PRICING AND INVESTMENT IN RAILWAY FREIGHT SERVICES*

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INTRODUCTION

The British Railways Board is a public corporation, created by statute, which operates all main line railway services in Britain. In a country as small as Britain, surrounded by a "canal" of infinite width and great depth, it is to be expected that most import or export orientated industries will locate near or on the seaboard. In addition, the disposition of the major manufacturing and consumption centres is not conducive to heavy rail traffic. Although the longest distance which can be travelled on the British Railways system is 1100 miles, the longest distance between cities of one million population is only 401 miles, and between the two biggest cities it is only 111 miles. Such relatively short distances between major points of traffic generation result in B.R. having relatively short freight hauls. In addition, the closeness of major centres, with their generation of predominantly short haul road movements, has been a justification for having a road haulage industry which is virtually free of economic regulation. (Although in the past there was "proof of need" capacity regulation in the public (i.e., hire and reward) road haulage industry, the absence of any regulation on private (i.e., own-account) carriers meant that in its competitive effects on the railways the road haulage industry was unregulated.) Under the Transport Act 1968, the remaining regulation of public carriers has been abolished. Although the intention of the then government was to limit long-distance (over 100 miles) movements of bulk materials and heavy loads, the refusal of the present government to gazette the necessary regulations to give effect to this has made Britain one of the few advanced countries to have no economic regulation of road haulage.

A necessary corollary of the absence of economic regulation of road haulage is that the competing railways should be similarly free of economic regulation, and this is the case in Britain. Commencing with the Transport Act 1953, the freight business of the British Railways Board has progressively been freed of regulation.[1] Thus what it carries, how it carries it, and at what price, are solely at the discretion of British Rail. There is no longer an "obligation to carry" in the traditional sense, and the Board is not a common carrier.

In addition to its general financial responsibility to

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[1]There is one minor exception. Through rates, or rates to ports, which might be considered discriminatory against the coastal shipping industry are liable to review by a special body created by the Ministry of Transport. Acting on that body's report, the Minister may direct the Board as to the rates it may charge.

"so conduct their business as to secure that their revenue is not less than sufficient for making provision for the charges properly chargeable to revenue, taking one year with another",[2]

i.e., to avoid an accounting loss, the Board must observe the general financial criteria laid down by the Government for public corporations.[3] Greatly simplified, these amount to the following rules:

(a) Prices should reflect long-run marginal costs, unless there is persistent unused capacity, when

(b) short-run marginal cost may be used as a basis of pricing to enhance the use of pre-existing resources.

We will now discuss the way these rules affect British Rail and their implications for short and long run, pricing and investment, decision-making. In translating these pricing criteria into workable decision rules, we shall find that for B.R. price setting must come before cost finding.

BRITISH RAIL'S FREIGHT PRICING POLICY

British Rail bases its freight prices on the prices of its competitors and on the relative qualities of service offered. Of course, with some traffics the "competition" is not an alternative transport mode, but an alternative location for the user (or an alternative fuel, where nuclear power generation is feasible). The role of long-run marginal cost is, therefore, as an investment indicator and not as a pricing constraint. Thus B.R. will be relating its long-run marginal costs to its prices, instead of the other way round.

An explanation is clearly required of what must at first sight appear to be a departure from the conventional wisdom. The Board's capital (which represented the money cost of its assets) was substantially written down at the end of 1968 in acknowledgement of its inability to recover from users prices which remunerated past investments. Accounting costs were not being recovered. The recapitalisation has reduced accounting costs, but it has not raised the level of revenue. The prices B.R. can obtain for many traffics will therefore continue to be less than the long-run marginal costs of handling them (i.e., the costs including full replacement, when due, of its renewable assets). Thus many prices already fall far short of the Government's "long-run marginal cost" constraint. In such circumstances B.R.'s prices (other than on London and grant-aided passenger services) must be based on the maximum the market is prepared to pay, which in turn depends on the competition of road hauliers, the private car, airlines and buses. This means there is no necessary *relationship* between each price and the long-run marginal cost of handling the traffic concerned.

The pricing and traffic acceptance rule cited above reflects British Rail's changing role. It is no longer providing universal geographic coverage with a vast variety of passenger and freight services. Its basic role differs in principle from that of most other public corporations in Britain (with the special exception of the National Coal Board,

[2]Transport Act 1962, S. 18.

[3]*Nationalised Industries: A review of the economic and financial objectives.* Cmnd. 3437. London, H.M.S.O., 1967, pp. 8–10.

whose traditional markets are in decline). Its nearest equivalent is the National Freight Corporation, the government-owned road freight and parcels organisation, which is not obliged to provide any particular service in any particular area. In contrast, the Post Office, the electricity industry and, to a lesser extent, the gas industry supply products and services for which there are no close substitutes, at least for a major part of their sales, and they are required, formally or informally, to distribute their products and services on a national scale. For those industries the availability of their products and services is imposed externally, and they are required to set prices which reflect the marginal cost of that availability in all situations, so that the level of demand will reflect those marginal costs.

