Contestability Theory: An Assessment of its Relevance to Australian Liner Shipping

Occasional Paper

Contestable market theory suggests that if certain criteria are met, above-normal profit-taking would be reduced or eliminated because of the threat of entry to exploit even transitory profit opportunities. In this Paper, the criteria which must be met for a market to be contestable are examined with the aim of determining whether Australian liner markets are inherently contestable and therefore theoretically self-regulating in the sense that shippers will receive services at or near average costs. The Australia/Europe trade is examined in detail to provide a practical basis for the arguments presented. The assessment, however, is intended to apply to Australian liner markets in general.
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Contestability Theory
An Assessment of its Relevance to Australian Liner Shipping

C.R. Sayers
CORRIGENDUM - BTE Occasional Paper 76

The analysis undertaken in this study and the conclusions drawn reflect the views of the author and do not necessarily represent the position or views of the Federal Bureau of Transport Economics.
Despite problems of interpretation, the analysis provided valuable insights into the conditions necessary to make liner markets more competitive and also served to develop 'in-house' expertise in an area of applied economic research which is seen as important in a number of other fields as well as international shipping.

G. K. R. Reid
Director

Canberra
Bureau of Transport Economics
May 1986
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The findings of the recent Federal Bureau of Transport Economics study of Australian liner shipping suggested the existence of above-normal profit-taking in some of the trades at particular periods. The Bureau study also produced some evidence of external barriers such as shipper bias, business-house patronage and union restrictions. The study, however, did not address the question of whether the removal of such barriers would ensure efficient markets or whether operator profits would be constrained to normal levels through competition or the threat of competition.

Contestable market theory suggests that if certain criteria are met, above-normal profit-taking would be reduced or eliminated because of the threat of entry to exploit even transitory profit opportunities. In this Paper, the criteria which must be met for a market to be contestable are examined with the aim of determining whether Australian liner markets are inherently contestable and therefore theoretically self regulating in the sense that shippers will receive services at or near average costs.

The Australia/Europe trade is examined in detail to provide a practical basis for the arguments presented. The assessment, however, is intended to apply to Australian liner markets in general.

Before proceeding to the examination, the background to the development of the new theory, its potential significance for government policy and details of the debate on its application are presented. In addition, to provide the necessary understanding of Australian liner markets required to undertake a realistic evaluation of the contestability criteria, the structure of the markets, the nature of competition and price sustainability in them are described.

An alternative market theory, which specifically applies to the liner shipping industry, is presented in Appendix I to provide theoretical insights into the behaviour of the participants. This alternative theory is also used to demonstrate that the theory of contestable
markets is not the only explanation for the low profits generally observed in liner shipping.

The concluding remarks draw together the various elements of the examination and offer some comments regarding implications for future arrangements for the regulation of liner shipping services to and from Australia. Evidence of some impediments to entry suggests that Australia's liner shipping market may not be fundamentally contestable and that Australia's 'long thin' trades may be among the least contestable. It is suggested also that characteristics of Australia's trades are such that the overtonnaging evident in the world fleet will not have a major impact on the competitive situation in the trades. Finally in regard to future arrangements for the regulation of Australia's liner shipping services it is suggested that while closed conferences can offer significant benefits in terms of efficient low cost services there is a need for mechanisms to ensure that conferences are not able to use their market position to earn above-normal profits. Attention is drawn to recent developments in the United States (US) where time-volume contracts are permissible under the new legislation.
CHAPTER 1 INTRODUCTION

This introduction outlines the background to the development of the theory of contestable markets and its potential significance for government policy formulation in respect of industry regulation.¹

The usefulness of the theory is the subject of debate in economic literature. As a prelude to the examination of the contestability of Australian liner shipping markets, the nature of the debate is also outlined in terms of the viewpoints of the proponents and critics of the theory.

CONTESTABILITY THEORY

The theory of contestable markets first attained prominence in the late 1970s and early 1980s (Panzar & Willig 1977, Baumol, Panzar & Willig 1982, Baumol 1982). Although the theory was particularly aimed at analysing markets which possess scale economies, that is natural monopolies, any market, in fact, is considered vulnerable to competitive forces provided that entry is absolutely unrestricted and exit is absolutely costless, and that all firms have equal access to the available technology and factors of production.

A relatively recent development in the theory of industry behaviour, this theory has laid less emphasis on the number of competing firms and assigned the key role to the entry and exit conditions of an industry. The theory asserts that the number of competing firms has little bearing on the level of efficiency in an industry. Rather, it is the ability of firms from outside an industry to contest a market, and to exit that market without any cost penalties, which provides the competitive conditions required for an efficient outcome.

The novel elements of the theory are claimed to be the emphasis on the freedom to exit an industry and the demonstration that potential entry can force the incumbents of an industry to behave in a competitive

1. The source material for the introduction is taken from BTE (1985).
fashion. The theory has been deemed particularly relevant for analysing markets tending towards natural monopoly, where there is little, if any, actual competition and where there is an expectation of monopoly profits. If such a market is contestable or can be made contestable, by appropriate public policies, the community can theoretically gain from the benefits of scale economies without incurring the normal adverse effects associated with market power, such as above-normal profits and inefficiency.

