DEVELOPING NATIONS AND OCEAN TRANSPORTATION: AN ANALYSIS OF PRICE AND COST OF OCEAN TRANSPORTATION, THE BALANCE OF PAYMENTS AND THE CASE FOR NATIONAL MERCHANT MARINES WITH SPECIAL REFERENCE TO SOUTHEAST ASIA

by

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Paper Number:	Title:
1	K.C. Sen, "Convergence in Planned Economies" (June 1965).
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4	E.D. Hawkins, "Job Inflation in Indonesia" (October 1965).
5	T. Morgan, "Economic Planning--Points of Success and Failure" (February 1965).
6	H.O. Schmitt, "The Integration of Capital Markets in Europe: A Step Towards Political Unification" (January 1966).
7	H. Myint, "The Inward and the Outward Looking Countries of Southeast Asia and the Economic Future of the Region" (February 1966).
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9	P.T. Ellsworth, "Import Substitution in Pakistan--A Comment" (June 1966).
10	S. Naya, "The Commodity Pattern and Performance of Southeast Asia's Exports to the Developed Areas" (May 1966).
11	T. Morgan, "Investment versus Economic Growth" (August 1966).
12	J.C. Leith, "The Specification of Nominal Tariff Rates in Effective Protection Estimates" (October 1966).
13	K.C. Sen, "Economic Growth and the Price Level--An Analysis of Some Asian Data, 1950-1963 (January 1967).
14	P.F. Bell, "A Quantitative Study of Entrepreneurship and Socio-Economic Determinants of Development in Asia" (February 1967).
15	A.C. Kelley & J.G. Williamson, "The Prospects for Regional Economic Cooperation and the Rate of Household Savings in the LDCs" (March 1967).
16	P.F. Bell, "Small Industry: Socio-Economic Aspects of its Promotion in Asia" (March 1967).
17	S. Naya, "Natural Resources, Factor Mix, and the Factor Reversal in International Trade" (May 1967).
18	T. Morgan, "Preferences Revisited" (June 1967).
19	A.C. Kelley, "Regional Integration, Demographic Change, and Patterns of Industrial Growth" (June 1967).

Developing Nations and Ocean Transportation: An Analysis of Price and Cost of Ocean Transportation, the Balance of Payments and the Case for National Merchant Marines with Special Reference to Southeast Asia

by

Bernhard J. Abrahamsson

I. Introduction

One of the problems of developing nations is their dependence on third countries for shipping services. The two major grievances stemming from this dependence are:

1. Liner freight rates are unduly high and are discriminatory against the exports of developing countries;

2. the balance of payments is strained by large freight payments.

Two main approaches have been used by the developing countries to solve the problem. First, facilities for consultations between shippers and carriers to solve shipping problems have been established in some countries.[1] Second, national merchant marines have been developed by some nations to improve their balance of payments.

The appropriateness and desirability of these measures were discussed and confirmed at the United Nations Conference on Trade and Development (UNCTAD) in Geneva 1964. However, the developed countries emphasized the need for consultative machinery and port improvements rather than new national shipping. The arguments against national tonnage are that the gain to the balance of payments is negligible and that opportunity costs are too high. It is also argued that there is excess world supply of tonnage which would necessitate excessive protection, or so-called flag

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[1] A summary of these developments in Southeast Asia is given in "Problems of Shipping and Ocean Freight Rates in the ECAFE Region," United Nations Conference on Trade and Development (UNCTAD), Vol. V., Financing and Invisibles, Institutional Arrangements (New York: 1964).

discrimination, to make new national tonnage profitable. This in turn, would interfer with the rational allocation of world tonnage.

Available data indicate that liner freight rates have followed an upward trend in the post war period whereas tramp rates have generally fallen. Liner conferences cite rising costs of operation as the cause of the increased freight rates. However, when UNCTAD's Shipping Committee met in Geneva in November 1965 for its first session to discuss various shipping problems, a proposal to investigate the level and structure of liner freight rates met with strong opposition from the shipping nations. A postponement of a decision on the proposal was needed to prevent the session from ending in disarray. The major issue was the developing nations' demand for figures on costs and profits of liner operations and the shipping nations' refusal to provide such figures.

The steady increase of conference liner freight rates that has taken place in the post war period is considered by the countries in Southeast Asia as a serious threat to the expansion of trade in the area.[1] Since the region is heavily dependent on foreign tonnage and the trade is dominated by conference shipping, it may seem natural for a particular country to view conference rates as discriminatory against its trade if the rates on similar commodities are lower when applied to a neighboring country's trade. Although a simple comparision of rates is not valid, such comparisons are made and the resulting feeling of discriminatory treatment in terms of conference rates has led to attempts to affect the rate structure by developing national shipping.

Conferences maintain that the increased rates reflect the steadily increasing costs of operations and that, therefore, the factors affecting

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[1] Ibid.

these costs must be the subject of corrective actions if lower rates are to be obtained. Developing national shipping will not influence operation costs and, in the present situation of "over-supply" of tonnage, it may actually increase these costs in particular trades by contributing to port congestion.

Although we do not dispute the claim that operation costs have increased, we argue that such increases only explain part of the total increase in conference rates. Part of the rise in the rates is due to compensatory increases which result from the different market structures in the liner and tramp trades.

II. A Shipping Model[1]

The model represents the behavior of one firm--that is, one shipowner--who is a member of a conference covering a specific trade route. The institutional framework within which the firm operates can, in essence, be described as follows.

A. The Institutional Framework

Conferences are formal agreements to control competition and avoid price wars. Concomittantly, prices are fixed by the conferences. The conference agreements can be of several kinds, ranging from outright pooling agreements, or allocation of number of sailings or shares in the total volume of trade, to service competition. The conference of a particular trade route assesses the total amount and kind of cargo moved on the route. Freight rates are then determined on the principle of "what the traffic will bear".

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[1] I am indebted to Mr. W.G. Waters II for his many useful suggestions, particularly those pertaining to the assumptions and the graphs.

The various members are then either allocated their respective shares of the trade or left to compete on a service basis, i.e., non-price competition. Although the alloted shares are determined with reference to the various members' capacity and customary share of the trade, it is only rarely the alloted share will enable the shipowner to utilize fully his operational capacity.

On every liner route there are also tramp cargoes to be moved. The freight rates for these cargoes are set in a competitive market and are outside the scope of conference regulations. If liners accept such cargoes, they become price takers in the sense that they do not participate in the determination of these rates.

B. Assumptions

Other researchers' empirical observations indicate that average cost falls up to the point of full capacity and then rises very steeply.[1] It is difficult to adapt ship size exactly to the amount of cargo available. This is especially the case if the amount varies at different periods of time. Thus, the large size of the indivisible unit in shipping together with the uneven flow of cargo makes it unlikely that the supply of space and cargo match at any particular instant of time. Furthermore, firms supply space up to capacity because variable costs are small and

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[1] W.J. Eiteman and G.E. Guthrie, "The Shape of Average Cost Curves," American Economic Review (December 1952).

The following abbreviations will be used in the model:

AC	-- Average Cost	PL	--Liner Freight Rate
AR	-- Average Revenue	P	-- Price
ART or PT	-- Average Revenue in the Tramp Market		
ARL	-- Average Revenue in the Liner Market		
AVC	-- Average Variable Cost		
TC	-- Total Cost		
TR	-- Total Revenue		
DL	-- Demand for Liner Space		
Q	-- Quantity		

there are costs connected with laying-up.

The firm is guided by two rational principles, namely profit maximization and security of profits, with a trade-off between the two objectives. As a result of the trade-off the firm has become a member of a conference thus achieving the security objective. Working within the constraint of conference rules, the firm now seeks profit maximization.

The possibility of selling capital is ignored. When freights are high there is no reason to sell. Since demand for and prices of ships vary directly with the freight rates, the short run incentive to sell capital when rates are low is small. We have joint supply of liner and tramp space, but the joint supply is not in fixed proportions. In other words, once a ship of a certain capacity is put into service carrying liner cargo and it is not fully utilized, excess space is by definition in existence. This excess space can be used from tramp cargoes if the carrier so chooses. Since the choice is between empty space or tramp cargoes, the latter will be carried as long as the freight rate covers the variable costs. The liner carrier, therefore, supplies tramp space as the result of supplying liner space. The joint supply characteristic is, however, one-sided. That is, while liner services produce tramp services as a joint product, tramp services do not in general produce liner space.

Tramp and liner services are differentiated when exclusively engaged in by a carrier. Different cost structures are applicable to the two markets. But when a carrier is in the tramp market as a result of inevitable joint supply, the liner cost structure is applicable to both services he performs. From the carrier's point of view, no differential service is performed when he accepts tramp cargoes aboard his liner. He

will not reduce speed, strip the ship of cargo handling gear, or change his sailing schedule because of the tramp cargo. Nor is it a differentiated service from the shipper's point of view. Speed is of minor importance to him and the special cargo handling facilities of the liner are neither needed nor used. If the carrying of tramp cargoes in liners, as "parcels", is not interpreted by either carrier or shipper as differentiated service, the relevant cost curves are, notwithstanding the joint supply, those of liner shipping.

The ratio of variable costs to fixed costs is small in shipping and the rates are set so as to cover the total costs over the accounting period. That is, full cost pricing is practiced: price must be equal to or greater than average total cost. The firm will produce at a point where AR exceeds AC by a maximum amount. Given the assumed shape of the AC-curve in this paper, that point will also fulfill the condition that AC=AR at full capacity and this expression will henceforth be used to indicate profit maximization. Since each member of the conference has his say in the setting of rates, it is reasonable to assume that rates are set at a level which makes it possible for the highest-cost member to cover his costs. Should this level be inconsistent with "what the traffic will bear", the high cost member is persuaded to withdraw. The costs of withdrawing, i.e., of laying-up may be borne by the other members. This implies a continual bargaining process within the conferences to determine the highest cost member actually participating in the carrying trade. It is assumed, therefore, that, in the model that follows, there is no carrier whose AC curve lies above the AR curve. Depending on their cost structures, then, conference members earn either normal or super-normal profits on the space provided for the liner market.

Although the firm's share in the total trade is determined by a bargaining process within the conference, it is assumed, for graphic simplicity, that each member is alloted an equal share of the trade.

