Container Shipping in Transition

Occasional Paper

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Container Shipping in Transition

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CORRIGENDUM - BTE Occasional Paper 77

p xiii, last sentence

...However, only the Europe/Australia and East Asia routes may be said to be fiercely competitive...

FOREWORD

This Occasional Paper has been prepared for the Federal Bureau of Transport Economics under its Research Fellowship Scheme. The Fellowships are offered to qualified and experienced people in the public or private sector or in academic institutions who are interested in undertaking a period of research on a specific issue or issues falling within the Bureau's general charter.

Dr Sidney Gilman, Director of the Marine Transport Centre, University of Liverpool, undertook the study presented in this Paper during 1985.

The analysis undertaken in the study and the conclusions drawn are the views of the author and do not necessarily reflect the position or views of the Bureau of Transport Economics.

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April 1986

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The usual disclaimer applies. The views expressed in this Paper are my own and none of the organisations or persons mentioned above necessarily agree with them.

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SUMMARY

The container industry has entered a new period of rapid transition when it might well have been expected to be settling down. This has been stimulated on the demand side by a very high rate of growth in US imports, but only part of this is attributable to growth in the economy, the rest being the result of the reduction in import prices which was a result of a strengthening United States (US) dollar. The implementation of policies which would reduce the US balance of payments deficit and weaken the dollar could reverse some of the growth of recent years and reduce the demand for transport capacity at a time when supply is increasing. This would create very severe conditions in container markets over the next few years, and even if the US economy makes a 'soft landing' and continues to grow in the late 1980s there is likely to be a degree of over-supply.

Turning to the supply side of the market the most important feature has been a colossal rate of growth on major routes, which has outstripped even a buoyant demand. This was partly a response to growth but has also been stimulated by changes in technology and operating patterns and fuelled by ship building subsidies, the availability of very large amounts of credit for new vessels and a degree of government support to liner shipping in both established and newly developing country fleets.

As far as the technology itself is concerned the main changes have been of an evolutionary rather than revolutionary nature. The most important change has been the huge increase in the number of very large ships; and since most of these operate at moderate speeds, with all the advantages of modern propulsion systems and reduced crew numbers, they have low costs per container slot mile compared to earlier generations of ships. However, some of these economies are available to smaller vessels of modern design and these still have an important role on shorter and thinner (less dense) routes, or on those which may benefit from the use of flexible ships.

Round-the-world (RW) services are argued to be rather less revolutionary than has been imagined and to present one among a number

of efficient methods of serving mainstream trades, rather than a new system of creating a world network based on mother ships and feeder operations. However, with the wide scope of modern networks, carriers have increasing flexibility to redeploy vessels across routes and these network re-adjustments are likely to become an increasingly important feature of the industry.

As a result of developments in the last five years the container industry has become much more competitive and conferences have lost much of their former market power. The shares of independent lines now range up to around 50 per cent, even on routes where conferences have held sway for decades. These changes in the industry have been to the advantage of shippers on many routes who have obtained rates which have been declining in real terms. Indeed rates on some routes have been so low that shippers have for a time obtained services at very little more than avoidable costs.

With the breakdown of the closed conference system on major routes, the challenge facing the industry is more one of the institutions and operation of the market place than it is of technology. It must be accepted that there are changes in market conditions which cannot be entirely anticipated and which are likely to result in periods of disequilibrium, the classic case within the maritime industries being that of the tanker market after 1974. The test of a good system is that it should dampen the adverse effects of these changes rather than accelerate them. The combination of high demand and technological change has presented such a challenge to the container industry, but with the collapse of the power of the conference system and the availability of plentiful finance there has been significant over-response. New forms of market institution are developing (particularly in the form of contracts between shippers and carriers) which may help the operation of the market, although they do not appear quite strong enough to deal with the problem. In any case it is now rather too late to change the prospects for the late 1980s.

Looking further ahead, the size of carriers and degree of integration into inland modes is increasing and it is not inconceivable that cartels could eventually regroup on major routes with sufficient scale to deter further entry. However, even if they do it seems unlikely that the classic form of closed conference operation would return.

Regulatory policy has also evolved in recent years. Among the major developments in this respect has been the reform of the US system and its adoption of a broad policy of allowing rationalisation within open trades. The recent European Community (EC) proposals follow a similar

direction allowing consortia and closed conferences within open trades.

The container industry has not been regulated in the sense of having government control of entry and review of prices. However, both of the above mentioned developments can be said to be in accord with the spirit of de-regulation in the more general sense of reducing the extent of government involvement and encouraging a more open market place. Both the US and proposed EC systems do, however, retain safeguards against the possibility of monopolistic abuse. This is perhaps as far as regulatory systems can go, although governments could also help by refraining from those policies designed primarily to support domestic shipping and shipbuilding but whose long term effect is to exacerbate conditions of over-supply.

As a relatively geographically isolated area of only moderate economic size, Australia generates fairly thin trades, some of which are very long and others of medium distance. This tends to limit the scope for entry, and there are certain other barriers, in terms of the specialised nature of some of the export cargoes, difficult port conditions, and union activities. Certain negotiating procedures of export marketing boards also affect the conditions of entry, tending to channel competitive activity into limited periods of negotiation, following which entry may be inhibited across the whole route. An examination of market shares shows that most Australian routes are now open, in the sense that independent lines have built up their shares to moderate levels. However, only the Europe/Australia route may be said to be fiercely competitive, and although world market conditions over the next few years may well ensure that Australian markets remain open and competitive it would be as well for the regulatory regime to retain safeguards, including those against the possibility of abuse of a dominant position.

CHAPTER 1 INTRODUCTION

The objectives of this study were to review developments in world container shipping and establish the main trends in the deep sea trades. This will in turn provide background to the BTE's own studies of liner shipping and the review of shipping policy now taking place in Australia. The changes now taking place in the industry are profound ones. Having established the trends in individual sectors using established material, including some of my own earlier published work, the attempt has been made to draw the threads together, to offer interpretations of the scale and dynamics of the process of transition now taking place within the industry, and to consider the nature of the important issues now facing it.

Chapter 2 contains a discussion of global trends in container traffic and the major factors affecting demand. There is also an assessment of market prospects to 1990. Chapter 3 first outlines the geographic structure of the world container market and then describes developments in the three major route groups over the past five years or so. The discussion focuses on changes in competitive environments and the impact of the independent lines. Developments in the supply side are explored in Chapter 4, including the significance of increases in ship size and improved operating costs, and also the trends towards round-the-world (RW) services. Based on information in the earlier chapters and some further material on regulatory policy, the final chapter draws some broad general conclusions, and some implications for the Australian trades.

CHAPTER 2 TRENDS IN DEMAND

It is still only 18 years since the introduction of the first deep sea container service, but the industry has grown rapidly and today the sea freight component alone may be estimated to be worth at least 25 billion United States (US) dollars per annum. A very rapid rate of growth was to be expected in the early years of takeover from the conventional system, but much of this process has now been completed and the rate of growth should by now have slowed down to that of a mature technology which already controls most of the market. But this has not proved to be the case and on the major routes of the world in the last three years there have been reports of a high rate of growth in demand and certainly a phenomenal increase in capacity. This raises a number of questions concerning the future of the market which require an understanding of the factors at work.

In investigating this area this chapter starts with an analysis of trade flows for the years 1972 to 1980 and the establishment of the relationship between growth in container cargoes and world income. Following this the trend to 1985 is estimated using supply side (capacity) data plus information on growth in the world economy. The extent to which containers have taken over the market is considered in a calculation of the levels of container penetration in 1980 and 1985. To obtain a more complete picture of the underlying sources of growth in the container trades, there is a review of the regional patterns of economic growth. A forecasting approach is developed in which projections are made on the basis of the established relationship between economic growth and the growth of container cargo. This estimate is then compared with supply side data, which suggests very much higher rates of growth in major markets. A broad interpretation of these differences is put forward in terms of the strength of the US dollar and a high price elasticity of demand in the US for imported goods. Finally, the implications of this analysis for the period 1985 to 1990 are considered in the light of prospects for the US economy.

THE SIZE AND GROWTH OF THE CARGO BASE 1972-1980

Although most countries publish trade statistics these are enormously detailed, the figures are in a variety of different units of quantity, and are classified under a number of different systems. The problem of aggregation is a difficult one and until recently global or regional information has been very limited. The situation has now been much improved by an initiative taken by the Norwegian Government, which has financed a team working under the auspices of the United Nations (UN) in New York to produce international seaborne trade statistics for 130 commodity groups and 32 trading areas. Their analysis starts with the trade statistics of the 97 nations whose exports are available in machine readable form. These are adjusted to produce all quantities in tonnes, take account of differences in trade classification, and remove trade across land borders. This provides data which are sufficiently detailed to be of real use in analysis. Since the data base includes all the major trading nations (and thus their trading partners) it encompasses all except some of the smaller flows between developing nations.

Three volumes have so far been produced (UN 1978, 1980 and 1982) covering the period 1972 to 1980 and the summary table for the last four of these years is reproduced in Appendix I. The estimate of containerisable cargo in this study is based on an allocation process which screens out the dry cargo trades, the major and minor dry bulks, semi-bulk cargoes like steel and forest products and specialised cargoes like reefer (refrigerated cargo), cars and trucks and chemicals and so on. This cannot be an exact process because of the variations in proportion of cargo containerised. In particular there are some commodity groups which make a significant contribution to container cargoes, although only a small or moderate proportion of the group total is containerised. The most important of these is chemicals (which is one of the very large general cargo commodity groups) although only about half of the total of chemical movements are containerised. Steel products also make quite a large contribution, although only the smaller more highly processed items move in containers. It is not possible to obtain comprehensive data in this respect but the analysis of this Paper is based upon United Kingdom (UK) experience for 1984 as shown in their customs statistics, supported by sector studies for some of the individual commodity groups.

Table 2.1 shows the quantities of containerisable cargoes, by commodity and by year. Also shown is the percentage of each commodity which is assumed to be containerisable. The amount of containerisable

TABLE 2.1 TOTAL WORLD CONTAINERISABLE GENERAL CARGO TRAFFICS, 1972-80

('000 tonnes)

General cargo	*Percentage containerisable*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*
Products of ferrous base metal	10	5 667	6 790	8 111	7 135	7 958	8 260	9 056	9 251	8 988
Refrigerated foods	15	3 462	3 586	3 532	3 443	3 901	4 087	4 328	4 529	4 636
General cargo										
Coffee	100	3 382	3 655	3 412	3 442	3 727	3 010	3 464	3 842	3 683
Tea	100	920	750	740	767	841	867	810	908	909
Other foods	100	20 737	21 472	20 879	21 958	25 827	27 060	30 992	34 337	35 385
Beverages	100	4 913	4 982	4 783	5 263	5 881	6 142	6 707	7 592	7 502
Tobacco	100	1 134	1 177	1 309	1 232	1 389	1 396	1 549	1 537	1 460
Crude rubber	100	4 336	5 017	4 960	4 533	5 106	6 178	5 968	6 459	6 081
Textile fibres	100	8 159	8 881	7 635	7 108	7 836	7 596	8 253	8 813	9 011
Other crude materials	100	2 195	2 222	2 243	1 926	2 416	2 427	2 571	2 791	2 606
Oils and fats	25	2 039	1 959	2 017	2 008	2 569	2 803	3 086	3 140	3 525
Paper and board	10	1 814	1 942	2 065	1 506	1 829	1 931	2 078	2 279	2 430
Textiles	100	4 509	5 112	6 584	4 461	5 388	5 761	6 065	6 648	6 576
Machinery (electrical and other)	100	7 777	8 740	10 107	10 641	11 437	12 602	13 397	14 545	15 643
Other manufactures	na	29 915	37 246	38 485	38 488	42 379	47 503	44 813	36 840	37 878
Chemicals	50	26 593	29 267	31 820	28 313	31 275	33 334	36 032	38 172	37 597

TABLE 2.1 (Cont.) TOTAL WORLD CONTAINERISABLE GENERAL CARGO TRAFFICS, 1972-80
('000 tonnes)

General cargo	*Percentage containerisable*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*
Other dry cargo										
Woodpulp and waste	10	1 320	1 468	1 636	1 278	1 462	1 477	1 614	1 781	1 880
Crude minerals	100	1 136	1 056	839	699	671	893	863	670	892
Non-ferrous metals	100	8 530	9 343	9 722	8 179	9 725	10 158	10 154	10 376	11 378
Metal manufacturing	100	2 681	2 983	3 700	3 719	4 152	4 481	4 761	4 323	4 527
Machinery and equipment (transport etc)	100	3 493	3 875	4 946	5 245	5 711	5 288	5 382	5 711	6 391
Miscellaneous	100	3 709	3 097	3 128	2 973	3 693	3 767	4 082	3 905	3 802
Total		148 421	164 620	172 653	164 317	185 173	197 021	206 025	208 449	212 780
Growth of cargo base (per cent)			10.9	4.9	-4.9	12.7	6.3	4.6	1.3	2.4
Growth of world GDP in real terms (per cent)			6.1	1.7	-	5.1	4.1	4.2	3.6	2.5

na Not available.

Sources UN (1978, 1980, 1982). International Monetary Fund (IMF) (1983).

cargo moved in international trade was some 148.4 million tonnes in 1972 rising to 213.8 million tonnes in 1980. This represents an increase of some 44 per cent over the period and a cumulative growth rate of 4.6 per cent, although with considerable variations in individual years, including a drop during the 1975 recession which followed the Organisation of Petroleum Exporting Countries (OPEC) price increase of 1974. During this same period world Gross Domestic Product (GDP) at constant prices grew by some 31 per cent, so that growth in the general cargo trades was about 1.4 times that of the world economy. This was not, however, a consistent relationship over the period, with high ratios of general cargo to world GDP growth in the years 1972 to 1977 (with the single exception of 1975) and relatively low ratios from 1977 to 1980.

The UN statistics also show average haul length for individual trades in each commodity and this enables deep and short sea trades to be distinguished. An examination of the statistics for 1980 showed that in that year about 60 per cent of the main general cargo trades were deep sea (defined as having a route length of over 1500 nautical miles). Thus the deep sea total for 1980 was some 128 million tonnes. The analysis also indicated that growth rates in overall deep sea and short sea trades were similar, although growth in individual regional trades varied widely depending upon the patterns of growth in the economies of the trading partners.

Container penetration

The growth of demand for the deep sea container trades has described the classic 'S' curve exhibited when a new industry takes over an established market. The growth is comprised of two components, diversion from existing markets and increases in the volumes moved in those markets. In the early years very high rates of growth are sustained, most of which comes from the process of diversion. However, as time goes on and the process of diversion nears completion, rates of growth drop and the increase in the cargo base itself becomes the major influence. In the case of the general cargo trades of the world there has been yet another element relating to the general re-structuring of the industry between liner, semi-bulk and specialised cargoes which has taken place in recent years. The effects of re-structuring and increasing containerisation had already been taken account of in the estimates of demand given earlier, which are based on a current assessment of containerisable cargoes.

For an analysis of supply it is possible to call on an analysis for 1980 carried out at the Marine Transport Centre of the University of

Liverpool. This was based on an actual count of the voyages of some 2300 container-carrying ships, including virtually the whole of the cellular fleet, plus as many roll-on roll-off (ro-ro) ships, semi-container ships and conbulkers as could be found in the registers. A summary of the results of this study is presented in Table 3.1 in Chapter 3, but for our purposes at the moment it is necessary to deal only with total movements. The study found some 13.2 million TEU[1] slot movements in 1980 in international deep sea trades. Of these, some 1 850 000 TEUs were on routes to the Middle East, where there were at that time only negligible amounts of return cargo. Subtracting half of this leaves a total of some 12 275 000 slot movements. Further allowance needs to be made for the following: that even on the remaining routes over-tonnaging and poor cargo balance reduce load factors; that container ratings sometimes overstate the effective capacity of the ship; and that flexible ships often employ some of their container capacity in carrying non-container cargoes. There are no precise figures on these subjects, but such general information as is available on load factors suggests that 70 per cent could be taken as an estimate of loaded containers. This gives some 8 592 000 loaded TEUs which at an average of some 11 tonnes per TEU would be equivalent to some 94.5 million tonnes of cargo. Relating this to the figure of 128 million tonnes found on the demand side gives a container penetration of some 74 per cent. In the last five years there have been very large increases in trade flows on the developed markets which have a high container penetration, as well as increases in penetration in markets to developing countries. As a result of this, average container penetration is likely to have risen to about 80 per cent (say 85 per cent on the developed routes which make up about three-quarters of the total and 65 per cent on the less developed remainder).

GROWTH TRENDS IN THE 1980s

The UN statistics of world flows of cargo do not yet go beyond 1980 and this makes it necessary to fall back on secondary sources to try to estimate demand in the period 1980 to 1985. There are four such indicators:

- a count of world box movements through container ports;
- an indication of the growth of the containership fleet;
- statistics on growth in the world economy; and
- estimates of the growth of slot capacity on mainstream routes.

1. Twenty-foot equivalent unit.

World box movements

The *Containerisation International* count of world box movements is obtained from a survey of some 342 ports with throughputs of over 1000 TEUs. It gives global figures, encompassing domestic and transhipment movements as well as overseas trade, and includes both short and deep sea movements in the overseas trade sector. Figures of total movements in recent years are given in Table 2.2.

It is not possible to make precise comparisons with the earlier figures of TEU slot movements, partly because of the differences in coverage but also because we cannot be certain of the reporting methods of individual ports. However, the 37.9 million box movements in 1980 should have a component of say 15 per cent for transhipment, and the remaining 32.2 million would represent 16.1 million TEUs moved (each movement between trading areas resulting in two port movements). Although deep sea general cargo traffics represented only 60 per cent of the total reported by the UN in 1980, much of the short sea traffic goes by ro-ro trailer system and probably about 85 per cent of actual containers moved will be on deep sea trades. Applying this percentage brings the total down to about 13.8 million TEUs (compared with a figure of 13.2 million TEU movements mentioned above derived from the Liverpool University study).

Table 2.2 indicates that total world box movements grew by some 8 per cent per annum for the years 1980 to 1984. The figures for 1981 and 1982 look rather high in relation to the development of deep sea traffic in those years but this could be explained by growth in short sea and transhipment traffics.