The policy implications of the theory follow on logically from the perceived desirability of contestable markets and generally revolve around preventing restrictions on entry and exit. If, on investigation, an industry displays little evidence of being contestable, it is suggested, by proponents of the theory, that it is appropriate for the public authorities to implement measures which would increase the degree of contestability, by:

- removing any government regulations preventing access to the industry, or preventing price competition in the industry;
- actively encouraging unrestricted entry into the industry and exit from it by, for example, avoiding price controls; and
- addressing large sunk cost problems where they exist, for example, through the public provision of facilities, or by ensuring access for new or potential entrants to existing facilities.

If, on the other hand, an industry is judged to be highly contestable, there is little need for any government regulation, at least on efficiency grounds. This applies to all varieties of industry structure, from natural monopolies, which had previously been considered, on the basis of traditional theory, essential to regulate, to industries containing numerous producers.

**THE ECONOMIC DEBATE**

Like 'perfect competition' contestability is a theoretical concept. A contestable market is identified by applying criteria which are unlikely to be fully met by any industry. Where the conditions are violated the theory of contestable markets does not provide any guidance on the relative importance of the criteria and the extent to which each must be met for a market to be judged as contestable.

A 'perfectly contestable' market is defined as one:

- in which the entrant suffers no disadvantage in terms of the
technology used nor the perceived product quality relative to the incumbent;
- into which entry is absolutely free and exit is absolutely costless;
- where the incumbents cannot change price quickly and invalidate the evaluation of profitability by the entrant in terms of the incumbents' pre-entry prices; and
- where consumers move quickly in response to price differences.

In essence, the ability of a potential entrant to contest a market depends upon that particular industry's vulnerability to 'hit and run' entry. A contestable market exists when a new firm can exploit a transitory profit opportunity by entering an industry, collecting profits and exiting before the incumbent firms (whether one or many) are able to react.

The proponents of the theory assert that where the conditions necessary for a perfectly contestable market are violated to some extent, a market, while no longer 'perfectly contestable', may still be 'contestable' or 'reasonably contestable' and the predictions of the theory will remain reasonably accurate. Thus, it is argued that the behaviour of firms and the benefits to society continuously approach those consistent with perfect contestability as the contestability of markets increase, and that in the real world a reduction of barriers to entry and exit (to make markets more contestable) yields steady improvements in industry performance and behaviour (Baumol et al 1982).

Critics of the theory assert, however, that small deviations from the conditions necessary for perfect contestability result in large deviations from optimal efficiency, and anything less than the assumption of totally unrestricted entry and absolutely costless exit renders the theory inoperable, or at best indeterminate. Schwartz and Reynolds (1983) argue that once a slight deviation from the strict assumptions of perfect contestability occurs, pricing and entry decisions depend upon the nature of interactions between firms as in oligopoly theory (see Appendix I). Consequently, they add, the notion that the economic consequences of almost perfectly contestable markets approximate those of perfectly contestable markets remains to be proven. Shepherd (1984) argues that with any departures from the pure criteria, contestability analysis becomes speculative and little different from conventional theory on entry barriers.
CHAPTER 2 THE STRUCTURE OF THE LINER SHIPPING INDUSTRY

Liner shipping markets are typically dominated by groups of shipping operators formally co-operating in an arrangement known as a conference. In this section, the organisation of conference operators and supply characteristics are examined to define the market structure of the industry.

The organisation of the industry is discussed first in general terms so that the subsequent examination of contestability is not specific to the existing arrangements in Australian liner markets. The supply characteristics of the industry, which reflect, in part, market conditions that are relevant to the contestability of Australian liner markets, are then specifically canvassed. The Australia/Europe trade is used as an illustration.

After the market structure is described, the nature of competition and price sustainability is examined to provide insights into the market behaviour of the operators. These insights were drawn upon to investigate the degree to which the criteria used to define a contestable market are met.

CONFERENCE ORGANISATION

Liner conferences are either open or closed. Open conference membership is not restricted and the arrangements primarily involve rate agreements. Closed conference membership is restricted (membership is by invitation of existing conference members) and may also include the integration of services, internal rationalization of capacity and discipline measures such as revenue pooling.

Conference operators comprise individual lines, container syndicates, consortia or joint ventures. Individual lines operating within a conference only remain on a few trades where the conference has been able to maintain a strong market position. Container syndicates and consortia have been introduced in the face of outside competition and shipper market power. Joint ventures, the closest form of co-
operation, have been established to enable lines to operate world-wide in many trades.

Each form of co-operation, that is, the formation of container syndicates, consortia or joint ventures, is usually undertaken for the purpose of:

- increasing productivity by the use of larger ships and, at the same time, maintaining adequate levels of frequency;
- achieving scale economies through the development of a homogeneous fleet; and
- reducing financial pressure through the spreading of risk.

Conference members operate as business entities within the conference framework and to some extent compete to increase their market share and, as a consequence, their influence in the conference. However, while conferences provide levels of service and stability which benefit shippers, a primary incentive for operators to form conferences is to establish market power and minimise competition with the aim of minimising risk and maximising profit.

Horizontal integration of liner firms within the closed conferences has occurred in the major Australian trades. The result has been a concentration of supply, leaving dominant operators with large market shares (see Table 2.1).