British Rail is faced with a situation very different in principle, and therefore requiring a different pricing treatment. Except for London and other grant-aided passenger services,[4] B.R. is under no constraint as to the availability of its services. It can provide or not provide them at its discretion, and in many markets there are available good substitutes for rail services, both passenger and freight. It is the existence of these substitutes which limits the price which can be obtained for rail services, and B.R. is therefore without any long-run opportunity to exploit a monopoly situation. Its past financial record indicates that, overall, monopoly profits are unlikely to be earned. And even if B.R. were able to earn monopoly profits (i.e., profits greater than necessary to retain resources in a particular business), legislative restriction of its opportunities for expansion means that, under its legislative remit to maximise rail service subject to a break-even constraint, British Rail is likely to invest in any potential monopoly situation with the effect of expanding output (either in volume or in quality) to a point where monopoly profits are eliminated.[5]

COSTING INFORMATION AND MARKET PRICING

If prices are not to be based on costs, costs must be used to tell whether, and for how long, B.R. can profitably accept traffic at prices determined in the market. Thus costing information is needed for two types of decisions: (i) whether or not to accept a particular traffic, (ii) whether or not to replace a particular asset being used by a whole variety of traffics of varying levels of long-run profitability. British Rail's investment strategy is to replace assets only to the capacity which is justified by traffics which are able to bear their long-run marginal costs. In future, investment will be made only in assets which convey existing traffics at a long-run marginal cost which is covered by their respective revenues, or in assets for new traffics which meet the same criterion. The use of market-based prices will provide a clear indication of the opportunities for profitable[6] investment in replacement or capacity-increasing assets.

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[4]These can only be altered or abandoned with government approval. But the difference between cost and revenues is made up by government grants.

[5]The Transport Act 1968, whilst giving the Board powers to diversify its activities, divested it of its remaining facilities for the road haulage of freight, the most obvious solution for a railway under competitive pressure from road hauliers.

[6]By profitable is meant: exceeding the Government's test discount rate (at present 10 per cent, taking no account of inflationary price increases).

For the freight business an important implication of a market-based pricing policy is that British Rail is now devoting substantial efforts to the measurement and estimation of road haulage costs, because they closely determine the road haulage prices on which most of B.R.'s own prices in the freight field will be based. Control of freight sales agreements is in general exercised:

(i) as to *price:* by reference to known competitive transport charges and costs, to relative qualities of service, and to distance minima,

(ii) as to the *period* of the agreement: by reference to railway cost data, to find
  (a) whether long-run marginal cost is covered – in which case an agreement can have a fairly long life, subject to price variation clauses;
  (b) which costs are not covered, because the traffic will have to be abandoned or repriced as soon as possible to avoid these costs.

This "cost avoidance" may take the form of a refusal to replace an asset (or of replacement by an asset of lower capacity), or of reduction in the capacity of an existing facility by varying the size of the work force. The competitively based prices B.R. is able to obtain for many traffics will mean that their acceptance may have to be qualified in one or more ways: for example, "only in the summer months" (when spare capacity exists), or "only as long as (a nominated class of) wagons are available."

It is clear that more time elapses before any major cost can be avoided than is needed to incur a new cost. The aim is to have rules for decisions on acceptance of traffic reflect the downward inflexibility of its costs, but to have the capacity and cost of each facility constantly adjusted to reflect the profitability of the traffics it handles. The "charging floor" might, for very short time periods, profitably be much lower than hitherto. In the past, when "direct" costs were intended to be a charging floor, one or both of the following occurred with respect to many freight train traffics: (i) prices were set below the charging floor, or (ii) the charging floor was based on a volume of traffic and a cost level which was not achieved at those prices. Thus the Board tended to lose both ways. Either the charging floor did not act to keep prices up, or it was so high that traffic was lost faster than the Board could avoid the associated costs. A transport organisation's life is one of acquiring and shedding traffics and acquiring and shedding associated costs. Some modes manage to acquire and shed traffic and costs concurrently. Others, such as railways, suffer a lag in this process. The Board's analytical efforts are being redirected in an attempt to shorten the lag between the loss of traffic and a reduction in costs.

RATE SETTING AND ADMINISTRATION

In 1970 only 2 per cent of B.R. freight[7] traffic revenue will be earned from traffics charged at published national scales. The remainder will all be charged at negotiated rates. Thirty-two per cent of the revenue will be for traffics carried on long-term contracts with price variation clauses, and the remainder will be for traffics carried under individual agreements with a currency of one year or until terminated thereafter. All these rates may be expressed in a variety of ways:

[7]Excluding parcels traffic.

"Per ton" – with a qualifying per wagon minimum,
"Per wagon" – with the wagon type specified,
"Per train" – with specified train size and regularity,
"Per ton mile" – again with consignment, train size, and/or regularity minima.