TABLE 2.2 WORLD BOX MOVEMENTS 1980-84

Year	*Box movements (millions TEUs)*	*Annual growth (per cent)*
1980	37.9	..
1981	41.1	8.2
1982	42.8	4.2
1983	46.0	8.5
1984	51.4	11.7

.. Not applicable.

Source Containerisation International (1985).

Three main trading areas are represented in Table 2.3. The US has 21 per cent of world moves (which would be increased a little with the addition of Canada which is jointly served on North American routes). The main European countries (all members of the European Community (EC)) also have 21 per cent. West Germany's importance is under-represented by virtue of the fact that much German traffic passes through Benelux and Mediterranean ports. Finally the Asian countries also had 21 per cent and this would be increased somewhat with the addition of Korea. However, the most surprising feature of the table is that Japan, although the largest single generator of container port movements in the Asian region, was responsible for only 40 per cent of the regional total. Taiwan is of very considerable importance as are the relatively small economies of Hong Kong and Singapore. All of these figures will owe something to transhipment, Hong Kong serving China and other Asian countries, and Taiwan also being a transhipment centre for Asia. However, a great deal is accounted for by economies based on the export of manufactures and sustaining high rates of economic growth.

Capacity of world container fleet

Table 2.4 shows the growth of slot capacity in ships of all types in

TABLE 2.3 WORLD BOX MOVEMENTS BY COUNTRY, 1983

Country	*'000 TEUs*	*Per cent of total recorded*
US	9 478	20.6
Japan	4 106	8.9
UK	2 768	6.0
Taiwan	2 429	5.3
Netherlands	2 423	5.2
Hong Kong	1 837	4.0
West Germany	1 758	3.8
Italy	1 368	3.0
Singapore	1 274	2.8
Belgium	1 214	2.6
Total of above countries	28 655	62.3
Other countries	17 302	37.7
Total recorded	45 957	100.0

Source Containerisation International, December 1984.

the world container ship fleet in the period 1980 to 1984. Projections to 1987 are given on the basis of the order book at the end of 1984. The table shows a growth of some 37 per cent in capacity in the period 1980 to 1984. However, these figures encompass all classes and all sizes of vessel. Many of the smaller vessels in the fleet operate in short sea trades, and the flexible ships (particularly semi-container and bulk container ships) trade in the small and shorter distance flows of bulks and semi-bulk cargoes as well as in the container sector.

PATTERNS OF ECONOMIC GROWTH

Turning to patterns of economic growth and looking first at the period 1972 to 1980, Table 2.1 shows that 1973 was a year of strong growth, this being followed by the two-year mid-1970s recession which followed the OPEC price increase. The years 1976, 1977 and 1978 were all quite good, as was 1979. This latter year, however, marked the beginning of a period of recession in western industrial countries which lasted until 1982. The recovery began in 1983, and 1984 was a year of exceptionally strong growth, which subsided somewhat in 1985. In regard to general cargo traffics, the period 1972 to 1977 was one of quite high growth. It started strongly with the high rate of growth in the world economy of 1973 being combined with a high general cargo to GDP ratio. There were then two years of recession, which were ridden out quite well, followed by two more exceptionally good

TABLE 2.4 HISTORICAL AND PROJECTED SLOT CAPACITY OF THE WORLD CONTAINER FLEET, 1980-87

Year	*'000 TEUs*	*Per cent increase*
Historic		
1980	1 497	
1981	1 670	11.5
1982	1 771	6.0
1983	1 894	6.9
1984	2 058	8.6
Projected		
1985	2 292	11.4
1986	2 427	5.9
1987	2 462	1.4

Source Containerisation International.

years. Following this, the period 1977 to 1980 was one of relatively poor growth. The main reason for this poor performance was a decrease in the general cargo to GDP ratio. Much of this can be traced to one important cargo group, 'other manufacturers', which grew by 17 million tonnes in the first five years and declined by ten million tonnes in the last three.

Growth in trading regions

Tables 2.5 and 2.6 show quite distinctive patterns in world growth rates with marked differences between regions. The most impressive long term performance in terms of high and relatively well sustained rates of economic growth was that of Japan. The average annual growth rate of 7.4 per cent between 1967 and 1976 was extraordinarily high for a large and mature economy. Rates of growth then slowed and 1982 and 1983 were relatively poor years, but even then the growth rate was well over 3 per cent and there was a strong recovery to 5.8 per cent in 1984.

The US is still the most important economy in the liner trades, as about half of the world's movements of general cargo are between the US and its trading partners. The average annual rate of growth between 1967 and 1976 was relatively low at 2.8 per cent. There were then very high rates of growth in 1977 and 1978, followed by a return to 2.8 per cent in 1979 and then three poor years 1980, 1981 and 1982. In 1983 there was the beginning of a strong recovery and this led to a year of extremely high growth in 1984.

The other important factor affecting general cargo trades to the US has been the dramatic changes in the value of the US dollar. Taking the mid-1970s as a base, the dollar weakened in the late 1970s, increasing export flows and creating a relative shortage of import cargoes. It then began to strengthen in the 1980s and this process accelerated in 1983 and 1984, with economic policies which allowed a very large public sector borrowing requirement and high interest rates. When combined with the growth in the US economy this created an enormous demand for dollars on capital account, satisfying both the large Public Sector Borrowing Requirement (PSBR) and a huge balance of payments deficit on current account.

General cargo imports into the US are reported to have grown by some 24 per cent in 1984, of which about 10 per cent might be attributed to an income effect (based on 6.8 per cent growth in real GDP x 1.4), leaving 14 per cent as a price effect. Meanwhile US exports have been held back somewhat by high export prices, although the high earnings

TABLE 2.5 ANNUAL GROWTH IN WORLD AND REGIONAL OUTPUT[a], 1967-86

(per cent)

Region	*Average 1967-76*	*Annual growth rate from preceding year*									
		1977	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*
World	4.5	4.5	4.4	3.5	2.0	1.6	0.6	2.6	4.3	3.4	3.4
Industrial countries	3.7	4.0	4.1	3.5	1.3	1.6	-0.2	2.6	4.9	3.1	3.0
United States	2.8	5.5	5.0	2.8	-0.3	2.5	-2.1	3.7	6.8	3.4	3.0
Other industrial countries	4.5	3.0	3.5	3.9	2.2	1.1	0.9	2.0	3.5	2.9	2.9
Japan	7.4	5.3	5.1	5.2	4.8	4.0	3.3	3.4	5.8	4.3	4.3
Fed. Rep. of Germany	3.5	2.8	3.4	4.0	1.9	-0.2	-1.1	1.3	2.6	2.7	2.9
Developing countries	6.0	5.8	5.3	4.5	3.4	2.4	1.6	1.5	3.7	4.0	4.5
Africa[b]	5.0	4.3	1.4	4.2	3.7	0.9	0.1	-0.2	2.2	2.9	3.6
Asia[b]	5.2	7.2	9.4	4.8	4.7	5.8	5.1	7.1	6.4	5.8	5.8
Europe[b]	6.0	5.4	5.4	3.8	1.6	2.5	2.2	1.3	2.5	3.2	3.4
Middle East[b]	9.3	6.9	1.9	1.8	-1.8	-0.7	0.3	0.6	2.3	2.9	3.6
Western Hemisphere[b]	5.9	5.3	4.1	6.1	5.3	1.0	-1.0	-3.1	2.4	3.2	4.2

a. Real GDP or Gross National Product (GNP) for industrial and developing countries and real Net Material Product (NMP) for centrally planned economies.
b. Median growth rates.

Source IMF (1985a).

TABLE 2.6 ANNUAL ECONOMIC GROWTH IN CERTAIN ASIAN ECONOMIES, 1977-84
(per cent)

Country	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*
Japan	5.3	5.1	5.2	4.8	4.0	3.3	3.4	5.8
South Korea	10.0	11.3	7.1	-3.5	7.1	5.5	9.5	7.9
Singapore	7.8	-0.6	3.3	2.3	-3.6	6.3	7.9	na
Malaysia	7.7	6.7	9.3	7.8	6.7	4.6	5.9	7.3
Thailand	6.8	6.2	7.5	4.4	3.6	2.8	1.3	-5.5

na Not available.

Source IMF (1985b).

of exporters to the US presumably helped to create secondary demand for US exports in the rest of the world. Total growth in US general cargo trades will be much less than the 24 per cent sustained by imports, but the growth in demand for transport capacity depends on the fat leg of the route and 1984 was clearly an exceptional year for the worlds' container trades.

Turning to the other sectors of the world economy, the industrial economies of Europe all performed at very much lower levels than Japan or the US in its boom years. Among the developing countries, Africa performed quite well in the 1960s and 1970s but there has been very little economic growth since 1981. The Middle East, which sustained high rates of growth in the late 1960s and early and mid-1970s, has been relatively stable since 1978; and the western hemisphere (which includes most of the countries of South and Central America) also levelled off in 1980. The developing countries of Asia, however, sustained high rates of growth throughout the 1970s and into the 1980s.

The phenomenon of economic development in Asia is illustrated in Table 2.6 which shows Japan, as the established industrial nation of the region, with a number of the newly industrialising countries. Statistics for Taiwan and Hong Kong are not available although it is known that these economies too have been growing rapidly.

The economies of the Asian newly industrialising countries vary considerably in size and type, but South Korea, Singapore, Taiwan and Hong Kong are all characterised by strong development in manufacturing industry and exports. It is apparent from Table 2.3 that Singapore, Taiwan and Hong Kong are more important in the general cargo trades

than their relatively small size might suggest, as they have a very high ratio of trade to GDP and also function as transhipment centres. These countries have a quite different trading profile from the traditional one for developing economies of commodity exports and imports of industrial goods. Their development has been based on manufacturing and the development of export markets for manufactures and this makes them of exceptional importance for the general cargo trades. Malaysia, Thailand and the Philippines are somewhat more traditional developing economies, but Malaysian general cargo exports include rubber, which is an important containerised product. These three economies have all sustained quite high rates of growth, although the Philippines fell away in 1983 and particularly in 1984. Two other factors characterise the Asian region. First, it possesses what is now the major part of capacity in world shipbuilding, with recent trends being for the further decline of European capacity being matched by growth in South Korea. Second, it is an area which has been a focus of development in container shipping. Unlike the developing countries of Africa and South America, the Asian newly industrialising countries did not take an intermediate path to shipping development in the form of semi-container ships but went fairly quickly for modern technologies and large vessels. This fact combined with low labour costs, high quality management, a degree of government support, the development of the region as a financial centre and a burgeoning domestic trade has allowed the Asian lines to grow, and the best of them are now among the largest and most competitive container companies in the world.

MARKET PROSPECTS

Some considerable progress has been made in the assessment of supply and demand for the deep sea container trades in recent years, with development of the data bases reviewed earlier. In particular this has allowed estimates of container penetration to be made, and confirmation of the present high level of penetration at least makes it clear that high rates of growth from the takeover of conventional cargoes are no longer to be expected. We also have a broadly established relationship between world economic growth and the growth of cargo moving in the deep sea container trades over the eight-year period from 1972 to 1980.

If the relationship between economic growth and the growth of cargo could be taken to be a stable one, estimates for the period 1980 to 1984 and forecasts to 1990 would be relatively straightforward. The cumulated growth in the world economy between 1980 and 1984 was 9.4 per cent, which would give growth in container cargo (at 1.4 to 1) of

some 13 per cent. The International Monetary Fund (IMF) estimates for economic growth in 1985 and 1986 are 3.4 per cent for each year, which would give further growth in the cargo base of 4.75 per cent each year. There is a fair probability that longer term forecasts for world output would be in the range of 3.5 per cent per annum plus or minus 1 per cent which would give forecasts for the growth of traffic of 5.75 per cent per annum plus or minus 1.4 per cent. Some allowance also needs to be made for the growth of container penetration which is projected to rise by 1 per cent per annum. Table 2.7 summarises these results and gives estimates of 20 per cent growth in containerised cargo between 1980 and 1984 with a further 6 per cent in 1985, projecting a 36 per cent increase from 1985 to 1990.

However, the supply side evidence reviewed above, plus the analysis of major routes of Chapter 3, conflicts with this approach, suggesting a higher overall growth rate in the period 1980 to 1985 and particularly strong growth in US markets in the period from 1983 to mid-1985, the alternative figures being set out in Table 2.8.

For the years 1981 and 1982, which were poor years for the world economy and world trade, the explanation of the high rate of growth in

TABLE 2.7 FORECASTS OF CONTAINER TRAFFIC BASED ON THE GROWTH OF WORLD OUTPUT, 1980-90

Year	*Growth of world output (per cent)*	*Growth of deep sea container cargo (per cent)*	*Growth of deep sea container cargo (million tonnes)*	*Container penetration (per cent)*	*Containerised cargo (million tonnes)*
Historic					
1980				74.0	94.5
1981	1.6	2.24	130.9	75.0	98.2
1982	0.6	0.84	132.0	76.0	100.3
1983	2.6	3.64	136.7	77.0	105.3
1984	4.3	6.02	144.9	78.0	113.0
1985	3.4	4.76	151.8	79.0	119.9
Projected					
1986	3.4	4.76	159.1	80.0	127.3
1987	3.4	4.76	166.6	81.0	134.9
1988	3.4	4.76	174.6	82.0	143.2
1989	3.4	4.76	182.9	83.0	151.8
1990	3.4	4.76	191.6	84.0	162.8

world box movements must surely be growth in short sea trades and transhipment, whilst the growth in container ship capacity can be explained by the development in the fleet of flexible ships which trade in the bulk sector as well as the container sector.

For the period 1983 to 1985, however, an explanation of the differences can be put forward based on the combined effects of growth in the US and Asian economies, and the strength of the US dollar.

In these circumstances there could well have been significant changes in the share of imports in US consumption, and since the US is an economy with a rather low ratio of trade to domestic consumption this substitution effect could have been substantial. The GDP effect alone would imply growth of 9.5 per cent in US imports in 1984, whilst trade figures indicate growth of about 25 per cent. In 1985 GDP growth would imply about 5 per cent growth in imports, whilst early estimates of trade figures suggested a continuation of high growth rates with a possible increase of 15 per cent over the year.

TABLE 2.8 GROWTH RATES RELATING TO SUPPLY AND DEMAND IN WORLD CONTAINER TRADES

(per cent)

Year	*Effects of growth in world output and penetration*	*World box movements*	*World container fleet*	*Capacity on major routes*
Historic				
1980-81	3.5	8.2	11.5	
1981-82	2.1	4.2	6.0	
1982-83	5.0	8.5	6.9	
1983-84	7.3	11.7	8.6	
1984-85	6.1	na	11.4	
1980-85	26.9	35.6	53.1	61.0
Projected				
1985-87			7.4	
1985-90	36.2			

na Not available.

Thus in the two years 1983 to 1985, growth in the demand for inbound capacity in US trades could have been 25 per cent above that which would have resulted from the growth of GDP alone. Since the US is now a trading partner in some 60 per cent of the deep sea trades, the effect on demand for world transport capacity would be about 15 per cent, whilst, with US exports relatively subdued, the effect on world cargo growth would have been about 7.5 per cent.

These estimates are clearly hypothetical and further research will be required to clarify precisely what has occurred. However, they do serve to raise two important questions concerning the prospects for world container traffic between now and 1990; the first is whether the US dollar will weaken in the process of reducing the PSBR and balance of payments deficit; and the second is whether this will reverse the process of substitution of imports for domestic goods and lead to a substantial decline in the demand for transport capacity in US container trades.

The US boom of 1983 and 1984 was a remarkable phenomenon with an extraordinarily high growth rate and low inflation, as well as the very strong dollar which strengthened the import boom. However, this was achieved at the expense of a huge balance of payments deficit and a very large PSBR. The presumption was that growth in the economy would generate increased tax revenues without the need for any increase in rates of tax. This would in turn have reduced the PSBR and allowed interest rates to fall, weakening the dollar and reducing imports, the economy making a 'soft landing' in 1985 and moving through the late 1980s with high rates of economic growth. Even under this optimistic scenario it is hard to see how the rates of growth of containerised imports would not return to a more normal level of around 6 per cent per annum. Indeed unless there is a major structural change taking place in the US economy the weakening of the dollar could well lead to a period of stability or even some decline in imports.

It is already clear that the policy is not working as hoped as the PSBR remains at a high level. The effect of high imports on domestic industry has led to protectionist moves in Congress to which the Administration remains opposed. Following a period in early 1985 when the dollar was at exceptionally high levels it moved down in the middle of the year. It then began to strengthen again in the northern autumn, this movement being offset by the combined intervention in the market of the central banks of Europe and Japan. Congress has now taken action against the high PSBR by passing the Gramm-Rudman Act which sets out to eliminate the budget deficit by 1990 and will (if

not declared unconstitutional) shortly become law. As the US belatedly turns to stricter policies of the type being followed in the UK and Europe and the dollar returns to levels at which US manufactures become more competitive in the domestic market, there could be a decline in US imports in the next few years, growth being resumed only in the late 1980s. If the price effects estimated above were put completely into reverse, then it would require a growth of some 17 per cent in GDP to regain the import levels of 1985, which would delay the resumption of growth in imports for as much as five or six years.

The world container shipping industry has responded remarkably to an extraordinary boom in demand, the requirements for transport capacity having been met with no significant increase in prices. Indeed the opportunity has been taken to introduce efficient new tonnage and operating patterns on major routes and there has been no let up in the fierce competitive battle. However, prospects for the next few years are rather uncertain. The optimistic scenario which results from the analysis would be a few years of stability or relatively low growth followed by a resumption of normal levels of 6 per cent or so in the late 1980s. Even in this case there will be over-supply in world container markets in the next few years. The pessimistic scenario is for a moderate setback in demand, which in the present period of expansion in supply could bring about very severe conditions in major world container shipping markets right up to 1990.

CHAPTER 3 A REVIEW OF CONDITIONS ON MAJOR ROUTES

STRUCTURE OF THE MARKET

Although world figures are available for trade flows, when it comes to the size and composition of individual markets, data on cargo carried become rather sparse, and the most comprehensive and consistent information is that based on vessel movements or schedules. It is this supply side data on which the analysis of market structure and function has to rely.

