on the coast might also affect the level of international trade. The Industries Assistance Commission (1988b) argued that cabotage, the reservation of coastal trade for Australian shipping, would adversely affect the international competitiveness of other trade exposed industries because the costs of Australian vessels are often higher than those of potential foreign competitors.

First, higher costs from cabotage might reduce the international competitiveness of products which have to be shipped around the coast prior to export. For example, Tasmanian exports can only be shipped directly overseas on routes for which liner shipping services make direct calls at Tasmanian ports. Other cargoes must be shipped to Melbourne on coastal ships, then transshipped overseas. This effect of coastal shipping costs does not seem to be large although it may be a problem for individual shippers.

Second, coastal shipping costs may reduce the competitiveness of Australian manufacturers in distant parts of the domestic market. For example, manufacturers in the eastern states may lose sales in the Western Australian market which would be viable if foreign ships could carry cargoes from eastern states to Fremantle, at lower freight rates, in cargo space that would otherwise be unutilised. (Australia's liner trade imports from Europe exceed exports to that market so there is often empty space on ships returning to Europe from New South Wales or Victoria.)

Third, Australian manufacturers may import raw materials from overseas in cases where coastal shipping costs make interstate Australian suppliers uncompetitive.

The Industries Assistance Commission inquiry into coastal shipping received several submissions citing examples of Australian products which were competitive in international markets but not within Australia. Some domestic manufacturers said it was often cheaper to import materials even though the fob prices of Australian and overseas suppliers were about the same. (Even if coastal shipping costs inhibit domestic sales of Australian produced materials, the negative effect on the balance of payments would be reduced if the materials were instead exported to overseas markets.)

Fourth, the development of additional industries processing raw materials might have been inhibited by coastal shipping costs. Several submissions to the Industries Assistance Commission inquiry on coastal shipping suggested that exporting unprocessed minerals was more profitable than processing them in Australia because processing here would involve shipment around the coast in high cost Australian vessels. There may therefore be instances where Australia has missed out on opportunities to add value to raw materials and thus to increase foreign exchange earnings.

The Economic Planning Advisory Council (EPAC) (1988) has also looked at the question of raw materials processing in Australia and identified a large range of factors which influence the decision whether to process in Australia. These factors range from taxation to high interest rates and construction costs. The cost of coastal shipping was listed as a contributing factor, but as one among many. While the removal of cabotage and the consequent reduction in some coastal shipping freight rates would help to encourage increased raw materials processing in Australia, EPAC concluded that it was not possible to attribute any particular lost opportunities solely to problems with coastal shipping.

In any case, it could be several years before any such replacement of Australian by foreign coastal ships could significantly affect the volume of trade. Even if cheaper foreign ships were allowed to operate on the coast, there would be lags before processing plants were constructed and transport and distribution systems established. The impact on the balance of payments in the short term might not be significant. In the long term, as remarked earlier, the balance of payments is a less relevant consideration; ultimately, real exchange rates will adjust to achieve equilibrium in the external account.

## **CHAPTER 3 EARNING POTENTIAL OF NEW SHIPS**

In the second line of inquiry, the Bureau investigated the potential effect on the external account of MIDC ships operating with crews of 18 under the conditions negotiated through the Shipping Reform Task Force. It is expected that the first MIDC ships with 18 crew will come into service in the early 1990s. (Ultimately the Task Force proposals envisage crew sizes coming down to 14, but the effects of such further changes are not addressed in this study.)

The Bureau research involved evaluations of hypothetical MIDC ships operating on selected international trade routes. The overall aim of the research was to indicate the type of service where Australian ships could earn foreign exchange while operating at a profit. In each case study, the Bureau estimated a ship's foreign exchange earnings and expenditures and calculated its efficiency in earning foreign exchange. The case studies also give some indication of how foreign exchange earnings will vary with ship type, route length and service characteristics.

The actual effect of each hypothetical ship's operations on the balance of payments would depend on whether it was a net addition to the fleet or a replacement ship. If it was a replacement ship, the net effect on the current account would equal the difference between the foreign earnings of the new ship and the vessel being replaced.

Most MIDC ships will be larger and more efficient than the vessels being replaced and hence are likely to earn (or save) more foreign exchange. However, net foreign earnings will fall if a new ship's revenue does not exceed that of the replaced vessel because its foreign exchange costs will be greater while cost savings will largely be in domestic expenditures.

The principles underlying the case studies are generally the same as those applied in the aggregate analysis in chapter 2 and are described in appendix II.

### **THE CASE STUDIES**

A total of seventeen case studies were evaluated comprising seven tanker, five bulk ship and five liner services. Details are shown in tables 3.1 and 3.2.

TABLE 3.1 TANKER AND BULK SHIP SERVICE CASE STUDIES

<i>Service</i>	<i>Size (<sup>'000 dwt</sup>)</i>	<i>Route</i>
<i>Tankers</i>		
T1	95	Singapore, Fremantle
T2	95	Ras Tanura <sup>a</sup> , Sydney
T3	95	Sydney, Los Angeles
T4	95	Ras Tanura <sup>a</sup> , Sydney, Melbourne, Singapore
T5	95	Djakarta, Melbourne, Manila
T6	32	Sydney, Auckland
T7	120	Ras Tanura <sup>a</sup> , Kwinana
<i>Bulk ships</i>		
B1	220	Hay Point, Pohang <sup>b</sup>
B2	220	Port Hedland, Rotterdam
B3 <sup>c</sup>	220	Port Hedland, Port Kembla, Yokohama
B4	140	Newcastle, Yokohama
B5	70	Newcastle, Yokohama

- a. Arabian Gulf.  
 b. Korea.  
 c. This study includes one coastal leg.

Source BTCE.

TABLE 3.2 LINER SERVICE CASE STUDIES

<i>Service</i>	<i>Size (TEU)</i>	<i>Route</i>
L1	2500	Europe via Suez: Rotterdam, Melbourne, Sydney, Flushing, Tilbury, Hamburg
L2	2500	Europe via Cape: as for L1
L3	2500	East coast of North America: Hampton Roads, Melbourne, Sydney, Brisbane, Philadelphia, Halifax, New York
L4	2000	Japan: Busan, Sydney, Melbourne, Adelaide, Brisbane, Yokkaichi, Nagoya, Yokohama
L5	1500	South-East Asia: Penang, Melbourne, Sydney, Brisbane, Singapore, Djakarta, Port Kelang

Source BTCE.

Of the twelve tanker and bulk ship services evaluated, nine are shuttle services and three are triangular operations. All the shuttle service case studies involve sailings between two ports, with ships loaded on the forward leg and in ballast on the return. The triangular case studies involve services between three or more ports, with cargo carried on at least two legs of the route.

The case studies were selected after discussions with various Australian ship operators and the Maritime Policy Division of the Department of Transport and Communications. Some of the services selected for evaluation are operational, with foreign or Australian pre-MIDC ships, while others are hypothetical services. The ship operators nominated the type of vessel likely to be used by Australian operators on each service and completed a questionnaire giving estimates of cost data needed to run a computer model (BTESHIP) which generates itemised estimates of ship operating expenses, including capital charges and other overhead expenditures.

All but one of the case studies were purely international services. Coastal services were not evaluated due to lack of data on the foreign exchange savings attributable to individual services. This problem arises because very little information is available on the freight rates currently applying on the coast, most cargoes being carried under confidential contract rates or in vessels owned by the shipper. Even if freight rates were available, it could be argued that they are inflated above international levels, and therefore overstate foreign exchange savings, because coastal trade is largely restricted to Australian ships.

The exception is the case study of a bulk ship carrying cargo from Port Kembla to Japan and then from Port Hedland to Port Kembla. This case study is intended to show the potential of triangular services and uses an 'average' freight rate estimated from an Industries Assistance Commission (1988b) analysis of coastal rates.

The Bureau selected both shuttle and triangular case studies in order to investigate how ship utilisation affects profits and foreign exchange earnings. Ship utilisation is defined as the ratio of loaded distance sailed to total distance. In their respective analyses of tanker and bulk ship operations, the Apelbaum (1988) and Trace, Meyrick and Robinson (1989) studies evaluated only shuttle services. This was somewhat unrealistic as ship operators will generally try to maximise their ship utilisation in order to maximise profits. A shuttle tanker or bulk service will usually not attain more than 50 per cent utilisation but triangular services can attain much higher figures.

In evaluating tanker and bulk operations, the Bureau assumed that:

- the tanker service T4 ex Ras Tanura carries cargo to Sydney and then from Melbourne to Singapore, giving a utilisation of approximately 70 per cent of its sailing distance;
- the Djakarta service T5 carries cargo on each of its three legs, giving a utilisation of 100 per cent; and



- the triangular bulk service B3 attains a utilisation of approximately 70 per cent, carrying cargo from Port Hedland to Port Kembla and then from Port Kembla to Yokohama.

A figure of 100 per cent utilisation was assumed for the Djakarta service to show how high load factors affect earnings. It would be unusual for a tanker or bulk ship to be loaded on all legs (but at least one Australian ship is said to be attaining very high utilisation). A similar qualification applies to the tanker and bulk case studies with 70 per cent utilisation.

The liner service case studies were assumed to carry cargo on all legs with an average load utilisation of 80 per cent. The costs taken into account include agency fees and stevedoring but not any relating to cargo centralisation. Ship costs were taken to include all expenses involved in operating a ship, including onshore administration:

- for liners, it was assumed that agency services were provided by a separate company in each port rather than being carried out in-house; and
- for bulk and tanker services, stevedoring costs were not counted, because freight rates normally cover only blue water costs with loading and discharge expenses being met by the exporter and importer respectively.

Although most of the data used in the case studies were based on the questionnaires, some figures were taken from published sources. For example, fuel costs were based on the lowest published prices for the ports included in each ship's sailing schedule. Some items were averaged where answers from ship operators varied significantly.

The data inputs used in the calculations are shown in detail in appendix VII.

## **COST AND REVENUE ESTIMATES**

For each of the case studies, BTCE used the data supplied by ship operators to estimate the costs and revenues for a hypothetical MIDC ship (with 18 crew) on a specific route. The cost estimates from BTESHIP were analysed into expenditures in Australia and overseas. Net foreign exchange earnings were then calculated as total revenue, less the sum of foreign exchange expenditure by the ship operator and displaced expenditure. (Displaced expenditure is the reduction in spending by foreign ships in Australian ports due to the operations of Australian ships.)

The estimates show earnings and expenditures per voyage on the assumption that ships are fully employed throughout the year, either on the case study services or some other routes. Overhead costs would increase and profits fall if ships were idle for part of the year or if empty steaming costs were incurred moving between different services.

Revenues for each case study were estimated from various published sources for the latter part of 1988. For the bulk ship case study involving a movement

from Port Hedland to Port Kembla, a coastal freight rate was derived from data in the Industries Assistance Commission report on coastal shipping (1988b). As with the aggregate calculations in chapter 2, foreign exchange earnings were taken to include freight on imports as well as freight on exports.

The case studies are therefore based on the costs and revenues obtaining in late 1988 but with crew levels which would not come into operation until 1990 (18 crew per ship and a crew to berth ratio of 2.0). The economic surplus figures shown in tables 3.6 and 3.7 may therefore be slightly overstated because the agreement to reduce crews to 18 also involved pay increases. (On the other hand, the reduction in crew sizes will cut capital costs on accommodation facilities in new ships.) The foreign exchange earnings would not be significantly affected since payments to seamen are in Australian currency.

Capital costs were estimated as an annuity over the ship's economic life of fifteen years at an interest rate of 5 per cent. This approach estimates the foreign exchange opportunity cost to Australia of capital tied up in ships, for example the return from a foreign currency annuity. However, for an investment evaluation, a ship owner might calculate capital costs using a shorter time period (say ten years or less) and a higher interest rate (because of the risks involved in shipping). The capital charges appropriate for a commercial investment evaluation are therefore likely to be higher than the figures used here where the aim is to estimate the effect on the external account.

The estimated cost and revenue figures for each case study were then used to calculate the ship's:

- foreign exchange earnings, taken as all revenues;
- foreign exchange costs, comprising overseas expenditures including all fuel costs;
- domestic resource costs, comprising expenditures in Australia;
- economic surplus, taken as total revenue less total costs, before MIDC assistance (described in a following section) and tax are taken into account; and
- the domestic resource cost (DRC) ratio, which is the ratio of domestic resource costs (measured in Australian dollars) to foreign exchange earnings (measured in foreign currency).

### **DOMESTIC RESOURCE COST RATIOS**

The DRC ratio is a measure of efficiency in earning foreign exchange. It is normally used for project evaluation in countries facing prolonged foreign exchange shortage or foreign debt problems, usually developing countries.

DRC analysis provides a technique for evaluating and ranking projects which is independent of the exchange rate. This is because it measures the ratio of Australian dollar costs to foreign currency income, so the exchange rate is not involved in the calculations.