Although there is still some local billing, within a year it is expected that all freight billing will be centralised. Thus there will be a need for any freight rate to be recorded at only two locations – the central billing office and the sales office responsible for the customer. Of course, for audit and review purposes, particular rates are circulated more widely than this; but the permanent recording requirement is strictly limited.

Contracts with price variation clauses are used for major flows and major customers. The price variation is usually based on a national economic indicator such as the index of wholesale prices, or (where a relationship with road rates is required) the index of transport workers' wage rates. A combination of these can be used. Ideally, the Board's aim is to have price variation clauses which raise rates in step with its own cost increases, but most users prefer the security of a price variation clause based on general cost increases. To maintain its own profitability, B.R. must therefore contain its cost increases within the bounds set by the indicators used. For large-scale movements, such as trainload traffic, the Board sometimes secures a "take or pay" clause which provides that, in the event of cancellation of a train service at the user's request, a charge is levied to cover at least the idle time of train crews, locomotives and wagons. In return, in such cases, B.R. is prepared to accept a reciprocal "penalty clause" which is invoked against it when the service falls short of a prescribed standard. The existence of such penalty clauses is used in evaluating priorities of movements in times of heavy demand.

All other rates are re-negotiated as required. Of course, only rates actually in use require to be re-negotiated, and it is necessary to have clear priorities in the order in which this is done.

More than half of the Board's freight revenue is derived from 30 major customers, and approximately three-quarters of the revenue comes from 300 customers (for each of whom a salesman has specific responsibility). Thus, even if the negotiations themselves are difficult, to ensure that the right negotiations take place is a manageable task.

Pricing for a large flow almost always requires an operational analysis to find out whether the required standards of service – wagon supply, transit times, etc. – can be provided, and this automatically highlights any unusual costs associated with the traffic. But the revenues at stake with very small flows do not justify such analyses. Control is exercised over price minima for these by an initial screening based on physical criteria, and a review procedure which compares any proposed rate with the market and, by analogy, with existing rates for traffics of similar physical and operational characteristics. The screening procedure uses a table of critical minimum mileages, which show:

(a) by traffic type, (b) by terminal conditions, (c) by load per wagon,

the minimum length of haul at which a price competitive with road is likely to be profitable for rail movement. These critical mileages are reviewed in the light of changes in road haulage prices or in rail costs and volumes.

IS THIS DISCRIMINATORY PRICING?

In its literal sense, the answer must be "yes". But it is a form of price discrimination which is necessary if many rail users are to receive service at all. The pejorative term "price discrimination" is hardly justified where most users would be worse off in its absence. It is important to note the difference between market-based prices and the old methods of railway pricing which elicited such controversy among welfare economists 50 years ago. Readers with long memories will be asking whether the wheel has not turned full circle. Is British Rail not returning to the *ad valorem* rates so beloved of railway commercial people 50 years ago? Are we not returning to the position Acworth argued in his *The Elements of Railway Economics*, a position which endured from the first edition (1905) when there were about 100 railway companies, until the revised edition in 1926 when the grouping into four main-line companies might have been expected to lead to something more like British Rail's present aim? Why deploy a great amount of effort in devising a pricing method vaguely similar to that proposed by Acworth, and does this not run foul of the government's guidelines?

Of course *ad valorem* rates, which Acworth was seeking to justify, are quite inconsistent with the existence of competitors who base their prices on costs. Such competitors, barely noticed in Acworth's writings, were soon at hand, and were to wreak havoc on the traditional notions of railway pricing. Between the wars the main-line railways' blind adherence to Acworth's revenue maximisation dictum, with an equally blind acceptance of Acworth's notion that costs are relevant only for constructing the profit and loss account, were root causes of the excess capacity, sub-optimal pricing, and other ills inherited by the British Transport Commission on nationalisation. Acworth's thesis was that if the revenue were maximised the costs would somehow look after themselves. But there must have been a flaw in this, because the chronic unprofitability of Britain's railways led to the need to consolidate the 100 systems into four regional systems in 1923, and then to nationalisation in 1948.

If Acworth was wrong, is not British Rail equally wrong today in pursuing a revenue maximising policy? The difference is to be found in the changed attitude to costs and the possibility of varying costs. I have already argued that in the long run, and as indicated by the inability of traffics to recover full costs, costs will in future be avoided by various means. But at the time Acworth was writing no individual railway company was prepared to reduce capacity (and therefore cost) for fear of not being followed by its competitors. In such a cost variation impasse, revenue maximisation equalled profit maximisation (or loss minimisation). Of course, it can now be seen that for the railway *industry*, if not for the individual company, capacity could profitably have been reduced. But now the railway industry in Britain is one company, and capacity reduction is possible as a way of improving long-run profitability. Acworth said: "Costs are fixed, therefore maximise revenue to maximise profits". The new dictum is: "All costs are potentially variable; as revenue in total falls below the long-run cost of the present system, revenue must be maximised to find which costs can profitability be allowed to remain fixed".

