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SUPPLEMENT
TO
THE ECONOMIC RECORD

AUGUST, 1930

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GIPE-PUNE-048263

FOREWORD

At the meeting of the Australasian Association for the Advancement of Science in Brisbane in May, 1930, Section G (Social and Statistical Science) devoted special attention to the problem of Australian transport. The papers published in this Supplement were read at the Section meetings and the Economic Society has undertaken their publication. It is not claimed that the papers offer a complete survey of the subject. The Society is indebted to the contributors who so readily prepared papers. It was fortunate in securing the services of so many authorities upon transport, and the appearance of the Supplement at the present time should enable the public to appreciate more clearly the issues involved in current discussions upon transport. The aim of the Economic Society is to provide an analysis of leading economic problems. It is not concerned with propounding a policy, but rather with furnishing the basic facts of any problem as it arises. The present Supplement is offered to the public solely with this purpose in view.

LEADING PROBLEMS OF AUSTRALIAN TRANSPORT.

- I. Over-Capacity in Transport Facilities.
- II. Competition in Transport and the Problem of Rationalisation.
- III. The Administration of Transport Enterprises.
- IV. Finance and Costing.

"It is evident," stated the Commonwealth Transport Committee in its report in 1929 on the Co-ordination of Transport in Australia, "that throughout Australia transport services have been provided whose capacity for movement of passengers and freight is greater than the business offering." This applies to sea and land transport alike, and the series of papers published in this supplement provides ample evidence of this condition of over-capacity. The report of the Tariff Board¹ on the Navigation Act showed that the Interstate Shipping Companies were carrying on business at a very low rate of profit, or at a loss. The return on the capital employed was 2.4% in 1926, and 1.6% in 1927. In 1928 there was a loss of .8%. In April, 1929, a deputation from the overseas shipping companies announced that the audited accounts of six representative British lines had incurred losses amounting to £2,900,000 during the years 1926-29. The losses on State railways amounted to £4,400,000 in 1928-29, and Professor Hytten has shown the degree of over-capitalisation of the railways.² In the papers by Mr. Crawford and Major Northcott there is evidence of financial losses in motor transport. Finally, the rapid development of air transport has been largely stimulated by subsidies. Australia is thus enjoying transport services at rates below cost. Such a state of affairs cannot continue indefinitely, even for those services that are publicly owned. The financial losses involved indicate that the present organisation of services is not bringing the most satisfactory economic results. Transport has necessarily exercised an important and even predominant influence on the economic development of the Commonwealth, but the services have been organised without any serious attempt at co-ordination, and in most instances plans have been made upon an incorrect estimate of the growth of trade and population. This is not less

1. Navigation Act. Enquiry into Coastal Clauses Report and Recommendations of the Tariff Board, December, 1928. See the *Economic Record*, May, 1930, for a review of this report by Professor Giblin.

2. See p. 22.

true of private than of public ownership. In overseas shipping the volume of traffic has not expanded with the transport facilities available. Our interstate shipping services, though less extensive than before the war and protected now by the Navigation Act, eagerly seek trade to justify the capital outlay, and are maintained partly because the leading companies have other commercial and industrial interests. In all States railway construction has proceeded too rapidly, and there is increasing competition with interstate shipping. While railway facilities were being extended, motor traffic commenced to compete with railways and to rob them of an expected reward for their enterprise. And now aircraft are commencing in a small but growing way to take their toll upon passenger traffic. We have, therefore, more intensive competition among transport agencies at a time when there is a decline in the rate of economic development. Transport has thus become one of our leading economic problems. It is the purpose of this publication to provide information upon certain important aspects of the Economics of Australian Transport. Though it is by no means a comprehensive study, it goes far to fill a serious gap in our economic literature. May we express the hope that it will stimulate further research and study of a complex problem and provide some guiding principles upon which future policy may be based and legislative action taken, insofar as the latter is necessary.

II.

All forms of transport are faced with an increasing difficulty in avoiding losses. This naturally tends to accentuate competition, and, with the introduction of mechanical transport, there is a greater tendency to undercut rates than at any time during the last 30 years. This competition has the peculiar feature that it is a contest in the main for special kinds of freight or passenger business. It is observed in the activities of the "tramp" in overseas shipping, in the railways competing with interstate shipping for passenger traffic, in the motor car competing with railways for both passengers and special classes of freight, and in the air services providing quick transport for mails and a limited number of passengers in competition with all other forms of transport. There is some element of irresponsibility and "piracy" in this competition, and it has stimulated transport agencies to offer special facilities to regular customers. The nature of the problem has been eloquently

stated by Marshall in relation to shipping. "This association of Conferences (of shipping companies) is a matter of but little direct concern to the tramp, for she has no fixed route and presents no good target for their artillery. So they turn their attacks, not on her, but on any who make use of her for work which they are ready to undertake; they think it an unfair competition for the tramp to come in when things are good and drop out again when things are bad. They are not able to eliminate the 'fitful tramp' from the regular trades; but their weapons are turned against anyone who sets up a regular line of cargo steamers, which may divert traffic from the Conference."³ This type of competition has perhaps reached its most extreme form in the activities of motor cars and lorries in attracting business from the railways. It is clear from the papers dealing with road and rail competition that motor traffic has been developed in Australia mainly in competition with the railways, but the traffic secured has been of a special kind, and the motors have never been regarded as common carriers. In some cases, however, they have provided a satisfactory form of transport where railways did not exist. An adjustment of the claims of these two transport agencies provides an excellent illustration of the problem of reconciling competition and monopoly in transport, whilst maintaining the public interests. The matter has been tackled by the Australian Overseas Transport Association, as indicated in Mr. Brigden's paper. In the case of shipping, however, it is not possible to forbid the competition of the tramp, and it is necessary to rely upon an agreement among shippers and shipowners to support and provide regular services. With road and rail competition, it is within the power of the State to set up a regulating authority for the purposes of rationalising services. It cannot be conceded that motor transport is to be forbidden merely because it takes traffic from the railways, and, therefore, increases the railway deficit to be met out of the consolidated revenue. In some cases the maintenance of railway facilities might involve the community in a greater economic loss than would the increased taxation required to meet that portion of a railway deficit due to motor competition on some lines. The State might find it profitable to close up a non-paying line or provide reduced services on it, and to leave the rest of the traffic to motor transport. A mere prohibition of motor transport cannot be re-

3. *Industry and Trade*, p. 437-8.

garded as an economically sound course. By such action the community in effect ignores the advantages to be derived from a new form of mechanical transport. It is clearly shown in Major Northcott's paper that the construction of larger motor vehicles is likely to reduce the costs of motor transport, while increasing the facilities it can offer. Governments would not be serving the best interests of their communities if they sought to establish a complete railway monopoly merely for the purpose of reducing the burden of railway finance upon budgets. On the other hand, the claim of private transport interests that unrestricted competition should be allowed cannot be sustained. Where motor transport is not a common carrier and merely takes the cream of the traffic on favoured routes, it may return a handsome profit to the private owners. To suppose that the existence of such a profit indicates a net economic gain to the community involves a fundamental error. In this case, the profit may be less than the net loss to the community through the reduction of railway revenue on routes where the railways are forced to carry the less profitable freight. For handling some goods motor transport may have advantages over railways. Yet, as Mr. Clapp shows, taking the whole of the traffic for any area where this traffic is considerable, it cannot be conceded that motors would offer facilities equal to those of the railways. While this condition of affairs prevails, the State is justified in protecting its railway assets, and any inconvenience caused through the railway handling the goods most suitable for motor traffic is counteracted by the facilities offered by the railways on the whole of the traffic. Of course, if the community can afford both forms of transport, it would not be necessary to restrict motor competition in such a degree. In that event, the more bulky traffic should be sufficient to meet the overhead expenses of the railways, but in Australia, evidence has not yet been furnished to show that such a condition of affairs is possible. It is, therefore, necessary to regulate competition between road and rail transport by rationing the services. For this purpose an expert authority is required, as suggested by Mr. Crawford,⁴ and by the Commonwealth Transport Committee, which made the following recommendation, "That motor vehicles be regulated and controlled by the State Transport Co-ordinating Authority in addition to the payment of adequate road taxation, and that, where possible, they be co-ordinated with the railway system as

4. See p. 84.

feeder services." This Committee summed up the position as follows:—

"An adequate system of transportation can only be obtained by making use of the best means of transport available, and by combining those services in such a way that they can be operated at the lowest total cost with due regard to the services required.

"There are many cases in which motor vehicles can provide a more economical and efficient service than the railway, such as for certain cases in urban areas and other places of short haul. The problem should, therefore, resolve itself into one of co-ordination rather than competition.

"The railway is best suited to long hauls, the motor to short hauls, air services where speed is important, and water carriage where speed is unimportant.

"The only means of attaining an ideal service is by co-ordinating the various forms of transport, since competition which merely means a duplication of facilities is an economic waste which is ultimately paid for by the users of the service.

"The best means of co-ordination is by the gradual introduction of feeder services, which gives the motor vehicle a field of action along which its development can take place with advantage to all. Services such as these have been supplied and operated by railway companies for many years in England and America, where the motor is used in rural and urban districts for bringing produce to or distributing from the railway."

To allot spheres of operation for railway and road transport requires careful investigation into the net costs and benefits of the two forms of transport to the State as a whole. Some steps in this direction have been taken in most States under special legislation for the control of motor traffic,⁵ but in the past, the controlling authority has tended to place heavy restrictions upon motor transport, rather than to consider what gains might be derived to the community by allowing the motor to supplement the railway. This is one of the major problems of rationalisation in Australian transport, and it is found in a modified form in the competition between railways and interstate shipping, and will doubtless become important in the competition of air transport with other forms of transport.

III

The problem of management is not less important than the problem of rationalisation. State-owned railways have not yet

5. The most important example in New South Wales and the legislation recently passed in that State is outlined later.

devised a satisfactory form of management and financial control. It is true that the method of appointing Commissioners and giving them large powers has improved railway management in Australia in recent years, but the Commissioners themselves will be the first to say that they are hampered by political interference and the claims of special areas for railway facilities. Moreover, the relation of railway finance to the general finances of the State is not conducive to sound financial administration. Owing to past errors all the railways are over-capitalised, and suggestions have been made from time to time that the surplus capital should be written off. This problem is discussed in Professor Hytten's paper. Suggestions are made for estimating the amount of over-capitalisation. The mere fact of relieving the railways of this burden will not allow the State to escape its obligation to pay interest upon the surplus capital. That, however, does not affect the argument upon which the proposal has been advanced. It is a question primarily of securing efficient management and freeing the railways from political control. An essential condition of good management is the prospect of balancing the railway budget. If the Railway Commissioners are faced with a dead weight of debt and forced, therefore, to present, year after year, a heavy deficit in their accounts, enterprise throughout the whole staff is likely to languish. To stimulate co-operation and initiative in both the management and the staff of the railways, it is necessary to present them with a task that can reasonably be accomplished. The writing down of capital would, therefore, have a good influence upon efficiency, and it would enable a complete severance of railway finance from the budget to be effected. The Commissioners could then be left to manage the railways as a business concern, making provision for adequate depreciation and maintenance and charging rates that are economically justifiable. This is perhaps a counsel of perfection, and it is frequently argued that no State Parliament will be prepared to surrender the field for patronage associated with railway development and administration. But counsels of perfection are sometimes realised even in the most unexpected conditions, and unless they are put forward and continually urged upon the authorities, they are not likely to receive any consideration at all. Some steps in this direction have already been taken in New South Wales, where the railway finances are separated from the budget, but the process of securing independent management and relieving the railways of over-capitalisa-

tion is far from complete, even in that State. Indeed, the inadequate provision made for meeting the annual railway deficit may defeat the objective of the limited reform that has been initiated.

An even more difficult problem in financial administration arises in connection with the development of motor transport. Professor Giblin discusses elsewhere in this Supplement the expenditure upon roads in Australia, and the sources from which the funds are derived. It will be observed that a substantial part is obtained from the petrol tax, but no attempt has been made to consider to what extent the taxes paid by the owners of motor transport are offset by the facilities available through the construction of motor highways. Indeed, the rapidity with which roads have been constructed in Australia in recent years has raised an extremely important problem. It is difficult at any time to estimate the economic results of loan expenditure upon road construction. Some of the facts to be considered are outlined in Mr. Kemp's paper, but the problem is complicated in Australia by reason of the competition of roads with railways. To some extent the improvement of the highways at the public expense has decreased the earnings of railways and added to the deficits on the railways. As already mentioned, the loss to the railways by reason of such competition is not to be regarded as the measure of the net effects upon the community. If road transport were cheaper and more rapid and generally more economical than railways, the community might gain, despite an increasing loss to the railways and the taxation necessary to construct and maintain the roads. To estimate the net economic results is by no means an easy matter. We have to consider (a) the effect on railway finance and the taxation required to meet the railway deficit; (b) the method of financing road construction and any permanent charges on taxation on this account; (c) the cost of maintenance of the roads; (d) the economic benefits from improved transport facilities; and (e) the prospects of increases in population and trade in the areas affected. These are problems which require the most careful investigation. The matter must be considered not only from the point of view of its effect upon Government finance, but also from the point of view of the community as a whole. It is, therefore, one for co-ordination through some authority controlling the development of transport as a whole.

IV.

The discussion of finance is inseparable from that of management, as already indicated in the above consideration of railways and roads. A similar position arises in connection with port facilities, discussed in Mr. Whitlam's paper. The subject was also reviewed at length by the Commonwealth Transport Committee, already referred to, and its recommendation may be quoted:—

“(a) The main ports where the bulk of the oversea trade is handled should be controlled by Boards or Trusts having adequate knowledge of importing, exporting, shipping problems. The finances of the major ports should be separate from those of the State, but the financial and developmental policy of the Ports Trusts should be subject to control by the State Governments, which should determine the rates of sinking and depreciation funds. Port rates should be revised and so adjusted that the estimated revenue be only that required to meet working costs, interest charges, and approved reserves.

“(b) The developmental policy of Port Trusts should be subject to investigation by the Transport Authority before it is approved by the Government.” (The Committee recommended a single transport authority to control policy in each State and a Commonwealth transport authority to co-ordinate the policy of the State authorities). The ideal arrangement with port facilities, as with railways and other forms of transport, is an independent authority charged with the duty of providing a service that will not be dependent on the State budget. It is equally true that the authority should not be required to make contributions to the State budget, but should earn sufficient revenue to meet all expenses, including depreciation, and to establish reserves for contingencies. In some States port facilities are a source of revenue to the Government, while the railways are a source of expenditure. Whatever arrangements are made for co-ordinating transport facilities, the guiding principle should be to make each form of transport self-supporting as far as possible. This again is a counsel of perfection, but is nevertheless an ideal to be aimed at.

Even in countries where State activity is relatively limited, the provision of transport facilities raises important questions of public control and public ownership. It would be reasonable to assume that under such conditions of public ownership and control, co-ordination in transport could be easily attained. The

history of Australian transport shows, however, that this is by no means the case. From the date of the great engineering blunder of diversified railway gauges, there has been comparatively little effort to promote co-ordination. The result has been over-development and duplication of services. Moreover, financial policy has often been decided on grounds of political expediency, and it will be extremely difficult to remove transport from political control. With the increased competition from motor transport, the financial provision for road construction, the growing deficits in railway finance, the commencement of competition from air transport, and the difficulties of both interstate and overseas shipping, there is now an opportunity for initiating a constructive policy. Such a policy should be based upon a co-ordination of existing facilities, a consideration of the economic costs and benefits of the provision of new facilities, the elimination of duplication and the rationalisation of transport, and, finally, the close investigation of costs for each type of transport. Costing has hitherto not received adequate consideration in State-owned services, and the facts mentioned in Mr. Crawford's paper show very clearly that even private enterprise has failed to grapple with the complexities of the subject. The technique of costing in transport has yet to be developed even in the case of privately owned services. This publication does not deal with this aspect of the subject, nor has it considered adequately many others, such as urban and suburban transport, the relation of local bodies to transport, and the desirability of establishing a uniform railway gauge throughout Australia. It does, however, contain material of first rate importance to all who desire to understand the economics of Australian transport.

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TRANSPORT AS AN ECONOMIC FACTOR IN AUSTRALIA.

- I. Geographic Control of Transport Development.
- II. The Productive Crescent in Australia.
- III. Radial Drainage and the Interposts.
- IV. Effect of Shipping on Industrial Development.
- V. Co-ordination of Function in Transport.

"The problem of the distribution of population is completely transformed," says R. G. Hawtrey,¹ "as soon as the division of labour comes to play a part in it." Settlers seek land that will produce *any* useful commodities, provided only that adequate means of communication exist to carry the commodities to markets where they can be exchanged. Transport facilities, although they are largely determined by geographical conditions, require great capital expenditure if they are to conform to modern trade and industrial requirements. This condition, especially as it affects the development of transport lines on land, is one of the chief factors governing the distribution of the population of any country. The first requirement in a review of Australian transport, therefore, involves a survey of the control exercised by geographical conditions upon land lines.

The problem of landward communications is a double one, dependent in the first place upon the geographical lay-out of the country and, in the second, upon the productivity of the hinterland. Land transport in a country of primary production fulfils its function by connecting areas of production with outlets to the world markets; and the whole complex of problems depends on the efficiency, *i.e.*, maximum service at minimum costs, with which this can be achieved. The development of land transport in a new country suffers because of the necessarily intermittent and spasmodic nature of its provision. Transport planning in such areas, therefore, because of the policy of "trial and error" that is an inevitable accompaniment of their settlement, involves expensive mistakes such as non-paying lines and differing gauges. Even in the present comparatively advanced state of our knowledge of possibilities, any really accurate estimate of future productivity is not available. Australian railway de-

1. Hawtrey, *Chapters on Transport, The Economic Problem.*

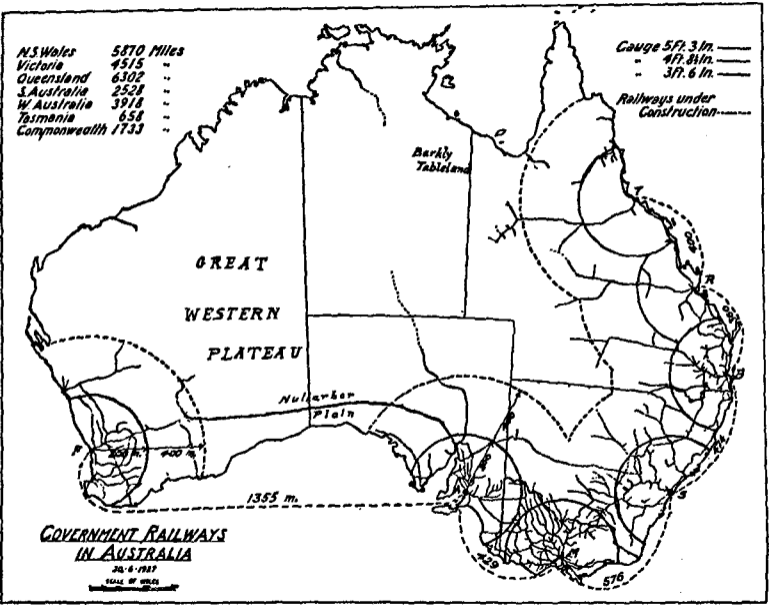
velopment in particular has been determined by the assumption that the natural resources to be exploited were suitable and extensive enough to pay for the investment of the capital necessary to provide the transport, and to leave a good margin to the State either as a surplus over working expenses or as a net gain in social efficiency.

Undeveloped areas may attain this necessary level of prospective advantage in several ways:—(i.) Growing demand owing to the expansion of population in the older lands may increase the returns to primary industries in new countries. (ii.) Exploration and scientific method may increase the productive possibilities of undeveloped areas. (iii.) Invention and investigation may find uses for products hitherto considered useless. (iv.) The cheapening of transport may bring infra-marginal areas up to the margin of profitable exploitation. The present survey is concerned rather with the last of these developments, but each of the others has a very definite bearing upon the provision and utilisation of transport facilities. Indeed, it is mainly through the realisation of the first three possibilities that the cost of transport will be lowered by the greater use of existing facilities.

The key positions in transport, called by Hawtrey the "interposts," are also determined by geographical considerations. Land lines connect the actual production areas, almost invariably without interruption at intermediate centres, to a point where many routes converge. This development is due to the fact that a transport system is governed by the same factors which control the development of any large-scale industry. Economies of effort, of time and of capital, influence the cost of transport at every stage; and the disposition of land lines is thereby determined. Concentration at the interposts is "designed to fill frequent and regular trains and ships as nearly as possible to the limit of their capacity. Only so can the full benefit be derived from the heavy capital expenditure and overhead charges inseparable from an effective modern transport system." It is in accordance with the principles here indicated that any examination of the Australian transport system must be conducted.

N.S.Wales	5870	Miles
Victoria	4515	"
Queensland	6302	"
S. Australia	2528	"
W. Australia	3918	"
Tasmania	658	"
Commonwealth	1733	"

Gauge 5ft. 3in. ———
 " 4ft. 8½in. ———
 " 3ft. 6 in. ———
 Railways under
 Construction - - - - -



**GOVERNMENT RAILWAYS
 IN AUSTRALIA**

30.6.1927

SCALE OF MILES

II.

The main productive area in Australia stretches in a crescent from the eastern end of the Great Australian Bight to Cairns—a strip vertebrated and rendered fertile by the Eastern Highland System. This arrangement of the agricultural hinterland has resulted in a two-dimensional transport problem. The main interstate traffic circulates *along* the crescent by the arterial interstate lines; and the distances involved give water transport a practical monopoly for heavy freight traffic. Land transport between the different States of the Commonwealth is, therefore, mainly devoted to the carriage of passengers. The chief function of Australian land lines is, however, the collection of primary produce and its concentration at the interposts. Thus a second system of traffic circulates to and from the coast *across* the crescent. This unique circumstance, a result of the physiography of the continent, has produced a characteristic pattern in the network of land lines concerning which more will be said in the next section.

The transport system of Western Australia may be regarded as an independent outlier, a detachment which is caused by the physiography of the continent in conjunction with the sterility of its middle section. The long East-West transcontinental line effects the connexion of the Western and Eastern systems at the expense of traversing that large unproductive area lying to the south of the Great Western Plateau. The linking of the two ends of the North-South transcontinental will add yet another line destined to be a mere communication, with little prospect of realising closer settlement or payable traffic in the future. A development which must inevitably follow the thickening of settlement in the north will be the connexion of the northern end of this system with the Queensland pastoral spur-lines through the Camooweal-Barkly Tableland region.

A further consideration of some importance is the necessity for pushing land lines across the agricultural crescent into the great pastoral area of the Darling Basin and the Western Plains. Long and expensive lines thus tap the sheep and cattle country as continuations of the agricultural lines lying nearer the coast. From the viewpoint of reproductive revenue, therefore, the distinction between the better paying agricultural lines and the pastoral lines which are in the main "loaing propositions" must be noted. This is, of course, inevitable from the very nature of the industry suited to the areas and from the scattered character imposed upon their settlement.

III.

What are the conditions which determine the location of interposts? It is fairly obvious that, in Australia, the initial advantages conferred on the sites of the capital cities mainly operated. The concentration of government at these points from the early days of settlement stimulated the concentration of population and the convergence of land and sea routes at these points. The start thus gained by those places led inevitably to the appropriation of the main trading and manufacturing enterprises as a direct result of the concentration of transport. By a series of happy accidents the sites for capital cities were selected at points which also proved to be the most efficient at which these various functions could be specialised. "Manufacturing can be carried on at almost any place to which the necessary materials can be brought, and from which the finished product can be sent to market." It is probable that, in the main, the collection of primary products and the elementary processing that is necessary before export could not be more effectively performed at any points other than the present interposts.

To the advantages thus acquired by the capital cities were added those which arose later from the developments in overseas shipping. The concentration of population accelerated the growth of industries dependent upon the greatest existing markets, and this consolidated further the position of these ports. With the solitary exception of Newcastle, where singular advantages for the location of specific industries exist, the disposition along the east and south-east coast of interposts at regular sailing distances of about 500 miles is too remarkable to pass without comment. In this arrangement of the great ports at uniform intervals the development of land and sea transport has co-operated in a unique fashion.

After the situation of the main ports had been thus fixed the network of land communications was commenced by the development of routes which radiated from the central hubs. This development, for want of a better name and in spite of the geographical contradictions involved, may be termed "radial drainage," since the general effect is to drain off the output of hinterlands which taper in productivity right back to the central arid regions. Reference to the accompanying map will show clearly the concentration of the radial State systems on the interposts. These railway systems form a series of spider-web networks

which is without parallel in the world in respect to regularity of distance from centre to centre and to uniformity of pattern.

From the aspect of revenue returns the effective reproductive radius of railway systems under Australian geographical and political conditions would appear to be about 200 miles; and within this distance from the interposts the reticulation of the land lines is mainly concentrated. In this circumstance, and in the facilities for cargo handling installed at the great ports, are to be found the reasons for the tendency, which has become so pronounced in recent years, for manufactures throughout the countryside to migrate to the seaboard, thus strengthening by an almost inevitable process the advantages already possessed by the capital cities.

Manufacturing always involves the use of bulky materials that are costly to transport; and the places at which manufactures will be localised tend to be those points where the charges for transporting these bulky commodities from their place of production to the place of their ultimate distribution are at a minimum. This is particularly true of the transport of fuel for which Newcastle over a long period was the main source of supply. The accessibility of the interposts from Newcastle by sea again strengthened the position of the capital cities. The subsequent development of State power schemes, such as that at Yallourn in Victoria and those of the Sydney area, still further increased this industrial inertia which now resists so forcibly any tendency to decentralisation. This "stickiness" in the localisation of Australian secondary industries has become most marked; and the chief reasons for it are to be found in the disposition of transport facilities.

Hawtrey has observed that "where the materials are not greatly diminished in bulk or weight in the course of manufacture there is no special advantage in placing the industry closer to any of the sources of materials than to the markets to which the finished products are to be sent." In that case the most suitable position for manufacturing enterprise will be one having convenient communications in all directions. In most industries, too, production is most efficient on the large scale; and the advantages of increasing returns will be maintained till the maximum development has been reached. The two tendencies just discussed will explain almost entirely the failure of most attempts to maintain new industries in inland situations, and also the arrested development which is characteristic of the

minor ports. The great concentration at the interposts is, of course, in the collection and processing of primary products; but such manufactures as jam and preserve making, sugar refining, wool scouring, textiles and engineering show the force of the tendency to confine secondary industry to the seaboard.

The advantages for the distribution of imports and of commodities produced at factories are also overwhelmingly in favour of the interposts, and here the main stocks of merchandise are perforce concentrated. This has a particular bearing, both on intrastate land transport and on interstate sea carriage. Manufacturing on a large scale requires the processing centre to be established at the point which serves most efficiently a large number of customers distributed over a wide area; and this tendency is responsible for many of the paradoxical conditions which irritate unthinking people. Further, the same land lines which collect and concentrate primary products for export and carry the raw materials from the producers to the factories also distribute the imports and manufactures to the consumers of the hinterland. This dispersion of the agricultural producer-consumer group in Australia is the peculiar problem of the railway from the point of view of costs; and it is here that the development of short distance motor transport, i.e., within a 50-mile radius of the interposts, is causing such disturbance to railway schedules and revenue. But the advantages still rest overwhelmingly with the interposts as against any other localities, since the trading and manufacturing population naturally concentrate here; and thus, as centres of distribution to consumers, become themselves the most important consumer group. There are also pronounced advantages in concentrating the administration of all distribution services, warehouse stocks, and depots for standardised parts at the interposts; and the accumulation of all these advantages originating in the layout of transport form an irresistible combination from the point of view of the manufacturer or importer.

IV.

This development of Australian interposts affects and is affected by the conditions operating in interstate and overseas shipping. This aspect of the problem, however, is so fully dealt with in succeeding papers that nothing but the briefest comment upon the relation between shipping and industry will be made here. The condition of geographical remoteness from the

great European markets, and the increased competition of primary producing countries within those markets, supply the urge towards greater efficiency in shipping services. This progressive efficiency is a *sine qua non* of our industrial development. The problem for overseas shipping is that involved in moving Australia nearer to her chief markets and in preserving her exports during the process of transportation. Those are not factors peculiar to Australian transport.

The problems of interstate shipping, however, are in a different category. The essential services rendered by shipping to a community strung out along the eastern and southern seaboard of a great continent are a vital concern to every industry in Australia; and it will, therefore, be necessary to examine briefly certain trends in business organisation as they affect the transport problem.

The great advantage which organised shipping offers in a regular and well-appointed service is the guarantee as to the care with which cargo will be handled, and the stability of the charges to be made. The more frail and valuable the goods the more highly is the security and speed to be rated, and the higher is the charge which the traffic will bear for such services. Marshall has stated a fact of the highest relevance in this connection. "The almost universal tendency of the present age," he says, "is towards keeping ever smaller stocks of each of an ever-increasing variety of goods, and replenishing the stocks by small orders at frequent intervals." The manufacturer, the middleman and the consumer benefit by this method of conducting business, and it relies absolutely upon cheap, quick and certain carriage. The bearing of this tendency upon the importance of interstate shipping is too obvious to need elaboration.

Modern technique in the conduct of shipping services themselves, moreover, demands a similar freedom from interruption. Because of the economies involved there is everywhere an inevitable concentration of a large part of seaborne commerce in the hands of a relatively small number of powerful companies. These groups, as in Australia, often act in "Conference." This movement is largely misunderstood, in that it is interpreted as a method of monopolistic control, tending towards higher costs for shipping services; but it is merely the same movement towards large-scale industry that is prominent in all modern production. By this means the size of the plant which can be worked by a given number of men tends always to increase. This enhances the efficiency of the plant far more than in proportion to the

cost; and it is equally conspicuous in the handling of big steamers. It is, indeed, "the only way by which an increasingly high class of professional services can be secured," to quote Marshall again.

These industrial influences, tending to strengthen companies that are already powerful, are indirectly supplemented by the geographical causes we have already examined which concentrate the greater part of the shipping trade in relatively few ports. Large ships need extensive harbour services and powerful appliances for handling cargo, which can only be supplied by organisations commanding large capital resources.

These are the real causes which have led to the development of shipping concentration in Australia as well as elsewhere. A big company, owning or controlling many large steamers, is in this way enabled to arrange more economically for the transport of commodities by adjusting to the varying demands the tonnage which is running on any route. Thus it can be seen clearly, that all the technical and financial developments of the shipping industry favour the extension of monopoly of control and monopoly of trade in a few ports. This combination can offer much greater services to many more customers, few of whom "can find any tolerable substitute." The Australian public undoubtedly gains much more than it loses by such an arrangement.

V.

In conclusion, it appears to be necessary to emphasise certain aspects of the transport problem that tend to be overlooked, and aspects which, moreover, have peculiar significance during a period of prolonged depression. Competition within railway and steamship transport has been virtually eliminated in Australia in the one case by public, and in the other by private monopoly. But there are still outstanding problems of economy pressing for solution. There is still no guarantee, to appropriate the words of Sir Josiah Stamp,² "that any one section of transport, in ignorance of the true costs and scientific position of the other sections, may not embark huge sums upon projects that may not be quickly rendered obsolescent, or, alternatively, may not fail to embark large sums of money for fear that obsolescence will come about through some suspected advantage or scientific improvement that is likely to arise, but does not actually arise, in a rival form of transport." That condition, it is to be shrewdly suspected, is leading in Australia to a state

² See Presidential Address to Institute of Transport, Scientific Research in its Application to Transport Problems, London, 1929.

of arrested development in transport through the great wastes of public and private capital owing to its piecemeal application. Communal blunders of that type and in Australia's present condition are, if they are avoidable, inexcusable. The preservation of existing assets beyond the point of potential obsolescence is, of course, quite as uneconomic as arrested development of existing facilities owing to fear of advance in another field. Under existing conditions governmental application of capital to transport is perhaps less a process of trial and error than it has been in the past; but there is no certainty that great wastes are not being perpetrated in embarking capital in land transport under private enterprise. Indeed, the certainty is that great economic waste is being so perpetrated.

Each form of transport ought to be aware of the chief problems facing the other forms; and adequate information should be available as to how these problems are being attacked and solved. Speaking for British transport, Sir Josiah Stamp says that "a true costing of road and rail services down to their ultimate essentials, including public costs, has hardly yet been made, yet a wise community would try to make it before embarking large sums of social capital." The complaint has still more pointed reference to our own disjointed and competitive efforts in transport; and the perpetuation of uneconomic conditions on this account must have an important if less obvious effect than the actual costs of production of Australian commodities.