Table 3.1 shows the world supply picture in 1980 based on the Liverpool University count of vessel movements and slot capacities. The first section of the table picks out the mainstream container trades. These are the large routes on the east-west axis which connect the major trading regions of Europe, North America and the Far East. The largest of these is North America/Far East, which actually breaks down into the Pacific routes to the West Coast (with onward overland routes to the Mid-West and East Coast) and the Panama canal route to the US Gulf and East Coast direct. In total these routes had 2 939 000 TEU movements in 1980 or 22 per cent of the world's total. The Atlantic routes were only slightly behind this with 2 712 000 TEUs or almost 21 per cent of the total, whilst Europe/Far East was some way down the scale with 1 405 000 TEUs capacity or just under 11 per cent. This is, however, much the longest of the high density routes, requiring more ship capacity and generating more revenue per TEU movement than the other two. Actual traffic volumes would also be some 5 per cent higher were it not for the incursion made by the Trans Siberian Railway. The three routes together accounted for some 55 per cent of the total world market in 1980 and because of high rates of economic growth in Asia and the US this proportion has increased in the last five years. This leads directly to two comments on the new round-the-world (RW) services. The first is that they serve the dominant trade flows of the world (in which respect they differ from those early RW services which have plied the Europe/Australia routes for some years). For this reason alone it does not make much sense to take the main raison d'etre of these routes as the serving of tributory flows by the use of feeder services. This may be one

TABLE 3.1 CAPACITY STRUCTURE OF WORLD ROUTES: BY SHIP TYPE, 1980

('000 TEU slot capacity moves per annum)

Routes	*Cellular*	*Ro-ro*	*Semi- and bulk-container*	*Total*
Large predominantly cellular routes				
North America/Far East	2 486	118	335	2 939
Europe/North America	1 838	432	451	2 712
Europe/Far East	1 284	33	88	1 405
Total	5 608	583	874	7 065
Smaller cellular routes				
Australasia/Europe	254	82	34	370
Australasia/North America	207	61	86	354
Australasia/Far East	315	165	48	528
Australasia/Middle East	35	-	8	43
Total Australasia	811	308	176	1 295
Far East/Middle East	223	57	31	311
Far East/USSR	103	1	5	109
Europe/South Africa	303	-	11	314
Europe/Caribbean Central America	125	20	87	232
Total other	754	78	134	966
Total smaller cellular	1 565	386	310	2 261

TABLE 3.1 (Cont.) CAPACITY STRUCTURE OF WORLD ROUTES: BY SHIP TYPE, 1980

('000 TEU slot capacity moves per annum)

Routes	*Cellular*	*Ro-ro*	*Semi- and bulk-container*	*Total*
Routes with high ro-ro share				
North America/Caribbean/Hawaii	624	471	18	1 113
Europe/Middle East	418	656	177	1 251
Europe/USSR	63	160	21	244
North America/Middle East	91	116	78	285
North America/Central America	-	125	50	175
Far East/China	35	61	12	108
Other USSR	8	56	26	90
USSR/Middle East	11	38	16	65
Total	1 250	1 683	398	3 331
Routes with high semi-container share				
Europe/West Africa	152	106	305	563
Europe/East Africa	3	20	42	65
North America/Africa	4	15	67	86
Far East/Africa	5	5	60	60
Total Africa	164	146	474	784

TABLE 3.1 (Cont.) CAPACITY STRUCTURE OF WORLD ROUTES: BY SHIP TYPE, 1980
('000 TEU slot capacity moves per annum)

Routes	*Cellular*	*Ro-ro*	*Semi- and bulk-container*	*Total*
Europe/South America	14	8	68	90
North America/South America	-	2	119	121
Total South America	14	10	187	211
Other				
Europe/India	4	43	39	86
North America/India	-	38	36	74
Far East/Central America	-	2	33	35
Miscellaneous	133	192	129	454
Total other	137	275	237	649
Grand total	8 738	3 083	2 480	14 301

- Nil, or negligible.

Source Gilman (1983).

objective for RW operators (as well as for some of the lines operating end-to-end services on individual routes) but it is likely to be a secondary objective and one which is constrained by the requirements of cargo balance and the need to maintain fast transit times for the major sectors. The second point is that these high volume RW trades are unequal in size with the Pacific and Atlantic having double the traffic volume of Europe/Far East. Any RW service is, therefore, contributing relatively more to Europe/Far East than it does to the other two routes, and any large scale attempts to follow this pattern would obviously produce gross overtonnaging between Europe and the Far East. In fact, a substantial degree of overtonnage on the Europe/Far East route has resulted from the development of existing RW services.

The next group of routes in Table 3.1 consists of the smaller, predominantly cellular routes, and most of these are also long-haul. The first set are the Australasian routes which received about 1 295 000 slots in 1980 or some 10 per cent of the total. On this basis (and taking a 50/50 split with trading partners) Australasia is shown as generating 5 per cent of the market in the deep sea container trades in 1980. There are four important trading routes in this group serving Europe, North America and East and West Asia. The first two of these are very long routes, but they are also very much thinner than the major RW routes, having about one-quarter the traffic flow of Europe/Far East and about one-eighth that of the Atlantic and the Pacific. The two Asian routes are grouped together; they are much shorter than the routes to Europe and North America, and are also relatively thin. The other routes in the predominantly cellular sector are rather varied and of somewhat less importance in total than the Australasian routes.

The next section contains a mixed group of routes with a high ro-ro share. The largest of these are the internal US routes to the Caribbean (Puerto Rico) and Hawaii, the high ro-ro share being the result of the high density trailer operations from the US Gulf and South Atlantic to Puerto Rico. (As mentioned, these routes have been set aside from the supply/demand analysis as the flows are not part of international trade.) The other important route in this sector is Europe/Middle East. The slot capacity shown exaggerates the importance of this route, because until very recently (when exports of petro-chemicals began to develop) it had a very poor cargo balance. It is also a rather fragmented route, with origins from Scandinavia through the UK and North Continent round to Mediterranean ports like Trieste and Ravenna, and destinations from the east Mediterranean through to the Red Sea and the Arabian Gulf. Extensive use is made of

land bridges and mini bridges and for a time in the mid-1970s there was a large volume of overland movement.

The final section covers those routes to developing countries which evolved during the 1970s by using semi-container ships of intermediate design and only modest size. Europe/West Africa was by far the largest of them in 1980, this being partly due to the strength of the Nigerian economy at that time, and partly to the fact that containerisation was relatively poorly developed in other regions within the group. Certainly the importance of South American and Indian markets is not reflected in the figures. Routes with a high semi-container share contributed 1 634 000 TEU slot movements in 1980 or 12.4 per cent of the total.

In the following sections the experience of the mainstream routes will be reviewed from 1980 to 1985. This was an extraordinary period of growth in which they dominated the world scene, with an increase of some 63 per cent in capacity, the development of large new ships and of new RW operating patterns. During this time the world league has changed with the Pacific emerging as the clear leader in terms of capacity with over five million TEUs in 1985. The Atlantic routes are now some way back with about three million TEUs whilst Europe/Far East has just over two million. In total these three routes must now have well over half of the capacity in the world's deep sea container trades and possibly as much as two-thirds.

EUROPE/FAR EAST

The Europe/Far East route is the third largest in the world. It is a very long route of some 22 000 nautical miles via Suez and, depending upon the precise details of route length and the speeds sailed, requires nine or ten vessels to provide a weekly service. It is also a rather complicated route with a large number of trading nations at both ends, and with intermediate trading areas like the Middle East and India being served on some itineraries. In the Far East the route serves Japan plus Malaysia, Singapore, Taiwan, Hong Kong and South Korea, with subsidiary services or feeder operations taking cargo from Thailand, the Philippines and Indonesia. As shown in Chapter 2 the economies of this region have been growing very rapidly with the newly industrialising group of countries now exceeding Japan in terms of generation of container movements through the ports. Growth in Europe has, however, been relatively subdued and this factor will have restrained cargo growth somewhat compared to that experienced on the Atlantic and the Pacific. The trade is somewhat unbalanced with westbound cargoes moving in higher volume than eastbound and also

consisting of rather higher value goods. In a report to *Containerisation International* in mid-1985 the Conference referred in general terms to the volume of cargo moving in its trades, quoting 7 million tonnes eastbound from North Europe to the Far East and 15 million tonnes westbound to all areas. Of this westbound cargo some 9 million tonnes was for North Europe with the rest for the Mediterranean and the Red Sea.

Throughout the late ninteenth and early twentieth centuries the route functioned under the auspices of a classic closed conference. British lines dominated in the early years and the Japanese lines had to force their way in and fight for a market share in the 1930s. The route was containerised in 1971, ship choice at that time being a function of the technological battle between Sea-Land and Trio. The outcome was the construction of the first Panamax container ships, a subject dealt with in detail in Chapter 4.

Throughout the early and mid-1970s the Far East Freight Conference (FEFC) maintained a considerable degree of control of the route, although facing competition from both the Trans Siberian Railway (TSR) and Evergreen. Evergreen, a Taiwanese owned flag-of-convenience operator, was a relatively small scale outsider in the early 1970s, but after 1974 it was able to compete effectively by taking advantage of the radical change in operating economies which resulted from the fourfold increase in the price of bunker fuel. Evergreen's ships were much smaller than the conference ships, but they were also much slower, and this when combined with low labour costs, efficient operations and a good marketing strategy enabled the line to gain a strong foothold in the market. In the late 1970s the pressure from Evergreen and the TSR seemed to ease somewhat, but there was a build-up of capacity within the conference by the Asian lines in the ACE and Scan Dutch consortia. By 1980 Evergreen was challenging strongly again, as was the Danish line Maersk, and the route was locked into a fierce competitive battle.

This situation is illustrated in Tables 3.2 and 3.3, which show total two-way capacities provided on the route in 1980, broken down according to sector, conference and outsiders and then individual line. In 1980 the North Europe sector of the route was still dominated by the three large consortia, Trio, Scan Dutch and Ace, which together provided just under one million TEUs slot capacity. Maersk was the other conference line on this sector, operating outside the consortia and planning to upgrade its service to a fortnightly one with four fast 2000 TEU ships. Evergreen was the most important of the outsiders but was still putting only about 1000 TEUs per week in

each direction onto the route and had about 8.5 per cent of the route capacity. The other non-conference lines were relatively small. The Mediterranean sector of the route was only about one-fifth the size of the North Europe sector, but here there was a much more even split between conference lines and outsiders; Evergreen featuring again as the major outsider. Taking the two sectors together, outsider penetration was some 21 per cent.

TABLE 3.2 CAPACITY OF THE NORTH EUROPE/FAR EAST ROUTE, MAY 1985
('000 TEUs per annum)

	1980	*1985*
FEFC		
Trio	522	561
Scan Dutch	263	322
Ace	200	218
Maersk	35	104
DSR	-	16
United Thai	-	10
POL	-	31
Yugolinja	-	10
Total	1 020	1 272
Non-conference		
Evergreen	102	284
Yang Ming	-	82
Norasia[a]	-	42[a]
Balt Orient	-	90
COSCO	-	7
Eagle	-	12
TSR	-	71
Others	91	-
Total	193	588
Route total	1 213	1 860
Outsider's share (per cent)	16	32

a. Westbound only.

\- Nil, or negligible, or not separately available.

Sources Gilman (1983). *Containerisation International* (1985).

During 1981 load factors fell and rebating (which had always been a feature of the route) became more widespread, with discounts ranging from 20 per cent up to an extraordinary 50 per cent in some cases. Finally, in November 1981 the Danish line Maersk, which with its small domestic cargo base had been unable to obtain an acceptable share and loading rights and was also dissatisfied with the conferences internal policing arrangements, announced its intention to leave the conference. Although only a small operator on the route, Maersk is a powerful line and the prospect of its joining the outsider camp was a threat the conference could not ignore. The conference tackled the problem with a series of moves designed to put its own house in order

TABLE 3.3 CAPACITY ON THE MEDITERRANEAN/FAR EAST ROUTE, 1980 AND 1985
('000 TEUs per annum)

	1980	*1985*
Conference		
Scan Dutch	-	39
Med Club	82	103
Mitsui OSK	14	-
NYK	14	-
Lloyd Triestino	30	-
CR	17	-
Lauro Line	7	-
Total	82	142
Non conference		
Evergreen	36	59
US Lines	-	116[a]
Blasco	-	31
Zim	-	23
Others	71	-
Total	107	229
Route total	189	371
Outsider's share (per cent)	56	62

a. Eastbound only.

- Nil, or negligible, or not separately available.

Sources Gilman (1983). *Containerisation International* (1985).

and to try to contain the threat of independent lines. First, in an attempt to regain price control, it introduced a set of Temporarily Reduced Rates averaging some 20 per cent below the previous level. At the same time internal policing arrangements were strengthened with the objective of reducing rebating to a very low level. Finally, commodity box rates were introduced for a number of important items in the eastbound trade. These moves provided the basis for an agreement with Maersk, and a three-year deal was struck which gave the line an increased share plus loading rights in the UK and Eire. At the same time the conference reached a temporary accomodation with Evergreen, which was given tolerated outsider status in return for an understanding on market share and on the rates to be charged (to be held to within 5 per cent of the conference tariff).

For a while it looked as if the conference moves might allow it to regain and maintain control of both capacity and prices. However, during 1983 and 1984 Evergreen and US Lines were beginning to implement the plans for their RW services, and other carriers were also following expansionist policies. Tables 3.2 and 3.3 pick up the position as it was in June 1985, at which time the Evergreen build-up was virtually complete. (The analysis is based on schedules, that is, it is a snapshot expanded to show an annual equivalent rather than an actual count of movements over the year.) Table 3.2 shows that during the period 1980 to 1985 the three main consortia within the FEFC had not increased their capacity by much in the North Europe sector. However, the Maersk build-up had been completed and a few additional small scale members had also joined, so that conference capacity had increased by some 250 000 TEUs. This increase in conference capacity would by itself probably have been enough to satisfy the demands of the trade, but increases in the outsider sector were of an even greater magnitude. By July 1985 Evergreen was operating its weekly RW services in each direction with the G class ships, providing a total of some 284 000 TEUs, this representing a colossal increase of some 180 000 TEUs in its annual capacity over 1980. This service also put the line into the same league as the three large consortia, although still some way below Trio in size. Yang Ming, a line in which the Taiwanese government has a share, had also become an important force and other outsider capacity had built up. In total the outsider capacity had risen 324 000 TEUs to some 32 per cent of capacity.

There was a similar picture of the Mediterranean/Far East sector (Table 3.3) although the scale was of course smaller. The conference lines in the Mediterranean Club increased their capacity by a moderate amount, whilst major new initiatives were made by the outsiders. In this sector it was the new RW service by US Lines which was the major

influence, adding 116 000 TEUs to capacity. The US Lines service is eastbound and since this is a leg with a high proportion of heavy cargoes the 40 foot boxes carried on the jumbos may not be able to lift much more than 20 foot boxes on conference ships. However, the build-up of the service continues and it will soon be placing a further 116 000 TEUs capacity on the route and introducing calls in North Europe. Evergreen also increased its capacity in the Mediterranean sector by re-deploying some of its older L class ships on its fortnightly service.

Taking the route as a whole the increase in capacity was some 790 000 TEUs of which 517 000 TEUs were from outsiders. In June 1985 the outsider share was some 38 per cent of the total, and with extra capacity in prospect from US Lines and other outsiders like Yang Ming and Blasco, it is expected to rise to something over 40 per cent. The increase in TEU capacity in the four and a half year period to mid-1985 was some 56 per cent and a further 10 per cent is expected by the end of 1985 or early 1986. Taking all prospective capacity into account and assuming no changes in membership, the conference share could drop to just over 50 per cent of eastbound capacity and some 63 per cent of westbound capacity in 1986.

THE ATLANTIC ROUTES

The Atlantic routes are the second largest group in the world comprising a very large sector to the US East Coast together with smaller routes to Canada, the US Gulf and West Coast. Capacity estimates for the route groups are given in Tables 3.4 to 3.7. The US East Coast and Canadian routes are strongly linked, with some Canadian cargo finding its way through US ports and probably something in the order of 60 per cent of traffic through Canadian ports being destined for US markets, particularly those of Chicago and the Mid-West.

The Gulf route is much longer with a round trip of some 11 000 nautical miles, (compared to some 7300 for the North Europe/US East Coast route) but it has a rather lower traffic density. There is also competition between the Gulf route and the US East Coast route which is extending its influence to the south. Finally there is the very long route to the West Coast which had only some 241 000 TEUs capacity in 1980. This also receives minibridge competition from the Gulf route and to some extent from the East Coast route, but traffic figures for a recent year are not available.

All trades through US ports are under the jurisdiction of the Federal

Maritime Commission (FMC) and operate under an open conference system. Canadian services are outside FMC jurisdiction.

The US East Coast and Canada

Tables 3.4 and 3.5 cover the period 1980 to 1984 for the US East Coast and Canadian routes, the first three and a half years being a period

TABLE 3.4 CAPACITY ON THE NORTH EUROPE/UNITED STATES EAST COAST ROUTE, 1980 AND 1984

('000 TEUs per annum)

	1980	*1984*
Conference		
ACL[a]	251	331
Dart[b]	161	109
Hapag Lloyd[a]	185	183
Sea-Land[ab]	257	322
US Lines[b]	196	212
Farrell	81	-
Trans Freight Lines	-	112
Total conference	1 131	1 269
Non-conference		
ABC	-	58
Amco	-	54
CNC	-	58
Evergreen[bc]	-	196
Park Lines	-	48
POL[a]	32	147
Sea Train	92	-
Trans Freight Lines	125	-
Others	98	-
Total non-conference	347	561
Route total	1 478	1 830

a. Includes Canada.
b. Includes US South Atlantic.
c. Includes US Gulf.

\- Nil, or negligible, or not separately available.

Sources Gilman (1983). *Containerisation International* (1984).

of intense competition. At the beginning of 1980 there were seven main conference lines (including Seatrain) on the US East Coast which together held about 80 per cent of total capacity. But if we take the two routes together and include the Canadian gateway, the conferences had only a 72 per cent share. The two major outsiders were Trans Freight Lines, which entered the US market in 1978 in a period of relatively prosperous conditions and low outsider participation, and Cast who operated bulk container ships through Montreal. Trans Freight Lines was a service oriented company which set its prices at a small discount from conference, this being covered by savings on conference membership plus the advantages of operating modern diesel engined ships under the Singapore flag. Cast was very different, operating on the basis of low cost and a substantial price discount

TABLE 3.5 CAPACITY ON THE NORTH EUROPE/CANADA (ST LAWRENCE) ROUTE, 1980 AND 1984

('000 TEUs per annum)

	1980	*1984*
Conference		
Canada Line	-	134
Manchester Liners	52	57
Cast	-	152
ACL	33	-
CP	68	-
Total conference	153	343
Non-conference		
Arctic	-	22
Constate	-	7
Falline	21	11
Cast	93	-
Others	24	-
Total non-conference	138	40
Route total	291	383

- Nil or negligible, or not separately available.

