

An Application of Cost Benefit Analysis to the Strategic Shipping Sector

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(Read before the Society on Friday, 22nd January 1971)

This paper is derived from a cost benefit study of the involvement of the State in the shipping industry which was carried out in the context of the Appraisal of the Public Capital Programme. A brief theoretical comment on foreign exchange rates is the only new material I have added. The paper is concerned with the mainly strategic company in the state-owned shipping sector, Irish Shipping Ltd.(I.S.L.).

The basic methodology of this paper is based on that employed by Dr. Martin O'Donoghue in a paper entitled "A Cost/Benefit Evaluation of Irish Airlines" read before this Society on 16th May 1969. I do not propose to explain in detail the methodology employed and I would refer any of you who are not already familiar with it to Dr. O'Donoghue's paper. This paper differs from that of Dr. O'Donoghue in that it applies the techniques of cost/benefit analysis to issues different in nature from those arising in his study and also attempts to carry the analysis a stage further than in his study. In order to give prominence to what is novel in this paper, and in order to avoid the tedium of covering ground already covered by Dr. O'Donoghue, I have relegated much essential explanation and calculation to appendices. I do not propose to read these appendices but I shall refer to them where necessary as the paper proceeds. The data on which this paper is based is for the year 1968/69 which, at the time of the original study, was the latest year for which full information was available.

Irish Shipping Ltd. was established by the State in 1941 with the primary purpose of ensuring the availability of sufficient shipping capacity to keep open vital supply lines during the second world war. During periods of general international emergency shipping is not normally available to neutrals and most such countries have consequently found it necessary to build up fleets of deep sea shipping under domestic control. Hence, Irish Shipping was established initially to fulfil a strategic role and, up to some years ago, the size and structure of its fleet was tailored to meet with strategic specifications.

The primacy of the strategic role of the company is made clear by the statement of Government policy with regard to the Company in the Third Programme for Economic Expansion:

... the essential role of Irish Shipping Ltd. is to provide and operate a fleet of total tonnage ... considered necessary to meet the basic strategic needs of the country. As well as meeting strategic needs, the fleet must be so constituted as to operate as profitably as possible. Any tonnage over and above the strategic level can, therefore, only be undertaken on the basis of profitable operation.

However, this statement may also be interpreted as permitting flexibility in the determination of the structure of the strategic fleet and as indicating the conditions under which capacity above the strategic minimum may be added. This is the interpretation which I have placed on Government policy in this regard and the remainder of this paper is based on this interpretation.

Since it was established in 1941 Irish Shipping has operated mainly on the international tramp market where there is intense competition, and where rates fluctuate widely in response to economic and political developments. The company has also operated liner services from time to time but at present the only liner service in operation is the Ireland/North American service in conjunction with Manchester Liners. In addition the company has recently gone into the continental ferry business through its participation in Normandy Ferries. However, the main business of the company is tramping on the international market both on time and voyage charter. This means that a major part of the company's activities constitute an invisible export.

As a result of the international character of its operations Irish Shipping earns most of its revenue from sources external to the Irish economy. Also much of Irish Shipping's expenditures are made abroad. Table 1 indicates the allocation of revenues and expenditures between Ireland and the rest of the world.

TABLE 1
ESTIMATED NET PAYMENTS BY AREA 1968/69
(£'000)

	Total	Ireland	Rest of the World
<i>Total Revenue</i>	5,040·7	1,321·7	3,719·0
<i>Expenditure</i>			
<i>Allocated</i> (Appx. 1)	3,991·5	2,024·6	1,966·9
<i>Depreciation</i> ¹ ...	733·6	279·0	454·6
<i>Operating Surplus</i> ...	315·6	315·6	—
<i>Total Expenditure</i> ...	5,040·7	2,619·2	2,421·5

¹ Depreciation is treated here as the cost of capital and is therefore allocated geographically according to the place of purchase of each vessel. In the case of two vessels, Irish Cedar and Irish Plane, depreciation has been allocated to the domestic economy although the vessels were in fact built in Holland. This has been done because the ships were ordered from Verolme's in Cork but were built at that Company's yards in Holland for the convenience of the builder. In return for the agreement of Irish Shipping to this arrangement, two ships of roughly equal value scheduled for building at Verolme's Dutch yards were transferred to Cork. Hence, for the purpose of this study, the net effects of this arrangement were the same as if the two vessels had been purchased in Cork.

From Table 1 it can be seen that the operations of Irish Shipping in the year 1968/69 produced an estimated net inflow of foreign exchange of

£1,297,500. (External revenue less external expenditure). Later in this study foreign exchange will be evaluated at a premium rate and the overall figures adjusted accordingly.

We require a measure of the basic contribution of I.S.L. to national income. There are a number of options here. Firstly, we might assume that there is full employment in all intermediate goods industries and calculate the contribution of I.S.L. to net national product as the net product of the company. In this case the net product of the company would be calculated as the sum of the total direct wage and salary bill and the net profit. Secondly we might assume less than full employment in the intermediate goods industries and calculate the contribution of I.S.L. to net national product as the gross product of the company. In this case gross product would be the sum of all direct expenditures by the company plus net profit. Neither of these approaches is wholly satisfactory since each is dependent on a sweeping assumption about the state of employment in intermediate goods industries which is unlikely to be wholly correct particularly if one thinks in terms of capital employment. A more realistic theoretical approach to this problem involves making an initial calculation of the contribution of the company to net national product by taking the net product but then attempting to estimate a vector of stemming production effects in intermediate goods industries. For technical reasons it is difficult to make such a calculation. In this paper I have made a crude attempt to follow the last approach in so far as I have indicated the main stemming production effects, but I was unable to estimate their magnitude. Hence the first step is to calculate net product for I.S.L. The net product, which is an indication of the value added by the company to the net national product, is simply calculated as the total direct wage and salary bill of the company within the economy plus the net profit. (Since Irish Shipping Ltd. employed no loan capital in 1968 no interest was payable and net profit would therefore be equal to operating profit). This gives us a measure of the total product of the company less all payments for materials and services and depreciation. Table 2 sets out this information.

TABLE 2
NET PRODUCT, AGGREGATE AND PER
EMPLOYEE, 1968/69

Total Wages and Salaries	...	...	...	...	£1,026,000
Net Profit	...	...	...	...	£ 315,600
Net Product	...	...	...	...	£1,341,600
Net Product per Employee ¹	...	...	...	...	£ 1,923

¹ Excluding dockers.

The net product per employee of Irish Shipping is relatively high in comparison with the corresponding figures for other companies in the transport or industrial sectors. This is largely a reflection of the relatively high capital/labour ratio of Irish Shipping.

The next step in this examination of the social contribution of Irish Shipping to the Irish economy is to consider those costs and benefits to the economy associated with the activities of Irish Shipping which are not reflected in the commercial data. These effects are generally described as indirect effects and are not fully reflected in the commercial accounts of the company because they are not charged at their true economic value. This point need not be discussed here and we shall proceed to try to identify the areas in which such costs and benefits which constitute indirect effects of the operations of Irish Shipping might arise.

The first task is to identify those effects which flow from the activities of Irish Shipping which may not be fully reflected in the commercial data. The following is a list of possible indirect effects. The list may, of course, not be exhaustive.

Strategic Function. The extent to which the state benefits from the potential strategic value of the Irish Shipping fleet and for which service the company is not paid the value placed upon it by the state.

Trade. Any effects which Irish Shipping may have on the volume of trade carried on between Ireland and other countries which are not reflected in the transactions of the company.

Foreign Exchange. The extent to which the official foreign exchange rate fails to reflect the true value of the net foreign exchange earnings of Irish Shippings.

Training. The extent to which Irish Shipping receives the benefits of training at less than cost or supplies other sectors of the economy with training at less than cost.

Employment. The extent to which the employment policy pursued by Irish Shipping yields benefits or imposes costs on the economy.

Prestige. Any enhancement of Irish national prestige resulting from the operations of Irish Shipping which is not paid for by the state.