**TABLE 2.1 CONCENTRATION OF OPERATORS SERVING AUSTRALIAN LINER TRADES, 1983-84**

<table>
<thead>
<tr>
<th>Operators grouped by capacity (number)</th>
<th>Ships owned (per cent)</th>
<th>Nominal TEU capacity of fleet (per cent)</th>
<th>Nominal DWT capacity of fleet (per cent)</th>
<th>Average size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 20</td>
<td>107 57.8</td>
<td>115 216 75.1</td>
<td>2 369 459 69.5</td>
<td>22 144</td>
</tr>
<tr>
<td>Others (38)</td>
<td>78 42.2</td>
<td>38 119 24.9</td>
<td>1 038 645 30.5</td>
<td>13 316</td>
</tr>
<tr>
<td>All operators (58)</td>
<td>185 100.0</td>
<td>153 335 100.0</td>
<td>3 408 104 100.0</td>
<td>18 422</td>
</tr>
</tbody>
</table>

*Source* BTE (1986).
Chapter 2

LINER SERVICES

Shippers have a variety of service requirements which are traded-off against the service cost. These service requirements might include:

- scheduled, frequent and reliable sailings;
- rates which remain fixed over a period of time; and
- access to a number of ports.

The importance of the various elements of the service requirements vary from shipper to shipper. Liner shipping services are differentiated because of this diversity of requirement, even though, as in the case of most containerized services, the physical aspect of the movement of the cargo is essentially the same. A definition of a differentiated product is given by Scherer (1970)

When due to differences in physical attributes, ancillary service, geographical location and/or subjective image, one firm's products are clearly preferred by at least some buyers over rival products at a given price.

Given the multitude of service variables, any two operators are unlikely therefore to be perceived as providing the same product by a shipper.

The recent BTE study of liner services to and from Australia (BTE 1986) revealed that Australian export shippers valued frequency of service most highly of all service characteristics. Empirical analysis of the trade-off between cost and frequency, undertaken as part of the study, indicated that a non-conference rate reduction of 7 per cent was required for shippers to be indifferent between conference services and the less frequent services offered by non-conference operators. To offset the difference in all the service characteristics, it was estimated that non-conference rates would have to be 14 per cent below conference rates.

The significance of service frequency and the commercial necessity of ensuring that customers are not lost to competitors makes it important that competing operators have a similar number of ships. This would be particularly the case in a highly contestable market where rate reductions could not be readily offered to compensate for any lower service frequency.
THE COST CHARACTERISTICS OF LINER OPERATIONS

A typical cost structure for the operation of a conference containership at typical levels of utilization in the Australia/Europe trade is shown in Table 2.2.

The cost schedule for a single ship of any particular size derived from this type of cost structure is presented in Figure 2.1. Also shown is the relationship between average variable, fixed and total costs for different levels of ship utilization.\footnote{1}

The maximum achievable level of utilization shown in Figure 2.1 varies

| TABLE 2.2 COST STRUCTURE FOR THE OPERATION OF A CONTAINERSHIP IN THE AUSTRALIA/EUROPE TRADE |
|---|---|
| Costs | Proportion of total cost (per cent) |
| Fixed | |
| Administration | 4 |
| Port charges | 2 |
| Canal dues | 2 |
| Containers | 9 |
| Ship operation\(^a\) | |
| At-sea | 30 |
| In-port | 3 |
| Total fixed costs | 50 |
| Variable | |
| Loading/discharging (LCL costs) | 19 |
| Terminal charges | 26 |
| Port charges | 1 |
| Land cost (centralization) | 4 |
| Total variable costs | 50 |

\(^a\) Ship operation costs include: the capital cost of the ship, insurance, repairs and maintenance, fuel, victuals and stores, and crew.

1. For a more detailed analysis of liner shipping cost relationships refer to Davies (1983a).
Chapter 2

Figure 2.1 Typical cost characteristics of a single ship liner service

Figure 2.2 Typical cost characteristics of a multi-ship liner service
with time and taken over the life of the ship will always be less than 100 per cent. Full utilization is not achievable on a long term basis because:

- excess capacity must be provided to absorb fluctuations in demand until an additional ship is required; and
- containers must be repositioned in loading and unloading operations if all container slots are utilized.

From the above cost structure, the cost characteristics of operating a single ship are:

- average variable costs are approximately constant;
- average fixed costs increase with decreasing utilization; and
- marginal costs are unlikely to ever equal average total costs because of the practical limitation of a maximum achievable utilization of the ship.

The cost characteristics of a multiple ship service can be derived by adding together the supply schedules of single ships as illustrated in Figure 2.2.

The characteristics of the multi-ship cost schedule are:

- the increase in the minimum average cost associated with the introduction of each additional ship decreases as its impact on the average level of utilization diminishes; and
- if the number of ships required to service a given level of output is exceeded the multi-ship cost schedule moves to the right and average costs increase for any given level of output because of the lower level of utilization achieved.

**ORGANISATIONAL SCALE ECONOMIES**

Given the nature of the cost structure for a multi-ship service, there are no significant organisational scale economies in liner shipping. This is because the only cost items which change with the number of ships are administration, land and agency costs and these items only comprise a small proportion of total costs. Organisational scale economies are reported in the literature (Stromme Svenson 1978) to be exhausted after the deployment of three to four ships in any particular trade at which point the administrative establishment threshold is fully utilized.
The absence of organisational scale economies indicates that liner shipping is not a natural monopoly. A natural monopoly requires that the cost of producing a service is lower when undertaken by a single operator than by two or more. As suggested above, after three or four ships are brought into a service there are no further significant scale economies available. Under these circumstances, another line with the same number, size and type of ships will, ceteris paribus, have the same costs.