It can also be demonstrated that there is a direct relationship between the economic surplus of a project and its DRC ratio. As economic surplus increases, the efficiency in earning foreign exchange also increases (giving a lower DRC ratio). At the point where the economic surplus equals zero, the DRC ratio will equal the market exchange rate.

In the absence of economic distortions, a project will be efficient in earning foreign exchange if its DRC ratio is less than the market exchange rate (where the exchange rate is measured in DRC form, that is, \$A/US\$1.00). A DRC ratio above the exchange rate shows the project would be earning foreign exchange at a cost greater than its market price. DRC analyses can therefore be used both to rank projects and to identify which would be efficient in earning foreign exchange.

However, drawing inferences about the absolute level of economic efficiency from a DRC ratio involves complications when there are relevant distortions. In this context there are two possible sources of distortion.

First, it might be argued that Australia's external deficit presents a constraint on economic growth in the short term, and that an extra dollar of foreign exchange earnings confers an external benefit by loosening this constraint at the margin. The same point could be expressed by arguing that restrictive macro-economic policies, implemented to reduce the external deficit, may hold the market exchange rate above its 'natural' (or 'shadow') level.

Second, it might be argued that assistance to other trade-exposed Australian industries (manufacturing and agriculture) raises the market exchange rate above its 'natural' long-term level. The efficiency of a trade-exposed industry might then be judged according to whether its DRC ratio exceeds the average DRC ratio of all trade-exposed industries.

Due to the possible existence of these distortions, in this study DRC ratios were used only to rank projects according to their efficiency in earning foreign exchange.

In the calculations of chapter 2, 'displaced foreign shipping expenditure' was discussed as a possible debit in calculating Australian shipping's contribution to the external account. If this approach is followed in calculating DRC ratios, it is necessary to deduct displaced expenditure in Australian dollars from domestic resource costs and in US dollars from net foreign earnings. The result would be DRC ratios which vary with the exchange rate. (This complication arises because displaced foreign shipping expenditure involves domestic sales to foreigners.) To avoid this problem, the DRC ratios were calculated with both denominator and numerator gross of displaced foreign expenditure. This procedure will have little, if any, effect on the ranking of trades and routes by DRC ratio.

Further details of the DRC analysis are given in appendix V.

## RESULTS

The case study results for tankers are given in table 3.3 and tables 3.4 and 3.5 give the figures for the bulk ship and liner case studies. The results are ranked according to their DRC ratio, with the more efficient services (the lower DRC ratios) at the top. The market exchange rate determines which services are rated as efficient in earning foreign exchange. For example, if the Australian dollar is worth US\$0.68, any service with a DRC up to \$A1.47/US\$1.00 would be efficient in earning foreign exchange, but if it appreciated to US\$0.88 the DRC would have to be \$A1.14/US\$1.00 or less. The results vary widely across trades and routes, reflecting differences in load factors, differences in intensity of competition, and perhaps differences in labour to capital ratios.

Over the last two years, the nominal exchange rate, in terms of Australian dollars per US dollar, has varied from a peak of \$A1.47/US\$1.00 to a low of \$A1.12/US\$1.00. Even without taking account of arguments suggesting shadow exchange rates above these levels, it appears that several of the services examined could earn foreign exchange efficiently. It should be stressed that these calculations are for services operated by new, technically efficient, ships with crews of 18.

As a generalisation, the case study results suggest that Australian flag tankers and bulk ships have the potential to earn foreign exchange efficiently on triangular services where good ship utilisation is possible, and perhaps also on the shorter

TABLE 3.3 NET FOREIGN EARNINGS AND DRC RATIOS: TANKERS

<i>Service, utilisation</i>	<i>Net foreign earnings per voyage (US\$'000)</i>	<i>Domestic resource costs per voyage (\$A'000)</i>	<i>DRC ratio (\$A/US\$)</i>
T5 Djakarta, 100 per cent	822	415	0.50
T4 Ras Tanura <sup>a</sup> , 70 per cent	696	584	0.84
T1 Singapore	188	170	0.90
T6 Auckland	109	114	1.05
T2 Ras Tanura <sup>a</sup> , 50 per cent	332	453	1.36
T7 Ras Tanura <sup>a</sup> -Kwinana	224	404	1.80
T3 Los Angeles	138	412	2.98

a. Arabian Gulf.

*Note* Discrepancies in figures are due to rounding.

*Source* BTCE estimates.

TABLE 3.4 NET FOREIGN EARNINGS AND DRC RATIOS: BULK SHIPS

<i>Service, utilisation</i>	<i>Net foreign earnings per voyage (US\$'000)</i>	<i>Domestic resource costs per voyage (\$A'000)</i>	<i>DRC ratio (\$A/US\$)</i>
B3 Yokohama, 70 per cent	1 101	523	0.48
B1 Pohang	259	413	1.60
B4 Yokohama, 50 per cent	162	350	2.16
B5 Yokohama, 50 per cent	140	337	2.41
B2 Rotterdam	-336	778	-2.32

*Note* Discrepancies in figures are due to rounding.

*Source* BTCE estimates.

TABLE 3.5 NET FOREIGN EARNINGS AND DRC RATIOS: LINER SERVICES

<i>Service</i>	<i>Net foreign earnings per voyage (US\$'000)</i>	<i>Domestic resource costs per voyage (\$A'000)</i>	<i>DRC ratio (\$A/US\$)</i>
L3 East coast of North America	6 801	3 892	0.57
L5 South-East Asia	2 181	1 976	0.91
L1 Europe via Suez	3 759	3 910	1.04
L4 Japan	1 981	2 467	1.25
L2 Europe via Cape	2 169	3 922	1.81

*Note* Discrepancies in figures are due to rounding.

*Source* BTCE estimates.

shuttle services. Most long-distance shuttle services seem to be inefficient because the cost of empty steaming on the back leg (the return voyage) outweighs the revenue from standard freight rates.

A negative result in a case study does not prove that the trade itself is not commercially viable — only that the type of service evaluated would not be efficient. For example, shipment of petroleum products to the United States west coast might be viable if carried out as part of a triangular service.

The case study results for liner services seem to indicate that Australian ships could operate efficiently on several routes provided good load utilisation is achieved. It must be remembered, however, that there are fundamental differences between liner services and other types of shipping. Tanker and bulk shipping services are competitive with a large number of buyers and sellers and relatively few barriers to entry. Provided money is available, any firm could quickly begin operations by buying a ship and hiring a management firm. To establish a viable liner service, however, a firm would probably need to buy more than one ship, to set up a system of agency services, and to establish goodwill with shippers. In addition, established liner services may oppose new services by reducing prices or improving services. (In economic terms, liner shipping is probably less contestable than bulk shipping.)

### **MIDC ASSISTANCE**

MIDC assistance comprises a taxable grant of 7 per cent of the value of an eligible ship's value plus accelerated depreciation over five years instead of thirteen years. The accelerated depreciation can effectively begin two years before the ship's first full year of operation. These incentives will be available up to 1997. They should properly be regarded as an integral part of the Shipping Reform Strategy announced in June 1989. In that context they provide a stimulus towards adjustment by encouraging investment in technically efficient ships operated by smaller crews.

The MIDC assistance per voyage for each case study was calculated as the difference between its commercial surplus and its economic surplus. To calculate commercial surplus, the present value of MIDC assistance was subtracted from the capital value of the ship, thus reducing the capital cost per voyage. At a corporate tax rate of 39 per cent, the present value of MIDC assistance equals 39 per cent of the present value of the accelerated depreciation plus 61 per cent of the cash grant made for the ship's purchase. Tables 3.6 and 3.7 show economic surplus and commercial surplus calculated for each case study at exchange rates of US\$0.70 and US\$0.82 respectively.

The figures are useful for showing the market niches likely to give the best returns to Australian ships, but they do not show whether Australian ships would be commercially viable or competitive with foreign vessels. To make such judgments, it would be necessary to carry out a commercial evaluation of each service. A commercial service is likely to yield profit estimates lower than the figures in tables 3.6 and 3.7 because:

- ship operators would use hurdle rates higher than the 5 per cent real interest rate used by BTCE in order to reflect the risk inherent in shipping and to identify services which do not give the minimum rate of return required for commercial purposes; and
- commercial operators might write off capital over a shorter time period than the fifteen years used by the BTCE.

TABLE 3.6 CASE STUDY RESULTS: COMMERCIAL SURPLUS PER VOYAGE AT EXCHANGE RATE OF US\$0.70<sup>a</sup>  
(\$A'000)

<i>Service, utilisation</i>	<i>Economic surplus</i>	<i>Value of MIDC</i>	<i>Commercial surplus</i>
<i>Tanker</i>			
T5 Djakarta, 100 per cent	759	122	881
T4 Ras Tanura <sup>b</sup> , 70 per cent	411	160	571
T1 Singapore	99	50	149
T6 Auckland	41	33	74
T2 Ras Tanura <sup>b</sup> , 50 per cent	22	135	157
T7 Ras Tanura <sup>b</sup> -Kwinana	-83	134	51
T3 Los Angeles	-215	121 <sup>c</sup>	-93
<i>Bulk ships</i>			
B3 Yokohama, 70 per cent	1 050	202	1 252
B1 Pohang	-43	140	97
B4 Yokohama, 50 per cent	-119	103 <sup>c</sup>	-16
B5 Yokohama, 50 per cent	-137	65 <sup>c</sup>	-71
B2 Rotterdam	-1 258	343 <sup>c</sup>	-914
<i>Liner services</i>			
L3 East coast of North America	5 824	333	6 157
L5 South-East Asia	1 140	111	1 252
L1 Europe via Suez	1 461	358	1 819
L4 Japan	363	161	524
L2 Europe via Cape	-824	379 <sup>c</sup>	-445

- a. Commercial surplus equals economic surplus plus the after tax value of MIDC assistance.  
 b. Arabian Gulf.  
 c. For commercially unprofitable case studies the value of assistance is meaningless since such services could not in practice be undertaken.

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

*Source* BTCE estimates.

It should also be noted that the results in tables 3.6 and 3.7 do not provide any basis for deciding whether the overall level of Australian shipping should be expanded or contracted. This is because the case studies are not a representative sample of present or future Australian shipping activity. The results suggest, for example, that bulk ships and tankers are most likely to be viable on short to medium distance routes and triangular services, but further research would be necessary to show what this implies for the overall level of Australian shipping operations.

Direct comparisons should not be made between the figures because each case study involves a different ship type or route. Where all other factors are constant, MIDC assistance will vary with route length, longer routes receiving a greater amount of MIDC assistance. This result occurs because of the way MIDC assistance is calculated. For a specific ship it is effectively a fixed amount per day, hence longer voyages receive a higher amount of assistance.

TABLE 3.7 CASE STUDY RESULTS: COMMERCIAL SURPLUS PER VOYAGE AT EXCHANGE RATE US\$0.8252<sup>a</sup>  
(\$A'000)

<i>Service, utilisation</i>	<i>Economic surplus</i>	<i>Value of MIDC</i>	<i>Commercial surplus</i>
<i>Tanker</i>			
T5 Djakarta, 100 per cent	581	104	685
T4 Ras Tanura <sup>b</sup> , 70 per cent	260	136	396
T1 Singapore	58	43	101
T6 Auckland	17	28	46
T2 Ras Tanura <sup>b</sup> , 50 per cent	-50	115	64
T7 Ras Tanura <sup>b</sup> -Kwinana	-132	114 <sup>c</sup>	-18
T3 Los Angeles	-245	103 <sup>c</sup>	-142
<i>Bulk ships</i>			
B3 Yokohama, 70 per cent	811	171	982
B1 Pohang	-99	119	19
B4 Yokohama, 50 per cent	-154	87 <sup>c</sup>	-67
B5 Yokohama, 50 per cent	-167	56 <sup>c</sup>	-112
B2 Rotterdam	-1 185	291 <sup>c</sup>	-893
<i>Liner services</i>			
L3 East coast of North America	4 350	283	4 632
L5 South-East Asia	667	95	762
L1 Europe via Suez	646	304	950
L4 Japan	-66	137	70
L2 Europe via Cape	-1 294	321 <sup>c</sup>	-973

- a. Commercial surplus equals economic surplus plus the after tax value of MIDC assistance.  
 b. Arabian Gulf.  
 c. For commercially unprofitable case studies the value of assistance is meaningless since such services could not in practice be undertaken.

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

*Source* BTCE estimates.

MIDC assistance itself will not directly affect foreign exchange earnings because it is only an Australian dollar transfer payment to ship operators. Rather its effect on foreign earnings will be indirect:

- first, the scheme will induce operators to buy more technically efficient ships; and
- second, the increase in profits from MIDC assistance might generate an increase in shipping operations and this in turn would increase foreign earnings.