Shipbuilding. The extent to which Irish Shipping pays a higher price to have a ship built in Ireland than it could obtain elsewhere and the value of any stemming production effect.

Marine Insurance. The value of any stemming production effect.

Secondary Effects. The fall in income in other sectors of the economy induced by the fall in net production directly associated with the abolition of Irish Shipping.

Having now identified the main categories of indirect effects which ought to be examined, and where possible quantified, it is necessary to consider the general hypothetical alternative situation which would obtain if Irish Shipping ceased to exist. This exercise is probably less speculative in the case of Irish Shipping than would be the case with many other companies since a very large proportion of Irish Shipping's business is carried on in a highly competitive international market and does not directly impinge on the Irish economy. It may be assumed right away that all of those carrying activities presently undertaken by Irish Shipping which do not have a terminal or intermediate stop at an Irish port would be lost entirely to the economy. The international tramp market is highly competitive and there is a good deal of excess capacity in the international shipping industry

which would undoubtedly mean that foreign shipping companies would take over all of this business. In the case of shipping activities which do have a terminal or intermediate stop at an Irish port a different alternative situation may be appropriate. There are three activities which fall into this category: Normandy Ferries; the North American Liner service; and the transport of bulk cargoes to and from Ireland.

Normand Ferries is a joint Irish/British/French venture in which Irish Shipping participates as a full partner with a French and a British company. This part of the company's activities is likely to develop rapidly and within a few years form an important activity of Irish Shipping. However, during the year under consideration in this study, 1968/69, the ferry arrangement was in its first year, a year which proved to be rather exceptional. For this reason commercial data relating to the ferry service has been excluded from the commercial accounts in Tables 1 and 2. Instead the ferry will be considered separately later in this study. Accordingly no alternative assumptions in relation to the ferry service will be made when constructing the general alternative situation should Irish Shipping cease to exist.

In the case of the North American Liner service, Irish Shipping cooperates with Manchester Liners and it will be assumed that if Irish Shipping ceased to exist this service would be withdrawn.* Assuming however, that the same volume of goods remained to be transported between North America and Ireland a trans-shipment arrangement would be necessary. Such an arrangement may be assumed to operate through British ports which would mean that companies operating cross-channel freight services would handle the goods diverted from the liner service over the first lap of their journey. Some of these cross-channel operators are Irish and we shall estimate the revenue which might be expected to accrue to them as a result of this traffic diversion. Two objections to this assumption are that the cross-channel freighters presently in use could not cope with certain types of liner cargo and that the extra costs of trans-shipment would reduce the flow of goods to and from North America. Since it is almost impossible to make reasonable allowance for these factors we shall ignore them in our calculations.

In the case of those other carrying services to and from Ireland at present provided by Irish Shipping it seems likely that foreign bulk carrying operators would take these over if Irish Shipping ceased to exist. However, it is once again assumed that the pattern of services would nevertheless remain the same and that the volume of goods carried would also remain the same.

Hence the basic overall alternative situation which may be assumed to obtain in the absence of Irish Shipping is that all of Irish Shipping's operational activities would be handled by foreign operators except that proportion of the liner business which was diverted to Irish cross-channel shippers. In addition, since we are assuming no change in the pattern of services which directly impinge on the Irish economy, certain other facets

*It is alternatively possible that externals would continue the service. However I have adopted the more conservative assumption.

of the company's activities would clearly remain in Irish hands, e.g. stevedoring. Where appropriate, adjustments will be made in this overall assumption in order to take account of a number of possible alternative situations. In particular, mention will be made of the special position of Normandy Ferries in this regard separately.

One further point must be made here. While we assume that Irish Shipping ceases to exist for the purposes of measuring its net contribution to the economy, we must take account of the alternative employment which might be secured for the resources displaced by the abolition of Irish Shipping. In other words we are here interested in measuring the difference between the net product which would be lost by the abolition of Irish Shipping and the net product which could be regained by the employment in alternative uses of the resources displaced in the course of such a change. The first step in evaluating the contribution of Irish Shipping to the economy is to estimate the financial accounts which would obtain in the hypothetical alternative situation. (These are set out in Tables 3 and 4 below. The calculations from which they were obtained are set out in Appendix 2).

TABLE 3

ESTIMATED REVENUE ACCRUING TO IRISH FIRMS IN THE ASSUMED ALTERNATIVE SITUATION 1968/69 (£'000)

	Total	Ireland	Rest of World
Liner	68.0	18.0	50.0
Stevedoring	160.0	50.0	110.0
Total	228.0	68.0	160.0

TABLE 4

ESTIMATED DOMESTIC EXPENDITURES OF SHIPPERS IN ALTERNATIVE SITUATION (£'000)

Port Charges, Discharge, Despatch, and Bunkers	158.4
Voyage Repairs	1.5
Stores and Victualling	5.7
Establishment	15.0
Liner	50.9
Dockers' Wages	118.0
Other Stevedoring	4.0
Other	25.3
Profit	42.8
Total Expenditure	421.6

Hence out of a total expenditure of £5,040,700 (Table 1) made by those companies which take over the business of Irish Shipping, £421,600 can be assumed to be made within the domestic economy. Hence the new inflow

of foreign earnings of £1,297,500 would become a net outflow of £900,100. This is calculated by subtracting domestic expenditure by the companies who take over the business of Irish Shipping from the total domestic expenditure on the shipping services provided by these companies. The net change in the foreign earnings position would be £2,197,600 as a result of the abolition of Irish Shipping (i.e. a net foreign payments inflow of £1,297,500 would become a net outflow of £900,100). The net product of the shipping industry in Ireland would fall by £1,170,800. This is the difference between the net product of Irish Shipping of £1,341,600 (Table 2) and the net product in the alternative situation which is £170,800 i.e. dockers' wages, establishment payroll and profits of liner and stevedoring operations.

So far we have confined our attention to the gross changes in net product, etc., which would follow the abolition of Irish Shipping. In fact, of course, the labour, capital and other resources released from Irish Shipping would become available for alternative use in the economy if the company ceased to operate. Thus in order to calculate the net changes in net product, etc. we require to estimate the net product which would be generated by those resources in their alternative uses and deduct this from the gross change. These calculations will be made later in this paper. For the moment we now consider the indirect costs and benefits associated with the operations of Irish Shipping in order to adjust the commercial data used so far.

STRATEGIC FUNCTION

At the beginning of this paper it was noted that the prime objective of Irish Shipping is a strategic one although the statement of Government policy in the Third Programme for Economic Expansion permits of flexibility in the structure of the fleet and a measure of independence for the company in increasing the scope and scale of its activities.

We may assume then that the primary objective of Irish Shipping Ltd. is to provide and maintain some minimum carrying capacity which the Government deems essential to the security of the State and therefore that the State would be prepared to bear the maximum possible loss associated with maintaining in existence a fleet with the minimum strategic carrying capacity. In other words the strategic constraint is a rigid one and the State would therefore be prepared to bear the maximum losses associated with maintaining the minimum of strategic capacity. This is the only reasonable interpretation which can be put on the concept of "minimum strategic capacity" and provides us with a simple method of evaluating the gross contribution which the company makes to the economy in its strategic role.

We may evaluate the strategic contribution of the company to the economy by calculating the maximum possible annual losses which could accrue to the State in maintaining the minimum strategic capacity.* The

*Assuming that the cost of providing a service is a minimum measure of the benefits accruing to the community.

maximum loss would be incurred when all of the strategic fleet was laid up and maintained and serviced such that it was continuously capable of performing its strategic function. This would further involve the continual employment of skeleton crews, maintenance of shore facilities, etc. necessary to the operational readiness of the fleet. Capacity above the strategic minimum has no strategic value since the company may only undertake expansion of its fleet above the strategic minimum '... on the basis of profitable operation...' In other words the State is not prepared to pay anything at all to increase fleet capacity beyond the strategic minimum.