Note Manchester Liners and Canada Line (consisting of CMB and CP North Atlantic interests) operate the St Lawrence Co-ordinated Service (SLCS).

Sources Gilman (1983). *Containerisation International* (1984).

for a service which was below that of the conference. Most of the other outsiders in 1980 were rather small, although in earlier years the Russian line, Balt Atlantic, had operated on a large scale.

In late 1979 Seatrain announced its resignation from the continental westbound conference becoming effective in February 1980. It cited as its reason for this its inability to compete effectively with outsiders. But the decision was influenced by the generally weak financial position of the line and by changes in foreign exchange rates which had reduced the flow of westbound cargo. Following a series of meetings within the conference in which the other American lines threatened to withdraw, it was finally agreed that a clause within the agreement, which allowed for independent rate action in an emergency, should be invoked. Rates which had been barely remunerative at the beginning of the year were slashed by between 25 and 50 per cent with the average reduction being estimated at about 30

TABLE 3.6 CAPACITY ON THE NORTH EUROPE/US GULF ROUTE, 1980 AND 1984
('000 TEUs per annum)

	1980	*1984*
Conference		
Atlantic Cargo	31	51
Hapag Lloyd	87	99
Sea train	34	-
Sea-Land	132	140
CGM	-	26
Lykes	-	40
Trans Freight Lines	-	100
Total conference	284	456
Non-conference		
Incotrans	-	26
Trans Freight Lines	17	-
Others	74	-
Total non-conference	91	26
Route total	375	482

- Nil, or negligible, or not separately available.

Sources Gilman (1983). *Containerisation International* (1984).

per cent. By the end of March, rate action had affected 1300 items in 4500 separate changes. During this period the conference acted largely as a vehicle for filing new rates with the FMC, such reductions becoming effective immediately - although increases require 90 days notice. In filing their new rates the conference lines were attempting to approach or possibly to equal the rates of competitors: any reduction below this was at risk of being interpreted as unlawfully predatory under US law. After the first few months some order was restored in the form of a weekly meeting in which lines would negotiate rates to match the competition, although the right of independent action was retained.

In July 1980 Eurobridge Lines, a small outsider, withdrew from the route and in September Seatrain went into liquidation, concluding

TABLE 3.7 SUMMARY OF CAPACITY ON THE NORTH EUROPE/NORTH AMERICAN ROUTES

('000 TEUs per annum)

	1980	*1984*
US East Coast		
Conference	1 131	1 269
Non-conference	347	561
Total	1 478	1 830
St Lawrence		
Conference	153	343
Non-conference	138	40
Total	291	383
Gulf		
Conference	284	456
Non-conference	91	26
Total	375	482
All sectors		
Conference	1 568	2 068
Non-conference	576	627
Total	2 144	2 695

deals with Trans Freight Lines for the purchase of its offices and goodwill and with Cast for the purchase of many of its containers. Finally, in November, Farrell Lines withdrew. The pace of rate action slowed down in the latter part of 1981 and in January 1982 the conference re-established its tariff at 4 per cent above the level of December 1979. There was a further reduction in capacity when Atlantic Container Line (ACL) re-organised the deployment of its fleet to lay up some of its G2s, which as steam turbine engined ships were the most expensive of its fleet to operate. However, outsider capacity continued to grow somewhat as Polish Ocean Lines implemented its plans to re-enter the route with four container ro-ro ships with a projected capacity of some 115 000 TEUs per annum.

During 1981 and 1982 much of the activity on the route was in the Canadian sector including of course the Canadian gateway to US markets. In the late 1970s, following a long period of slow growth and low cost operations with cheap bulk carriers slightly modified to take containers, Cast decided upon a US$400 million programme of expansion. This covered the construction of six purpose-built, bulk-container ships of 70 000 Deadweight Tones (DWT) and 1450 TEUs on the basis of which it planned to double capacity to 180 000 TEUs per annum by 1983. At the same time, after being a 20 foot box operator for many years it planned to diversify into the 40 foot box market. In preparation for these changes Cast was very active in the market in 1981, offering low box rates from origin to destination. These were not so much FAK (freight-all-kinds) rates or commodity box rates as competitive rates set at whatever level necessary to secure cargo. However, early in 1982 the line was severely affected by a weakening of bulk cargo rates, and as a result of this, together with its substantial acquisition programme and relatively low rates on container carrying, it found itself in severe financial difficulties. In a complex re-structuring operation it sold three of its bulk carriers and entered into a sale and lease back arrangement for three of the new bulk container ships, and this formed part of a US$200 million package which allowed the line to continue in operation. At the same time, under pressure from its creditors, Cast was forced to increase its rates and had to apply a US$275 per TEU recessionary surcharge in April 1982. Following this, Cast lost much of its rate advantage and a curious situation developed in which some of its rates were for a time higher than those of the conference lines. This, together with uncertainties regarding its future, resulted in the loss of many of its shippers.

Cast's problems coincided with a re-organisation of the Canadian services in which CP, Manchester Liners and Dart formed a new

consortium. A number of small ships were taken off the route, the Dart service to Halifax was discontinued, and three large ships of over 1800 TEUs were introduced to provide a low cost weekly service and give a moderate boost in capacity. The northern summer of 1982 saw Cast, a traditionally aggressive line (often considered to be irresponsible in the ferocity of its rate cutting), engage in serious negotiations with the Canadian conferences, and in mid-August it announced its intention to join. At the same time the conferences planned to introduce commodity box rates to accommodate Cast's pricing strategy, and to increase rates generally to recover profitability in operations. There was also discussion of a programme for rationalising capacity. This would have involved a complicated set of arrangements by which Cast would slot charter capacity to the new co-ordinated service, which in turn would make capacity available to ACL, some of the latter consortium small ships being taken off the route. Cast were also to be allowed to break a conference ruling which prevented the use of feeder ships in serving the UK market. Clearly a very serious attempt was being made to restore stability, but these plans were upset when in September 1982 there was a defection of Cast's senior executives. They left to start a new service, to be know as Sofati, which would operate as an outsider with three small ships (of some 500 TEUs) running between Tilbury, Antwerp and Montreal. This upset the whole deal and at the end of September Cast announced that it would not be joining the conference after all. ACL did, however, go ahead with its plan to withdraw its small ships from the Montreal service, re-instituting a Halifax call on its US East Coast service to meet the needs of its Canadian shippers.

In 1983 there was a further ferocious rate war, which was the result of two influences; the continued activities of Cast and Trans Freight Lines operating as outsiders in a stagnant market, and the complex regulatory situation relating to the use of inter-modal rates. The rate war began in December 1982 when Sea-Land filed with the FMC a set of micro-bridge tariffs between a range of inland points in the US and traffic centres in the UK and Europe. Sea-Land had to operate independently as at that time, conferences were not allowed rates which included any inland component. Sea-Land's move had been tailored to hit those areas where outsider competition was at its most intense, particularly the Mid-West, served by Cast and other Canadian operators overland from Montreal. However, it sparked off a response both by conference members and outsiders, and some of the other conference members were less careful than Sea-Land, cutting rates even in the coastal sector where the conference was relatively strong. By September 1983, rates were at their lowest with TEUs moving westbound for about US$900, and some FEUs of wines and spirits being quoted at

US$1 100. Eastbound rates for FEUs were quoted at around US$1 500. At that time, rates in the Continental North Atlantic Westbound conference were at only 80 per cent of the level of early 1979. At these levels some carriers were barely covering their outpayments for terminal charges and inland transport, having very little for the sea freight itself. In fact, 1983 was a period in which the conference virtually ceased functioning, all the rate making activity being in the inter-modal sector and carried out by individual lines.

Some semblance of stability was again restored in November 1983 with Trans Freight Lines moving towards full conference membership and transferring some of its attention to the US Gulf, and Cast easing off on rate cutting to the US mid-West and moving towards associate membership of the Canadian conference. The conferences raised rates by about 15 per cent at the end of 1983 and a further 12.5 per cent in March 1984, the carriers claiming that even this only took them back to the level of 1979. They were given the right to quote inter-modal rates in February 1984 and general provision for this was included in the 1984 Shipping Act which entered into force six months later. Towards the end of the year the conferences established an inter-modal rating system, with the geographical breakdown of the country based on the ZIP code. At the end of 1984, FMC approval was given for the nine conferences covering the trades between the UK, continental Europe and the Baltic, and the US north and south Atlantic ports, to be merged into two groups; the westbound North Europe Atlantic Conference (NEAC) and eastbound Atlantic North Europe Conference (ANEC). One effect of this is that inland rates from the southern sector are based on Southern ports rather than the nearest port in the northern range.

The latter part of 1984 and the first part of 1985 have been a relatively good period for the Atlantic trades. Marad statistics of liner cargo (reported in *Containerisation International*, April 1984) indicated an increase in westbound cargoes of 17.5 per cent in the first nine months of 1983, although eastbound cargo declined by 8.8 per cent, and various trade press reports suggest a further increase in westbound cargo of over 20 per cent in the boom year 1984.

As shown in Tables 3.4 and 3.5, capacity growth among the established lines has been fairly well contained, with the conference lines providing an increase of only 130 000 slots on the North Atlantic to the end of 1984, with a total increase of only 82 000 TEUs in the St Lawrence services, where the conference now holds the major share.

The big increases in capacity came in the outsider section of the North Atlantic, where POL had 147 000 TEUs, and Evergreen 196 000 TEUs

in late 1984, Evergreen's capacity increasing to some 284 000 TEUs by June 1985. US Lines eastbound RW service has also entered the market. So far Evergreen has not followed a very aggressive rate policy, being satisfied to take a share of the abundant westbound cargo, and not fighting too hard in the light eastbound sector. US Lines will also be rather more cautious in its own home territory, and may adjust its capacity by taking some of its own older ships out of service. The overall capacity increase on the three Atlantic routes was some 31 per cent between 1980 and the end of 1984 and would have been only 21 per cent without the Evergreen entry. This was not excessive given the growth of cargo in 1983 and 1984, but it took a series of rate wars to obtain this result, and to lead to the formation of the new super conferences. Even then there remained a strong outsider presence with 31 per cent of US East Coast capacity, although the outsider share of the total Gulf, Eastern Seaboard and Canadian traffics remained at 23 per cent.

THE PACIFIC ROUTES

The container trade from North America to the Far East is the largest in the world with almost three million TEUs capacity in 1980 and over five million in 1985. At the US end a high proportion of the cargo is generated in the east of the country and this can move either on a sea route from east coast ports via Panama, or via a minibridge through the Pacific Coast. The economic case for this improves quickly as cargo location moves inland towards the Mid-West, as this simultaneously reduces the inland haul to Pacific Coast ports and increases that to the US East Coast. The Pacific Coast itself has a very long port range and this leads to a degree of specialisation of itineraries between the Pacific north west and Californian ports. Capacity estimates for the Far East/West Coast and Far East/Gulf and East Coast routes are given in Tables 3.8 and 3.9.

In the Far East, Japan is the closest country to the US, and as the largest trading partner receives a number of dedicated services. It is, however, close to South Korea and there are also a number of Japan/South Korea services and a joint conference. An extension of about 1300 nautical miles to the south is required to bring Taiwan and Hong Kong within range and further extensions of similar length encompass Singapore, Malaysia and the Philippines. As cargo in the Asian region has grown there has been an increasing specialisation of services across the Pacific. An alternative approach has also been developed to the whole route in the eastbound RW services of Orient Overseas Container Line (OOCL) and Neptune Orient Lines (NOL) described in Chapter 4.

As a result of strong market conditions in the mid-1970s and the ambitions of many of the newly developing lines of the Far East, capacity began to increase rapidly towards the end of the decade.

TABLE 3.8 FAR EAST/PACIFIC NORTH WEST AND CALIFORNIA, 1980, 1985 AND 1986

('000 TEUs per annum)

	1980	*Jan-1985*	*mid-1986*
APL	349	482	482
EAC	30	52	52
Evergreen	52	450	450
FESCO	-	12	12
Hanjin	88	122	122
Hapag Lloyd	95	120	120
Hoegh	32	20	20
HKIL	-	86	124
Hyundai	-	104	204
Japanese Pact	465	567	316
Japan Lines/YS	-	-	134
K Line	-	122	-
K Line/MOL	-	-	150
Karlander	-	31	31
KMTC	25	68	68
KSC	-	156	156
Lykes	41	110	260
Maersk	-	72	72
MOL	-	76	-
NSPC	-	28	28
NOL/OOCL	148	218	218
NYK/Showa	-	172	198
Sea Land	338	372	372
Sea Train	183	-	-
Star	65	72	74
TMM	-	62	110
Westwood	-	52	52
Yang Ming	33	-	-
Others	200	-	-
Total	2 144	3 626	3 825

- Nil, or negligible, or not separately available.

Sources Gilman (1983). *Containerisation International* (1985).

In the fully cellular sector it rose from 1 840 000 TEUs in 1978 to 2 168 000 in 1979 and 2 486 000 in 1980. This was an increase of some 35 per cent which was matched by growth in the smaller sectors served by ro-ro and semi-container ships. But from about 1978 onwards the US dollar began to decline against the yen, and although this strengthened the flow of US exports, these are relatively low value goods, and the more remunerative eastbound trade went into decline. In fact, cargo flows were estimated to have dropped by about 7 per cent in 1979 at a time when capacities were increasing by 17 per cent.

The conference had been becoming progressively weaker throughout the 1970s as many lines which were traditionally conference oriented began to choose outsider strategies. These included some of the new Far East lines, but also companies like Hapag Lloyd, who as cross traders in a competitive environment adopted a rather uncharacteristic market

TABLE 3.9 FAR EAST/US GULF AND EAST COAST, 1980, 1985 AND 1986
('000 TEUs per annum)

	1980	*Jan-1985*	*mid-1986*
BBS	43	73	73
COSCO	-	33	96
Evergreen	26	283	283
Hanjin	-	-	187
Hoegh	-	18	18
Japanese Five	148	144	144
Lykes	-	7	7
Maersk	137	306	306
NOL/OOCL	90	140	202
US Lines	124	131	131
US Lines (RW)	-	111	221
Yang Ming	48	156	156
Zim	89	122	148
Others	51	-	-
Total Far East/US Gulf & East Coast	756	1 524	1 972
Total Pacific routes	2 901	5 150	5 797

- Nil, or negligible, or not separately available.

Sources Gilman (1983). *Containerisation International* (1985).

strategy. The conference had, however, just about held together with support from the traditional Japanese lines, the two large American carriers Sea-Land and American President Line (APL) and a number of smaller lines. The inevitable rate crisis developed in March 1980 when Sea-Land pulled out of a dozen eastbound conferences and rate agreements. In the 11 months to May 1980 there were 27 rounds of rate cutting with an estimated total decline of about 20 per cent in the Japan/South Korea conference and 25 per cent in the Taiwan/Hong Kong conference. As a result of this, of some 20 major lines surveyed in 1981, none reported a profit.

Following these developments many eastbound trades were for a time virtually dominated by non-conference lines. This is rather difficult to follow because of the large number of conferences and rate agreements. Broadly, outsiders had built up a 30 per cent share prior to March 1980. The rate crisis and departure of lines from the conference changed this, with outsider penetration ranging up to 60 per cent in some sectors. Some amelioration was achieved in 1981 and 1982 with moves towards rationalisation and withdrawal of some capacity.

During 1983 and 1984 the Pacific sustained a large increase in traffic, as Japan and the newly industrialising countries responded to the tremendous increase in demand from the US. On the supply side, there has been an enormous increase in capacity combined with a very large increase in vessel size. The RW services have been responsible for some of this with Evergreen putting about 260 000 TEUs on the US East Coast route, US Lines adding 221 000 TEUs and NOL/OOCL adding a further 110 000 TEUs - these last two being eastbound only. But this is only part of the story. Evergreen have added another 400 000 TEUs to the West Coast routes, with other major contributers being Hyundai, Korean Shipping Corporation (KSC), K Line/Mitsui OSK Line (MOL), and Nippon Yuesn Kaisha (NYK)/Showa on the Pacific, and Hanjin, Maersk and Yang Ming on the US East Coast routes. Total slot capacity rose by over 75 per cent between 1980 and 1984 and will have virtually doubled by mid-1986.

CAPACITY GROWTH ON MAJOR ROUTES

Table 3.10 brings together the totals of capacity of the three mainstream routes. The figures show an extraordinary period of growth in which the mainstream trades dominated the world scene. The Pacific routes sustained the highest individual rate with growth of 78 per cent and have emerged as the clear leader among deep sea container trades. They were followed by Europe/Far East with 56 per cent and

the Atlantic with 40 per cent. Most of the increase in capacity has been from independent lines who now hold large shares on all three major routes, and it is quite clear that the conference system has not been able to control entry during the period. Although capacity increases have in part been a response to growth in major markets, there has been a strong element of pure competition for market share, taking early advantage of technological and operation developments and the ability to mobilise large amounts of subsidised finance.

TABLE 3.10 SUMMARY OF CAPACITY, 1980-86
('000 TEUs per annum)

	1980	*1984*	*1985*	*1986*
Europe/Far East				
North Europe/Far East	1 213		1 860	
Mediterranean/ Far East	189		371	
Total Europe/Far East	1 402		2 231	
Atlantic				
North Europe/ US East Coast	1 478	1 830		
North Europe/Canada	291	383		
North Europe/ US Gulf	375	482		
Total Atlantic	2 144	2 695	2 993	
Pacific				
West Coast/Far East Japan	1 468		3 626	3 825
West Coast/Japan only	677			
East Coast Gulf/ Far East	756		1 524	1 972
Total Pacific	2 901		5 150	5 797
Total major East West routes	6 447		10 374	

CHAPTER 4 TECHNOLOGY AND OPERATIONAL PATTERNS

SHIP TECHNOLOGY

The most fundamental changes which have taken place in the technology of deep sea liner shipping in the post-war period are those of the container revolution itself (including within this the flexible systems like ro-ro and conbulkers etc). Designs for large fast container ships had already been completed by 1966, and between 1967 and 1972 cellular container ships developed from a first generation on the North Atlantic of about 1000 TEUs and 19 knots, through a second generation of 1540 TEUs and 23 knots on the Europe/Australian trade to a third generation of 3000 TEUs and 27 knots on the Europe/Far East trade. Along the way Sea-Land also built its SL7s for the Atlantic and Pacific trades. These were ships of 2048 TEUs and 33 knots, with 120 000 shaft horse power (shp)[1] burning 500 tonnes of fuel a day at full power.