British Rail freight rates are set to be competitive with the price charged by an alternative mode, mainly road. Thus any "discrimination" between customers is limited to the amount by which nature discriminates by causing the purely competi-

tive road haulage industry to have different costs (and, therefore, prices) for the different movements. The old spectre of low rail rates for the shipper located on a canal, and high rates for his competitor in the next valley, can no longer be raised as a general objection to railway pricing freedom.

The ubiquity of good roads and motor trucks has eliminated most of the natural handicaps to inter-modal competition. These are now likely to arise only in the few situations where coastal shipping is a feasible alternative mode for all or part of the transit. The legislative protection given to the coastal shipping industry means that prices for sea-competitive movements must be kept close to long-run costs. Because any unusually low rate would expire as soon as it was exceeded by long-run costs, the "advantage" to the shipper on tidewater is likely to be shortlived. Any unusually high "pit-to-port" rate would be rejected on complaint made by the affected shipowners.

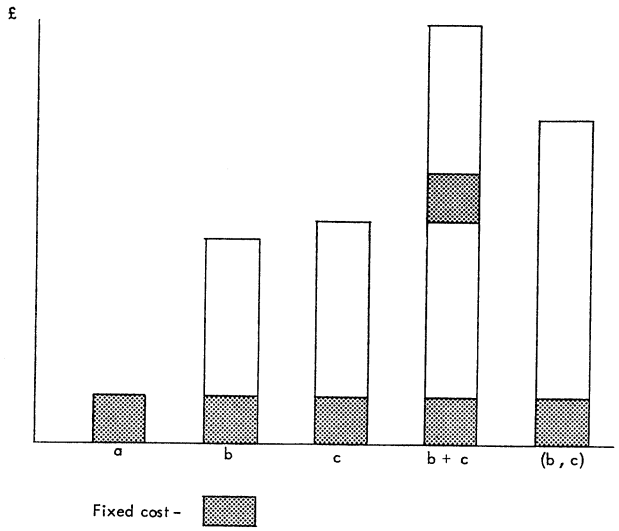
THE JOINT COST QUESTION

This method of control of long-run profitability, by accepting the market and by varying capacity, requires a different approach to the measurement of railway costs from that made in the past. No longer does the Board attempt to measure the "direct" (i.e., average variable) costs of every transit. But it does now tackle the "joint" cost problem. It was once thought that the "indirect" costs (up to 40 per cent of total costs) could not be allocated to specific traffics and need not necessarily be recovered from users. The most important step here is to determine the level and scope of policy decision which can use cost information. We are not setting out to find whether a wagonload of, say, pools coupons[8] from Penzance to Liverpool at £x will be profitable to the Board. Provided £x bears a close relationship to the cost (i.e., price) of the same movement by road, the Board's analytical requirements of that particular wagonload are exhausted. To attempt to isolate all the costs of that wagon movement would be fruitless. But we are interested in whether, say, the least profitable 10 per cent of freight traffics over a particular route is profitable. This is either because other traffics are making competing demands for the resources (wagons, engine power, train paths) concerned, or because the Board is faced with a major replacement decision and the optimal size of the new plant must be determined. It will be seen that in both cases an investment decision is required, the counterpart of which will be a decision to abandon the traffic concerned.

Such decisions require consideration of *all* the costs concerned – first to identify those costs which will vary, and then to measure the marginal cost attaching to the decision. The area in which the measurement of marginal cost has given greatest trouble in the past is in assessing the track and signalling cost implications of changes in the volume or mix of traffic on a route. Of course, track and signalling cost has been allocated between broad traffic groups on a very arbitrary basis in recent years, for the production of a necessarily crude analysis of profitability of broad traffic groups in the Board's Annual Reports. This was done by allocating track costs by a

[8]I do not know whether BR actually carries pools coupons by the wagonload; the example was chosen after seeing a special rate for "pari-mutuel tickets" in a U.S. railroad rate book.

Figure 1



Legend a - route open, no traffic.

b - route open, passenger traffic only, fixed cost "a" plus extra facilities provided for given passenger train frequency.

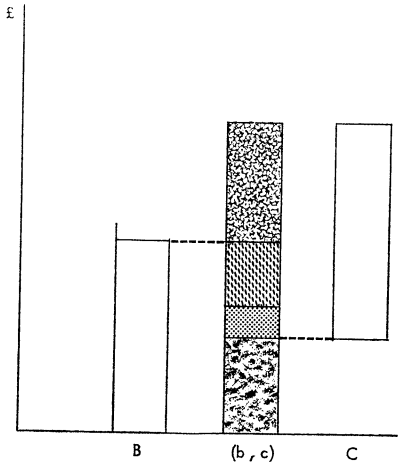
c - route open, freight traffic only, fixed cost "a" plus extra facilities provided for given freight train frequency.

b + c - total cost if passenger and freight routes are provided separately.