The strategic minimum fleet tonnage prescribed by the government is 150,000 d.w.t. The maximum possible losses associated with the maintenance of this tonnage, i.e. the fixed costs, have been estimated by the company at £1.5 million per annum. This figure may then be taken as an estimate of the annual gross contribution which Irish Shipping makes to the economy by virtue of its strategic potential. We are not, of course, primarily interested in evaluating the gross value of the indirect benefits associated with the operations of Irish Shipping but rather the change in those benefits consequent on the abolition of the company. In the case of the strategic function however there is no very satisfactory way of calculating the change in benefits which would occur. The only conceivable alternative to a system of strategic sea transport is a system of strategic air transport and for obvious reasons it would be unrealistic to attempt a valuation of such an alternative. It seems quite likely indeed that the change in the value of the benefits in switching to a strategic air transport system, calculated as the maximum possible loss associated with maintaining a minimum carrying capacity, would exceed the gross valuation put on the strategic sea system. Hence it is convenient and appropriate here to simply assume that if Irish Shipping was abolished the economy would cease to have a strategic transport system. The net loss associated with the abolition of the strategic fleet to the State is measured by the gross value implicitly put on it by the Government, estimated at £1.5 million per annum.

Shipbuilding

Two possible indirect benefits to the economy must be examined in relation to shipbuilding. Firstly there is the question of whether Irish Shipping favours Verolme in Cork to the extent that it pays a higher price to have a ship built in Cork than it could obtain by buying the vessel abroad. To the extent that this has happened the net contribution of Irish Shipping to the economy is greater than indicated by the commercial accounts. Any such divergence can be corrected by calculating annual depreciation at the rate that would have applied if Irish Shipping had purchased the vessel at the lowest price available. For a number of reasons it is difficult to identify any subsidy of this kind if indeed it exists at all. Hence no attempt to evaluate the amount of any subsidy to Verolme is made here but it may be safely assumed that in any case the amount would be very small.

The second possible indirect benefit which arises in relation to ship-building concerns the degree to which the net product of the ship building industry is increased as a direct result of the orders for vessels placed in Cork by Irish Shipping. Such benefits are of the nature of stemming production benefits. The calculation of such benefits can be made by subtracting factor opportunity costs from profits plus wages and salaries plus any scale economies associated with orders placed in Cork by Irish Shipping. The resulting net product would then require to be expressed in annual terms. To state the problem is to indicate its complexity and no attempt is therefore made here to put a value on this benefit.

Marine Insurance

During the war Irish Shipping were obliged to act as marine underwriters as a result of the prohibitive war risk premiums required by international marine underwriters. The underwriting business proved highly profitable for Irish Shipping but at the end of the war they transferred this business to the Insurance Corporation of Ireland which now has the major share of marine insurance in Ireland. If Irish Shipping were to be abolished it is unlikely that the Insurance Corporation of Ireland would remain in the marine insurance business since the volume of business provided by Irish Shipping is the mainstay of this branch of its activity. This then is another stemming production benefit flowing from the operations of Irish Shipping. The benefits so produced could be measured as profits plus wages and salaries plus scale economies less factor opportunity costs associated with marine insurance business provided by Irish Shipping. Measurement of such benefits is complicated by the fact that the books of the company are kept open for three year periods on this type of business, and it is therefore not possible to calculate profits at an annual rate. Further, Irish Shipping is a major shareholder in the Insurance Corporation of Ireland and therefore receives profits from the company in the form of dividends. For these reasons no evaluation of this benefit will be made although there is reason to suppose that it is in fact substantial (perhaps as high as £100,000 per annum).

Foreign Exchange

A large proportion of the receipts and a smaller proportion of the expenditures of I.S.L. arise from transactions made outside of the domestic economy. The question arises as to whether the change in the net foreign exchange inflow consequent upon the abolition of I.S.L. should be treated in the same way as domestic exchange, which would imply that the official exchange rate is a true measure of the opportunity cost of foreign exchange to the economy, or whether a shadow exchange rate should be employed to evaluate foreign currency, which would imply that the official exchange rate does not reflect the true opportunity cost of foreign exchange to the economy. The official foreign exchange rate of the Irish pound is largely determined in relation to the view of the British government on what constitutes an appropriate exchange rate for the pound sterling. This rate is fixed and can only vary significantly if the pound sterling is revalued. Now

if exchange rates were everywhere allowed to float, then each country's currency would exchange at the equilibrium rate, i.e. that rate at which balance of payments equilibrium would be continuously maintained, and there would be no question of using a shadow exchange rate to evaluate foreign exchange. However, because exchange rates are fixed and determined in relation to the circumstances of another economy, there is every reason to consider whether the official exchange rate is in fact the equilibrium exchange rate.

The equilibrium exchange rate is defined as that rate which will continuously maintain balance of payments equilibrium. At the official exchange rate however it is apparently necessary for the State to pursue policies designed to affect the pattern of trade in Ireland's favour. Examples of these policies are export subsidies, tariffs on imports, agricultural subsidies etc., These policies suggest that the official exchange rate overvalues the Irish pound and that a shadow exchange rate should be employed to evaluate foreign currency. However, as Bristow and Fell¹ point out, if such policies are efficient at the margin they will fully reflect the difference between the official and the equilibrium exchange rates and firms benefiting from them will therefore be actually trading at the shadow rate. This would suggest that no premium valuation should be made on foreign exchange. However Bristow and Fell further point out that these policies impose a cost on the community in the form of reduced domestic consumption resulting from higher import prices and higher taxes than would be necessary if subsidies were not paid. Counterbalancing this cost to the community is of course the benefit of not devaluing and thereby worsening the terms of trade and reducing domestic consumption. Once again if policy is efficient at the margin the cost and benefit of such policies should exactly offset each other. Hence there might equally be a case for either ignoring both the cost and the benefit of these policies or including both the cost and the benefit, the result being the same in either case.

In the case of firms or individuals who are trading at the equilibrium rate by means of the subsidies or protection afforded by government policies it would be wrong to evaluate foreign earnings at a premium rate since this would involve counting a benefit twice and the associated cost only once. However, for firms which are not in fact assisted by government policy to trade at the equilibrium exchange rate there are benefits accruing to the community from their foreign earnings but the community does not bear the cost of generating this benefit. Hence for firms in this position trading is at the market rate rather than at the equilibrium rate and the firm itself must therefore bear the cost of trading at a rate which overvalues the Irish pound and the benefit to the community consequent on so doing is not recorded in the transactions of the firm. There is therefore a case for adjusting foreign exchange earnings in such firms in such a way as to record the magnitude of the benefit accruing to the community by way of balance of payments effects. This is best done by estimating the difference between the official and equilibrium exchange rates and adjusting the net

¹ J. A. Bristow and C. F. Fell. *Bord na Mona: A Cost/Benefit Study.* (Forthcoming)

foreign exchange inflow generated upwards by a premium which reflects this magnitude.

Estimating the premium on foreign exchange implied by government policy is very difficult. One might choose the export profits tax exemption rate as a basis for estimating the premium or one might equally choose the average tariff rate. To be as accurate as possible one might choose a selection of rates according to the precise nature of the foreign earnings inflow and outflow. The safest and most conservative approach to estimating the premium is to select the rate which yields the smallest adjustment since it is better to underestimate indirect benefits than to risk overestimating them. The appropriate rate is therefore the rate based on the export profits tax exemption. Dr. O'Donoghue has estimated the premium rate on foreign exchange at 4% on this basis and I am accepting that rate here.

Hence in calculating the net loss to the economy consequent on the abolition of Irish Shipping it will be necessary to value the change in the net foreign exchange inflow at a premium rate of 4%. The net inflow of foreign exchange resulting from the operations of Irish Shipping in 1968 was £1,297,500. In the assumed alternative situation which would obtain in the absence of Irish Shipping there was a net foreign exchange outflow of £900,100. Hence the direct impact of the abolition of Irish Shipping on net foreign receipts or payments would be an overall change of £2,197,600. £88,000 is the foreign exchange premium calculated at a rate of 4%. This latter sum is included in the table of adjustments for indirect benefits later in this chapter.