Trio's third generation ships were built to match the presumed threat of the SL7s, being designed to the maximum size permitted by the locks of the Panama canal and the maximum speed possible when operating within the limits of 40 000 shp per screw for twin screw vessels. There was also at that time a preference for steam turbine engines, the penalties in fuel consumption not being excessive given the low bunker prices, and being outweighed by the known reliability of turbines and the fact that diesel engines were still in the process of development at the higher power ranges. All these early ships were designed with two high container stows on the weather deck, being uprated to three high early on, the second generation increasing in rated TEU capacity from 1230 to 1570 TEUs and the third generation from 2600 to 3000 TEUs.

It is somewhat ironic that having been so dynamic and far sighted in

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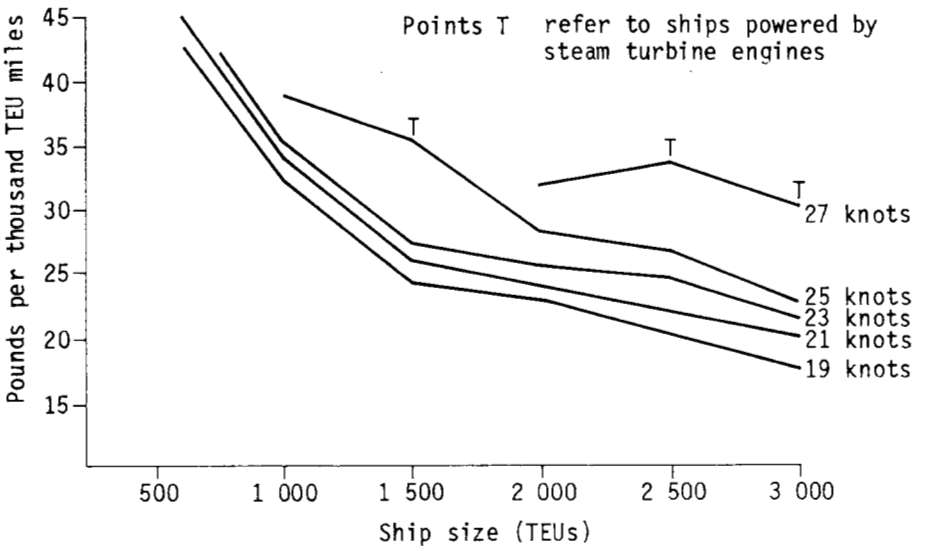
1. Shaft horse power is frequently used as a measure of the power of turbine engines and brake horse power (bhp) a measure of the power of diesel engines.

the late 1960s in terms of fundamental changes in technology, the leaders of the container revolution were caught out by the fourfold increase in bunker prices in 1974, exacerbated by further increases in the late 1970s. This completely changed the cost mix, with high speeds, steam turbines and twin screws all carrying cost penalties. The late 1970s and early 1980s was a period in which most of the ordering was in slower speed, medium sized ships, typified by Evergreen's L class and Sea-Land's D9s and these were certainly able to compete effectively with high speed ships of 3000 TEUs. In the late 1970s and early 1980s many of the early, third generation ships were either re-engined or had their propulsion systems modified to enable them to compete.

Figures 4.1 and 4.2 illustrate the effect of changes in fuel prices, taking a family of ships of early 1970s design and estimating costs on the basis of the cost mix of 1980. The figures show that even in terms of costs at sea (where economies of scale are not reduced by the effect of the higher port costs of large vessels), the early third generation ships could not compete with slower speed ships in the medium size range.

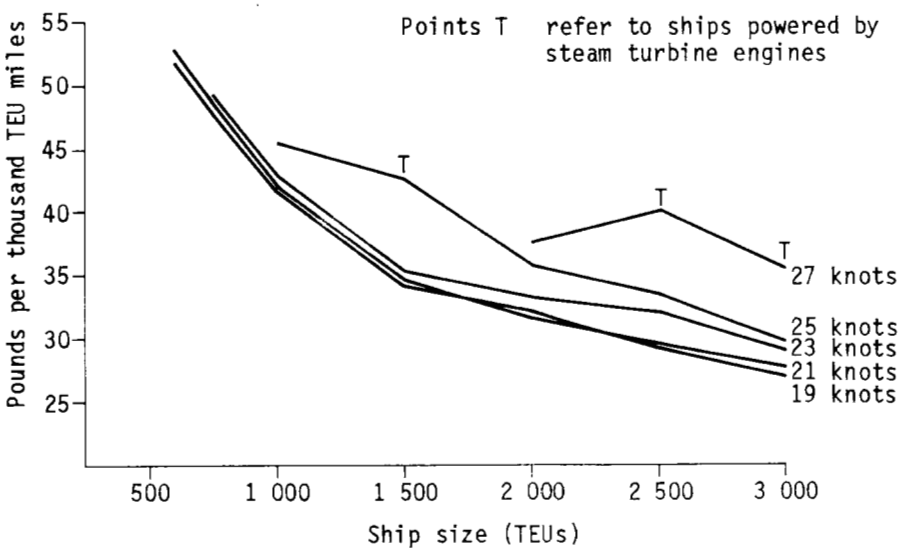
The result of the trend of the late 1970s was that the very large ships were confined to the Europe/Far East route, this point being illustrated in Tables 4.1 to 4.3. Table 4.1 shows that even on the Europe/Far East route the full third generation ships were confined to the Trio consortium (excluding Mitsui OSK), plus Malaysian International Shipping Corporation (MISC) and Brostroms from the other consortia. (In the table most of these vessels are rated on the basis of a two-high weather deck stow.) At that time Evergreen were competing with ships in the medium size range. On the Mediterranean/Far East route, ship size was smaller at an average of only 1408 TEUs for the conference and under 700 TEUs for non-conference operators including Evergreen.

The US East Coast/Far East is the next longest of the major routes, but in 1980 had a relatively small average ship size of only about 1500 TEUs, with a maximum of 1800 TEUs in the ships of the Japanese lines. The shorter Pacific routes were very fragmented with an average ship size of only about 1100 TEUs. Sea-Land had by far the largest average on this sector, due to the presence of the SL7s. Finally, the Atlantic, shown in Table 4.3, also had a large number of vessels of 1000 TEUs or under, although Sea-Land, Hapag-Lloyd and Dart operated on a larger scale.



Source Gilman (1980).

Figure 4.1 Economies of size at various speeds for a family of cellular container ships



Source Gilman (1980).

Figure 4.2 Economies of size at various speeds for a family of cellular container ships (taking account of containers and inventories)

TABLE 4.1 AVERAGE SHIP SIZE ON EUROPE/FAR EAST ROUTES, 1980
(TEUs)

	North Europe	*North Europe and Mediterranean*	*Mediterranenan*
Conference			
Trio			
Ben Line	2 670	..	..
Hapag Lloyd	2 858	1 582	..
Mitsui OSK	1 950	..	1 406
NYK Line	2 177	..	1 409
OCL	2 522	..	..
Weighted average	2 493	1 582	..
Scan Dutch			
CGM	1 726	2 800	..
MISC	2 450	2 450	..
Nedlloyd	..	2 913	..
Brostroms	2 441	2 464	..
Weighted average	2 014	2 641	..
Ace			
CMB & CR	1 466	..	1 402
K Line	2 298	..	..
KSC	1 500	..	..
NOL	1 624	..	..
OOCL	1 749	..	..
Weighted average	1 684	..	..
Other			
Maersk Line	1 095	..	..
Lloyd Triestino	..	..	1 382
Lauro Line	..	..	1 452
Outsiders			
Evergreen	1 457	..	689
Comecon	642	415	)
Others	680	698	) 670

.. Not applicable.

Source Gilman (1983).

TABLE 4.2 AVERAGE SHIP SIZE ON NORTH AMERICA/FAR EAST ROUTES, 1980

(TEUs)

West Coast/Far East, Japan	
Conference	
Japanese joint pact	1 042
APL	1 356
EAC	663
Korean Marine Transport	1 034
Lykes	707
OOCL	809
Total conference	1 098
Outsiders	
Sea-Land	1 808
Seatrain	1 119
Hapag Lloyd	1 010
Neptune Orient	1 394
Evergreen	878
Hanjin	1 294
Yang Ming	788
Star Shipping	795
Hoegh	1 400
Comecon	582
Others	604
Total outsiders	1 156
West Coast/Japan only	
Conference	
Japanese joint pact	1 100
APL	1 484
Others	437
Total conference	1 045

TABLE 4.2 (Cont.) AVERAGE SHIP SIZE ON NORTH AMERICA/FAR EAST ROUTES, 1980 *(TEUs)*

West Coast/Japan only (Cont.)	
Outsiders	
Seatrain	1 041
Star Shipping	1 064
Seaboard Pacific	1 090
Comecon	719
Yang Ming	787
Sea-Land	1 700
Others	319
Total outsiders	na
US East Coast/Far East	
Conference	
Japanese Lines	1 824
Maersk	1 400
OOCL	1 544
US Lines	1 363
BBS	1 800
Total conference	1 539
Outsiders	
Evergreen	1 126
KSC	1 540
Yang Ming	1 532
Zim	1 648
Others	1 057
Total outsiders	1 473

na Not available.

Source Gilman (1983).

The era of the jumbos

In the 1980s economies of size re-asserted themselves and this has ushered in a new era in container ship design and operation. The era began with APL, who designed and built three ships of 2450 TEUs for the Pacific, this fleet entering into service in 1982 and 1983.

TABLE 4.3 AVERAGE SHIP SIZE ON THE ATLANTIC, 1980
(TEUs)

	East Coast	*St Lawrence & Great Lakes*
Conference		
ACL	884	540
Dart	1 590	..
Hapag Lloyd	1 728	..
Sea-Land	1 648	..
US Lines	1 009	..
Farrell	1 000	..
CP	..	755
Manchester Liners	..	519
Major outsiders		
POL	350	..
Cast	..	765
Seatrain	1 087	..
Trans Freight Lines	912	..
Minor outsiders		
Falline Blasco	..	374
Star Shipping	799	1 200
Contract Marine	391	..
Waterman	820	..
Lusitainer	152	..

.. Not applicable.

Source Gilman (1983).

Although they represented quite a radical change for the Pacific and were single screw, slow speed diesel, APL's ships were at 24.4 knots still rather fast and somewhat fuel hungry by modern standards.

The next moves were those taken by Evergreen with its 22 G class ships of 2728 TEUs for its RW services, and US Lines with the 12 jumbos of 4482 TEUs on its eastbound RW service. Since then there has been an enormous surge in the ordering of new container ships of 2400 TEUs and over (Table 4.4) plus a widespread tendency for owners of smaller tonnage to enlarge their ships and bring them up to the maximum possible size (Table 4.5).

TABLE 4.4 NEW BUILDINGS OF CONTAINER SHIPS OF OVER 2400 TEUs SINCE 1982

(number of ships, by average size in TEU)

Line	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*	*Present or prospective route*
APL	3 x 2 750						USWC/Far East
Evergreen			20 x 2 728	4 x 2 928	4 x 2 928	2 x 2 948	22 RW 6 USWC/ Far East
US Lines			12 x 4 482				RW east bound
Maersk			3 x 3 386				USWC/Far East
Mitsui OSK			1 x 2 450				
Chargeurs				2 x 2 450			Europe/Far East
NOL				4 x 2 970			Europe/Far East
Yang Ming					4 x 3 050	4 x 3 200	Europe/Far East/ USWC
KSC					5 x 3 000		
Lykes					6 x 2 600		US/Far East
Hanjin					6 x 2 480		USEC/Far East
OOCL					6 x 2 900		US/Far East RW
NOL/NYK/YS					6 x 2 800		USEC/Far East
K Line						4 x 2 400	
Sea-Land[a]						6 x 3 500	USWC/Far East

a. Not yet confirmed.

Source Container Data Ltd (1985). *Containerisation International* (1985).

As a result of this, the number of these large ships is likely to increase from 18 in 1979 and 30 in 1984 to something over 170 by the end of 1987.

Of these, about 99 will be new buildings since 1982 and 42 the result of 'jumboisation' from ships of under 2400 TEUs, the remainder being the older third generation ships. About 60 of these ships will be deployed on RW services (Evergreen (22), US Lines (12), Barber Blue Sea (18), and the OOCL/NOL K Line pact (8)), whilst most of the rest will be on end-to-end services along the main east-west axis.

The introduction of the new vessels is bringing about an enormous increase in average ship size. The greatest effects will be on the routes from the Far East to the US, where the trans-Pacific trade average in 1980 was only about 1000 TEUs, and even the route to the US East Coast employed ships of only about 1500 TEUs. The Europe/Far East trade will also sustain a substantial increase in average ship size even though some of the ships on the route were already quite large. Finally the Atlantic will obtain a lift, partly from the RW services but also from the newly introduced ships of existing carriers, particularly ACL's G3 container/ro-ros.

TABLE 4.5 CONTAINER-CARRYING VESSELS 'JUMBOISED' TO OVER 2400 TEUs

Owner/operator of vessel	*Pre-1984 TEU capacity*	*Enlarged TEU capacity*	*Number of ships*
East Asiatic	2 577	2 950	2
Mitsui OSK	2 364	2 880	1
Swedish East Asia	2 546	2 870	1
APL	2 284	2 800	2
Maersk	2 200	2 800	4
Wilhelmsen	2 422	2 770	1
Mitsui OSK	2 246	2 750	1
Evergreen	2 240	2 728	3
Yang Ming	1 919	2 650	7
Yang Ming	1 927	2 658	3
Hapag Lloyd	1 758	2 598	4
Sea-Land	1 808	2 472	12

Source Container Data Ltd (1985).

Characteristics of the new generation ships

Perhaps the first point to make about the 'jumbo' container ships of the 1980s is that they are no larger than the third generation ships of the early 1970s, being built to the same maximum size constraint imposed by the need to be able to transit the locks of the Panama Canal. Indeed this limit, which was in some ways a notional one for the third generation ships as few of them were deployed on routes which transitted Panama, is a firm constraint for ships on the modern RW itineraries which pass through on every circumnavigation. Further to this, many of the large container ships of the 1980s are not even of the 289 metre Panamax length, Evergreen's G class for example being some 50 metres shorter.

The second main point about the new designs is that all vessels have very much higher TEU capacities in relation to principal dimensions and DWT than the older third generation. Part of this is a quite genuine increase in capacity brought about by the reduced requirements for space of engines and bunkers, and the rather fuller hull form of the ships, all of which result from slower speeds. But a large part of it is a result of the fact that the ships are rated with a five-high weather deck stow, compared to the two or three of the third generation ships. The weather deck capacity may be used to the full on certain legs where there is no overall DWT constraint on the ship and where very light cargoes are available for the upper tiers, but any proper comparisons between vessels should be based on like for like, and with three-high weather deck stows Evergreen's G class would be rated in the 2250 to 2350 TEU size range and the US Lines, jumbos would be down to between 3700 and 3800 TEUs.

The third major feature of the new vessels is their propulsive efficiency. The largest single component of this (when comparisons are made with the third generation ships) relates to the reduction in speed, as fuel consumption varies broadly in proportion to the cube of the speed. However, the switch from twin screws to single screws saves about 6 per cent in fuel consumption, whilst diesels consumed less fuel than steam turbines even in 1972 (155 grams per bhp-hour compared to 190 grams per shp-hour), and their consumption has now come down to something of the order of 130 grams per bhp-hour. Further smaller scale improvements have been made in the details of hull form, propellor design, hull paints and so on, so that the modern vessels are enormously more fuel efficient than ships of the early 1970s and have significant advantages even over some of the ships of the late 1970s and early 1980s.

Table 4.6 shows quite clearly the great differences in fuel efficiency between the high speed Hapag Lloyd and APL ships of 1981 and 1982 and the jumbos of 1984 and later. One interesting comparison is between these early 1980s 24 knot ships and the 1984 Maersk vessel which by virtue of modern engine design (and perhaps a higher weather deck quota) achieves acceptable fuel economies. The US Lines' ships, as would be expected, achieve the greatest fuel economies, but they also stand out as being some 3 to 4 knots slower than most of the other modern vessels, and this may impose severe penalties in transit times and service quality, particularly when they meet heavy weather.

The fourth major improvement in modern vessels is in manning, where reductions have been remarkable. Some of the early third generation ships were initially crewed with as many as 45 men, although by now these numbers must have been significantly reduced. For modern European manned vessels crew numbers are between 18 and 23, the difference being largely related to the amount of on-board maintenance, with some lines minimising the sum of maintenance and crew costs with 23 men. The Evergreen G class ships are manned with a crew of 17 (presumably with low maintenance duties) although they take a pilot on board for an extended period in the north continent.

The final point about the modern ships is that they have been built and ordered mainly in Far Eastern yards at a time when they have been quoting very low prices. The most notable case is that of Evergreen where the first 24 vessels were obtained for prices between US$30 million and US$33 million each and where the last six slightly larger ships are also reported to have been ordered at the same cost.

As a final perspective on the new generation, a comparison of costs of the Evergreen and US Lines' ships with a 1500 TEU ship of European flag produced by Brown & Sons is shown in Table 4.7. Without further details of the European ship we cannot be certain if it has been rated with the same high weather deck stows as the jumbos. The comparison also takes account of the much higher capital costs per slot paid by the European line in 1980/81 and differences in crew costs between flags, and it is based on a rather high proportion of time at sea. Nevertheless at face value it suggests that on long 40 foot box routes the new vessels will be operating at half the slot mile costs of the medium sized European flag vessel of recent vintage.