(b,c) - total cost if passenger and freight traffic combined on the one route.

(This diagram is for expository purposes only - it does not depict an actual situation.)

Figure 2



Fixed Cost

Analogous to fixed cost as long as one traffic remains

Common Cost

Attributable to Passenger Traffic

Attributable to Freight Traffic

Must be covered by aggregate net revenue of both traffics (after meeting all other costs).

To be recovered directly from traffic cocerned.

simple *pro-ration* based on gross ton miles, and signalling costs on the basis of train miles. The method now used provides a more accurate indication of the *causation* by particular traffics of track and signalling costs, leaving a much smaller residue of cost to be covered by all traffics in concert. We now avoid the term "allocation", which has come to mean an arbitrarily calculated share of cost, having no necessary connection with any costs which are avoidable if the traffic concerned is abandoned. For this purpose costs are categorised into specific, common and joint costs. Specific costs are those costs incurred in the production of a particular product which, with due notice, can be avoided by ceasing to make the product. Common costs are incurred in the production of two or more products, where it is cheaper to produce them together than separately, but where the level of common cost would decline if production of one of the products ceased. The level of common cost is responsive to changes in the required level of output of any one of the products. Joint costs are those costs incurred for the production of two or more products, the level of which will not change with the abandonment of any of the separable outputs.

We may explain this with a practical example. To have a railway route open for traffic there must be at least the necessary earthworks and one line of permanent way. The cost of maintaining the earthworks, and the minimum cost of providing and maintaining one line of permanent way, is *fixed* for as long as the route is to remain open at all, and is *joint* to all traffics which use the route. This is the only joint cost incurred in providing the route.

If the route is to be worked by more than one train at a time, it will require signalling facilities and crossing loops, or even multiple track. Imagine a route carrying passenger and freight traffic. With rare exceptions it is cheaper for passenger and freight traffic to share a route than to have separate routes provided. Thus the cost of those fixed facilities in excess of the earthworks and the minimal maintenance of a single track is common to both passenger and freight services, and its level is determined by their aggregate requirements and the degree to which their requirements are complementary. The specific costs on the route are the costs of actual wear and tear caused by the passage of trains, and any signalling operation costs which would be avoided if a particular train or trains did not run.

In Figure 1 it is clearly cheaper to combine the passenger and freight traffics on one route. There is only one lot of fixed cost (a), and that is joint to both traffics, The *long-run variable* cost of the combined route is less than the sum of the long-run variable costs if separate routes were to be provided (i.e., (b, c) is less than b +c). The lower long-run variable cost of the combined route is a common cost. It is cheaper to provide for the given levels of passenger and freight service together than separately. But we shall see that much of the common cost can be attributed to specific traffic. (It is important to note that such cost attributions are only for long-run decision making about investments and the pattern of services; there is no intention that they should be used for pricing purposes.)

Now look at the long-run costs of Figure 1, rearranged as in Figure 2. The left-hand block (B) represents the long-run total (i.e., variable *and* fixed) costs for the passenger trains on their own. The central block (b, c) represents the long-run total costs for the passenger and freight traffics, worked together, comprising fixed and common cost. If we subtract from this aggregate cost the long-run total cost of the freight traffic on its own (see the right-hand block – C), it is clear that the coarse

speckled area is wholly caused by the passenger traffic. That is, the amounts of cost represented by the coarse and fine speckled areas would be saved (in the long run) if passenger and freight traffics, respectively, were removed from the route; they are caused by, and can be attributed to, the traffics concerned. The only parts of the total costs which cannot be attributed in this way are the vertically dashed area, which represents the difference between the respective variable costs contained in "b" and "c", and the fixed cost. The non-attributable common cost can only be avoided by withdrawing both traffics from the route. It is therefore analogous to the fixed cost, and is effectively joint to both traffics. But the coarse and fine speckled areas of (b, c) are in no sense joint costs, and should be attributed to their causing traffics.

It will be obvious that the pure (fixed) joint cost and *de facto* (non-attributable common) joint cost form a far smaller proportion of the total cost than has hitherto often been claimed. The remainder, being caused by individual traffics, can be varied by varying the traffics concerned.

We can now discuss some examples. A four-track main line route will probably have nearly all the "fast" lines' track and signalling costs attributed to the inter-urban passenger services. The residual caused by freight and grant-aided passenger services would comprise the costs of the slow lines, crossovers, freight loops and similar facilities.