Training

Irish Shipping requires a body of highly skilled employees and has found it necessary to establish and finance training schemes in order to ensure that its demands for these skills can continually be met from within Ireland. It is possible that commercial data do not adequately reflect the costs and benefits to the economy of the provision of trained personnel to Irish Shipping. The true social costs of training personnel may exceed the actual cost to Irish Shipping where training is provided outside of the company at no cost or at less than cost to the company. On the other hand the benefits which result from the training provided by Irish Shipping may accrue in other sectors of the economy at less than cost to those sectors. There is no simple way of evaluating the net effects of training in Irish Shipping since the necessary data is not readily available. However, it is certainly true that Irish Shipping yields substantial net benefits under this heading.

Prestige

There is a certain enhancement of national prestige in having a modern fleet of deep sea vessels flying the Irish flag. As well as this purely prestigious effect there are no doubt more tangible benefits which accrue to the economy as a result of the presence of the Irish deep sea fleet on the high seas and in foreign ports. Trade, for example, may benefit to the extent that Irish Shipping is a good advertisement for the national economy.

Once again these benefits cannot easily be quantified, partly as a result of their intangibility and partly because the necessary data is not available.

Trade

Irish Shipping does most of its business outside of the Irish economy altogether but there are two areas of its activities which relate to the domestic economy, the North Atlantic Liner service and the transport of raw materials for Irish industry. The only aspect of these operations which is not reflected in the commercial accounts of Irish Shipping concerns the premium of foreign exchange which is saved. Where Irish imports or exports are carried on foreign ships and freight is paid to foreign shipping companies by Irish merchants this constitutes an invisible import. Where such freight is paid instead to Irish Shipping foreign exchange is saved and may be evaluated by calculating the premium on the saving. This calculation is included in the general estimation of the net foreign exchange contribution of Irish Shipping to the economy.

Employment

In employing crews for its vessels Irish Shipping, as a matter of policy, recruits relatively high wage Irish seamen rather than relatively low wage foreign seamen (Chinese, Indian or Lascar). Irish seamen produce a higher average product than foreign seamen but the ratio of the average product of the Irish seaman to that of a foreign seaman (2:1) is lower than the ratio of their respective wage rates (4:1) and as a result the total labour cost of manning any given ship with an Irish crew is greater than for a foreign crew. Most of Irish Shipping's competitors employ foreign crews, and so could Irish Shipping if it chose, and these companies therefore enjoy lower unit labour costs than Irish Shipping. Since prices in the shipping industry are determined in a highly competitive market, higher unit labour costs must be financed out of Irish Shipping's profits. This employment policy raises no particular problems in the calculation of the actual net product of Irish Shipping. However, the question does arise as to whether the actual net benefits yielded by the company could be increased if the company were permitted to switch to a policy of employing the cheapest labour available to it.

The answer to this question is difficult to determine. The opportunity cost of Irish seamen to the Irish economy is likely to be considerably lower in aggregate than the total wage bill they presently receive from Irish Shipping. A switch in employment policy would therefore be likely to bring about reductions in domestic employment and aggregate consumer demand and a loss of the premium on some part of the net foreign exchange inflow. Against these losses must be set the value of the premium on foreign exchange saved as a result of reduced import consumption and the increase in profits resulting from the lower total wage bill paid to foreign crews. In the absence of a premium on foreign exchange net benefits would be increased by a change in employment policy only if the aggregate annual opportunity cost of Irish seamen was greater than the actual annual wage bill of the foreign seamen who replaced them. In this

case the net product gained by the re-employment of the Irish seamen would exceed the net product lost by replacing them with foreign seamen (see Appendix 3).

Secondary Effects

Any change in the net product of Irish Shipping will have a general impact on output and employment in other sectors of the economy. The loss of the net product of Irish Shipping will directly reduce the purchasing power of the community and this reduction will in turn have secondary or multiplier effects on output and employment in the economy as a whole. Dr. O'Donoghue has discussed this effect in his paper on Aer Lingus and has estimated the adjustment factor at two-thirds of the initial loss of net product. Applying this factor to our estimate of the net product lost we obtain a figure of £780,530. Hence the initial loss of net product of £1,170,800 would induce associated reductions in income generally of £780,530.

We may now bring together the estimated indirect effects of the abolition of Irish Shipping and adjust the commercial accounts accordingly. We are here seeking to estimate the total gross loss to the economy, direct and indirect, from the abolition of Irish Shipping and its replacement by the assumed alternative arrangements.

TABLE 5

ESTIMATED GROSS LOSS TO THE ECONOMY FROM THE ABOLITION OF IRISH SHIPPING LTD. (£'000)

	Low	Middle	High
<i>Direct</i>			
Loss of Net Product	1,170·8	1,170·8	1,170·8
<i>Indirect</i>			
Strategic	1,250·0	1,500·0	1,500·0
Shipbuilding	?	?	?
Foreign Exchange	88·0	88·0	88·0
Training	? (+)	? (+)	? (+)
Prestige	?	?	?
Trade	?	?	?
Employment*	-49·0	0	49·0
<i>Secondary Steaming Benefits</i>			
Shipbuilding	? (+)	? (+)	? (+)
Marine Insurance	? (+)	? (+)	? (+)
<i>Secondary</i>			
Induced Income Changes	780·5	780·5	780·5
Total Gross Loss	3,240·3	3,539·3	3,588·3

? = unquantified.

* = see Appendix 4.

We now have an estimate of the total gross loss to the economy consequent on the abolition of Irish Shipping and it will be noted that the gross social loss is substantially in excess of the gross commercial loss. In order to estimate the net loss involved we must take account of the potential product which might be produced in alternative uses by the resources released from Irish Shipping. The difference between the gross loss already calculated and the product produced in alternative employments by the resources displaced from Irish Shipping provides us with a measure of the net contribution to the economy made by Irish Shipping. Because the Irish economy does not enjoy full employment of labour it cannot be assumed, as it could be if full employment did exist, that the net product of the capital and labour displaced from Irish Shipping would be almost equal to that of Irish Shipping when employed in alternative uses. Neither is it realistic to assume that conditions of full employment are likely to obtain in the near future. This means that we must make estimates of the likely product of these displaced resources in alternative uses. Dr. O'Donoghue has discussed the issues raised by such a situation in detail in his paper on Aer Lingus. These estimates are listed in Table 6 below. The calculations from which these were obtained are given in Appendix 4.

TABLE 6

ESTIMATE OF GROSS GAIN TO ECONOMY FROM RE-EMPLOYMENT OF IRISH SHIPPING'S RESOURCES (£'000)

	Low	Middle	High
<i>Direct</i>			
Labour	353.5	484.9	707.0
Capital	825.0	825.0	825.0
Net Product	1,178.5	1,309.9	1,532.0
<i>Indirect</i>			
Foreign Exchange	15.7	17.5	20.4
Other	?	?	?
<i>Secondary</i>			
Induced Income	785.6	873.2	1,021.4
Total Gross Gain	1,979.8	2,200.6	2,573.8

We may now estimate the net contribution to the economy made by Irish Shipping by subtracting each estimate of the net product regained from each estimate of net product lost. In the following table there are nine estimates of the contribution of Irish Shipping to the economy since we have made three estimates of net product lost and three of net product regained.

	Gross Loss (Table 5)	Gross Gain (Table 6)	Net Contribu- tion of Irish Shipping
1.	3,240.3	2,573.8	666.5
2.	3,539.3	2,573.8	965.5
3.	3,588.3	2,573.8	1,014.5
4.	3,240.3	2,200.6	1,039.7
5.	3,539.3	2,200.6	1,338.7
6.	3,588.3	2,200.6	1,387.7
7.	3,240.3	1,979.8	1,260.5
8.	3,539.3	1,979.8	1,559.5
9.	3,588.3	1,979.8	1,608.5

The figures in the final column give us an estimate of the social contribution of Irish Shipping to the economy. Expressed as a social rate of return on the £11 million capital employed the rate ranges from 6% to 15%. These rates are to be compared with the commercial rate of return of about 3% on capital employed. It must be borne in mind, however, that the estimates of the social rate of return of Irish Shipping are based on a large number of assumptions some of which are rather arbitrary. For this reason the actual figures themselves should be treated with a certain amount of caution. However, throughout this study care has been taken to underestimate rather than over-estimate the net benefits yielded to the economy by Irish Shipping and, in view of the fact that certain indirect effects could not be evaluated at all, it seems fair to suggest that the calculated contribution of Irish Shipping is likely to err on the side of conservatism rather than exaggeration.