The assumptions of the model are then:

1. Industry demand in the liner market is relatively inelastic over the relevant range: a change in P leads to a proportionately smaller change in Q.

2. Demand for the firm in both the tramp and conference liner market is perfectly elastic. For the liner, however, this is true only up to a certain quantity.

3. Carriers operate on the "full-cost" pricing principle. Profits are maximized subject to the constraint of conference rates.

4. AC curve falls until full capacity is reached and then rises steeply.

5. PL is the liner tariff rate set by conferences on the basis "what the traffic will bear" but with consideration taken to the cost structure of members so that the rate is set at a level where AR=AC for the participating highest cost member. PL is rigid downward.

6. Each member is alloted his equal share in terms of a percentage of the trade. If this share is not sufficient for capacity utilization of the fixed capital, the excess liner space may be utilized for tramp cargoes.

7. Conferences do not completely control capacity. Although rates are set by conferences, each member is free to seek his own capacity level--in other words, the individual member is free to withdraw or to build and put into service any number of ships.

Tramp rates never exceed liner rates because the low value of bulk cargoes prevents such a high level of tramp rates. Before proceeding to the model representing the behavior of one conference member, a short exposition of the liner industry price setting mechanism is given below.

C. Industry Price Setting

"No market price similar to that existing in tramp shipping is to be found for liner goods. Freight rate offers by liner owners cannot

therefore, be based on a market price."[1] As mentioned earlier, PL is set on the principle "what the traffic will bear"--that is, at a point where the demand for liner services becomes elastic. Conference rate making is a joint effort and each contribution is based upon "...the subjective, and more or less intuitive conception of the shipping firm as to what the traffic will bear, in which, however, an established institutional custom probably plays an important role."[2] Thus, PL will not be at the level determined by the intersection of market supply and demand curves for any particular member or for the conference as a whole. The point of "what the traffic will bear" thus established may, also, not be the true point where demand becomes elastic.

The situation is depicted in figure 1A where it is assumed that PL is set at a point above the equilibrium rate determined by the intersection of DD and SS and where demand becomes elastic. Thus, of the total conference liner space available (figure 1B), $O\text{-}Q_1$ will be engaged in liner trade and $O\text{-}Q_2$ will be either unused or engaged in tramp trade at the tramp market rate PT. The PL thus determined becomes the conference members' AR curve which, therefore, is perfectly elastic over the range corresponding to the alloted share. This is illustrated in part C of figure 1 and in figure 2.

D. The Model

In figures 1C and 2, PL is the fixed liner rate and (O,Q_A) the firm's alloted share. The firm can supply any amount of space up to (O,Q_A) at the fixed price PL or at a higher price if PL is only a minimum rate. If he wants to supply more, he must leave the conference, in which

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[1] T. Thorburn, Supply and Demand of Water Transport (Stockholm: Business Research Institute at the Stockholm School of Economics), p. 116.

[2] Ibid., p. 119.

case he is free to lower his price and supply as much as he can employ. Neither alternative is rational. A higher price would not attract business away from other conference members, and to leave the conference would invite price wars, the prevention of which is the reason the conference exists.

Should the firm supply in excess of $(0,Q_A)$, the excess can, therefore, only be sold in the tramp market at PT. Thus, the AR-curve becomes the line PL, A, B, ART. With the AC-curve falling until capacity is reached and then rising vertically and the ART intersecting the vertical part, AR=AC where AC is minimum, i.e., profits are maximized at capacity, which is the lowest point of the AC curve. This is always the case where ART lies above the minimum point on the AC curve. Should ART lie below the AC-curve, the firm may still try to operate at capacity since this minimizes AC. The amount of TR depends on how far to the right capacity output lies, the levels of PL and PT, and the size of the alloted share. TC depends on the amount of capacity utilized. If TR is greater than TC, supernormal profits are earned. Normal profits are earned when TR=TC.

If the alloted share equals capacity and the AC-curve's lowest point coincides with PL, then the carrier earns normal profits and engages in the liner market only, i.e., AC1 at point A is relevant.

Should the alloted share exceed capacity and the lowest point on AC is below PL then the carrier engages in liner trade only, but he earns supernormal profits--that is, some point below and to the left of A applies.

If capacity exceeds the allotted share and PL is given, profits depend on the relative positions of the AC curve and ART. If the lowest point of AC coincides with ART (and PL is above ART), then TR is greater

Figure 1

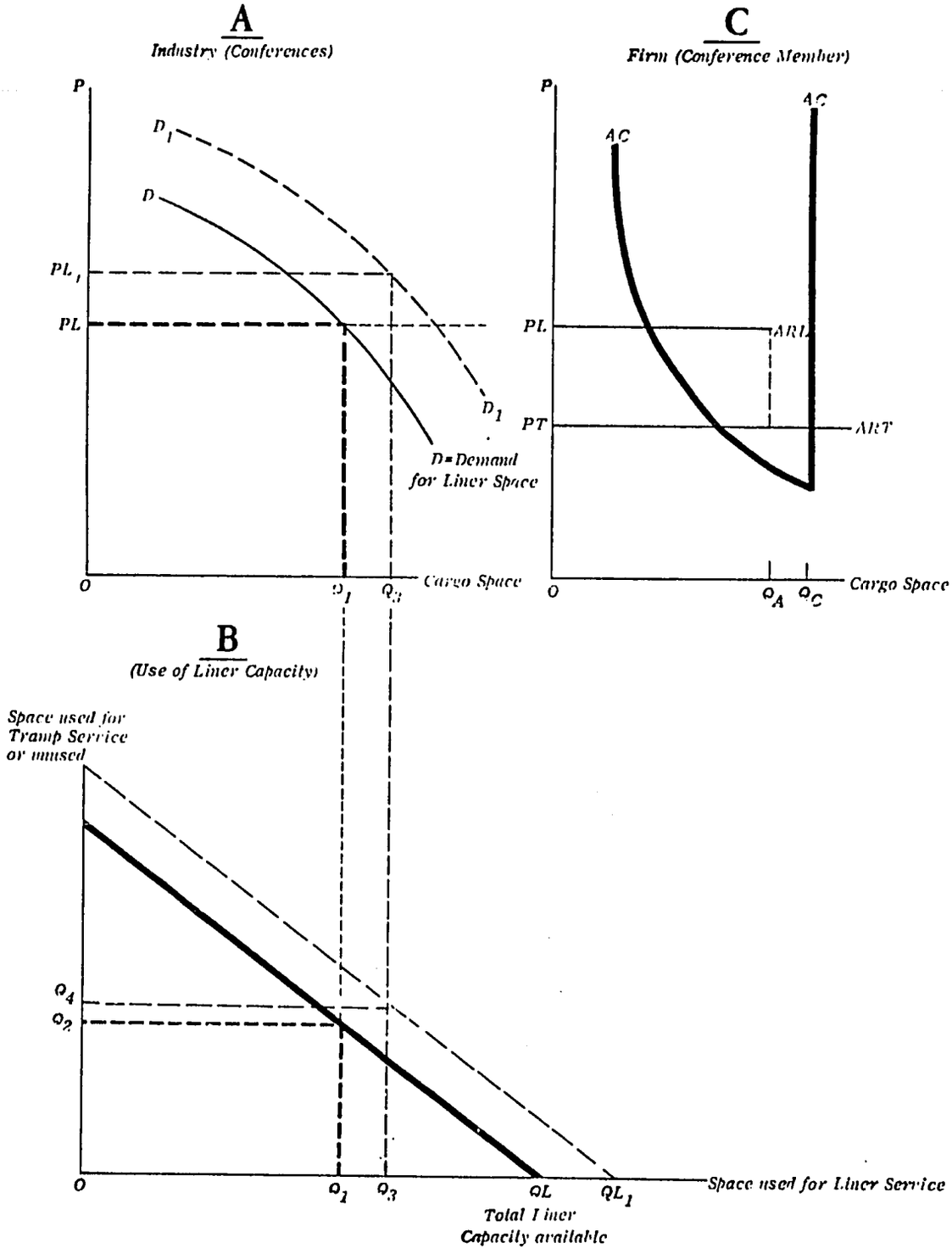

A
Industry (Conferences)
P
D1
D
PL1
PL
D1
D = Demand
for Liner Space
O
Q1
Q3
Cargo Space
C
Firm (Conference Member)
P
AC
AC
PL
ARL
PT
ART
O
QA
QC
Cargo Space
B
(Use of Liner Capacity)
Space used for
Tramp Service
or unused
Q4
Q2
O
Q1
Q3
QL
QL1
Space used for Liner Service
Total Liner
Capacity available