## EFFECTIVE ASSISTANCE

Having calculated the absolute value of MIDC assistance, the Bureau used the results to estimate the effective assistance the scheme would give to shipping. For each of the hypothetical case studies, effective assistance was calculated as



the ratio of MIDC assistance per voyage to value added before tax and without MIDC assistance (unassisted value added). Value added was calculated as revenue less all costs, except for wages and interest.

For services with a positive economic surplus, the effective assistance is nearly always less than 20 per cent, in some cases being as low as 5 per cent. For services with a positive commercial surplus, the effective rate of assistance is usually less than 30 per cent and the overall average is less than 20 per cent. (Where the implied rate of assistance is high, the voyage is unlikely to be undertaken since the profit would not cover the carrier's risk premium). By comparison, the latest available data show that the average effective assistance for the manufacturing industry sector was 17 per cent in 1988–89 while agriculture received 9 per cent in 1987–88 (Industries Assistance Commission 1989). (Both of these sectors have a large proportion of output which is relatively lightly assisted and a small proportion receiving a high level of assistance — Industries Assistance Commission 1985, 6).

The comparison may not be entirely apt since different conditions apply to tariffs and MIDC assistance. Tariffs give ongoing assistance to all firms in protected industries, enabling them to increase domestic prices without any requirement to improve efficiency. MIDC assistance is only paid to new or rebuilt ships operated by crews of agreed maximum size, and the scheme is subject to a sunset clause terminating it in 1997.

The effective assistance for coastal services would be calculated in the same way, but with the value of assistance also including any premium in freight rates due to cabotage. All else being equal, the effective assistance to a coastal service would usually be higher than that given to an international service with the same commercial costs and revenues.

## CHAPTER 4 CONCLUSIONS

What is the contribution of Australian shipping to the balance of payments? The question is simple, but it does not have a simple answer. There is some measure of agreement that shipping's 'contribution' should include earnings from the carriage of exports (which is a credit item in the official balance of payments figures), plus revenue from carrying imports (which is not). It also looks self-evident that overseas expenditures by Australian ships should be deducted. On this basis the estimated contribution in 1986–87 was about \$388 million.

The hypothetical question addressed by the Rochdale Inquiry in the United Kingdom goes further to ask how much larger the current account deficit would be if there were no national merchant fleet? The answer to this question is a smaller figure than the above because domestic expenditures on tradeable intermediates (for example, bunkers), and displaced foreign shipping expenditure (for example, port dues, towage and stores), are subtracted. On this basis the estimated contribution in 1986–87 was about \$265 million.

But what about Australian coastal shipping? If that too is regarded as a trade-exposed activity, hypothetically replaceable by foreign vessels, net earnings on the coast also contribute to the current account. However, coastal and trans-Tasman earnings should be valued at 'world prices' (that is, net of any revenue premiums made possible by cabotage or shipping restrictions). Adding in these adjusted earnings leads to an estimated contribution to the 1986–87 current account of \$576 million.

Notionally this estimate represents the net revenue product at world prices of the 'primary factors' employed in Australian shipping. This was the concept applied to UK shipping by the Rochdale Inquiry. But is it meaningful to ask what would happen if there were no Australian merchant fleet? A better approach might be to ask how the external account would be affected if the fleet were sold, because the answer to this question would show the opportunity cost of having a national flag fleet. After all, ships are themselves tradeable commodities.

The market value of all Australian owned trading vessels in 1986–87 was estimated very roughly as \$798 million. If that value were realised and used to purchase an annuity in New York or London, it could generate an annual contribution to the external account of about \$136 million. Deducting this estimate

of the 'opportunity cost' of the ships would leave a net contribution by Australian shipping to the external account of about \$440 million in 1986–87.

This contribution was effectively earned by Australian crews, officers, management and risk taking. It has a meaning in the short to medium term. In the long run these human resources also have opportunity costs, since they could be employed in other sectors of the economy. Over the long run, the Rochdale Inquiry's comments on submissions from United Kingdom shipowners might be appropriate:

According to this view, since the balance of payments is the residual of the whole economy, every economic activity must enter into it, whether directly or indirectly and, if it enters indirectly, then it does so by as long a chain of marginal substitutions as may be necessary. Thus, not only is the entire net output of the textile industries export-earning or import-saving, thus producing a balance of payments effect similar to that which the shipowners claim for their industry, but the same is true of an industry, like construction, making products which cannot move in international trade. From this it would follow that the shipowners are correct in asserting that the balance of payments effect of UK shipping is equivalent to value added, but they would be wrong in suggesting that different principles ought to be applied to other industries merely because they export only a proportion of their output or even because their products do not enter into international trade at all. If this argument is accepted it follows that, subject to such things as divergences between social and private benefits and costs, the balance of payments and the national product benefit by resources moving to activities where they earn the highest cash return (Committee of Inquiry into Shipping 1970, 349).

A central theme in the debate about coastal shipping policy is that the protection of the Australian coast from foreign competition has resulted in forgone opportunities for processing raw materials in Australia and other lost trading opportunities. The size of these effects is extremely difficult to estimate, but is thought to be small in the short term. The longer-term implications may be more significant but cannot be evaluated in the short to medium term period covered by this analysis.

In the long term the more important question is not foreign exchange earnings, but economic efficiency. This is being promoted by the shipping reform strategy introduced in 1989 which will reduce crewing costs for existing and new Australian ships in both the coastal and international trades. In 1986–87, the Australian fleet comprised mainly ships antedating the Crawford reforms of 1982 with crews of 30 or more, which inhibited their competitiveness in international operations. The Shipping Reform Task Force initiative will reduce crews on existing vessels to 26 or less in 1990, with new ships coming into service with crews of 18.

The MIDC scheme has already had a positive effect on Australian shipping. As orders stand at present, the period 1987–88 to 1991–92 will see a total of twenty-seven new ships coming into service (as additional ships or replacements). In international services, ship operators will only buy new vessels if they expect them to be profitable at internationally competitive rates. On coastal trades Australian ships will continue to receive protection but price monitoring by

the Prices Surveillance Authority will ensure shippers ultimately benefit from the increased efficiency of the new ships.

The case studies (chapter 3) suggest that there are several market niches where Australian flag ships might be viable and efficient earners of foreign exchange in overseas trades. Tanker and bulk ship operations are most likely to be viable on triangular services, where good load utilisation can be achieved, and possibly on some shorter, Australian based, shuttle services. It seems less likely that they would be viable on long distance shuttle services where revenues would often be insufficient to outweigh the cost of empty steaming on the return voyage.

For liner services, the case studies suggest that Australian flag vessels might be viable on several routes. It must be recognised, however, that liner services require a great deal of investment in trade-specific overheads, and probably involve a greater degree of risk than bulk or tanker operations.

These case studies related to hypothetical ships, with modern technology and small crews. The potential market niches for such ships were examined in the context of the freight rates and costs ruling in 1988–89. Since then, international sea freight rates have, if anything, tended to strengthen and the Australian dollar has weakened. However, there is no certainty that these trends will persist through the lifetime of new ships put into service.

In the long term Australian flag shipping will be subject to the pressures bearing on the flag shipping of all OECD countries. Convenience flags offer OECD shipowners the attraction of minimal tax burdens and lower wage rates. Historically, OECD governments have sought to reduce the erosion of their own national flag shipping by offering tax exemptions, subsidies and, where feasible, protection. More recently they have been driven to make available 'semi-detached' flags, or second registers (Eyre 1989). These developments may be a tacit recognition of the difficulties in retaining ships engaged in international trade within an effective national tax base.

## **APPENDIX I TRANSPORT AND THE BALANCE OF PAYMENTS**

This appendix has two purposes. First, it defines the balance of payments and describes how it is prepared. Second, it shows how the Australian Bureau of Statistics analyses transport entries in the balance of payments accounts. The data presented here are from various Australian Bureau of Statistics publications (1981, 1988b, 1988c, 1988d).

### **THE BALANCE OF PAYMENTS**

The balance of payments (also referred to as the external account) is an accounting record of all economic transactions between Australian residents and the rest of the world (non-residents).

Transactions are recorded using a double entry system of bookkeeping. Credits record exports, income received from overseas, sales of assets to foreigners or increases in liabilities to foreigners. Debits record imports, income payable to foreigners, purchases of assets from foreigners and reductions in liabilities to foreigners. For example, when Australia exports goods and services and receives a cash payment, the balance of payments transactions involve a credit to exports and a debit to foreign exchange holdings.

Transactions in the balance of payments can be classified into three broad groups:

- goods, services and incomes;
- financial liabilities, for example, loans; and
- unrequited transfers, for example, gifts and foreign aid or any economic transfer without a *quid pro quo*. Unrequited transfers are offset by *pro-forma* entries.

Transactions in goods, services, incomes, and unrequited transfers are analysed in the 'current account' while transactions in financial assets and liabilities are grouped in the 'capital account'. Because the accounts are prepared using double entry bookkeeping, the overall balance equals zero, with total debits equalling total credits. (In practice, a *pro-forma* balancing item is necessary to offset the net errors and omissions in the data.) A current account deficit is therefore offset by an equal surplus in the capital account. For example, in

1985–86 there was a current account deficit of \$14 677 million (table I.1) which was offset by an equal surplus in the capital account.

The current account shows Australian transactions with the rest of the world in respect of trade, income and gifts; it is in deficit if payments exceed receipts, and if receipts exceed payments there is a surplus. The capital account shows how current account deficits are financed, or what is done with a surplus. For example, the capital account might show a current account deficit being financed by a mix of increased foreign investment, loans and a fall in foreign exchange holdings. Alternatively, a surplus could reduce foreign debt or boost foreign exchange holdings.

The Australian Bureau of Statistics ensures consistency between the balance of payments figures and the national accounts by following international standards. The national accounts are broadly based on a standard defined by the United Nations while the Bureau of Statistics generally follows the principles recommended in the International Monetary Fund's Balance of Payments Manual in analysing international transactions.

TABLE I.1 BALANCE OF PAYMENTS CURRENT ACCOUNT  
1985–86

(\$ million)

<i>Transaction type</i>	<i>Amount</i>
Goods and services	
Merchandise	
Exports	32 210
Imports	-35 622
Balance on merchandise trade	-3 412
Services	
Credits	5 742
Debits	-9 813
Net services	-4 071
Balance of goods and services	-7 483
Income	
Credits	2 206
Debits	-10 232
Net income	-8 026
Unrequited transfers	
Credits	2 532
Debits	-1 700
Net transfers	832
Balance on current account	-14 677

Source Australian Bureau of Statistics (1988b).

## **BALANCE OF PAYMENTS ACCOUNTING PRINCIPLES**

This section describes some of the balance of payments accounting principles which are particularly relevant in analysing transport transactions.

### **Residency**

For balance of payments purposes, an Australian resident is an economic entity which has a closer association with Australia than any other territory. Resident individuals comprise persons living permanently in Australia or persons staying for over twelve months although there are exceptions, such as foreign diplomatic staff and students. External territories such as Christmas Island and Norfolk Island are not included in the Australian balance of payments accounts.

Resident enterprises include all bodies providing goods or services on a commercial basis within the territory of Australia. They can be government or private, incorporated or unincorporated and locally or foreign owned. Defining residency in terms of location makes it necessary to divide some single legal entities into two or more separate entities. For example, the overseas branch of an Australian firm may be treated as a separate, foreign resident enterprise, acting for its Australian parent. Net profits from its sales abroad would be recorded as income credits received by the parent company in balance of payments figures.

An Australian transport operator with an overseas branch will have a number of transactions which affect the balance of payments figures:

- provision of capital to establish and operate the branch will be treated as Australian investment abroad;
- net profits from the branch will be treated as income credits to Australia; and
- sales by the branch to non-residents on behalf of its head office will be treated as sales made direct from head office and recorded as balance of payments credits (because head office owns the equipment and operates the service), and any costs incurred in making the sales will be treated as transport sector debits.

### **Transaction value**

The Australian Bureau of Statistics does not always follow the International Monetary Fund recommendation that balance of payments transactions be recorded at actual or estimated market values. Instead, the Bureau of Statistics generally compiles Australian balance of payments figures using 'transaction values', this being defined as the open market value of a transaction or the value at which it is recorded in company documents. Thus, when Australian firms ship cargoes in their own ships, the freight revenue might be recorded as the operating cost, rather than the open market freight rate for an equivalent service.

### **Mobile equipment**

Special rules apply to mobile equipment which moves across frontiers, such as planes and ships. The key question is whether their transactions should be attributed to Australia or a foreign economy. Factors considered include the residency status of the owner and operator, their contractual arrangements, the equipment's location and the length of time it is in Australia.

For ships and aircraft, the Australian Bureau of Statistics attributes operations to the enterprise organising the transport service. Operations of Qantas aircraft are attributed to Australia, while those of Air Niugini planes flying into Australia are attributed to Papua New Guinea.