In contrast, there are many commuter routes and rural branch lines on which the existence of freight service adds only a small cost of rail wear. But if there were no passenger service the freight service would require only a much less costly route of lower capacity. There are cases where the revenue (net of all other costs) of the freight traffic covers very little of the common costs of the route; thus if the route is to remain open the passenger service must cover, from revenue or grants, a very large proportion of the common costs. Full account is taken of this point in the basis of social passenger service grants.[9]

There will, of course, be a number of routes in which the various traffics are truly complementary, as the excess of revenue over all other costs of any particular traffic would be insufficient to justify retention of the route. Note that we have returned, unashamedly, to the concept of contributions rather than arbitrary allocations. On such routes, unless the surplus over all other costs for *all* traffics exceeds the cost of maintaining the route, the traffics and the route should be dispensed with. But at the same time, unless each traffic can recover at least its own specific track and signalling costs, it should be abandoned, along with the causes of its specific track and signalling cost – e.g., in the case of wagon-load freight traffic, signal boxes whose primary purpose is to control the entry to private sidings.

There remain the cases where the net revenue (i.e., after covering all other costs) of traffic B is sufficient to cover cost b, c, but the net revenue of traffic C is inadequate to cover marginal track and signalling costs (i.e., b,c less b). The obvious solution is to abandon traffic C, and reduce the track and signalling costs to b. If traffic C continues to be handled, on the grounds that traffic B can make a contribution sufficient to cover C's specific track and signalling costs, the railways' net profit will be reduced

[9]This is described in the government's *Railway Policy* report, Cmnd. 3439, London, H.M.S.O., 1967.

to the extent of the difference between (b, c) and b, and the users of traffic C will be subsidised to that extent.

Finally, a word on the determination of cost causation. This is best done by finding the peak period (in terms of trains handled) and studying the mix of trains. Such a period may be very short, e.g., a route may be signalled for a $1\frac{1}{2}$ minute headway which is fully utilised for only a few minutes of each day. But it is the trains that require such a short headway for those few minutes which determine the whole track and signalling cost of the route. On a number of routes it will be found that the only specific costs imposed by freight traffic are the cost of operating signal boxes outside the hours of passenger service, and the train-caused wear and tear on the permanent way. On other routes, an iterative subtractive process will be required. To find cost causation we must ask: can cost be reduced by eliminating trains and rearranging the remainder? If so, the potential cost reduction may be attributed to the trains which could be eliminated. Costs not reduced are costs incurred and attributable to the cause of the failure to reduce.

The broad effects of this method of analysing track and signalling costs are that:

(i) where a route has a predominant traffic, most of its cost will have to be recovered from that traffic,

(ii) on all routes, the cost of facilities required only for one traffic must be highlighted to ensure that the net revenues of that traffic are reimbursing the cost of its specific facilities.

Although the exposition of this method of handling common and joint costs has used track and signalling as the cost head, and passengers and freight as the traffic groups under analysis, it is equally useful to distinguish the causation of different costs by different types of freight traffic. The crucial step is to define the decision unit. This can come from either the supply or the demand side. For example:

A bridge requires either costly repairs or the imposition of speed limits which will reduce line capacity. Does the net revenue (i.e., after meeting all other costs) of the traffic which would have to be turned away (after the capacity limitation) compensate for the bridge repairs? Such an analysis requires that all traffics using the bridge can be ranked according to their net revenues, so that it is the least profitable traffics which are put in jeopardy.

Growth of highly profitable traffic is expected soon to cause total potential traffic to exceed the route capacity. Does the aggregate net revenue of the least profitable traffic justify expansion of route capacity, or should it be displaced?

A particular class of specialised wagon has reached the end of its mechanical life. Would loss of all of the traffics requiring this type of wagon permit savings in route provision costs, and, if so, how much? Do the potential future revenues of these traffics cover both the cost of new wagons *and* the marginal route costs they cause?

A route suitable for 100 m.p.h. passenger train operation costs £y per mile per annum more than a 70 m.p.h. route. Does the net revenue gained from the extra 30 m.p.h. exceed the £y per route mile which it causes?

To make the best use of market-based prices, and to decide on the basis of cost which traffic to carry and which facility to reinvest in, B.R. has to know much more than hitherto about:

(i) the *variability* of all costs with changes in traffic volumes, and
(ii) the revenue and "other cost" characteristics of traffics at risk in a reduction or increase in volume at any facility.

Its aim is to fully and profitably utilise all present facilities, but the "profit" criterion will mean that certain traffics cannot, in the long run, justify the replacement of assets or retention of capacity, and in those cases the traffics will have to be abandoned. Concurrently, only those new traffics will be accepted whose revenues cover the associated long-run costs. The objective is to have a control mechanism for restructuring the railway, both in the pattern of its traffics and in the pattern of future assets. The new role of cost analysis is to advise the freight and passenger businesses how much traffic and how much railway we should have, and not how much to charge for the traffic. The price to charge will be determined only by reference to the market.

B.R. AND EUROPEAN PRICING AND COSTING METHODS

At present only a small proportion of B.R. freight tonnage passes to or from other European railways, and this is covered by international rates agreed as required with the systems concerned. But if Britain should join the European Common Market B.R.'s pricing and costing methods will require to be compatible with the principles laid down for the railways of the Six. This section is devoted to a comparison of pricing and costing methods in Britain and the Common Market countries.