An exception to this generalization are those trades where the number of ships required to provide a service is less than the number by which the scale economies run out. These trades, however, will not necessarily be serviced by a single operator. Two operators having established approximately equal market shares would be unlikely to increase their capacity with the long-term aim of gaining monopolistic control of the trade because of short-term losses associated with under-utilizing the ships and the long-term risk of not gaining control of the market.

ECONOMIES OF PLANT SIZE

There are significant economies of scale in ship size (Gilman 1980). If not constrained by physical limitations in ports or by service requirements, the size of ship which minimises cost will be determined by the trade-off between at-sea and in-port costs (see Table 2.2). In short-haul trades or multi-trade operations, where the time spent in port is relatively large, a small ship will be optimal. In Australia's long-haul trades, large ships will tend to minimise operating costs.

Physical constraints, such as draft, beam and length, which apply to the ports, canals and cargo handling facilities on the routes over which the ship will be operated, may constrain the operator to choose a ship which is smaller than the size which minimises costs. Service considerations, such as providing a service with an adequate frequency, may constrain ship size further because it influences the number of ships required and their size or capacity for an expected market share.

Figure 2.3 shows the average cost/ship size relationship for the Australia/Europe trade. The economies associated with the deployment of large ships are immediately apparent from the figure. For instance, at 75 per cent utilization, the average cost of a 1000 TEU ship is 20 per cent higher than that of a 2000 TEU ship.
Large ships, however, make the provision of services highly indivisible. The introduction of a ship in a trade can increase the available capacity by a significant amount and on 'thin' trades will substantially affect average utilization of the ships already in service and thus increase average costs. The lower utilization of existing ships in the trade caused by new entrants introducing additional capacity to a trade will increase the significance of the fixed cost component of average total cost because there is a large fixed cost component in operating ships for established operators. The fewer the ships in the trade the greater the effect will be. While a single ship may be technically efficient in the sense that it meets the service objectives at least cost, the presence of operators who are not competing to increase their market share can lead to over-capacity and over-servicing and result in the ships being inefficient in operation.

Figure 2.3 Average cost by ship capacity and level of utilization: Australia to Europe and North Mediterranean trade (1984 prices)
The economies of plant size make it desirable to obtain large market shares. Large market shares, usually obtained by operators combining into consortia, allow the introduction of larger ships without a reduction in the level of service.

ECONOMIES OF SCOPE

Attempts to take advantage of economies of scope are most visible in operations involving the use of combination ships such as con-bulk and con-ro and the fitting of ships with reefer points. Depending on how a market is defined, it can also be argued that the practice of serving large geographical areas out of a limited number of ports also provides economies of scope.

In some circumstances, economies of scope can also be realised by operating in more than one trade. Non-conference operators typically engage in multi-trade operations to gain economies of scope. However, in doing so, the level of service they provide is lower than an operator which has the same number of ships dedicated to servicing just two geographical areas.

All of the above examples of economies of scope are difficult to distinguish from economies of plant size because they are inevitably used to deploy larger ships. For the purpose of this Paper, it will be assumed that the practice of serving more than one market results mainly in savings through economies of plant size.

COMPETITION AND PRICE SUSTAINABILITY

It has already been established that, in the case of 'normal' existing liner operations, marginal costs are likely to be lower than average costs. Furthermore, because of the differentiation of services by shippers, no two operators, that is, individual lines, consortia or joint services, are likely to be perceived as producing the same product. In these circumstances, incumbent operators behave as competing monopolists by setting their own level of output to maximise profits on a product which is similar but not identical.

In markets which are characterised by monopolistic competition, there are usually barriers to entry if an incumbent has control over a market. If there are no barriers to entry, competitors can offer a service which is perceived by some shippers to be the same or better price/service mix. In the long run, providing that operators have similar production costs (that is, they are able to take advantage of economies of plant size to a similar extent) they will continue to
enter into a service on a trade until profits are driven down and disappear when average rates are equal to average costs. The observation of average rates remaining above average costs for prolonged periods therefore indicates the existence of barriers to entry. These may be institutional barriers or a barrier which is fundamental to the industry structure which signifies that the market is not contestable.

A feature of monopolistic competition is that there is almost always excess capacity. In the more competitive monopolistic markets, average rates will tend towards average costs at equilibrium where the demand schedule facing each firm is tangent to the average cost schedule. While there is some negative slope to the demand schedule, the tangent point must be greater than the minimum cost-maximum output point unless it happens to be coincident at the level of maximum achievable utilization (in which case an additional ship will be introduced and thereby increase average costs). The more inelastic the demand for a service the greater the likelihood of there being excess capacity because the slope of the average cost schedule increases as output decreases. If there is not full monopolistic competition in the market, some services will be earning profits. In this case, the demand schedule is above the average cost schedule and there will also be excess capacity.

The situation never arises, given equivalent operating costs, where an entrant can sustain average rates lower than the average cost of the incumbent(s) because average costs always decrease with increasing levels of output. There are also entry forestalling levels of output because of the economies of plant size which, if controlled by an incumbent or by incumbent operators acting as a conference, could prevent profitable entry (Pincus 1984). Sturmey (1967) concludes that conferences do establish deterrent prices rather than maximise profits per se. If this is the case, it indicates that conference operators are concerned about possible entry to some extent and that liner markets may be contestable to some degree.