That there exists in Australia a crying need for a comprehensive attempt at co-ordination of transport will scarcely be denied. There is a correspondingly urgent need for the organisation of some body similar to the Institute of Transport in England where transport studies can be prosecuted on common ground. This body has "abstracted from a number of hitherto quite separate services, a common function, and agreed to look at that common function more by what it represents as a single idea of economic service than by the varied ways in which it is discharged." Scientific research is no less necessary, and no less impressive in its results, in transport than in any other economic field; and the sooner we can agree upon some course of action to eliminate expensive competition in transport, the sooner will the lowering of production costs become a practical possibility in Australia.

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THE FINANCES OF AUSTRALIAN RAILWAYS IN RELATION TO STATE BUDGETS.

- I. Introduction.
- II. Over-Capitalisation on State Railways.
- III. Politics in Management.
- IV. The Difficulties of Treasury Control.
- V. Separate Railway Budgets.
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I.

For good or for ill, Australia has State-owned railways, which are costing the Governments of Australia a considerable sum yearly. Possibly we might have been better off with private railways, which would not have undertaken the development of "our empty spaces" on such a grand scale unless they had been paid to do it, but speculation on this point would be fruitless; State enterprise in railways has become an institution in Australia. State steamship lines may come and go, but State railways, like the Tariff and the poor, are likely to be always with us.

In considering a remedy for Australian State railway losses, then, the problem is whether the Commonwealth and the States can manage their railways with better financial results than in the past. There is a common superstition that State industrial undertakings are of necessity inefficient, and one must admit that it is not difficult to prove that State railways as a whole are less successful financially than privately-owned railways. But that may, after all, only prove one of a number of things: It may prove (1) that managements are inefficient, (2) that they have less opportunity of hiding blunders, (3) that they are more kind to the public than private managements, (4) that politicians in the past have taken risks which they are paying for, or (5) that present politicians are demanding too much say in their affairs. It is not difficult to prove that Australian railways are suffering from the effects of all the last three difficulties. In suggesting possible improvements in the financial posi-

tion of Australian railways, this paper will deal principally with the last two difficulties.

During the last five years the aggregate deficits on Australian railways have amounted to close on four million pounds a year, but it should be remembered that this is not synonymous with "losses" as stated by a private corporation. During the last financial year (1928-29) the railways of the States showed a profit on working of £10,300,000, but as the railways had an interest bill of about £14,700,000 to meet, there was a net loss after paying interest of £4,400,000. A private company, with the £319 million capital subscribed by shareholders, would have shown a net return of a little over 3 per cent. on its capital. This is admittedly a low return, but it sounds infinitely better than a statement showing a net deficit of £4,400,000.

However, a private company would probably have had an even nicer-looking balance sheet, because it would not have had the millstone of £319 million nominal capital round its neck. It would probably not have constructed costly "developmental" railways in the same light-hearted way as our State Governments in the past, but even if it had issued this large amount of stock to the public, it would have found means of getting rid of it by a reconstruction. This seems to be a vital difference between the actions of governments and private investors in such circumstances; private investors have no compunction about writing off capital that is definitely lost, while Governments will cling tenaciously to the fiction that lost capital still exists. And railway capital is irretrievably lost if it is invested in a railway that has insufficient traffic to pay, and no prospect of increasing that traffic, just as surely as capital invested in a mine that produces no ore.

II.

This tendency is perhaps inherent in the financial structure of most State enterprises. Were these financed from consolidated revenue, losses of capital might be more readily admitted, but they are usually financed by means of loans, and in the vast majority of cases there has been no provision made for the repayment of these loans. Interest payments, then, have to go on, and if that is so, why should the capital be wiped off? To the private investor the matter will have a different appearance. If he receives no interest on his investment, he quickly comes to the conclusion that it does not exist, or at least that its value

is no longer what he thought it was. "Reconstructions" of railway companies are therefore not uncommon. Ripley¹ states that in the 30 years prior to 1911 nearly 600 American railway companies, with an aggregate capital of £1,335 mill., went through receivership and reorganisation, with a recorded loss of capital far greater than the total capital of Australian railways. The reasons range from unreasoning optimism through various degrees of culpability to speculation and fraud. Australian governments have built railways with the same implicit faith that the country's resources could stand any sort of burden, coupled with considerations of election strategy. What might have happened had we not received the wholesome check of a crisis in the 'nineties is vividly pictured in the history of the "Octopus" Railway Bill in Victoria, providing for the construction of 53 lines, to which malcontents in the House added another 57, making a total of 110 lines, only 10 of which were ultimately constructed, as a crisis intervened.

No railway system can stand indiscriminate construction without serious loss, but little in the way of capital loss has so far been admitted by State governments. There is, in addition, the matter of accrued depreciation of assets, for which no State has made anything like adequate provision. South Australia has now made a start by admitting that the railways have surplus capital due to accrued depreciation of over £4 mill., about 16 per cent. of total capital. In Victoria accrued depreciation has been ascertained to amount to £16.5 mill., which is about 22 per cent. of the capital, but no step has so far been taken to write it off. Tasmania and Queensland, in that order, are probably the worst offenders, but no estimates have been made in these States of the amount which should be written off, but in the case of Tasmania will not be less than 60 per cent, and probably a great deal more.

The advantages of writing down these high capital figures should be fairly clear, but their importance is evidently not realised. An analysis of them may help in this direction. Let it be said at the outset that there is no known feat of legerdemain by which Treasuries can be relieved of the burden of the debt, except by paying it back. The only financial advantage possible is greater efficiency, and consequently less loss, on the part of the railways, and this should be of sufficient importance to warrant the step being taken. The psychological effect on the

1. *Railroads: Finance and Organization*, Chapter XII.

management of having to budget for deficits is depressing, and not conducive to the effort needed to keep the undertaking working efficiently.

There is also another point. Good public finance demands clear book-keeping methods, and the present capital burden of the railways is due merely to bad book-keeping. The carrying forward of the large fictitious capital means the perpetuation of confusion in the nation's accounts. Unfortunately, a judicious amount of confusion seems to smooth the political path, in that it prevents the inquisitive section of the public from asking awkward questions, and makes it possible to throw the blame for bad results on whom or what for the moment appears best suited to bear it. In the case of the railways it has become so fashionable to blame State ownership that no one believes a State enterprise capable of being anything but inefficient.

Railway administrations in Australia are reaping now what governments in the past have sown. The omission of proper maintenance charges, including depreciation, has had no other object than that of reducing the deficit for the time being. No government is anxious to exhibit incapacity in administration, and a deficit in a public undertaking is usually interpreted as such. If a deficit is looming, means will be sought to diminish it, and an item as intangible in the public mind as depreciation falls a ready victim. The result is obvious. Something is written to capital which ought to come out of revenue, and succeeding generations are saddled with costs that the past ought to have met. The practice is not different from that of funding revenue deficits.

Over-capitalization from this cause is therefore a result of successive breaches of one of the most important rules in public finance; namely, that the expenditure of the year must be met from the revenue of the year. The consequence is that a large amount of deadweight debt is being regarded as capable of earning full interest. Viewed from this standpoint, the debt incurred by the construction of lines, which are so clearly incapable of ever paying that they must be regarded as the results of errors of policy, may be put in the same category.

Apart from this there are important effects on the management of the railways. The recurring deficits have inevitably had the effect of suggesting to the public that the railways are suffering from extremely bad management. And the public is encouraged in that belief by occasional speeches in Parliament, which on the whole are moderate, and election speeches, which

usually are not. The psychological effect of this on the administration cannot be over-estimated. It is the task of the management to give the public the best services possible, and at the same time make both ends meet. A management so discouraged as to look on the task as utterly impossible is not likely to work with much enthusiasm. It might muster some energy to make the deficit smaller, but the effects of over-capitalisation have a tendency to grow and get out of hand.

There must also be an effect on rates. Total cost of services, although it is not a determinant of individual rates, is an important criterion of rates in the aggregate, in that it provides a minimum below which the total return from freights and fares must not fall. If total costs are inflated by the burden of surplus capital, there must be a tendency for railway administration to inflate what rates can be raised in order to meet them. The result is at times that political means are used to bring individual rates down, and a group of producers strong politically may inflict injustices on politically weaker groups.

III.

This brings one to the general question of political interference with railway policy, which is the most serious drawback to State railways. It is generally taken for granted that the chief advantage of private over State enterprise is that the incentive to efficiency in the former is much greater, and one could quote more than one able economist for this view. But, as Pigou rightly points out, the practical choice is generally not between the private business and the public enterprise, but between the large joint stock company and the public concern.² The difference is important; the large joint stock concern is not of necessity vastly more efficient than a State undertaking. The incentive is in neither case the same as that of a business managed by its owner. But in the case of the railways of Australia and other countries with similar methods of management, there is an important difference in that the managements are subject in too great a degree to political caprice. Fluctuations in political fortunes are liable to lead to a policy based on views limited by the distance of the next election, which is fatal to the continuity of policy essential to the successful conduct of an industrial undertaking. This becomes obvious when one analyses expenditure on maintenance and renewals. In an

² *Economics of Welfare* (1924 ed.), p. 352.

article on "Railway Maintenance Expenditure in Australia,"³ I pointed out the close correspondence between this type of expenditure and revenue. It is quite natural that an industrial undertaking should make "savings" on such expenditure in lean times, and make up for it when profits are high. But on politically controlled State railways, particularly if these railways do not pay interest on capital, the temptation to "save" on maintenance expenditure becomes too great. Thought for the future of the undertaking takes second place to considerations of political strategy, with the inevitable result of over-capitalisation. Some assets are allowed to depreciate for want of proper maintenance, and others are replaced by capital expenditure instead of expenditure from revenue. The capital figure which results from this practice bears so little relation to the actual assets of the undertaking that it becomes increasingly difficult to make ends meet.

Apart from these general tendencies which react directly on the finances of the railways, there are constant difficulties with political interference which must react indirectly on the financial result. There were several instances of such interference quoted in evidence before the Royal Commission on the Victorian Railways. The Commissioners showed that the Minister had on occasions imposed his own views on the Railways Commissioners in regard to relations with their employees, and allegations were made of undue preference being given to locally manufactured goods to the detriment of the railway finances. The worst case was probably that in which the Minister had attempted to force the Commissioners to adopt his view in regard to the most economical size of truck to be adopted, obviously a matter for expert rather than political judgment. Even a former Minister for Railways supported the view of the Commissioners by stating that the pressure brought to bear on him while Minister was tremendous, and that his term of office "was one long tug-of-war with adverse political influences."

This is, in fact, the difficulty with political management of industrial undertakings. It is not that ministers are by nature meddlesome; it is the pressure of constituents with an axe to grind that forces Ministers to action. If a Minister refuses to let political views guide the policy of the railways, he is liable to be accused of weakness, and it takes a strong man to stand accusations of weakness with equanimity, particularly if he can get a name for strength by being weak. It is much easier to avoid Parliamentary derision by giving in to popular clamour.

3. *Economic Record*, November, 1928, p. 239.

This is the chief source of weakness in the administration of Australian railways. Political expediency is liable to overrule considerations of sound financial policy under the present systems of management, and the system is at fault rather than the men who for the time being administer it. It was well expressed by the Fay-Raven Commission, in its report on the New South Wales railways in 1924:—

“Governments come and go,” states the report, “policies change and are reversed according to the political hue of the Ministry of the day, but the transport needs of a State are constant; they are vital factors in the everyday life of all the people and should not be made in any way the shuttlecocks of politics.”⁴

The Fay-Raven Commission dealt chiefly with another phase of the general problem, but one which is quite as important as those already dealt with in this paper; that is, the instability of railway finances which results from the railway revenues being considered part of the Consolidated Revenue Fund, and their expenditure part of the general budget expenditure. This system is an excellent one in public finance generally, but it does not suit a commercial undertaking. One of the chief faults of the system when applied to a commercial undertaking is that when the accounts of the Consolidated Revenue Fund are closed each year, all unexpended balances must be paid back into the fund. This means in practice that the concern is assumed to go entirely out of business on June 30th of each year, and to start anew on the following day; an assumption which naturally will hamper an undertaking that must go on uninterruptedly if it is to be efficient.

The Acworth Committee on the Indian railways in 1921 pointed out the difficulties experienced by the management of the railways in losing their unspent balances at the end of the financial year. There is usually a rush at the end of the year to complete as much work as possible, so as to get the maximum benefit of the vote of the year; but once the year has ended, the work has to be seriously curtailed, owing to the provision usually in force that the expenditure per month must not exceed the average monthly expenditure of the previous year. The more a railway system grows, the greater this handicap becomes, but even where there is no growth to speak of there are difficulties. The budget is usually not dealt with until three or four

4. *N.S.W. Parliamentary Paper No. 28910-167 of 1924, p. xxxii.*

months after the end of the financial year, and then only do the new votes become available. This means that they have to be spent in eight or nine months, instead of being spread over the whole year. The result is feverish activity for eight or nine months and a slackening of effort during the rest of the year.

The Acworth Committee also found the difficulty mentioned earlier, namely, that railway expenditure was entirely subordinated to the needs of the Treasury. When funds were plentiful, the railways were allowed a generous sum for such expenditure on maintenance and renewals, but when the Finance member found himself in financial difficulties, he would curtail the expenditure of the railways. The Committee quotes one or two rather bad cases of capital expenditure being stopped before it was finished. One was that of instructions being given for the construction of a new line to proceed for six months, with "no expectation of any money being available for this line next year." Another case quoted was that of rolling stock being purchased in England at the expense of Rs. 43 lakhs, and lying idle on arrival for want of Rs. 8 lakhs expenditure on its erection in India.⁵ Examples of the same kind of difficulties are given by Mr. Bland concerning New South Wales railway construction in a recent article on *The Administration of Government Enterprises*.⁶

The effect of this hand-to-mouth finance must be disastrous to stability and continuity of policy. For its proper maintenance and development a railway requires a carefully planned expenditure, both on capital and revenue account, for some years ahead, but this is impossible under such conditions. The true financial position of the undertaking becomes obscured, the distinction between capital and revenue expenditure at times is confused, and there are always chances of capital lying idle when it ought to be earning revenue. As has been pointed out already, confusion between capital and revenue expenditure may occur with private concerns, but the manager who has to look further ahead than the next two or three years will formulate a sounder policy than one to whom immediate results are more important.

V.

One of the chief recommendations of the New South Wales Commission was the separation of the railway budget from the general budget of the State. The Commission found that while

5. *Report of Committee on Indian Railways*, Cmd. 1512 of 1921, p. 22.

6. *Economic Record*, May, 1929, p. 18.

the financial year began on July 1st, the authority for working on the estimated basis was not given until late in October or early in November, the result being that in many instances money voted could not be spent between the time of approval and the following June. The difficulty was well summarised by Mr. James Fraser, then Chief Commissioner of Railways, in his evidence:—

“It has a deterrent effect in connection with the mapping out of a programme of expenditure during a given year. No one in an administrative position can lay out a programme of expenditure for a whole year, unless he knows that the money will be made available to spend, because you really want to begin to spend on the first day of the 12 months and continue that expenditure fairly consistently through the whole year. That is a thing the Railway Department has never been able to do, either from a loan or on working expenditure.”⁷

One of the chief difficulties is the maintenance of stability of employment. The maximum amount of labour is employed during the last few months of the financial year in order to use as much of the funds voted as possible, while the end of the financial year means the putting off of a number of employees, for whose employment no money is available. At a time when decasualisation of employment is looked upon as a remedy for the ills of other industries, this is surely a bad example to be set by a State undertaking. Not only is it bad for the labour concerned, but it is bad for the railways. In the first place rush work is not good work; when a department is striving feverishly to spend a given sum of money by a certain date, economical spending becomes a secondary consideration. Secondly, the kind of labour found to take casual employment is not the best labour, and thirdly, there are certain overhead charges in connection with the work which must go on the year round.

The difficulties have been recognised by a number of countries, and the practice of removing State railways as far as possible from political control and of separating the railway budget from the general budget is growing. In Prussia the latter question came up as early as 1878, but the project of separating the railway budget failed, because the railways were too prosperous and there was too great a temptation for the Finance Minister to make the best of this large non-voted

7. *Report*, p. xxii.

revenue. Among the countries which have adopted the system are France, Italy, Germany, Switzerland, Japan, South Africa and New Zealand, and New South Wales has just inaugurated it.

The new organisation in India was introduced with the budget of 1925. The Indian railways are prosperous, and it was established they should make an annual contribution to the Government's revenue in addition to providing for interest on their debt and depreciation. Likewise, the German railways are expected not only to pay their way, but to make a considerable contribution towards reparation payments to the Allied Powers.

VI.

There is a different problem in Australia, where none of the railway systems has been able to pay full interest on capital in recent years. There are two ways of dealing with this difficulty; one is to provide that the Treasury shall make a contribution towards the railway deficits, and the other to put the railways on a paying basis as far as possible before they are given independence of management. The former alternative would obviously make the railway managements still to some extent dependent on the state of the general finances of the States, and the second is therefore to be preferred.

There is an historical reason why the railways should be put on a better basis before being given independence. It has been shown that the present financial difficulties are in a large measure due to over-capitalisation, caused partly by the construction of developmental lines on a somewhat too optimistic scale, and partly by failure to meet obligations in regard to maintenance and renewals as they have occurred. As governments in the past, and not railway managements, have been responsible for these mistakes, it is only fair that present managements should not be asked to bear the rather impossible burden.

In this connection an interesting proposal, placed before the Victorian Royal Commission by Mr. H. A. Pitt, the Victorian Under-Treasurer, and backed by two other witnesses, is worthy of mention. Mr. Pitt proposed that the Railways should be relieved of all interest charges, amounting to £3 mill., making it possible to reduce freights and fares by 25 per cent. He contended that as land values all over the State, in the metropolitan area as well as in country districts, had been raised by the building of the railways, the money required to pay these interest

charges ought to be raised by a tax on the unimproved value of land. The idea is not unattractive, and would only be an extension of the existing "betterment tax" in Victoria. Such a tax would undoubtedly be just if imposed from the beginning, and would tend to discourage extravagant construction. But there are difficulties in imposing it on a settled system; it becomes a levy on present owners by the immediate capitalisation of the tax, and present owners have probably gained little in that most of them will have bought since the railways were built, and have therefore paid some past owner for the gain the railway brought.

It is questionable whether the railways of Australia have not raised the ability to pay land tax sufficiently to get some acknowledgment of having done the community this service. Much of the land taxation now collected must have its origin in ability created by the transport facilities given by the railways. The railways are at present given no credit for this, whereas road transport, which is a serious competitor, is reaping benefits which it never created. Private railways in America and elsewhere have been given large areas of the land, whose value they increased, and have therefore benefited by the increase. Australian railways have never had the same treatment. The owners of the railways have certainly taken a share of the increased values, but have never acknowledged their source.

The proposal made by Mr. Pitt showed that a tax of 3d. in the pound on unimproved values would yield the required amount, and if that is the case the measure would not be a very drastic one. The proposal also provided that the tax should be imposed gradually at the rate of $\frac{1}{4}$ d. a year until the full amount became operative. This would allow time for adjustment, but in the case of sales the whole tax would most likely be capitalised immediately in expectation of the full impost.

While such a proposal would put the railways in an excellent position and would give them greater equality with motor transport even over short distances, a much less drastic writing down would in most cases give railway administrations a chance to balance their budgets. The determination of the figure at which the new capital value should be fixed will be a matter of the valuation of assets, and the valuation of non-paying branch lines must, of course, have regard to their limited earning power.

VII.

A rough idea of the amount involved may be gained by ascertaining the capital amount on which the railways would

be able to pay the standard rate of interest. The method is a recognised one in the sale of any going concern. Average earnings for the past few years are taken as a basis, and modified by prospects of greater or smaller earning capacity in the future. This method was used by the Victorian Auditor-General, Mr. Norris, in making an estimate of over-capitalisation in Victoria, and he found by this method that the Victorian railways had surplus capital to the amount of £15 mill., which comes fairly close to the amount arrived at by valuation. This will not be the case on all Australian railway systems, unless a drastic writing down of non-paying lines is undertaken, and this must be done unless the lines show a definite promise of improving earning capacity. In the following table the average interest has been taken to be 5 per cent., but this is probably a little low at present, as the average rate on most railway systems is now rising towards 5½ per cent., and will probably continue to rise still higher as the old loans raised at low rates fall due. The estimate must therefore be regarded as a conservative one.

Average Capital Compared to Average Earnings on Australian State Railways—1919/20-1928/29.

State.	Average Capital, \$mill.	Average Yearly Earnings, \$000.	Earnings Capitalised at 5 per cent., \$mill.	Deficiency in Earnings Capitalised.
N.S.W.	99.0	4,350	87.0	12.0
Victoria	67.0	2,620	52.0	15.0
Queensland	51.0	877	17.5	33.5
S.A.	23.5	684	13.5	10.0
W.A.	20.0	717	14.0	6.0
Tasmania	5.8	40	0.8	5.0
All States	266.3	9,293	184.8	81.5

These figures can only give a very rough measure of the over-capitalisation of the railways on the average. The figures for the individual States are made unsatisfactory by varying expenditure on maintenance and renewals, which not only affects earnings, but also the capital figure. Tasmania's capital, for instance, is badly inflated by inadequate provision of expenditure from revenue in the past. The most unsatisfactory figures are those of South Australia, which has made a special effort during the period under review to write down capital. The result has been large deficits, but as far as possible the figures

have been corrected so as to exclude from the expenditure of the year abnormal amounts of provision for depreciation. But what is at present considered normal expenditure under this head differs greatly from what was considered normal at the beginning of the period, with the result that net earnings have diminished considerably.

The peculiar position of South Australia in this regard is deserving of special attention. There is a great drop in net earnings in 1927, partly due to the new conception of what ought to be spent on depreciation, and partly, no doubt, due to the depression of the last three years. The drop in Tasmanian earnings is due to the same cause; in 1926/27 provision for depreciation to the extent of £52,500 was made for the first time, and the next year a similar amount was found, but the deficiency was greater still last year, when the provision for depreciation was reduced to £10,000. This was due to diminished earnings on account of the floods in Northern Tasmania, and an extremely poor season throughout the State.

VIII.

When one considers the States individually, therefore, a number of other considerations must enter. There is a vital difference, for instance, between Tasmania on the one hand and Queensland and Western Australia on the other. That difference is clearly shown in the figures, there is a distinct tendency for earnings to rise in the case of the two latter States, while Tasmania shows a steady downward trend. This is to be expected. Tasmania has built developmental lines, now beyond the developmental stage, which have not come up to expectations, and are gradually becoming a heavy burden. The two younger States have built, and are still building, developmental lines on which the traffic is gradually increasing, and which will in time return something like full interest on capital. There would, then, not be the same need to write off what has been called "surplus capital" in the case of these two States, one of the causes of losses that will presumably right itself as population increases.

On the average, however, it is roughly true that the railways of the six States have included in their capital dead-weight debt to the extent indicated, namely, £81.5 mill. The period reviewed was on the whole a period of prosperity, broken only by the comparatively mild depression of 1921, and it is extremely

doubtful whether earnings during the next few years will come up to the average shown in the table above. Under the circumstances one would feel inclined to call £81.5 mill. a conservative figure for over-capitalisation, the only countervailing influence being the possibility of developmental lines increasing their earning power with the return of some degree of prosperity. But this will not influence the figures of Victoria, New South Wales, and Tasmania. In the two former States the Railway Commissioners are at present being reimbursed for ascertained losses on these lines from consolidated revenue, and Tasmania has no lines that can be regarded as developmental.

Before the railways can be put on an independent basis a writing down of capital, approximately to the extent indicated, must be undertaken. This has been recognised by New South Wales, the only State which has so far given the railways a measure of independence. The 1928 Act provides for the setting up of a Committee to review the Capital debt.

No step has been taken in any other State to separate the railway budget from the general budget of the State, but the Victorian Royal Commission in 1928 made a recommendation in that direction. It is only a matter of time when the necessity for taking such a step will force itself on the various State governments, but there is a need for discussion on the question with a view to accelerating the process. One of the difficulties is probably the need shown for admitting past errors by writing down of capital. There is also the question to be settled separately by each State of the proportion of surplus capital to be written off. Where there is a large mileage of developmental lines, as in newer States, it must be assumed that the capital put into new lines is not lost, but will become reproductive in time. Machinery will have to be invented in those cases to tide the railway administration over the period during which the lines must remain unproductive. This is perhaps best done by the method used in Victoria and New South Wales of losses being covered by a special appropriation from consolidated revenue. This provision must, of course, continue for lines built in the future. It cannot be expected that the railways should bear the burden of developmental railways demanded by the State, and it is hardly to be expected that the States will discontinue the present policy of rather over-optimistic railway building. The practice will in any case form a check on extravagant building.

IX.

Perhaps a warning should be given against expecting too much from the measures outlined. Improvement must be gradual, and will possibly be better for that. In regard to the independence of managements there are lessons to be learned from other countries in which railway administrations have been given a freer hand. There is evidently not generally a complete cessation of political interference; naturally, some decisions must be left to Parliament, and there will always be disputes as to where the authority of Parliament ends. There has evidently been some disappointment in South Africa, where the system has been in operation since 1911. Mr. S. H. Frankel, in a recent work,⁸ criticises rather severely the present administration. He points out that:

“under the present system a Minister for Railways represents the interests of the government generally, rather than those of railway transport, and a political Board ratifies his decisions.”

This, contends Mr. Frankel, nullifies the provision of Section 127 of the South Africa Act, which provides that “the railways . . . of the Union shall be administered on business principles.” The chief difficulty is evidently with loan money, in regard to which the railways are subject to the general provision of “the lapse” at the end of the financial year, but he also mentions other directions in which there is still political interference with the management.

This is probably inevitable. Provisions of this type are efforts to save democracy from itself, but democracy has never exhibited any burning desire to be saved. It is impossible by an Act of Parliament to do much more than to lay down general principles admitting of a fairly wide interpretation. This makes for a frontier of control only vaguely defined and with large territories of debatable ground on either side. In the last resort the people will demand control of the people's railways through their political representatives. Political interference which is public interference is inevitable if results are not considered satisfactory. But the public has to be educated to a greater trust in the expert and to give him reasonable latitude for the sake of efficiency. How far a railway administration will achieve independence will therefore not only depend on the Act passed for the purpose, but also on the spirit in which that Act is interpreted. That will again depend on the

8. S. Herbert Frankel: *The Railway Policy of South Africa* Johannesburg

degree of honesty of purpose actuating the government responsible for the reform. If the government is really sincere, it will do its best to establish new practices that will give the maximum amount of efficiency; but this is not easy. There must always be hesitancy on the part of a political body in resigning any of its powers, caused partly by a reluctance to admit incapacity and partly by fear of creating a new Frankenstein which might slay its creators. This hesitancy becomes expressed in half measures which cannot possibly achieve their purpose, and the process of strengthening the new body becomes a slow and painful one.

X.

One wonders, for instance, how far the New South Wales Act of 1928 is likely to achieve the purpose the Fay-Raven Commission had in mind. Considerable power is left to the Government and Parliament, and a great deal will depend on the interpretation of the Act. There are two funds established under the Act—the Railways and Tramways Fund, and the Railways and Tramways Renewals Fund. The Act provides that “the Commissioners may, with the approval of the Governor, expend from the Fund in anticipation of appropriation by Parliament such sums . . . in respect of such services as cannot be reasonably postponed without injury to the public interest . . .” This is an elastic clause, which may be interpreted so as to make for the maximum efficiency, but may also be an instrument of obstruction in the hands of ministers.

In regard to the Renewals Fund the Act provides that this “shall be available only to meet such appropriations as Parliament may make,” which does not seem to make for much improvement. There is also a possibility of abuse in regard to payments into this fund. The Commissioners are to make a statement showing the amount they wish to transfer from the general fund; this will be submitted to the Committee of Review for investigation, and they will report to the Governor, “who shall determine the amount to be transferred.” The Committee of Review is to consist of the Chief Commissioner, the Under-Secretary to the Treasury, and the Auditor-General, but the Governor may appoint two other persons to the Committee. There are two dangers here. The Committee of three, of which one is the Chief Commissioner and another the Auditor-General, gives guarantee of sound financial policy, but there is a danger of two political appointments being made for the purpose of imposing the Government’s view on the Committee. This is

evidently what has been done in South Africa. In the second place, the Government may simply ignore the report of the Committee, since the Act provides that "the Governor shall determine the amount."

The Administration of the Renewals Fund will probably provide the crucial test of the working of the Act. Expenditure from such a fund is always debatable, the cutting down of amounts to be paid into it will always provide an almost irresistible temptation to the needy government, and raids on this and other funds to cover temporary Treasury shortages are always possible.

There may be occasion for none of these fears: everything will depend on the attitude of the Government of New South Wales during the first few years of the operation of the Act. But one of the first of the acts of the Government is open to criticism. A new Chief Commissioner has been appointed with a term of seven years, following the precedent of previous similar appointments.⁹ One of the strongest points made by the Fay-Raven Commission was that this term was too short, and that no Chief Commissioner with such a term could be expected to act independently; he has to give consideration to the possibility of re-appointment, which will rest with the government of the day. The term of seven years is the longest given to any Commissioner of Railways in Australia, but the Commission considered that the appointment should be made for life. This was also the idea of the Canadian Royal Commission, which recommended that the Canadian National Railways should be managed by a Board of Trustees, which should be "permanent, non-political, and subject to Government approval of each nomination, self-perpetuating."

But whatever may be said concerning the New South Wales Act, it must be kept in mind that it is a pioneering effort as far as Australia is concerned, and makes at least a small step forward. Australian democracy has yet to learn to get over its youthful ambitions to spend money it has not earned in the naive belief that the resources of the country will stand any kind of a load; possibly the present crisis will help in that direction. There is no witchcraft in public finance by which sons can avoid atoning for the sins of their fathers. And our political fathers have sinned heavily against the canons of sound finance.

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⁹ Since this was written the Government of New South Wales has passed another Act, further limiting the powers of the Commissioners.

SUBSIDIES TO PRODUCTION THROUGH RAILWAY RATES.

- I. The Construction of Railway Rates.
- II Rates to Foster Industry.
- III Examples of Subsidies.
- IV Additions to Tariff Protection.
- V. Difficulties of Definition.
- VI. Railway Deficits as Subsidies.
- VII. Summary.

I.

The construction of railway rates involve the consideration of such complicated issues, and individual rates differ so much from one another, that it is difficult to determine what is a "just rate" on any particular commodity, or what is the maximum a railway can charge for any particular service. That arises from the differentiation made between commodities, differentiation between various distances for the same commodity, and discrimination between shippers. While all these may at a first glance appear unjust, particularly the last-named discrimination, there may be no injustice inflicted on anyone. As shown by Hadley's famous "Oyster Case" and numbers of similar cases, a railway may even be justified, in face of competition, in charging a higher rate to an intermediate point than to a terminal, and would actually be doing an injustice to the intermediate point by not doing so.

A railway has to make these discriminations in order to pay the greatest possible return on capital. The reason is the large proportion of overhead charges, with a consequent relatively low proportion of direct costs involved in any one service. If a rate is slightly higher than sufficient to cover these direct costs, it is payable; yet the return from rates in the aggregate must be sufficiently high to cover all costs. The justification for the low rate is that the traffic could not be got without it, and that therefore the small contribution it makes to overhead charges would be lost; the justification for the high rate is that it must make up what the lower rate cannot contribute to these charges. Perhaps Taussig sums the whole matter up best in a few words when he says that the justification of charging what the traffic will bear rests on the principle "that it con-

duces to the fullest utilisation of the railway." The fullest utilisation will give the greatest spread of overhead charges, and will therefore give the cheapest service.

II.

How, then, is one to find a way through the maze of railway charges to rates that definitely offer a subsidy to production? It is a very difficult problem which only the closest analysis of the whole question of railway rates can solve, and I intend only to touch the fringe of the problem. It is difficult to say what a subsidy amounts to. Mr. S. H. Frankel, in his recent publication, *The Railway Policy of South Africa*, implies that the South African Railways subsidise agricultural and pastoral production in the Union by charging unfair rates to other industries, as, for instance, the Rand mines, but does not seem to bring conclusive proof, although his arguments are strong. He argues that the railways have abused the power of rate-making "in order arbitrarily to attempt to regulate the direction of the country's economic activities." This involves subsidies to certain production at the expense of other, if the railways are to be made to pay, as the South African Railways are.

This type of rate-making is common among competing private railways, which, in order to foster an industry within its territory, will lower rates so as to enable the industry to compete with producing centres in the territories of other railways. In that case it will amount to a subsidy to the industry concerned, although the railway obviously does it to create payable traffic. A State railway system may go further, and undoubtedly often does, in providing rates which do not even pay the direct costs of the service.