Figure 2

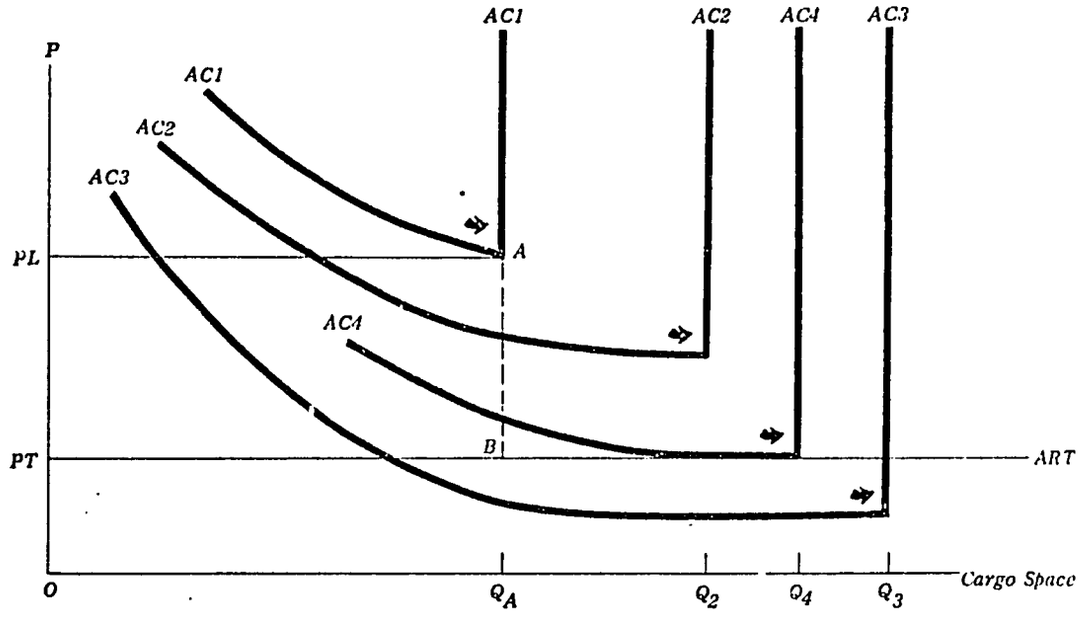
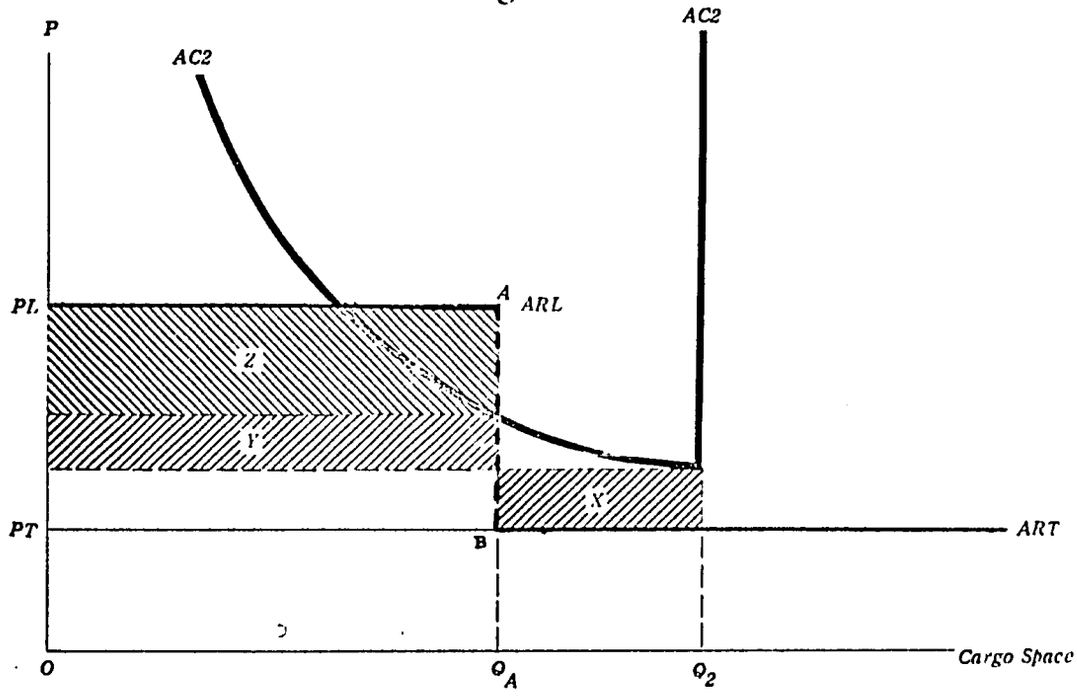


Figure 3



than TC and supernormal profits occur, i.e., AC4 is relevant.

By assumption 5, the lowest point of the AC curve cannot lie above PL. Alloted shares do not usually engage full capacity. Therefore, three cases can occur. First, capacity point of the AC curve coincides with ART, as mentioned in the preceding paragraph. Second, the cost curve's lowest point lies below ART. In both of these cases supernormal profits are earned; AC3 and AC4 are the relevant curves. Third, the AC curve's capacity point lies somewhere between PL and ART. In this case AC2 applies, and losses are incurred on the space used in the tramp market. The space used in the liner market earns supernormal profits as long as the AC curve cuts the (PL-A) line to the left of A. In the marginal case, AC goes through the point (A) and only normal profits are earned on the space engaged in that market. But TR is the sum of revenues earned in both of these markets. When total cargo space is considered, supernormal profits are earned as long as AC's lowest point is on or below ART.

The situation relevant to the present analysis is presented in figure 3, and is the third case mentioned above where ART lies below AC. The firm may still enter the tramp market. Whether it does so or not depends on the degree to which losses in the tramp market are offset by increased profits in liner operations which result from the reduction in unit costs effected by operating at full capacity. In other words, it depends on the relative sizes of the shaded rectangles X and Y in the figure. (Area Z represents profits gained in the liner market alone.) If X equals Y, the losses in the tramp market just offset the increased profitability of liner operations and the firm would be indifferent between engaging in liner trade only or engaging in both markets. If Y is larger than X, profits are increased by engaging in tramp operations; but if X

is larger than Y, the firm would not enter the tramp market and the excess capacity would be unutilized. Supernormal profits are earned on the unutilized capacity in either case. These profits provide the incentive for new entrants into the shipping industry offering non-conference liner services.

Some Dynamic Elements

As trade increases over time, total demand for liner services increases. The conferences adjust each member's share accordingly. Due to profit expectations and political crises such as wars and threats of war, the number of ships is increased, and due to technological progress such as increased size and speed, the operational capacity grows. That is, we would expect (PL-A) in figure 3 to be lengthened and the AC curve's capacity point to move down and to the right. However, as mentioned above, there is an incentive for new firms to offer non-conference services. The "security of profits" motive is likely to eventually prompt some of these firms to seek conference membership which, if granted, will increase both the total conference capacity available and the number of firms among which the tra e is to be allocated. This has a tendency to counteract the effects of increasing demand and to shorten (Pl-A), i.e., demand must increase more than aggregate capacity if the alloted share should grow. At the same time, the excess capacity that may enter the tramp market increases, thus exerting downward pressure on tramp rates. If (PL-A) becomes smaller and PT falls, some firms will withdraw from the tramp market and move along the AC curve to the left. This inefficient level of operacion wtth increased unit costs leads to pressure for higher PL.

A discussion of the shift of the AC-curve leads to similar results.

If the costs of a particular firm's inputs have increased more than is offset by technological progress, the AC-curve moves upward to the right. The essence of the conferences' argument about increasing costs is that this movement of the AC curve is larger than the increase in demand and thus justifies a rise in PL. However, as demand increases we would expect the point where demand becomes elastic to rise as well and conferences would, therefore, raise PL regardless of the development of costs. Indeed, we would expect PL to be raised even if cost remained unchanged or even declined.

In figure 1A demand has increased from DD to D_1D_1 and in part B of the figure the available liner capacity has increased from QL to QL_1. Thus, the result of the dynamic changes is that more space will be engaged in the liner market at a higher PL, but at the same time more space will also be engaged in the tramp market because of joint supply.

Assuming that ART remains unchanged, and that average costs are rising, the distance between the AC curve and ART increases, and losses on space engaged in the tramp market are increased, an increase enhanced by the greater amount of space engaged in that market. This loss is partly offset by more space engaged in the liner market at the new higher PL. Should, however, ART fall over time as (PL-A) moves to the right or left and the AC curve shifts upward to the right, then the distance between AC and ART increases further and losses in the tramp market segment are further enhanced. This development is likely to occur because the liners' entry into the tramp trade in one route would depress tramp rates in that route. The mobility of ships and the competitive structure of the tramp market would enable the marginal operator to move to another trade route. This would increase supply on that route and the "spill over" effect would

continue until the whole tramp market is stabilized at a lower rate level.

Since AVC in the liner market are small, ART can fall to a relatively low level without discouraging the conference members from engaging in the market. That is, it is still rational to choose the carrying of tramp cargoes before going in ballast. Should however, ART fall to a level sufficiently low for conference members to withdraw from the tramp market, TR must come from the liner market alone. If TR is not sufficiently high--TR is less than TC--then a higher PL is desirable for the individual member. With a falling AC curve, operation at less than capacity would also result in a higher PL, since in such a case average costs increase. PL is only rigid downward and can be raised by individual members. However, not all members will raise their price since different cost structures mean different positions with respect to TR. If only one first raises PL, he is likely to lose part or all of his allotted share to conference members who find it worthwhile to disregard the rules and take more than their share; or, a non-conference carrier may capture it. Inasmuch as conferences exist for their members and consideration is taken to the marginal members, there is a tendency for conferences to readjust PL to the new higher level dictated by higher AC resulting from the withdrawal from the tramp market.

The number of conference members that will incur losses from participating in the tramp market will increase the lower ART falls. This happens because the greater the difference between PL and ART, the greater the possibility of a particular firm's AC curve being above ART. Thus, the lower ART falls, the greater the pressure within the conference to withdraw from the tramp market. If we for the moment disregard that

PL is set on the principle of "what the traffic will bear," this leads to pressure from firms toward higher PL. The more conference members there are pressing for such an increase the more probable it is that the increase will occur.

As PL and the AC curve move upwards and the ART moves downwards, the rectangles X and (Y+Z) in figure 3 increase in size. Should X exceed Y, total losses are incurred. The only way to offset such a development--given ART--is to try to increase Z or Y, the latter by lowering AC at full capacity through innovation. It is possible to simultaneously reduce X and increase both Y and Z if the individual share, Q_A, can be increased. Given demand for liner space, this implies that a reduced number of carriers is desirable from the firm's point of view, but as mentioned earlier, the number is more likely to increase. If firms at the end of the accounting period find that profits have fallen, compared to some acceptable norm, the immediate reaction may be pressure within the conference to raise PL in order to increase Z by the amount by which X exceeds Y. That is, the members would resort to compensatory increases in PL. This would be perfectly feasible if the level of "what the traffic will bear" assumed by the conferences when setting the original rates lies below the true level. Although, as mentioned earlier, the two levels may not coincide, conferences and their members act as if this is the case.

Therefore having set PL on the principle "what the traffic will bear" implies that PL has been set at the highest possible level--that is, at a level where DL becomes elastic. Unless the shape or position of DL changes, PL cannot be increased without a proportionately larger loss of sales. Therefore, compensatory increases can only occur if conferences

can change the shape or position of DL so as to make it inelastic over the range between the old and new PL, or, in other words, if they can raise the point of "what the traffic will bear."