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2. In practice, higher than normal rates of return could usually be expected because of the high risks involved in liner shipping.
CHAPTER 3 CONTESTABILITY OF LINER SHIPPING MARKETS

As noted in Chapter 1, a 'perfectly contestable' market is defined as one:

. in which the entrant suffers no disadvantage in terms of the technology used nor the perceived product quality relative to the incumbents;
. into which entry is absolutely free and exit is absolutely costless;
. where the incumbents cannot change price quickly and invalidate the evaluation of profitability by the entrant in terms of the incumbents' pre-entry prices; and
. where consumers move quickly in response to price differences.

In essence, the ability of a potential entrant to contest a market depends upon that particular industry's vulnerability to 'hit and run' entry. A contestable market exists when a new firm can exploit a transitory profit opportunity by entering an industry, collecting its profits and exiting before the incumbent firms (whether one or many) are able to react.

The structure and organisation of the liner shipping industry was examined to determine whether the industry is fundamentally contestable. This approach was adopted because:

. fundamental barriers are of prime interest to policy makers considering regulations which must apply to a range of market conditions; and
. an assessment of individual markets would not reveal the extent to which any institutional barriers, such as cargo reservation, were influencing the contestability of the market.

The contestability of liner shipping markets were investigated on the basis of each of the criteria which must be satisfied before a market can be categorised as a perfectly contestable market. To be consistent with the proposal to examine the fundamental contestability
of liner markets, it will be assumed that incumbent operators are generally technically efficient, as inefficiency implies that markets are not contestable.

TECHNOLOGICAL AND SERVICE EQUIVALENCE

For there to be technological equivalence between incumbent(s) and potential entrants in liner markets, the entrant must be able to take advantage of the available economies of plant size to the same extent as the incumbent(s), that is, the entrant must be able to deploy similar sized ships. In addition, unless the incumbent(s) are over-servicing shippers, the entrant must introduce the same number of ships to have an equivalent service frequency. Furthermore, if the entry is to be relatively costless, the ships introduced must be utilized quickly to levels which are at least comparable to those being achieved by the incumbent(s).

In Australian markets, the major conference consortia generally control market shares which are large compared with the share of individual non-conference lines. For instance, in the Australia/Europe trade, as illustrated by the capacity shares reported by Lloyd's Shipping Economist (1983) for 1982, the three main non-conference operators (ABC Containerline, Polish Ocean Lines and Eagle Container Line) would have to combine into a consortium and introduce new ships to attain technological equivalence with technically efficient conference operators. The share of total slots among operators in the Australia/Europe trade was; Australia New Zealand Europe Container Service (ANZECS) 48.2 per cent, Scan Carriers 17.5 per cent, Associated Container Transport (Australia) Ltd/Australian National Line (ACT(A)/ANL) 16.5 per cent with the combined non-conference lines accounting for the remaining 17.8 per cent.

To enter the Australia/Europe liner market with equivalent service and technology to the conference incumbents would require at least five ships of approximately 1500 TEU capacity. Failure to obtain a full return on this fixed expenditure could therefore represent a considerable loss. The large market shares required to operate equivalent technology on 'long-haul' routes, such as the Australia/Europe trade, therefore militate against entry. This may not, however, be the case on shorter more dense trade routes where smaller ships are more efficient. The entrant to a market with these characteristics could introduce an equivalent fleet to the major incumbent operators and only have to attract a small market share to efficiently utilize the ships introduced into the trade.
The scale of non-conference operations in the Australian liner market supports the argument that the risk associated with technological equivalent entry is an effective barrier. Not only is the frequency of non-conference services usually inferior (as indicated earlier) they generally operate smaller ships (see Table 3.1). This suggests they were also unable to take advantage of the economies of plant size to the same extent as the incumbent conference operators. It does not follow, however, that non-conference ship operating costs are greatly different to conference costs because the conference operators have generally chosen to continue to operate their older less efficient ships.

Part of the liner market, however, may be regarded as being contestable in relation to the technological equivalence condition. Some non-conference operators, as stated in the previous chapter, engage in multi-trade operations to take advantage of the economies of scope derived from this type of operation. If lower rates are offered to compensate for the lower levels of service which result from multi-trade operation, as they are in Australia's outward trades, then this type of operation could be quite attractive to those shippers who do not require the levels of service offered by direct-service operators. Nevertheless, the cost reduction associated with multi-trade operations is unlikely to offset the reduced revenue and the

<table>
<thead>
<tr>
<th>Trade area</th>
<th>Average DWT (tonnes)</th>
<th>Conference</th>
<th>Non-conference</th>
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<tr>
<td>Europe and North Mediterranean</td>
<td>25 982</td>
<td>20 430</td>
<td></td>
</tr>
<tr>
<td>Philippines, Hong Kong and Taiwan</td>
<td>17 888</td>
<td>11 130</td>
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<td>Japan</td>
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<td>Papua New Guinea and Solomon Islands</td>
<td>11 835</td>
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.. Not applicable.

Source BTE 1986.
loss of economies of plant size associated with the smaller ship sizes which are optimal for this type of operation. Consequently, multi-trade operations are unlikely, in most circumstances, to affect the contestability of markets.