If this is done by State railways, which are expected to pay their way—as the South African—it must be done at the expense of other railway users; if it is done by railways which are not expected to pay, as the Australian, it becomes a burden on the taxpayers. That such rates occur is not difficult to prove, although most of them are hidden in a maze of other possible considerations. If motive may be taken as a guide, a number of these rates are easily identifiable on the Queensland railways, which provide more information in this direction than most railways. Special rates granted during the year are listed in the annual reports, and the last report (1928/29) records no less than 34 special rates granted to "assist industry." There are

similar cases in other States, in which assistance to local industry has been the motive. But this is not always a sure guide; the rate imposed in the first place may have been an impossibly high rate. In Victoria the Commissioners some years ago decided to increase freights on agricultural produce by 10 per cent., but the State Government decided against the increase, and paid the commissioners the extra revenue that would have been raised from taxation revenue. There again is a case of subsidy, if the intention is to be taken as proof, and in this case it seems that it might be.

III.

There are, in fact, few cases to which one can definitely point as cases involving a subsidy. One of the few clear cases is provided by the rates on Tasmanian beer. The rate on beer between Launceston and Hobart three years ago was 61s. 3d. This rate applied to Hobart beer going north and to Victorian beer going south, but there was no competition to speak of between the two, on account of the difference between the two brews, and the Hobart brewery evidently had costs low enough to meet what competition there was. Then in 1927 another brewery was floated in Hobart on a wave of patriotic fervour, with the slogan "Buy Tasmanian Goods." The object was to brew a beer sufficiently like the Victorian to drive it off the market, and with this object in view the railways were asked to lower their rates in order to allow the Hobart brewery to compete with the Victorians in the north of the Island. The freight from Hobart to Launceston had to come down below shipping freights from Melbourne, and was fixed at 20s. per ton. But the rate from Launceston to Hobart remained at 61s. 3d. per ton, and while rates to other northern ports were reduced similarly, the rates from these ports remained unaltered.

There was in this case no question of the motive, and the effects cannot have been to increase revenue. First of all, there was a great deal of traffic from the brewery already in existence which did not feel the "foreign" competition, or had costs low enough to meet it unaided. This traffic is now taken at a very much lower rate, involving a loss of revenue. In addition there may have been a loss of revenue on Victorian beer, which previously went to centres away from the seaboard, and which paid a higher rate. There is no reason to believe that Tasmanians consumed more beer; traffic was merely deflected. This seems

a clear case of a subsidy. There seems to be a similar position in regard to Victorian wine, which is carried at very low rates for export beyond the State, and in addition, wine not for export benefits to the extent of a 15 per cent. rebate listed among the concessions to Victorian country industries.

Victorian country industries benefit by concessions on raw materials and other requirements by a 26½ to 28½ per cent. rebate on ordinary rates, and a 4½ to 20 per cent. rebate on manufactured goods. These must also be put in the class of rates which involves subsidies, in that they "attempt arbitrarily to regulate the direction of the country's economic activities," notwithstanding the possibility that they may be all the traffic can bear. When such rates apply to goods which are more economically manufactured in the country than in the city, as, for instance, wines, they definitely become measures of protection to the industry as against the industries of other States.

IV.

Another set of clear cases of subsidies to local production are the rates allowed by New South Wales on locally manufactured iron and steel. Iron and steel products occupy nearly two pages in the goods rate book, and each item is given a lower classification for the locally manufactured product than for foreign. This amounts to a bounty on these products in addition to the protection given by the Commonwealth, and in order to extend the operation of the bounty to other States a further reduction of 20 per cent. is allowed on iron and steel products exported beyond the State, presumably to make up for the charging of full rates on other railway systems.

South Australia has similar rates on fresh, canned and dried fruits, with a preference in favour of Australian produce, which is increased in the case of exports. South Australia also has special rates for country industries, giving a rebate of 20 per cent. on raw materials. But the most interesting rates on the South Australian railways are the rates on Broken Hill ores, concentrates and tailings from the border to South Australian ports. There are four tables of rates which operate in turn, as the price of lead rises and falls on the London market. When the London quotation is between £14 and £19 per ton the rate on concentrates to Port Pirie is 12s. 11d. per ton, when the quotation is between £29 and £34 the rate is 15s., and there are two intermediate rates. Furthermore, if the price falls

below £14 there is a reduction of 6d. per ton (to 12s. 5d.), and if it rises above £34 there is an addition to the higher rate of 5 per cent. for every £5 increase in price.

All these rates must be said to contain an element of subsidy to the industry concerned, but it is impossible to get a measure of such a subsidy. Too many other factors may enter; there may be a lowering of rates owing to competition, or because previous rates have been found for other reasons to be more than the traffic can bear. Nor does a rate of necessity include a subsidy if it does not take all the traffic can bear; if it were there would be no need for such bodies as Rates Tribunals in countries with private railways. In the carriage of goods for naturally sheltered markets the railways may, in the absence of competition, charge exorbitant rates on commodities with little elasticity of demand; in the case of protected markets the railways may take a share of the protection afforded in the case of such goods. Charging all that the traffic can bear is therefore open to serious objection, and, as Dr. N. B. Mehta points out,¹ the policy would have been better understood had it been expressed as "not charging what the traffic cannot bear, or what the trade could properly and profitably pay."

V.

There are, therefore, considerable difficulties in the way of defining a subsidy to production by a railway. If a railway carries goods at rates which do not cover the direct costs of the service it must be said to be giving a subsidy to production, providing the aggregate services of the railway cannot be provided more cheaply by some other transport agency. But a rate may provide a subsidy even if it is higher than this, and may even do so if it bears more than a proportionate share of overhead charges, although it is not likely that it will. This would lead to the definition of a subsidy as revenue the railways are prepared to forego in order to foster an industry or to divert the general trend of economic development; a rather vague definition, but nothing more concise seems possible.

So far specific subsidies have been considered; there remains the more general question of whether the annual revenue deficits of the Australian railways can be considered, as a whole or in part, to be subsidies to Australian production, as inferred by the Committee of Enquiry into the Australian Tariff. The

1. N. B. Mehta: *Indian Railways: Rates and Regulation* (London, 1927), p. 70.

Committee makes the assumption that the whole of the railway deficits may be taken as aid to primary production,² although it recognises that the assumption needs some qualification.

VI.

Even given the assumption the Committee makes, that the suburban and through passenger traffic incur no loss, it is impossible to regard the whole of the railway deficits as subsidies. Some account has to be taken of other factors which militate against profitable railway operation in Australia. I have dealt elsewhere with factors which militate against efficiency, and motor competition has been dealt with by others. These factors account for a part of the deficit, the general policy of forcing development and thereby building lines which must remain unpayable for considerable periods accounts for more. Generally speaking, however, this policy is one of awarding subsidies, in that it attempts to divert the trend of economic development, and even if the lines in the end develop nothing in the way of useful production, they might be regarded as subsidies which did not reach their destination. Sums lost on such lines are certainly sums lost in abortive efforts to divert the trend of economic development. That the general policy is usually only an attempt to redirect development already directed by other artificial means (*i.e.*, the Tariff) into other channels does not alter the case.

The general argument of the Committee is that the national policy of protection to secondary industries imposes costs on primary industries which are in part met by the railways charging unpayable rates on primary products.³ Protected industries, by being able to charge higher prices on account of the protection afforded, impose higher costs on unprotected industries, competing in the world market, which these cannot meet, and which are therefore met by taxation disbursed, not directly as bounties, but indirectly in the form of freights low enough to cause railway deficits. The fact that the Commonwealth Government imposes the protective policy while the States pay the costs makes no difference; the taxpayers of the States are the makers of Commonwealth policy.

No doubt this is true, but no rate can be pointed to as definitely involving a subsidy, far less can the amount of subsidy involved be measured. Railways are not sheltered indus-

2. *The Australian Tariff: An Economic Enquiry* (Melbourne, 1929), p. 193.

3. See *The Australian Tariff*, p. 54.

tries in the full sense this phrase usually denotes; they are open to competition, in so far as they carry goods for export, with the transport agencies of other parts of the world, and will therefore of necessity bear some of the excessive costs imposed on exporting industries. There is just one possibility of escape. If the tariff protection given an industry is more than sufficient to cover the other costs of the industry, it is possible for the railways to take part of the profits of the industry in higher freights. In a tariff imposed with as little regard to cost as the Australian, there must be plenty of cases of such excess protection, but whether railways subject to political control are able to take much advantage of it is another matter. The case of the New South Wales rates on iron and steel seem to point in the opposite direction, as in that case the State is adding to the protection afforded by the tariff. And there are numerous other cases in which rates are designed to give protection to the industries of a State as against those of other States, irrespective of whether the industry is already protected from foreign competition. Cases of such a nature have been quoted above, and are sufficiently numerous to show that Interstate Free Trade, like Imperial Preference, is a sentiment which is seldom allowed to interfere with business.

VII.

There have been mentioned three types of subsidy which can be identified in Australian railway policy. These are:—

- (a) Easily identifiable subsidies to specific industries as in the case of Tasmanian beer, Victorian wine, and iron and steel products in New South Wales.
- (b) Subsidies to aid the settlement of new areas at a faster rate than this would normally take place. Both these types of subsidy are common even with private railways, but are made in the expectation that growing traffic will repay the subsidy given in the first place. On Australian railways that motive is only vaguely present; railway earnings take second place to industrial development.
- (c) Subsidies to export production generally, in order to counteract the effects of the Tariff on the costs of these industries. No satisfactory measure can be obtained of these, and this is generally the case with all subsidies, except in cases in which they are definitely a lower rate than prescribed on "foreign" goods.

It is not at all certain that the taxpayer will pay these subsidies. Cases can be conceived of highly protected industries footing the bill, in which case some if it will in the last resort come from the consumers of the goods concerned. It is also possible that industries naturally sheltered bear part of the costs of subsidies to export industries. It is clear that in a case of railways which pay a full return on capital, subsidies paid to one set of industries must be paid by other industries or their customers; in most cases some will stick in the industry, while some is passed on to consumers, the proportion depending on elasticity of demand and supply. Some of it may be paid by some types of passenger traffic, but this is too involved a question to enter.

How much, then, of the aggregate Australian railway deficit, if any, may be caused by such subsidies to Australian industries? In another paper I have outlined two factors contributing to present deficits, namely:—

- (a) Inefficiency due to political control, and
 - (b) Over-capitalisation, due to various causes,
- to which may be added:
- (c) the growing factor of competition from road transport.

The cost of the first factor cannot be estimated, but is undoubtedly considerable. It also affects rate policy directly, in that industries that are politically strong may exact lower rates than the industries are capable of paying, thereby possibly leading to an uneconomical division of overhead charges. The second factor does not affect the part of the deficit due to subsidies to the same extent, in that it is curiously bound up with it. In so far as it is due to developmental railways, which have proved errors of construction, it is due to misapplied subsidies. In so far as it is due to accrued depreciation, it is the result of deficits in the past left for a future generation to meet, and these past deficits will to a greater extent than the present be due to subsidies to development, mainly agricultural development. Probably the greater part of costs due to this factor may therefore be disregarded.

The third factor is more important. Competitive rates have been spoken of as subsidies to local production against production enjoying small transport costs abroad, and even rates designed to foster the industry in one State as against that of others may be placed in this class, although they must be regarded as wasteful, if Australia is to be regarded as an

economic unit. But road competition, which with unimportant exceptions operates at present only within the borders of one State, is in a different category. Rates lowered to meet road transport rates make for a loss due to wasteful duplication of services within the State, and must be subtracted from the deficit before the amount of subsidies paid by taxation can be calculated.

These conclusions are only tentative, and intended to serve as a basis for further discussion. No accurate measurement of the costs of the policy is possible, and even rough measurement will involve a great deal of further research.

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THE COMPETITION OF ROAD AND RAIL TRANSPORT

From the Point of View of the Railways.

- I. The Problem Stated.
- II. Effect of Development of Motor Transport Upon Railways:
 - (a) Passenger Traffic.
 - (b) Goods Traffic.
- III. Position of Railways in Economic Life of Community.
- IV. Transportation as a Commodity.
- V. Value to Victoria of Primary Production and Relation of Railways Thereto.
- VI. Is Uncontrolled Competition Desirable?
- VII. Duplication of Services or Co-ordination? Community Must Decide.

I.

The problem of Road *versus* Rail is, of course, engaging the minds of transport experts practically all over the world. During recent years, there has been a flood of controversy on the subject, and out of it all has emerged the fact that there is fairly general unanimity that after all what is wanted is the greatest good for the greatest number. But how to achieve that desirable condition is the problem upon which there is not such general agreement. On the one hand, we hear that free and unrestricted competition is the thing, and on the other hand that competition is apt to become a vicious, destructive force unless it is subject to very rigid control.

The problems of transportation are not only for transportation experts. They are equally problems for business men, who will be obliged sooner or later to decide—not by any casual rule of thumb, but by a careful study of the economics of transportation—what is best for the State and thus for business itself. Obviously, it is not merely a clear-cut issue between railways and road services. Both are needed by the community. Both, in their proper places, can be powerful factors in increasing the prosperity of the State. The question to be determined is what is the proper sphere of each of these transportation agencies, and in what respects is either economically superior to the other.

I do not think that anyone can reasonably take the view that railways are entitled to preferential treatment because

their development preceded that of motor transport. The determining factor, I agree, must be what is best for the community as a whole. There are, however, definite economic considerations involved of far-reaching importance in the establishment of road motor transport in substitution for railway transport. In Victoria, as in every other State of the Commonwealth, the relative importance of towns has been almost entirely established on the basis of railway communication, and any change which will disturb that relative position can hardly fail to bring about an important dislocation of values. Indeed, we experience one of our lesser difficulties in Victoria whenever we are obliged, owing to diminishing business or to a change in our methods of operating, to take what would seem to be the simple step of reducing the personnel or the status of a country station. There is immediately an outcry that the interests of the town are being adversely affected, and frequently much pressure is exerted upon the railway management in an endeavour to preserve the economic *status quo* of the town.

I do not suggest that this is a highly important aspect, and I mention it merely to show how intimately the railway business concerns, and is bound up with, local interests. It is not too much to say that the greater part of the development of the State of Victoria, as, indeed, of the other States of the Commonwealth, has been made possible by railway expansion. The history of our land development has been almost entirely a railway story. The development of the Victorian railway system has proceeded steadily during the past seventy-five years. On an average, nearly one million pounds have been invested each year during that period in the creation and the improvement of the system, the total capital investment now standing at approximately seventy-four million pounds. A glance at a railway map of Victoria will show how wisely the system has been designed. There are few towns in the State distant 10 miles from a railway. The miles of railway in operation now total 4,699.

II.

(a) *Passenger Traffic.*

All over the world motor transport has developed since the war at a remarkable rate. Throughout Australia the development has taken place mainly since 1924. The following table of motor vehicle registrations in Victoria for the years

1921, 1924, 1928 and 1929 presents what to me are astonishing facts:—

	Private Cars.	Commercial Vehicles.	Hire Cars.	Total.
1921		Not available		24,795
1924		" "		57,902
1928	111,195	20,100	2,653	133,948
1929	123,715	25,373	2,907	151,995

The population of Victoria is 1,767,539, and one in every 14 is the possessor of a private motor car. This should, I suppose, indicate remarkable prosperity, although I must admit that I am somewhat sceptical about whether it indicates anything of the kind.

Now, let us examine the effect of this development of motor transport upon the railways. The railway passenger business has suffered most severely, and particularly the country passenger business. In the following table I have shown, in respect of the years 1921, 1923, 1925, 1927 and 1929, the total number of country passenger journeys and the number of journeys per head of population:—

Year Ended 30th June.	Country Passenger Journeys.		No. of Journeys Per Head of Population.
1921	10,061,866	..	6.5
1923	10,047,058	..	6.2
1925	9,765,623	..	5.8
1927	9,083,149	..	5.2
1929	8,161,894	..	4.6

Admittedly, the decline has been very largely due to the increasing use of the private motor car, which, it is conceded, possesses advantages for individual travel, since the area of railway operation is necessarily limited by its fixed tracks. But a very substantial amount of traffic has also been taken by commercially operated services, which in many instances are purely a duplication of the service which is given by the railway. The railway traffic in parcels and the higher-rated goods business has also declined to an important extent. It is estimated that the Victorian Railways are now losing annually to motor transport between 85,000 and 100,000 tons of high-class traffic.

In 1924 it was realised by the Victorian Legislature that there was need for the restriction and regulation of the numerous commercial motor services which had suddenly sprung into being in the metropolitan area, and at the end of that year

legislation¹ was enacted which prescribed in effect that no motor omnibus service should be permitted to operate in any district where adequate other transport facilities already existed, or where the roads were unsuitable for motor omnibus traffic. The effect of this legislation was the prohibition of most of the services which were running in direct competition with railways or tramways, and at the present time there are only sixteen metropolitan omnibuses regularly operating direct into the city of Melbourne. There are, however, somewhat more than one hundred omnibuses in the metropolitan area licensed to operate as "feeders" to railways or tramways. Further legislation,² embodying the same principle as that contained in the Act of 1924, was introduced in 1927 for the regulation and control of motor omnibuses plying for hire in country and urban districts. This legislation, however, was more or less stultified by the substitution, on practically the whole of the routes affected, of five-seater "service" cars in place of the larger omnibuses. On one route alone, viz., between Melbourne and Ballarat, a distance of 75 miles, the loss of railway revenue, due to the operation of these small cars, was estimated at upwards of £20,000 per annum.

In 1929 an additional Act³ was passed which, while it does not interfere with the operation of five-seater car services on a number of routes, is designed to prohibit them from running on the five principal highways in the State, although they will be allowed to continue to do so (provided that they had been operating for a period of at least three months) until the end of the year 1930. It can therefore be said that in Victoria there is reasonably satisfactory legislative regulation and control of all commercially operated road motor services for the conveyance of passengers. Of the equity of the legislation I have no doubt whatever. Prohibition applies only where it is established that other adequate transport facilities exist, unless, of course, the roads are unfit for traffic. The interests of travellers are thus safeguarded, and the finances of existing transport agencies protected against the inroads made into the revenue by unnecessary competitive services.

1. The Motor Omnibus Act 1924 (No. 3378). It prescribes (*inter alia*) "The Minister shall satisfy himself that the condition of the roads to be included in the route is such as to be capable of carrying motor omnibus traffic thereon without unreasonable damage to the roads, and that there are not sufficient other facilities for the conveyance of passengers to, from or within the district proposed to be served."

2. The Motor Omnibus (Urban and Country) Act (No. 3570).

3. The Motor Omnibus Act, 1929.

(b) *Goods Traffic.*

So far as goods traffic is concerned, however, practically no legislation exists in Victoria for the control of road services. I say practically, because there does exist an enactment which prescribes a somewhat lower load limitation in respect of vehicles operating on routes competitive with the railways, and another enactment limiting the hours for the delivery of goods by road carriers in certain specified cities and towns. Those who have studied the subject are convinced that there is a limit to the distances over which road motor services can economically operate. Yet in Victoria at any rate distance does not appear to deter the road operator. We find road motor freight services operating between Melbourne and towns as far distant as 269 miles. One of the chief road services operated to a town distant 204 miles from Melbourne, charging rates for general merchandise, comprising compact, easily handled goods, which were from 24s. to 44s. lower than the rates charged for the same classes of goods by the railways.

I am convinced that the popularity of long-distance road freight services is due not to any greater convenience which they afford, but solely because they are charging, for the particular kinds of goods they carry, lower rates than are charged by the railways for the same classes of goods. It is commonly argued that this is a very good reason why they should be encouraged, since anything which reduces the cost of transport is desirable. But an examination of the facts makes it abundantly clear that, whatever the future may bring, it is at the present time entirely fallacious to assume that road transport is cheaper. The average rate charged last year (1928-29) by the Victorian Railways for all classes of goods—that is, including both low-rated and high-rated—was 1.7d. a ton-mile. Wheat was carried on an average for eight-tenths of a penny a ton-mile, and soil fertilizers for one half-penny a ton-mile. I think it will be conceded that it would be utterly impossible for road motor transport to provide service at anything like the rates which I have quoted.

Road services in competition with the railways are not acting as common carriers. They are not, in other words, concerned with the transport needs of the community. They carry only what they choose to carry, and they ignore or reject whatever does not suit them. Fertilizers, wheat, primary produce generally, timber, firewood, coal, material for road making—

in fact, all the commodities which must be carried at low rates because they will not stand high charges—they reject entirely. These commodities comprise approximately 70 per cent. of Victoria's freight traffic. Because very low rates must be charged for primary produce, and the like, in order that our products may compete in the world's markets, it is necessary that commensurately higher rates be obtained for more costly goods, such as wines and spirits, groceries and general merchandise. But it is these very commodities—these compact, easily-handled goods which will bear high freight rates—which are being taken by the road services. The railways are thus losing the traffic upon which they depend to make ends meet. No credit is due to the road services for carrying these goods at lower than railway rates. That they can do so is due to the benevolent complaisance of the general taxpayers, who are providing roads free of charge for the motor trucks, and in addition are bearing three-fourths of the cost of the damage caused by their operation.

III.

We hear from time to time loose statements to the effect that the usefulness of the railways is approaching an end, and that good roads are even more necessary than railways. It would seem, therefore, that there is need for setting out the facts showing the position the railways occupy in the economic life of the community. In a recent article Professor D. B. Copland, M.A., D.Sc., Dean of the Faculty of Commerce, Melbourne University, has expressed himself as follows:—

“The competition of road transport with railways involves problems of first-rate importance to the community as a whole. Australia has incurred heavy indebtedness on account of railways and, when the earnings are not sufficient to meet interest on the debt, the balance must be met from taxation. In every State, railway finance imposes a burden upon the budget, and deficits have to be met by taxation. The position is rather less acute in Victoria, but even here railway losses have been a source of difficulty to the Treasurer in recent years. If we had no railway deficit there would be less need for increased taxation.

“To the extent to which these railway losses are due to competition of other forms of transport there is a duplication of services for which the community must pay. We

may employ other methods of transport, but we cannot escape our obligation to pay interest on the capital invested in the railways.

"Of course, the other forms of transport may be more economical for certain services, and may actually increase our productive efficiency. For the community as a whole, the increased efficiency may add to our national income more than the additional taxation required to meet the consequent losses to the railways. If so, the competition has resulted in a net economic gain. It would be profitable under these conditions to allow extensive road competition with the railways. If the increase in income is less than the additional taxation, there is a net economic loss to the community. The problem is one familiar to students of economics. The cost must be set off against the benefits.

"Unfortunately, the costs and benefits are rarely considered from a national point of view. Sectional interests press for the new services because they yield a private profit in a limited sphere of transport. But such a private profit may not be coincident with a net national gain. The real benefits must be measured in terms of the national income. To what extent does road transport add to our productive capacity? The costs are the additional burdens imposed upon the national income to defray losses on existing methods of transport.

"These costs and benefits are very difficult to measure, but the community must determine the issue upon these grounds if it is to make a wise decision. The national asset embodied in the railways can best be protected by considering the net effects of the new form of transport upon national income and not merely upon railway finance.

"It may be more economic to forego the somewhat limited advantages provided by road transport, and thus to reduce the burden of railway finance on the Budget. If, however, it can be proved that road transport will increase efficiency sufficiently to meet railway losses, and thus involve no reduction in income, the competition will be economic.

"But this is a very doubtful claim."

IV.

Transportation is a commodity, the cost of which has a highly important bearing on the financial position of the com-

munity. It enters in some way or other into every phase of modern life. It may be affirmed with confidence that, next to the land, an efficient system of transportation is at least equal in importance to any other factor in the production of wealth from what are known as the primary industries. And for other than very limited distances, the only practicable system of land transportation in these cases is that provided by the railways. The factors which are necessary for production are land, labour and capital, with which is frequently associated organisation. No one of these can function without the assistance and combination of the others; but the results accruing from their successful combination will be nullified in most cases unless the product can be taken to the consumer, and this involves transportation. The need for adequate transportation was demonstrated to the great disadvantage of Australia during the war years, when, owing to the shortage of shipping facilities our surplus stocks of wheat had to be piled in great stacks to await the means of shipping them overseas. In many cases considerable loss was sustained by reason of the damages suffered in the stacks, and had it not been for the special steps taken to meet the abnormal situation in every State in Australia, and the generous assistance extended to us by Britain, our position would have been a very serious one. We had in excess of our needs millions of tons of wheat which would have had great value if it could have been transported to those who wanted it; but, in the absence of transportation, it lay useless in the stacks, in danger of rotting, until the required ships again became available.

A like position would immediately arise in the absence of facilities to transport our surplus wheat from the points at which it is produced to the seaboard. Except for its exchangeable value most of the wheat produced in Victoria in the Mallee district, for instance, is of no use to the producers in, or to the inhabitants of, that district. It must, therefore, be transported to the market, and as far as the land transportation is concerned, the only possible means of profitably achieving this end are provided by the railways. The primary industries are of supreme importance to Victoria, and, while most of them are greatly dependent upon the railways, wheat, the most important of them all, could not, as regards the great bulk of it, be profitably produced unless it could be transported to the consumers or to the seaboard by rail. And if it could not be produced

at a profit, production would certainly cease. That position follows as a matter of course. It is not necessary to labour this point, and the next one which comes up for consideration is:

V.

What is the value to Victoria of its primary production, and to what extent is the State dependent thereon for its prosperity? It may be well to repeat that, as regards a primary product such as wheat, the only practicable means of transporting the great bulk of it from where it is grown to the market, and thus to the consumers, are provided by the railways.

The average haul of wheat in Victoria in the year 1928-29 was more than 173 miles. This is far too great to allow of any other known system of transportation to deal with it. Assume then, if it be possible to do so, that the railways were withdrawn or abolished. It may be at once postulated: no railways, no wheat. What, then, would be the position of the State?

Information furnished by the Victorian Government Statist shows, in respect of two provinces—the Wimmera and the Mallee—that in the year 1926-27:

The value of the ratable property was	£49,500,000
The population was	98,000
The estimated value of the products was	£13,700,000
Of which the value attributable to cultivation was	£12,100,000

Without the railways wheat could not be produced in those provinces because it would not be profitable to produce it. Inquiries from those who are fully experienced elicit the like statement in every instance, namely, that without wheat the Mallee lands would not be productive, and would revert to their original state.

The Wimmera is more favourably situated. The breeding of sheep and cattle could be successfully carried on, but a most important adjunct to that industry would be lost if the growing of wheat became unprofitable, and the consequent loss of value would, it is stated by competent authorities, be enormous. In these two provinces it is conservatively estimated that the loss of value, under present conditions, if wheat could not be profitably produced, would be not less than four-fifths of the value of the ratable property—that is, not less than £40,000,000 of now existing value would be utterly lost. The effect in the

other provinces of the State would be more or less similar to that in the Wimmera and the Mallee, although, as the distance from the seaboard became less, the effect would, of course, be less serious.

VI.

But even the most zealous advocates of road transport have never suggested that it is possible to scrap the railways. It is generally agreed that for bulk transportation the railways are unchallenged and unchallengeable. I am constantly hearing that competition is a good thing, that it stimulates those affected to greater effort, to better service. There is something to be said for this contention, but there is also a lot to be said against it. Experience has shown that uncontrolled competition frequently results in the survival of the strongest, not of the fittest. It often means the selling of services or commodities at less than cost, but the community must ultimately pay the full cost. Competition that necessitates selling at below cost is always destructive. But in any case, I have already said enough to show that actually road services are not even attempting to compete with the railways as a national transport agency. They are taking the "cream" of the traffic, refusing the heavy, dirty or bulky commodities, and are only able to do that because they are heavily subsidised by the taxpayers. If the road services were placed on the same basis as the railways, if they were obliged to carry whatever is offering, and to pay the cost of constructing and maintaining that essential part of their plant—the roads—there is little doubt what the result would be. They would soon cease to exist. So long as the community needs its railways, it must pay to maintain them at a standard which will permit of their giving satisfactory service. In Victoria at the present time it is paying, apart from the other costs associated with actual operating, approximately a million pounds a year for the maintenance of the tracks alone. It is also paying about three and a half million pounds yearly as interest charges on the capital investment in its railways. These payments cannot be escaped.

VII.

It is for the community to decide whether, in addition to meeting unavoidable railway costs, it is also prepared to meet

the additional costs involved in duplication of transport. But before it makes the decision, it should be clear about the costs, which are none the less real because they are unseen. One of the costs which will have to be met is increasing railway deficits, and another is the ever-growing charge for the maintenance of roads which have not been constructed for heavy, fast-moving traffic. Economic laws are inexorable and cannot be escaped. If the community insists upon additional transport facilities, it must pay for the luxury. But I am very positive that the luxury is at present beyond our means. One scarcely needs more than a very superficial knowledge of economics to realise that the community of this young, relatively undeveloped country cannot afford to squander its resources by unnecessarily duplicating its transport costs. The ideal course would be for the community to budget its transportation expenditure, just as it budgets its expenditure on other national utilities, and thus to ensure that the expenditure on this commodity is wisely directed, and is not unduly great for the benefits secured.

The fact that the railways were first in the field of modern transportation should not, as I have already said, be permitted to weigh unduly in their favour. Cobb and Company were here before the railways, and were superseded. No reasonable person could contend that there should be no changes in the form of transportation, if these changes are found to be economically sound and likely to prove of lasting benefit to the State. The question is not one for determination by railwaymen or other transport agents. It is a question for business men and economists. If it could be shown that the railways can be economically supplanted by road services, then they should be scrapped as obsolete. I repeat that whatever is best for the community as a whole should be adopted. So far as Victoria is concerned, the railways are unquestionably the State's greatest asset. How the depreciation of that asset, without any compensating advantage, will affect the position of the State in the world's money markets is a question that requires to be very carefully weighed by our economists, by our business men and, more especially, by our statesmen.

All the controversy on the question of the relative merits of rail and road transport leaves one fact outstanding. The railways are indispensable. They are as necessary to-day as ever they were to develop this country, and to consolidate the development which has already taken place. They must be retained for the essential and exclusive service which they render.

This being so, it seems to me to be quite illogical to allow unregulated, subsidised competition to take from them the goods upon which they depend to balance the ledger, and that it would be much wiser to ensure that commercial road transport should be developed upon a co-ordinated plan with a sound economic basis, rather than along lines of destructive competition.

H. W. CLAPP.

Victorian Railways.

THE COMPETITION OF ROAD AND RAIL TRANSPORT.

From the Point of View of a Motor Trader.

- I. Introductory.
- II. Various Aspects of the Problem.
 - (a) An Unprofitable Railway Route.
 - (b) Inefficient Road Control.
 - (c) When Rail Routes Should be Scrapped.
 - (d) Carriage of Live Stock by Road.
- III. The Motor Transport Control Act 1928 (South Australia).
- IV. Unrestricted Competition.
 - (a) Development of Motor Competition.
 - (b) Examples of Temporary Prosperity.
 - (c) Failures and the Consequential Economic Effects.
 - (d) Developments in Road Transport.
 - (e) Effect on Railway Revenue and Evils Resulting Therefrom.
- V. Increased Road Expenditure Owing to Motor Transport.
- VI. Possibility of Co-ordination.
 - (a) Co-operative Effort.
 - (b) Public Interest Paramount.
 - (c) Operation of Spur Lines by Motor Transport.
 - (d) Establishment of a Trust for Purpose of Co-ordination.
- VII. Running Costs and Calculation of Depreciation—Motor Transport.
 - (a) Freight Vehicles.
 - (b) Passenger Services.
- VIII. Conclusions.

I.

In addressing you on this world-wide problem, I do not think my conclusions can be regarded as reflecting in any degree the attitude of the motor trade, although such a task has been allotted to me.

Because of the vital connection with our national welfare, I like to consider transport as a servant of industry—the essential lubricant without which none of our industries can function, and such a theory regarding transport has greatly influenced my thoughts on this problem. It would be only reasonable, however, if those who, like myself, have their assets invested in the industry, should seek every opportunity for what they deem to be its advancement, although such progress might be inimical to railway or other sectional interests.

There is a wide field in which motor traction is not in competition with the railways, and in such a sphere developments are obviously beneficial to the community generally.

I propose at present to deal solely with the developments within the area of conflict, although I recognise that only a small percentage of all motor transport actually does come into conflict with railways interests. Within this area some of the competition does appear to me to be deplorably uneconomic.

For the purposes of this analysis, I shall endeavour to examine the problem as it bears on the welfare of the whole community, as well as on that of the sectional interests involved. In the discussion of this subject there is too frequently a lack of tolerance towards the views and rights of the other side, but there fortunately still remains a section of the community which can take an impartial view of the case, irrespective of its own personal interests. It is to this section that I shall endeavour to address these comments.

II.

(a) *An Unprofitable Railway Route.*

In South Australia the Victor Harbour line might be deemed an example where the railways system has to a degree outlived its usefulness. The distance by rail is 81 miles and by road 53 miles. The rail route is indirect, and traverses for the first 35 miles the steepest gradients in the State. Throughout the hills portion of the route, where the rail haul is most expensive, the great proportion of the freight and passenger traffic has been won by the road services, which function most successfully over short distances and which do not suffer to the same extent by reason of the gradients to be negotiated. Steam passenger trains, which now run but seldom, occupy four hours twenty-four minutes over the journey, whilst rail cars take three hours fifty-five minutes, as against two hours thirty minutes occupied by the road services.