"The question of what the traffic will bear is connected in the first place with alternative means of transport available..., and in the second with the risk that the shipper abstains from the transport altogether. One alternative...is to forward the goods in a specially chartered tramp ship. For this, whole cargoes are required. Since the liner goods consist of small consignments, small tramp ships will naturally be needed...The costs per ton cargo increases rapidly if very small vessels are employed, and it is therefore seldom practically possible to take advantage of this alternative."[1]

The only feasible alternative, in terms of ocean transportation, is the use of non-conference liners. The availability of these liners varies according to the trade route. Given that independent liner service, in a particular trade, is inadequate in terms of offering an alternative to all conference service, and given that freight accounts for a very small part of delivered price of a liner commodity, a small--or even a large--percentage increase in PL above "what the traffic will bear," would only initially result in a proportionately greater decrease in sales. A small increase in PL means an even smaller increase in landed price and, if the elasticities of demand and supply of the goods carried by liners are such that the incidence of the increased freight can be passed on to the consumer, the point of "what the traffic will bear" will, with some time lag, be raised. Considering, however, that the original point is ar-

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[1]Thorbun, op. cit., p. 117

rived at by "intuition" and "custom" and not necessarily is the true point, it is possible that the raised level of "what the traffic will bear" is merely a lagged adjustment narrowing the gap between the true and assumed levels, and not a dynamic change in demand. It is probable that the initial reaction of shippers to a rise in PL and the possibility that such increases may lead to demands for legislation and control of conferences prevent the latter from resorting to compensatory increases unless the pressure for such action is very strong within the conference.[1]

Increases in PL dictated by increased AC resulting from the withdrawal of liners from the tramp market would, in effect, probably show up in the dynamic changes in operation costs and demand for liner services, and it would be difficult to distinguish the effects of rising costs due to a movement along the AC-curve from those resulting from a change in the position of the curve. That is, a movement along the curve would be to the northwest, but if technological progress and increased costs of operations outweigh this movement, the AC-curve would shift to the northeast.

It is now possible to summarize the main points of the preceeding discussion: We would expect the point where demand becomes elastic to move upward and to the right as demand increases. Conferences charge "what the traffic will bear;" hence, PL will rise over time regardless of changes in costs. Liner capacity also increases because profit expectations attract new entrants into the industry; technological progress and periodic political crises increase the supply of ships even more.

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[1]The political powers of governments thus act as an effective competitive force. The politically feasible freight rate level determines to a great extent the rate of increase in PL, the time of implementation and the permanency of the increase. That is, at each instant of time the political environment determines what conference price policy may be tolerated without evoking government interference.

New entrants seeking security of profits are absorbed into the conferences possibly reducing each member's share of the total traffic. In addition, an increasing amount of excess capacity goes into the tramp market driving tramp rates (PT) down. As PT falls, some members will incur losses on the space engaged in the tramp market. They still remain in the market, however, because the losses are outweighed by the gains resulting from the lower unit costs achieved by operating at full capacity. When this is no longer the case, some firms will generate pressure within the conference to raise PL so as to compensate for the losses and enable them to remain in the tramp market. Others may find it more profitable to withdraw from the tramp market thus incurring higher unit costs of operation as they move along their AC-curves. These firms will refer to higher costs in their claim for a higher PL.

Thus, increases in PL may be the result of:

1. Monopoly power in an industry faced with a growing inelastic demand
2. Shifts upward and to the right of the AC-curve
3. Compensatory increases to enable firms to operate at capacity and minimum AC when losses in the tramp market are not offset by declining unit costs
4. Conference liners' withdrawing from the tramp market resulting in higher unit costs due to an inefficient level of operation.

Although increased costs alone can explain the increase in liner rates, it is probable that a part of these increases is due to declining tramp rates and the element of monopoly power of conferences. The falling tramp rates, in the face of increasing world trade, are explained by

the chronic "over-supply" of liner tonnage, tanker and liner competition in tramp markets, and the periodic entry into this market of tonnage which has been employed on time charter.

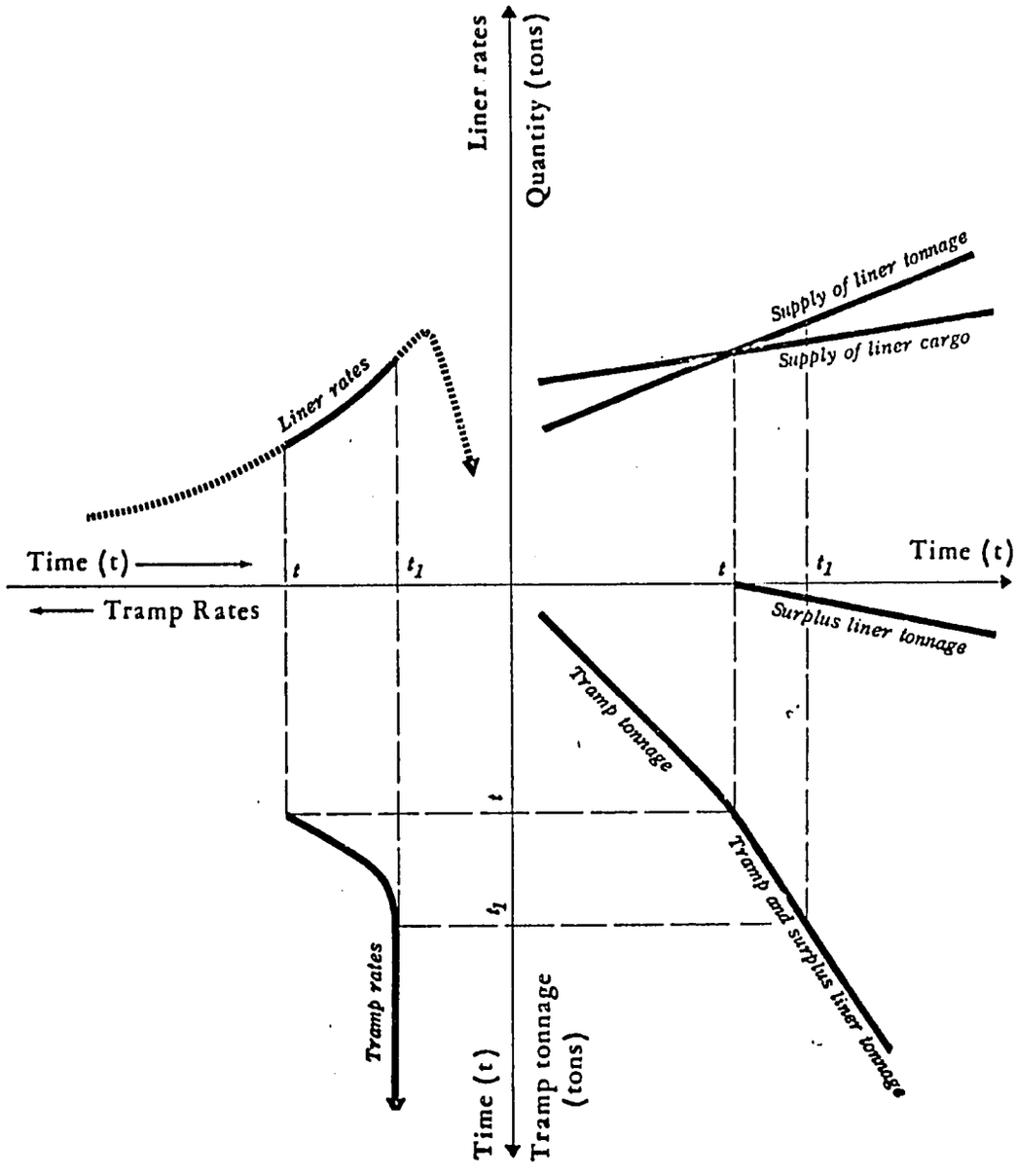
E. Summary and Some Further Aspects of the Model

The argument is summarized graphically in Figure 3. The horizontal axis measures time from the origin to the east and tramp rates to the west. Time is measured horizontally from west to the origin. The vertical axis measures time from the origin to the south on the southwestern side and tramp tonnage on the southeastern side. Liner rates are measured from the origin to the north on the northwestern side and quantity in terms of tons on the northeastern. The various curves are labeled.

Starting in northeast, supply of liner tonnage is in excess of supply of liner cargo, i.e. supply of space exceeds demand for it, after time (t) is reached. Thus, at that time (t), the surplus liner tonnage is put into the tramp market, the effect of which is illustrated in southeast. Tramp tonnage, therefore, begins to increase at time (t) and tramp rates begin to fall as seen in southwest. It is not known how these rates behaved before (t) but it is argued that they cannot fall below a certain level--thus, the flattening of the curve at (t_1). When tramp rates begin to fall, total revenue of liners decline and liner rates are raised to compensate for this development. This is illustrated in northwest.

It is difficult to say how liner rates behave when tramp rates reach their lowest level at (t_1). Excluding increases in liner rates due to increased costs, the rates will possibly stabilize at the level reached at (t_1). But if more liner tonnage must be put into the tramp market at

Fig. 4. GRAPHIC SUMMARY OF THE ARGUMENT FOR COMPENSATORY INCREASES



the prevailing low tramp rates, further attempts at compensatory increases must be expected.

This leads to a further important implication in the model. There is, and must be, an upper limit for compensatory increases. If excess supply continues to increase and is engaged in the tramp trade after tramp rates have reached their lowest level, compensatory increases may continue somewhat further. They will cease when the excess liner tonnage cannot be fully employed in the tramp market. That is, the tramp market is being over-supplied with tonnage. In other words, there is a general excess supply of tonnage. The effect on the tramp market would be pressure on the participants towards more efficient production. The immediate effect on the liner market, on the other hand, would be a feedback of tonnage from the tramp market. The resulting excess supply in the liner market would necessitate too large compensatory increases to be feasible politically or otherwise. The final result may be pressure upon the conferences by members to ease regulations controlling competition. Some members may leave the conferences if such easing is not forthcoming. As a substitute for these courses of action, innovation may be actively pursued. In either case, liner rates--excluding increases dictated by costs--should stabilize or decline.

The situation starting the sequence of events and depicted in the northeastern quadrant, is a kind of expanding cobweb the functioning of which can be outlined as follows:

The system--liner and tramp markets--is in balance, i.e., no excess demand for or supply of tonnage exists in either market. An autonomous shock such as war, political crisis or technological innovation leads to an "abnormal" increase in demand. The resulting high freight rates pro-

vide incentives to new ship construction. When the demand-generating effects of the shock wear off, the supply of tonnage is greater than would have been the case had it responded to "normal" needs of growing world trade. Thus, excess supply has been created. The near-perfect market conditions in the tramp market ensure that the excess tonnage in this market disappears. This is not the case in the liner market. Liner rates remain high, the excess supply is put into tramp trade and the process described in Figure 3 takes place.