The participation of Irish Shipping in Normandy Ferries Ltd. has been excluded from the calculations made so far in this study. The reason for doing so are:

- (a) Irish Shipping's connection with the company is of recent origin and there is little meaning in analysing performance so far as a result;
- (b) For a number of reasons the first, and only complete, year of the company's Irish activities was exceptional;
- (c) To date Irish Shipping have only been involved in agency participation in Normandy Ferries but will shortly become a full partner and will provide a vessel for the company. Hence there is little point in examining what is in effect a transitional arrangement.

Having said this a few general comments on the future of the ferry service follow in order to give some impression of how it is likely to affect the general performance of Irish Shipping.

On the basis of (incomplete) data on the Ferry Service for the year 1969/70 it is clear that the service is rapidly realising the potential which was estimated for it. During the year the passenger load factor averaged 74%. In addition, it seems evident that the service is generating a substantial volume of new tourist business and is a direct net earner of foreign

exchange.* Under the agency participation arrangement the service has proved highly profitable for Irish Shipping and this situation is likely to be greatly improved under full participation arrangements. The company has plans for improved and expanded services and these too ought to make this venture more profitable in the future. Little more can usefully be said about the ferry service here in the absence of satisfactory data but there seems to be little doubt that the net contributions of Irish Shipping to the economy will be improved in the future by the contribution of the ferry service to:

- (1) Improved net profits;
- (2) Increased net foreign earnings;
- (3) Generated tourist business;
- (4) Improved services for Irish exporters and importers.

The calculations made in this study relate to a single year, 1968/69. It is useful to briefly consider how the net contribution of Irish Shipping might be expected to change in the future in the light of their forward planning. Irish Shipping are in process of significantly altering the structure of their fleet. Certain vessels which were included in the fleet for purely strategic considerations and which proved most costly to operate are being disposed of and replaced with vessels which will be commercially viable. At the same time the policy of the company is altering to favour time charter arrangements for its vessels rather than voyage charter. In effect this considerably reduces the risks involved in international tramping and guarantees stable prices. In addition the company envisages a general expansion of its activities in the future both within already established operations and also in new ventures. For these reasons Irish Shipping's net contribution to the economy is likely to change over the next five years and we now consider how certain items might reasonably be expected to alter during that period.

The two components of net product are payroll expenditure within Ireland and profits. Payroll expenditures are likely to increase over the next five years but primarily as a result of rising wages rather than rising employment. There is not likely to be a substantial increase in the numbers employed by Irish Shipping in the future because shipping technology is tending to make the industry increasingly capital intensive. Hence it cannot be assumed that the real net product of Irish Shipping will increase significantly as a result of increased payroll expenditures. However, it is likely that there will be a significant increase in net product resulting from increased profits. Irish Shipping, on the basis of detailed research and analysis, have forecast the growth of profits to 1974/75. The first year of the forecast was 1968/69 and forecast profits were exceeded by £130,000 as a result of an exceptionally rapid reduction in overhead expenditures of about that amount. Results for the year 1969/70 show that forecast profits were exceeded by about £200,000. Assuming, however, that this excess profit over forecast will not continue at this rate, since a reduction

*The company estimates that the service generated about 3,000 passengers during 1969.

in overheads of £100,000 was planned and later forecasts are based on this reduction, we might briefly examine the situation in the light of forecast profits. The forecasts are as follows:

TABLE 7
INTERNAL FORECAST OF NET PROFITS
IRISH SHIPPING 1969-75
(£'000)

	Net Profit	
	Forecast	Actual
1968/69	185.0	315.6
1969/70	300.0	500.0
1970/71	400.0	700.0 (Est.)
1971/72	500.0	—
1972/73	600.0	—
1973/74	700.0	—
1974/75	750.0	—

This profit level to be maintained from then onwards. It will be readily appreciated that the net contribution of Irish Shipping would significantly improve year by year to 1975 if these profit levels were achieved. While it is difficult to comment on the reliability of these forecasts two factors would encourage me to place confidence in them as minimum estimates. Firstly, the two short term forecasts proved fairly conservative in the event although planned reductions in overheads were achieved more quickly than anticipated. Secondly, the forecasts have been made on the basis of certain firm forward commitments to time charter which guarantee rates for as many as eight years. Taken together with realistic estimates of future cost trends these give a solid basis for forecasting. However, shipping is a particularly unpredictable industry, subject to sudden and dramatic fluctuations, and one must therefore treat any forecasts relating to the industry with a certain amount of caution.

Changes in the indirect benefits to the economy resulting from the future development of Irish Shipping are more difficult to assess. There is every reason to be confident that the net foreign exchange earnings of the company will grow at least in proportion to increased revenue. This will have the effect of increasing the company's net contribution to the economy. The strategic contribution, because it is defined in terms of a minimum tonnage requirement, is not affected by an expansion of the company's activities over that minimum. The remaining indirect benefits to the economy might be thought of as varying in direct proportion to changes in the volume of business undertaken by the company, and therefore, in so far as the company expands its activities in the future, are likely to increase and improve the company's net contribution to the economy. Similarly the secondary stemming benefits in shipbuilding and marine insurance are likely to improve as the company develops. In view of the fact that Irish

Shipping anticipate adding one new ship per year to their fleet the improvement in the shipbuilding industry might be expected to be substantial.

So far we have confined our attention to average social rates of return in Irish Shipping. However, for the purpose of allocating capital in the public sector it is of course marginal social rates of return that are relevant. Now in the case of Irish Shipping the principal differences which are likely to exist between social rates of return at the margin and on average are that the benefits of the strategic function have no significance at the margin, commercial rates of return will be higher at the margin than on average and induced income will consequently be higher at the margin than on average. In other words, each additional pound of investment in Irish Shipping will yield greater profits, induce more secondary income but yield less strategic benefit than each pound already invested yields on average. The simplest method of estimating the social rate of return at the margin is to substitute into our calculations of the gross loss to the economy resulting from the abolition of Irish Shipping (Table 5) estimates of the marginal values of profit, payroll, induced income and strategic benefits, and proceed to recalculate the net contribution to the economy of Irish Shipping. The assumptions implied in this estimate are that all other average values, expressed as rates of return on capital, would have the same value at the margin as on average and that the gross gain to the economy from the re-employment of the resources displaced from Irish Shipping would be the same at the margin as on average expressed as a rate of return on capital. These are large assumptions but by this method we may be able to gain a rough idea of the order of magnitude of the marginal rate of social return.

The relevant commercial rate of return here is 15% on capital employed. Since new investment in Irish Shipping is presently undertaken only against secured time charter business returning 15% or over this rate is an accurate one. In calculating net product at the margin we make an estimate of the payroll associated with new investment by excluding all but crew payroll. This is a realistic approach since the payroll of shore based staff is unlikely to increase as new investment is undertaken. Secondly, income effects and the foreign exchange effect are adjusted *pro rata* with the change in net product implied by the inclusion of marginal profit and payroll figures. The strategic benefit has a zero marginal value and is therefore eliminated from the list. The gross loss which would result from the abolition of marginal investment in I.S.L. expressed as a rate of return on capital would be:

Net Product	Profit	15%
	Payroll:	6%
		<hr/>
		21%
Foreign Exchange:		1%
Induced Income:		14% (two-thirds of 21%)

This indicates that the total gross loss at the margin is 36% as a rate of

return on capital employed. Adjusting the gross gain figures on the same basis as the gross loss figures gives:

Net Product:	High	Middle	Low
Profit:	7½%	7½%	7½%
Payroll: ¹	4%	3%	2%
	11½%	10½%	9½%
Foreign Exchange:	0·2%	0·2%	0·2%
Induced Income:	8%	7%	6%
Total:	19·7%	17·7%	15·7%

¹ See Appendix 4.