First, it is important to note some fundamental differences in the transport environment. A primary aim of the Common Market is the harmonisation of competitive conditions between the modes, and the equalisation of treatment for the various users of any particular mode. Such harmonisation can be achieved either with no regulation or subsidy, or by attempting to apply to rail's competitors a regulatory framework comparable to that applicable to the railways. Although B.R. receives a subsidy for certain of its passenger operations, its freight business is neither subsidised nor regulated. In contrast, the Common Market countries have attempted to equalise the effects of regulation on rail and its competitors. The problem with the latter course is that the railways' regulatory framework has been built up over a century and reflects many conditions which cannot apply to the road haulage industry. Having been in public ownership for very long periods and having been regulated before that, the railways have accepted public obligations which far exceed those appropriate to firms in private ownership, and particularly those as small as typical road haulage operators. The common carrier obligation is just one of these. The whole manner in which a railway does business follows from "public service" commitments, whether these are imposed by legislation or voluntarily assumed. With the railways, there is an implicit guarantee of continuity of service which could not be expected from a privately-owned road haulier. Many traffics, particularly passengers, are carried at a loss for social reasons. On some railways, the pension commitment assumed far exceeds that justified on purely commercial grounds. In most cases the capital debt bears no relationship to the ability of the railway to pay interest on it.

Such historic obligations do not concern the road haulage industry, which under-

goes a continuous process of capital reconstruction as failures go bankrupt and leave the industry, only to be replaced by new entrants with new capital. Even ignoring capital debts, all current costs of running a railway are internal to the railways, whereas its principal competitors, both road hauliers and barges, use a track the cost of which is imperfectly charged to users, if at all.

In freight pricing, public ownership has often meant the perpetuation of constraints first imposed in the days when the railways had an effective monopoly for many traffics, and when users needed protection against arbitrary exploitation. But the universally adopted constraint on such exploitation of users – a standard rate for each commodity based on distance only, and subject to arbitrary maxima – in turn led to the exploitation of the railways. There has probably been more academic analysis in this field than in any other part of applied economics. Even those who would argue that it is possible to calculate in a meaningful way the "cost" of handling a particular consignment would concede that this "cost" will vary:

– over the same distance on different routes,
– in different combinations with other consignments,
– according to the manner of despatch,
– at different times of day, week or year.

Even in the days of widespread railway monopoly such regulations meant that low-cost traffic had to subsidise high-cost traffic. But the advent of road haulage competition put the railway into an impossible position. Traffics which incurred high costs on rail were likely also to have high costs if moved by road, but the constrained standard rail rate meant in most cases that it would stay on rail. Thus the railways tended to attract the traffic which was unprofitable to them. But traffic which had low costs on rail, and for the same reason was likely to have low costs on road, was over-priced at the standard rail rate, and therefore tended to be lost to road. In Britain this situation gave rise to the widespread use of "exceptional" rates, set well below the standard rates. But, even if exceptional rates managed to keep low cost traffics on rail, the railways had no way of avoiding the high cost traffics. Although the exceptional rates broke the principle of "the same rate for all" and thus embraced market pricing, rate maxima forced the railways into involuntary competition with road for precisely those traffics they were least well fitted to carry.

In resolving these difficulties, the governments of Britain and the Six have, initially, chosen apparently opposite courses. Commencing in 1953, the British Government has progressively liberalised the regulation of the railway freight business. The Transport Act 1962 was an attempt to compensate B.R. for its other handicaps through a partial suspension of its capital debt. This did not work, and B.R. deficits continued to increase. The government finally agreed in the Transport Act 1968 to accept financial responsibility for obligations imposed on B.R., and, in the light of this adjustment, to write down the capital debt to a level supportable by existing traffics and revenue. This put B.R. on a roughly equal footing with its competitors.

In contrast, most Common Market countries have obliged their railways to carry on in the traditional manner. Although the "normalisation" of year-end accounts has adjusted railway deficits to take account of the cost of some of these obligations, in other respects their freedom of action has been constrained, and governments have tried to impose similar constraints on rail's competitors. In particular, the Common

Market has been attracted to the idea of published, regulated rates for all modes. This attraction flowed from the development of the "forked" tariff, first used in 1952 under the rules of the European Coal and Steel Community. These rules were designed to provide a completely free market for coal and steel products within the member countries, unconstrained by such time-honoured strategems as basing-point pricing or transport rates favouring national producers against those of other countries within the community. This obviously required published rates which contained no element of hidden subsidy or protection. The chosen solution was the "forked" tariff, which permits a certain amount of pricing freedom within a constrained maximum. The "fork" is usually stated thus: the lowest rate shall be no more than x per cent below the maximum rate for a given distance. The spread of the fork is expected to provide sufficient freedom for optimal rate setting under special circumstances of cost or competition.