If no further shocks occur, demand due to growth of world trade will "catch up"with supply. However, compensatory increases have meanwhile raised liner rates. These high rates provide, again, incentive for new ship building. Trade cycles and new autonomous shocks create optimism as to the possibilities of utilizing more tonnage. The liner operators, basing their investment decisions on utilization prospects and prevailing liner rates, are led to new ship construction which again results in excess supply of liner tonnage. The "split" between the liner and tramp market continues until the pressure of the excess supply is brought to bear on liner rates in the manner described above.

While, admittedly, this exposition relies heavily on theoretical inference, recent autonomous shocks--excluding the Second World War--resulting in excess tonnage can easily be found. The Korean War, the crises of Berlin, Cuba and Suez, all generated "abnormal" demand for tonnage. The response of supply had its full effect with some time lag because of time lapsing between placement of orders and delivery of ships. The Suez incident in particular had far-reaching effects. Many ship-building countries increased their building capacity to meet needs for more ton-

nage on the assumption that the canal might be closed permanently or that its use might be tied to political considerations and objectives. Ship owners, sensing government concern, placed large orders for new tonnage which was delivered in 1958 when the apprehensions prompting the construction were shown to be groundless. The Suez crisis also gave the impetus to a larger scale utilization of technical know-how for the building of very large ships--primarily tankers.

There are also some signs that the "split" may have reached its final stages. The drive towards more efficient production in the tramp market has been discernible for some years in the advance of special carriers and large, fast tramps. Coming technological innovation is evident in the liner market where the use of containers is gaining momentum in most maritime countries. Trials with roll-on-roll-off ships have been successful and such ships are in operation. There are proposals for the building of ships consisting of separate propulsion and cargo holding units, and the "hovercraft" is already in limited use.

It follows from the model that policy-makers trying to secure lower conference rates, must consider policies affecting either compensatory increases or the cost structure of conference members or, preferably, both.

III. Implications of National Tonnage in Terms of the Model

A. Short-term Effects

There are short and long term implications in the model. The short term aspects refer to a situation somewhere between (t) and t_1) in Figure 3. That is, tramp rates have not reached their lowest level and there is, thus, scope for compensatory increases.

If, in this case, new national tonnage is brought into tramp shipping in a certain trade, rates will fall in that particular trade. The marginal operator will move into other tramp routes thus depressing freight rates in those trades and driving the marginal operator in these trades into other routes where the same development will take place. This "spill-over" effect continues from route to route until lower rates prevail in the whole market.[1]

As has been shown, this may have the effect of boosting conference rates. There will be some beneficial effects on trade in bulk commodities from the general decline in tramp rates, but these lower rates are "subsidized" by increases in liner rates. Whether this is good or bad depends on the incidence of the freight costs. If a particular country pays the freight on both its imports and exports, its situation with regards to freight payments remains unchanged. If, however, the importer pays the freight, then developing countries are likely to be the losers. They will pay a higher freight on their imports which are primarily liner commodities. But the lower tramp rates will be beneficial only if the lower rates on their bulk exports increase the demand for these commodities to an extent where increased export earnings offset the increased freight payments on imports.

National tonnage which join conferences probably have no short-term effect at all in reducing freight rates. First, it is likely that a Southeast Asian shipping company will be representing a minority interest in the conference and such interests have little opportunity to influence

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[1]Because of the costs connected with laying-up and then reactivating a ship, rates can fall relatively far before supply decreases because of laying-up.

rate decisions.[1] Second, participation in conferences bind them by agreement to observe rules and regulations in rate matters and this prevents unilateral rate reductions.

Non-conference liner operation seems to be one area where national shipping can influence rates in theshort term. Increased tonnage in this kind of operation will have some influence on tramp rates since some joint supply exists. However, inasmuch as tramp rates are affected, conference earnings are also affected and compensatory rate increases may again occur. Since non-conference liner rates "shadow" the conference rates we can expect increases also in the independents' rates. Thus the effects of engaging in independent liner operations are similar to those of engaging in tramp shipping.

There are two major differences, though, in the final effects of the two kinds of operations. First, tramp trading will, through "spill-over" effects, affect the <u>whole</u> market and cause a relatively permanent lowering of tramp rates which will affect conference rates in <u>all</u> trades. Non-conference operations will have the same effect to the extent they infringe upon tramp markets, but since the part of the independent liners' space used for parcels is small, the effects will be much smaller than in the case of tramp shipping. Second, at a particular instant in time the independent liner is confined to a particular trade route, and only

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[1]For instance, it is noted that Philippine conference members have not been able to influence conference rates. ("Ocean Shipping and Freight Rates and Developing Countries" UNCTAD, Vol. 5, <u>Financing and Invisibles, Institutional Arrangements</u> (N. Y., 1964), p. 252)

that small part of its services which affects tramps will have world-wide repercussions. The major impact of its services will be felt in the trade where its liner services are offered. The increased competition among independent operators will exert downward pressure on non-conference rates. This may lead to counter-actions by conferences either by some kind of price war or by actual, relatively permanent, decreases in liner rates. The latter result is probable if the conferences are made to understand that national independent operators are in a financial position to survive rate wars.

However, the potential decreases in conference rates mentioned above can only be obtained to the extent compensatory increases have taken place. That is, non-conference liners could provide alternative means of transportation, and thus make it difficult for conferences to raise the point of "what the traffic will bear." It may be possible even to lower this point. The independent carrier is not tied to any agreements making his price rigid downward. He faces a demand curve, which because of the existence of rigid conference rules, is relatively elastic. Thus he can lower rates if necessary and will be able to engage more of his capacity in the liner market than will the conference member. He may, therefore, be able to operate close to capacity, i.e., at low AC--and still engage mostly in the liner market. By offering low rates and having the support of the government in case of a rate war, the independent operators may be able to offer a low-cost, dependable alternative to conference shipping. The more abundant independent tonnage is in a particular trade, the lower will be the conferences' point of "what the traffic will bear." The increases in rates due to cost factors can only be met by actions aimed at lowering operation costs and will be

discussed later.

The model is not directly applicable to the case of either state trading or cargo preferences, i.e., flag discrimination. Both measures have the effect of restricting cargo to specific tonnage.

In state trading, a fixed amount of cargo is in each instance allocated to tonnage of a particular flag. The freight rate is usually set by bilateral agreement between the governments involved. Thus, the world market freight rates are not directly affected by state trading. Inasmuch as state trading removes some cargo and tonnage from particular routes, freight rates are indirectly affected, but it is impossible to say in what manner. It is probable that bilateral governmental negotiations pay more attention to the carrying capacity of the tonnage to be used, and therefore, that less tonnage is removed from the world market than would be the case if the cargo involved was to obtain tonnage in the world market. For example, if 100,000 tons of liner cargo are to be shipped, ten specified ships of 10,000 tons each may be set aside, or one ship of 10,000 tons may be scheduled to make ten trips. The timing of the shipments is adapted to the availability of the specified ship(s). Thus, 100,000 tons of shipping capacity are used to move 100,000 tons of cargo. If instead, tonnage were obtained in the open market at the time when the shipment was ready, it is possible that the optimum ship for the particular shipment would not be available. Smaller or larger ships would have to be used. The end may very well be that the movement of 100,000 tons of cargo necessitated the use of considerably more carrying capacity.

If this is the case, then more cargo than tonnage is removed from the world markets when state trading takes place.[1] This would enhance the "over-supply" of tonnage and, if we accept the above argument, the model can be used to analyze the implications of state trading. That is, increased supply of liner space which cannot find employment in the liner market leads to more such space being offered in the tramp market. Tramp rates may fall and compensatory increases in liner rates may occur.

Cargo preferences, on the other hand, would tend to increase freight rates because they restrict shipments to a specified amount of tonnage which in all cases is smaller than what the world market can supply and because market forces are left free to operate in this isolated market. In Southeast Asia where all merchant marines are very small cargo preferences would restrict the supply of tonnage severely and, unless effective administration could control the situation, rates would probably increase. The U.S. has experienced a similar development.[2] Apart from these undesirable economic repercussions, there would be political complications with regard to the traditional maritime nations which have established themselves in the various trades.

In summary it can be said that the short term effect on freight rates by new national tonnage is to lower tramp rates and increase both con-

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[1]For example, let us say that under "normal" conditions it is necessary to use 150,000 tons carrying capacity to move 100,000 tons of cargo. If state trading should have no effect on the world shipping situation it should also use 150,000 tons of shipping to move the cargo. But if actually only 100,000 tons of shipping is used, then, in a relative sense, state trading increases the supply of tonnage by 50,000 tons.

[2]U.S. Congress, Joint Economic Committee, Discriminatory Ocean Freight Rates and the Balance of Payments (Washington: U.S. Government Printing Office, January 6, 1965).

ference and non-conference rates. The magnitude of the movements in the rates is, however, different depending on what kind of shipping the national lines engage in. The effects are strongest if they enter the tramp market, and weakest if they join the conference. However, independent liner operations would provide a good alternative to conference shipping, and thus offer possibilities in terms of lowering conference rates. Only in this segment of the shipping industry will, on a short-term basis, increased tonnage not only have small effects of the kind mentioned above, but also exert pressure on liner rates and may force conferences to forego compensatory increases.

B. Long-Term Effects

Taking a longer view, however, tramp shipping becomes the important segment (see Figure 3). By engaging new tonnage in the tramp market the direct effects are to lower tramp rates and raise liner rates. The faster tramp rates fall, the sooner they will reach their lowest level. Concomitantly, liner rates will reach their highest level after which they may decline. Thus, a massive employment of new tonnage in tramp shipping would enforce the development of the "split" and thus facilitate the feed-back of excess supply to the liner market which in turn would lead to competition and innovation.

Although the strongest long-term effects are to be obtained from new tramp tonnage, it is clear that any mode of shipping operations would have the same long term effects. It is merely a matter of degree, in terms of length of time needed to accomplish the process, that distinguishes the effects. Rate increases dictated by cost conditions can only be removed by taking action to lower costs of operation.