On the basis of my various assumptions and estimates the marginal rate of return on investment in I.S.L. lies in the range 16·3% to 20·3%. These rates may be taken as indicators of the general order of magnitude of the marginal social rate of return to investment in Irish Shipping. Investment at any positive marginal social rate of return is socially profitable, because the opportunity cost of capital has already been taken into account.

APPENDIX 1

IRISH SHIPPING LTD.
REVENUE AND EXPENDITURE BY AREA, 1968/69 (£'000)*

	Total	Ireland	Rest of World
<i>Revenue</i>			
Tramp	3,104.4	495.4	2,609.0
Liner	1,560.0	560.0	1,000.0
Stevedoring	160.0	50.0	110.0
Investments	216.3	216.3	—
Total	5,040.7	1,321.7	3,719.0
<i>Expenditure</i>			
Port Charges	138.0	34.5	103.5
Loading	42.1	—	42.1
Discharge	105.2	70.1	35.1
Agency	13.8	—	13.8
Brokerage	123.6	—	123.6
Despatch	44.7	29.8	14.9
Bunkers	69.5	24.0	45.5
Sundries	2.1	—	2.1
Crew Wages	722.6	722.6	—
Crew Relieving	56.2	56.2	—
Drydocking	122.7	24.5	98.2
Spare Gear	51.6	—	51.6
Voyage Repairs	57.8	2.9	54.9
Stores	134.7	25.6	109.1
Victualling	90.3	22.7	67.6
Radio Rentals	50.5	—	50.5
Insurances	276.7	130.0	146.7
Establishment	205.2	200.0	5.2
Liner	1,511.5	509.0	1,002.5
Dockers' Wages	118.0	118.0	—
Other Stevedoring	4.0	4.0	—
Other	50.7	50.7	—
Total	3,991.5	2,024.6	1,966.9

*Not including revenue or expenditure on Ferry service. The Ferry is treated separately here.

APPENDIX 2

CALCULATION OF FINANCIAL ACCOUNTS OF ALTERNATIVE OPERATORS,
1968

Under the assumption that foreign shipping companies would transact all the business now handled by Irish Shipping, and assuming no change in the pattern of services or volumes of traffic, all of the revenue of £3,719,000 earned from externals would be earned by foreign operators. Of the £1,321,700 revenue earned presently from within the domestic economy, £216,300 derives from investment income which would of course not form part of the revenue of foreign shippers. Hence under this assumption a sum of £1,105,400 which are revenues from domestic sources would henceforth be paid to foreign shipping companies. This assumption must now be adjusted to take account of the assumed alternative situation in relation to the liner service. On the assumption that a cross-channel trans-shipment arrangement would be substituted for the present liner service and that the present volume of cargo would continue to be handled, then some part of liner revenue would accrue to Irish cross-channel operators. Similarly certain expenditures in relation to liner cargo would be made within the Irish economy under the trans-shipment arrangement. A rough estimate indicates that approximately 10% of present total liner revenue would be paid to cross-channel shippers and that half of this sum would be paid to Irish firms. Hence 5% of liner revenue, £68,000, would continue to be earned by Irish firms in the absence of the liner service. It may be further assumed that this figure will break down between foreign and domestic revenue in proportion to existing liner revenues. A further adjustment of our original assumption is necessary in relation to revenue from stevedoring activities. Since we have assumed that the existing volume of traffic would continue to be handled in the absence of Irish Shipping we must also assume that the stevedoring requirements of that traffic will remain unchanged. Hence although liner service would be withdrawn the stevedoring requirements of that service would be simply transferred to cross-channel operators. Thus no change in the financial accounts of the stevedoring business is assumed. This gives us a revenue table for the alternative situation as set out in Table 3.

On the expenditure side the most useful way of drawing up an alternative account is to consider each item of expenditure listed in Appendix 1 in turn. Domestic expenditures on Port Charges, Discharge, Despatch and Bunkers are a function of the pattern of services provided and volume of traffic and, since we have assumed these to remain effectively as at present, we may further assume that expenditures on these items would remain in the assumed alternative situation. Expenditures on Loading, Agency, Brokerage and Sundries fall exclusively externally and therefore do not concern us. *Crew Wages*. On the assumption that foreign shippers would take over all of Irish Shipping's business it is reasonable to assume that Irish crews would cease to be employed domestically. It is quite likely that a number of ship's officers would quickly find alternative employment with

foreign shipping companies but would in all probability become externally located. Since there is no obvious way of estimating the probably rather small number of officers who might remain domestically located while employed by a foreign company it seems reasonable to assume that domestic employment of the sea-going staff of Irish Shipping would become zero.

Crew Relieving. Since foreign shipping companies may be assumed not to favour Aer Lingus for crew relieving work as a matter of policy this item of expenditure may be assumed to entirely disappear.

Drydocking. By far the largest proportion of Irish Shipping's expenditure on drydocking fall outside of the domestic economy and those which do fall within Ireland are largely associated with the company's policy of utilising home produced goods and services and with the operation of the liner service. It may be assumed that under our alternative assumption this expenditure within Ireland would cease.

Spare Gear and Radio Rentals. Since both of these items of expenditure fall entirely outside of the economy it may be assumed that they will continue to do so in the absence of Irish Shipping.

Voyage Repairs. The small proportion of this expenditure which falls within the domestic economy is a reflection of the relatively small proportion of voyages undertaken by Irish Shippings' fleet which put in to Irish ports. Since certain of these services which do directly serve Irish ports would continue to operate under our assumed alternative situation, e.g. bulk cargo services and some would not e.g. liner, we arbitrarily assume that 50% of this expenditure would continue to fall within the domestic economy.

Stores and Victualling. Stores and Victualling expenditures in Ireland are mainly associated with those operations which serve Irish ports and certain of those would under our assumption continue to operate. However since a shipping company has a measure of choice in determining where it purchases stores and victuals, in a sense that it does not in relation to voyage repairs, it seems reasonable to assume that it may favour the home base in this respect. Hence it is arbitrarily assumed that only 25% of current domestic expenditure on those items would remain.

Insurances. Irish Shipping place almost half of their total insurances with an Irish marine underwriter in order to favour local industry where ever possible and also because they are a major shareholder in the company concerned. Since neither of these considerations would be likely to apply to foreign ship-owners this entire item is assumed to disappear as domestic expenditure.

Establishment. Under the assumption that all of Irish Shipping's business was taken over by foreign operators it seems reasonable to assume that the administration of the fleet would be externally located. However, it is likely that foreign operators would either increase their existing administrative establishments in Ireland, or establish new ones, in relation to those services which call at Irish ports. It is arbitrarily assumed that these expenditures would amount to £15,000 per annum.

Liner. Following our assumption that 10% of liner revenue would

accrue to cross-channel operations under a trans-shipment arrangement we may also assume that 10% of domestic expenditure would remain within the economy.

Docker's Wages. Docker's wages would remain unchanged in our alternative assumption since we are assuming that the volume and pattern of traffic remain unchanged.

Other Stevedoring. Remains unchanged for the same reason as above.

Other. We may arbitrarily assume that 50% of this item would remain within the domestic economy in our alternative situation. We have assumed that crew members currently employed by Irish Shipping would not continue to find employment with the external operators who took over the business of Irish Shipping. To be strictly accurate here it would be necessary to estimate the increase, if any, in employment in the Irish cross-channel services which resulted from the diversion of liner traffic. There is no satisfactory way of making such an estimate and since the numbers involved would probably be small this aspect is ignored. However, certain categories of employment would in fact remain on the assumption that the volume and pattern of services remained unchanged. Firstly, it is assumed that the same number of dockers would be employed and that their total wage bill of £118,000 would remain unchanged. Secondly, some administrative employment would continue to be necessary in relation to those services calling at Irish ports. This is taken, following the arbitrary assumption made in relation to the change in establishment expenditures to amount to £10,000 per annum. Hence the payroll total in our assumed alternative situation would amount to £128,000. It may be assumed that depreciation would cease to arise as an expenditure within the domestic economy. This is not to say that foreign shipowners will never order ships from Cork but rather that there is no reason to suppose that such orders will be made in direct relation to the business of Irish Shipping taken over by externals. Similarly profits may be assumed to be transferred abroad in our alternative situation with the exception of 5% of liner profit assumed to be earned by cross-channel operators handling liner business and the whole of stevedoring profit.