Compact design

The analysis above has shown how a combination of factors (slower speeds, improvements in propulsive efficiency, compact design with a

TABLE 4.6 A COMPARISON OF SELECTED JUMBO CONTAINER SHIPS

Carrier	*Ship TEU*	*Year built*	*DWT*	*Length[a] x beam x depth (m)*	*Engine bhp*	*Max service speed (knots)*	*TEU-nm/hr capability*	*TEU-nm per ton of fuel consumed*
US Lines	4 482	1984	58 870	279.0 x 32.2 x 21.5	28 000	18.5	82 917	27 242
Maersk Line	3 386	1984	53 400	259.3 x 32.2 x 19.8	47 500	24.3	82 280	15 690
Hapag Lloyd	3 045	1981	51 540	271.0 x 32.2 x 24.0	65 680	24.0	73 080	10 307
APL	2 750	1982	30 825	246.9 x 32.2 x 20.1	43 200	24.4	67 100	12 193
Yangming	3 050	1986	39 000	252.6 x 32.2 x 19.7	26 330	21.5	65 575	22 612
NOL	2 970	1985	45 000	244.0[b] x 32.2 x 21.4	31 500	21.7	64 449	20 077
Evergreen Line	2 928	1986	46 580	225.0 x 32.2 x 19.2	25 760	20.4	59 731	21 843
Lykes Lines	2 600	1986	33 360	245.0 x 32.2 x 18.8	28 880	21.0	54 600	17 859
Hanjin Lines	2 480	1986	36 000	224.0 x 32.2 x 19.0	30 000	22.0	54 560	17 846
Sea-Land Service	2 472[c]	1985	34 400	258.2 x 30.6 x 17.5	30 150	22.0	54 384	14 160

a. Length between perpendiculars (bow at design waterline, and rudder post).
b. Length overall.
c. 1980-built as 1678 TEU, jumboised 1985.

Note Reference has been made to Motor Ship 'Ships on order' and Lloyd's Shipping Index for certain vessel tonnages, dimensions and engine/speed data. Analysis: Container Insight.

Source Container Data Ltd (1985).

TABLE 4.7 COMPARISON OF COSTS OF 1980-81 AND 1984-85 GENERATION VESSELS

	1980-81 vessel	*1984-85 vessels*	
	European flag	*Taiwanese flag*	*US flag*
FEU[a]	750	1 364	2 109
TEU	1 500	2 728	4 218
Sea speed (knots)	20	20	18
Million TEU-miles per year based on 280 days at sea	201.6	366.6	510.6
Capital costs (US$m)			
Vessel	45.0	30.0	47.5
Containers	11.0	18.5	28.5
	56.0	48.0	76.0
Capital costs/TEU (US$)	37 300	18 000	18 000
Annual vessel financing costs (US$m)			
Average Interest on 80% at 10% over 10 years	1.80	1.20	1.90
Repayments annually over 10 years	3.60	2.40	3.80
Interest on 20% at 15%	1.35	0.90	1.43
	6.75	4.50	7.13

TABLE 4.7 (Cont.) COMPARISON OF COSTS OF 1980-81 AND 1984-85 GENERATION VESSELS

	1980-81 vessel	*1984-85 vessels*	
	European flag	*Taiwanese flag*	*US flag*
Estimated cost structure (US$ per day)			
Capital			
Vessel (over 365 days)	18 495	12 330	19 535
Containers	4 500	7 500	11 500
	22 995	19 830	31 035
Operating			
Crew	4 200	1 500	8 500
Lube, supplies and spares	1 000	1 000	1 000
Repairs and maintenance	1 800	1 800	1 800
Insurance	1 400	1 100	1 800
Administration	1 000	800	1 000
	9 400	6 200	14 100
Voyage			
Bunkers	7 500	9 400	10 600
Port charges	750	1 000	1 500
Canal dues, etc	1 500	2 000	3 000
	9 750	12 400	15 100

TABLE 4.7 (Cont.) COMPARISON OF COSTS OF 1980-81 AND 1984-85 GENERATION VESSELS

	1980-81 vessel	*1984-85 vessels*	
	European flag	*Taiwanese flag*	*US flag*
Estimated cost structure (US$m per year)			
Capital	6.75	4.50	7.13
Operating (355 days)	3.33	2.20	5.00
Voyage	3.46	4.40	5.36
	13.54	11.10	17.49
Total cost per container-mile (cents)			
100 per cent utilisation	6.7	3.0	3.4
70 per cent utilisation	9.6	4.3	4.9

a. Forty-foot equivalent units.

Source Alex Brown & Sons (1985).

high weather deck stow, low crew numbers and very competitive subsidised construction) have given the new vessels considerable advantages over earlier generations of cellular container ships. However, many of these factors are not confined to the top end of the size range. Medium sized and small vessels can also come down the speed range, although they will never again obtain quite the same advantages from speed differentials as were available to them in the mid-1970s to early 1980s. They have also been designed according to the principles of compact design, reaching Panamax beam with a length-over-all (LOA) of only 185 metres, and at that size achieving 1600 TEUs with a four high weather deck stow. Fuel consumption is reduced to under 40 tonnes per day and crew numbers are also down to the 18-22 range. If built with subsidy in Far East yards they should also in principle be cheaper than the larger ships. What this amounts to is that, if compared on a consistent basis with jumbos, some of the advantages of the larger ships would be reduced, particularly on routes with a relatively higher ratio of port time to sea time, that is, the shorter routes or those with a higher proportion of 20 foot boxes. The main problem is that, although compact ships have been built to 1600 TEUs, modern ships of this size are not yet a well established class. Nevertheless, although the above analysis explains some of the factors behind recent trends, any current decisions on ship choice for routes other than those covering the high density mainstream flows, should be based on a current parametric study of the options.

Table 4.8 below gives details of vessels of 1600 and 900 TEUs to illustrate the design progress which has been made in this area, and show that fuel efficiency can be brought to levels not too far from the large container ship of 2400 TEUs and over.

OPERATIONAL PATTERNS AND RW SERVICES

The inauguration of the new RW has revived an idea that has been around since the early days of containerisation, which is that scale economies in container systems are so important that services would consist of very concentrated trunk routes served by networks of feeders. This idea is discussed in Gilman (1983), and the main issues are reproduced here. In one extreme form this theory postulated global networks operating to no more than about five hub ports to be served by intermediate sized relays as well as feeder ships; and the hub ports were not necessarily to be located close to major cargo generating areas. Ports like Falmouth were suggested for Europe and Puerto Rico for the US. There was some basis for these views. It was clearly important for container systems to escape from the extended

itineraries of conventional liners, and large fast ships have to be turned round quickly to avoid size diseconomies in port. But even leaving aside the fantasies relating to world-wide networks, the idea of concentration never really caught on among the lines, and there is a logical flaw at the heart of it. This lies in the failure to distinguish between operational and geographical aspects of concentration. It is operational concentration only which is achieved by two port itineraries, and geography is an entirely different matter.

To take just one example, Sea-Land's concentrated North Atlantic itinerary with their SL7s was New York, Rotterdam and Bremerhaven, a

TABLE 4.8 PRINCIPAL DIMENSIONS, CAPACITY AND FUEL EFFICIENCY OF MEDIUM SIZE AND SMALL COMPACT CONTAINER SHIPS

	Ned Lloyd Van Neck	*Leif Hoegh MPC*[a]	*1984 Compact*
Principal dimensions (m)			
LOA	185.0	198.0	145.0
Beam	30.5	32.3	21.7
Draught scantling	11.2		
Draught optimal service	9.1	12.0	
DWT	23 709	41 100	
Capacity TEUs			
12.5 tonnes	1 600		834
14 tonnes	1 444	1 622	581
Propulsion			
Max service output (bhp)	14 875	13 600	
Service speed (knots)	18	16.5	17
Fuel consumption[b] (tonnes per day)	37	34	22
TEU-nm per hr	28 800[c]	26 760	14 178[c]
TEU-nm per tonne of fuel	18 701	19 114	15 478

a. Multi-purpose container ship.
b. Estimated on basis that average output = 80% of maximum, and consumption at 130 gms per bhp-hr.
c. Based on maximum TEU capacity.

Sources Ned Lloyd Lines of Rotterdam. Cargo Systems (1982). Ahrens, D. (1983).

distance of some 7400 nautical miles. A multi-port itinerary on the North Atlantic would be likely to include one UK, one French, one Benelux and one German port in Europe, whilst in North America it would call at New York for US imports and one or two ports in the Norfolk Baltimore range for exports. This seven port itinerary is only slightly longer than the Sea-Land one and this is simply because of the extension south of New York (the UK, French and Benelux calls being *en route* to the German port with only relatively small diversions). Geographical concentration or consistency is not a function of the number of ports served, nor even of their closeness to each other, but depends on their location with respect to the main route alignment. This in turn depends on the location of the major cargo concentrations on the route and their geographical relationship. Provided that ports are on the main route alignment the extra cost of multi-port calling will be largely that of extra port access, (including tugs and pilots etc), together with the extra time in port as a result of somewhat slower cargo handling. There may be some extra distance involved but this is not necessarily the case, and so long as the number of ports is held within limits, cargo exchanges can still be substantially greater than in the conventional era. Container handling costs themselves are no greater than on concentrated itineraries and in many cases it is easier for ports to handle a succession of moderate container exchanges than it is for them to deal with full ship turnarounds in short periods of high intensity working.

The other side of concentration concerns the additional costs of distribution that accrue if main line itineraries are limited. Feeder ship and inland transport costs are much higher per TEU-mile than the costs of main line ships, and additional handling costs are also substantial. To take just one illustration, the feed from a Continental port to a nearby UK port would cost not less than £100 per TEU, so that a 200 TEU exchange (only some 6 per cent of the total of a 1500 TEU ship), would cost about £20 000 - equivalent to two additional days in port. With the SL7s Sea-Land operated a 14-day itinerary at about 28 knots, whilst the other lines were operating 21-day round trips at 23 knots. These alternatives were compared in a parametric study at 1977 prices and it was found that the basic ship costs of the two systems were roughly the same, so that the broader distribution of the multi-port service was a clear benefit (Gilman, Maggs & Ryder 1977). (In this respect it may be noted that although a concentrated itinerary gives faster transit times between the base ports the differences are only small, transhipment involves substantial additions to transit times.)

A few lines tried to follow the ideas of concentration to the letter although even in these cases route networks eventually evolved to encompass multi-port operations with quite large ships. However, most lines were rather more pragmatic. There was amalgamation of services to obtain adequate scale and this led to the formation of new operating consortia. New route structures were then developed which, although they did not go to the extremes of concentration, were still substantially rationalised compared to conventional operations. Certainly the combination of container technology and new route structures led to a quantum reduction in the number of ships employed. Main line services could also be linked to give greater breadth without excessive complication of mother ship itineraries and these basic networks could be supplemented by the use of inland transport and feeder ships.

At the centre of modern container services are main line itineraries, which are geographically consistent but nevertheless contain a moderate number of ports. These may be linked at various points to allow for broader overall coverage. Individual ports within the main line itineraries can then serve as centres for feeder ships or terminals for long overland routes, the choice of port depending on transport geography but also to some extent on historically established patterns and political links. In some cases transhipment or the use of inland modes in land and minibridge routes allows for the establishment of radically new transport patterns. To take a European example, a single UK port located in the south east can serve the whole of the country by the extensive use of inland modes, with a supplementary feeder service for Irish traffic; a German port can serve as a base for a feeder service from the whole of Scandinavia whilst the UK and French ports can handle feeder services from the Iberian Peninsular, the Mediterranean and Africa. Finally Continental ports can take rail services from central and eastern Europe and some areas in the Mediterranean region.

Evergreen

Coming back to the RW services, the point has already been made in Chapter 2 that they serve the dominant trade flows of the world, and have been established for that purpose rather than that of servicing tributory flows by extensive feeder operations. An examination of the Evergreen itinerary shows that in terms of port calling patterns the RW service is not all that different from established end-to-end services.

Evergreen Westbound RW Full Container Service:[2]

- Far East (Tokyo, Osaka, Pusan, Keelung, Kaohsiung, Hong Kong, Singapore)
- Europe (Hamburg, Felixstowe, Rotterdam, Antwerp, Le Havre)
- US East Coast (New York, Norfolk, Charleston)
- Carribean (Kingston)
- Far East (Tokyo etc).

Evergreen Eastbound RW Full Container Service:

- Far East (Singapore, Hong Kong, Kaohsiung, Keelung, Pusan, Osaka, Tokyo)
- Caribbean (Kingston)
- US East Coast (Charleston, New York, Baltimore)
- Europe (Hamburg, Felixstowe, Rotterdam, Antwerp, Le Havre).

The Evergreen RW westbound service has seven calls in the Far East, two Japanese, one Korean, two Taiwanese, one Hong Kong and one in Singapore. It then goes straight to Europe following a classic North Europe calling pattern of one German, one UK, one French and two Benelux ports, before leaving for the US where it serves New York, Norfolk and the South Atlantic port of Charleston before calling at Kingston and completing the round trip by sailing direct to Tokyo. The eastbound service follows a reverse pattern in the Far East, and an identical one in Europe. The US East Coast pattern is different on the eastbound service, Baltimore being sustituted for Norfolk. None of the calling patterns in Europe, the Far East or the US East Coast would be surprising if encountered on a traditional end-to-end multi-port service, and in fact some of these services would have rather more concentrated itineraries. In the Far East, for example, Trio splits its itineraries, operating a Japan/Korea service, and another service for Hong Kong, Singapore and Taiwan.

There are of course feeder centres in the Evergreen service. Kingston is one of these, serving the line's Caribbean connection, whilst some of the Asian ports also act as transhipment centres. But none of this is very different from the end-to-end services. The final point about

2. These service patterns have been derived from Evergreen Marine Corporation (EMC), Sailing Schedule No. 224, June 1985.

the Evergreen operation is that in June 1985 it was operating three Trans Pacific services, a US East Coast/Mediterranean service and a Far East/Mediterranean service as well as the RW service itself. Clearly the whole network has been carefully worked out in respect of cargo balance, transit times and service quality and the RW service is precisely what it says it is, a Far East/US East Coast/Europe service aiming at major flows between the main trading regions.

US Lines

US Lines RW service had a slower build-up than that of Evergreen. At the beginning of the northern autumn 1985 it was still operating with ten vessels and had only just begun calling at Rotterdam.

US Lines Eastbound RW itinerary, northern Autumn, 1985:

- Far East (Singapore, Hong Kong, Kaohsiung, Pusan, Kobe, Yokohama)
- North America (Long Beach, Charleston, Norfolk, New York, Saint John)
- Europe (Rotterdam, Marseilles)
- Mid-East (Jeddah)
- Far East (Singapore, etc).

The itinerary has some similarity with that of the Evergreen eastbound service in the Far East sector except that it has only one Taiwanese call instead of two. After loading in the Far East it makes one US West Coast call and then three calls on the US East Coast and one in Saint John for the Canadian market. The rest of the itinerary has an unusual look about it with just one North Europe Continent call at Rotterdam, one Mediterranean call at Marseilles/Fos and one Middle East call at Jeddah. The North Europe Continent call could clearly be supplemented with main line interchanges with the US Lines Atlantic service plus its existing North Europe/Continent feeder network whilst the Marseilles call could also be supplemented by feeds from other parts in the Livorno/Barcelona range. Jeddah is not, however, an ideal port for the Arabian Gulf and another call would be required as a feeder centre. However, this looks rather like a Pacific US eastbound service, which by going round the world gains some supplementary European and Mid-East traffic on what would otherwise be a light return leg. The limited call strategy in Europe and the Middle East would appear to be necessary to maintain service quality between the East Coast and the Far East, although the itinerary will change as the fleet gets up to full strength with its last two vessels.

NOL/OOCL/K Line

The third RW service is to be formed by a space charter agreement between Neptune Orient Lines of Singapore, Orient Overseas Container Line of Hong Kong, and Kawasaki Kisen Kaisha of Japan, and is really just a new approach to the Far East/US East Coast service. The agreement for the service was concluded in April 1985 at about the same time that NOL and OOCL inaugurated an RW service using eight 2200 TEUs ships. It will use nine new large ships, two of 3000 TEUs under construction for NOL plus four of the six 2900 TEU vessels on order for OOCL. The K Line contribution is less clear but it may be that the 1987 order for four ships of 2400 TEUs will be uprated to provide the required capacity.

NOL/OOCL/K Line Projected RW Itinerary:

- Far East (Singapore, Hong Kong, Kaohsiung, Pusan, Kobe, Yokohama)
- US West Coast (Long Beach)
- US East Coast (Charleston, Norfolk, New York, Saint John).

Both NOL and OOCL have stated that it is not their intention to make European or Middle East calls, although this policy could of course change. However, the main immediate advantage of the service would appear to be operational. As the Pacific route has extended farther west to take in Singapore and Malaysia it becomes closer to a RW service in length and the change in approach may simply give better loading and box balancing characteristics and faster transit times on key legs like New York/Singapore.

Barber Blue Sea

Barber Blue Sea (BBS) was the first of the RW operators on the mainstream axis, although the company operated on some of the less dense sectors with flexible ships.

The service loads in the Pacific for Panama (which is used as a transhipment centre for South America) the US Gulf and East Coast. Having reached New York after a set of discharging calls on the East Coast, it goes back down the coast, loading for the Mediterranean and Arabian Gulf. After the discharge in these areas, it travels fairly light to the Far East, where it commences loading again for the US.

There has recently been a major re-organisation of both the BBS service and Scan Carriers' Europe/Australia service, which are now being run together. This was brought about by the sale by Scan Carriers of five of the older Australian service 1420 TEU ro-ros to

the US Navy. The capacity required for the Europe/Australian service is now provided by BBS ships which then ballast up to Singapore and Hong Kong to join the established BBS service for the Pacific sector. When these ships reach New York they ballast across the Atlantic to load again for Australia. Taking the two services together, Pacific/US Gulf and East Coast capacity has been maintained, whilst US Gulf and East Coast capacity to the Mediterranean has been reduced and the Australasia/Europe north bound service has been replaced by a slot charter arrangement with other carriers. On the Europe/Australasia trade Scan Carriers is now using larger ships at a reduced frequency (20 days compared to 16.5 days), losing a net 3 per cent capacity. The service has also cut out secondary port calls in Oslo, Dunkirk, Le Verdun and Lisbon in Europe, Burnie, Brisbane and Townsville in Australia and Tauranga, Napier and Timaru in New Zealand. The new itinerary is Gothenburg, Hamburg, Rotterdam, Fremantle, Melbourne, Sydney, Brisbane, Auckland. The 20 day frequency on the Europe/Australia service is now being provided by six large ro-ros on a 120-day round trip, whilst the old BBS service uses five vessels plus four smaller Nedlloyd ships on its original schedule and the six Europe/Australia vessels on the Pacific/US Gulf and East Coast sectors. This rather complicated re-arrangement is interesting in that it shows how a large network can re-organise and switch capacity about on a global scale. It provides an alternative approach to that of simple transhipment and mother and feeder operations for radical changes in operating patterns.