The residence of the equipment owner is also taken into account. The Australian Bureau of Statistics generally attributes operations of ships and aircraft to the legal owner of the equipment. If the owners are foreigners, then operations are attributed to their country of residence. An exception is mobile equipment operated under a financial lease arrangement, which is deemed to be owned by a resident in the country of operation regardless of where the legal owner actually resides.

A foreign owned ship is also deemed to be resident in Australia if it is sailing under a time charter or financial lease to an Australian resident firm. In this case, the Australian charterer or lessee would be regarded as a ship operator. The same situation applies to Australian vessels under time charter or financial lease to foreign enterprises. The section below on time charters discusses the effect of this accounting principle in greater detail.

### **Asset accounting**

If an Australian resident purchases an asset from overseas, the Australian Bureau of Statistics records its full value in the balance of payments accounts in the year of acquisition. If the asset was purchased for cash, the transaction would involve a debit to imports and a credit to foreign exchange holdings. A purchase on credit would show a debit to imports and an increase (a credit) in overseas liabilities.

The important thing to note is that buying and importing a ship or plane has the same initial impact on the current account regardless of whether it is paid for in cash, leased, or purchased on credit, and, if the latter, regardless of the credit terms. The value of overseas asset purchases is always debited to merchandise imports in the current account while the offsetting credit represents a reduction in foreign exchange holdings or other overseas assets in the capital account.

Repayments of loan principal are recorded by debits to overseas liabilities with corresponding credits to foreign exchange holdings (both in the capital account). Interest payments involve a debit to the current account and a credit to the capital account.



When a ship is imported into Australia under a long-term bareboat charter, its value is not debited as an import, but its operations are attributed to Australian resident shipping operators. However, Qantas imports of new aircraft are debited to the balance of payments account as imports. This is due to differences in the substance of the respective transactions:

- Qantas usually imports aircraft under a financial lease and, under the accounting conventions followed by the Australian Bureau of Statistics, ownership is imputed to the lessee.
- Ships are usually imported on a long-term charter which the Australian Bureau of Statistics treats as an operational lease, with the lessor retaining ownership.

Depreciation charges are not included in the balance of payments accounts because they are regarded as domestic transactions.

## TRANSPORTATION

The transportation section of the balance of payments includes the following items:

- payments for international movements of freight (including insurance on freight), passengers and mail;
- payments for other services provided by a transport operator to residents of another country;
- payments for goods and services purchased by a transport operator in a foreign country;
- payments for the time charter or operational lease of ships and planes made by residents in one country to operators in another.

Balance of payments accounts do not include all transactions relating to international transport and hence do not show the total costs and freight rates for overseas shipping. Transactions not recorded include those where both parties are Australian residents or where both are foreign residents. (There are some exceptions to this rule, but they are not relevant to this study.)

For reasons of expediency and international standardisation, it is assumed that all freight charges are paid by residents of the importing country. That is, the Australian Bureau of Statistics assumes that Australians pay all freight on imports and that foreigners pay all freight on Australian exports.

Given this assumption, freight charges on imports carried by Australian shipping operators are excluded from the balance of payments figures because it is regarded as a domestic transaction. Similarly, freight on exports carried by non-resident operators is excluded, being regarded as a transaction between foreign residents. Australian balance of payments figures therefore include only:

- freight charges on imports carried by foreign ships; and
- freight charges on exports carried by Australian ships.

(Figures for international freight charges not included in the balance of payments accounts are shown as memorandum items in Australian Bureau of Statistics 1988d.)

## DATA PRESENTATION

To collect information on international transport costs and revenue, the Australian Bureau of Statistics carries out surveys of international aviation operations and shipping operations (SISO and SIAO). The results are incorporated in the overall balance of payments accounts and are analysed in *International Transport Services, Australia* (Australian Bureau of Statistics 1988d). The figures in that publication are the same as those in the balance of payments accounts except that the totals do not include:

- payments to freight forwarders or insurers; and
- payments or receipts for the overseas purchase or sale of ships and planes (capital transactions are recorded elsewhere in the balance of payments accounts as merchandise trade).

TABLE 1.2 EARNINGS AND EXPENDITURES ABROAD OF  
AUSTRALIAN RESIDENT TRANSPORT OPERATORS  
1986-87<sup>a</sup>

(\$ million)

<i>Item</i>	<i>Amount</i>
Earnings abroad	
Freight on exports	449
Passenger services	1 197
Other earnings	202
Total earnings abroad	1 848
Expenditure abroad	
Charter and lease	177
Fuel	219
Stevedores	48
Agency and advertising	312
Other expenses	307
Total expenditure abroad	1 063
Memorandum item <sup>b</sup>	
Freight on imports	462

- a. The Australian Bureau of Statistics does not publish separate air and sea figures in order to protect the confidentiality of Qantas data.
- b. Memorandum items are not included in the balance of payments accounts. Payment of freight on imports to Australian transport operators is deemed to involve a transaction between two Australian residents.

Source Australian Bureau of Statistics (1988d).

TABLE I.3 EARNINGS AND EXPENDITURES IN AUSTRALIA OF  
NON-RESIDENT SEA TRANSPORT OPERATORS  
1986-87

(\$ million)

<i>Item</i>	<i>Amount</i>
<b>Earnings in Australia</b>	
Freight on imports	1 726
Passenger services <sup>a</sup>	na
Other earnings <sup>b</sup>	na
<b>Total earnings in Australia</b>	<b>1 828</b>
<b>Expenditure in Australia</b>	
Bunkers	89
Stevedores	281
Provedores	25
Agency and advertising expenses	66
Other expenses	579
<b>Total expenditure in Australia</b>	<b>1 040</b>
<b>Memorandum item<sup>c</sup></b>	
Freight on exports	3 872

- a. Total air and sea passenger services revenue was \$1328 million but for confidentiality reasons the Australian Bureau of Statistics does not publish separate figures. Foreign shipping earns passenger revenue in Australia from sales of cruise tickets and possibly from some international passengers.
- b. Total other revenue for air and sea was \$35 million. For sea, this includes demurrage and freight for coastal shipments under 'single voyage permits'.
- c. Memorandum items are not included in the balance of payments accounts. Freight on exports received by non-resident operators is deemed to involve a transaction between two foreigners.
- na Not available.

Source Australian Bureau of Statistics (1988d).

The balance of payments credits received by Australian resident ship operators comprise:

- freight receipts for carrying Australian exports; and
- other earnings abroad, made up of freight for carrying cargo between other countries (for example, New Zealand to Europe) and from time chartering or leasing Australian vessels.

Separate totals for air and sea operators are not shown, in order to keep Qantas data confidential (table I.2). A small number of overseas services are flown by other operators, but Qantas is the major overseas air carrier and must account for nearly all Australian international air transactions.

TABLE I.4 FREIGHT EARNINGS ON AUSTRALIAN EXPORTS AND IMPORTS BY RESIDENT AND NON-RESIDENT TRANSPORT OPERATORS BY TYPE OF VESSEL 1986-87

(\$ million)

<i>Item</i>	<i>Exports</i>	<i>Imports</i>
<b>Sea</b>		
Liners	874	1 281
Non-liners		
Bulk ships	2 909	245
Tankers	187	222
Other	285	220
Total non-liners	3 381	687
Total sea	4 255	1 968
Air	197	503
Total	4 452	2 471

*Source* Australian Bureau of Statistics (1988d).

Both air and sea operators carry freight but the passenger revenue must be generated by air services because Australian ships carry few, if any, international passengers. Passenger revenues attributed to Australian transport operators comprise only overseas sales; sales in Australia are regarded as domestic transactions and hence are excluded from the balance of payments accounts.

The main debit items attributed to Australian transport operators comprise goods and services purchased from non-residents, including the lease or time charter of vessels, fuel, stevedoring, agency and advertising, and other expenses. Other expenses includes such items as port charges, maintenance and advances to crew (payments made to Australian crew in foreign ports which, it is assumed, are spent entirely overseas).

The last figure in table I.2 shows Australian transport operators' freight receipts for carrying imports. This is a so-called memorandum item because it is not included in the balance of payments accounts. Freight on imports received by Australian operators is excluded because it is regarded as a transaction between two Australian residents.

In general, the descriptions of items in table I.2 also apply to the equivalent entries for foreign residents in table I.3. An exception is 'other earnings' in Australia which includes coastal freight movements (for example, under 'single voyage permits') and demurrage. Revenue from the lease or charter of vessels to Australian residents is included in expenditure abroad by Australian resident operators.

All balance of payments data on sea freight payments is based on information from the survey of international shipping operations but the export and import figures are calculated in different ways. Freight on exports is taken directly from the survey while freight on imports is calculated from trade statistics as the cif value of imports less the sum of:

- the fob value of imports;
- the estimated cost of insurance on imports; and
- freight charges on imports paid to Australian resident transport operators.

The total freight paid on Australian imports and exports is shown in table I.4. The figures are compiled from the survey returns. They include amounts not entered in the balance of payments accounts; that is, freight on exports paid to foreign transport operators and freight on imports paid to Australian transport operators.

## TIME CHARTERS

Table I.2 shows balance of payments transactions for Australian resident transport operators, but this does not mean its figures relate only to Australian flag vessels. Under balance of payments accounting principles, foreign flag vessels leased or time chartered by Australian residents are deemed to be Australian ships for the period of the lease or charter. (This includes foreign manned ships.) For example, an Australian mining company time chartering a Japanese ship for an export cargo would be regarded as an Australian resident ship operator, and the ship as an Australian vessel. The freight earnings and charter fee for the shipment would be attributed to Australian resident ship operators in the balance of payments figures, the freight as a credit and the charter fee as a debit. Any associated overseas costs met by the charterer, such as port costs, would also be debited to Australian ship operators. On the other hand, port costs paid by the charterer in Australia would be excluded from balance of payments figures, as they are considered to be domestic transactions.

If the same cargo were shipped under a voyage charter, transactions would be attributed to the account of foreign transport operators, the freight payment as a balance of payment debit and expenditure by the ship in Australia as a credit.

The balance of payments transactions of Australian resident transport operators therefore include debits and credits for:

- Australian planes;
- Australian flag vessels where the ship is owned by an Australian resident or bareboat chartered from a foreign resident; and
- foreign manned vessels operating under time charter to Australian residents.

For this project, it was necessary to analyse table I.2 into its three components in order to determine the earnings and expenditures abroad of Australian shipping.

BTCE could not locate any data on the chartering practices of Australian shippers but understands there is a small proportion of time chartering in some trades, namely bulk shipments to Europe and petroleum imports. Most bulk exports to Asia are said to be shipped fob. An informal survey carried out for BTCE by an industry association indicated that time charters comprised less than 10 per cent of bulk cif exports consigned by Australian firms on foreign ships. However, even if only a small proportion of Australian trade is shipped in time chartered foreign ships, the earnings of these foreign vessels will be quite significant compared to those of Australian flag shipping (see tables II.3 and II.4).

Under the same principle, Australian flag vessels are treated as foreign ships while sailing under time charter or lease for foreign residents. If a ship carries cargo for a foreigner under voyage charter, the freight and overseas expenditures are entered as separate items in the balance of payments accounts. For a time charter, only the net charter payment is entered under the classification of 'other earnings abroad by resident operators' (table I.2).

## COVERAGE

As noted above, balance of payments accounts do not show all of the revenues and costs of carrying exports and imports. Rather, costs and revenues are included or excluded according to whether they are attributed to an overseas or Australian resident. This is illustrated in table I.5. For example, the balance of

TABLE I.5 FREIGHT TRANSACTIONS INCLUDED IN THE BALANCE OF PAYMENTS FOR AUSTRALIAN AND FOREIGN SHIP OPERATORS

<i>Item</i>	<i>Foreign operators</i>	<i>Australian operators</i>
<b>Revenues</b>		
Freight on imports	yes	no <sup>a</sup>
Freight on exports	no	yes
Freight between other countries	na	yes
Freight between Australian ports	yes	no
Demurrage in Australia	yes	no
<b>Expenditures</b>		
In Australian ports	yes <sup>b</sup>	no
In foreign ports	na	yes

a. Freight on imports carried by Australian operators is not explicitly shown in the balance of payments accounts, but it is taken into account indirectly.

b. Except if sailing under time charter to an Australian resident in which case the transaction would be attributed to Australian resident operators.

na Not applicable.

Sources Australian Bureau of Statistics (1981, 1988c, 1988d).

payments transport entries would not reflect an increase in exports from Australia which was carried by foreign resident ships, or an increase in imports carried by Australian ships (although market shares could be calculated from data which are shown in Australian Bureau of Statistics 1988d as memorandum items).

However, if the level of trade is constant, changes in market shares held by Australian and foreign ships are reflected in balance of payments figures. An increase in exports carried by Australian ships is shown directly in the balance of payments tables, while an increase in their share of import trade reduces freight on imports paid to foreign operators.