FREE ENTRY AND EXIT

The existence of sunk costs is considered to be a major impediment to contestability. In the case of liner shipping, sunk costs can be almost entirely avoided. Investment in agencies is not normally necessary and the ships can theoretically be redeployed in other trades or disposed of in a stable second-hand ship market. As long as common-user facilities are available, investment in terminals is not necessary (although some control over operations may be lost) and therefore any sunk component of terminal cost should not be considered as representing an exit cost which affects the fundamental contestability of liner shipping.

An entrant, however, does have to face the possibility that the incumbent(s) may fight and be prepared to forego some profit in the short term to prevent a loss of market share. If this occurs, the entrant may have to lower rates below average costs. As discussed earlier, entrants are unlikely to have technological equivalence. Under these circumstances, the incumbent(s) do not have to incur losses themselves to ensure that an entrant will experience losses in the process of attracting sufficient cargoes to establish the service as a viable operation. These losses will be perceived as potential entry costs unless there is an expectation of future profits. An expectation of this nature would imply that the entrant believes that the market is not contestable, that is, either it is not fundamentally contestable and/or institutional barriers to entry will manifest themselves at some later date. As foresight of future barriers to entry is improbable, the entry of operators without technological equivalence signifies that the market is not fundamentally contestable as defined above and that the rate levels which attracted them are not a short-term or transitory phenomenon.

The potential for initial losses associated with not achieving the required market share quickly, represents a risk that fixed expenditure will not be fully recovered for some time. Entrants

1. If the second hand ship market becomes more or less favourable to sellers between entry and exit, an entrant will experience a profit or loss on exit.
usually minimise the potential loss by deploying smaller ships and by competing for only part of the market. This strategy, however, suggests that the risk of losses is real, and represents a significant barrier to the contestability of the market as a whole.

**PRICE INERTIA**

Incumbent operators can react to an entrant by lowering rates to sustain their pre-entry market share. Conference operators have demonstrated the ability to respond to rate reductions by incumbent non-conference operators on particular commodities. These interim rates are usually called 'special or development rates' but are probably a direct reaction to a potential loss of customers to a non-conference operator. Conferences could, however, similarly respond to a new entrant as the conference members would have time to consider their response to different rate level and structure scenarios because a new entrant would have to advertise the intention to enter a market well in advance of commencing operations.

**RAPID CONSUMER RESPONSE**

Conference operators to some extent, are buffered against competition from a new entrant until the next round of negotiations with the Australian Shippers' Council because shippers are generally under contract. The incumbent(s) will also claim that service will suffer and may even be de-stabilised by the entry. Consequently, there is a natural reluctance on the part of shippers to changing arrangements away from incumbent operators, particularly where centralization is involved and uncertainty exists about whether the entrant will stay in the trade or 'hit and run'. In addition, any reluctance on the part of shippers to change agents because of their knowledge of the shippers' specific requirements could be expected to favour the incumbent(s) and militate against a rapid consumer response to the entry of a competing operator.

In Australian markets, this reluctance to change has enabled conference operators to maintain a share of the task which allowed the members to retain adequate levels of utilization of their existing ships, even where there has been long-term non-conference competition. For instance, over a period of approximately 10 years, the non-conference operators in the Australia/Europe trade, have collectively gained only an 18 per cent share of the market.

The non-conference operators in the major Australian trades have typically set rates at 10 to 15 per cent below the scheduled
conference rates to compensate users for the difference in service and to increase their market share. If liner markets are reasonably contestable, average rates can be expected to be at a level which is approximately equivalent to technically efficient average costs. Under these circumstances, a potential entrant is unlikely to be in a position to sustain a greater rate differential for a period long enough to attract long-term customers. Given the slow consumer response observed in the past, a potential entrant, therefore, would not expect a rapid consumer response to any level of rates which could be set at or above average costs. In the event that an operator entered a market with technological equivalence and a similar level of service as the incumbent operator(s), the incumbent(s) could respond to maintain their market share with equivalent or lower rates within a short period of time in relation to the expected rate of consumer response.

HIT AND RUN ENTRY

The examination of the criteria which must be met for a market to be perfectly contestable suggests that Australian liner markets are not vulnerable to 'hit and run' entry. If, however, the markets are in fact contestable and above-normal profits are being earned, instances of short term entry and exit could be expected to have occurred. In particular, the exits from the market must include instances of voluntary withdrawal from the market.

Figure 3.1 suggests that above-normal profit taking has occurred because, in the absence of any change in technology and consequently costs, rates have been substantially reduced over the succeeding 8 years and the conference operators, by and large, are still in operation and providing similar levels of service. This implies there were profit opportunities to encourage the entry of the non-conference operators in the first place.

If these profit opportunities were a transitory aberration in a contestable market, the theory of contestable markets suggests that the threat of entry would be reinforced and average prices would return to the level of efficient average costs. Under these circumstances, and particularly if entrants do not have technological equivalence, the expectation is that an entrant would leave the market after there was no more profit to be made.

An examination of recent exits from Australian liner services reveals that there have been no instances of 'hit and run' profit taking. Operators which have withdrawn services since 1980 did so for a variety of non-voluntary reasons:
seven went into liquidation;
five were bought out;
three lacked sufficient cargo; and
one withdrew due to a union dispute over the ships used.

Figure 3.1 Trends in conference scheduled rates: Australia to Europe and North Mediterranean trade, 1973-85 (1984 prices)

Source BTE estimates.
The majority of the non-conference operators which entered the markets in the late 1970s with modern ships are still in operation. The continued presence of these operators signifies that the profit opportunity was more than transitory (and possibly a willingness on the part of the incumbent(s) to share the market).