In fairness to the railways, I must add that when holiday traffic warrants the effort, rail cars cover the distance, running express, in two hours forty-two minutes.

Prior to the passing of the Motor Transport Act, road motors on this route were eating so heavily into revenue that the railways placed a fleet of highly expensive road vehicles on the roads in competition with the private passenger carrier.

During the period of operation of the Motor Transport Board the Railways Commissioner tacitly admitted that the

railways could not be considered competitive on this route. The Act required the withdrawal of railway road vehicles, and certain road motors were allowed to operate unhampered. Unfortunately, when the Motor Transport Act was repealed and unrestricted competition allowed to function without hindrance, the railways re-established their goods and passenger road services and immediately proceeded to cut fares and freights by road, incidentally making losses ever since on such road operations. Against such unfair competition it is inevitable that the private road motors can make no headway, although an excellent service is provided.

Owing to the railways road competition, fares have been cut to such an extent that passengers are now carried the return journey of 104 miles in luxurious vehicles at 10s., or slightly over 1d. per mile, as compared with a fare of 20s. formerly charged. These road services will be made to pay, but not until they are protected from the uneconomic competition of a powerful monopoly and a long and bitter experience has eliminated the weaker competitors. A revised road service with an efficient plant, directed by men with business intelligence in place of the present system, is also necessary.

(b) *Inefficient Road Control.*

In South Australia, with but few exceptions in the road freight services and none at all in the passenger branch, have I noted that the best advantage has been taken of the opportunities existing to compete effectively against the railway services. The means exist but the degree of intelligence brought to bear on the requirements of the road services has not been of the highest order.

The interest charges on the high first cost of the road vehicle is generally deemed an important factor in considering the possibilities of road competition. The bane of depreciation has also been ever foremost in our minds. Latterly I confess I have had to recast my views on these two points, and I am now inclined to believe that both of these factors should be viewed from an entirely different angle. On pages 87-93 I have given figures of transport costs which throw some light on this matter.

These calculations have been devised to illustrate the possibility of new types of road transport competing effectively with the railways under existing circumstances. They do not mean that the costs have been reduced sufficiently by the newer

developments to make the competition economic from the point of view of the community. They serve, however, to show that there are distinct possibilities of road transport becoming a very profitable business to the road carrier in the near future.

This will involve a menace to the railways much greater than any competition they have been subjected to in the past unless rational steps are taken immediately to co-ordinate the transport systems.

I have observed that lack of success of road operators is often due to the purchase of wrong equipment. Generally speaking, the available capital is limited and this factor governs the type of vehicle selected. The question whether it is the most efficient vehicle for the work in hand must, therefore, remain a secondary consideration. Once possessed of an unsuitable machine, it is difficult in practice to break away, as a new vehicle is generally required before the old one is paid for, and the best trade-in terms are to be secured from the trader who disposed of the original vehicle.

A motor truck operates at a cheaper cost per ton mile as its capacity increases. I have with me a carefully compiled data sheet issued by a manufacturer, which illustrates amongst many other valuable facts that the cost per ton mile, loaded one way over a distance of 80 miles, varies as follows:—

5-tonner	5.4d.
4-tonner	5.76d.
3-tonner	6.48d.
2-tonner	9.18d.

Therefore, the largest capacity that can be operated in relation to the freight offering should be utilised. The carrier has to estimate the quantity and freight value of loading available—if seasonal or constant, and the number of trips per week into which this freight would need to be divided.

The class of road would also have a bearing on the capacity of the machine utilised, the nature of the freight and if loading could be secured both ways, also whether the machine could be constantly engaged on the job, or whether casual hire would be necessary to fill in slack periods. With such a set of contingencies to consider it appears that the right course might be to have different vehicles of varying tonnage capacity. For financial reasons this is seldom practicable.

Pneumatic tyred vehicles have increased the range of choice, although at a higher first cost.

The new 6-wheelers of 6 to 12 ton capacity are also a development, to my mind, of more importance than any other factor in the progress of efficient road transport. Such types of machines will make substantial cuts in transport costs over country where hitherto road conditions have limited the load on a two-axle machine to about 3 tons.

I am confident we shall eventually witness 6-wheelers handling up to 12 tons over the same tracks and with greater ease than the smaller vehicle carries its 3-ton load.

(c) *When Rail Routes Should Be Scrapped.*

Up to the present I do not think that the functioning of competitive road services in general has demonstrated any striking economy to the community.

On this phase of the question I am reminded that from the economist's standpoint, if road transport on a particular route can effectively handle the whole of the traffic offering at a cost to the community which is less than the cost of working the non-paying competitive railways section, then the scrapping of the latter is justified, in spite of the loss of interest which has to be raised by taxation. However, if the railways can handle the whole of the traffic at the same cost as it can be carried by road and cover working expenses and provide even a small rate of interest on the capital outlay towards the revenues of the State, then the scrapping should only take place as the railways equipment wears out.

In a calculation of this nature we cannot disregard the inconvenience to which the community might be put by being compelled to use a rail system that does not give the most up-to-date service. Such inconvenience might well be of major importance in the consideration of such a problem and yet remain intangible.

On the other hand, if the annual loss is not great, it might be worth while to maintain a losing railway line, where there are prospects of future developments making it able to handle the traffic more economically than the road motors.

As in the case of railways and road transport, so in the conduct of any private enterprise; if the cost of working a new machine plus interest is less than the cost of working an old machine, then the latter should be scrapped, even although the capital value of the old machine be lost thereby.

Illustrations of this truth may readily be found amongst country municipalities, many of whom retained their obsolete

gas and electric lighting plants merely in order to preserve their asset long after more efficient methods of lighting were available.

The time for a general scrapping of our railways systems has not yet come, but if we make our legislation too rigid, motor transport might conceivably be kept back artificially, although in certain instances it would constitute the more economic means of transport. That it has not yet proved itself to be such to any considerable extent is due rather to the lack of business ability than the absence of the necessary machinery.

Many aspects of the problem are entirely different in older countries with dense populations, and where railways are privately owned. In such countries both rail and road services are highly organised, and with ample capital available for their development.

Luxurious road vehicles are provided with dining and sleeping accommodation. Well-equipped waiting and refreshment rooms serve the traveller at suitable stages along the routes. It is obvious, therefore, that under such conditions the competitive forms of transport are enabled to stage an interesting contest for supremacy.

It will be many years before a similar degree of competition prevails in our country; therefore, we must examine the problem as it actually exists here to-day.

A striking summary of the present position by Professor Hytten was published in the *Economic Record* in the May, 1929, issue:—

“The world appears to be once more at the cross roads of transport development. This time a little more perplexed than on the previous occasion. There are no finger signposts to show the way.

“The railway displaced the stage coach, and there was merely a little good-humored disbelief in the capabilities of the new toy. Then an outburst of enthusiasm. But there is a difference in the attitude then and now. The displacement of the stage coach hurt no one very much, but the displacement of the railways of the world would mean a capital loss of such dimensions that it must seriously disturb our economic life. Yet, if mechanical road transport is definitely proved more economical in the long run, we should be scrapping our railroads with few more regrets than our forefathers felt at the displacement of the stage coach.

“The problem is not so simple as that. It is a problem

with two forms of transport, each more economical than the other in its own sphere, which makes it a problem of deliberate interference rather than the complete displacement of one by the other.

"At present one is developing so much faster than the other, and no sooner has a satisfactory solution appeared than the problem presents itself in an entirely new light, demanding a fresh solution. Both these two services differ in their economic structure, and it is important to understand the difference."

The fallacious yet widely accepted opinion that the railways system generally is obsolete has been so ably disproved that I need not enlarge on this topic. Nevertheless, the railways should not be allowed to monopolise the situation and to strangle road competition where it is really beneficial to the community.

Where the railways do not give the more economic service the field should be thrown open to motor competition and the Public should not be asked to accept the one route traffic formula.

It seems to me that in Australia we need some independent authority to determine when it is in the best interests of the country to license motor traction to supply an efficient service where the Railways are not functioning to the greatest advantage of their customers, or where progress is retarded because of the restricted operation of rail transport.

In South Australia we have had a varied experience. Road motors were eating into railways revenue on all hands and the railways successfully appealed for protective legislation. In the Motor Transport Control Act of 1928 absolute preference was given them, and even where the railways service was not adequate, every effort was made to restrict the road services. I represented motor interests on that Board, and I know quite definitely that it was impossible to obtain impartial consideration to any application for a road license on its merits.

(d) *Carriage of Live Stock by Road.*

In many cases, viewed from the good of the whole community, the decisions were questionable. In one instance an attempt was made to prevent a grazier bringing his fat lambs to town by a service lorry that ran to Adelaide empty and brought vegetables and fruit supplies back to the country centre. The rail freight on these lambs was approximately the same as the road charge, but the rail journey involved a longer haul in time and distance and the lambs were delivered in worse condi-

tion to the abattoirs than by the road service. At times the difference in prices realised amounted to 3/- per head.

Another grazier situated close to the railway line purchased for £1800 a road vehicle and trailer to transport his fat lambs to market. At times he conveys 250 lambs in the one journey by road in a few hours against 1½ days formerly occupied by rail transport. This grazier assured me that in a little over eighteen months' operations the better prices realised for his stock by reason of the more rapid transport had wiped off the total capital cost of the vehicle.

This points to the fact, as yet insufficiently recognised, that in some cases, although rail and roads routes parallel one another, yet the railways may not be providing the most economic service. Two years ago the percentage of fat lambs brought to our abattoirs by road was negligible. To-day I am informed that out of a total of 352,000 lambs marketed, fully one-third are carried by motor transport. Large numbers of pigs and calves are also conveyed to-day by motor lorries.

At an abattoirs sale recently in Adelaide, upwards of 50 motor lorries brought in consignments of stock as against one or two that were conducting such operations 3 years ago. On the other hand, it is interesting to note that last year 602,000 sheep were yarded at our abattoirs, most of which were carried by rail in large droves from distant stations.

The comparative costs of the contending means of transport are not always the chief factors in the moving of stock to market. It is sometimes rather a question of rapid and efficient handling. The road motor can frequently pick up the stock in the paddock on the morning of the sale and they appear under the auctioneer's hammer three or four hours later.

If, on the other hand, the railways are used, stock has to be yarded the day before, driven to the nearest railhead, trucked, and then taken by a slow stage to the sale yards.

Admittedly the railways lose this freight, but these are cases where the labour savings in droving, the increased market price realised, and the increased satisfaction obtained generally amounts to more than the lost freight. During the operations of the Transport Act such anomalies came before our notice constantly. From the railways point of view the monopoly of such freight transport might appear to be desirable, but it is not in the best interests of the State and might conceivably retard progress.

In the development of any nation cheap and efficient trans-

port is the basis of all successful endeavour, and every obstacle that is placed in the way militates against development. I have often tried to measure the total gain to the community as a whole if merchandise in different capitals could be cheaply and expeditiously exchanged. Apart from other economies effected, it would undoubtedly mean that we could run our affairs with much less capital absorbed in stocks than is practicable to-day.

This might even justify the maintenance of a more expensive, although more expeditious, means of transport.

III.

Viewed broadly, the administration of the Motor Transport Control Act was interpreted with a view of eliminating uneconomic road transport which, in time, it might have achieved. But for various and insufficient reasons the Act was repealed and no restrictions hamper the operations of the road services to-day, except the payment of licensing fees, common to all road vehicles.

Though the Act was administered in a repressive manner, I have always maintained that this repeal was not in the best interests of the community as a whole.

Despite many anomalies, during the brief period of its operations, I believe that motor transport actually commenced to function without resulting in any net loss to the community, due to its effect on the railways. The Act was not inherently wrong. On the contrary, in my considered opinion it contained the germ of a system of co-ordination that would, in time and with patient application, have gone far to solve many of the problems that have further developed since its repeal.

The repeal of the Transport Act left the field clear to the opposing parties to enter on a period of unrestricted competition, which is the position pertaining to-day. Realising that the protection formerly enjoyed no longer existed, the Railways Department set out in earnest to secure the traffic.

I have noted both in this State and in Victoria a curious tendency of the official mind to gently but firmly insist that all transport, however unwilling, should be shepherded towards such terminal points as Mile-End and Spencer Street.

Such a custom might not be hurtful where facilities are adequate, but the layman would perhaps be pardoned if he preferred a condition of affairs where our railways, by reason

of these facilities, invited our custom and where no spirit of compulsion existed.

In South Australia the railways, enjoying, as they did for so many years, a virtual monopoly of transport, were allowed to drift into a state almost amounting to chaos. Rehabilitation became essential, and, despite features which have received much criticism, I believe that the mechanical re-organisation will yet receive the commendation it deserves. However, should one form of transport monopolise the whole of the State services, it is apt to become arbitrary in its methods.

The danger of such monopoly is that when a service is not paying it is apt to grow inefficient and does not give the more modern method the opportunity to function to the greater advantage of the taxpayer. Although this point may not have much validity at present, yet it may have greater force in the future. At times a great industry, once highly efficient, is allowed to drift unless some other form of competition provides the necessary spur to efficiency.

IV.

(a) Development of Motor Competition.

Owing mainly to the state of our roadways competition from road transport in the past was negligible. Thanks to the taxation extracted from the motoring public and the general taxpayer, the magnificent roads recently constructed became a silent though eloquent invitation to enterprising carriers to utilise this growing asset for purposes of private gain.

In the operation of selling a motor vehicle destined for hire operations, the salesman does not pause to consider the relation of such a venture to the welfare of the community generally. Therefore, we must anticipate the rivalry of the motor to continue, whether justified or not. However, I cannot but admit that this is not in the general interest, and I frequently ask myself if it would not be wiser to restrict sales to cases where the functioning of such a vehicle fulfils a definite need. I have to admit that in my opinion, if the traffic offering can be efficiently handled by the existing means of transport, whether road, rail, or both, then the community as a whole loses every time a motor trader disposes of a vehicle that is destined to compete for such transport.

Such a vehicle should only be licensed provided it is going to be of useful service to the public.

Sir Hugo Hirst, when in Adelaide, expressed the opinion that he did not care whether the most efficient means of transport was by road, rail or sea, but if any transport facility was proved to be adequate and efficiently served the public needs, no matter whether it was run by private enterprise or by the State, then that facility should be protected and all uneconomic competition eliminated.

Now, this theory is not so damaging to the motor industry as might at first appear. In my own State we have enjoyed kaleidoscopic changes in motor legislation over the last few years that have entirely unsettled the motor carrying industry. These have taken such forms as restriction of routes and size of tyres, heavy imposts on solid tyred vehicles, regulation of freight and passenger charges, and so on.

During the period directly prior to these undigested efforts of our Legislative bodies, road competition was entirely unrestricted. Wherever a road man thought he saw a chance of securing some of the railways traffic he lost no time in sailing in. If ever he had the opportunity of making good that was the Golden Age. But the business did not prosper. The experiments were mostly disastrous, and the examples of vehicles repossessed at a tenth of their new selling value were legion. At that time, whilst our bankers viewed with equanimity the progress of the ordinary car or light lorry business, the companies retailing heavy duty vehicles were anathema to banks and finance companies, and one after another such companies gave up the task and went into liquidation. Motor finance houses were so adversely affected that, as a rule, they refused to touch the finance of heavy freight vehicles altogether.

The defeat at that time was pronounced, but the vehicles were often utterly unsuitable for the work and the roads were atrocious. The highways have since been improved. Nevertheless, just as much then as to-day, I believe that careful investigation as to the needs of the added convenience by an impartial body would have established the motor carrying trade on a sounder footing.

Motor salesmen at that time stumped the country from village to village with potential lorry buyers. They mapped out a route where a road enterprise was considered likely to be successful, and solicited patronage of country merchants

who hitherto had been somewhat inefficiently served by the railways system. The autocratic methods of this body had created such dissatisfaction amongst their customers that country merchants were prone to look with favour on new ventures.

That autocracy has now hidden its head and sweet reasonableness prevails, but only owing to emergence of the more modern methods of transport. To that extent the motor trade, badly as it has suffered in the process, has been of genuine service to the community.

(b) *Examples of Temporary Prosperity.*

I have touched on the sudden development of road transport prior to the passing of the restrictive legislation in my own State. In a fashion it endured, but whilst appearing to become ever more menacing, it became in reality more a wasteful test of brute strength and perseverance, with an utter disregard of the economics of the situation.

Without doubt occasional freight and passenger services have prospered, but in the few instances where this is so they have been directed by men with business ability, operating on the more favoured routes.

Apart from the exceptions I have referred to, the road operator, working along competitive routes in his fruitless endeavours to make ends meet, worked more often than not 80 to 100 hours per week, week in and week out, almost without pause. I have known many such misguided victims who drove their machines, not occasionally, but as a regular practice, so continuously that the only respite they obtained during the week was a few hours snatched alongside the road stretched along their cab seats.

These men do not work under any Wages Board restrictions, but should hours and pay become subject to regulation their plight would be still more hazardous.

In one instance, where a carrier drove on an average 700 miles per week, his wife invariably accompanied him in order to keep him awake. Fatigue alone of both man and machine ruined this enterprise. I have never known a clearer illustration of the evil effects on a motor vehicle of over-driving. It proved to me that long hauls, with a one-man outfit running to a regular schedule, cannot prosper.

Many of these owners had bought their vehicles, costing frequently well over £1000, and having heavy financial com-

mitments, found it necessary to carry on in this manner in order to keep abreast of their obligations. Of course, many fell by the wayside, and when this occurred and the vehicle was repossessed, it became the business of the merchant holding the vehicle to re-sell to some other optimist, and so the old story was re-enacted.

Have you ever paused to consider the genesis of many such carrying and passenger outfits? The glamour of it is attractive, but in most cases all hopes of a legitimate profit crumble before a critical examination.

A vehicle, either passenger or freight, is purchased on a small deposit, and for the first few months all goes merrily. There are no replacements, breaks-down are rare, a large sum of money is handled, and to the untrained mind the venture appears to be on the high road to success. However, if one views the operations after the end of the first year the enterprise wears a somewhat different aspect. By this time probably a new set of tyres, costing up to £100, will be required, repairs have mounted up, occasional breaks-down and delays arise, and in the course of time the machine requires to be thoroughly reconditioned, and the renewal of annual licence fees provided for. After two or three years the vehicle is passed in as part payment for a new machine, and the owner starts again at the same point as he did two or three years previously, with another heavy burden to wipe off.

I find amongst my notes a typical instance that came under my own notice. A man acquired under H.P.A. a 5½-ton American truck two years ago, at a cost complete with body, of £1000, on £250 deposit, and balance on long terms and with that soul-destroying flat rate of interest clause included. The machine proved to be incapable of the work it was called on to do, and at the end of the period the hirer still owed £200 in terms payments. Its actual market value was £100. The agent allowed him £275 on the old vehicle, of which sum £200 squared the old debt and the balance of £75 was utilised towards the purchase of another similar vehicle at £1050. He therefore commenced all over again, just £175 behind scratch. Such a venture can only end in tragedy. Not only will the hirer lose all his savings, but the nervous strain on such a man must be intense. Only those in touch with this class of buyer can realise the dread of extinction that haunts him and his really pathetic attempts to extricate himself from the muddle by venturing on even greater hazards.

So much for the hirer.

As regards the vendor of the machine, I suggest that a critical examination of the whole transaction would have proved just as unsatisfactory from his point of view. Yet this class of business continues to be written.

Only recently I came across an instance where a Victorian road operator carries a certain class of freight from Melbourne across the border to Mount Gambier, a distance of 301 miles, for £3 7s. 6d. per ton, which is the rate of freight charged by the South Australian Railways for the carriage of the same commodity from Adelaide to the same point. Even the railways rate is a preferential one, designed to offset Victorian competition, and yet this road operator was hauling the load at a freight rate equalling 2.7d. per ton per mile, with little hope of back-loading.

I have in mind a further case of an optimistic operator who conducted a run to Broken Hill, a distance of 350 miles, with a 30-cwt. truck. Could any operation be more futile?

(c) *Failures and Their Economic Effects.*

An example in the passenger carrying branch may also be of interest. An owner commenced seven years ago with one vehicle, purchased on hire payments. He has since possessed at times twelve new vehicles, and to-day is carrying on with three cars, worth on re-sale perhaps £900, and which doubtless carry a burden of hire payments amounting to the present day value of the machines.

Lest this last example should tend to illustrate the ineffectiveness of motor transport in competition with the railways, I should like to point out that, if the various undertakings on this particular road route were controlled by one or two business men with special knowledge of the business, working in co-operation, and utilising the most suitable types of vehicles, they would achieve instant success, because the other features surrounding the enterprise are entirely favourable.

So far as the passenger service is concerned, I question whether there is a single service that is operating at a profit. Blind chance rarely wins out—and yet in few instances are the possibilities weighed before the venture is undertaken. Over the past few years there have been innumerable instances of passenger and freight services coming on to a route hitherto served by the railways. In their own language they give it

a "fly." Frequently they last a few months and then more often than not they fade away. Such spasmodic efforts have no economic value, but they seriously affect our greatest asset—the railways—who have perforce to cut rates to meet the situation, and frequently find it essential to provide extra facilities, unwarranted by the traffic offering. However, when such ephemeral enterprises fade away the railways must be ready to take on the job again.

Let us assume that a specific rail service exists that is not payable, but is continued merely to serve the public. A road service comes into competition and attracts so much of the limited business offering by cutting rates that the railways withdraw their service altogether. The road operator finds the venture unprofitable and retires from the contest.

In such a contingency what an outcry we could expect if the railways declined to reinstate the service!

I will touch on another instance where unregulated competition has proved abortive. This example concerns a line of freight vehicles which operate in another State. The particular feature of interest about this run is that it is one of the longest I have yet investigated.

It has yet to be proved whether efficient direction and plant equipment would actually enable long road haulage operations to function successfully, but should such prove to be the case, it would forecast a greater menace to the existing railways systems than any developments in road competition hitherto experienced. However, at present I can only deal with developments on this route that have taken place to date.¹

My object in investigating this service was to ascertain just what genuine progress the carriers on a long distance haul had made. They were carrying a lot of freight and appeared to be prospering. I obtained reports from bankers, trade investigators, and from the actual merchants whose goods at one time or another were being conveyed by road. One reply received was "Broke or on the verge."

One merchant reported he had swung back to the railways for his whole traffic, as the latter had cut their rates beyond all possible competition.

Bankers and trade reports advised caution; a further independent report stated that several very hard-working, ex-

1. Although short runs involve higher overhead in loading and unloading, it is at times more payable than long hauls because of stress on tyres, overheated water and oil, engine wear, fatigue of driver and so on, all of which are less in evidence in short hauls. Such important features are very seldom taken into account by operators.

perienced carriers had thrown it up as hopeless. They had lost all their savings, and it was obvious that the freight rates then offering could not even yield enough for the inevitable repair bills. There was still a remnant operating, and they were scraping along.

They boasted a lot about their progress, but did they really know their position? One of my informants stated that, "taking the whole lot, he did not think one of them would have a feather to fly with when it came to the inevitable replacement of his vehicle."

Professor Hytten has supplied me with an illuminating example of what transport competition will do. From Launceston to Burnie there is a run of just over 100 miles, 112½ by rail, but slightly shorter by road. The railways charged £1 for the trip, having reduced the fare from 25s. on account of competition. One bus service, running seven-passenger cars (maximum allowed), competed and charged £1 for the 100 odd miles of bad road. Fairly regular loading was obtainable. Then another company came along and fares were gradually reduced to 8s. by the new company, to which the old one replied with a fare of 5s. ! With the traffic divided there would be little chance of full loads, and they could not rob the railways of much more, as most of the traffic left to the railway is season ticket traffic at low rates. At this stage the new Transport Board stepped in, fixed the rates for motor vehicles at £1, and prosecuted. But they lost the case, the magistrate contending that £1 (which has been considered fair for years) was a ridiculously high rate.

If the above are typical instances, are they doing any good to the motor trade, the community or to themselves? Should we finance the railways and construct good roads with taxpayers' money, whilst allowing such men to enter upon big engagements without an elementary knowledge of the difficulties they are up against. Emphatically the permanent well-being of the motor trade is not wrapped up in such ill-timed ventures. If such services were restricted, we would possibly sell less vehicles, but those we sold would be retailed at a profit and a real service done to the community.

When it is all summed up, I often wonder whether the owners, with all their anxieties, even draw wages from the undertaking. But they continue to exist. As one falls out another takes up the burden, and so they drive along, for ever pursuing the elusive mirage of prosperity. All this may sound

far-fetched, and, indeed, a better knowledge of the factors governing success in road operations may even now be emerging. However, I have touched on this phase of the problem to illustrate the evils of such competition—great hearts, without the elementary knowledge of finance, battling with an enterprise backed by all the resources of the State.

(d) *Developments in Road Transport.*

The position from the railways' point of view is aptly covered in *Edinburgh Review* of October, 1928. In this article the contributor points out that the railways cannot choose their freights, but that road competition skims the cream off the goods traffic of the railways.

Where road motors do function in competition with the railways without hindrance, they secure the best paying traffic, particularly where quickness of delivery is of more importance than cheap transit. There is a further factor—the ability of the road service to deliver to consignee's door.

In the earlier developments the road service provided a door to door service, but I believe this system is now giving way to the central terminal system. Accordingly, the door to door service operates at the country end only, at which point the carrier picks up his outward loads at individual points and distributes his inward freight in the same manner. At the city terminals this convenience has been generally curtailed.

These city terminals represent the most uneconomic methods of handling goods possible to imagine. In Adelaide to-day there are twelve such depots operating, most of which are conducted by individuals who secured some old sheds and leased platforms to the various carrying services; therefore the merchant who has both inwards and outwards parcels to and from various country centres has to send his delivery trucks to each one of these centres daily. The congestion at such terminals is deplorable and the waste of effort immense. I believe that if all road carriers could sink their petty jealousies and combine in the erection of one grand central terminus in each capital city for the clearance of all freight they would reduce their costs and give a dignity to their labours which, by comparison with the present methods, would be surprising.

It is certainly a reform much desired by merchants, and would do more to popularise the road services in the eyes of

the business community than any other development yet heralded. Many of these depots levy a fee on the merchant before they will allow his vehicles to pick up in their yards, which imposition does not tend to increase their popularity. These depots embrace 120 carriers, of which 37 operate within 25 miles of the G.P.O. and are, strictly speaking, non-competitive. A further 36 carriers are only partially in competition, due in most instances to the fact that the railways do not extend as far as the terminal points of such carriers.

These latter enterprises are of great value to the community, as their speedy and frequent schedules allow country traders to carry lower stocks than would be essential were communications less frequent.

There then remain 47 carriers in direct opposition to the railways outside the 25-mile radius.

(e) Effect on Railway Revenue and Evils Resulting Therefrom.

I have rather crudely estimated that the total freight lost to the South Australian Railways through the operations of competitive carriers amounts to £100,000 per annum. This loss of traffic, although considerable, might be deemed more vexatious than vital if it did not exceed the figures quoted.

When we realise the enormous advances made by motor transport, it is rather surprising that only 47 carriers, running probably 60 lorries in all, represent the total competition from the road services. Obviously the railways must look more to the private car user and the general trade depression for the cause of their ever-diminishing revenues.

I merely touch on the private car traffic in passing, as we must recognise that no legislative enactment can prevent its expansion. Nevertheless, I do believe there is a possibility of such an exodus being arrested over distances greater than 100 miles, should the development of the rail car provide such a cheap and speedy service as has proved to be possible in other countries.

It might really resolve itself into the question of whether or not the railways managers consider the fresh expenditure worth the effort to secure a return of such traffic, particularly as regards freight vehicles.

In dealing with transport operations it seems to me that the practice of the railways of basing freight rates not on the cost of service but on what the traffic will bear inevitably causes

unrestricted road competition to be wasteful and not in the interests of the community. If this be so, providing the existing forms of transport are giving the most efficient and economical service, then the railways should be given adequate protection. Even from the point of view of the road operator, unrestricted competition is wasteful in the end. It leads to inefficiency and breaks-down to such an extent that a permanent service cannot be always relied on. Against this, a license to run on a certain route soon establishes a goodwill which enables the licensee to build up a stable business.

The worst examples of the evils of unrestricted competition that I have yet encountered are to be found in the conflict that raged some years ago between the carriers and railways for the cartage from steamers at Outer Harbour wharfs. The railways desired the monopoly of all such traffic and considered they had the sole right-of-way. In their efforts to effectively embarrass the carriers, at one time they shunted long lines of empty trucks from one end of the wharves to the other, thus creating an effective barrier against the road carriers. Ultimately such efforts were superseded by more ingenious methods. It was necessary for the carriers to drive their lorries over the permanent way to reach the ship's side. The railway authorities therefore had the metal ballasting removed from between the rails, thus creating an insuperable barrier to the progress of the motor lorries.

As a further example of unrestricted competition, in road hauls I could instance operations on our Peninsula where wheat formerly carted about 12 miles to the nearest ketch (its natural outlet) was hauled by road vehicles over 50 miles to Wallaroo at a figure per ton mile equalling that paid for the transport to the nearest ketch, plus only the additional price obtained for the wheat at the deep-sea port. The rate for such cartage to Wallaroo worked out at approximately 3½d. per ton per mile, as against about 5½d. per ton mile required to run the vehicle.

Thus the ketch owners, the road surfaces and the lorry owners all suffered in the effort.

Just let us contemplate for a moment where such unrestricted competition leads to.

First of all, let us deal with the highways laid down and maintained at great expense to the taxpayers. Each mile of roadway constructed leaves the railways more open to attack. These roads generally parallel the existing systems. It has never seemed to me, therefore, that this asset should be handed over to any body of men to utilise for their private gain, unless by

such effort a definite advantage was likely to accrue to the community as a whole. The unrestricted competition in the past does not seem to have resulted in any net gain to any section. It caused damage to the roads; it brought ruin to many of the carriers concerned; and whilst functioning, it robbed the railways of much of their legitimate traffic and probably displaced just as many men in the railways system as it absorbed in road operations.

V.

The extent to which motor transport has increased the expenditure on roads in South Australia was indicated in our Auditor-General's report for 1928. Attention was drawn to the fact that the State is subsidising motor transport to the extent to which the increased expenditure due to motor transport exceeds the receipts from taxation of motor vehicles and motor spirit. The amount involved was stated to amount to £426,617.

The Auditor-General estimated that this subsidy spread over the total number of vehicles running equalled 4½d. for every gallon of petrol consumed by road vehicles in one year and equalled a subsidy of £12 9s. 9d. which the vehicle owners received from the general taxpayer.

Details of this calculation were given as follow:—

Total expenditure on roads by the State and Local Governing Bodies for 1910 was	£382,496
Population in 1910	407,000
The population in 1929 was	579,348
Increasing the 1910 expenditure by the rates of the altered value of money, and the increase in population gives what would probably have been the expenditure for 1929 if motor transport had not come into general use.	
The figure thus arrived at is	£923,052
The total actual expenditure for 1929 was	£2,189,031
Less contributed by horse-drawn vehicles	9,794
	<hr/>
	£2,179,237
Increased expenditure due to motor vehicles . . .	£1,256,185

Of this increased expenditure, motor taxation provided—

Motor vehicles, licences, taxation, etc., and hawkers' licences	£558,116
Commonwealth grant	212,181
	<hr/>
	£770,297

The whole of the grant received from the Commonwealth has been credited as having been obtained from motor taxation.

Extra expenditure caused by motor transport for the year 1929, approximately	£1,256,000
Less contributions from motor vehicles and taxation towards this	770,000
	<hr/>
	£486,000

Less contributed by motor vehicles special licences and paid to General Revenue	59,383
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Contribution from General Revenue and local rates to motor transport for the year 1929	£426,617
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This contribution from the General Revenue and Local Rates is, in effect, a subsidy to owners of motor vehicles, particularly those who use the roads extensively. The total petrol consumption by motor vehicles for the year 1929 was, approximately 22,260,000 gallons. Applying this figure to the subsidy of £427,000 gives 4½d. per gallon. The position can be more clearly seen by taking an actual case of a large motor vehicle, e.g.:

Annual mileage	8,000
Petrol consumption, 12 miles to gallon	666 Gals.

On this petrol consumption the subsidy which the owner of this vehicle receives from the taxpayer is £12 9s. 9d. per annum. If he were required to pay this amount by a levy on his petrol consumption it would raise his running costs approximately .37 of one penny per mile and petrol would cost 4½d. per gallon more than at present; but even if this amount of 4½d. per gallon were paid by the owner *in addition* to his present motor tax he would not then be bearing the full cost to the State of supplying road facilities, but only the extra cost due to motor transport, as compared with the cost of roads provided for methods of transport in vogue in 1910.