## **APPENDIX II CALCULATIONS FOR THE EXISTING FLEET**

This appendix outlines the theory and empirical method used in the aggregate analysis in chapter 2 to calculate Australian shipping's foreign exchange earnings. The same general theory was also used in the case studies in chapter 3.

### **ANALYSIS METHOD**

The balance of payments effect of a shipping service is defined as the change in net foreign exchange receipts which results from its operations. The foreign exchange receipts and payments associated with a shipping operation may be classified into four main groups:

- freight receipts
- overseas spending
- domestic spending (also referred to as displaced spending by foreign shipping)
- capital costs

#### **Freight receipts**

For the purposes of calculating their balance of payments effect, Australian ships were credited with all freight revenues from international services including freight on both imports and exports. Goss (1968) adopted this approach because payments from foreign residents involve receipts of foreign currency, while payments from Australian residents save foreign currency which would otherwise go to foreign shipping lines.

#### **Overseas spending**

Australian vessels sailing on international routes inevitably incur overseas costs such as foreign port charges, bunkers and agents' commissions. These costs must be deducted from shipping's gross freight receipts when calculating its net foreign exchange earnings.



### **Domestic spending**

Operating Australian vessels in overseas trades will tend to reduce calls by foreign ships to Australia and their expenditure in Australian ports. This reduction is referred to as 'displaced foreign shipping expenditure'. It represents a loss of foreign exchange to Australia but is not perceived as a cost by Australian ship operators.

### **Capital costs**

Australian trading vessels are generally purchased from overseas and paid for in foreign exchange. These payments must be taken into account when calculating the net foreign exchange earnings of Australian flag shipping.

Whatever method is used must match lifetime foreign exchange earnings of ships against their foreign exchange capital costs. In this study, BTCE has calculated the annual capital costs of ship operations, both for the aggregate analysis and case studies. This approach was also followed by Goss (1968) and Apelbaum (1988). An alternative method, also suggested by Goss, is to calculate the discounted present value of a ship's lifetime earnings and operating costs for matching against capital costs.

Shipping's annual effect on the balance of payments cannot be measured validly by simply summing all current foreign exchange transactions including imports of ships. This approach would understate foreign earnings in years when ships are purchased and overstate earnings in other years. Similarly, loan repayments are not an accurate measure of foreign exchange costs. New ships have an expected life of about fifteen years or more, while loans are often repaid in eight years. A more fundamental objection is that historical ship costs might not equal current market values; loan repayments would therefore not accurately measure their foreign exchange opportunity cost.

### **Freight rate premium**

In the trans-Tasman trade it cannot be assumed that the same amount of freight would be paid to foreign shipping in the absence of Australian vessels. Rather, if foreign ships operated without restriction in the Tasman, freight rates would decline. On this route, therefore, the freight rate premium due to cabotage cannot be counted as a balance of payments credit. Rather, Australian shipping should be credited only with earnings based on freight rates likely to apply under open competition. The same argument applies to revenue from coastal trading.

### **The calculations**

The net foreign exchange earnings of an Australian ship sailing in international trades thus equal:

- total income from freight on imports, exports and cross-trades,
- less

- foreign exchange operating costs,
- foreign exchange lost due to reduced foreign ship calls at Australian ports (displaced foreign shipping expenditures),
- capital costs for the ship, and
- the freight rate (trans-Tasman) premium.

In this report, all bunker fuel purchases were counted as foreign exchange costs. Other items were only treated as foreign exchange costs where they normally involve a payment to an overseas resident.

## **EMPIRICAL METHOD**

This section describes the empirical methods used in the aggregate analysis. The calculations involved two steps:

- First, balance of payments figures published by the Australian Bureau of Statistics were analysed to determine the current overseas earnings and expenditures attributable to Australian ships; the difference between these two figures shows shipping's gross foreign earnings.
- Second, net earnings were calculated as gross earnings less capital costs, displaced foreign expenditure, bunker purchases in Australia and the freight rate (trans-Tasman) premium.

The Australian Bureau of Statistics (1988d) publishes figures showing the overseas earnings and expenditures of Australian resident transport operators in *International Transportation Services, Australia*. The earnings and expenditures attributed to Australian transport operators comprise transactions for:

- Australian flag shipping, including bareboat charter payments for foreign owned ships operated by Australian crews on coastal and overseas routes;
- Australian overseas air operations; and
- foreign manned vessels operating under time charter to Australian residents.

Only combined air and sea totals are published in the balance of payments statistics in order to protect the confidentiality of Qantas data, since it is the major Australian airline operating overseas (although a small number of services are provided by other Australian operators and many receive foreign exchange income from interlining operations).

For balance of payments purposes, foreign manned vessels are treated as Australian ships while operating under time charter to Australian residents (see appendix I). Also, Australian residents time chartering foreign manned ships are treated as ship operators.

Tables II.1 and II.2 give a simplified example of how the calculations were carried out, using hypothetical data. The first column of figures in table II.1 corresponds with the data published by the Australian Bureau of Statistics showing earnings and expenditures overseas by Australian resident transport operators, both air

TABLE II.1 HYPOTHETICAL CALCULATION OF EARNINGS AND EXPENDITURES  
ABROAD OF AUSTRALIAN TRANSPORT OPERATORS  
(\$ million per annum)

Item	ABS air and sea (1)	Qantas (2)	Shipping		
			FMS <sup>a</sup> (3)	Coastal (4)	Overseas (5)
<b>Income</b>					
Freight	1 500	400	100		1 000
Passengers	2 000	2 000			
Other	300	150			150
<b>Total</b>	<b>3 800</b>	<b>2 550</b>	<b>100</b>		<b>1 150</b>
<b>Expenditures</b>					
Time charters	200	50	100	25	25
Fuel	300	150			150
Stevedores	80	..			80
Agency etc.	350	150			200
Other	400	200			200
<b>Total</b>	<b>1 330</b>	<b>550</b>	<b>100</b>	<b>25</b>	<b>655</b>
<b>Gross foreign earnings</b>	<b>2 470</b>	<b>2 000</b>	<b>0</b>	<b>-25</b>	<b>495</b>

- a. Foreign manned ships time chartered by Australian residents.  
.. Not applicable.

Source BTCE.

TABLE II.2 HYPOTHETICAL CALCULATION OF FOREIGN  
EXCHANGE EARNINGS BY AUSTRALIAN FLAG  
OVERSEAS SHIPPING  
(\$ million per annum)

Item	Amount
Gross foreign exchange earnings	495
<b>Less</b>	
Bunkers purchased in Australian ports by Australian overseas trading ships	40
Annual capital costs	30
Trans-Tasman premium	25
Displaced foreign shipping expenditure	10
<b>Net foreign exchange earnings</b>	<b>390</b>

Source BTCE.

and sea. To find the overseas transactions of Australian manned vessels, three sets of figures were subtracted from the Australian Bureau of Statistics total:

- Qantas's overseas earnings and expenditures (column 2 in table II.1)
- earnings and expenditures for foreign manned vessels while operating under time charter to Australian residents (column 3)
- bareboat charter fees paid for foreign owned vessels operated on the coast by Australian crew (column 4).

The gross foreign earnings figure was transferred to table II.2 where net foreign earnings were calculated by subtracting the four foreign exchange costs not included in published balance of payments figures.

The actual balance of payments figures published by the Australian Bureau of Statistics are analysed in tables II.3 to II.5 to show shippings' gross foreign earnings in 1985–86, 1986–87 and 1987–88.

TABLE II.3 BALANCE OF PAYMENTS TRANSACTIONS FOR AUSTRALIAN TRANSPORT OPERATORS 1985–86

(\$ million)

Item	ABS air and sea	Qantas	Shipping		
			FMS <sup>a</sup>	Coastal	Overseas
<b>Income</b>					
<b>Freight</b>					
Exports	371	b	136	0	b
Imports	490	b		0	b
<b>Passengers</b>					
Foreign	846	846	0	0	0
Australian	649	649	0	0	0
Other	197	b	0	0	b
<b>Total</b>	<b>2 553</b>	<b>1 840</b>	<b>136</b>	<b>0</b>	<b>577</b>
<b>Expenditures</b>					
Time charters	179	24	136	2	17
Fuel	306	b	0	0	b
Stevedores	56	b	0	0	b
Agency	239	b	0	0	b
Other	302	b	0	0	b
<b>Total</b>	<b>1 082</b>	<b>738</b>	<b>136</b>	<b>2</b>	<b>206</b>
<b>Gross foreign earnings</b>	<b>1 471</b>	<b>1 102</b>	<b>0</b>	<b>-2</b>	<b>371</b>

a. Foreign manned ships time chartered by Australian residents. For balance of payments purposes, transactions of these vessels are credited to Australian resident operators.

b. Confidential.

Sources Australian Bureau of Statistics (1988d); BTCE estimates.

TABLE II.4 BALANCE OF PAYMENTS TRANSACTIONS FOR AUSTRALIAN TRANSPORT OPERATORS 1986-87

(\$ million)

Item	ABS air and sea	Qantas	Shipping		
			FMS <sup>a</sup>	Coastal	Overseas
<b>Income</b>					
Freight					
Exports	449	b	116	0	b
Imports	462	b		0	b
Passengers					
Foreign	1 197	1 197	0	0	0
Australian	733	733	0	0	0
Other	202	b	0	0	b
<b>Total</b>	<b>3 043</b>	<b>2 365</b>	<b>116</b>	<b>0</b>	<b>562</b>
<b>Expenditures</b>					
Time charters	177	43	116	2	16
Fuel	219	b	0	0	b
Stevedores	48	b	0	0	b
Agency	312	b	0	0	b
Other	307	b	0	0	b
<b>Total</b>	<b>1 063</b>	<b>772</b>	<b>116</b>	<b>2</b>	<b>174</b>
Gross foreign earnings	1 980	1 593	0	-2	388

- a. Foreign manned ships time chartered by Australian residents. For balance of payments purposes, transactions of these vessels are credited to Australian resident operators.  
 b. Confidential.

Sources Australian Bureau of Statistics (1988d); BTCE estimates.

The foreign earnings of Australian ships from international operations are shown in table II.6 for the years 1985-86 to 1987-88. Similar calculations in table 2.1 (chapter 2) show the total effect on the external account from both international and coastal operations for 1986-87. The figures in table 2.1 are based on data for 1986-87 which were collected by the Industries Assistance Commission (1988b) for its inquiry into coastal shipping; such data are not available for other years.

## DETAILS

This section describes how individual figures were calculated for the aggregate analysis.

TABLE II.5 BALANCE OF PAYMENTS TRANSACTIONS FOR AUSTRALIAN TRANSPORT OPERATORS 1987-88

(\$ million)

Item	ABS air and sea	Qantas	Shipping		
			FMS <sup>a</sup>	Coastal	Overseas
<b>Income</b>					
Freight					
Exports	527	b	115	0	b
Imports	519	b		0	b
Passengers					
Foreign	1 511	1 511	0	0	0
Australian	802	802	0	0	0
Other	187	b	0	0	b
Total	3 546	2 802	115	0	629
<b>Expenditures</b>					
Time charters	206	75	115	6	10
Fuel	246	b	0	0	b
Stevedores	51	b	0	0	b
Agency	407	b	0	0	b
Other	391	b	0	0	b
Total	1 301	965	115	6	215
Gross foreign earnings	2 245	1 837	0	-6	414

a. Foreign manned ships time chartered by Australian residents. For balance of payments purposes, transactions of these vessels are credited to Australian resident operators.

b. Confidential.

Sources Australian Bureau of Statistics (1988d); BTCE estimates.

### Aviation transactions

The BTCE eliminated aviation transactions from the balance of payments figures by calculating Qantas's overseas earnings and expenditures, then subtracting them from the Australian Bureau of Statistics totals for all Australian transport operators. The Qantas figures were compiled from confidential data. The BTCE did not estimate the overseas transactions attributable to other Australian air operators. The Australian Bureau of Statistics suggested these are small and BTCE assumed they would be eliminated by rounding up the Qantas figures to the nearest million dollars.

### Bareboat charters

Time charter payments by Australian transport operators to foreign residents comprise:

- Qantas payments for aircraft chartered from foreign owners;

TABLE II.6 FOREIGN EXCHANGE EARNINGS BY AUSTRALIAN  
FLAG OVERSEAS SHIPPING 1985-86 TO 1987-88  
(\$ million)

Item	1985-86	1986-87	1987-88
Gross freight rates	577	562	629
Less			
Trans-Tasman premium	25	25	25
Gross foreign exchange earnings	552	537	604
Less			
Expenditures overseas	206	174	215
Bunkers purchased in Australia	38	29	31
Capital costs <sup>a</sup>	47	59	61
Displaced foreign shipping expenditure	104	94	104
Net foreign exchange earnings	157	181	193

a. This figure is based on an arbitrary fifty-fifty allocation of capital costs between coastal and overseas services for ships involved in both trades; see table III.2.