Australia's geographic isolation also militates against the type of entry which occurs in other markets along the world's main shipping routes. Established operators can not readily build up market shares by including calls to Australia without having a significant affect on the levels of service they are providing in their existing markets.
CHAPTER 4 CONCLUDING REMARKS

Australian liner operators typically require large individual market shares to efficiently operate services which utilize large ships at a frequency which adequately meets shipper requirements. In these circumstances, the most significant impediment to perfectly contestable liner markets is the size of the investment and the commercial risks associated with an attempt by an entrant to commence operations with technology which is equivalent to the incumbent(s). Consequently, entrants have not in the past had the same opportunity to take advantage of the economies of plant size which would enable them to achieve similar operating costs to the incumbent(s).

This impediment to contestability arises because of market conditions which militate against rapid shifts in demand between operators. In effect, the entrant is denied access to the whole market and, unless above-normal profits are being earned by the incumbent(s) and/or they are prepared to share the market, the entrant faces a potential entry cost in the form of losses until a viable market share has been captured. This applies to State-owned lines as well as entrepreneurial operators, although in the case of national operators the risks are borne by the State instead of individual owners or share-holders.

The failure of typical Australian liner shipping markets to meet all the contestable market criteria suggests that they may not be fundamentally contestable. In a wider context it might be also concluded that liner shipping in general is not fundamentally contestable because there are markets which do not fulfil the contestability criteria.

The degree to which each market is contestable will depend upon the regulatory environment and specific market conditions and must be assessed on a market by market basis. However, while the degree of contestability cannot be assessed in absolute terms, it is reasonable to conclude that Australian 'long-haul' markets, in particular, are amongst the least contestable of liner markets.
In support of this conclusion are observed instances of:

- the progressive concentration of conference operators into cooperative ventures to secure larger market shares in the face of external competition;
- apparent above-normal profit taking over periods which cannot be regarded as transitory; and
- the entry of non-conference operators without technological equivalence.

Although the precise effect is difficult to assess, the current over-tonnage of the world liner fleet is not expected to impact significantly on the contestability of Australian liner markets. Over-tonnage will have an impact on cost and availability of tonnage for prospective new entrants, however, on the other hand, incumbent operators with ships at the end of their useful life would also take these factors into account in considering replacement tonnage. In addition, it should be remembered that Australian liner trades are generally served by purpose-built ships and there are costs associated with using (or modifying) ships not ideally suited for the trades. For commercial reasons, it might be expected that incumbent operators (who generally have world-wide operations) would be likely to ensure that surplus or displaced tonnage would not become available to potential competitors.

It is also relevant to note that State-owned lines may assess barriers to entry (such as potential entry losses) differently to a commercial entrepreneur and, consequently, act as though the market was contestable. The effect of this is to enhance the contestability of the market and consequently militate against incumbent operators earning above-normal profits.

**IMPLICATIONS**

Contestability theory provides an important new focus for governments concerned with economic efficiency. By examining entry and exit conditions to a market as well as the actual number of operators in the market and their economic behaviour, governments may develop more tractable policies because direct regulation may not be necessary.

1. Over-tonnaging is an exogenous influence on liner shipping operations. As such, it does not affect the concept of fundamental contestability examined in this Paper.
Specifically, to enhance contestability, policies should:

- ensure equal access to technology;
- encourage potential competitors;
- eliminate price controls; and
- address sunk cost problems.

At face value, the above finding that Australian liner markets are not 'fundamentally contestable' and that the degree of contestability varies from market to market, suggests that there may be a role for government intervention in some markets.

While the service and cost advantages of established operators is a major impediment to contestability, shippers can potentially benefit from the greater technical efficiency made possible by the market share of the conference operators. The central thrust of any government intervention in these circumstances is best directed at ensuring operators do not earn more than a reasonable profit (commensurate with the risks) rather than ensuring the market is more contestable per se.

The traditional Australian regulatory approach to concerns about the market power of dominant liner operators has been to:

- seek to ensure that there is an effective countervailing shipper power; and
- remove institutional anomalies which give rise to external barriers to entry.

This general approach appears to be more appropriate in situations where there are potential efficiency benefits which could be passed on to shippers. This is particularly so where action to limit market power (such as restricting market shares) would preclude access to these benefits and so add to shipper costs.

To establish market conditions which are conducive to these benefits being passed on to shippers, it is necessary to address other aspects which would enhance contestability. Such aspects might include encouraging shippers to develop arrangements which avoid 100 per cent loyalty requirements and which at the same time are more responsive to market conditions. It is relevant to note that recent developments in the United States have given rise to time-volume contracts as a vehicle to enhance the market power of shippers vis-a-vis conference operators. Time-volume contracts can encourage shippers to work
together to control significant volumes of cargo and thus substantially improve their negotiating position. The contracts also provide the necessary guarantee of cargo to enable shipowners to continue to deploy large efficient ships at negotiated levels of service.
An argument used to support the usefulness of the theory of contestable markets is the apparent failure of traditional theories to explain instances of low profit in the liner industry (Davies 1984b). In this appendix, a theoretical treatment of the behaviour of industry participants is presented, which is intuitively appealing, and which explains why liner operators co-operating within conference frameworks do not always earn the above-normal profits normally associated with cartels.