The report in conclusion stated that there was no justification for providing from the public revenue of the State what was, in effect, a subsidy to owners of motor cars used for luxury or convenience and that this subsidy to motor transport had a direct bearing on the losses being incurred by the Railways Departments.

VI.

(a) *Co-operative Effort.*

Owing to the method employed by the railways of calculating their freight rates, it would appear the difficulties can only be overcome and both forms of transport used to the greatest advantage under some form of co-operative effort, and I shall now endeavour to indicate the lines on which a solution of our problems may be expected.

Being directly interested in motor transport, I am naturally anxious that no unnecessary interference shall prevent its natural expansion. At the same time, if we will allow ourselves to look to the ultimate result and not be too deeply impressed with the immediate factors that so frequently cloud the true perspective, I think we may arrive at a point where both systems will attain the maximum advantage.

I believe that a certain amount of headway has already been made by our Railways Department, in co-operation with certain motor carriers on the Broken Hill-Burra route, particularly as regards moving the wool clips.

The retention of our rail transport to Broken Hill is a matter that closely affects the welfare of the whole State.

South Australians are of one mind in desiring the Railways Commissioner to quote the lowest possible rates for freight along this route. Such being the case, does it not appear apparent that every assistance should be tendered the railways in their efforts to continue the service at the lowest figure possible? It does not seem reasonable to expect cut rates while unrestricted competition is allowed to function along such a route, where the present facilities are adequate.

South Australia had the courage to extend its railway system from Peterborough to Broken Hill, making it possible for the latter to become the greatest silver mining centre in the world and bringing the Hill into direct communication with its natural geographic sea outlet to Port Pirie.

The South Australian Government also expended large sums of money at Pirie to provide the necessary shipping faci-

ties for the vast trade that poured in. Latterly, however, motor trucks running from Adelaide have been competing against the rail for some of the higher-priced commodities, making it increasingly difficult for the railways system to function successfully.

On the return journey these carriers have latterly been picking up the wool at the various stations en route at cut prices. This development has been met by the railways and the Burra carriers getting together and fixing a through rate for the cartage of wool. The railways subsidise the Burra carriers, which enables a competitive through rate to Port Adelaide being quoted. Up to the present the wool growers have viewed the position in its broadest aspect and co-operated in this arrangement.

It might be suggested that it is unfair to deprive the Broken Hill carrier of back loading and to subsidise competitive carriers to his detriment. However, the operation of the Broken Hill carriers is uneconomic and the private interests of the individual must of necessity be subordinated to the greater good of the whole community.

Such examples make it obvious that whilst the competing systems fight it out, the transport of the country suffers in the process, but if some system of co-ordination were evolved, whilst it might prove hurtful to the individual, the transport facilities of the community would be improved. From whatever angle we view the future, I think we must admit that the uncontrolled competition by the road services up to the present has not been reasonable, nor should our railways systems be left open to the varying types of competition I have endeavoured to portray.

Many schemes have been advanced by various States towards co-ordination of transport facilities. Commissions of enquiry held in both New South Wales and Victoria have recommended that a Ministry of Transport be formed to take over railways, tramways, harbour boards, road motor transport, and so on. The New South Wales proposals also include the control over main roads board, navigation, taxi-cabs, motor registration, and the allocation of the various funds received from motor taxation.

My own impression remains that a scheme of this nature might by its very complexity defeat the objects of its creation. In the solution of the problem I believe that to hasten slowly is the better method.

The greatest possibilities of improvement would be found

in the investigation of all unpayable branch lines with authority to close these down where a road transport system could demonstrate its ability to conduct the whole of the operations at a lesser cost to the community, and where no likelihood existed of the closure of such a branch line hindering possible natural developments of the country.

Owing to the rehabilitation of our railways system the financial drift of these unpayable spur lines must become more pronounced in the future. The policy adopted has been to gradually replace all rolling stock with larger engines and trucks, and has also necessitated strengthening the bridges and permanent way. In the course of time the lighter rolling stock must inevitably be scrapped, and there is nothing at present to take its place except the heavier equipment. This latter cheapens the cost of running where heavy haulage is available, but where the traffic is meagre the use of the heavier rolling stock must inevitably increase the drift.

I should like to read a few extracts from the report of a Commission of Enquiry held in U.S.A. three years ago which investigated problems very similar to ours:

(b) *Public Interest Paramount.*

The public interest and national welfare are fundamental in legislation affecting transportation. When there is conflict between public interest and private interest the former is paramount and the latter must give way.

Railroads have no more economic right to any traffic than had the canals and stage coaches which opposed the construction of railways on the ground that they would take traffic already being carried on the canals and highways. But economically wasteful rivalries which marked the past should be avoided for, in the end, the public must pay.

It is not a question of whether any particular transportation agency shall prevail or be given advantage. The readjustments or re-adaptation of transportation facilities should be made with the least possible economic waste. Regulatory legislation and administration should have the single purpose of improving transportation.

It is not always easy to determine what is public interest. With reference to the present problem induced by the rapid growth of motor transport, it may be difficult to determine where the public interest lies if motor transport draws traffic to such an extent from existing railways that the earnings of these lines

are so impaired that they can no longer adequately serve the public. The public is interested if there should arise a question as to which agency should continue to exist when by reason of the sparseness of traffic, both cannot do so. The public is interested in the extent and manner in which motor vehicles *for hire* use the highways, particularly, as related to the primary use of such highways by the public in private automobiles.

The vital fact in regulatory control over motor carriers is the certificate or permit issued by the regulatory body for a specified motor operation after finding that it is in the interest of public convenience and necessity.

Certificates of convenience and necessity are required, not so much with a view to safety or the conservation of the highways, but primarily for the purpose of protecting the public interest by excluding unnecessary and wasteful competition and by determining what persons or companies are best able to serve the public. The primary object of regulatory laws is not to establish a monopoly or guarantee the security of investment in public service corporations, but to serve the interests of the public. In considering the question of whether or not a new transportation service should be permitted in competition with an established service, it is, however, economically sound and in the public interest to require that available transportation facilities be taken into consideration, as well as the effect the proposed new service would have on the existing transportation agencies, the continued operation of which is important to the territory served. No preference as a matter of right or law should be given to an established transportation agency where it is a question of furnishing a different kind of service.

(c) Operation of Spur Lines by Motor Transport.

I have dealt in detail with the position of affairs that exists to-day and have illustrated what progress private enterprise has made under conditions of unrestricted competition.

After long consideration I have come to the conclusion that neither in the freight nor passenger section has the system justified itself, particularly in South Australia, nor does it seem likely to do so effectively in the future. Occasionally, perhaps, a carrier makes a comfortable living, but only when some feature is particularly favourable, such as an indirect railway route.

In my opinion there exists in the present road transport competition the maximum of waste effort and the minimum of profit to all sections of transport, directly or indirectly involved. The

Railways could, with advantage, probably close down several unpayable spur lines and leave such hauls to motor transport. It appears unlikely that the Railways Department would voluntarily hand over such trade to its competitors. If, however, a State Trust were formed, with control over all road operations in competition with the Railways outside the metropolitan area, there would be less reluctance to a transfer of the business. It would be the function of this Trust to license all private carriers, including those now competing with the Railways. No additional carriers competing with the Railways would be licensed unless the Trust believed their operations would be in the interests of the public. Where the Trust considered that it could advantageously co-operate with the Railways, either in the closing down of spur lines, or in other ways, it would be empowered to engage in the transport business itself. For successful co-ordination, I believe the road equipment would need to operate from points adjacent to Railways headquarters, and the fleet would have to be in actual proximity to the Railways passenger and goods terminals.

If the Railways Commissioner were appointed a member of the Trust, it should be possible for both sections to act in close co-ordination with the maximum of advantage to both departments and to the State generally. I would not advocate that the control of such road transport be conducted through the Railways Department. From my limited observations, I believe the Railways road transport operations have been conducted at the maximum expense and they have not been able to achieve simplified control.

Until recently there have been separate administrations within the Railways Department controlling the road services, the fleets and the repairs respectively, and I doubt whether road transport experience is available in the Department to conduct road operations at the minimum cost. Perhaps the whole training of the Railways Engineer, who deals with huge outlays and heavy rolling stock, is not the best ground work for conducting the lighter and more mobile undertaking.

Not only this, but I believe that if the Railways were given control of competitive motor transport it would result in the latter being artificially restricted and made subsidiary in every sense to the older system, whereas a Road Trust could operate in co-ordination with and yet be competitive to the Railways.

If there were only one unpayable railway line to be closed down, then a private enterprise might be given a monopoly and could run the job economically. However, if all unprofitable

lines were closed down, there would be many occasions when one particular route might only require a light lorry or passenger bus, and another route call for heavier transport. It would be difficult for individual private companies operating by road to provide the necessary vehicles without providing much larger equipment than the ordinary demands merit.

(d) *Establishment of a Trust for Purpose of Co-ordination.*

If one Trust were responsible for the whole fleet, reserve and stand-by vehicles could be swung over to the line making the heaviest demand for the moment.

Any scheme promoted should have as its basis the closest co-operation with the Railways so that the most economical channel would be used for the business and through bookings be practicable.

I have mentioned elsewhere that our railways stock has been re-constructed for heavy duty only, and that no provision is being made for the lighter demand. It might thus appear possible that in the future railways transport operators may restrict their efforts to carrying bulk loads to main centres, perhaps at 20 miles distance from one another. This might enable the railways, except during harvest, etc., to close up their intermediate stations and motor transport could pick up the bulk loads and passenger freight at these points and distribute them to the various villages lying between.

In regard to freight traffic, this would enable road transport to act as the delivery agent in the intervening areas, thus giving to the consignees delivery to their doors, which is a feature of road transport to-day. The road transport authority also could contract for picking up goods from the merchant in the city, actually delivering them to the consignee's door at any point in the country. With such a system of co-ordination brought about by the establishment of a Trust, much uneconomic competition would automatically disappear.

It would be immaterial to the consignor whether his goods were carried by rail or road. He would make his contract with the one authority. As an example, let us assume that the road system has a very heavy loading to Murray Bridge. It could hire from the Railways just sufficient closed trucks to carry the whole varied consignment. The Railways, on their part, would be simply hiring a truck. The road transport operator could put in what he liked but at the terminal point, Murray Bridge, the road system would take charge of the truck, unload and deliver. This would involve the Railways in no additional expense, but

would save an unnecessary road haul with its consequent wear and tear to vehicle and roads.

This procedure was actually employed in Great Britain with advantage to both parties, and only failed because the Railways system, observing the success of the movement, endeavoured to capture both functions. The objection raised to this scheme might well be that the road man is securing payable traffic in small parcels and getting them shifted by the rail at truck load rates. This objection would be fatal if the road transport unit was operated by a private concern, but is not of importance to the taxpayer, providing both facilities are handled by the State.

Let us attempt to prophesy the result of such effort ten years from now. I believe it would mean the restriction of the Railways to long hauls with fewer stops and stations to control; also a marked reduction in overhead expenses. Further than that, the profit accruing to the State through road transport operations would, I believe, be considerable. The capital cost of a suitable transport fleet would be comparatively low, and it might be worth discussing whether such a scheme as this could gradually be developed even on the main lines, allowing for intermediate and unimportant railways stations to be closed down in favour of the co-ordinating road transport effort.

Apart from the obvious economies it would give to the Railways the advantage of speed that they lose to-day through the frequent stoppages necessary at wayside stations.

This argument leaves untouched the consideration of seasonal traffic such as wheat, but the scheme would not prevent the railways from utilizing the wayside stations when bulk loading was available.

The layman little realises the menace threatening the finances of our State Railways by the advent of the new 6 and 8 wheeled pneumatic tyred vehicles, capable of hauling 12 to 20 tons, and even at times up to 80 tons freight. It is the appreciation of this position which has forced me to conclude that the only way of facing the situation is by the establishment of some such form of Trust as I have suggested.

In considering a proposal of this nature it is essential to bear in mind the rights of the present Carriers, both freight and passenger. Having pioneered various routes, they should receive consideration, and for a long time to come they might be allowed to function without interference on the payment of adequate license fees.

VII.

(a) Freight Vehicles.

I propose to give you some figures of transport costs based on pneumatic tyred vehicles only.

A few years ago pneumatic tyres were confined to vehicles ranging up to 2 tons only. To-day they are standard equipment on vehicles up to 12 tons capacity. Solid tyres are still the most economical in running costs for heavy duty vehicles, however, and pneumatic tyres are more expensive. Heat is at the bottom of all tyre troubles. Pneumatic tyres invite speed. Overloading and speeding induce heat in the tyres. It is of interest to note in passing that during hot weather carriers with modern vehicles equipped with pneumatic tyres have learned by experience to travel in the cool of the evening and thus avoid excessive tyre trouble.

Depreciation should not be written over so many years unless the truck is merely an adjunct to a merchant's business. As we are dealing with competitive carrying it will be more satisfactory to calculate the depreciation over the useful life of the vehicle.

For the purposes of my illustrations I propose to assume that all loading is one way only. In practice there will be generally a proportion of back loading, but against this, at times the outward load may not reach full capacity. Then again, if we calculate the possibilities on the basis of one-way haul only, any back loading obtained will add to the possibilities of further profit accruing to the venture.

Such depreciation should be calculated by deducting the cost of the set of tyres^a from the purchase price and dividing the life of the truck in miles into the balance of capital cost.

In England the useful life of a high-class machine is usually estimated at 160,000 miles, although in certain instances it may achieve double this mileage. However, under rougher conditions in Australia we may reduce this to 100,000 miles. Therefore, if a 4-ton British truck costs £1000, of which amount pneumatic tyres represent £200, we have a depreciation of approximately 2d. per road mile, or ½d. per ton mile.

Presuming the machine runs back empty, then the outward journey must bear double the charge, or 4d. per road mile or 1d. per ton mile for a 4-ton load.

Bear in mind that when you buy a truck for competitive

a. Cost of tyres before depreciation calculated £100 and £200 respectively.

road operations you are only buying transport calculated in miles.

The life of the high-grade American machine must be considered equal to that of its British competitor. In fact, many of Adelaide Municipal Tramways American passenger buses have exceeded 214,000 running miles and the Board anticipates that a further 100,000 miles of running is possible. This illustrates the possibilities when proper maintenance and attention are rendered.

The types of British commercial motor vehicles sold in Australia are superior in their useful economical life to the cheaper medium capacity foreign machines commonly found in competition against our railways. From my experience the life of the latter may be taken at 60,000 miles as against 100,000 miles estimated for the British machine.

The average carrier does not appreciate clearly the importance of these figures. He is more likely to weigh the lower first cost than the suitability of the machine and to pay £750 for the 3-ton vehicle than £1450 for a 6 ton 6-wheeler truck.³

Assuming ample freight is offering for one way only at 8d. per ton per mile, the smaller machine would earn 2s. per freight mile against a depreciation of 5½ pence per freight mile.

The 6-wheeler would have an earning capacity of 4s. per freight mile and a depreciation of 6d. per freight mile, leaving a balance of 3s. 6d. per freight mile to meet all other costs, as against 1s. 6½d. for the smaller machine.

I give below the comparative costs of three British commercial vehicles of 2, 3 and 6 ton capacity. Weekly run, 500 miles. Two trips weekly to a point 125 miles from the metropolis. One way loading, fully loaded. 50 working weeks. Freight value, 8d. per ton per mile. Vehicles' life, 100,000 miles. Tyres, 10,000 miles.

3. Influences on Running Costs—

All examples of operating costs (not including standing charges) are the *approximate cost of the average truck* of the capacity mentioned. It is impossible to give the actual cost, as many factors have a bearing on running costs whilst standing charges are known and definite.

Causes affecting running costs are: Variation of road conditions, winter and summer driving, long or short runs, pace machine is driven, hilly or flat routes, amount of attention given machine, ability of mechanics doing repairs, one or several drivers on a machine, nature of loads, attention to tyres, reckless driving, prompt attention to essential repairs.

The cheap machine needs more mechanical attention, more frequent overhauls, is off the road for longer periods and causes losses and delays to those dependent on regular service. Experience has proved that maintenance of a cheaper vehicle will at times exceed both depreciation and maintenance of the high class job.

Makers' Carrying Capacity.	First Cost, Less Tyres.	Freight Value Per Week.	Depreciation, Standing Charges & Running Costs as Detailed Below.	Final Result.
2-Ton	800 100			
	700	£16 13 4	£24 15 10	£8 2 6
3-Ton	1025 125			
	900	£25 0 0	£28 7 6	Loss £3 7 6
6-Ton- (6-Wheel)	1400 150			
	1250	£50 0 0	£37 9 10	Loss £12 10 2 Profit

DETAILS OF STANDING CHARGES AND RUNNING COSTS.

	2-Tonner.	3-Tonner.	6-Tonner.
Interest, 7%	£49 0 0	£63 0 0	£87 10 0
Tax	16 0 0	18 0 0	22 5 0
Insurance over Trucks and Goods	85 0 0	44 0 0	50 0 0
Rent	50 0 0	50 0 0	50 0 0
Wages	300 0 0	300 0 0	300 0 0
Yearly Standing Charges	<u>£450 0 0</u>	<u>£475 0 0</u>	<u>£509 15 0</u>
Standing Charges Weekly	£9 0 0	£9 10 0	£10 4 0
Depreciation Weekly ..	3 10 0	4 10 0	6 5 0
Petrol—12 m.p.g., 10 and 6 m.p.g.	4 3 4	5 0 0	8 6 8
Oil and Maintenance — 1d., 1d., 2d. p.m. . .	3 2 6	3 2 6	5 4 2
Tyres	5 0 0	6 5 0	7 10 0
	<u>£24 15 10</u>	<u>£28 7 6</u>	<u>£37 9 10</u>

I have compiled this estimate to cover an actual run in a neighboring State where the carrier actually does utilise one 2-ton and one 3-ton vehicle in his operations.

As sufficient freight is offering in this instance, the illustration serves to prove the possibilities of profit by employing the 6-ton vehicle.

Calculating the possibilities and using the same formula—on the Adelaide-Broken Hill run—350 miles (one trip weekly, returning empty), to merely cover expenses the 6-tonner would cost £8 1s. 4d. per ton for the trip, the 3-tonner £11 19s. 6d., and the 2-tonner £15 11s. 1d.

Eliminating the two smaller vehicles from our calculations, the 6-tonner at £8 1s. 4d. per ton for 700 miles equals 2.76d. per ton per mile; therefore at 8d. per ton per mile, without back loading, the 6-tonner would show a profit of £21 12s. for the journey.

This illustration should serve to show the possibilities for carriers over long distances where the road conditions limit the

load to 3 tons on the ordinary two axle vehicles, whereas the 6-wheel 6-tonner could negotiate the journey carrying double the freight with equal ease. Since these figures were compiled a 6-ton 6-wheeler has actually commenced operating on the Broken Hill run, and from operating figures I have available, it appears that this type of vehicle will be able to compete with surprising success against railway competition.

The following table will illustrate the bearing of road miles run per week on cost per road mile and also cost per ton:—

Standing charges for a 3-ton machine, £9 10s. per week (as per illustration), 36 hours running time per week at 20 miles per hour = 720 miles, which would be the limit without overtime, or second driver, both of which would mean increased standing charges.

Miles Per Week.	Running Costs, 9d. Per Mile.	Standing Charges.	Total.	Per Mile.
100	£3 15 0	£9 10 0	£13 5 0	2s. 7.8d.
200	7 10 0	9 10 0	17 0 0	1s. 8.4d.
300	11 5 0	9 10 0	20 15 0	1s. 4.6d.
400	15 0 0	9 10 0	24 10 0	1s. 2.7d.
500	18 15 0	9 10 0	28 5 0	1s. 1.4d.
600	22 10 0	9 10 0	32 0 0	1s. 0.6d.
700	26 5 0	9 10 0	35 15 0	1s. 0.25d.
800	30 0 0	9 10 0	39 10 0	11.85d.

It will be noted that the cost per road mile falls very little after 500 miles.

The road man carries his load at a flat rate per mile. He has little conception of his costs in quoting for the operation and is generally dominated by the rail charges existing for a similar operation.

On the other hand, the railways system of tapering rates makes it more difficult for the road operator to compete over long distances. However, within a radius of about 120 miles from the city the comparisons I have made do illustrate the possibilities, provided the most suitable vehicles for the work are utilised.

Developments in motor transport in older countries have changed so rapidly of recent years that it is difficult to follow the ever varying aspects. Since I commenced to investigate this problem the announcement of the 12-ton 6-wheeler has brought an entirely new light to bear on the possibilities of road transport.

As an illustration, the relative costs of a 3-ton British truck and the latest 12-ton six-wheeler, as now produced in England, are interesting. Presume each carried full loads one way to a point 50 miles out of Adelaide, say, Port Victor, and doing 6

round trips per week. Then, where the 3-ton vehicle would show a loss of £2 per week, the 12-ton vehicle would show a profit of £55 10s. 7d.

3-Ton cost \$1025		12-Ton cost \$2,235	
125 Less Tyres		385 Less Tyres	
<u> </u>		<u> </u>	
\$900 For Depreciation		\$1,900 For Depreciation	
STANDING YEARLY COSTS.			
Interest	\$68 0 0	Interest	\$133 10 0
Wages	800 0 0	Wages	350 0 0
Insurance Vehicle and Goods ..	44 0 0	Insurance Vehicle and Goods ..	50 0 0
Tax	15 0 0	Tax	45 0 0
Rent	50 0 0	Rent	50 0 0
	<u>\$476 0 0</u>		<u>\$628 10 0</u>
50 WORKING WEEKS PER YEAR.			
300 Miles per Week.			
Standing Cost Per Week	\$9 10 0	Standing Cost Per Week	\$12 11 5
Running Costs at 9d. p.m.	22 10 0	4 m.p.g. at 2s.	15 0 0
Cost for 18 Tons	432 0 0	Oil and Maintenance at 3jd. per mile	8 15 0
Cost Per Ton	<u>\$1 15 6</u>	Tyres, 6.7d. p.m. (12,000 miles) ..	16 15 0
		Depreciation at 4.66 pence per mile	11 8 0
		Cost for 72 Tons	<u>\$64 9 5</u>
		Cost Per Ton	<u>\$0 17 11</u>
Returns for Week at 8d., fully loaded one way	\$80 0 0	Returns for One Week at 8d., fully loaded one way	£120 0 0
LOSS	<u>\$2 0 0</u>	PROFIT	<u>\$65 10 7</u>

This calculation presupposes full loading one way, which is unlikely as there would be much wayside freight carried. However, against this, with a properly equipped road organisation a range of vehicles of suitable tonnage would meet such a disability.

Nothing I have studied has so much impressed me as the possibilities of these large road vehicles replacing the rail services on those lines which are at present unpayable. Indeed, the 20-tonner 6-wheeler is already an entity.

To further illustrate the startling improvements that are taking place in motor transport I should like to add that a British road tractor with pneumatic tyres and with five gears has just been announced (see *Commercial Motor*, 24th Dec., 1929). This vehicle hauls 15 tons with a road speed of 36 m.p.h., a petrol consumption of nearly 10 m.p.g., and a turning circle of 40 feet.

If experiments with such road vehicles under efficient control were made over a selected branch line that has proved uneconomic under the rail system, no great dislocation of traffic need be encountered and the possibilities of savings to the community would be of the utmost interest to all who are interested

in endeavouring to combat the losses to our railways system as a whole by the necessity that exists of maintaining unprofitable routes.

(b) *Passenger Services.*

For reasons of space, I have not touched very fully on the passenger services. The analysis of such would be on very similar lines to those surrounding the freight vehicles, and the same reasonings would apply.

I will include one example of this truth, taking for my illustration the Victor Harbour road passenger services. The comparison is made between the 7-passenger type of vehicle at present employed and a modern 28 passenger coach. The cost per passenger mile for the 7-passenger type of vehicle would be 1½d., while for the 28-passenger coach it would be .575 pence.

Useful life, 150,000 miles — Tyre mileage, 8,000 miles.

7-Passenger 30 H.P. Saloon Car, Costing £1,000.		28-Passenger Saloon Coach, Costing £1,760.	
Standing Charges—		Standing Charges—	
Interest at 7% p.a. on \$950 ..	\$86 10 0	Interest at 7% p.a. on \$1650 ..	\$115 10 0
Insurance	81 14 0	Insurance	90 0 0
Tax	15 0 0	Tax	28 0 0
Rent	50 0 0	Rent	50 0 0
Wages	300 0 0	Wages	300 0 0
Total Yearly Standing Charges (say, \$500)	\$498 4 0	Total Yearly Standing Charges (say, \$1,100)	\$575 10 0
50 Working Weeks Equal, Say, \$10 p.w. Standing Charge.		50 Working Weeks Equal, Say, \$11 10s. p.w. Standing Charge.	
Running Costs—		Running Costs—	
Petrol, 12 m.p.g., at 2s. p.g. ..	\$0 0 2	Petrol, 8 m.p.g., at 2s. p.g. ..	\$0 0 3
Oil, Grease and Maintenance ..	0 0 1½	Oil, Grease and Maintenance ..	0 0 2
Tyres (8,000 miles)	0 0 1½	Tyres (8,000 miles)	0 0 3½
Depreciation	0 0 1½	Depreciation, 2.8d. (say)	0 0 3
Cost Per Road Mile	\$0 0 6½	Cost Per Road Mile	\$0 0 11½
600 Miles Per Week Cost—		600 Miles Per Week Cost—	
Standing Charge	\$10 0 0	Standing Charge	\$11 10 0
600 × 6½d. = \$21 18s. 4d. ..	16 5 0	600 × 11½d.	28 15 0
	\$26 5 0		\$40 5 0
Equalling 10½d. Per Road Mile. 10½d.		Equalling 1s. 4-1/10d. per road mile.	
Cost Per Passenger Mile $\frac{10\frac{1}{2}d.}{7} = 1\frac{1}{2}d.$		Cost Per Passenger Mile, .575 pence.	

Generally eight cars are employed to handle the traffic throughout the year. The same traffic could be handled by two coaches.⁴

4. For the sake of simplicity, in calculation I have eliminated the stand-by vehicles in both cases. In the slack period the traffic is frequently pooled, thus avoiding unnecessary running costs but without benefit to Standing Charges. There is no data for estimating the actual passengers carried and revenue earned. In winter the cars run with minimum loads, whilst in the holiday season they frequently do the return trip twice and sometimes three times.

The comparative standing charges and running costs would be as follows:—

8 Cars	£210 0 0
2 Coaches	80 10 0

The cost of carrying one passenger by car is almost three times greater than by coach, which is sufficient to illustrate the possibilities if the services were limited by regulation and suitable vehicles employed.

I recently observed in the *Commercial Motor* of 11th February last that a new line of high-speed buses accommodating 40 passengers has been inaugurated between Edinburgh and London at a fare of 20s. for the single journey of 400 miles against the railways third-class fare of 50s. With the type and size of vehicles employed in South Australia on similar passenger services, it would take at least five vehicles to conduct the same operations. The all-round waste effort thus expended need not be stressed, but the contrast does serve to illustrate the possibilities should the correct type of machine be engaged.

VIII.

This, as I see it, embraces the position of the road services to-day, particularly in my own State. I am conscious of the fact that in the larger States developments may have been along sounder lines. Despite this possibility, doubtless the conditions are generally relevant. With increasing knowledge of the factors I have stressed, the road motor may yet become a formidable competitor to the railways system, even to the stage I have indicated where certain systems might be scrapped in its favor.

In many directions, and particularly over long distances, I do not doubt the railways will continue to function to the general welfare, but as motor transport becomes progressively more efficient and cheaper, so will sections of the railways become obsolete.

At times we read of proposals to develop the outback country by means of motor trains capable of hauling 100 tons and over unmade tracks.

This vision-splendid will ultimately have its place in the scheme of things, and we may see motor trains running to a regular time-table from rail heads such as Alice Springs to Queensland terminals, linking up the various sheep and cattle stations en route.

Before such developments are likely in Australia we must pre-suppose a greater spread of wealth and population.

For the immediate present the economy of donkey teams and the comparative unimportance of time in transit—in relation to cost—are factors on the other scale.

Recent British trade journals actually announce multi-wheel machines, on the articulating 6-wheel principle, of 20, 60 and 100-ton capacity and with an average road speed of 20 m.p.h. for the 20-tonner. These vehicles are intended for use on made roads, but I believe the Empire Marketing Board in England has made a grant towards the expense of constructing an experimental machine of 100 tons capacity for cross country operations.

The discovery of cheaper fuels in our own country would doubtless accelerate developments of motor transport in back areas. I had intended to sketch the developments of alternative fuels and the use of Diesel engines, which contain great possibilities as regards both the rail and road systems. In some quarters it is claimed that Diesel crude oil engines will entirely supersede the petrol driven engines. The steam propelled road freight vehicle also provides an interesting study in economy and efficiency. However, both these subjects cover rather a large field.

Much of the diversity of opinion we meet with to-day seems due to the impression that road transport appears cheaper. If we could demonstrate clearly what unrestricted competition really costs the community the problems would be simplified.

Whether or not co-ordination of the various means of transport will ultimately be achieved, I believe the railways will continue to be a prime factor in our industrial life. However, their activities will change to meet the needs of the times, and in all probability goods traffic will be confined to heavy hauls, such as complete train loads over long distances.

In a similar manner the railways will continue to cater for long passenger journeys, as road transport of either passengers or goods in Australia to-day over long stretches up to 300 miles is not economic, nor does it justify elaborately fitted vehicles and wayside depots.

Assuming our Commonwealth continues to progress, and that no further railways except main trunk lines are laid down, there will, in course of time, arise a field for the legitimate operation of motor transport of dimensions as yet little realised.

SIDNEY CRAWFORD.

Adelaide.

DEVELOPMENT OF MECHANICAL TRANSPORT.

- I. Introductory.
- II. Historical.
- III. The Power Unit.
- IV. The Motor Car.
- V. The Commercial Vehicle.
- VI. Service and Maintenance Organization, Repairs and Running Costs.
- VII. Standardization, Mass Production and Hire Purchase System.
- VIII. Motor Fuel and Substitutes for Petrol.
- IX. Roads and Motor Taxation.
- X. Economic Radius of Mechanical Transport and Co-ordination with Existing Transport.
- XI. Post-War Developments.
- XII. Conclusion.

Table 1—Estimated Costs of Operating Motor Transport in Victorian Mallee.

Table 2—Operating Costs in Great Britain from "Commercial Motor" Tables, March, 1930.

I.

1. The term "Mechanical Transport" is normally applied to self-propelled vehicles capable of travelling on roads or over roadless country accessible to these vehicles; it is therefore intended to confine this paper to a brief survey of the development of road motor transport and some of the many economic problems which this has brought in its train. Railway, tramway and air transport, although essentially mechanical, have therefore been excluded, also it is not proposed to deal with the technical details of the many improvements that have been made from time to time in design of engine or chassis during the evolution of the modern types of motor vehicles, but rather to touch upon what may be considered as the most important developments in the various stages of its existence and the effect of these in regard to the economics of transport.

2. Mechanical transport, together with the industries which have sprung up to meet its requirements, have grown with such remarkable rapidity in the last twenty-five years that it now occupies a foremost position in the trade of the world, and it may be of interest to consider first of all the early history of the attempts to produce the "horseless carriage" which now plays such an important part in our everyday life.

II.

3. *Steam Road Locomotives.* The idea of a carriage without horses was talked about and toyed with by many inventors, including Sir Isaac Newton, ever since James Watt's discovery of the properties of steam. One of the earliest practical attempts, and probably the most historical example, was a steam-driven carriage produced by a French engineer, Nicholas Cugnot, about 1769. This was a cumbersome three-wheeled vehicle, which stopped every fifteen minutes to get up steam, it carried four persons, and could do $2\frac{1}{2}$ miles per hour. Unfortunately, it took "the bit between its teeth" and ran through a wall in Paris on its first public trial, which wrecked it. Cugnot's next attempt was a steam tractor built in 1771 as an artillery tractor for the French Government. It was supposed to be capable of hauling $4\frac{1}{2}$ tons at $2\frac{1}{2}$ miles per hour, but was never actually used. It is still preserved as an exhibit in the Paris Science Museum (*Conservatoire des Arts et Metiers*). It is of interest to note here the early connection between the development of mechanical vehicles and the requirements of military transport in various countries, which have provided a stimulus for the inventor and designer ever since Cugnot built his artillery tractor. About 12 years later experiments carried out by two English engineers named Murdock and Trevethick resulted in each producing a working model of a road locomotive. It was not until 1825, however, that any attempt was made in England to develop this new form of transport into a practical commercial proposition. About this time, and within a few months of each other, Sir Goldsworth Gurney and Walter Hancock produced steam propelled buses, which ran on several routes around London with varying success for about 12 years. Hancock's coaches were required to pay a toll of £2, as compared with 3s. charged for stage coaches. Present-day motor owners and harried bus proprietors will agree that little progress has been made in this respect during the last 100 years. The introduction of railways and the hostility of the stage coach interests finally proved too much, and further development was stopped for nearly 60 years. During this somewhat dormant period mechanical transport was employed in the Crimean War, when steam tractors were used for hauling heavy artillery, which is the earliest recorded use for military purposes. Two Fowler steam tractors were used by the German army in the Franco-Prussian War. These weighed about 20 tons each and were successfully

operated throughout the campaign. The Russians also had twelve tractors in use during the war with Turkey in 1878, all of which worked well. It will be noted that these early self-propelled vehicles were driven by steam and were improvements of the "portable" agricultural engine. Gearing was first added, which enabled it to propel itself from place to place, and later on a form of steering, which turned it into an independent road vehicle.