IV. Influencing the Cost Structure of Shipping

In shipping, as in any other business enterprise, it is essential that long term revenues should be sufficient to cover all costs. It is useful for analytical purposes to divide the costs of water transportation as incurred into two parts. The first is the expenditures most governments make in providing for waterways and port facilities. These investments are generally not self-liquidating. The fees charged for the use of the facilities are usually nominal and the costs are primarily borne by the tax payer. However, the costs connected with the use of the facilities such as cargo handling and warehousing are partly borne by the carriers and included in the freight rates, and partly by the shippers. The costs incurred by governments will be referred to as indirect costs, i.e., indirect as far as the ship owner is concerned.

In the second instance we have the costs incurred by the carriers directly, or direct costs. This cost category can be considered as consisting of two components. The first is the capital cost of acquiring the transport equipment. Depending on the life of the equipment, some definite portion of its cost must be charged to the shippers of goods, and thus enters into the freight rates. The second component is the operating cost. Included in this are the crew's wages, fuel, maintenance, insurance, administrative costs, commissions to brokers and port costs.

If permanently reduced freight rates are dependent on lower costs of operations, it is necessary to consider the second component of the direct costs only. The scope for action depends on how large a proportion of operation costs the various items making up this component account for and on the source initiating action, i.e., on whether carriers or governments, as representatives of shippers, initiate action.

Recent research shows that the most important part of the operations costs is accounted for by port costs. "Sixty to seventy per cent of the cost of transporting cargo at sea is accounted for by what takes place while the ship is at the dock, and not by steaming time."[1] Judging from the frequent surcharges imposed on shipments from Southeast Asia it is highly probable that a figure closer to the upper limit is relevant for the area, especially since inadequate internal transportation facilities contribute to congested ports and long waiting times for the vessels. Port congestions have posed one of the most important problems in shipping in the post-war period. It has been estimated that the average dry-cargo ship spent 250 days at sea in 1937, 140 days in 1950, 170 days in 1954[2] and 146 in 1962.[3] These figures provide a measure of port congestion in 1950 and the subsequent improvement and deterioration in 1954 and 1962 respectively on a world-wide basis. No later estimate seems to be available, and it is not possible to say if there has been an improvement again. However, the frequent imposition of surcharges and general rate increases applicable to Southeast Asian ports imply that shipowners still consider port congestions in this area a serious problem. In Indonesia, for example, little has been done to improve or maintain shipping facilities since 1940, and it has been estimated that turn-

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[1]D.C. MacMillan & T.B. Westfall, Competitive General Cargo Ships (Society of Naval Architects and Marine engineers, November 1960), p. 2.

[2]U.N. Monthly Bulletin of Statistics, March 1956.

[3]Great Britain, Parliamentary Papers, Cmnd. 1824, Report of the Committee of Inquiry into the Major Port of Great Britain (London: Her Majesty's Stationery Office, 1962), p. 112.

round time in ports is three to four times greater than elsewhere in the region.[1]

The problem of port congestion underlines the importance of steps being taken nationally to modernize ports.

It is obvious that a country dependent on third countries for shipping services is not in a position to affect that part of operating costs accounted for by the crew's wages, fuel, maintenance, administrative costs and brokers' commissions. However, insurance is to some extent affected by the conditions of the ports the ships call at, and a country can affect the insurance premiums paid by another country's carriers by port improvements.[2] This aspect of reducing costs is small relative to the other results that can be accomplished by such improvements. From the shipowners' point of view, though, it means that government action on ports has a greater final effect on the carrier's cost structure than the immediate lowering of port costs indicates.

Measures to lower operation costs can, thus, be taken both by governments and by ship owners. The former can influence the port costs and to some extent carriers' insurance costs. These two items most likely make up 50-75 per cent of total operation costs. By implication, ship owners can effect 25-50 per cent of these costs. It would seem that the scope for government action is wider than that of carriers in affecting operation costs. However, there is a close relationship between actions taken by the two parties. By necessity there is a close connection be-

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[1]U.S. Economic Survey Team to Indonesia, Indonesia: Perspectives and Prospects for U.S. Economic Aid, (Report to the President 1962), p. 82.

[2]The insurance referred to here is for the ship and crew. Cargo insurance is, on the other hand, not affected so much by the physical conditions in the ports, but rather by administrative conditions which may provide more or less opportunities for pilferage.

tween ports and ships. This suggests that a qualitative change in one party will have repercussions on the other. In other words, technological innovations in shipping equipment which require facilities other than those currently available in ports will either bring about such facilities or the innovation will simply not be generally accepted.

It can be questioned what the causal direction is. Do ship designs affect port facilities or do the latter bring about changes in the former? It is difficult to give an unequivocal answer although a good case can, at the present, be made for the ports' dominating the relationship. Ports require huge long-term investments. At the time the investment is made, the port facilities are adapted to the existing or immediate foreseeable shipping technology. Apart from propulsion machinery and construction material, the shipping industry did not introduce any major innovation for a long time. The expectations as to possible innovations were small and, therefore, the immediate foreseeable shipping technology was conceived as not materially different from the existing technology and ports were built accordingly. The ships, on the other hand, while requiring large capital investments and having a life of 20-30 years, are, relative to ports, short-term investments and of short duration. A ship owner who builds a new ship after port facilities have been established adapts the ship's design to these facilities. The heavy investments necessary for major innovation in established ports deter such innovations and this, in turn, holds back innovating ship owners. There are, of course, institutional factors in various countries which also prevent innovations in shipping. For instance, labor unions in many countries have resisted the introduction of containers and actually prevented their use in some trades.

Indirect evidence for the above argument is the fact that while

modern freighters at sea today may have finer hulls, better propulsion units, more efficient winches or cranes, and better navigational aids and living quarters, their basic characteristics are essentially similar to the vessels of fifty years ago. On the other hand, tankers, bulk ore carriers and a wide variety of specialty vessels carrying such items as cars, liquid chemicals, wine, orange juice, bulk cement and hazardous chemicals have changed drastically in size and design.

The latter ships are engaged in a new kind of trade and they were built for those special trades. New ports and equipment were constructed specifically for these ships and trades. Thus, ports were developed with reference to the particular ships they were to serve. The conventional ships engaging in conventional trade do not generally call at tanker or specialty ports, but are tied to ports with conventional facilities and are therefore deterred from major innovation. The innovation that has taken place has had impact on the cost structure inasmuch as better hulls, winches and propulsion units increase speed and ease of stowage thus increasing the operational capacity per unit of cost. Better specification of materials and machinery also reduce insurance costs.

These developments have at times been interpreted to mean that conferences are incapable of absorbing rising costs by rationalization and technological development.[1] It has been pointed out that freighters are primarily under conference control and specialty ships are not. From this it is concluded that conferences use their monopoly power to resist innovation.

This argument necessitates a closer look at the possibilities avail-

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[1]See Times (London) Jan. 3-4, 1962, quoted in J.L. Eyre, The Unhappy Marriage, paper delivered at the American University School of Business Administration (Washington, D.C., May 22, 1963).

able for freighter operators to lower costs and what technical developments could be taken advantage of in the shipping industry. First, carriers can lower costs by better utilizing their equipment. The present situation of over-capacity tends to keep costs and rates up. On the other hand, the liner market structure leads to over-capacity and, unless the conference system is abolished, there is not much scope to increase utilization beyond present use. Nevertheless, it is true that the individual ship owners encourage, by all means at their disposal, maximum utilization of capacity in both directions along a trade route.

Another means of reducing operation costs is to introduce larger and more efficient equipment. This means is being used, but primarily in tanker operations.[1] Although it has been calculated that a 65,000 ton tanker can operate profitably at rates that would drive a 20,000 ton tanker into bankruptcy and that the ratio of operating costs of these two sizes is shown to be 2:1,[2] it should be kept in mind that this cannot be applied to dry-cargo ships. A tanker needs only some connections to

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[1] Average Increases in Sizes of Ships Under Construction

Tonnage Group (g.r.t.)	Percentage Change from Preceeding Year 1961	1962
100 - 2,000	4.0	3.1
2,001 - 4,000	2.9	2.0
4,001 - 8,000	-0.7	-2.5
8,001 - 10,000	1.4	2.7
10,001 - 15,000	4.8	3.4
15,001 - 25,000	11.2	7.6
25,001 - 30,000	39.0	14.8
30,001 and up	54.0	35.0

Source: Maritime Transport 1961 and 1962 (OECD).

[2] Pipelines in Relation to Other Forms of Transport, III A/8, World Power Conference, Sectional Meeting, Madrid, June 1960.

a pipeline and can load and discharge at outlying terminals which only house the pipeline connections. As long as the depth is sufficient, the size of the ship is generally unimportant. A dry-cargo ship, however, engaged in general cargo trade, needs dock space as well as depth to be operated most efficiently. Both conditions entail that ports have to be chosen carefully before entry is attempted. Unless the major ports in the world undertake dredging and enlarge berths, very large cargo ships will be restricted to very few ports. It is most probable that in such a case they would have difficulties to secure enough cargo to utilize the capacity fully and costs would increase rather than decrease. This is apart from the higher port charges, cargo handling costs and longer turn-round time.

Shipboard automation, while increasing safety and efficiency in cargo handling, has the effect of increasing capital costs. Since the number of crew members aboard a ship is determined by legislation, union agreements and international safety agreements, automation has usually little or no immediate effect in cutting the cost of wages. Research has also shown that shipping of general cargo can be most effectively improved by changes in the so-called "process segments" of receipt and storage, loading and discharging, and receipt and handling, rather than in the "movement segments" of inland and sea transport.[1]

Another study divides port delays into controllable delays and unavoidable delays. It found that the delays that could be controlled or avoided revolved around waiting time--waiting for pilots, for tugs or

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[1]The S.S. Warrior: An Analysis of an Export Transportation System from Shipper to Consignee, National Academy of Sciences--National Research Council, Publication 339 (Washington, D.C., 1954).

barges, for berths, for stores, and for clearance of customs papers. More time was lost on such delays than on unavoidable delays such as adverse weather and tides.[1] Short working hours in ports, improper stowage necessitating shifting of cargo, inefficient customs procedures, and lack of storage facilities are the major reasons for port congestions and high shipping costs in Indonesia,[2] and these conditions are likely to be duplicated in many Southeast Asian countries.