One of the main reasons why traditional models do not adequately predict the range of market equilibria observed in the liner shipping industry is because the market equilibrium depends upon the behaviour of incumbents prior to entry and a range of possible outcomes of entry. The strategies, which can be employed by incumbent monopoly operators or conference cartels, are described below and some of the theoretical models of subsequent profit maximising behaviour are presented.

MARKET STRATEGIES

Recently, predatory behaviour has been explained on the basis of Game Theory. Dixit (1982), for instance, uses a decision tree approach to illustrate the strategy options and outcomes which are considered by a firm contemplating entry into a market. In Dixit's model, a committed entrant will incur an entry forestalling cost in the belief that, in the long run, the profit earned less the cost incurred is greater than the profit earned in sharing the trade. In the case of liner shipping this may take the form of:

- pricing to make entry unprofitable; or
- rebating rates in return for shipper loyalty.

If an incumbent is not overtly committed in this way, there must be a reliance on reputation or imperfect information for the entrant to attach some probability that the incumbent will decide to fight against entry.
Potential entrants, according to Dixit's model, make a decision on whether to contest a market on the basis of probabilistic pay-offs associated with several outcomes of entry. The assumption used to examine the probabilistic pay-offs are:

1. pre-entry profits are greater than the profit earned if the market is shared;
2. the profits available if the market is shared are greater than zero;
3. a price war will be conducted on the basis of an expectation that short-run losses would be recovered by subsequent profits; and
4. a price war may result in average rates falling below average costs and losses being incurred.

The possible outcomes are:

1. The entrant will decide that, in probabilistic terms, the shared profits will not exceed those lost in fighting a price war and, on this basis, decide against entry.
2. The incumbent(s) and entrant embark on a price war in the belief that short run losses will be recovered by subsequent profits. If the incumbent(s) can offer superior service to the entrant and the entrant is not employing more efficient technology or is not able to achieve higher ship utilization, the entrant will suffer a higher initial loss than the incumbent(s).
3. The incumbent(s) will decide it is more profitable to share the market. This decision may be reached after a period of price warfare.

MARKET EQUILIBRIUM MODELS

Models of market equilibrium under imperfect competition usually assume that the entrant and incumbent(s) face the same demand curve. This situation does not apply to liner markets because liner shipping operators produce a differentiated product. The device used by an entrant who is competing against an incumbent with a service advantage is to offset that service advantage by offering lower prices. The resulting price differential reflects:

1. the value placed by shippers on the better service provided by the incumbent(s); and
2. an amount to overcome shipper reluctance to change (consumer inertia).
The entrant may, in this process, decide to compete for cargoes of only certain commodities, that is for only part of the market. This does not, however, affect the application of the models or the insights into behaviour they give.

The model with the most intuitive appeal as representing market behaviour in liner shipping is the Stackelberg model (see Varian 1978). This model, which assumes that the entrant will maximise profits after taking the competitors' reactions as given, is compatible with the Game Theory model of predatory behaviour described above. According to the Stackelberg model, the entrant incorporates an expectation of the market share which the incumbent(s) will attempt to sustain. If the incumbent(s) decides to sustain their existing market share and fight, the average rate will be lowered until:

1. average costs are reached; or
2. either the incumbent or the entrant is forced out of the market.

An equilibrium is achieved if the incumbent(s) does in fact react to the entrant's level of output as assumed. This is the outcome where the incumbent(s) decides to share the market.

If the incumbent(s) decides to share the market and the entrant does not want to lead the market by setting rates to gain a greater market share, the Stackelberg model takes on the form of the better known Cournot-Nash model. The Cournot-Nash model assumes that the price shippers pay depends on the aggregate level of output on the trade. In addition, it is assumed that each operator or the conference takes its competitors' level of capacity as fixed. Each competitor maximises its profits given an expectation of the competitor's actions and an equilibrium is reached when the actual output equals the expected output for each operator or the conference. The Cournot-Nash model is also usually used to describe market equilibrium for monopolistic competition which, as suggested above, best describes liner markets.

A result of the Cournot-Nash model is that an entrant can always earn at least the same level of profit by colluding with the incumbent operators. In this case, the resultant cartel of operators maximises profits for the cartel as a whole. Profit maximisation implies that, at equilibrium, the marginal costs of each operator are equal at their respective levels of output. The significant feature of collusion is that it will usually result in a more profitable outcome for each operator than monopolistic competition.
One of the major problems of collusive behaviour is to maintain stability by ensuring that cartel members do not increase their production. The behaviour of conferences in this respect is well documented (Cassidy 1981). The devices used to maintain discipline include revenue pooling which prevents competitive pricing of capacity and reduces the likelihood of competition being initiated again by member operators with a consequential loss of profits.

PROFITABILITY

The above models describe a range of market equilibria where incumbent operators may be earning rents or incurring short term losses with average prices set at below average costs. Given the presence of non-conference competition in most Australian trades and the entry forestalling behaviour of conference operators, above-normal profits would not be the expected norm. Profits will be forced down further if established non-conference operators are prepared to set rates at or below average cost for motives other than profit.

Action by a liner operator to control a market share which makes entry unprofitable necessarily requires excess capacity, particularly in trades where cargo offerings are variable. In addition, a general observation of collusive behaviour is that it leads to inefficiency. Both these factors tend to increase costs and may also reduce profits.
REFERENCES