4. *Gas Carriages.* During the latter half of the last century many inventors were working on the production of a "gas carriage," and many claims are put forward as to which was the first successful forerunner of the modern motor car propelled by an internal combustion engine. Two of the first internal combustion-engined cars were constructed by a German named Markus about 1860, and Lenoir, a Frenchman, in 1862. These were very crude, however, and little practical use was made of the development. During the 'eighties Edward Butler produced two or three vehicles of interesting design, but was so much handicapped by severe highway laws of the "red flag in front" type that no commercial development was possible. Butler's car was fitted with 32-inch wheels shod with solid rubber tyres, and for steering made use of what is now well known as the Ackerman principle, which is the normal system used in modern cars. It was also fitted with the first float-feed carburettor and was capable of a speed of four to twelve miles an hour. In Germany, Daimler produced a vehicle driven with benzine which has been claimed as the first of the modern motor cars. Under the encouragement given to inventors in Germany and France others, whose names are now famous in the motor trade, soon followed Daimler's car. Benz, in Germany, and Levassor, in France, produced cars using gas engines of the slow running type with a speed of about 700 revs. per minute. Count De Dion and M. Bouton produced the first engine of the high speed type; this worked at 1500 revs. per minute, thus obtaining a greater power output in relation to weight. Many other car builders, both in Europe and America, began to construct their first models about this time. Of these, the one who realized most the great commercial possibilities of the motor car was Henry Ford, who constructed his first "gas buggy" in 1893.

5. *The Racing Era.* During this early phase of its development the motor car was regarded more as a toy or hobby, and later as a luxury, than as a commercial proposition or new

means of transport. The greatest object of motor builders was to produce a car that would race any other. Races, demonstrations and reliability trials with steam cars, electric cars and petrol-engined cars all helped in gaining experience in design and educating the public to the new means of propulsion. The remarkable improvements made in securing speed in those early days are interesting. In 1898 an electric car attained a speed of 39.24 miles per hour over a flying kilometer; the following year a record of 65.79 miles per hour was established. In 1902 a steam car at Nice was driven at 75.06 miles, which was later in the year beaten by a petrol car, which held the record until 1906, when a Stanley steam car beat it with a speed of 127.5 miles per hour. In 1909 a Benz petrol driven car obtained a new record of 140.9 miles per hour. This racing era was a passing phase in motor development, and from 1909 onwards manufacturers began to realize the commercial possibilities of mechanical transport, and with the experience gained in materials, design and construction were able to settle down seriously to meet its requirements.

III.

6. *Internal Combustion Engine.* The internal combustion engine embodies the practical ideal of giving the greatest power in the smallest amount of space and weight and at the smallest expenditure of fuel. Its development has undoubtedly been the principal factor in the success of the modern motor vehicle. The fact that so much power can be obtained from a small I.C. engine is due primarily to the use of fuels of high calorific value, such as petrol, which enable the expansion of gases due to explosion and heat of combustion to be directly applied within the engine itself to power production. These fuels vaporize at ordinary temperatures, and when mixed with air in the proportion of about 1 to 20, can be exploded by a spark and converted to an enormous amount of mechanical energy. The I.C. engine is designed to utilize as much of this energy as possible and run at a much higher speed than any other type of engine. Its development from the early one cylinder engine, with its unreliable feed and ignition, its crude lubrication and cooling systems, to the present-day six and eight cylinder types of wonderfully efficient design, forms an interesting technical study.

7. *The Steam Engine.* Although the petrol motor is by far the most widely adopted for mechanical transport, the above-

mentioned types, by reason of their special characteristics, are also utilized where the nature of the work gives the necessary scope for their employment. The steam vehicle was the earliest form of mechanical road transport, and up till 1907, long after the introduction of the petrol motor, led the way for heavy haulage and commercial transport generally. Where good supplies of suitable fuel and water are available they are still used for certain classes of heavy work, but have the disadvantage of greater gross weight than the internal combustion engine. They are extensively used in Great Britain, which is the home of the "Steamer."

8. *The Petrol Electric Vehicle* is used mostly in the field of passenger transport, and to a small extent for special types of vehicles. With this form of propulsion a petrol motor is used to drive a dynamo, from which the current is generated and carried to one or more electric motors which are connected with the driving axle. Electric equipment of this type is more expensive and heavier than mechanical transmission, but has the advantages of smooth running, greater silence in operation, simplicity of control and less wear and tear on tyres and chassis.

9. *The Electric Battery Vehicle* is dependent upon convenient charging stations for renewing its energy and thus has a very limited sphere of action. For city work, where short runs, moderate speed, congested traffic and a great deal of stopping and starting occurs, the electric vehicle is economical and is often employed for city delivery, transport of fragile articles or as small electric trucks for factory use. It is very simple of control and reliable, it has a smooth drive and accelerates rapidly. Its construction is simple, and it thus has a longer life than other mechanical vehicles. Its main disadvantages are weight and useful life of storage batteries, and necessity for frequent charging, limiting the load, and the distance it can run.

10. *The Semi-Diesel, Diesel and Diesel Electric Engines* have been developed principally in Germany in recent years. These types have been constructed in a size and weight suitable for use with a 3 to 5 ton lorry, which is a considerable achievement in design. The very high compression required to secure ignition of the atomized fuel in the chamber necessitates a heavy, strongly-built engine, which renders the Diesel type unsuitable for a light vehicle. The Diesel engine burns a cheaper fuel, a crude oil, which at present can be obtained for about 5d. per gallon in Australia, and also uses it more economically than the

ordinary internal combustion engine. In 1928, under the supervision of the Mechanical Transport Committee Development and Migration Commission, a Diesel type 5 ton lorry with full load ran from Melbourne to Castlemaine and return, 150 miles, at a fuel cost of 5s. 2d., compared with a fuel cost of a petrol vehicle of similar capacity of £2 15s.

IV.

11. It will be convenient under this heading to touch briefly upon some of the main improvements in design and construction which, in addition to the introduction of the internal combustion engine, have contributed largely towards the rapid growth of mechanical transport since the beginning of the century. The rapidity of this growth may be judged from the fact that at the beginning of 1900 there were 11,000 motor cars in the whole world, and in 1928 the total motor car registrations were over 29½ millions. Prior to 1910 it may be said the motor car was regarded more as a novelty, or at least a luxury for the rich, rather than an ordinary means of transport. Commercial motor vehicles were comparatively little used up to this time. In 1910 Great Britain had the greatest number of motor vehicles in use in Europe, and France led the way as regards production. Heavy taxation on vehicles and fuel in Europe hampered any rapid growth of mechanical transport. About this time American manufacturers began to invade the market with vehicles selling much below the European car, the reasons for which will be dealt with later. This rapid growth and popularity of the motor vehicle may be traced in a large measure to the great improvement in design and construction which took place from year to year. Considerable progress was made with materials of all kinds, the hardening of steel, alloys of steel and aluminium enabled lighter and stronger parts to be utilized in construction, greater efficiency in engine speeds and power, improved lubrication, cooling and feed systems, ignition, transmission and steering gear, all helped to make the car more reliable, efficient and speedy. The introduction of electric starting and lighting systems marked a considerable advance; the first complete system was brought out about 1912 in America. The improvement in design and power of brakes has made for greater safety, and the comparatively recent development of the four-wheeled brakes was a necessary counterpart of the increased power and speed of the present day six and eight cylin-

der cars. Of all these improvements probably the next in importance after the introduction of the light internal combustion engine was the adoption of the pneumatic tyre. The early motorist's idea of speed was largely influenced by the law, which required a man carrying a red flag to precede every mechanically propelled vehicle. Consequently, it was not until this law was abolished that the inefficiency of solid rubber tyres became apparent. The famous Dunlop firm first made commercial use on bicycles of air-filled tyres, the invention of R. W. Thompson, of Edinburgh, in 1845, and later adopted the same idea for motor cars. In 1900 Michelin Coy. in France produced the first satisfactory tyre by employing a much heavier form of construction and using the Clincher principle for the cover. Improvements in fabric and treatment have greatly increased the reliability of tyres, so that manufacturers are now able to give a guaranteed mileage to every cover. The recent development of the giant pneumatic and low-pressure balloon tyres has enabled load-carrying vehicles to attain a much greater speed and higher gross load with less wear and tear to roads and vehicle.

12. The types of cars in use have varied greatly with the gradual introduction of improvements in manufacture and the effect of taxation or fuel restrictions. When the car was regarded as a luxury for the richer classes, the types of car necessary to meet their taste were built, the price corresponding to these conditions of manufacture. The American manufacturers, by improvement in production methods and unhampered by necessity for fuel economy and horse power taxation, produced a cheap, reliable car complete with new devices and attractive fittings. This competition forced English and Continental makers to attempt to lower the cost of motoring by producing the light types of car of 12 h.p. and less. The motor cycle has always been most popular in Great Britain, owing to its cheapness in first cost and running expenses. The motor cycle and side-car, together with the "light car" and the more recent "baby car" of the well-known "Austin" type, have enabled many people who could not otherwise afford a motor car to participate in the advantages and pleasures of cheap road transport. The effect of this movement by road has given serious concern to Railway authorities all over the world, who are faced with keen competition between the motor vehicle and the railway passenger and freight services. On the other hand, a remarkable revival has taken place, on traffic routes and tourists'

resorts, of the country hotels which had almost ceased to cater for travellers since the old stage coach days. The taxi-cab also has now taken the place of the old horse cab and provides a convenient and rapid means of transit in the cities. Recently in England and on the Continent two-seater side-car combinations have been introduced and charge much lower fares than the ordinary taxi.

V.

13. The term "Commercial Motor Vehicle" is commonly used for all types of vehicles employed exclusively for business purposes. It was not until after 1910, however, that the mechanical vehicle was seriously regarded for commercial work. In fact, its early unreliability had brought a certain discredit upon it, which took some time to overcome in the business world. It is interesting to notice that in England some of the first road motor services established 20 years ago were operated by the principal railway companies as feeders to their railway systems, carrying passengers, parcels, mails and goods. In England and certain of the European countries the use of motor lorries suitable for army purposes was encouraged by means of a subsidy system. Under this system an annual grant was made to owners of light lorries carrying 30 cwt. to 2 tons, and medium lorries of 3 to 4 tons capacity, whose makers fulfilled the specifications laid down by the various War Departments. In Great Britain particularly, this induced British manufacturers to produce a sturdy, reliable and efficient vehicle, which has well stood up to the tests of heavy service in the Great War. Early in its development the importance of the motor vehicle for passenger transport was recognized, and from 1910 onwards the growth of a network of motor coach and bus services began, which now connects every town of any importance in America and Europe. Long distance motor services, including night travelling coaches with sleeping accommodation, are in active competition with the railway systems. The vehicles used to operate the services between the more important provincial towns in England, on the Continent and America, carry from 20 to 35 passengers, are most comfortably fitted, and run on giant pneumatic tyres up to 30 miles per hour with the utmost reliability. The use of the motor bus for city and suburban traffic was one of the earliest commercial applications of mechanical transport and has since proved a serious competitor to tramways and suburban railways. The bus has certain advantages,

as the bus routes are flexible and can be changed or increased without expense, also a bus has greater mobility, as it can steer in and out of traffic and cause less interference with other traffic in busy congested streets. In the country new areas have been opened up for settlement and the village has been connected with the market town by means of the smaller bus carrying passengers and parcels. A feature of the bus traffic in rural areas in America is its assistance in regard to education. Children in sparsely populated districts are collected by bus daily and carried to central schools. In 1927, 32,800 school buses transported 875,400 children daily. The estimated number of buses then in operation in the world was 191,410, of which only 936 were running in Australia, a possible indication of the effect of restrictive legislation when this is compared with 1,772 in New Zealand, 2,008 in Ceylon, 2,077 in Philippine Islands, 21,000 in Great Britain, and 80,000 in America, to quote some of the smallest and largest users.

14. Commercial vehicles for goods haulage and many other purposes for which particular types of motor vehicles are now built began to develop after the passenger services were well established. Steam vehicles for transporting heavy loads were first operated, as the heavy capacity vehicle showed more clearly the economy of mechanical traction, but in the case of the smaller load on short runs, such as for delivery work, the early motor vehicle showed little advantage in the matter of cost as compared with horse vehicles. A great impetus was given to mechanical transport by the demands of the last war in all belligerent countries and in America by reason of its production of vehicles to supply the needs of the Allies. The strain on the railways during the war rendered them inadequate to meet the whole of the transport demands of the nations concerned, and the utilization of mechanical transport supplementary to the railway systems established a place for it which has since grown tremendously. Reliability, low prices of vehicles, extended adoption of the "hire purchase" system, convenient distribution of fuel, speed and flexibility of motor services, door-to-door delivery, reduced costs of handling and packing, individual responsibility and absence of pilfering, are some of the many factors which have been largely responsible for the rapid growth of mechanical transport in all countries. These cannot, however, entirely account for its phenomenal increase during the last few years, but it is the general realization of the advantages of motor transport and the fact that it is an economical

and paying proposition. The following statistics assist one to realise how great this development has been. In 1905, in U.S.A. there were 600 motor lorries registered; in 1910 this had grown to 10,000 lorries, 1920 over 1,000,000 were registered, and in 1928 over 3,100,000. In Great Britain in 1911 there were 53,000 commercial motor vehicles, in 1922 the number of registrations had grown to 237,000, and in 1928 this had reached nearly 500,000. In Australia the rapidity of this growth is indicated by the registrations of motor vehicles of all kinds. In 1921-22 this amounted to 139,000, and in 1927-28 had increased to 565,000, a density of one motor vehicle to every eleven persons.

15. The types and the capacity of motor vehicles vary largely and depend upon the nature of work performed. Statistics show by far the largest number are of the light van and lorry type of chassis with a capacity of about one ton and under. In America and Canada 77.7 per cent. are in this class, 17.4 per cent. in the 30 cwt. to 3 ton classes, and vehicles of 5 tons and over only amount to 3.5 per cent. The use of specially constructed bodies and mechanical handling appliances of all kinds have served to render such vehicles indispensable to the modern contractor or municipal and other authorities who require these facilities. The introduction also of the container system and the use of trailers has assisted greatly in the transfer of goods from road vehicle to railway or ship.

VI.

16. The numerous service stations, maintenance and repair garages and workshops are a development of the motor industry which has spread very rapidly in the last few years. In every town and village wherever the motor vehicle operates the village blacksmith and his smithy have become the village mechanic and his garage, but from experiences in several countries it is doubtful whether the skill of the smith has been passed on to his modern successor. The village also has changed, and in the older countries particularly has lost much of its old world charm and peacefulness by the advent of the motor and the glaring advertisements which direct the motorists' attention to the value of some fuel, lubricant or superiority of one garage or another. A well-organized system of service and maintenance is, however, an essential part of any motor transport system. Where a fleet of vehicles is operated by one firm or under one authority, maintenance repairs and replacements are usually carried out

in one or more central workshops, whilst running repairs are dealt with in the various depots where the vehicles are garaged. A system of regular inspection and the keeping of suitable running records for each vehicle is a necessary part of the organization. For the small owner this part of his business is no less important than in the case of a large fleet if running costs and depreciation are to be kept as low as possible. The motor vehicle ceases to contribute towards profit as soon as it is laid up in the repair shop, although its standing charges continue; the time spent on repairs and overhauling must therefore be reduced to a minimum. A recent development permits of major parts requiring repairs to be replaced by a complete unit, and enables the vehicle to continue running. Many owners of large fleets, such as the London General Omnibus Coy., have their vehicles specially designed to enable such units as the engine, or the gear box, which may need repair, to be unbolted and removed completely from the chassis on a secondary frame run on castors. It is then replaced by a spare unit, which greatly simplifies repair work and reduces the time the vehicle is laid up. Many manufacturers have paid considerable attention to designing their vehicles, so that parts are easily accessible for replacement. The practice of standardising parts, the distribution of spare parts and the provision of service for each vehicle through numerous agents has now developed as a normal custom for practically all makers. There has been a growing tendency towards specialization in repairs during recent years, various workshops concentrating on a particular type of repair work, such as electrical equipment, radiators, cylinder boring and gear cutting, tyres, etc. This development is the natural outcome of improved factory methods and standardization, and certainly increases the efficiency of repair work.

17. *Motor transport costs* are usually considered under two heads, i.e., standing charges and running costs.

The *standing charges* are those items of expenditure which are calculated on an annual basis, whether the vehicle is in continuous use or not. Those normally included under this heading are—

- (a) Interest on capital cost of the vehicle.
- (b) Depreciation (usually calculated on basis of estimated life, less tyres.)
- (c) Insurance.
- (d) Proportion of overhead costs, administrative and other expenses.

- (e) Licence, registration fee or other vehicle tax.
- (f) Drivers' wages.

The *running costs* are those incurred whilst the vehicle is actually running, and increase or decrease according to the mileage. These costs include:—

- (a) Fuel.
- (b) Lubricants.
- (c) Tyres.
- (d) Repairs, maintenance and overhaul.

Although one shilling per ton mile is often quoted as the cost of motor transport in Australia no fixed amount which is applicable to every case can be given. Both the standing charges and running costs will vary greatly according to the type of vehicle used, the nature of the work performed, long or short haulage, average speed, condition of the roads and gradients, time occupied in loading and unloading, amount of back loading, efficiency of repair and maintenance organization. It is therefore apparent that all these circumstances must be taken into consideration in regard to each case before an accurate estimate of the ton mile cost of any motor transport service can be arrived at. The decrease in motor transport costs during the last few years has been a big influence in the rapid growth of commercial motor services and has contributed in no small measure to the increased competition with railways, as a wider range of freight can now be economically transported greater distances by the motor vehicle. A table showing present-day motor costs applied to the transport of wheat over unmade roads in the Mallee country of Victoria, and obtained from special trials carried out by the Mechanical Transport Committee of the Development and Migration Commission, has been attached as an appendix, also as an example under extremely different conditions, a table of operating costs in Great Britain.

VII.

18. The improvements in methods of production and marketing of the motor vehicle have placed it within reach of a very large proportion of the population in the more developed countries of the world where high wages generally ruling admit the wage earner as a prospective car owner. As early as 1909 Henry Ford announced that he intended "to build a motor car for the multitude"; and the Ford Company set out to re-organize

their factory to produce this car, "to be constructed of the best materials available, after the simplest design, and so low in price that any man making a good salary would be able to own one."¹ The Ford Company thus pioneered a movement which was later adopted generally in America with considerable success by the motor industry. During the war the importance of mass production in practically all classes of manufacture was very soon apparent in the increased output and reduction in costs possible under such conditions. Since the war these methods have been developed to a remarkable extent in the motor industry and have been greatly assisted by the standardization of parts commencing from the screw thread and working up through various parts of the car and its accessories. The British Engineering Standardization Committee and the United States Society of Automotive Engineers and similar technical bodies in Europe have carried out a great deal of valuable work in this direction, and there is a tremendous field still to be covered. Mass production of parts of the engine and chassis and the assembly of these parts in properly organized and equipped assembly shops has been the means of lowering the cost of the motor vehicle very much. Whilst this practice has been widely adopted by manufacturers in America, comparatively few firms have embarked on production on a similar scale in Great Britain and the Continent. Such firms as the Morris and Austin in Great Britain, the Citroën, Renault and Fiat companies on the Continent, in the manufacture of their light types of car have adopted most up-to-date mass production methods, although possibly on a smaller scale and on rather different lines than the large firms in America. There is still a great number of buyers who require a car differing from the cheaper mass produced types, and for this market many smaller firms still specialize in providing the racing and sports cars, or the larger, more powerful and expensive chassis. The cost of body building has similarly been reduced by mass production methods of manufacture. This was first made possible by the use of pressed steel sheets, which were utilized in the ordinary touring body from about 1915 onwards, and more recently with the closed type of body, which has largely superseded the open car.

19. The "Hire Purchase," or time payment, system by which motor vehicles may be obtained on payment of a percentage of the capital value as a deposit and the balance paid off on

1. From *My Life and Work*. Henry Ford.

such terms as may be arranged with the selling agent is an important factor in the universal ownership of motor cars amongst all classes. This system of purchase has become widespread in recent years, owing to the keen competition between agents to keep up sales of new cars. It has opened up an extensive market with far-reaching, and in many cases unsatisfactory, economic effects, particularly in regard to encouraging innumerable individual owners to commence a small transport service in an already well-supplied area.

20. Two other problems which are due, primarily, to the growth of motor transport might be conveniently touched upon here. Firstly, the gradual elimination of horse transport and the consequent decline in the number and quality of horses of all types, but particularly those suitable for riding, driving and light transport duties, such as may be required for army purposes. In Australia between 1911 and 1914 there was an increase of some 250,000 horses of all classes, but from 1914 onwards this has been converted to a considerable decrease, which has averaged 67,000 per year for the last 4 years, or 400,000 fewer horses in the Commonwealth since 1914. The Indian Army buyers for the first time last year were unable to purchase their requirements, owing to the lack of suitable types of horses for the Army, thus we are losing a valuable export trade, whilst building up a large adverse import balance by the growth of motor transport.

21. The other problem refers to the congestion of traffic caused by the increased use of motor vehicles in the large cities, together with the attendant difficulties of traffic control, parking and street accidents. Prior to the general adoption of the motor car the bulk of passenger traffic was carried on tramways, railways or buses, and by this means each passenger occupied a minimum of street space. With the advent of the car as a popular means of transport, generally carrying only 1 or 2 passengers, it has been found that there is not enough street space to go round, and the consequence has been a tremendous congestion of vehicle traffic, particularly in the older cities, where narrow streets are the rule. The handling of this traffic demands a specialised study to deal satisfactorily with all its phases, and at the present time provides one of the most difficult conditions to be overcome by the municipal and traffic authorities of the great cities throughout the world.

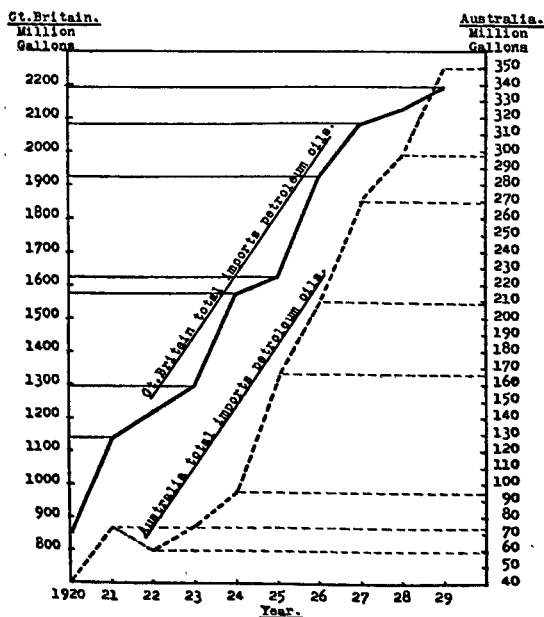
VIII.

22. An indication of the growth of mechanical transport may be found in the statistics of production and consumption of oil fuels throughout the world.

Production (Millions of Gallons).

1900	1910	1920	1928
6,262	13,763	28,929	55,557

The growth of oil fuel imports in Great Britain and Australia, as typical of the large importing countries, is shown in the following graph:—



Countries without natural oil supplies are at a grave disadvantage, both physically and economically, as not only does the importation of vast quantities of fuel oils tend to create an

adverse trade balance, but it is liable to be a serious source of weakness in the event of interruption of supplies on account of war or trade disturbances. This fact is amply illustrated in the case of countries such as Great Britain and Australia, who are almost entirely dependent on outside sources for their supplies. In 1928 Great Britain paid out £43,437,000 to meet the country's oil fuel bill, whilst Australia paid some £8,000,000. The value of petrol as a fuel for the I.C. engine was first realized by early inventors in the last century, such as Butler and Knight in England, and Daimler, Markus, Lenoir and Benz on the Continent, and it may be said that petrol, which at this time was a waste product of paraffin, has made the I.C. engine practicable for locomotive purposes. The exploitation of the oil fuel resources of the world has therefore been largely due to the tremendous demand for fuel for the I.C. engine in its many activities. The struggle for oil which was set going by these early inventors provides one of the most thrilling stories in history, and is undoubtedly one of the great political factors in the world to-day. During the Great War campaigns in Mesopotamia and in the Balkans were fought largely for the protection of oil resources, which were of vital importance to both sides in the conduct of the war. A very important factor in the development in motor transport, both for pleasure and business, has been the vast organization of a network of petrol supply facilities. The efficient system of bulk storage and distribution which has in recent years been thoroughly organized in every country by the petrol supply companies, ensures that retailers have a sufficient supply of fuel on hand, even in the most remote localities. In fact, "the village pump" has become a petrol pump the world over, and it would seem that with 29,000,000 motor vehicles all using petrol the demand must soon outrun the supply.

23. *Development of Substitutes for Petrol.* Fuel must have the following properties in order to satisfactorily fulfil the requirements of a motor spirit:—

- (a) Contain a large amount of energy.
- (b) Volatile enough to vaporize quickly at ordinary temperatures.
- (c) Reasonably free from tendency to "knock."

Petrol made from petroleum oils possesses all these qualities to a greater extent than the majority of its possible substitutes. The disadvantages suffered by countries without natural supplies of oil fuel have caused extensive research and experiments in

regard to substitutes for petrol. During the war use was made in England of large containers filled with coal gas and carried on motor vehicles. With these some 400 cubic feet of gas under pressure carried a vehicle about 13 miles at a cost of .85 pence per vehicle mile. The distillation of oils from shale and coal and the production of benzol have so far only a limited commercial success in Great Britain, but extensive research is being carried out by the British Fuel Research Board and private companies.

24. In France a great deal has been done with the use of producer gas equipment or the gasogene, using wood, charcoal or carbonite, as fuel. Extensive trials and demonstrations are carried out each year, and several very successful types of gasogene have been produced. Vehicles thus fitted receive a substantial subsidy from the Government in addition to a remission of vehicle taxes. Although only about 75 per cent. efficiency is obtained from producer gas as compared with petrol, the lower fuel cost in countries where petrol is dear is of considerable importance in reducing running costs. Experience gained by the Mechanical Transport Committee with producer gas equipment provides the following data:—Producer gas requires a higher compression ratio than petrol, and the I.C. engine must be designed accordingly or altered to meet this requirement in order to function efficiently. The charcoal consumption is approximately .5 lbs. per gross ton mile and one gallon of petrol equals from 13 to 16 lbs. of charcoal. With charcoal at £3 per ton and petrol at 1s. 10d. per gallon, the fuel costs per 100 gross ton miles are 1s. 4d. for charcoal and 5s. 9d. for petrol. The engine takes 5 to 10 minutes to start from cold, but each vehicle is usually fitted with a carburettor to enable it to start up on petrol. There is without doubt a large possible field for employment in inland areas in Australia where wood is plentiful and petrol expensive.

25. In Germany and France also, a considerable development has taken place in the production of fuel oils from coal. Two processes seem to offer the best commercial results—a low temperature carbonization and the process of hydrogenation. The British Fuel Research Board has experimented with these processes, and the Council for Scientific and Industrial Research in Australia is closely in touch with their development throughout the world. The commercial possibilities of each in regard to the utilization of Australian coals is also being considered by

a special Committee of the Development and Migration Commission.

26. *Power Alcohol.* The production of power alcohol from molasses has been carried out for some time in Queensland. The total amount of alcohol, however, that could be produced from this source is very small compared with the total fuel requirements for Australia. Whilst many other suitable materials could be used for its production the difficulty of obtaining supplies in sufficiently large quantities makes it doubtful whether production on a large enough scale to be effective could be entered upon.

27. *Benzol.* This is another possible fuel which has been produced in certain quantities in Australia. In 1926-27 the Broken Hill Pty. Ltd. produced about 1½ million gallons at their works at Newcastle. A certain amount of additional production might be possible if various coke plants were equipped for by-product recovery. It has been estimated that it would be possible to recover some three million gallons of benzol from gas works in Australia if they were equipped with the necessary plants. The costs of production, however, are such that it is doubtful whether recovery of benzol can be regarded as payable commercially, unless the market value is above 2s. 3d. per gallon. The use of crude oils in Diesel type engines for commercial purposes suggests a possible reduction in the present fuel bill, although this would not lessen our dependence on overseas oil supplies. The production of oil from the shale deposits in Australia has been tried in N.S.W. and Tasmania. At Newnes, in N.S.W., some 25 million gallons were obtained by the Commonwealth Oil Corporation during eleven years' work, but this plant was forced to close down, notwithstanding a bounty of 3½d. per gallon of crude oil produced. The oil shale deposits at least form a reserve of potential fuel to which we may turn in case of necessity, and production from this source may become a commercial success if costs can be reduced.

IX.

28. Quite early in the development of the motor transport it was found that an essential complement to the vehicle was a good road surface. The ordinary macadam road, which stood up quite well to the slow moving horsed vehicle, soon broke up under the strain of an increasing number of fast motor vehicles, and the normal repairs carried out with stone or gravel were quite insufficient to meet the new conditions. In England,

which was one of the best roaded countries, the dust nuisance in summer became intolerable, and the first Road Board established in 1909 set to work to produce a dustless road surface. A year or two later a considerable mileage of main roads in the vicinity of towns and villages had been treated with tar or bitumen. The revenue from motor taxation for the first year of the Board's existence was £750,000, and in 1928 it had risen to £25,500,000, whilst the expenditure on roads in that year amounted to £56,250,000. In the same year America spent £52,500,000 on her State highway systems, and in Australia the central roads authorities spent £10,000,000 principally on main roads. Motor transport can only operate at its greatest efficiency where suitable road surfaces are provided, and the story of road improvement in England illustrates what is taking place in every other country where the road motor is used. The motorist realizes that road improvement more than pays for itself in the form of lower transport costs, and that special taxes for improvement and maintenance of the road system are necessary. In addition to the suitable surfacing of roads, attention has also been paid to the improvement of grades and curves, so that reasonable speeds might be maintained. After the general improvements introduced by the two great road engineers, Telford and Macadam, road building became a more or less haphazard business left almost entirely to local municipal bodies, where, especially in country centres, they were generally unable to pay an expert technical staff to plan and supervise. This caused very little concern whilst local movement by horsed transport was the only factor to be considered, but the increased motor traffic called for urgent reforms, both in road making and road administration. The result has been that the great national main roads or highways have been taken over by special administrative bodies equipped with skilled road engineers and expert road administrators. The establishment in Australia of the various State main road authorities and their organization illustrates the action taken in most countries to meet the new conditions.

29. Two systems of taxation of the road user are generally employed:—

- (a) Vehicle Tax.
- (b) Petrol Tax.

These usually take the form of licences, registration fees based on seating, laden or unladen weight and horse power,

customs duty and fuel tax. It is an important principle that motor taxation should be levied, primarily with a view to providing funds for the construction and maintenance of roads required for the operation of motor vehicles. The U.S.A. collected approximately £162,000,000 in motor taxation in 1928, which works out at an average of £6 11s. 11d. per vehicle, as compared with the £1 per horse power tax on motor vehicles in England, with the addition of the petrol tax. This system is an example of taxation which definitely effects the design of motor engines to the detriment of trade outside the country.

In Australia in 1927-28 £3,620,000 from motor taxation was collected, an average of £6 8s. 0d. per vehicle, which does not include the Federal petrol tax, from which source £1,630,000 was obtained for road purposes.

X.