One further comment which emerges from the review is that the RW services are characterised by variety rather than uniformity. The same comment applies to end-to-end services on the 'fatter' routes, where there always has been considerable variety in operating patterns. This is itself a reflection of the fact that the detailed design of an operating structure is determined by the precise balance of cargo flows in the network of each carrier and that these vary substantially between carriers.

The RW services described above do not appear to offer much scope for the transhipment of Australasian cargoes. The most likely possibility for such transhipment is on the Europe/Australia trade, simply because this is the case where the distances would not be too different. The obvious transhipment point on this route would be Singapore. However, of the three RW services on the main east-west axis, Evergreen is the only operator westbound as well as eastbound, and is the only line which has reasonably wide distribution in Europe. This would be essential for a service which already had one transhipment point in Singapore if transit times were not to become very long and

transhipment and feeder costs excessive. Other difficulties would arise from the fact that the Evergreen ships are oriented towards 40 foot boxes and have little reefer capacity. In fact such transhipment possibilities as occur on this route would be much more likely to make use of the traditional end-to-end services.

Looking further at transhipment at Singapore, the route distance would be almost 1000 nautical miles further than a direct service, adding about two extra days sailing time. A transhipment of 500 TEUs (in the 20 foot boxes which still predominate in the Europe/Australia trade) would require about two days handling, and there would be an additional day or so for the normal container exchange of the Europe/Far East ship. Finally there would be likely to be an average of at least two days waiting for the arrival of this vessel. Thus for southbound cargo to Australasia, transit times would be lengthened by at least a week compared to a direct sailing from Europe and service quality (in terms of damage, lost boxes and so on) would also be likely to be impaired. For northbound cargoes the calculation is more complicated because of the association of Australian with New Zealand cargoes and the use of the eastbound route via Cape Horne.

A weekly shipment of 500 boxes each way in 20 foot units would also generate something over 100 000 box moves a year requiring one to one and a half berths capacity at the transhipment port, whilst any reefer transhipment would require specialised port facilities which are particularly costly to build and to run. Certainly at face value the option does not appear attractive and the comparisons in the BTE liner shipping study support this view, finding transhipment considerably more expensive with a much higher level of inventory costs.

Development of the charter market

One of the general developments in recent years has been the growth of the charter market. This began in the coastal sector and moved up the size range with the evolution of semi-container and later conbulker designs, so that there is now a considerable number of vessels available in the 1000 to 1500 TEU size range. There is also a small number of large cellular vessels in the fleet, a few purpose-built for charter and others the result of adjustments made by container lines to changes in operating conditions.

This development is already of some modest importance on Australasian routes and could become of increasing relevance if the trend towards larger vessels size in the charter fleet continues.

Table 4.9 shows the structure of the fleet in late 1984 and demonstrates the importance of these flexible classes of ships. About a quarter of total slot capacity is accounted for by semi-container ships, most of which are under 700 TEUs in size. A further 10 per cent is accounted for by the bulk container sector.

The recent trend for tramp-type ships (breakbulk) and handy sized bulk carriers to acquire a container capacity will further increase container capacities in the low and medium size ranges.[3] Since many of these vessels operate in the charter market, they are likely within the next five years or so to take a substantial level of charter capacity up into the medium size range of 1500 TEUs.

3. In 1980 the volume of minor dry bulks moving in world seaborne trade was some 235 million tonnes, whilst the neo-bulks totalled some 292 million tonnes. If we add to this some 200 million tonnes of the main bulks which move in small vessels it can be seen that there is a world market of some 730 million tonnes moving in tramps and handy sized bulk carriers.

TABLE 4.9 WORLD CONTAINER SHIP FLEET AND ORDER BOOK AT THE END OF 1984

(TEUs)

	Under 500	*500-999*	*1 000-1 499*	*1 500-1 999*	*2 000-2 499*	*2 500 & over*	*Total*
Fully cellular							
Present world slots	84 644	114 713	180 220	239 396	122 882	138 499	880 354
Number of ships	311	157	146	137	55	47	853
Slots on order	6 894	6 730	23 289	18 795	6 400	113 128	175 236
Number of ships	17	9	19	11	3	37	96
Converted to cellular							
Present world slots	10 988	48 499	64 185	7 840	-	-	131 512
Number of ships	43	67	55	4	-	-	169
Ro-Ro/Container							
Present world slots	18 850	17 023	24 724	3 600	10 801	-	74 998
Number of ships	62	25	20	2	5	-	114
Slots on order	2 389	500	-	5 400	-	-	8 289
Number of ships	6	1	-	3	-	-	10
Ro-Ro							
Present world slots	80 610	53 111	66 855	17 293	19 630	-	237 499
Number of ships	305	30	53	10	9	-	407
Slots on order	12 809	7 912	2 800	-	-	-	23 521
Number of ships	40	13	2	-	-	-	55
Semi-container							
Present world slots	332 844	167 126	15 498	-	-	-	515 468
Number of ships	1 244	257	14	-	-	-	1 515
Slots on order	14 617	35 059	4 580	-	-	-	54 256
Number of ships	44	53	4	-	-	-	101

TABLE 4.9 (Cont.) WORLD CONTAINER SHIP FLEET AND ORDER BOOK AT THE END OF 1984

(TEUs)

	Under 500	*500-999*	*1 000-1 499*	*1 500-1 999*	*2 000-2 499*	*2 500 & over*	*Total TEU*
Breakbulk							
Present world slots	26 642	-	-	-	-	-	26 642
Number of ships	150	-	-	-	-	-	150
Slots on order	784	-	-	-	-	-	784
Number of ships	4	-	-	-	-	-	4
Bulk-container							
Present world slots	19 931	68 179	53 889	33 127	2 400	-	177 526
Number of slots	57	96	43	20	1	-	217
Slots on order	1 492	2 166	22 060	8 052	-	-	33 770
Number of ships	6	3	18	5	-	-	32
Barge carriers							
Present world slots	2 745	8 388	-	3 104	-	-	14 237
Number of ships	8	11	-	2	-	-	21
Total							
Present world slots	577 254	477 039	405 371	304 360	155 713	138 499	2 058 236
Number of ships	2 180	643	331	175	70	47	3 446
Slots on order	38 985	52 367	52 729	32 247	6 400	113 128	295 856
Number of ships	117	79	43	19	3	37	298

- Nil or negligible.

Source Containerisation International.

CHAPTER 5 CONTAINER SHIPPING IN AN AGE OF OPEN TRADES

HIGHLIGHTS OF DEMAND AND SUPPLY

One of the statements frequently heard with respect to liner shipping is that the industry is suffering from a period of prolonged recession. The analysis of Chapter 2 showed that this is very much of an over-simplification. There was moderate growth in the volume of cargo during most of the 1970s, and although there was a recession in the world economy which held it back in the early 1980s, the years 1983 to 1985 again saw relatively high rates of growth, particularly in US imports. What has happened in recent years has been a very large growth in capacity resulting in the development of fiercely competitive conditions on many routes. These conditions are likely to prevail on world markets in the period up to 1990, particularly on the three mainstream routes connecting Europe, the US and the Far East. The extent of over-capacity is a matter for conjecture as it depends upon the interpretation placed on developments in the US economy. If the very large growth of US imports in the mid-1980s is the result of long term structural changes in the economy, demand may only level off over the next few years and re-commence growth as the US economy moves into its next expansionary phase. If, however, the growth in imports was largely the result of a strong US dollar with the US having to make future adjustments which eventually result in a decline in the dollar and reduction in the deficit in the balance of trade, then there could be a genuine recession in cargo volumes in the next few years and market conditions will be very severe until at least 1990.

The Pacific, Atlantic and Europe/Far East routes reviewed in Chapter 3 connect the major trading regions of the world and with 5.1, 3.0 and 2.2 million TEU slots capacity in 1985, are responsible for about 60 per cent of the world market. Even with the new large container ships of some 2500 TEUs, a weekly service provides only about 250 000 TEUs capacity a year so that these three routes would sustain 20, 12 and 9 services respectively. In fact there is a certain degree of fragmentation in route patterns and smaller ships are employed in some sectors, so that the actual number of services is rather greater than this. As might be expected these routes are served by the most

powerful and experienced US, European and Japanese lines. But these have been unable to retain control and in recent years there have been major new entrants, particularly from the Asian newly industrialising countries. These have grown to become formidable lines with very powerful backing, and one of them, Evergreen, is now the largest in the world in terms of ship capacity, slightly ahead of Sea-Land and US Lines. The major routes also sustain a fringe of smaller scale operators, land bridge routes and so on, which in total account for a fair amount of capacity. With many of the new lines operating as independents and a substantial fringe of small independent operators, conference shares have fallen sharply and even closed conferences can no longer claim to control and rationalise capacity.

The analysis of Chapter 4 indicated that enormous changes have been taking place in the world container ship fleet. The main development has been the very large increase in the number of giant container ships, which is in the process of increasing from about 30 in 1980 to something around 170 in 1987. This represents a scaling up within existing Panamax limits which raises average ship size on major routes rather than increasing the maximum dimensions of the ships themselves. There have also been increases in the capacity available within a given set of dimensions resulting from slower speeds and a higher weather deck stow. Associated with the use of new larger ships has been a dramatic reduction in speeds compared with the period prior to 1974, and a large reduction in crew numbers, so that they have very low slot mile costs compared with earlier generations. This has led to the idea that the new vessels represent a revolutionary change, particularly when they are associated with RW services. In Chapter 4 it was argued that these changes are not of such a revolutionary nature as has been imagined. There are two main dimensions which affect ship costs, size and speed. The new large container ships are economic partly because they are of large size, but also because they are of relatively low speed and have taken advantage of the improvements in propulsive efficiency of recent years and developments in 'compact' design. But the choice of an appropriate speed, improvements in propulsive efficiency, compact design and low crew numbers are all available irrespective of ship size. Further to this there are still constraints to size imposed by time in port, while on the thinner routes it tends to be constrained by the need to maintain frequency. Proof of this general point is available in examination of the new large container ships themselves, because they have not all gone right up to Panamax size, whilst on some of the depressed routes of the world, ship size has declined in recent years.

The RW services appear even less revolutionary than the jumbo

container ships. Certainly the economies of the new vessels are not so large that they will allow radically new operating patterns to be constructed involving much greater amounts of feeding, numerous transhipments and a longer overall route length for tributory flows.

Examination of the RW itineraries in Chapter 4 showed that Evergreen is operating the equivalent of three end-to-end services with quite traditional multi-port calling patterns in each trading hinterland. The other three services all operate eastbound only and this immediately limits scope for transhipment. The OOCL/NOL/K line pact is also traditional in that it serves the Far East/US East Coast route only, preferring the RW itinerary for operational reasons including a fast transit from New York to Singapore. Even US Lines operate traditional calling patterns in the Far East and on the US East Coast. It is only in Europe that it has limited its port calls to Rotterdam and Marseilles Fos. There is also a clear limit to the number of RW services set by the fact that the Europe/Far East route is only about one-third the size of the Pacific routes and about half the size of the Atlantic.

Where there does appear to be scope for radical change is in the ability of carriers to make rapid changes in the balance of capacity and frequency on the various sectors within their complex networks. There have recently been two examples of this in Australian trades. The first and most radical was the change in operating pattern made by Scan Carriers following the sale of five of their smaller ro-ro ships to the US Navy. Southbound services to Australia were retained, being operated at about the same capacity with a lower frequency and larger ships, but SCAN vessels were withdrawn from the northbound service, the Australian ships ballasting up to Singapore to join the BBS Pacific run. On a rather smaller scale OOCL have recently introduced a new service from Australia to the ports in the Leghorn/Barcelona range, linking with a feeder to North Europe to maintain the breadth of coverage.

INDEPENDENTS AND OPEN TRADES

The status of independent lines

One of the major changes in liner shipping in recent years concerns the role and status of outsiders or independent lines as they prefer to be known. Traditionally, independants have often been found among the smaller scale or fringe operators in the liner shipping industry. This began to change even in the early days of containerisation as Sea-Land often followed an outsider strategy in its attack on

established conference markets. However, in general the early years of the container era appeared to be reinforcing the conference system, and the scale required to develop the new fleets of large ships for the longer routes was so large that it was often attainable only with the formation of consortia. This certainly applied to the European routes to the Far East, Australasia and South Africa, and even to some of the operations on the very much shorter Atlantic route. US carriers were rather out on a limb in this respect because of regulatory barriers to the formation of consortia, and partly for this reason they operated for many years with a very high proportion of old converted tonnage.

Recent developments in the Far East, and particularly the growth of Evergreen, represent a rather radical change in this situation. Evergreen is a Taiwanese owned flag-of-convenience line which has traditionally favoured an independent strategy. Certainly most of its growth in the Europe/Far East route was as an independent and although the line was for a time given tolerated outsider status by the conference, it is now again operating in its old role. In the early 1980s Evergreen embarked upon an ambitious development programme, building 22 ships of some 2728 TEUs for its eastbound and westbound RW services plus another eight slightly larger ships for the Pacific. The review of Chapter 3 showed that this line is presently placing some 850 000 TEU slots on the RW services plus 450 000 on its three Pacific services operated with the older vessels. In addition to this it runs separate services from both the Far East and the US to the Mediterranean. The total of all routes is of the order of 1 450 000 TEU slots, which is something like 8 per cent of the total on world deep sea routes. As a result, Evergreen is now the world's largest carrier ahead of US Lines and Sea-Land. The size of the investment in ships alone is something of the order of US$900 million (30 vessels at US$30 millon each) and the grand total, including containers and so on, is reported to be about US$1500 million.

Whereas in the early days of containerisation carriers often formed consortia to provide the scale required for just one long route, in the early 1980s Evergreen alone was able to invest on a sufficient scale to provide the three end-to-end services incorporated into the RW operation on a weekly basis, and still have enough left for eight more large ships for the Pacific. Evergreen is a private company and there is no accurate information with respect to its financing, but the most persuasive report is that the money was put together by a consortium of Japanese, US and Arab banks. One can only guess how it was that Evergreen was able to raise so much finance. Perhaps the first point is that it is a successful company, and is very

competitive in terms of operating costs. Its design and operating strategy were well developed even before it made its large investment and its independent status was not seen as any disadvantage. The second point is that the company is operating in a very large market and one which in recent years has shown rapid growth. Finally the RW services certainly capture the imagination and suggest potential further gains in operational efficiency. Factors which apparently did not concern Evergreen's backers were the possibility of over-capacity on world routes or the prospect of fierce competition. An element of the strategy could have been to make an investment on such a large scale that it pre-empted the options of some of the traditional lines in the market. This seems to have worked to some extent, although other Far Eastern lines as well as US Lines and some of the European operators are also expanding. Developments like that of Evergreen have made it clear that for the present, at least, conferences are not in any sense an instrument for capacity control on major world routes.

The collapse of conference control on major routes has not been associated with any reduction in the size of shipping lines. In general the trend is towards an increase in the scale of the large operators, associated in many cases with integration into ports and inland transport. This is particularly the case among some of the large Pacific carriers, being a function of the great length of the inland hauls in the US, which increase the importance of efficient inland operations in holding down costs, guaranteeing service quality, and allowing carriers to hold on to their customers.

There are two possible scenarios for the further development in the conference system. The first of these would see the present position simply as a gigantic attack by independent lines on major routes, which will follow the traditional course of rate wars followed by a shake out and the reconstruction of the conferences. According to this approach, when the conferences are re-established the scale of container operations will be so large and the extent of integration so complete that the scope for further outsider attack will be limited and the industry will enter a much more stable period where rates will recover and profits be earned. The alternative view is that some of the new lines will prefer to operate as independents, and that the conference system, whilst not actually breaking up, will prove incapable of reconstruction to a level sufficient to obtain control of prices and capacity. In this case there will be a continuation of oligopolistic competition, the sheer scale of the industry and the number of nations involved preventing the development of a position of market dominance by any one group. This would be the more competitive

of the scenarios, although even in this style of market operation there can be periods of relative stability.

The nature of competition

The traditional explanation of market function in the liner shipping industry was in terms of the operation of conferences. One of the most common views was that closed conferences provided the means by which capacity could be rationalised and efficiency guaranteed (Codes of Conduct and negotiations with Shippers Councils providing the means by which abuse of a dominant position would be prevented), whilst the open conference was the positive cause of over-capacity. In citing evidence to prove this case the Australian route was often favourably compared with the North Atlantic. Contestability theory is in fact used as a modern extension of this argument, setting out the conditions which will allow a conference having a dominant market share of a route to nevertheless set prices which would prevail in a competitive market.

However, in the last five years the whole basis for the case for closed conferences has been undermined as they have lost control of capacity. The review of mainstream routes in Chapter 3 showed that the Europe/Far East route, where many lines support the Far Eastern Freight Conference (the largest and traditionally one of the most powerful in the world), is now extremely competitive, with the conference share being not much more than half of the total capacity and with a considerable degree of over-tonnaging. In fact, of the three mainstream routes, the Atlantic was in 1984 among the most stable, the conferences having re-grouped even though the dual rate system has now been virtually abandoned. Much of the industry is now operating as an oligopoly with conferences simply providing a degree of price leadership, the nature of competition on individual routes being determined by the particular set of conditions controlling exit and entry.