APPENDIX 3

EVALUATION OF IRISH SHIPPING'S EMPLOYMENT POLICY

This condition can be conveniently set out in algebraic form. Let:

w = the total annual wage bill for foreign crews;

W = the total annual wage bill of Irish crews;

t = aggregate annual transfer earnings of the Irish crews;

P = annual profits when Irish crews are employed;

N_i = net product when Irish crews are employed.

N_f = net product when foreign crews are employed.

Then $N_i = W + P$ and $N_f = t + P + W - w$

Thus $N_f - N_i = t - w$ which, of course, will only be positive when $t > w$.

It might be held that the employment policy pursued by Irish Shipping is integral to the strategic role of the company. In the case even if $t > w$ the strategic constraint would not permit a change in the policy and the annual value of the strategic function would then be increased by $t - w$. It is unnecessary to make this calculation here since to do so would anticipate the calculations concerning the net output which could be regained by re-employing the capital and labour released from Irish Shipping if that company ceased to exist. It will be shown later in this study that it is unlikely that net benefits could be increased as a result of changing this policy in the present circumstances of labour markets for unskilled labour in Ireland.

APPENDIX 4

CALCULATION OF GROSS GAIN TO THE ECONOMY FROM THE RE-EMPLOYMENT OF RESOURCES RELEASED FROM IRISH SHIPPING

The table below sets out the composition of the labour force employed by Irish Shipping. The categories employed in the table are not coincident with those used in the national labour force statistics since in a rather specialised industry such as shipping it is more useful to specify as precisely as possible the actual job which each man does.

COMPOSITION OF THE LABOUR FORCE EMPLOYED BY IRISH SHIPPING*

Shore Staff

Top Management	6
Senior and Junior Management**	29
Clerical Staff	81
Total Shore Staff	116

Seagoing Staff

	Officers	Cadets	Ratings
Deck	71	49	120
Engine	116	51	36
Catering	13	—	64
Total Seagoing Staff ...	520		
Total Labour Force	636		

*Excluding Dockers.

**Includes 10 Masters and Chief Engineers in shore jobs.

In the case of the labour which would be released from Irish Shipping we refer to our table above. Taking dockers first we may simply eliminate these from our consideration since under our alternative assumptions they will continue to be employed in the same numbers as when Irish Shipping existed. Hence we have already accounted for dockers in our estimate of the gross loss of net product resulting from the abolition of Irish Shipping. The remaining categories of the Irish Shipping labour force require more detailed consideration. The issue involved in making estimates of the alternative employment opportunities and transfer earnings of labour in cases of this kind centres around the circumstances which obtain in the various labour markets onto which this labour would be placed. Clearly where there are conditions of high demand in particular labour markets we may be reasonably confident that small additions to the supply of labour in such markets will rapidly be taken up at something close to the going rate. Conversely, where particular labour markets are continuously slack it is reasonable to suppose that the prospects of persons entering such markets to find new employment are poor in proportion to the rate of unemployment in the market. The alternatives for those unable to obtain suitable employment in such markets are to emigrate or to remain unemployed or to attempt to find employment in some other labour market. Hence the estimates we shall make of the net product likely to be regained

by the re-employment of the labour displaced from Irish Shipping will be calculated according to estimates of their alternative employment and pay prospects. First we shall consider shore based staff. It seems likely that of the managerial staff employed by Irish Shipping most would have excellent prospects of obtaining alternative employment in Ireland at a salary similar to that which they earn in Irish Shipping. However, there are a number of managerial employees who are specialised in skills relevant only to the deep sea shipping industry, e.g. naval architects. Such persons might well prefer to emigrate rather than accept lower paid alternative employment. Clerical staff are generally likely to have quite good prospects of alternative employment although at lower clerical grades the prospects will be rather less good. A rough estimate might be that of all shore staff two-thirds would have very good prospects of alternative employment in Ireland and that one-third would have relatively poor prospects and would be likely to emigrate. In the case of seagoing staff alternative employment prospects would vary with occupation. It seems likely that almost all deck officers and cadets would join foreign shipping companies and many might become externally located as a result. The employment prospects of deck ratings, either here or with foreign shipping companies, would be poor. It seems likely that a high proportion of these would emigrate or remain unemployed. Engine officers, cadets and ratings would all have rather better prospects of alternative employment locally than their deck counterparts. Similarly catering ratings and officers might have reasonably good alternative employment prospects in Ireland. In terms of the total wages and salaries displaced from Irish Shipping which would accrue to the labour force in alternative employments a middle estimate of two-thirds of shore staff payroll and one-half of seagoing payroll is made. A minimum estimate would give one-half shore staff payroll and one-third seagoing payroll. A maximum estimate would give all shore staff payroll and two-thirds of seagoing payroll.

We are now in a position to evaluate the employment policy pursued by Irish Shipping and referred to in Paragraph 2.34. Applying the same three estimates of payroll totals in the alternative situation to ratings only we have a maximum of two-thirds payroll regained, a middle of one-half and a minimum of one-third. Since the total wage bill which would have been paid to foreign ratings to perform the same total amount of work the Irish crew would have been just over half of the actual total payroll to Irish ratings this policy would have imposed net costs on the economy under both the high and middle payroll estimates and yielded net benefits under the low estimate. Since in the case of ratings prospects of alternative employment are likely to be less good in general than for other categories of seagoing staff, the low to middle range of payroll estimates is likely to be the most relevant and net benefits rather than net costs are consequently likely to flow from the policy. The numerical estimates in Table 6 have been scaled down slightly from the estimates for seagoing staff as a whole.

It is now necessary to consider the alternative employment prospects of the capital which would be released from Irish Shipping if it were abolished. Again the important issue in this regard concerns the state of the capital

market. Since 1965 it appears that there has been a relative shortage of capital for investment purposes and according to the N.I.E.C. Report on Full Employment this situation is likely to continue to obtain in the foreseeable future. Hence we may assume that if the capital presently employed by Irish Shipping was made available for other purposes it would quickly be fully utilised. However, the measure of this opportunity cost presents well-nigh intractable problems, theoretical as well as practical. In the circumstances, I assume this cost to be $7\frac{1}{2}\%$ (that is the approximate borrowing rate in 1968) on capital employed, giving a figure of £825,000.

In order to make a complete estimate of the net product which would be regained by the resources displaced from Irish Shipping in their alternative domestic uses it would be necessary to identify and evaluate all of the indirect costs and benefits which would result. However, only some of these are amenable to simple calculation and we shall therefore consider only the foreign exchange and secondary income effects. On the assumption that the output regained by the re-employment of the resources displaced from Irish Shipping would have an export content equal to the national average Dr. M. O'Donoghue has calculated that the foreign exchange premium will be $1\frac{1}{2}\%$ of net output regained. (See page 000) Applying this to our estimate of net product regained will give an adjustment for the indirect benefits of exchange earnings. Secondary income effects may be calculated in the same way as previously, i.e. two-thirds of net product regained.

DISCUSSION

Mr. W. A. O'Neill (summary of remarks): A most thoroughly prepared and interesting paper. The extent and detail of the research so obviously involved is eloquent testimony of the speaker. We are grateful to him for his excellent presentation—and for treating us to such a worthwhile evening.

Whilst by no means a new technique the application of Cost Benefit Analysis to the Irish scene is a recent and welcome trend. It is clearly a technique which can add much to the quality of information available where critical judgements are involved and thus of course to the quality of the judgements themselves.

Its greatest value at this point in time is, of course, that it brings a further valid dimension into a field where profit has for too long been the major yardstick. This is not decrying profit motive—it is and will remain the most potent of all management tools, but clearly in certain cases it is quite invalid. It is especially in such areas that this technique has its greatest potential and where its application will help to avoid serious errors of judgement.