30. The radius of action most suitable for the employment of mechanical transport may be said to commence within a $1\frac{1}{2}$ to 2 miles of the central depot or garage. Under this minimum distance delivery by horsed and electric vehicles is more economical. It is, however, far more difficult to fix a maximum radius, as there are so many varying factors which must be taken into consideration in regard to each case. It may be generally said that the most economical avenue of employment of the motor vehicle is principally in regard to short haulage of approximately 30 miles. Some figures prepared by the U.S.A. Bureau of Public Roads show that in certain States 36.9 per cent. of the tonnage carried by motor trucks was moved from 1 to 9 miles and 30.5 per cent. was transported from 10 to 29 miles. The balance of the tonnage, 32.6 per cent., was carried 30 miles or more, for which lack of sufficient rail service was largely responsible, together with certain types of commodities specially adapted to motor lorry carriage beyond the short haul zone. Whilst this is applicable in one area it does not necessarily apply in another area, and in each case the under-mentioned factors must be taken into consideration in arriving at a suitable radius for the transport of any particular commodity. Nature of the roads, distance between towns and areas of production, the type of commodity to be moved, whether high class freight, perishable goods or low class freight, any considerable bulk handling, the type of vehicle and the loading appliances available. All of these so vitally effect the question of

operating costs that no hard and fast mileage limit can be laid down when assigning mechanical transport to its proper sphere of action.

31. The growth of motor transport for passenger and freight services has resulted in an acute and increasing competition with existing rail systems all over the world. Much has been written and said in recent years about the necessity for co-ordination of transport and the allotment of the road motor to its own sphere of action. In order to adjust this problem many countries have been forced to take steps to regulate traffic with a view to eliminating wasteful competition between rail and road services, and also between existing road services. In Great Britain a Ministry of Transport was created in 1919 with wide powers in regard to all forms of transport, including railways, tramways, canals, roads, bridges, ferries, vehicles and traffic, harbours and docks. In the United States of America the individual States regulate the road motor services within the State and the Federal Government deals with the regulation of interstate road services. Increased power has been given to railway companies in regard to the utilization of motor vehicles as feeders of their systems. On the Continent and in Italy particularly, very strict regulating legislation has been put into operation. Many of these attempts to co-ordinate transport services are merely the first steps to cope with a problem which is growing more difficult as the road motor vehicle is improved and its operating costs reduced. The necessity for co-ordination of the various transport services in Australia has been realized for some time, and certain attempts have been made by legislation to deal with it. Definite action in the form of a co-ordinating authority has not yet been set up with the necessary power to survey the whole of our transport requirements with the object of preventing uneconomical competition and unnecessary growth of either railway or road services for areas already supplied.² A report on the co-ordination of transport services in Australia submitted to the Premiers' Conference in May, 1929, contains some general principles which serve as a useful guide in dealing with the matter. Restrictive legislation and taxation alone cannot satisfactorily solve this problem. The improvements which have been made in speed, carrying capacity, reduced running costs, the general advance in design of vehicles and improvement of roads all tend to increase the economic radius of mechanical transport and soon overcome the disability of

2. *Report of Commonwealth Transport Committee, May, 1929.*

restrictive regulations. It seems that a similar position has developed in the sphere of civil transportation as occurred in France in 1915-16 in connection with the Allied transport services. Each system or link in the transport chain was functioning fairly efficiently as far as its own service went, but the transportation organization as a whole almost broke down through the absence of any co-ordination between the various systems. As a result of the experience gained a "Movement Staff" forms part of the Army organization in war. This staff provides what is really the co-ordinating authority for movement throughout all the transport systems. It ensures that each link in the chain is utilized to the best advantage to meet the demand of troops in front. It would appear that an authority similar to this is also required as part of the organization of commercial transportation.

XI.

32. Reference has already been made to the influence of military needs in regard to mechanical traction, but at no stage in its development has this been more marked than during and since the Great War, when types of vehicles suitable for army purposes and also meeting commercial requirements have been largely experimented with. The technical branches of the War Office in England have worked in closest co-operation with manufacturing firms in evolving new types of vehicles in which good cross country performance is important, as well as adaptability for commercial work. As the vehicles required for the army on mobilization will be those in daily commercial use this latter quality is very necessary and applies particularly in Australia, where we do not manufacture motor chassis and are dependent on the types in the country at the time. With the decline of the horse it is essential for defence purposes that commercial motor users should be encouraged to equip themselves with types of vehicles which, whilst meeting their own requirements, would also provide the army with a suitable type of vehicle on mobilization. The vehicle capable of reasonable movement across country has an immense value in the provision of transport facilities in the less developed parts of the Empire, where tracks and unformed roads render communication and transport of produce a difficult and expensive undertaking. In 1914 the British Expeditionary Force went to France with some 400 motor vehicles, but in 1918 this small organization had grown to 80,000 vehicles. A vast amount of valuable technical

and administrative experience was thus gained in regard to design of vehicles to meet various needs and in the running of large M.T. organizations. Whilst it was inadvisable to alter types in production under the strain of war, the experience gained has since been freely used and made available to makers, the outcome of which has been the following types of vehicles.

33. *Light Subsidy Type Lorry.* Most of the lorries used during the war were of the heavy 3 ton four-wheeled type shod with solid rubber tyres, exerting a high pressure per square inch of contact with the ground. It was proved during the war that vehicles carrying light loads shod with pneumatic tyres could maintain a service in roadless country where the heavy solid tyred vehicle could not go. This led to the production of the War Office specification for a light lorry carrying 30 cwt., with a high power weight ratio and shod with "giant" pneumatic tyres. The development of this type with the War Office subsidy considerably influenced the design of commercial vehicles, and in Great Britain most manufacturers built to the War Office specification, which soon established a reserve of these vehicles in commercial use throughout the country.

34. *Rigid Frame Six-Wheeled Lorry.* Following the success attained with the 30 cwt. vehicle the War Office decided to experiment with a type suitable for accompanying units across country or on the road. The success of the Citroën-Kegresse semi-track and Renault multi-wheeled vehicles in the Sahara directed attention to these, which were tried out and improved upon for use in the army as field artillery vehicles, machine gun and ammunition carriers and for technical units generally. The six-wheeler has met with the widest adoption in the army, and its use in the commercial world is growing. Its particular features are the four rear driving wheels, which are designed to exert their tractive effort uniformly, to follow the rise and fall of the ground without unduly disturbing the distribution of weight over the wheels whilst causing the minimum movement and distortion to the main frame. The advantage of the six-wheeler is its good road performance and correspondingly good cross-country work, for which special "over all non-skid" chains have been adopted. These are easily attachable to the rear driving wheels and give a greater supporting area and tractive effort on soft or slippery ground. Six-wheelers have a subsidiary gear box, which provides a wide range of gears and permits the slow speeds necessary when accompanying troops, without damage to the engine.

35. The recent development of the six and eight-wheeled lorry marks an important advancement in design of load-carrying vehicles, as by this means vehicle design has been adapted for operation over less expensively constructed roads. The six-wheeler has been extensively used in South Africa for the opening up of poorly-roaded and difficult mountain country, and it offers considerable possibilities of similar employment in Australia. The increased load capacity which is made possible in the multi-wheeled type without exceeding wheel load limits, is an important contribution towards reducing costs for developmental and feeder transport services. Vehicles carrying 10 to 12 tons are already in operation, and higher-capacity units, with multi-wheeled trailers, are being experimented with by the Overseas Mechanical Transport Committee in England.

36. *The Semi-Track Vehicle* is fitted with rubber and fabric belts, on which it is driven by a friction or positive drive at the rear end of the belt, the weight being supported by a series of small wheels operating inside the track and sprung on the chassis. The unsuitability of this type for commercial work and their comparatively poor road performance have prevented any very great adoption. An improved track, consisting of rubber-jointed metal shoes, has recently been experimented with which has proved a considerable advance on previous types of track, both for the semi-track and full track vehicles. The use of this new track will do much to overcome many of the difficulties experienced in operating these vehicles. The *full-track type* was developed as the necessity arose for moving heavy guns into position and carrying armoured fighting vehicles across country. Early in the war the "caterpillar" tractor was used, and later the "tank," with its 30 tons weight, was moved across country on a very wide, long and full track. Its speed was only $1\frac{1}{2}$ to 2 miles per hour and the noise of its engine and tracks advertised its approach to the enemy. The tank is carried on a wide metal track driven by a sprocket meshing with teeth inside it, the weight is supported sprung upon a number of small wheels running inside the tracks. The motive power is supplied by a powerful air-cooled I.C. engine, and steering was first done by skidding one track or the other, as these were geared independently. Since the war considerable improvements have been made, and there are now several different types of armoured fighting vehicles with speeds up to 20 m.p.h. across country. The adoption of this track type of vehicle may

be looked for in the future in the form of the heavy capacity road train or for heavy haulage in roadless country.

XII.

37. The part played by various motor organizations, such as the Royal Automobile Club and the Automobile Association in England, also the numerous motor racing clubs, motor shows, automotive industries and engineering institutes throughout the world, cannot be overlooked in any survey of mechanical transport development. A great deal of the progress made in design and construction of vehicles has resulted from the experience gained and research carried out as a result of their activities, also the education of the general public in all countries as to the utility of mechanical transport. The great racing tracks, such as Brooklands and Daytona Beach, where Seagrave broke the world's record with a speed of 231.362 m.p.h., together with such events as the Gordon Bennett race, the Grand Prix in France, and other important international events, are well known throughout the world.

38. Very little systematic research was carried out during the earlier years of the development of the motor vehicle, but since 1910 considerable attention has been given by the Automotive industries to well-established research laboratories. Since the war a great deal has been done by the technical branches of the War Office, and recently an Overseas Mechanical Transport Committee, working in co-operation with Empire Marketing Board, the War Office, Fuel Research Board and the Motor Industry, is experimenting to produce a type of vehicle which it is hoped will considerably lower the cost per ton mile for the transport of produce between less developed areas and the railway system or shipping port. Experiments in this direction are being carried out in an endeavour to obtain a large capacity road train capable of moving at reasonable speed upon unformed roads or tracks without damage to the surface. A powerful tractor and a number of multi-wheeled trailers have already been tried with some success. It is difficult to forecast what development may take place in the future, so many predictions have been made regarding a saturation point in reference to sale of motor vehicles and production of fuel which have not yet been realised that further estimates in this direction serve no purpose. As far as Australia is concerned it would appear that our main attention should be given to the successful

solution of the many economic problems which the growth of mechanical transport has forced upon us. In the next few years without doubt the growth of air transport will be an additional factor to be reckoned with. The production of lower-priced aircraft with lower running costs and larger lifting capacity is being gradually developed which, together with an improved ground organization, will soon enable the air to compete seriously with rail and road, all of which will require co-ordinating if unnecessarily high transport costs through wasteful competition are to be avoided.

J. NORTHCOTT.

Army Headquarters, Melbourne.

TABLE 1.

Comparative Estimated Operating Costs.

Prepared from data obtained from capability tests carried out with six-wheeled motor vehicles operated over unmade roads in the Victorian Mallee.

Assumptions: Vehicles operated 250 days per annum.
Average lead 20 miles.

Item.	2 Ton.	5 Ton.	5 Ton & Trailer Equals 7 Tons.	7 Ton.
Cost Lorry	\$680	\$1,400	\$1,400	\$1,900
" Trailer	—	—	250 \$1,650	
Less Cost Tyres	100 4580	200 \$1,200	280 1,870	300 \$1,600
Scrap Value	100 480	200 1,000	225 1,145	300 1,800
Standing Charges per Annum—				
Insurance	\$16.8	24	26.5	29
Registration	14.1	35.1	36.6	41.6
Interest, 5½ per cent.	35.7	79.6	89.6	100
Administration	20	25	25	25
Garage	25	30	30	30
Driver	286	286	286	286
Total per annum	\$397.6	473.7	\$490.7	\$511.6
Average miles per hour with 1/3rd back loading	16.6	14.9	11.42	12
Gross Ton miles per hour with 1/3rd back loading	62	130	130	130
Driver's Time per day	8 hours.	8 hours	8 hours	8 hours
Running Time per day	6 "	6.7 "	5.75 "	6.6 "
Round Trips in two days	5 "	5 "	5 "	4 "
Useful Ton miles per day, 1/3rd back loading	182	335	280	378
Useful Ton miles per annum	32,250	33,250	70,000	93,250
Standing charge per net ton mile	2.87d.	1.37d.	1.68d.	1.80d.
Operating Costs in Pence per Mile—				
Petrol, 2/6 gal.	2.19d.	7.50d.	9.75d.	9.35d.
Oil, 2/6 gal.	0.48d.	0.48d.	0.48d.	0.48d.
Tyres, 15,000 miles	1.60d.	3.20d.	4.48d.	4.80d.
Repairs, 4/0 per 1,000 miles	2.40d.	2.40d.	2.40d.	2.40d.
Depreciation, 50,000 miles	2.80d.	4.80d.	5.50d.	6.24d.
Total operating cost per mile	9.97d.	18.38d.	22.61d.	23.25d.
Operating cost per net ton mile with 1/3rd back loading	7.47d.	5.50d.	4.35d.	4.93d.
Total cost per net ton mile with 1/3rd back loading	10.34d.	6.87d.	6.53d.	6.29d.

TABLE 2.

Table of Operating Costs of Motor Transport in Great Britain.

Compiled from "Commercial Motor" Tables of Operating
Costs, March, 1930.

Pence Per Ton Mile (Full Loads).

Pence per Ton Mile (Full Loads).									
		Petrol.			Steam.			Electric.	
Load and		4-Wheelers.		R.F. 6 W. 4 Wheel.		R.F. 6 W. Artic 6 W.			
Mileage per Week.	Solid.	Solid.	P.	P.	Solid.	Solid.	Solid.	Solid.	P.
1 Ton	300 ..	—	5.85	—	—	—	—	5.88	5.81
	800 ..	—	3.63	—	—	—	—	—	—
2 Tons	300 ..	4.03	4.15	4.20	—	—	—	3.42	3.42
	800 ..	2.76	2.87	2.91	—	—	—	—	—
3 Tons	300 ..	3.36	3.41	3.61	—	—	—	2.86	2.95
	800 ..	2.39	2.47	2.65	—	—	—	—	—
4 Tons	300 ..	2.99	3.05	3.22	—	—	—	—	—
	800 ..	2.16	2.25	2.39	—	—	—	—	—
5 Tons	300 ..	2.57	2.57	2.72	2.45	—	—	2.21	2.23
	800 ..	1.92	1.90	2.05	1.67	—	—	—	—
8 Tons	300 ..	1.95	1.98	2.09	1.79	—	—	—	—
	800 ..	1.51	1.55	1.64	1.28	—	—	—	—
10 Tons	300 ..	—	—	1.73	—	1.58	1.66	—	—
	800 ..	—	—	1.37	—	1.17	1.11	—	—
12 Tons	300 ..	—	—	1.58	—	1.38	1.44	—	—
	800 ..	—	—	1.22	—	1.03	0.98	—	—

SOME GENERAL PRINCIPLES OF THE ECONOMICS OF ROAD DESIGN.¹

- I. Introduction.
- II. Finance.
- III. Forecasting Traffic Increases.
- IV. Planning.
 - (a) Location.
 - (b) Road Shortening.
 - (c) Gradients.
 - (d) Pavement.
 - (e) Type of Surface.
 - (f) Destructive Agencies.
- V. Bridges.
- VI. Tolls and Franchises.
- VII. Conclusions.

I.

The users of roads nearly always have two points of view: as users, they demand good roads, especially if they have been bogged a few times, and as taxpayers they generally grumble at paying for them. As critics, they divide themselves into two sets; one standing for the highest type of road at whatever cost and condemning the other set, who advocate the road cheapest in cost, irrespective of its usefulness.

The road designer and builder may not rashly accept the opinion of any such critics, but must logically examine the factors which govern likely traffic savings, and cost of construction on each particular project. Belloc, in his *Essay on the Road*—“To find a formula of minimum expense in energy for communication between two given geographical points under given conditions of travel and carriage”—a simple statement of a guiding principle with infinite ramifications.

Mr. D. A. Crawford, in a valuable paper to the Brisbane Economic Society last year, laid down the conditions to be aimed at in the design and construction of the ideal road, which he stated must be “as short, straight, level, smooth and safe as is economically possible.”

Roads may only be economically planned after an elaborate survey of traffic flow, topography, land productivity, etc. Any

1. Excerpts from a paper read before a meeting of Section H of the Australian Association for the Advancement of Science at Brisbane, June, 1930, by J. R. Kemp, M.Inst.C.E.; M.I.E.Aust., Commissioner of Main Roads, Queensland. All sections dealing purely with engineering matters have been deleted.

road project before adoption should be proved to be an economic or social necessity. The degree of improvement should be limited by its profit-earning capacity or social advantage. Costs and benefits must be weighed, and the relation of the particular project to the general road planning scheme of the Commonwealth, State, Town or Shire, considered. The relative importance of any particular project to others must be considered, so that available funds may be utilised in proper order, to best serve the community as a whole. Costs may usually be determined with a reasonable percentage of accuracy, but benefits are more indefinite, and their forecasting requires vision. Social and educational benefits conferred by roads are not easily translated into cash value, but are no less tangible than the purely material values of easy transport of goods and passengers.

Development of new areas is an important function, another being that of feeding existing transport agencies. The Railway man regards the road with jealous eye, and often his point of view is that rural roads should be planned *only* to feed existing established transport facilities, in such a manner as not to depreciate the earning value of the railway. The development of the internal combustion engine and motor vehicle has, however, created a situation which demands that our big centres shall also have good road communication, and whilst the railway point of view may be agreed with in general, it is certain that lack of inter-centre road communication might often-times cause greater community losses than the gains to railways due to their absence. Many branch lines of railway to-day fail to return working expenses, and should be closed, leaving the traffic to roads.

II.

It is not proposed to discuss the equity of any special method of financing road projects.² The general practice of Governments to-day is to place responsibility for local roads upon local authorities, who raise funds by taxation of land, often employing the benefited area system. Roads of more than local interest, or required for the development of the public estate are usually financed mainly by the central governments, and to a lesser degree by the local authorities. In Australia, the Commonwealth raises funds for road construction purposes by means of customs imposts upon petrol and motor vehicles; the States raise road funds by imposing vehicle registration fees.

2. Maintenance methods will not be discussed in this paper.

The Commonwealth distributes its road funds to the States on a basis of three-fifths population and two-fifths area, with a view to specially subsidising road development in the larger and less populous States. Commonwealth subsidies to the State are exclusively employed upon construction, although there is a movement to allow their use upon maintenance work. State road revenues are applied to meet the cost of road administration and road maintenance; to a limited extent in direct construction, and to a great extent in meeting interest and redemption charges on road loans. Whatever the future may hold, the obligations incurred in this latter direction must continue to be met, and, therefore, require estimation for long periods ahead.

The value of developmental roads to the public estate is recognised in some States by contributions from the consolidated revenues to the road funds. In America, it is common practice for the Legislature to authorise bond issues for road construction upon the security of the road revenue. In Australia, Governments authorise local authority borrowing for local roads upon the security of land rate revenues, backed by Government guarantee.

The principles of road finance have been stated in the following terms by Mr. T. H. McDonald, Chief of the United States Bureau of Public Roads (as referred to by the late Mr. Wm. Calder, M.Inst.C.E., in his notable report on his investigations of road problems in Europe and America in 1924).

(i) States in the initial stage of highway development should issue bonds to defer that portion of the annual charge for construction which would overburden either property or the road user.

(ii) States where original construction programmes are well under way can, in the main, finance further expenditure for construction by bond issues devoted to deferring the cost of special projects.

(iii) The maintenance of interstate and State roads should be a charge against the road user.

(iv) States where original construction is practically completed are concerned chiefly with maintenance, and should depend on current funds, except in case of emergency.

(v) Roads serving a purely local purpose will generally require only light upkeep, and this should properly be a charge against the adjacent property, which in this case is the first, and often the only beneficiary.

(vi) No road should ever be improved to an extent in excess of its earning capacity. The return to the public in the form of economic transportation is the sole measure of the worth of such improvements.

The most difficult problem of road economics has been stated in the last paragraph. The building of long lengths of moderately improved road is generally more essential than the building of short lengths of high type road. Whatever method of finance be adopted, whether capitalisation of revenue, pay as you go, or a combination, it is essential that the general road programme shall not be spasmodic. Essential funds for maintenance must be secured over long periods, for the protection of the assets created. Surplus funds only (after providing for administration and maintenance) should be employed on new construction, whether directly or for securing interest and redemption payments on bonds or issues. These considerations involve attempts at long distance forecasts of traffic increases; revenues which can be derived from road users and land owners; maintenance costs, and necessary building programme and costs, in an attempt to prevent over-capitalisation of the road system. The programme, in other words, must be kept within limits, governed by the willingness and ability of the road user and land owner to pay for it.

In U.S.A. there are forty people and one mile of road to each square mile of area, while in Australia there are only 2.1 persons and 1/8th mile of road to each square mile. In America there are thirty motor vehicles per mile of road, and in Australia only 1.5 vehicles per mile. In U.S.A. the annual expenditure on road construction, excluding maintenance, by Federal and State road authorities is approximately £1 per head of population and £39 per square mile, while for Australia the corresponding figures are £1/5/- per capita and £2/15/- per square mile.

III.

An example of forecasting increases in motor vehicles is illustrated in the following notes and diagrams for California, U.S.A. (years 1900 to 1930), (Plate 1) and Queensland 1922/1940, (Plate 2).

Such forecasts are a necessity if Governments are to be advised as to the necessary amount of taxation, since lack of revenue would wreck the road programme, and excessive taxation might force a needless road growth, at the expense of other public utilities, or a reaction against road building.

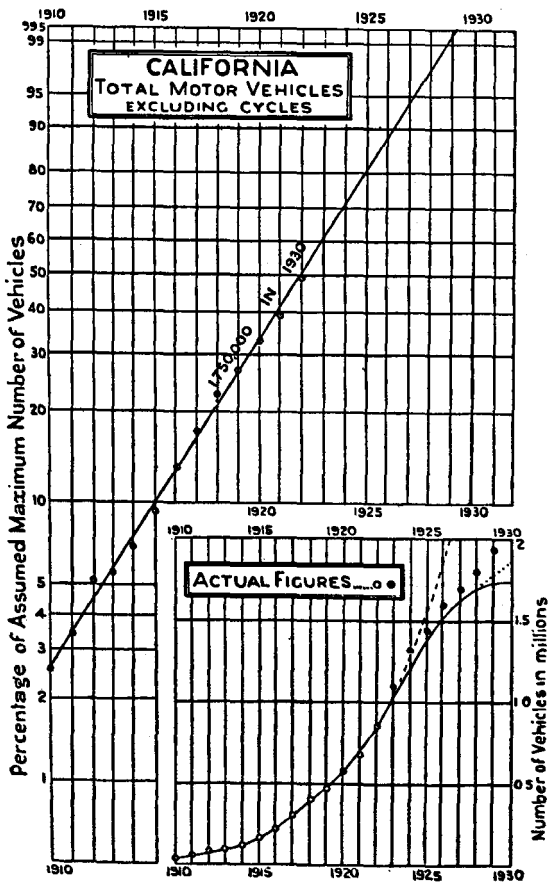


PLATE 1.

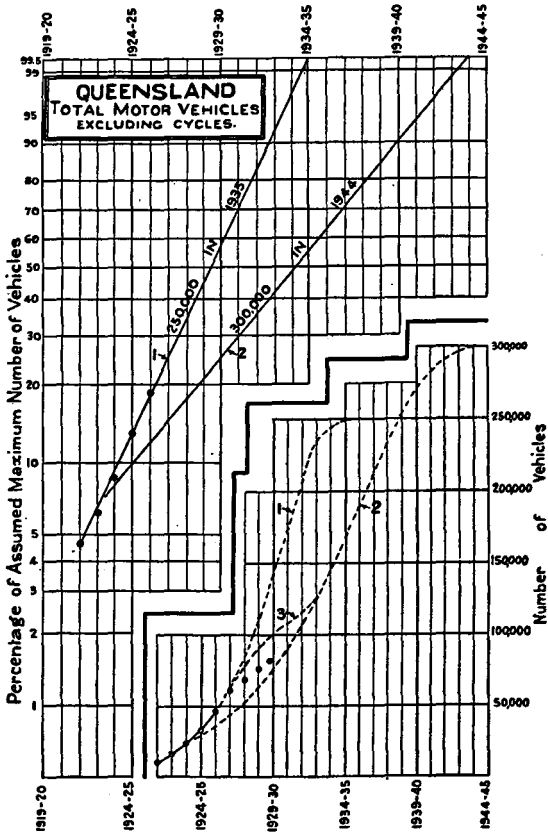


PLATE 2.

The following notes² will elucidate the forecasting method adopted by the Queensland Main Roads Commission:—

When a new commodity of general usefulness, the consumption of which is subject solely to the natural laws of supply and demand, is placed upon a market created by a population which varies only slightly, it is found that, if the number of that commodity in use at any date be plotted on squared paper as ordinates against intervals of time as abscissae, the line joining the plotted points forms a characteristic "S" shaped curve, similar to the full line in the lower figure of Plate 1. The number of the commodity given by the right hand end of the curve represents a condition of saturation when the market is fully supplied. If now the number of the commodity in use at any date, expressed as a percentage of the ultimate total number be plotted against time on skew frequency paper, which is a modification of probability paper, a straight line will be obtained. But if the number be expressed as a percentage of a number which is either greater or less than the ultimate total number, then the points plotted on skew frequency paper will form a curve diverging to the right or to the left respectively of the straight line. If, therefore, we know the numbers of a commodity that were in use at various dates in a market, the ultimate requirements of which have been only partly supplied, we can, by plotting the data on skew frequency paper, obtain a straight line which can be extrapolated to give a forecast of the number of the commodity which will be in use at any date until the saturation point is reached. In applying the principles to motor vehicles, it must be borne in mind that there is no absolute saturation point, since, even when a maximum density of vehicles to population is reached, the steady increase in population will involve a further increase in the number of vehicles in use.

Plate 1 illustrates the application of the method in forecasting the number of motor vehicles in California from the known registration for each year up to 1922 inclusive, shown by open circles. By extrapolation of the straight line in the upper figure, the ideal "S" curve, shown as a full line in the lower figure, was extended to 1930. When the slope of the motor registration curve has decreased until it equals that of the population curve, it can decrease no further, but must follow the dotted line in the lower figure which has been drawn parallel to the curve of population. The filled in circles in Plate 1 indicate the actual registrations since 1922, and it will be

2. Prepared with the assistance of Mr. W. H. R. Nimmo.

seen that they form a curve which generally follows that of the forecasted curve, although at some distance above it.

Any changes in economic conditions which affect the purchasing power of the people or restrict the supply of the commodity, or any new invention or improvement which changes the sphere of usefulness of the commodity, will affect the rate at which the commodity is purchased, and alter the shape of the normal "S" curve. Since 1922 there has been a tremendous increase in the proportion of closed to open cars in California, and this has led to an increase in the number of families owning more than one car, with a consequent increase in the number of registrations. This is probably the explanation of the fact that the actual registrations have been higher than the forecasted figures.

It is evident, however, that the forecast made is far more correct than that which would have been obtained by extrapolating the registration curve on natural paper, as indicated by the broken line in the lower figure of Plate 1.

In applying the method to the number of motor vehicles registered in the Australian States up till 1926, it was found instead of a single straight line on skew frequency paper, the data produced two straight lines having different slopes, and intersecting at the year 1921. The reason for this is that prior to 1921 conditions resulting from the war artificially restricted the supply of cars to Australia, while the high prices also limited the demand. After 1921 the price of cars commenced to fall rapidly in America, and a surplus was available for export to Australia. During the period 1922-26, Australia purchased cars at an accelerated rate to make up the accumulated deficiency of the previous period. Extrapolation of the two straight lines on skew frequency paper accordingly yielded one curve based on the 1913-21 period, giving a rate of increase of cars which was obviously below normal, and another curve based on the 1922-26 period, which was obviously above normal. After a careful study of the data for all the States, a curve was chosen which appears to represent the normal trend that would have been followed by motor registrations, if the abnormal economic conditions arising from the War had not occurred.

Registration figures for Queensland are only available from 1922 onwards, and the straight line on skew frequency paper, and the corresponding "S" curve obtained from them are shown by Curve 1 in Plate 2. Curve 2, Plate 2, represents the probable normal trend of registrations, and it appeared that future registrations must gradually follow some transition,

Curve 3, in order to get back to the normal curve, and a forecast of future registrations was made upon this basis. The actual registrations shown in Plate 2, by filled in circles, bear out the conclusions arrived at from the curves, and indicate the error which would have resulted if a forecast had been attempted by extrapolating the actual 1922-26 registration curve on natural paper. The present financial depression constitutes another variation from normal conditions. Its effect is to depress the registration curve and bring it towards the probable normal curve more rapidly than was anticipated in 1926, and it may even cause the actual curve to cross the normal curve for a time.

Knowing something of the likely future numbers of motor vehicles, the taxation should then be adjusted to what the road user can afford to pay, and the construction programme is adjusted accordingly. If proper revenue forecasts be made, we are unlikely to enter upon construction which is greater than can be afforded. Government railways in Australia have always had the consolidated revenue to fall back upon in meeting their deficits; let us hope that no such practice will become general in connection with roads.

IV.

Planning involves consideration of the best general location for development of traffic, and leading it to its objective in the shortest distance.

(a) *Location*: Forms of transport, and special uses to which the roads would be put, have, throughout the ages, determined location. . . . The early roads following and extending from the tracks of the explorers were chosen by teamsters and pioneer settlers, who endeavored to reach their objective with a minimum expenditure in road and bridge construction and tractive effort. They adopted steep gradients which followed the tops of spurs, thus avoiding the necessity of side cuttings, but often missing the lowest gaps in the range; made detours to avoid marshy country, and followed banks of rivers and streams in an endeavour to avoid expensive ford or bridge construction. Surveyors subsequently entrusted with the subdivision of land were formerly compelled to adopt similar principles in their road location, by reason of the absence of funds for road construction. The road locator of to-day takes into account moneys likely to be available.

(b) *Road Shortening*: The denser the traffic the greater is the need for a short, straight alignment. Consider a concrete

case of a flat country road, carrying 500 vehicles per day. Assume the cost of maintenance of the vehicle and running cost other than the interest and depreciation to be 4d. per mile. A shortening of the road by one mile represents an annual saving in operation of £3041. The problem is not really so simple as this, but its importance may be gauged from the calculation.

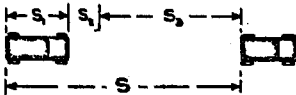
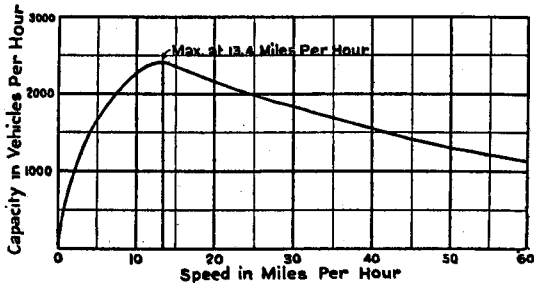
(c) *Gradients*: The question of economy of land resumption becomes more difficult when grade reduction and not alignment is the determining factor, and the road economist must, therefore, become a student of land valuation, which involves calculation of the value of severance, disturbance of business, etc., and the value of direct enhancement to the severed property. Such questions require study, otherwise the annual charges due to resumption costs may exceed the annual savings in cost of transport and road maintenance due to the improved grade. Economic gradients should be determined from consideration of the type of vehicle which will be operating; load and speed limitation; the cost of excavation and fills; length of road required to develop the gradient; road surface maintenance; effect upon straightness, and the momentum value in the case of rolling grades. As the settlement of a country proceeds, the increasing demands of traffic make it profitable to build embankments over marshes, construct bridges and generally reduce gradients.

The necessity of obtaining easy gradients, in order to prevent undue load limitation, has considerable effect upon the detailed road alignment, because of the necessity of developing sufficient distance between limiting points, such as saddles in spurs and stream crossings; and a proper balance for true economy must be obtained between the saving in energy required for transport, and the extra cost of constructing the easier gradient.

(d) *Pavement*: The most suitable pavement and its required degree of smoothness will be determined by the type and density of traffic operating and climatic conditions, class of foundation soil, availability and cost of material, drainage, difficulties, etc., and each of these factors will be briefly discussed. The type of paving (which so largely governs smoothness) should be determined from consideration of first cost, life and maintenance of the pavement. The wear and tear on the road and vehicles and the energy required to overcome the tractive resistance of the road to the vehicle (which, *inter alia*, governs fuel consumption) when balanced against pavement construction costs will determine the smoothness required.

The economics of road vehicle operation to-day demand a speed as great as is safe. The road width governs safe speed and it has been demonstrated both practically and theoretically that on the present status of motor vehicle brake design, the

CAPACITY OF A SINGLE LANE OF TRAFFIC AT VARIOUS SPEEDS.