*Note* Appendices III and IV show how the debit items in this table were calculated.

*Source* BTCE estimates.

- payments for time charters and leases of foreign manned vessels; and
- bareboat charter payments for foreign owned ships operated by Australian crews on coastal or overseas routes.

Qantas charter payments were calculated by the BTCE as outlined above and the Maritime Policy Division of the Department of Transport and Communications provided estimates of the bareboat charter rates for foreign owned vessels in the Australian trading fleet. Time charter payments to foreign manned vessels were calculated as the remainder after deducting the Qantas and bareboat charter payments from the Australian Bureau of Statistics total. Details of Maritime Policy Division's estimates of charter payments are given in appendix III and the total costs are used in tables II.3 and II.4.

It was then assumed that the freight earnings of foreign manned ships equal the time charter charges for their services. Most time charters by Australian residents are for exports of bulk cargoes, with the cif price approximately equal to the fob price plus the charter rate. The ship operators interviewed by BTCE said that, for internal costings of these voyages, they calculate the freight rates as the charter rate plus Australian port costs, plus a mark-up of 2 to 5 per cent. (Overseas port costs are generally met by the buyer.) Assuming freight receipts equal charter port payments may therefore understate total freight rate receipts for these vessels but the error is probably not significant.

### **Capital costs**

For the case studies in chapter 3, capital costs were calculated as annuities based on each ship's estimated new value over a fifteen-year life with residual values of 5 per cent. Annuities generate fixed annual charges including both interest and depreciation costs. Depreciation reflects the cost of 'wearing out' the vessel, while interest charges reflect the foreign exchange opportunity cost of capital tied up in ships. In addition, for liner services, annual capital costs for containers were calculated as an annuity assuming a twelve-year economic life. The calculations assume new containers were purchased at the end of year 12.

For the aggregate analysis, BTCE did not use an annuity because the Australian merchant fleet comprises ships of varying ages. Instead, the Bureau assumed depreciation would be calculated by the declining balance method. Total capital costs were taken to equal 17 per cent of the fleet's current market value, comprising depreciation of 12 per cent plus an interest charge of 5 per cent.

The capital cost of Australian overseas shipping was taken as 100 per cent of capital costs for ships sailing only on overseas routes plus 50 per cent of capital charges for those operating in both overseas and domestic trades. This allocation of capital was based on subjective judgment. The capital costs used in the aggregate analysis are shown in appendix III.

### **Fuel**

In the published balance of payment accounts, fuel purchased abroad by Australian ships is treated as a debit, but purchases in Australia are excluded because they are regarded as domestic transactions. However, for this project the BTCE treated all bunker purchases by Australian ships as foreign exchange costs including purchases in Australian ports. The Bureau adopted this approach because most, if not all, bunker fuel is imported or refined from imported feedstock. Also, fuel oil has a foreign exchange opportunity cost because it can easily be exported or sold to foreign ships visiting Australia.

Statistics published by the Department of Primary Industries and Energy show total bunker sales in Australia ports but not how much is purchased by Australian vessels. The BTCE therefore estimated purchases by Australian vessels as the difference between total sales and exports of fuel as ships' stores on foreign vessels. From information supplied by an oil company, it was then assumed that one-third of sales to Australian vessels was taken by overseas trading ships. Further data on bunker sales are given in appendix IV.

### **Displaced expenditures**

Displaced foreign shipping expenditure is the extra amount foreign ships would spend in Australian ports if Australian vessels did not operate. For the aggregate analysis, BTCE estimated displaced expenditure as a *pro rata* increase on foreign shipping's current expenditure in Australian ports. Calculations were based on the total freight rates paid to Australian and foreign ships for carrying Australian



overseas trade. Details of the calculations are shown in appendix IV and the results are used in tables 2.1 and 2.2 to calculate foreign exchange earnings.

For the case studies, it was assumed that each Australian ship displaces a similar foreign vessel with an identical, albeit mirror image, spending pattern.

### **COASTAL SHIPPING**

In chapter 2, the foreign exchange earnings of coastal shipping are calculated as blue water revenues less foreign exchange costs. Blue water revenue was derived from data published in the Industries Assistance Commission report on coastal shipping and was taken to equal wharfgate to wharfgate revenue less shore-based cargo costs. The calculations are shown in table II.7. A nominal \$1 million was also subtracted to represent the rates paid to foreign ships carrying coastal cargoes under single voyage permits.

TABLE II.7 FOREIGN EXCHANGE SAVINGS OF AUSTRALIAN  
COASTAL SHIPPING 1986-87  
(*\$ million*)

<i>Item</i>	<i>Amount</i>
Wharfgate-to-wharfgate freight	924
Less	
Shore-based costs	293
Freight paid to foreign ships <sup>a</sup>	1
Fuel excise	30
Blue water freight rates	600

a. Payments to foreign vessels carrying coastal cargoes under single voyage permits.

*Sources* Industries Assistance Commission (1988b); Inter-State Commission (1988); BTCE estimates.

## **APPENDIX III CAPITAL COSTS AND CHARTER RATES**

This appendix gives estimates of capital costs and charter rates for the Australian trading fleet. The figures shown here were used in the aggregate analyses described in chapter 2.

### **CAPITAL COSTS**

For the aggregate analyses, capital costs were calculated as 17 per cent of the estimated current market value of Australian owned ships. This represents a depreciation component of 12 per cent plus an interest charge of 5 per cent. The logic underlying this approach is outlined in appendix II in the section on 'Details'.

The estimated values of Australian trading ships on various routes are shown in table III.1. The figures are BTCE estimates based on sale price data published in Lloyds's *Shipping Economist* (1988b). Values are shown for the years 1985–86 to 1987–88 in 1987–88 prices. The table classifies ships into three groups according to whether they operated only on coastal or overseas routes or in both trades. (BTCE considered other methods of allocating capital costs between coastal and overseas operations for ships operating in both trades; however, the data that would be required were not available.)

Table III.2 shows the estimated annual capital costs of ships calculated as 17 per cent of their market value. Overseas operations were calculated as 100 per cent of the capital costs for ships sailing only on overseas routes plus 50 per cent of those operating in both the overseas and coastal trades.

### **CHARTER PAYMENTS**

Overseas charter expenses for Australian transport operators comprise:

- charter costs for aircraft;
- payments for bareboat charters (where a ship is chartered from a foreign owner and operated by an Australian crew); and
- payments to foreign ships operating under time charter to Australian residents; for balance of payments purposes these are deemed to be Australian ships.

TABLE III.1 ESTIMATED VALUE OF AUSTRALIAN OWNED SHIPS AT 1987-88 PRICES  
(\$ million)

<i>Routes</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
Overseas routes only	215.3	210.6	205.9
Overseas and coastal	124.8	272.1	308.0
Coastal only	241.1	315.8	368.4
Total	581.2	798.5	882.3

*Note* Values were estimated in US dollars and converted to Australian currency at an exchange rate of 0.8123.

*Source* BTCE estimates.

TABLE III.2 ANNUAL CAPITAL COSTS OF AUSTRALIAN OWNED VESSELS 1985-86 TO 1987-88<sup>a</sup>  
(\$ million)

<i>Routes</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
Overseas only	36.6	35.8	35.0
Coastal and overseas	21.2	46.3	52.4
Coastal	41.0	53.7	62.6
Total	98.8	135.7	150.0
Share attributed to			
Overseas trades	47.2	58.9	61.2
Coastal	51.6	76.8	88.8

a. The share of capital costs attributed to overseas trades is 100 per cent of the costs for vessels sailing only on overseas trades and 50 per cent of the cost for vessels sailing on both coastal overseas routes. Capital costs were calculated as 17 per cent of the current market value (table III.1), representing 12 per cent depreciation and a 5 per cent interest charge.

*Note* Discrepancies in figures are due to rounding.

*Source* BTCE estimates.

TABLE III.3 ESTIMATED LONG-TERM CHARTER RATES FOR FOREIGN OWNED SHIPS IN THE AUSTRALIAN FLEET 1985-86 TO 1987-88  
(\$ million per year)

<i>Routes</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
<i>Historical values<sup>a</sup></i>			
Overseas only	12.8	11.8	5.0
Coastal and overseas	4.4	4.4	4.9
Coastal only	2.5	2.2	6.2
<b>Total</b>	<b>19.4</b>	<b>18.4</b>	<b>16.1</b>
<i>Current values<sup>b</sup></i>			
Overseas only	42.2	35.9	8.0
Coastal and overseas	14.3	14.3	15.6
Coastal only	7.0	7.0	12.2
<b>Total</b>	<b>63.5</b>	<b>57.2</b>	<b>35.8</b>

- a. Calculated as an annuity from the estimated market value of each ship when it entered service in the Australian fleet.  
b. Calculated from the estimated 1988 value of foreign owned ships in the fleet.

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

*Sources* BTCE estimates; Department of Transport and Communications estimates.

BTCE estimated Qantas overseas charter costs from confidential data, and the Maritime Policy Division of the Department of Transport and Communications provided estimates of bareboat charter payments. Time charter payments to foreign ships were then calculated by subtracting these two figures from the total value of overseas charter payments published by the Australian Bureau of Statistics (1988d).

The results of these calculations were then used (appendix II) in estimating the foreign exchange earnings and expenditures of Australian flag ships.

Bareboat charter costs for each foreign vessel were estimated as an annuity over 15 years with a zero residual value. Calculations for each ship were based on the ship's estimated market value in the year it entered service in the Australian fleet. The Maritime Policy Division used this method of calculation as a method of approximating long-term charter rates, say for periods of five years or more. (Australian ship operators usually prefer long-term bareboat charters, so as to recover the cost of upgrading ship accommodation to Australian standards.)

The results of the Division's calculations are shown in table III.3. By way of comparison, the table also shows the estimated long-term rates that would apply if they were negotiated at 1988 values.

## **APPENDIX IV CURRENT FOREIGN EXCHANGE EXPENDITURES**

The overseas expenditures attributed to Australian transport in the balance of payments accounts comprise only payments actually made by operators. To correctly measure Australian shipping's effect on foreign exchange costs and revenues, three additional items must be taken into account:

- displaced expenditure of foreign ships in Australian ports;
- fuel purchased by Australian ships in Australian ports; and
- freight premiums, that is, the increase in freight revenues due to restrictions on competition in the trans-Tasman and coastal trades.

Appendix II explains why these items must be taken into account and this appendix shows how the figures were calculated. The results of the calculations are used in chapter 2 to calculate Australian shipping's effect on the balance of payments.

### **DISPLACED EXPENDITURE**

Any increase in Australian shipping operations will tend to reduce services by foreign ships to Australian ports and their spending in Australia. This displaced expenditure is a foreign exchange cost which must be taken into account in measuring the net effect of Australian ships on the current account.

For this study, displaced foreign shipping expenditure was calculated as a pro rata increase in the actual level of spending by foreign ships in Australian ports. The calculations are shown in table IV.1 and are based on revenues received for carrying Australian international cargoes. For example, in 1986-87, revenues received by Australian ships from international trading equalled 9.9 per cent of freight paid to foreign ships for carrying Australian imports and exports. It was therefore assumed that foreign ships would increase spending in Australia by 9.9 per cent if Australian ships ceased operations. The value of bunker sales was not included in these calculations because any fuel sold to foreign ships would have to be imported.

It must be pointed out that there is a conflict between balance of payments figures (table IV.1) and trade statistics (table IV.2) on how much foreign ships spend in Australia. According to the balance of payments figures, foreign ships spent

\$1040 million in 1986–87 including \$114 million on ship's stores (\$89 million on fuel and \$25 million on provedores). However, the trade figures for that year show that exports of ship's stores on foreign vessels totalled \$233 million (\$160 million for fuel and \$73 million for other stores). The balance of payments figures are based on the Survey of International Shipping Operations carried out by the Bureau of Statistics and the trade figures are derived from Customs records. (The trade figures do not include spending on services, such as stevedoring or port charges, and hence do not show total foreign exchange income from foreign ships in Australian ports.)

The difference might be due to underreporting of expenditure by foreign ships or an incorrect analysis of spending. For example, in reporting their expenditure to the Australian Bureau of Statistics, some foreign ship operators might have included purchases of stores under the classification of 'other expenses'. If the difference is due to underreporting in the survey returns, then income from sales to foreign ships is understated in the published balance of payments figures and the deficit for transport services is correspondingly overstated.