Issues in regulatory policy

Before considering the nature of the issues in regulatory policy it is perhaps necessary to consider its role and the limits of its power. In some sectors of transport the term regulation means the control of capacity and prices, this being implemented by the issue of licences and the setting, or at least review, of prices by a government body. In the liner shipping industry regulation applies largely to the conditions under which liner conferences operate and is of quite a different character. Although there may be an element of capacity control when governments determine conditions under which state

controlled or subsidised lines may enter the market place, there is no legal barrier to entry. Regulatory policy does, however, moderate the nature of the contractual arrangements between shippers and conferences or individual carriers and the nature of the co-operative arrangements (conference agreements and so on) among the lines themselves. In the late 19th and first half of the 20th centuries regulating policy and market conditions acted to restrict entry and allow conferences a high degree of market power. However, in the conditions of today both closed and open conferences have lost much of this power. Certainly they have lost it on the large routes of the world and conference control appears to have weakened even on some of the less naturally competitive, long thin routes like those serving Australasia. There might towards the late 1980s be re-establishment of conference power on major routes, but it seems as if the industry is in fact moving away from conference hegemony towards an era of oligopoly.

Only one regulatory regime has tried to monitor the operation of the conference system to ensure that all agreements in the market place produced a net benefit to the public interest. This was the US system during the period from 1960 to 1984 when the courts and the Department of Justice mounted a fierce attack on conference carriers, notwithstanding the notional primacy of the Federal Maritime Commission in this respect. In fact this created a system which became increasingly legalistic and bureaucratic and eventually almost unworkable, and probably counter-productive. The US Shipping Act of 1984 was a measure of reform which virtually abandoned this approach, although anti-trust powers are held in reserve to prevent monopolistic abuse.

The basic elements of the world's main regulatory systems as they operate today are that they all allow co-operative agreements between carriers concerning rates, that is, the basic ability of lines to form conferences or operate rate agreements. These have to be filed and are often screened for conformity with regulatory conditions. These systems also allow the formation of operating consortia which are subject to review in situations where a consortium might have such a high market share as to pose dangers of monopolistic abuse.[1] Regulatory systems often control the nature of the loyalty ties between shippers and conferences and here the general trend has been for a weakening in traditional loyalty ties, with the reduction in the

1. Consortia arrangements were severely constrained in the US between 1970 and 1984.

use of deferred rebates and the abolition of even the dual rate system in the US trades. New systems have, however, developed in the form of medium term contracts between carriers and shippers, with shippers frequently being required to guarantee shipment volumes over the term.

Regulatory regimes also control the form of negotiations between shippers and conferences, with support often being given to the classical closed conference system in which negotiations are based on independently audited accounts for all conference lines grouped together. This approach is also now generally in decline. The US never followed the closed system but the 1984 Act showed the way forward by placing the emphasis on features which retain open and competitive conditions in liner trades. The new EC proposals also moved in the same direction, continuing to allow closed conferences but placing an emphasis on open trades. And just as the idea of supervision of conference agreements according to the anti-trust interpretation of the public interest has been dropped in the US regime, so the idea of the rationalising power of closed conferences appears to have been dropped in the new EC proposals. In fact the only place where it is retained by implication is in the Liner Code, which is much less of a force than was anticipated simply because of the loss of power of the traditional closed conferences. The move away from traditional loyalty ties and towards service contracts also undermines the traditional basis of negotiations between conferences and Shippers Councils. This traditional system can even be said to have broken down in Australia where the wool and meat boards and various other commodity groups negotiate independently. This does, however, raise an issue concerning the whole nature of shipper/conference relationships, because once these negotiations have been concluded, barriers to entry by non-conference lines are re-established until the next round and this weakens the power of those smaller shippers who are outside the negotiations.

IMPLICATIONS FOR THE AUSTRALIAN TRADES

How open?

One of the major factors which determines the competitive character of a container trade is the relationship between economies of scale and traffic density. Clearly the greater is the traffic density on a route in relation to the size of an effective operating unit the larger will be the number of services which the route will sustain and the smaller is the amount of growth required to sustain an additional entry. Container routes vary enormously in traffic density from those

which will sustain only one fortnightly service to others which sustain a multiplicity of weekly services. They also vary substantially with respect to economies of ship size and the number of ships required to provide a service of given frequency, both of these depending upon route length and ship time in port. Large ships obtain economies of size at sea but (for a given handling rate) diseconomies of size in port, and with other things being equal the greater the amount of port time the smaller will be the optimum ship size on a route and the shallower the slope of the size economies curve.

Australasia as a relatively geographically isolated region of only moderate economic size generates relatively thin trades, some of which are very long and others of intermediate length. Economies of scale are diluted by a relatively high proportion of port time, which is a function of the predominance of 20 foot boxes combined with only moderate port handling rates. There is also frequent disruption in Australasian ports and an extended port range, both of which tend to favour the flexibility provided by medium sized vessels.

However, even with a requirement for only medium sized container ships, Australasian routes have not been among the easiest to enter. In the late 1970s for example the Europe/Australasia conferences enjoyed a high market share and relatively high rates at a time when conditions were becoming increasingly competitive on mainstream trades. The position on this route began to change in 1978 as ABC Container Line entered the market with the early stages of its conbulker operation. ABC had the advantages of its bulk mineral sands contract, and was able to purchase its ships at low prices, with an exceptional financial deal. It was also able to select a service speed appropriate to the late 1970s competing with ships designed and built in the late 1960s. Given this formidable battery of advantages ABC had ample room to cut rates and, by operating as an independent with discounts ranging between 20 per cent and 5 per cent of the conference rate and concentrating its marketing on consignee selling in Australia, was able to establish itself.

The second development on this route was that of Polish Ocean Lines (POL) which, after operating in a rather haphazard fashion for years, pulled its service together in the early 1980s and began to offer serious competition. However, as a Comecon line, POL has the advandantage of government support for its activities.

Finally, Eagle Containerline entered the market using chartered vessels and in the last year at least is reported to have been the leader in rate cutting. Meanwhile the conference has reduced its

scale of operation, terminating some of its ships in the Mediterranean ports and losing the Scan Carriers northbound service. It does, however, retain its commitment to meeting the needs of the trade and has chartered vessels to cover the recent boom in southbound cargoes.

As a result of this competitive action, rates which were as high as A$4000 per TEU in the late 1970s are around A$2300 today. In present circumstances the earlier outsiders in the trade might like to achieve an accomodation with the conference and a degree of rate recovery. Eagle as the most recent independent leads rate action in the trade, but it also has to take a rather long route back to Europe in order to pick up return cargoes, extending its round trip and operating in markets which one must presume will be very competitive, and this must place some constraints on its long term competitive power in Australian trades.

The second very long route in Australasian trades is that to the US East Coast. This is an open conference route, but in fact entry is

TABLE 5.1 TASK AND NON-CONFERENCE SHARE TO AND FROM AUSTRALIA IN THE MAJOR TRADES, 1983-84[a]

	Quantity ('000 tonnes)		*Non-conference share (per cent)*	
Trade area	*Inward*	*Outward*	*Inward*	*Outward*
Europe and North Mediterranean	1 491	897	23	19
East Asia	610	674	26	31
Japan	629	1 314	12	19
South Korea	80	116	17	20
West Coast North America	714	332	30	16
East Coast North America	503	595	15	47[b]
Middle East Gulf	6	134	0	3
South East Asia	432	754	17	26
New Zealand	388	317	77	66
Papua New Guinea and Solomon Isands	39	330	31	33
All trades	5 683	6 317	34	29

a. Task shares relate to the tonnes of cargo shipped.
b. This figure is high because of shipments of high-density mineral sands in conbulk ships.

largely controlled by the Australian Meat and Livestock Corporation which negotiates at regular intervals with carriers and designates those with whom it will deal. Freight rates appear to be quite high on this route but it is a rather poorly balanced trade with a very high proportion of reefer cargo and as such is particularly expensive to operate.

The other Australian trades are rather shorter and require less of a commitment to enter. The Japan and South Korean trades tend, however, to be controlled by large trading houses and as shown in Table 5.1 have only a moderate degree of independent activity. Table 5.1 shows that Australian routes are now certainly open, although only the Europe and East Asian trades might be considered fiercely competitive.

In one sense it might appear rather easy for conferences to regain control of Australasian routes. For example, on the Europe route all that this would require would be the withdrawal of one carrier, the accession to the conference of another and a tacit agreement on tolerated outsider status for the third. However, the scale of entry on Australian routes is small in relation to the size of operation on mainstream routes and with an excess of capacity in the world there must be a strong probability of new entry to fill gaps left by departure of independent lines or their accession to the conference.

Regulatory issues in Australian routes

Conditions on Australian routes have already moved away from those of the classic rationalising closed conferences, both because of the increased participation of outsiders and also because of the changing nature of the process of negotiation between shippers and carriers. One possible approach would be to try to re-establish the old system by imposing conditions which would inhibit the operations of some present and prospective outsiders. Actions would also need to be taken to re-establish the joint process of negotiation between conferences and carriers and to ensure the equity of the operation of its system as between different groups of shippers. Even if this attempt were made there is no guarantee that it would succeed, or that new independents not affected by the controls would not replace those whose actions have been curtailed. It would also be very difficult to impose the necessary limits on the negotiating processes of shippers. The alternative approach would be to move in the general direction of regulatory policy in the US and Europe. This continues to allow conferences (even of the closed variety) to function, and also allows the operation of consortia with normal safeguards against abuse of

potential monopolistic power and perhaps some limits on subsidised competition. However, in essence the system will rely on open trades and competition as the guarantee of economic efficiency and quality of service required by shippers, attention being paid to that set of arrangements between shippers and carriers which will help promote these objectives.

APPENDIX I WORLD EXPORTS BY COMMODITY

TABLE I.1 WORLD EXPORTS BY COMMODITY, 1977-80

Commodity	1977 Quantity ('000 tonnes)	1977 ALH[a] (nm)	1978 Quantity ('000 tonnes)	1978 ALH[a] (nm)	1979 Quantity ('000 tonnes)	1979 ALH[a] (nm)	1980 Quantity ('000 tonnes)	1980 ALH[a] (nm)
All commodities	3 436 409	5 242	3 475 763	5 109	3 709 221	4 852	3 507 158	4 775
Bulk Dry	1 113 512	4 356	1 166 468	4 354	1 301 669	4 367	1 320 806	4 424
Grains	149 422	5 231	166 790	5 243	178 088	5 183	192 571	4 926
Sugar	26 686	5 255	24 191	5 177	24 836	4 764	25 336	4 849
Oil seeds	26 048	5 636	31 388	5 529	32 240	5 714	33 054	5 586
Timber	78 750	2 980	91 595	3 035	101 203	3 204	93 924	3 376
Ores	375 358	4 870	372 471	4 840	427 120	4 860	409 496	4 997
Metal scrap	10 452	4 368	14 341	4 700	15 548	4 638	17 694	4 503
Coal coke etc	168 261	3 969	166 160	4 012	199 960	4 165	226 474	4 304
Fertilizers	76 934	3 648	83 142	3 770	88 260	3 857	88 866	3 923
Ferrous base metal	89 961	4 236	98 301	4 222	100 696	4 030	97 835	3 960
Animal feeding stuff	30 015	4 830	31 496	4 913	35 105	4 956	37 710	4 933
Other bulk dry	81 625	2 442	86 593	2 396	98 613	2 428	97 845	2 576
Bulk liquid	1 951 301	5 983	1 911 567	5 802	2 006 539	5 356	1 777 857	5 220
Crude petroleum	1 642 314	6 611	1 597 845	6 422	1 665 776	5 888	1 452 790	5 756
Energy petroleum products, liquid	275 754	2 482	271 457	2 465	286 392	2 553	274 145	2 635
Fuel gases liquefied	25 728	3 485	31 611	3 619	46 702	3 720	44 265	3 703
Other bulk liquid	7 505	3 946	10 654	3 210	7 668	3 743	6 657	3 869

TABLE I.1 (Cont.) WORLD EXPORTS BY COMMODITY, 1977-80

Commodity	1977 Quantity ('000 tonnes)	1977 ALH[a] (nm)	1978 Quantity ('000 tonnes)	1978 ALH[a] (nm)	1979 Quantity ('000 tonnes)	1979 ALH[a] (nm)	1980 Quantity ('000 tonnes)	1980 ALH[a] (nm)
Refrigerated foods	27 246	3 796	28 852	3 830	30 191	3 753	30 909	3 636
General cargo dry	289 123	3 984	311 290	3 961	310 712	3 866	312 542	3 925
Coffee	3 010	5 085	3 464	5 058	3 842	4 919	3 683	5 140
Tea and mate	867	5 646	810	5 320	908	5 275	909	5 409
Other foods	27 060	4 969	30 993	5 156	34 337	4 819	35 385	4 983
Beverages	6 142	2 972	6 707	3 040	7 592	3 108	7 502	2 995
Tobacco	1 396	5 055	1 549	4 718	1 537	4 733	1 460	4 932
Crude rubber	6 178	4 909	5 968	4 812	6 459	4 655	6 081	4 503
Textile fibres	7 596	5 352	8 253	5 532	8 813	5 425	9 011	5 397
Other crude materials	2 427	3 955	2 571	3 859	2 791	3 674	2 606	3 591
Non-energy petroleum products	29 744	3 399	32 735	3 183	25 816	3 607	25 232	3 538
Oils and fats	11 211	5 231	12 344	5 258	12 561	5 122	14 101	4 994
Chemicals	66 667	3 757	72 063	3 635	76 351	3 623	75 914	3 694
Paper etc	19 312	2 844	20 779	3 003	22 792	2 882	24 297	3 049
Textiles	5 761	4 489	6 065	4 269	6 648	4 205	6 576	4 176
Machinery	12 602	4 467	13 397	4 618	14 545	4 387	15 643	4 422
Other maunfactures	89 148	3 857	93 593	3 827	85 720	3 517	84 141	3 573

TABLE I.1 (Cont.) WORLD EXPORTS BY COMMODITY, 1977-80

Commodity	1977 Quantity ('000 tonnes)	1977 ALH[a] (nm)	1978 Quantity ('000 tonnes)	1978 ALH[a] (nm)	1979 Quantity ('000 tonnes)	1979 ALH[a] (nm)	1980 Quantity ('000 tonnes)	1980 ALH[a] (nm)
Other dry cargo	55 227	4 205	57 586	4 221	60 110	4 090	65 044	4 313
Woodpulp and paper waste	14 776	3 750	16 143	3 949	17 811	3 471	18 880	3 742
Crude minerals NES	893	3 857	863	3 195	670	2 545	892	2 854
Non-ferrous base metals	10 158	4 497	10 154	4 416	10 576	4 208	11 378	4 236
Manufactures of metal	4 481	4 199	4 761	4 100	4 323	3 934	4 527	3 977
Machinery & equipment	21 152	4 483	21 582	4 558	22 824	4 610	25 565	4 950
Miscellaneous	3 767	3 729	4 082	3 383	3 905	4 001	3 802	3 838

a. ALH is average length of haul in nautical miles.

Source UN (1982).

REFERENCES

Ahrens, D. (1983), The role of trans tonnage in Containerisation, Container Asia (Conference Proceedings), CS Publications.

Boyers, J. R. C. (1984), A stabler North Atlantic braces itself for the storm to come, *Containerisation International*, 18:no. 4.

__ (1985), Transpacific capacity heads for 5.6 million TEU by 1986, *Containerisation International*, 19:no. 2.

Bureau of Transport Economics (1986), A Study of Liner Shipping Services into and out of Australia, Report 60, Canberra (in press).

Cargo Systems (1982), Hoegh takes an individual approach, March issue.

Container Data Ltd (1985), *World Container Data*.

Fossey, J. (1985), New generation containerships lead the orders, *Containerisation International*, 19:no. 1.

Gilman, S. (1983), *The Competitive Dynamics of Container Shipping*, Gower House, Aldershot, UK.

Gilman, S., Moggs, R. & Ryder, S. (1977), *Containers on the North Atlantic: An Economic Analysis of Ships and Routes*, Marine Transport Centre, University of Liverpool.

International Monetary Fund (IMF) (1985a), *World Economic Outlook*, IMF, Washington DC.

__ (1985b), *International Financial Statistics*, IMF, Washington DC.

Lambert, M. (1984), World box moves set to top 50 million TEU for 1984, *Containerisation International*, 18:no. 12.

Phillips, F. E. (1985), Europe/Far East Conference is ready for the storm, *Containerisation International*, 19:no. 5.

United Nations (UN) (1978, 1980, 1982), *Maritime Transport Studies*, Series D, vols. 23-28, New York.

ABBREVIATIONS

ABC	ABC Containerline
ACL	Atlantic Container Line
ALH	Average Length of Haul
ANEC	Atlantic North Europe Conference
APL	American President Line
BBS	Barber Blue Sea Line
bhp	brake horse power
CGM	Compagnie Generale Maritime
CR	Chargeurs Reunis
CMB	Companie Maritime Belge
CNC	China Navigation Company Ltd
COSCO	China Ocean Shipping Company
CP	Canadian Pacific Steamships Ltd
CR	Chargeurs Reunis
DSR	Deutfracht/Seereederei Rostock
DWT	Dead Weight Tonnes
EAC	East Asiatic Company Ltd
EC	European Community
EMC	Evergreen Marine Corporation
FAK	Freight-all-kinds
FEFC	Far East Freight Conference
FESCO	Far Eastern Shipping Company
FEU	Forty-foot Equivalent Unit
FMC	Federal Maritime Commission
GDP	Gross Domestic Product
GMP	Gross National Product
HKIL	Hong Kong Island Line
IMF	International Monetary Fund
KMTC	Korea Maritime Transport Corporation
KSC	Korean Shipping Corporation
LOA	Length-Over-All
MISC	Malaysian International Shipping Corporation
MOL	Mitsui OSK Lines Ltd
MPC	Multi-Purpose Container ship
NEAC	North Europe Atlantic Conference

nm	nautical miles
NMP	Net Material Product
NOL	Neptune Orient Lines
NSPC	National Shipping Corporation of the Philippines
NYK	Nippon Yusen Kaisha
OOCL	Orient Overseas Container Line
OPEC	Organisation of Petroleum Exporting Countries
POL	Polish Ocean Line
PSBR	Public Sector Borrowing Requirement
Ro-ro	Roll-on roll-off
RW	Round-the-World
Shp	Shaft horse power
SLCS	St. Lawrence Co-ordinated Service
TEU's	Twenty-foot Equivalent Units
TMM	Thai Mercantile Marine Ltd
TSR	Trans Siberian Railway
UK	United Kingdom
UN	United Nations
US	United States of America
USSR	Union of Soviet Socialist Republics
YS	Yamashita-Shinnihon Steampship Co Ltd