It seems, then, that innovation by carriers in the field of cargo stowage would be the best cost reducing action they can take.

The most important technical development with implications for stowage as well as other aspects of the transportation system has been the development of pallets and containers. Pallets and containers obviate much cargo handling and make possible the use of smaller stevedore gangs. Any pallet or container system is less costly than the conventional break-bulk system of carriage; pallet systems cost less than corresponding container systems but containers can be bigger than pallets and the bigger the container the more savings accrue; the closer to the origin of the shipment the consolidation into containers takes place, the more are total transportation costs reduced; the higher the degree of utilization of the container, the more costs decrease; the costs of shippers, stevedore companies and carriers are, under all pallet and container systems, significantly lower than under the conventional break-bulk system. The same is true of the costs for operators of marine

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[1]New York Times, February 21, 1965, reviewing a study by Socony Oil Company.

[2]U.S. Economic Survey Team to Indonesia, op. cit.

terminals.[1] It has been estimated that the use of containers can cut terminal costs by fifty per cent in general, and that U.S. ship operators in domestic trade actually have reduced these costs to one third or less of the costs incurred before they abandoned the break-bulk system.[2]

An additional advantage of containers is the protection they give against pilferage--a hazard which, with conventional shipping, is serious indeed and necessitates high insurance costs. In this respect, shipments to developing countries have been especially unsatisfactory Also, rough handling by unskilled labor has been a primary cause of losses, and external notices regarding the handling of cargo have been of little or no value because local labor could not read.[3] All these problems would disappear with the use of containers.

The introduction of pallets in the canned meat trade between Gdynia and New York increased the stevedores cargo handling capacity by 100 per cent. Under the conventional system a gang in Gdynia was able to load 100 tons per work shift. The unloading in New York was 15 tons per gang and shift. The use of pallets increased the figures to 200 and 30 tons respectively.[4]

Given that costs can be reduced by using pallets and containers, why do not carriers use them extensively? To say that it is the monopoly position of conferences that is an obstacle to this innovation is to

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[1]Inland and Maritime Transportation of Unitized Cargo, National Academy of Sciences--National Research Council, Publication 1135 (Washington D.C., 1963)

[2]Eyre, op. cit., p. 5.

[3]Fairplay Shipping Journal, September 23, 1965, p. 35.

[4]Norges Handels og Sjofartstidende (Norway's Commercial and Shipping Gazette), September 7, 1965, p. 2.

disregard several more concrete considerations. One is the fact that, although transportation costs would be reduced, income would be lost for many participants in the maritime transportation services. Stevedores would lose employment and, perhaps, income, since fewer men would be required in each gang and the stowage time per ton would be greatly reduced. Local forwarders and truckers would lose since containers involve large scale operations and direct movements. Shorter turn-round time means less port charges and a smaller contribution to the economy of the port community. Customs procedures aregenerally not flexible enough for container shipments. Throughout the world, customs inspections have traditionally been made on piers and in ports. The arrival of air cargo transportation broke this pattern by requiring customs inspection of imports and exports at inland non-waterfront locations, but by and large inspections are still made in ports. A container, if it is to achieve the utmost efficiency in reducing costs, must be able to pass through ports without being delayed for customs inspections and should be opened at the ultimate point of destination. The adjustment of customs procedures to accommodate container shipments also involves costs for additional inland inspection facilities.

Added to these institutional considerations are the costs involved in acquiring containers and the necessity of new ship designs to allow maximum utilization of stowage space for containers. Further, not all kinds of general cargo can be shipped in containers. Certain cargoes that stow easily in limited space and are subject to much pilferage could definitely be best shipped in containers. There are other kinds of cargoes which could be shipped in containers as well as on pallets

or in the standard break-bulk manner. A third kind of cargo could not at all be shipped in containers. Thus the flow of trade becomes important. Unless there is enough cargo suitable for containers, both outbound and inbound, the containers will partly be moved or stored empty. This would increase costs. One solution to this problem would be to have container pools where containers would be available on rental or subscription basis to all participants in the international transportation system or a particular trade route. Such pools are found in Germany and generally throughout Europe.

On the whole there has been a movement towards the use of containers in Europe, U.S. and Japan, but not in Southeast Asia. Apart from the institutional factors mentioned previously the reasons seem to be that container service requires heavy port installations such as cranes, warehouses, storage and transportation facilities for containers and large pier aprons for container handling. Internal transportation facilities to move containers are inadequate. To introduce containers in such a situation would be too costly for the ship operators. It is a case of carriers' adapting their shipping technology to the existing conditions--institutional and otherwise--in the ports of call. The introduction of containers has brought changes in ports in Europe and the U.S. and more is bound to follow.[1] That is, innovation in shipping has

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[1]G. Alexandersson (Stockholm School of Economics), "Recent Developments in Ocean Trade," lecture delivered at Univ. of Wisconsin, Madison, Nov.1964. The Rochdale report (Report of the Committee of Inquiry into the Major Ports of Great Britain, Cmnd. 1824), op. cit., pp. 123-24, recommends, among other things, the following:

(a) The National Ports Authority should initiate improved coordination between manufacturer, shippers, carriers and ports to make best use of pallet systems. (Italics mine.)
(b) A study, in process, pertaining to containers, should be pressed forward.
(c) The Board of Customs and Excise should review the possibilities to provide inland customs facilities for containers.
(d) The National Ports Authority together with a proposed Port Industry

brought about innovation in ports. In Southeast Asia the ship operators have presumably deemed the obstacles to port innovation to be too severe, and shipping innovation has not occurred.

In one sense, though, the introduction of containers is adverse to the liner trade. The use of containers makes heterogeneous cargoes homogeneous and makes it possible for tramps to ship liner cargoes to a greater extent than under the break-bulk system. At the present, the tramp ships with their wide hatches, few tween-decks and simple cargo gears, are better suited for container carriage than the modern liners. Although the speed of tramps is usually less than that of liners, they would be able to offer strong competition if containers were introduced on a large scale.

Rapid loading and unloading of containers means that the optimum size of ships engaged in a given trade is bigger than under the break-bulk system. This will tend to concentrate traffic in a few larger ports.[1] This, in turn, would necessitate good internal transportation facilities for the distribution and consolidation of imports and exports.

The above discussion points out the course of action for port improvements and the impact it can have on freight rates. "All ships afloat are not a number of interchangeable units which, subject to the limitations in the physical size of ports, use any or all ports. Ships fall into several classes according to the trades which they are engaged and the

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Research Association should promote the study of all problems connected with container systems.

[1]Alexandersson & Norstrom, World Shipping (New York: John Wiley & Sons, 1963), p. 50.

nature of these trades greatly affects the ports which they frequent."[1] Tankers, tramps, and special carriers have developed rapidly in the post-war period and the technological progress reflected in these kinds of ships is also seen in their respective ports. In liner ports in Southeast Asia, port improvements have been with reference to the traditional break-bulk system of carriage. The more forward-looking improvements in the Indian port of Kandla resulted not only in the abolishing of surcharges applicable to this port, but led actually to a rebate from conferences if shipments were made through Kandla. These improvements included, among other things, the building of alongside berths with deep drafts, large transit areas with shed and warehouses, broad wharves with three railway lines, electric shore cranes, large open storage yards, and a fleet of tugs and barges.[2] Also in Manila, port improvements have led to less congestion and the abolishing of surcharges. The exact opposite is true of Indonesia where rigid customs procedures, short working hours, lack of storage facilities, inadequate handling equipment and, on the whole, badly maintained ports prolong the turn-round time and keep freight rates high.[3]

In searching for means to decrease turn-round time, port authorities have generally attempted mechanization of cargo handling. In this they have been assisted by a corresponding mechanization aboard ships. Fork lift trucks and mobile dock-side cranes ashore are complemented by automatic hatch covers, side loading openings and more efficient winches or

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[1] W. Morgan, Ports and Harbours (London: Hutchinson University Library, 1961), p. 30.

[2] "Problems of Shipping and Ocean Freight Rates in the ECAFE Region," UNCTAD, N.Y. 1964 (E/Conf. 46/141, vol. V).

[3] U.S. Economic Survey team to Indonesia, op. cit., pp. 82-86.

cranes aboard ship. The most promising technological development in transportation, namely pallets and containers, has not been subject to such complementary actions.

Although it would be to the benefit of both parties, very little is being done to promote the use of containers in Southeast Asia. National governments could take the initiative by providing facilities such as wide dock aprons, flexible customs procedures and inland transportation. Such facilities would in no way detract from the handling of conventional cargo carriers. It would reduce the ship owners' costs of innovating, i.e., of introducing containers in the trade, and so encourage such innovation which, in turn, would work towards more competitive conditions.

Thus, by increasing the "indirect costs" of water transportation, "direct costs" can be reduced significantly. For the developing countries in Southeast Asia containers will be more important and feasible as economic development progresses. Economic growth brings with it changes in the composition of exports and imports, with the share of light industrial goods increasing at the expense of bulk commodities.[1] The more the trade--in both directions--consists of goods suitable for transportation in containers, the more are costs reduced by their use and a permanent lowering of freight rates is made possible. The developing countries have in these "indirect costs" a beneficial double-edged sword--it provides essential social overhead which also has the external effect of making possible a permanent lowering of freight rates.

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[1]Witness the similarity of exports and imports between the U.S. and Northern Europe and the increasing share of manufacture and semi-manufacture in India's exports.

V. National Shipping and the Balance of Payments

It is generally conceded that Southeast Asia's foreign trade is heavily dependent on foreign shipping for its transportation needs and, therefore, incurs a large freight bill.[1] The amount of foreign exchange involved is considerable and potential savings and earnings which may accrue from increased "domestic" shipping could be large. However, it is difficult to derive a concept which adequately expresses the contribution of shipping to the balance of payments.[2]

There are some aspects which are of particular importance to a developing country building up a merchant marine. It is necessary to have access to supporting industries such as shipyards and dry or floating docks. The feasibility of developing such industries depends on whether the merchant marine is big enough to support them, because foreign exchange is needed to develop these facilities. Unless the merchant marine is so big that its maintenance abroad would cost more in foreign exchange than

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[1]This is a major conclusion drawn in "Problems of Shipping and Ocean Freight Rates in the ECAFE Region," UNCTAD, Financing and Invisibles, Institutional Arrangements (E/Conf.46/141, Vol. V) (New York, 1964).