TABLE IV.1 DISPLACED FOREIGN SHIPPING EXPENDITURE 1985–86 TO 1987–88  
(\$ million)

<i>Item</i>	<i>1985–86</i>	<i>1986–87</i>	<i>1987–88</i>
Shipping revenue			
Total overseas shipping revenue	5 896	6 233	6 527
Less Australian flag revenue <sup>a</sup>	577	562	629
Total foreign revenue	5 319	5 671	5 898
Ratio of Australian to foreign flag revenue	0.108	0.099	0.107
Foreign expenditure in Australia			
Bunkers	115	89	90
Stevedores	297	281	286
Provedores	25	25	25
Agency expenses	60	66	71
Other expenses	579	579	593
Total foreign expenditure	1 076	1 040	1 065
Total excluding bunkers	961	951	975
Estimated displaced expenditure <sup>b</sup>	104	94	104

a. See appendix II, tables II.3 and II.4.

b. Displaced expenditure was calculated as a pro rata increase in spending by foreign ships, the proportional increase being equal to Australian flag shippings share of freight paid on Australian international cargoes.

*Note* Discrepancies in figures are due to rounding.

*Sources* Australian Bureau of Statistics (1988d); BTCE estimates.

TABLE IV.2 EXPORT OF SHIP'S STORES ON FOREIGN VESSELS 1986-87  
(\$'000)

Port	Fuel			Other stores	Total
	Auto diesel	Marine diesel	Fuel oil		
New South Wales	3 064	4 233	37 849	14 461	59 609
Victoria	2 448	9 469	42 375	15 781	70 073
Queensland	6 201	2 588	10 173	2 890	21 853
South Australia	996	1 138	5 095	6 373	13 601
Western Australia	3 475	6 986	19 020	31 851	61 332
Tasmania	732	2 227	381	546	3 888
Northern Territory	441	1 322	78	747	2 588
Total Australia	17 360	27 963	114 971	72 649	232 944

Notes 1. Totals may not add due to rounding.

2. Ship's stores were sold to foreign vessels at sixty-three ports, but just over 75 per cent were consigned from the Sydney, Melbourne and Fremantle areas, including Botany Bay and Geelong.

Source Australian Bureau of Statistics (1986, 1987b).

The balance of payments data were used to calculate displaced expenditure (table IV.1) because the trade statistics show only purchases of ships stores and do not cover other foreign shipping expenditures, for example port charges.

The difference between the balance of payments and trade figures is not significant so far as ship's stores are concerned. If the trade figure of \$73 million is substituted in table IV.1, then total spending by foreign ships in 1986-87 increases to \$999 million (excluding fuel) and displaced expenditure increases to \$99 million. However, it would be significant if there were a similar degree of underreporting for all expenditures by foreign ships in Australia.

## FUEL SALES IN AUSTRALIAN PORTS

This section presents figures showing the estimated value of bunker sales to ships in Australian ports.

Petroleum sales to trading vessels in Australian ports comprise fuel oil, automobile diesel oil and marine diesel oil. The fuel is used for propulsion and for auxiliary engines generating electricity supplies.

In the balance of payments accounts, the cost of fuel purchased overseas by Australian ships is a debit, while sales of fuel to foreign ships in Australian ports are credits. The value of fuel imports is included in the overall balance of payments figures but, because it is imported by oil companies, it is not debited to the transport sector.

TABLE IV.3 BUNKER FUEL SALES IN AUSTRALIAN PORTS  
1985-86 TO 1987-88

Year	Total sales	Foreign vessels	Australian ships <sup>a</sup>
<i>Quantity (megalitres)</i>			
<i>Automotive diesel</i>			
1985-86	118	33	85
1986-87	178	69	109
1987-88	180	70	110
<i>Marine diesel</i>			
1985-86	146	123	23
1986-87	139	112	27
1987-88 <sup>b</sup>	126	104	22
<i>Fuel oil</i>			
1985-86	1 007	652	355
1986-87	1 008	654	354
1987-88	1 059	713	346
<i>Value (\$'000)</i>			
<i>Automotive diesel</i>			
1985-86	41 182	11 517	29 665
1986-87	44 500	17 250	27 250
1987-88	54 900	21 350	33 550
<i>Marine diesel</i>			
1985-86	57 232	48 216	9 016
1986-87	35 584	28 672	6 912
1987-88 <sup>b</sup>	31 500	26 000	5 500
<i>Fuel oil</i>			
1985-86	252 757	163 652	89 105
1986-87	178 416	115 758	62 658
1987-88	194 856	131 192	63 664

- a. Sales to vessels operating on both overseas and coastal routes.  
 b. For 1987-88, BTCE estimated sales to Australian ships from the Department of Primary Industries and Energy data only. The method used for other years was not followed due to inconsistencies in the data; the Australian Bureau of Statistics figure for exports of ships stores exceeded the Department of Primary Industries and Energy figure for total sales.

*Sources* Department of Primary Industries and Energy (1987, 1989); Australian Bureau of Statistics (1987a, 1989); BTCE estimates.

For this project, however, the cost of bunkers purchased in Australia by Australian vessels was counted as a foreign exchange cost: first, because most bunkers sold in Australia are refined from imported feedstock with possibly a small proportion being imported direct from overseas (Australian crude oil is too light to produce any significant quantity of bunker fuel oil); and second, because fuel oil has a foreign exchange opportunity cost and can easily be exported or sold to foreign ships visiting Australia.



The cost of bunkers purchased in Australian ports by Australian ships was calculated using figures published by the Department of Primary Industries and Energy (1989) (total volume of bunker sales in Australian ports) and the Australian Bureau of Statistics (1989) (quantity and value of bunkers exported as ships stores on foreign vessels). The volume of sales to Australian vessels was taken as the difference between total sales and exports as ships stores. Unit prices derived from the Australian Bureau of Statistics data were used to calculate the total value of sales to Australian ships. Table IV.3 shows the estimated total volume and value of sales to Australian ships and table IV.4 shows the unit prices used in the calculations.

It was assumed that 30 per cent of sales to Australian vessels were to ships operating on overseas routes. This assumption was based on an analysis of sales records carried out for BTCE by an oil company. The company found that just under 40 per cent of its bunker sales to Australian ships were to vessels sailing on overseas routes. Table IV.5 shows the estimated total value of sales to Australian ships and the value of sales to ships in overseas trades.

TABLE IV.4 UNIT VALUE OF BUNKER FUEL EXPORTED AS SHIP'S STORES 1985-86 TO 1987-88  
(*\$ per litre*)

<i>Year</i>	<i>Automotive diesel</i>	<i>Marine diesel</i>	<i>Fuel oil</i>
1985-86	0.349	0.392	0.251
1986-87	0.250	0.256	0.177
1987-88	0.305	0.250	0.184

*Sources* Australian Bureau of Statistics (1987b); BTCE estimates.

TABLE IV.5 BUNKER SALES TO AUSTRALIAN VESSELS 1985-86 TO 1987-88  
(*\$ million*)

<i>Year</i>	<i>Auto diesel</i>	<i>Marine diesel</i>	<i>Fuel oil</i>	<i>Total sales</i>	<i>Total used on overseas routes<sup>a</sup></i>
1985-86	29.7	9.0	89.1	127.8	38.3
1986-87	27.3	6.9	62.7	96.9	29.0
1987-88	33.6	5.5	63.7	102.8	30.8

a. The share of domestic bunker sales used by Australian vessels operating on overseas routes was taken to be 30 per cent of total sales. This assumption was based on information supplied by an oil company.

*Source* BTCE estimates.

## **FREIGHT RATE PREMIUM**

On most international routes, the foreign exchange saved by operating Australian instead of foreign ships will be the actual freight earnings of the Australian ships. This is not so on the Tasman where foreign ships are largely excluded by a cabotage policy enforced by Australian and New Zealand trade unions. This reduces competition and increases freight rates.

Trans-Tasman freight rates therefore include a premium which cannot be counted as a foreign exchange earning because it does not represent a saving in payments to foreign ships.

If the trans-Tasman trade were opened to international competition, a two-level service would probably result, with Australian and New Zealand ships operating a regular 'ferry' service and foreign cross-over vessels providing additional sailings on an irregular basis. (Cross-over ships are those sailing between Australia and New Zealand as part of a longer international voyage.)

A two-level freight rate structure would also evolve. Increased competition would force down the overall average level of freight rates, but Australian and New Zealand vessels would be able to charge more than cross-over ships due to their higher standard of service.

For this study it was assumed that the trans-Tasman premium received by Australian and New Zealand ships would total about \$49 million comprising:

- an average reduction of \$300 per TEU on the approximately 97 000 TEU of non-bulk cargo shipped between Australia and New Zealand; and
- a \$10 per tonne cut on the 2 million tonnes of bulk cargo.

This figure was arbitrarily divided equally between the Australian and New Zealand fleets, taking the premium component in rates received by Australian ships as \$25 million. In other words, the foreign exchange earnings of Australian ships in the trans-Tasman trade equal their actual earnings less about \$25 million.

This figure is a subjective estimate based on BTCEs previous research on the trans-Tasman trade (Bureau of Transport Economics 1987) and discussions with various shipping lines.

## APPENDIX V DOMESTIC RESOURCE COST

The data collected for the balance of payments calculations were also used to calculate the domestic resource cost (DRC) ratio of Australian overseas shipping operations. The following paragraphs describe how DRC measurements were used in this study. Further details on the use of domestic resource costs are given in Bruno (1972) and Shneerson (1983).

The DRC ratio measures the opportunity cost of domestic resources used by an enterprise in earning foreign exchange or in saving foreign exchange (that is, in import replacement activities). DRC ratios can also be used as an evaluation criterion for investment proposals, as an ex-post measure of the trade protection given to existing enterprises and as an indicator of whether a country has a comparative advantage in a specific industry.

For specific enterprises, the DRC ratio is calculated as the ratio of domestic resource costs to net foreign exchange earnings. For example, consider the hypothetical example of an industry with export sales of US\$1000 per annum and costs of US\$600 for imported materials and \$A450 for locally purchased resources. The DRC ratio for this project would be calculated as follows.

$$\begin{aligned} \text{DRC ratio} &= \frac{\text{Domestic resource costs}}{\text{Net foreign exchange earnings}} \\ &= \$A450/(\text{US\$}1000 - \text{US\$}600) \\ &= \$A1.125 \text{ per US\$}1.00 \end{aligned}$$

This result shows that it cost \$A1.125 of domestic resources to obtain US\$1.00 in foreign exchange.

In a hypothetical economy with no price distortions or 'externalities', a project's efficiency in earning foreign exchange is determined by comparing its DRC ratio to the market exchange rate. Projects with a DRC ratio below the exchange rate are efficient in earning foreign exchange while a higher figure indicates inefficiency. An industry with a DRC ratio above the exchange rate would be earning foreign currency at a cost above its price on the foreign exchange market.

In reality, governments do intervene in the economy causing price distortions. It might be argued that the current value of the Australian dollar is increased as a result of the Australian government's assistance to various industries and its monetary policy. If this is the case, then the market exchange rate might not be an accurate measure against which to assess DRC ratios. Rather, a shadow rate of exchange should be used which has been calculated to exclude the effects of government distortions.

For example, consider a situation where the market rate for the Australian dollar is US\$0.80 while the shadow rate is US\$0.70. If the market rate is used as the benchmark, then firms with a DRC ratio of \$A1.25 or less will be rated as efficient, while a ratio of up to \$A1.43 would be acceptable using the shadow rate.

Similarly, in calculating DRC ratios for individual firms, appropriate adjustments should be made to remove the effect of price distortions which influence foreign earnings and to ensure domestic costs are measured accurately. For example, cabotage arrangements inflate coastal and trans-Tasman freight rates, so that the total revenue of Australian ships operating in these trades overstates their foreign exchange earnings.

The DRC equation can also be manipulated to demonstrate a link between profit and efficiency in earning foreign exchange. If

$$DRC = \frac{C_A}{Y_{US} - C_{US}} \quad (V.1)$$

and

$$P_A = Y_{US} \cdot R - C_A - C_{US} \cdot R \quad (V.2)$$

then

$$P_A = NY_{US} (R - DRC) \quad (V.3)$$

where

- $DRC$  = Domestic resource cost ratio (\$A/US\$1.00)
- $C_A$  = Domestic costs (\$A)
- $C_{US}$  = Overseas costs (US\$)
- $R$  = Exchange rate (\$A/US\$1.00)
- $Y_{US}$  = Gross earnings (US\$)
- $NY_{US}$  = Net earnings (US\$)
- $P_A$  = Profit (\$A)

Profit is defined here simply as revenue less costs; government assistance and tax are not taken into account. In chapter 3, the term economic surplus is used instead of profit.

Care should be taken in using the identity in line V.3. It is an accounting identity rather than an equation and would not always be relevant from the viewpoint of

economic analysis, particularly where the social costs and benefits of shipping differ from those perceived by industry.

Subject to this qualification, the identity shows that:

- profitability increases with efficiency in earning foreign exchange, that is, as the DRC ratio declines;
- an enterprise is just efficient in earning foreign exchange at the point where its DRC ratio equals the exchange rate; this is also the break-even point for profit; and
- unprofitable enterprises are not efficient in earning foreign exchange.