Understandably human nature is already showing its face in the area of acceptance or rejection of the conclusions drawn from a number of these studies.

Where conclusions are favourable, of course, there is acceptance—

conversely when unfavourable there is rejection. It would be a real pity if so useful a tool were to come into disfavour merely because it fails to suit the 'Image Makers'.

To highlight the value of Mr. Mulvey's work and of this technique in particular, one example, concerning tramping, from our own experience will perhaps help to pinpoint the essential validity of the many points made in the paper.

We provide a complete training course for boys from entry right up to commissioned officer level. We do this alone without educational grants of any sort and it is the only comprehensive Merchant Navy course in the country.

That we subsequently loose some of our trained officers to other Shipping Companies and especially to the short sea trades is obviously a matter of concern. However, many of those opting for the short sea companies continue to serve on Irish ships and in terms of the country's well-being the availability of expert seamen to other Irish Companies is, of course, important. Thus we supply a pool of trained officers with skills which otherwise would not be available and in this way enhance the scope of career opportunities for Irish boys. The costs involved feature as an expense in our Accounts, whilst the gain to the nation's well-being is not so featured.

Dr. N. Whelan: It gives me great pleasure to second the vote of thanks to Mr. Mulvey on the presentation of his extremely interesting paper. His treatment of the theoretical aspects of 'shadow-pricing' for foreign exchange earnings and his analysis of the marginal social rates of return for further investment in Irish Shipping Ltd. have added two interesting dimensions to the literature already available on the application of cost-benefit analysis to Irish public sector investment areas. I think that, once again, we have a closely reasoned illustration of how misleading the commercial accounts of public enterprise bodies such as Irish Shipping Ltd. may be in relation to their returns to the community.

I wish to raise three points in relation to the topics covered by Mr. Mulvey. The first of these is whether analyses such as this are of any practical purpose for long-term planning and for resource allocation. I think they are to the extent that they indicate what considerations ought to be taken into account apart from the narrow profitability considerations. But they are not the whole picture. For instance, I feel, also, that if this type of analysis is to be of full use we must face up to the fact that the many cost-benefit analyses showing what social returns pertain to individual public enterprise bodies must now be related to the key problem . . . which is, to what extent do the various social returns for individual bodies relate to the objectives of the individual bodies concerned? In other words I think we need some methodology which will relate the various social returns now being produced for each public enterprise body to what society expects and requires of these bodies. The second point I wish to make is that once more we have an illustration of how the social benefits depend very heavily upon labour. This seems to me unwise and serves only

to render more difficult the answering of the key question which is . . . how can one quantify the social returns accruing from the *role* of each individual organisation? My third point refers to Mr. Mulvey's valuation of the strategic function. The objective of Irish Shipping Ltd., as stated in the Third Programme for Economic and Social Development is as follows:

In pursuance of Government policy, the essential role of Irish Shipping Ltd. is *to provide and operate* a fleet of a total tonnage (at present accepted as about 150,000 tons d.wt.) considered necessary to meet the basic strategic needs of the country. As well as meeting strategic needs, the fleet must be so constituted as to operate as profitable as possible.

I suggest that one can interpret, from this, the valuation of the strategic function as being the cost of maintaining the strategic function minus such reasonable operating profits as can be obtained. Thus Mr. Mulvey may have overestimated the value of the strategic function.

The foregoing three points are introduced only to ask clarification on issues which I consider to be very relevant if Mr. Mulvey's excellent study is to be used fully as a medium for influencing future planning. In conclusion, Chairman, it gives me great pleasure to second the vote of thanks to Mr. Mulvey.

Mr. S. O'Sullivan: I should like to add my own words of thanks to Mr. Mulvey for an interesting and informative paper.

It is always interesting for me, not being an economist, to study the methodology used in this type of appraisal. As you know one of the most noteworthy examples of the application of cost benefit analysis to a project in the transport sector is the study by Beesley and Foster in relation to the Victoria Tube project in London. It was only when the social costs and benefits were taken into account that the project was deemed worthwhile and the decision to commence was then taken.

An average of this type of appraisal is that it can help to establish the relative merits of a number of individual projects. The more diverse and unrelated the projects, the greater will be the disparity between the social costs and benefits, and the more difficult it will be to find a proper basis for quantifying them.

I realise that it will not be easy to develop this exercise to a stage where it can be of real assistance in determining priorities for investment in the public sector. If this exercise could be advanced to a stage where it would provide a basis for assessment of priorities for a State investment in would, indeed, be very beneficial. I should, therefore, hope that Mr. Mulvey will not rest at this point, that he and other experts who have undertaken studies of this kind on aspects of the Public Capital Programme will continue their good work.

There are a few points of detail in the paper and its appendices which may be worth mentioning. The first point relates to the estimate of £1.5 m. as the gross annual contribution which Irish Shipping makes to the economy by virtue of its strategic function. It is not unfair to point out that there could never be any question of the State allowing the fleet to be laid up.

The Irish Shipping fleet includes some of the most modern ships afloat. If, indeed, the Government had to re-examine this question at any time no decision would be taken until the whole position had been reviewed by the various Government Departments concerned. The figure of £1.5m. is therefore hypothetical. If one were to leave it aside the net benefit of Irish Shipping Ltd. to the economy as expressed on page 52 disappears.

The recent report of the Rochdale Committee on British Shipping has some pertinent comments on the over-all financial contribution of shipping to the economy. The Committee found that the industry makes a large contribution to the balance of payments but at a high price. This high price is due to the relatively low return on the total domestic capital and labour resources employed by the industry compared with the return which might have accrued had these resources been otherwise employed. In Britain the rate of capital per worker employed in shipping is £17,000; in Irish Shipping it is roughly the same; this is a high figure. Thus the principal domestic resource that shipping converts into output and foreign exchange, is capital.

These comments reflect the way in which that much harassed man the Minister for Finance, looks on proposals for further capital expenditure on shipping.

The detailed information in this paper and in the Tables and Appendices is very welcome.

Dr. Geary: At the centenary banquet of this Society the Minister, who was the guest of the evening, brought down the house with his peroration: "The best things in life are not measurable by statistics and we may all fervently pray that they will remain so." That is the trouble with cost-benefit analysis, the problem of the statistization (forgive the word!) of immeasurables, usually on the benefit side. (Added after meeting: I recall a paper on cost-benefit in transportation in which each death on the road was costed at £20,000 (I think) which happens to be the figure set popularly on the loss of an Irish emigrant at one time. In this Society at the time I made a wholehearted effort to kill the idea.) Costs are usually comparatively easy.

This is not to say that papers like this evening's excellent paper are not worthwhile, but to remember that in many applications cost-benefit either does not go far enough or does so in a statistically dubious way. I hasten to add that I detect no such dubiety in this evening's presentation. My thinking has been mostly on problems of a more macro type. How is one to value love, music, poetry, the Irish language in what we call in linear or mathematical programming the (necessarily single) decision function? We can't please everybody. Ragnar Frisch has suggested that a parliament of the nation (*not* a political parliament) be assembled to decide on national priorities, in effect to give weights to the immeasurables in the national decision function.

I know from experience that elements for which statistics (whether conceivable or not) are not available tend to be overlooked in discussion. In this situation I have considered (perhaps wildly!) and possibility of

using a formula for net benefit (+ or —, or used for comparison of projects) which include not only the value figure but also a set of symbols denoting the immeasurables such as beauty of countryside, sonic booms etc., etc., with some indication of the intensity of these; we recall that order statistics, 1, 2, 3, etc. *are* statistics. In this way such elements won't be forgotten.

This evening there has been some mention of transport companies. I wonder would Mr. Mulvey agree with me in saying that to consider the transport company in isolation for cost-benefit study may be misleading, that the benefit side could contain a substantial entry for the boon the transport company is to the whole economy, i.e. what the loss would be if that company ceased to exist. This leads to my final remark: even within the measurable zone, it may often be desirable to study a particular problem within the national framework, e.g. by input-output technique, so that secondary effects may be assessed.