(Southeast Asia is here defined to include India, Pakistan, Ceylon, Burma, Thailand, Laos, Cambodia, South Vietnam, Indonesia, the Philippines, Taiwan, Federation of Malaya, Sarawak, Singapore and North Borneo.)

[2]For conceptual considerations see F.M. Tamagna and W.D. Bowles, The Contribution of the American Maritime Industry to the U.S. Balance of Payments, Committee of American Steamship Lines (New York, 1960).

R.O. Goss, "Investment in Shipping and the Balance of Payments: A Case Study of Import Substitution Policy," The Journal of Industrial Economics, March 1965, examines in a general manner the gain to the balance of payments from national shipping.

would be required to provide for domestic facilities, it would not pay to invest in shipyards and dry docks. A small merchant marine is feasible, though, if the country is so located that it can attract other countries' ships for maintenance.

Given that large investments of foreign exchange are needed to develop a merchant marine, that the business is highly competitive and requires extensive technical know-how on both managerial and operational levels, and that even a large merchant marine does not appreciably contribute directly to general employment, one can a priori question the validity of the balance of payments argument for Southeast Asia. Especially in developing countries where the so-called "linkage" effects[1] are important, one can question investments in the shipping industry. This is not to say that there are no linkages connected with shipping. There are both forward and backward linkages, but it is not necessary to have a domestic merchant marine to bring them about. Shipping, regardless of ownership, will provide a basis for supporting industries, port development and the opening of hinterlands.

Although the balance of payments argument in favor of national shipping has much immediate appeal, its validity seems, a priori, limited. If the volume of trade is large enough to cause concern as to the share of it carried by domestic shipping, then port operations in the particular country should also be sufficiently large to cause concern as to the decreased foreign exchange earnings coming from port operations as a result of increased national participation in the ocean-borne trade. National merchant tonnage may help to earn and save foreign exchange, but the

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[1]See A.O. Hirschman, The Strategy of Economic Development, Yale University Press (paperback) (New Haven, 1961), pp. 98-104.

potentials must be weighed against the initial outlay of foreign exchange for the acquisition of ships and the earning prospects in a situation of chronic "over-supply" of tonnage.

Since the balance of payments argument asserts that, by substituting national ships for foreign, there will be an improvement in the balance of payments, a test of its validity would require data on freight payments, port expenditure at home and abroad, and costs of acquiring ships. Such data are inadequate in developing countries except, in some cases, for freight payments.

However the problem can be circumvented by looking at the allocation of freight earnings to various items of operation costs and assessing the impact of such allocations upon the balance of payments. The argument here is that all ships regardless of flag disburse freight earnings for similar cost items in the course of operations. Thus, by examining the various cost items of foreign ships to be replaced by national ships, the substituting country can obtain information as to which items its own freight earnings have to be alloted. Similarly, the proportions of freight earnings allocated by the foreign ship to the different cost items indicate what these proportions will be for the substituting ships.

If all ships have expenditures for similar cost items regardless of flag, it follows that at least some of the costs are not determined by flag alone, but also by other factors common to all ships. Such common factors are found in the trade routes the ships operate on and the availability, price and geographical distribution or location of goods and services needed to operate the ships. Thus, the objective is to examine the cost items and assess whether they are determined by flag alone, by flag and other factors, or by other factors alone.

This method of analysis was presented in a memorandum to UNCTAD in Geneva 1964 by the Norwegian delegation.[1] It found "...that only something like 12 per cent (of gross freight earnings) will be influenced by a change of flag, ownership, seat of management and nationality of crew." The remaining gross freight was "...related to the trade itself and various competitive factors, and would not be saved by a substitution of foreign by national ships."

However, there are further implications in the analysis. There are three main components in the Norwegian Analysis:

(1) Freight revenues.

(2) Costs determined by flag alone, including profits.

(3) Costs determined by other factors than flag alone.

If port expenditures were to be reduced while all other cost items and freight revenues remained unchanged, component (3) above would decrease. Profits would increase and, since this is a flag determined item, the net gain to the balance of payments would increase. Actually, the levels of maximum and minimum net gain would both move upwards. Thus port improvements would widen the scope for developing national shipping by increasing the profitability of operations. However, the argument for port improvements is that decreased costs should be passed on in the form of lower freight rates. Given that this is done, there is, however, no reason to assume that the other cost items will decrease. Therefore, port improvements will result in a reduction of freight revenues which, at the most, is equal to the amount by which port expenditures decrease. This means that the relative magnitude of components

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[1] "Balance of Payments Aspects of Cargo Liner Freights and Expenditures," UNCTAD, (E/Conf.46/C.3/5), April 29, 1964.

(2) and (3) changes. As proportions of freight revenues, costs determined by flag will increase and those determined by other factors decrease; since flag determined costs constitute the potential net gain to the balance of payments, the scope for national tonnage is widened also in this case.

On the basis of the above analysis we conclude that the balance of payments argument for developing a national merchant marine is valid in the sense that a net contribution is actually made to the balance of payments and, particularly so, when port improvements take place. While national shipping may, at face value, seem more attractive to invest in than port improvements, it is the extent to which the latter occurs that enhances the scope for the former.

The substitution of a national ship for a foreign one results in a net contribution to the balance of payments. However, whether the contribution is optimal, in terms of resources used, depends on the opportunity costs involved and these can only be assessed in each particular case, i.e., by a specific project evaluation. Some general observations can be made, though.

The present situation in Southeast Asia raises the question whether the marginal resources transferred to the maritime industry to increase the share of carriage add or subtract from national income or if, from the developmental point of view, there are better investment projects. The acquisition of ships will, in most cases, involve foreign exchange disbursements and the impact on the balance of payments must be considered. If the purchases are financed by the world's shipbuilding industry, payments of interest and capital will involve foreign exchange disbursements for many years. Whether a country can undertake such ob-

ligations depends on the magnitude of its already existing debt burden.

Even a relatively large merchant marine does not per se contribute appreciably to general employment--the industry is capital intensive. To the extent that unemployment--disguised or otherwise--may be high, it is necessary to consider whether or not the expenditures needed to acquire or expand a merchant marine could be better used, for instance, by improving the internal transportation network. Such a course of action would, apart from providing employment, add valuable social overhead and contribute to a general development of the economy which, in a wider perspective, could have a greater positive impact on the balance of payments than a merchant marine. On the other hand, shipping puts small demands on social overhead while other industries are dependent on a relatively well developed infra-structure. Thus, if capital for social overhead is scarce, shipping may be a more feasible project than other industries. A country with a low per capita gross national product resulting from small production of and trade in physical goods and with few prospects of growth could possibly expand its international service sector rapidly by engaging in shipping and thus raise the gross national product. However, the existence of a comparative advantage in shipping should be assessed in each particular instance and only a consideration of opportunity costs can determine the optimal course of action.

VI. Conclusion: Some Policy Implications

The shipping model indicates that policies aimed at securing lower conference freight rates should be intended to affect compensatory increases or the cost structure of conference liner shipping or, preferably, both.

Compensatory increases can be affected by changing the competitive environment. While legislation can do this, its effective administration requires international cooperation to an extent not likely to come about in the foreseeable future.

A more direct economic measure would be to encourage domestic operation of tramps and non-conferences liners. Alternative means of transportation would become available through such operations, and the upward movement of the point of "what the traffic will bear" would be retarded or prevented. In case of retaliatory actions from conferences, e.g., rate wars, it might be necessary for governments to provide financial support. New tonnage would promote competition and innovation leading to lower rates and, if pursued with that aim, to the breaking-up of the conference system.

However, the massive development of national shipping which would be needed to achieve these results is not necessarily the best course of action. First, large investments, usually in foreign exchange, would be required; against these large outlays would be set relatively small returns in terms of gains to the balance of payments. Second, freight rates would be reduced only to the extent that compensatory increases have occurred. Rate increases caused by rising costs would remain unaffected. Since the relative importance of cost and compensatory factors is unknown, exclusive reliance on national shipping thus could be a weak and expensive solution. Third, it is also questionable if the breaking-up of the conference system is indeed desirable. Whatever the defects of this system, its beneficial effects in providing reliable, stable liner services seem to be well established.[1] What is called for may not be

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[1]See D. Marx, Jr., International Shipping Cartels, Princeton Univ. Press, 1953.

its demise but its improvement.

On the other hand, policies affecting the cost structure by means of forward-looking port developments will not influence the compensatory factor. An argument can be made for the development of ports before shipping on the grounds that port developments affect the costs of shipping in a manner which, at a later stage, increases the potential contribution of shipping to the balance of payments. However, port developments are part of a general program of economic development to a greater extent than is the building of tonnage. Thus, recent progress in container, pallet and other shipping techniques, together with the technical capacity for building increasingly larger cargo ships, makes the modern port dependent on adequate internal transportation networks. The full benefits of containers can only be realized if internal movement is facilitated. Large ships require large ports in which it would be necessary to consolidate many small cargo lots originating from numerous inland points. Port developments must, therefore, be only one phase of a larger scheme of transportation development which entails far larger capital expenditures than shipping alone.

The prospective returns would be far reaching, however. Employment and income effects would be greater than they would be from investment in national shipping alone. Social overhead would be created and freight rates would decline because of decreased turn-round time. The impact of forward looking port facilities on shipping techniques and ship design would also tend to reduce freight rates. Port costs as a proportion of total operation costs of shipping would decrease. This would increase that proportion of these costs which is determined by the ship's flag and, consequently, the potential gain to the balance of payments from

shipping increases. At this stage, investment in national shipping to influence the compensatory factor may be more feasible than at an earlier stage of development.

The long gestation period of port developments, however, makes it desirable to develop some national tonnage concommitantly. This would provide competition and leverage to pass on savings from port developments to shippers. Although the long-run goal should be to utilize containers, pallets should be extensively used in the early stages since they require small capital investments and few new facilities, and have a large impact on cargo handling costs. In this context it is also important to improve procedures so as to minimize documentary and administrative aspects of cargo movements.

The above discussion suggests that developing countries can indeed pursue policies to secure lower freight rates. The optimum course of action, however, depends in each case on an assessment of the relative importance of the cost and compensatory factors relevant to the particular situation.