## APPENDIX VI CASE STUDY DATA

The case studies discussed in chapter 3 are based on estimates of ships' costs and revenues prepared by BTCE. Costs were estimated using the computer model BTESHIP (Bureau of Transport Economics 1987).

This appendix shows the information used in the calculations. Data were collected from questionnaires sent to Australian ship operators, various publications, and personal contacts.

Table VI.1 shows the freight rates assumed for each of the tanker and bulk ship case studies. They were obtained from various published sources including

TABLE VI.1 1988 FREIGHT RATES USED FOR TANKER AND BULK SHIP CASE STUDIES  
(US\$ per tonne)

<i>Service</i>	<i>Cargo</i>	<i>Freight rate</i>
T1 Singapore–Fremantle	oil	5.40
T2 Arabian Gulf–Sydney	oil	10.54
T3 Los Angeles	oil	8.47
T4 Arabian Gulf–Sydney	oil	10.54
Melbourne–Singapore	oil	6.05
T5 Djakarta–Melbourne	oil	6.56
Melbourne–Manila	oil	7.10
Manila–Djakarta	oil	2.29
T6 Auckland	petrol	8.56
T7 Arabian Gulf–Kwinana	oil	7.31
B1 Pohang	coal	5.03
B2 Rotterdam	iron ore	6.88
B3 Port Hedland–Port Kembla <sup>a</sup>	iron ore	5.69
Port Kembla–Yokohama	coal	5.03
B4 Yokohama	coal	6.00
B5 Yokohama	coal	9.00

a. Derived from Industries Assistance Commission (1988b, 381–2).

*Sources* World Scale Association (1988); Lloyds (1988b); Drewry's *Shipping Statistics and Economics* (1988); shipping company (pers. comm. 1988); Industries Assistance Commission (1988b).

Lloyds (1988) and Drewry's *Shipping Statistics and Economics* (1988). The market rates applied to the Worldscale rates (World Scale Association 1988) were based on figures for similar services at the time of analysis, or from personal contacts with ship operators.

Table VI.2 shows the freight rates used for container services. They were obtained from the Export Marketing Group of the Australian Meat and Live-stock Corporation (1989), Lloyd's (1988b) and the *Australian Financial Review* (1989).

The proportions of Australian shipping expenditures spent in Australia were determined from the questionnaire responses and from published studies such as Apelbaum (1988). These percentages are shown in table VI.3.

The ship utilisation figures used in the calculations (table VI.4) are BTCE estimates reflecting common industry practices and based on published sources such as Lloyd's *Shipping Register*. The proportions of refrigerated containers in shipments from the different ports are shown in table VI.5 and are based on a recent BTCE study into refrigerated shipping (BTCE 1989).

TABLE VI.2 1988 FREIGHT RATES USED FOR LINER SERVICE  
CASE STUDIES  
(\$A per container)

Route	Dry container	Refrigerated container
Japan		
Import	1 987	..
Export	1 386	3 991
Europe		
Via Suez		
Import	2 787	..
Export	2 520	5 222
Via Cape		
Import	2 254	..
Export	1 970	5 222
Singapore		
Import	1 721	..
Export	1 865	3 760
East coast of North America		
Import	4 387	..
Export	3 740	5 734

.. Not applicable.

Sources Australian Meat and Live-stock Corporation (1989); Lloyds (1988b); *Australian Financial Review* (1989).

TABLE VI.3 CASE STUDY ASSUMPTIONS: SHARE OF AUSTRALIAN SHIPPING'S EXPENDITURE SPENT IN AUSTRALIA, 1988  
(per cent)

<i>Cost item</i>	<i>Tanker</i>	<i>Bulk ship</i>	<i>Container ship</i>
Capital	0	0	0
Administration	95-100	90-99	90
Fuel	0	0	0
Crew	95	95	95
Repairs	55-100	80	40-75 <sup>a</sup>
Insurance	18	10-17	18
Victuals	80-100	85-90	70-80
Stores	80-100	50-95	80-90

a. For container services, it was assumed that expenditure in Australia comprised 40 per cent of ship repair costs, 50 per cent of container cleaning and 75 per cent of container repairs.

*Note* In some cases, the figures show the range of figures used in the case studies.

*Sources* Ship operators; Apelbaum (1988).

TABLE VI.4 CASE STUDY ASSUMPTIONS: CONTAINER CAPACITY UTILISATION AND SLOT UTILISATION  
(per cent)

<i>Item</i>	<i>Destination</i>			
	<i>Europe</i>	<i>Japan</i>	<i>USA</i>	<i>Singapore</i>
Container capacity <sup>a</sup>				
Exports	85	80	72	80
Imports	75	80	67	80
Slot capacity <sup>b</sup>				
Exports	95	85	85	85
Imports	90	85	85	85
Refrigerated capacity <sup>c</sup>	17	24	32	28

a. Ratio of cargo carried to ship's maximum capacity, measured in TEU or deadweight tonnes.

b. Proportion of slots on ship occupied by full and empty containers.

c. Refrigerated cargo as a percentage of total shipments in the northbound trade.

*Sources* Bureau of Transport Economics (1986); various shipping lines, pers. comm. (1989).



TABLE VI.5 CASE STUDY ASSUMPTIONS: PROPORTION OF REFRIGERATED BOXES IN LINER CARGOES SHIPPED FROM AUSTRALIAN PORTS  
(per cent)

Australian port	Destination			
	Europe	Japan	USA	Singapore
Sydney	30	10	20	25
Melbourne	70	40	65	35
Adelaide	..	5	..	..
Brisbane	..	45	15	40

.. Not applicable.

Source BTCE (1989).

For bulk ships it was assumed that cargoes equalled 90 per cent of deadweight capacity, while for tankers a figure of 95 per cent was used.

Stevedoring charges for containers in Australian and overseas ports are shown in table VI.6. Other charges such as wharfage and port costs were obtained from published schedules of the various ports, or from the questionnaires. Agency fees of 5 per cent on exports and 2.5 per cent on imports applied to liner services, both in Australian and overseas ports.

Last, table VI.7 shows a number of data items entered into BTESHIP to estimate ships' operating costs.

TABLE VI.6 STEVEDORING CHARGES FOR DRY AND REFRIGERATED CONTAINERS  
(\$A per box)

Container type	Destination			
	Europe	Japan	USA	Singapore
Dry				
Australian ports	260	260	260	270
Overseas ports	250	270	250	120
Refrigerated				
Australian ports	427	450	427	427
Overseas ports	460	440	460	150

Source Ship operators.

TABLE VI.7 DATA USED IN BTESHIP MODEL FOR ESTIMATION OF COSTS

<i>Input item</i>	<i>Tanker</i>	<i>Bulk ship</i>	<i>Liner</i>
Age of ship	new	new	new
Life of ship (years)	15	15	15
Crewing level	18	18	18
Ship speed (knots)	14/14/13.5	14/14/13.5	15/18/19
Ship size ('000 dwt)	32/95/120	70/140/220	27/38/45
Analysis period (years)	15	15	15
Days in operation	300/350/358	360/360/360	358/358/358
Container life (years)	..	..	12
Empty container (tonnes)	..	..	2.4
Container to slot ratio	..	..	3:1
Real interest rate (per cent per annum)	5	5	5
Exchange rate (US\$/£)	0.70/0.8252	0.70/0.8252	0.70/0.8252
New ship cost (\$/m)	40/40/50	32/49/64	36/49/65
Ship insurance fraction	0.004	0.004	0.004
Repairs and maintenance (per cent per annum)	1.5	1.5	1.5
Administration fraction	0.05	0.05	0.05
Container costs			
Refrigerated porthole (\$/A)	..	..	15 000
Refrigerated integral (\$/A)	..	..	30 000
Dry container (\$/A)	..	..	3 300
Maintenance (\$/A per annum)	..	..	550
Main engine fuel (\$/A per tonne)	122/66/90	120/120/120	90/90/90
Auxiliary fuel (\$/A per tonne)	211/131/187	.. / .. /200	160/160/160
Cargo per TEU (tonnes)	..	..	16
Suez charge (US\$) <sup>a</sup>	..	..	210 000
Panama charge (US\$) <sup>a</sup>	..	..	129 206

a. Two-way charge.

- Notes*
1. Insurance and repairs and maintenance were taken as a fraction of new ship cost. Administration costs were taken as fraction of ship running costs.
  2. For items showing multiple entries (entries separated by a slash), data are shown in order of ascending ship size.

*Sources* Ship operators; BTCE estimate.

## **APPENDIX VII REVENUES AND COSTS**

The tables in this appendix show the estimated revenues and costs for each of the case studies discussed in chapter 3. The figures were generated by the computer model BTESHIP (Bureau of Transport Economics 1987) and are based on the data provided by ship operators which are shown in appendix VI. All figures are in US dollars. The economic surplus equals total revenue less total costs before payment of tax and without MIDC assistance.

TABLE VII.1 CASE STUDY RESULTS: ECONOMIC SURPLUS AT EXCHANGE RATE OF US\$0.70<sup>a</sup>

(US\$'000 per voyage)

<i>Service, utilisation</i>	<i>Total costs</i>	<i>Total revenue</i>	<i>Economic surplus</i>
<b>Tanker</b>			
T1 Singapore	425	494	69
T2 Ras Tanura <sup>b</sup> , 50 per cent	949	964	15
T3 Sydney-Los Angeles	925	775	-150
T4 Ras Tanura <sup>b</sup> , 70 per cent	1 230	1 518	288
T5 Djakarta, 100 per cent	928	1 459	531
T6 Sydney-Auckland	233	261	29
T7 Ras Tanura <sup>b</sup>	914	855	-58
<b>Bulk ship</b>			
B1 Pohang	1 027	997	-30
B2 Rotterdam	2 243	1 362	-880
B3 Yokohama, 70 per cent	1 389	2 123	735
B4 Yokohama, 50 per cent	839	756	-83
B5 Yokohama, 50 per cent	663	567	-96
<b>Liner service</b>			
L1 Europe via Suez	8 532	9 554	1 023
L2 Europe via Cape	8 510	7 933	-577
L3 East coast of North America	8 492	12 568	4 077
L4 Japan	5 028	5 282	254
L5 South-East Asia	3 284	4 082	798

a. Economic surplus equals total revenue less ship operators' costs before tax and without MIDC assistance.

b. Arabian Gulf.

*Note* Discrepancies in figures are due to rounding.

*Source* BTCE estimates.

TABLE VII.2 CASE STUDY RESULTS: ECONOMIC SURPLUS AT EXCHANGE RATE OF US\$0.8252<sup>a</sup>

(US\$'000 per voyage)

<i>Service, utilisation</i>	<i>Total costs</i>	<i>Total revenue</i>	<i>Economic surplus</i>
<b>Tanker</b>			
T1 Singapore–Fremantle	446	494	48
T2 Ras Tanura <sup>b</sup> , 50 per cent	1 006	964	-42
T3 Los Angeles	977	775	-202
T4 Ras Tanura, 70 per cent	1 303	1 518	215
T5 Djakarta, 100 per cent	980	1 459	480
T6 Auckland	247	261	14
T7 Ras Tanura <sup>b</sup> –Kwinana	964	855	-109
<b>Bulk ship</b>			
B1 Pohang	1 079	997	-82
B2 Rotterdam	2 340	1 362	-978
B3 Yokohama, 70 per cent	1 454	2 123	669
B4 Yokohama, 50 per cent	883	756	-127
B5 Yokohama, 50 per cent	705	567	-138
<b>Liner service</b>			
L1 Europe via Suez	9 021	9 554	533
L2 Europe via Cape	9 001	7 933	-1 068
L3 East coast of North America	8 979	12 568	3 589
L4 Japan	5 336	5 282	-55
L5 South-East Asia	3 532	4 082	551

a. Economic surplus equals total revenue less ship operator's costs before tax and without MIDC assistance.

b. Arabian Gulf.

*Note* Discrepancies in figures are due to rounding.

*Source* BTCE estimates.

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## ABBREVIATIONS

ABS	Australian Bureau of Statistics
AG	Arabian Gulf
ANA	Australian national accounts
ANMA	Australian National Maritime Association
BHP	The Broken Hill Proprietary Company Limited
BOP	balance of payments
BTCE	Bureau of Transport and Communications Economics
BTESHIP	a computer model for estimating ship operating expenses
cif	cost insurance and freight
DRC	domestic resource cost (ratio)
dwt	deadweight tonnes
EPAC	Economic Planning Advisory Council
FMS	foreign manned ships
fob	free on board
IAC	Industries Assistance Commission
IMF	International Monetary Fund
MIDC	Maritime Industry Development Committee
NPV	net present value
OECD	Organisation for Economic Cooperation and Development
SIAO	survey of international aviation operations
SISO	survey of international shipping operations
SRTF	Shipping Reform Task Force
SVP	single voyage permit
TEU	twenty-foot equivalent unit
UN	United Nations