The success of the forked tariffs in furtherance of the aims of the Coal and Steel Community has led to their preferment in more general applications. In May 1965 the European Communities Council affirmed that, to optimise the use of the rail systems of the community, pricing policy must be in the hands of the rail managements. But at the same time it was decided that virtually all the freight transport within the community should eventually be subject to forked public tariffs. Implementation of this principle has been very slow. In July 1968 it was decided to implement the forked tariff decision in the field of international road haulage, with the requirement that for all rates below the lower fork it had to be proved that each special contract will "maintain or improve the haulier's financial position". It is of interest to note that the E.E.C. Liaison Committee of Road Hauliers objected to the provision for this modern form of "exceptional" rates, and would have preferred an obligatory forked tariff system with the lower bound universally observed. Great problems have arisen in framing the tariffs. These are not left to the hauliers, but are subject to bilateral negotiation between governments.

In general, equality of treatment for the railways is being sought through regulation of road haulage and barges, rather than the freeing of the railways. Of course, it is only where entry to the industry is regulated on economic grounds (e.g., road haulage), or where an industry does not pay all its costs (e.g., barges on government-provided canals), that there is a case for enforcing extra-market discipline on participants by forcing them to publish and adhere to rate schedules. If entry to the road haulage industry were free, market forces would control rates. And if barge operators had to pay the full cost of the canals they use, their rates would be much higher.[10] The publication of rates determined under such circumstances does not make them any less arbitrary, nor does it necessarily give equality of treatment to all users. Apart from the massive administrative problem of attempting to promulgate and enforce rates for such an atomistic industry as road haulage, the benefit to users is not immediately apparent. On the face of it, published road rates should ensure equal treatment for all users, but in practice this will not occur. When demand is heavy

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[10]And possibly fewer canals would be built. See F. Fülling: "The Economic Importance of the Rhine – Main – Danube Link: and EEC Cost–Benefit Analysis", *Rail International*, July–August 1970, pp. 459–475.

and there is a shortage of capacity, the best quality of service will be given to the users with the greatest bargaining power. Thus instead of the price rising, as would happen in a free market, average quality of service by road will fall.[11]

In such an artificial market, road and barge rates provide no "control" over rail rates. Without this control, users (and their governments) demand other "proof" of the reasonableness of rail rates. Although a railway may demonstrate that the surplus of freight revenue over cost is not excessive, this will not satisfy:

- users, who want their own rates lowered;
- competitors, who want particular rail rates raised;
- the railway's own government, which requires specific data on routes and traffic for the evaluation of major investment proposals, both on rail and on competitive modes (e.g., new canals);
- other governments, which are concerned to prevent the subsidising of particular industries or regions through arbitrarily depressed rail rates.

Such requirements have led to the development of very complex railway costing systems. But, because of the ultimate sources of many of the questions put to the railways' cost analysts, there is a pressure to use average[12] costs rather than marginal costs, which are the only costs relevant to business decisions. It is natural that the competitors of a decreasing cost industry like the railways should wish to base their attacks on railway average costs, which must exceed marginal costs. Of course, the marginal cost of all traffics does not sum to the total cost. The gap has two components. *First* is the accounting "costs", which have no relevance to *future* decision-making items, such as the interest commitments on loans to cover accumulated losses and on the book values of non-renewable plant. In Britain these have been removed from the calculus by the capital write-down of the Transport Act of 1968. But most continental railways remain encumbered by such obligations of the past, and pressures to make them recover from future users can only divert traffic from rail and raise the unit costs of that remaining. *Second* is the aggregate true and *de facto* joint cost, described in a limited example in the previous section. If the railway is not gradually to distribute its resources to its users, these costs must be recovered. In Britain it is now accepted that the most equitable and practicable way to do this is on the basis of users' preparedness to pay, and this paper has detailed the various checks and balances applied in the freight field. On the Continent there still exist distortions in the transport market, and uncompensated obligations of the railways (which are only another form of distortion). These would inhibit the use of the pricing

[11]This is not to say that the same thing cannot happen on a railway. But the road user must state the destination of the loads he wishes to have moved, whereas on rail it is only when the loaded wagons are shunted out that the destinations become known. Thus the haulier can pick and choose among traffics in a way which is denied to the railway. In the United States, the "Car Service Rules" provide that a shipper must nominate destinations when ordering wagons (to ensure that wagons are normally despatched loaded towards their "home" railroad). Thus in times of wagon shortage a U.S. railroad can, to a certain extent, pick and choose the traffic it wishes to carry. I am indebted to Professor W. Vickrey and Mr. H. T. Landow for advice and information on this point.

[12]"Fully distributed" in North American terminology.

and control methods outlined here, thus tending to keep the railways in businesses where they cannot exploit their fundamental advantages. Perhaps worse for the long-run health of the railways and their contribution to the national product, they are denied the full potential traffic growth and optimisation of the size and activity of the system which such a pricing and control system could provide.

British Railways Board