V - Speed in Miles Per Hour

μ - Coefficient of friction = 0.5

S - Effective space between two vehicles (*In feet*)

S_1 - Overall length of vehicle (- 12 feet)

S_2 - Space due to lag in application of brakes = $0.44V$ feet

S_3 - Distance required to pull up = $\frac{1.07V^2}{\mu g}$ feet

Then $S = S_1 + S_2 + S_3$

Capacity of Road = $\frac{5280V}{S_1 + S_2 + S_3}$

PLATE 3.

maximum capacity of the road is attained when the speed of vehicles is uniform at about fourteen miles per hour. The attached diagram (Plate 3, prepared by D. A. Crawford) from "Report on Uniform Weight and Speed Regulations" illustrates this.

Many writers on road economics state that pavement width should be in multiples of ten feet. This is only true under certain conditions; density of traffic and average speed and direction of traffic modify this. It will be obvious that a road upon which ten vehicles may be expected to pass each other per mile per day will not need to give as large a clearance on the pavement as if the traffic were ten times as great. Stage construction by gradual widening as the traffic increases often produces odd widths.

Having determined minimum width, etc., from previously mentioned considerations, the next question is to determine the necessary class of surfacing or pavement. In the words of Mr. W. Calder "there is no best pavement," notwithstanding the attempt of vendors of various materials which go to make pavements, to make the public believe otherwise. Since the pavement is generally the most expensive single item in the construction of a road, particularly careful study of the economics of its design and construction are necessary.

The degree of regulation of speed and weight of vehicles influences pavement design, and complete reference to this factor may be found in the report by Mr. D. A. Crawford and the author to the Federal Aid Roads Board, wherein it is shown that unrestricted weight and speeds might lead to an excessive and wasteful expenditure of over £24,000,000 in ten years on the rural roads of Australia controlled by the State road authorities.

Soil conditions determine pavement thickness for given conditions of traffic density, and maximum weight and speed of vehicles, and the economic importance of a study of soils is indicated in the report quoted above by the statement that one inch of extra thickness of paving on rural roads as above controlled, and built within the ten year period would cost £9,000,000. Improper judgment of the necessary thickness of paving may easily involve the community in 30% extra paving costs for extra strength, whilst over-estimation of the bearing value of a soil might easily lead to early destruction of the pavement, with just as great a waste. In order that the personal equation may be eliminated in judgment of the bearing capacity of soils, practical laboratory and field tests should be made and correlated, with experience under similar conditions.

(e) *Type of Surface*: In deciding whether it is economical to improve progressively the smoothness of pavements, two factors crop up—

- (i) Traffic density.
- (ii) Tractive resistance of the pavement surface.

Different surfaces affect tractive effort in the following manner:—

- (1) Average earth—90 lbs. per ton.
- (2) Gravel or macadam—60 lbs. per ton.
- (3) Bitumen or concrete—45 to 50 lbs. per ton.

Knowing the traffic and mileage, we can compute the different expenditures of energy required for each type, and convert this into money values.

Good surfaces have a still more striking effect in reduction of tyre and vehicle maintenance costs, as the following quotation from the annual report of the Main Roads Commission, Queensland, will illustrate:—

“ The tentative conclusions . . . are that modern tyres can be expected to have a life of 20,000 to 30,000 miles on concrete or bituminous roads (unless they perish from age); 10,000 to 12,000 on good gravel or macadam, and 2,000 to 4,000 miles on loose gravelled surfaces.”

Smoothness must be attained as far as possible without slipperiness. The annual tyre savings on a basis of 50 vehicles per day, travelling on concrete instead of gravel or unsurfaced macadam, indicate that it would be economical to expend between £3000 and £7000 per mile in conversion of poor rough surfaces to smooth concrete.

We are, however, always faced with the relative importance of projects, and should make our money produce the greatest good for the greatest number. It is often found that still more striking economies could be first effected with available funds, by making sections of road trafficable which were previously untrafficable in wet weather, rather than by improving existing surfaces. This is the reason for the piecemeal system of construction necessarily adopted in young and undeveloped countries, but which often cause a public outcry from large centres of population.

A typical calculation is here quoted to determine the most economical type of pavement, both of which are assumed to have equally good surfaces, the choice having been narrowed down previously from consideration of traffic density. The method adopted is that of Professor Hawken in his paper on Economy of Purchase, Transactions of the Institute of Engineers, Aust., Vol. 6, 1925 (see table below).

The premises for such calculations should be based upon

actual cost, maintenance, traffic density and other records of the physical properties of the materials employed, etc. The collection of such data should be an important duty of road building authorities. Where no records of actual normal traffic wearing values exist, the results of accelerated field tests are utilised, whilst universities and road departments carry out laboratory tests to determine the wearing qualities of various stones, in regard to attrition, toughness, cementing value, etc. Experimental work in field and laboratory is as essential in road building enterprise, as in any other, in the interests of production of articles of better value. The survey of the condition of existing pavements and their traffic history, is important in future economic design.

Standardisation of specifications, methods for the testing of road stones, gravel, cement, bitumen, steel, etc., is of value in reducing the cost of pavements, whilst simplification of general conditions of contract, and preparation of a glossary of highway terms will lead to a better understanding between the designer and builder. These works are being undertaken in Australia by the Standards Association, assisted by the Institution of Engineers, Aust.

TABLE I.—SHOWING THE RELATIVE VIRTUAL COSTS OF TWO DIFFERENT FORMS OF PAVEMENT.

Pavement A. (A medium quality pavement of comparatively low first cost).

Pavement B. (A good quality pavement of high first cost).

Comparison is required of the sum of money to be invested now in order to build, maintain and replace at life intervals—

Pavement A (life, 14 years)—Cost, 10s. per square yard; annual maintenance costs first eight (8) years, 2d. per square yard per annum. At the end of 8 years, will require renewals costing 3s. per square yard, which with proper maintenance at 2d. per square yard per annum will extend the life of the work another 6 years, at the end of which period—a total of 14 years—the whole work will have no scrap value, and the pavement will require entire reconstruction of the same form.

Pavement B (life, 20 years)—Cost 15s. per square yard; annual maintenance costs first twelve (12) years, 1d. per square yard per annum. At the end of 12 years, will require renewals costing 3s. per square yard, which with proper maintenance at 2d. per square yard per annum will extend the life of the work another 8 years, at the end of which period—a total of 20 years

—the whole work will have no scrap value, and the pavement will require entire reconstruction of the same form.

Interest charges will be assumed at 5½%, for both payment and investment.

Pavement A.

	Shillings per Square Yard.
First cost of pavement	10.00
Sum required for investment now, to replace the pavement at 14-year intervals	8.96
Sum required for investment now, in order to pro- vide 2d. per annum for maintenance purposes ..	3.03
Sum required for investment now, to provide 3s. at the end of 8 years	1.96
Sum required for investment now, to provide 3s. at 14-year intervals, but for which the first payment will not be required until 22 years from now. . .	1.75
	<hr/>
Total virtual cost	25.70s.

Pavement B.

	Shillings per Square Yard.
First cost of pavement	15.00
Sum required for investment now to replace the pavement at 20-year intervals	7.83
Sum required for investment now, to provide 1d. per annum for maintenance purposes for 12 years	0.72
Sum required for investment now, to provide 1d. per annum for 12 years at 20-year intervals, but the first payment for which will not be required until 32 years from now	0.19
Sum required for investment now, to provide 3s. at the end of 12 years	1.58
Sum required for investment now, to provide 3s. at 20-year intervals, but for which the first payment will not be required until 32 years from now. . .	0.82
Sum required for investment now, to provide 2d. per annum for 8 years starting 12 years hence ..	0.56
Sum required for investment now, to provide 2d. per annum for 8 years at 20-year intervals, but for which the first payment will not be required until 32 years from now	0.29
	<hr/>
Total virtual cost	26.99s.

(f) *Destructive Agencies*: Water is the greatest destructive agent, and therefore sufficient waterways must be provided to carry it across and away from the road. The size of culvert openings is again a study in economics, the problem being to design an opening sufficiently large to discharge normal or abnormal quantities of water as the case may require. It will be economical, in the case of small openings, to make them sufficient to discharge storm water which will regularly fall, but it might be quite uneconomical to design them for conditions which would occur only once in fifty years. It is a case of balancing the probable damage against the probable extra cost of construction. The city engineer designs his storm water sewers and channels on this basis.

The other major factor in the destruction of roads is traffic, which, however, in certain cases helps initially to make a road, as in the case of sand clay, bladed bitumen and gravel mixture. Iron-tyred traffic helps to consolidate unsurfaced crushed rock roads.

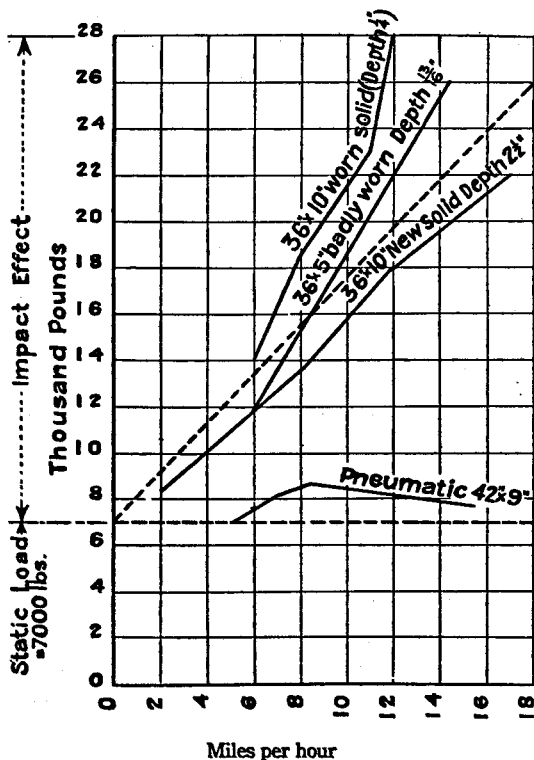
Impacts from pneumatic tyres do not vary greatly with speed, but the shear set up from the tractive force at high speeds damages the surfaces, particularly those of gravel or unsurfaced macadam, and speed regulation of such tyres needs consideration only on the latter account.

Impacts from solid rubber tyres increase with the speed, and inversely with the rubber thickness, and may reach thrice that of the static load, on slightly uneven pavement, and up to seven times on decidedly uneven pavement at even moderate speeds. As the highly destructive impacts are caused by the heavier vehicles with solid tyres (which represent less than 5% of total traffic), it is obviously economic to attempt some regulation of speed and weight of such vehicles. It seems probable that in Australia excessive weights and speeds of vehicles are causing an uneconomic loss of millions a year, after making full allowance for extra earnings due to high speed and capacity.⁴

The design of pavement will be determined upon the laws regulating speed and weight. The attached diagrams (Plates 4 and 5) from the report on Uniform Weight and Speed Regulations quoted, illustrates the effect of speed upon impact, and necessary road thickness

4. Vide report of Mr. D. A. Crawford and the Author to the Road Authorities of Australia on Uniform Weight and Speed Regulations.

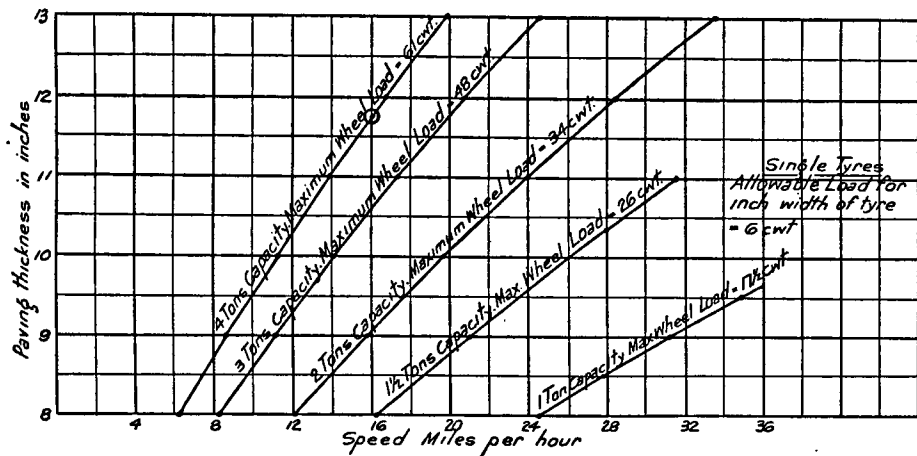
EFFECT OF SPEED UPON IMPACT.



NOTE:—The line shown thus ----- represents Total Load = Static Load \times (1+0.15 V.)

Heavy lines are result of experiments made by Bureau of Public Roads, Washington, U.S.A. vide Leeming's *Road Engineering*, Page 203 et seq.

Dotted line assumed to represent impact effect of partly worn solid rubber tyres (average condition on gravel and macadam roads).



NECESSARY PAVEMENT THICKNESSES FOR VARIOUS WEIGHTS & SPEEDS —

V.

The order in which city bridges⁵ should be built requires investigation to ascertain which project will return the greatest benefit. Financial considerations generally govern the matter where there is any great disparity in the costs. It cannot be too strongly emphasised that the investment value of a bridge should be fully investigated before a design is adopted, or over-capitalisation may result. A method

CITY OF BRISBANE.
GREY STREET BRIDGE.

Graphical Illustration of Forecasted Financial Position for a £700,000 Loan.

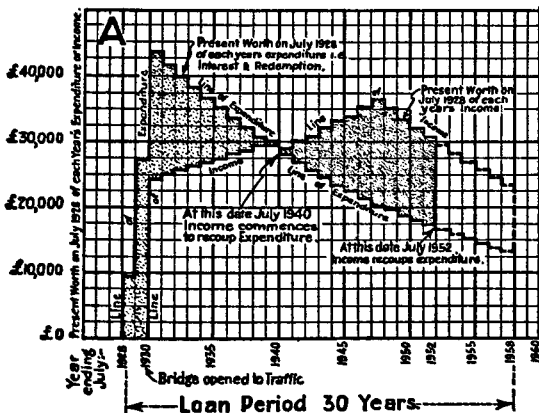


PLATE 6.

of investigation adopted by the author and his assistants on behalf of the Queensland Government in the case of proposed bridges over the Brisbane River, was to compare the present worth of annual interest and redemption charges on the various proposed loans with present worth of the estimated traffic savings, as illustrated on the attached diagrams (Plates 6, 7 and 8).

5. The author, in his original paper, dealt at considerable length with the economical construction and suitable location of highway bridges. Limitation of space precludes the possibility of including such matter here. The notes concerning city bridges are of particular interest in view of recent developments.—Editor.

The present worth of each year's annual interest and redemption charges on the proposed loan, were plotted together with the present worth of the annual savings to the community. The date at which these plots intersect is the date at which the proposal would begin to have traffic earnings equal to the annual interest and redemption charges; that is, as a business proposition the earnings are just becoming equal to interest and redemption on the capital invested.

The area between these lines and up to this date represent excess of expenditure over income, and a further date must

CITY OF BRISBANE.
GREY STREET BRIDGE.
Graphical Illustration of Forecasted Financial Position for a
£530,000 Loan.

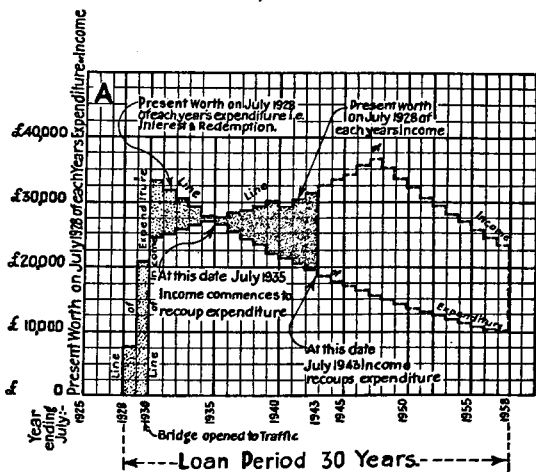


PLATE 7.

be awaited until the area beyond the date of commencement of equalisation of expenditure and income is equal to the area of excess expenditure in the early stages. At this date the proposal may be considered as commencing to show profits.

The shaded areas of the graphs clearly show the difference between a proposed £700,000 loan (Plate 6) and the £530,000

loan (Plate 7) for a similar bridge crossing, the former only commencing to show a profit after 24 years, the latter after 15 years, a far more reasonable period. The charges on the loan of £700,000 (Plate 6) are made up after 1930 of annual payments over the period of the loan, sufficient to pay interest and redemption. It is assumed that the full amount of the loan is borrowed in three instalments 1928-1930. The charges are

CITY OF BRISBANE.
CENTRAL BRIDGE.

Graphical Illustration of Forecasted Financial Position for a £3,000,000 Loan for a more central bridge double the capacity of Grey Street Bridge.

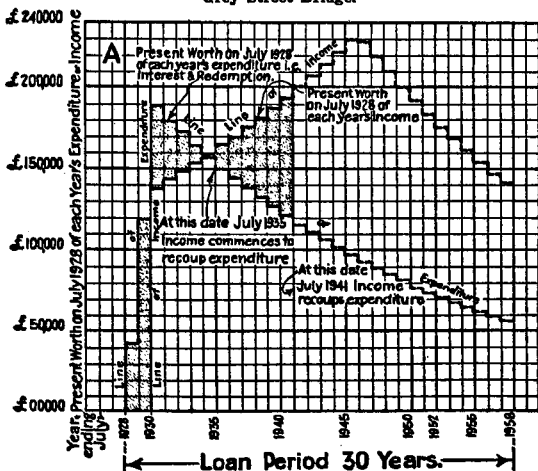


PLATE 8.

called expenditure because they represent money which would be paid out by the community each year, and their present values for each year over the period of the loan are plotted, giving the line of the expenditure curve.

The estimated annual income to the community is arrived at by computing from the data available in the Cross River Commission's report, the value of the saving to the community in lessened distance of haulage, etc. The proportion of cross river traffic which would be likely to use the Grey Street bridge

has been, after careful consideration of the Cross River Commission investigation, taken as 24.6 per cent. The average distance saved has been taken as .31 miles as between Victoria bridge and Grey Street bridge. The value per vehicle mile has been taken at 13.6 pence, which is the figure deduced by the Cross River Commission. The actual quantity of traffic has been taken to increase at the rate of 8% per annum compounded. Trams are not considered, as the proposal does not include any scheme for altering the existing tram distribution. Money has been considered as costing $5\frac{1}{2}$ % per annum and earning $4\frac{1}{2}$ % per annum.

It will be noted that after 1947 a bridge at Grey Street will have reached its full carrying capacity. The bridge will take no greater volume of traffic (in this case taken as 15,000 vehicles per day) without congestion losses tending to counter-balance any gains which might arise by endeavouring to force more than this maximum value over the bridge. From 1947 on the income remains constant. This is illustrated by the curve (Plate 6).

Plate 6 shows that the annual income is not equal to the annual expenditure until 1940, and that the total income does not compensate for the total expenditure until 1952. After that date, the bridge is a profitable proposition. Plate 7 has been prepared in an exactly similar manner, except that the annual charges are for a £530,000 loan. It shows that the annual income equals the annual expenditure in 1935, and that the total income compensates for annual expenditure in 1943, i.e., 9 years earlier than the £700,000 proposal.

Plate 8 is a similar illustration for a £3,000,000 loan to be spent at a more central site. It shows that this expenditure, viz., twice the estimated virtual cost of the Cross River Commission for a central bridge, is as profitable (if loan funds had been available) as a £530,000 loan for Grey Street, and far more profitable than the £700,000 loan proposal, and would show a profit after thirteen years of use. The difficulty of raising funds, in the first instance, is one of the chief reasons for deferring its construction.

VI.

John Macadam, in 1811, estimated the toll revenues on English turnpike roads at £1,250,000 per annum. The toll system has been in disuse for over fifty years in Australia, but of late years the laws of several States have been amended to provide for the imposition of tolls by local authorities and Governments. These tolls have, up to date, been applied only to

defray annual charges on bridges in New South Wales, but it is proposed to extend the use of the toll in Queensland to tourist roads. The building of a modern road to serve a limited area may actually cause depression of market values of land, due to high rating necessary for its financing, if the full cost is to be met locally; yet the road itself may be largely used by tourists, and oftimes may be quite a payable proposition if a toll be allowed.

Toll bridges upon main arteries of traffic are in general unwarranted. The user of such roads is specially taxed for the building of main arteries, by imposition of petrol taxes and motor registration fees. Cases may arise, however, where the public has a choice of route, and may avoid the toll bridge. In such cases the bridge might be regarded as a convenience to be specially paid for. In all cases where the traffic over a bridge has been created by reason of the works of the authority controlling the road, the right of toll should be strictly conserved for that authority.

Private Franchise for Roads and Bridges.—In America of late years, many bridge projects have been completed under this system by local bodies, but have brought troubles in the shape of additional road construction. In Italy and England, private concessions for fast through toll roadways have been secured. The author has, on several occasions, been required to examine franchise proposals for structures not likely to be constructed within reasonable periods by Governments or local authorities. Having ascertained the costs of the projects by consideration of:—

- (a) first cost and life,
- (b) value at end of franchise,
- (c) maintenance, annual and periodical,
- (d) administration and toll charges,
- (e) taxation on profits,

Franchise periods should be fixed from a consideration of:—

- (i.) likely traffic during the franchise period,
- (ii.) toll fee,
- (iii.) capital cost of constructing,
- (iv.) reasonable rate of dividend over the franchise period, payable to shareholders,
- (v.) rate of interest payable to bond-holders,
- (vi.) sinking fund investment rates.

Annual revenue:—

$$= \text{£} \frac{\text{No. of vehicles per annum} \times \text{toll in pence per vehicle}}{240}$$

hence the net profit each year may be set down as annual revenue, less annual cost and taxation. Taxation will depend upon the percentage of gross profit to invested capital, and the rate of tax in the State concerned.

The figures show that the project will pay 2% dividend for the first year of operation, and 21% dividend for the last year of operation, or an average annual dividend of 13.8%, which would justify some equalisation of dividend during the early stages.

TABLE II.—TOLL BRIDGES.

Table Showing Estimated Profits of a Project Costing £40,000
With a Franchise of 20 Years. Toll of 6d.
Per Vehicle for 850 Days per annum,
Sinking Fund earning 4%.

Annual cost of maintenance, collection of tolls and office expenses,
£1,200.

Traffic as set down in the table.

Year.	Vehicles Per Day.	Gross Revenue.	Annual Cost.	Gross Profit.	Profit. Gross %	Taxation.	Nett Profit.
		£	£	£		£	£
1	400	3,500	2,540	960	2.40	120	840
2	486	4,250	2,540	1,710	4.28	210	1,500 (2%)
3	544	4,760	2,540	2,220	5.55	290	1,930
4	622	5,440	2,540	2,900	7.25	370	2,530
5	719	6,290	2,540	3,750	9.38	450	3,300
6	796	6,965	2,540	4,425	11.06	530	3,895
7	893	7,810	2,540	5,270	13.10	625	4,645
8	971	8,500	2,540	5,960	14.90	700	5,260
9	1,070	9,360	2,540	6,820	17.05	800	6,020
10	1,109	9,700	2,540	7,160	17.90	830	6,330
11	1,128	9,870	2,540	7,330	18.32	900	6,430
12	1,166	10,200	2,540	7,660	19.15	950	6,710
13	1,192	10,430	2,540	7,890	19.72	975	6,915
14	1,220	10,675	2,540	8,135	20.34	1,000	7,135
15	1,248	10,920	2,540	8,380	20.95	1,025	7,355
16	1,275	11,155	2,540	8,615	21.54	1,040	7,575
17	1,301	11,380	2,540	8,840	22.10	1,050	7,790
18	1,330	11,640	2,540	9,100	22.75	1,100	8,000
19	1,357	11,870	2,540	9,330	23.33	1,125	8,205
20	1,384	12,110	2,540	9,570	23.92	1,150	8,420 (21%)

Total profit . . . £110,785

Average Profit = £5,540 = 13.8%.

In one case which the author had under consideration, the extension of a proposed franchise by ten years would have a

probable cash value to-day of £150,000 or more, and a cash value of over £1,000,000 at the date of its operation; hence great care is necessary in determining the reasonable franchise period.

VII.

The general conclusions which have been reached as the result of the above discussion are:—

(a) The function of roads under present economic conditions consists primarily of the development of new areas, and secondarily of the feeding of existing transport agencies. These two functions, which to a great extent are closely inter-related, are accompanied by a third which consists of the provision of inter-centre communication in certain cases, notwithstanding the presence of existing services.

(b) The road building programme of any area should be non-spasmodic in character, should be influenced by the willingness and ability of the land owner and road user to pay the cost, and should be determined by careful analyses of future traffic requirements.

(c) Roads should be economically located and should follow the shortest available route which is consistent with service. The alignment to be adopted will depend upon the cost of construction and maintenance and the volume of traffic and the safety thereof.

(d) The most suitable pavement and its required degree of smoothness will be determined, *inter alia*, by the type and density of the traffic operating thereon; by the prevailing climatic conditions; the class of foundation soil; the availability and cost of materials and the constructional difficulties encountered.

(e) Speeds and weights of vehicles should be regulated in the interests of public safety and in such a manner as to preserve an economic balance between transportation savings and construction and maintenance costs.

(f) Money spent on road construction should be outlaid in such a manner as to provide the greatest amount of service to the largest number of people.

(g) Bridges should be so located as to serve the best interests of the maximum number of users, but to avoid over-capitalisation, the investment value of such should be fully investigated before a design is adopted.

(h) Toll bridges on main traffic arteries and toll roads in general are unwarranted. In certain cases where alternate facilities exist or where the traffic is non-local in origin, the imposition of tolls is justifiable.

In conclusion, the author wishes to express thanks to Messrs. D. A. Crawford, W. Nimmo and D. Garland, of the Queensland Main Roads Commission, for notes and diagrams in reference to road capacity, momentum grading, motor vehicle forecasting and bridge finance.

J. R. KEMP.

Main Roads Commission,
Brisbane.

BRIEF SURVEY OF CONTROL OF RAILWAYS AND TRAMWAY TRANSPORT IN AUSTRALIA*

(Prepared from Notes Furnished by the Victorian Railways
Department.)

- I. Victoria.
 - (a) Railways.
 - (b) Tramways.
- II. New South Wales.
 - (a) Railways.
 - (b) Tramways.
- III. Queensland.
 - (a) Railways.
 - (b) Tramways.
- IV. South Australia.
 - (a) Railways.
 - (b) Tramways.
- V. Western Australia.
 - (a) Railways.
 - (b) Tramways.
- VI. Tasmania.
 - (a) Railways.
 - (b) Tramways.
- VII. Commonwealth Railways.

I.

(a) Railways.

The railways of Victoria consist of—

	Route Mileage.	
	M.	Chs.
Victorian Government Railways	4,699	0
Kerang to Koondrook Railway	13	75
Yarra Junction to Powelltown	12	0

Victorian Government Railways.

Legislation: Railways Act 1928.

The Victorian Railways are vested in and administered by a board of three Commissioners, appointed by and responsible, through a Minister of Railways, to Parliament for the management and operation of the railways. The Chairman of Commissioners is appointed for a term of five years, and the

*See also Article on "Legislation for Co-ordination of Transport," on page 165.

other two Commissioners for seven years. The Railways Commissioners are not, however, the railway constructing authority. Railway construction is undertaken by the Board of Land and Works, which is also responsible to Parliament, through the Minister of Railways. The construction of any new line of railway must first be authorised by Parliament, after having received a report and recommendation from the Parliamentary Standing Committee on Railways. Upon the construction of a line of railway by the Board of Land and Works, an order is made by the Governor-in-Council transferring such line of railway to the Railways Commissioners, who are then responsible for its operation and maintenance.

The powers and duties of the Railways Commissioners and of the Board of Land and Works (so far as they relate to railway construction) are defined in the *Railways Act 1928*. The Commissioners are empowered, subject, however, to confirmation by the Governor-in-Council, to make, alter and repeal by-laws fixing the amount of fares and freights, and generally for the conditions under which the business shall be conducted (Sec. 128). The Minister of Railways may at any time in writing request the Commissioners to propose in writing a scheme for effecting an increase in income or a decrease of expenditure, or for carrying out any matter of general policy specified by the Minister, and if the Minister approves of the same he may direct the Commissioners to take all necessary steps to carry out the same. If the Minister does not approve of any scheme proposed by the Commissioners, he may himself transmit to them any proposition for effecting and carrying out such increase, decrease or matter of policy, and thereupon the Commissioners shall take all necessary steps to give effect to such proposition. If any doubt or difference of opinion occurs respecting the provisions of this section the same may be finally determined by the Governor-in-Council.

The following provisions relating to expenditure are contained in the *Railways Act* :—

Sec. 102.—In the following cases (that is to say) :—

- (a) Where Parliament makes any alteration in the law which occasions any increase of expenditure by the Commissioners or any decrease of the railways revenue; or
- (b) where Parliament or the Governor-in-Council directs the Commissioners to carry out any system or matter of policy which occasions or results in any increase

of expenditure by the Commissioners or any decrease of the railways revenue; or

- (c) where Parliament authorises the construction of any new line of railway which, when vested in the Commissioners, does not produce sufficient revenue to cover the interest on its cost of construction and the expense of its maintenance,

the annual amount of the increase of expenditure or decrease of revenue or of the loss resulting from such new line of railway shall be from time to time notified in writing by the Commissioners to the Auditor-General, and if certified by him shall be provided by Parliament in the annual Appropriation Act and paid to the Commissioners.

Sec. 103.—Before the Commissioners authorise or incur any expenditure for any works or services which are not required for ordinary working expenses and maintenance, it shall be necessary for the Minister to submit or cause to be submitted to both Houses of Parliament a statement of such proposed works and services, and also an estimate of the cost of such works and services, and such estimate shall be submitted for the sanction of the Legislative Assembly in the same manner as the annual estimates of expenditure.

Provision is made in the *Railways Standing Committee Act 1928* that no railway works, the estimated cost of completing which shall exceed £20,000, shall be commenced until it has been considered and reported upon by the Parliamentary Standing Committee on Railways, and subsequently approved by the Legislative Assembly. The Commissioners are empowered to enter into contracts for the execution of any authorised work or for furnishing materials, labor, etc., provided that they shall not, without the consent of the Governor-in-Council, enter into any such contract for the supply, either directly or indirectly, from places outside Victoria of materials, etc., nor make any contract the consideration for which exceeds Five thousand pounds, or the performance of which may extend over a period exceeding one year.

Kerang to Koondrook Railway.

Legislation: Tramways Act 1928.

This railway is owned and worked by the Municipality of the Shire of Kerang, and is open for general traffic.

Yarra Junction to Powelltown Railway.

Legislation: Tramways Act 1928.

This is owned and operated by a private company. It was constructed principally for private use, but one of the conditions of its construction was that it should also undertake the general business of transportation of passengers and goods.

(b) Tramways.

	Route Mileage.
The tramways of Victoria consist of:—	
Melbourne and Metropolitan Tramways	116.76
Ballarat Tramways	13.85
Bendigo Tramways	8.79
Geelong Tramways	10.26
St. Kilda to Brighton	5.18
Sandringham to Beaumaris	4.61

Melbourne and Metropolitan Tramways.

Legislation: Melbourne and Metropolitan Tramways Act 1928.

On 7th January, 1919, the Royal Assent was given to the Melbourne and Metropolitan Tramways Act, which is administered by a Board consisting of seven members appointed by the Governor-in-Council. The Board has control of all the tramways in the metropolitan area with the exception of the St. Kilda-Brighton and Sandringham-Beaumaris tramways. The Board is empowered to borrow up to £4,750,000 by the issue of stock or debentures secured upon its revenues and undertakings, this being in addition to the transferred liabilities attaching to the tramways vested in it. Before the Board can construct any tramway, the estimated cost of which exceeds £20,000, a "Special Construction Scheme," dealing with the proposed route, must be approved by the Railways Standing Committee (a Parliamentary body) and authorised by Parliament. The Board has prepared a general scheme for the future development of tramways in the metropolis, which has been approved by the Railways Standing Committee.

Pursuant to the Melbourne and Metropolitan Tramways Act 1928, municipal councils may require the Board to submit a special construction scheme to the Railways Standing Committee, dealing with any route included in the general scheme. In the event of such route being approved by the Committee, and its construction being authorised by Parliament, the Board shall construct the line under a guarantee against loss on opera-

tion from the council or councils concerned for a period of five years. The council may recoup itself by a levy of a "tramway betterment rate" over the whole or a portion of the district served.

The Board may make by-laws fixing fares and charges, and prescribing generally the conditions under which the services shall be conducted. No such by-law, however, shall have effect unless or until it has been approved by the Governor-in-Council. The Board is required, under the Melbourne and Metropolitan Tramways Act 1928, to pay to the Consolidated Revenue each year a sum equivalent to the Government's contributions to the Queen's Memorial Infectious Diseases Hospital, the Metropolitan Fire Brigades Board, and certain specified municipalities pursuant to the Licensing Act. The surplus on the operations of any year, after transferring not less than 4 per cent. nor more than 6 per cent. of the capital cost of the undertaking to Reserve Funds, and carrying to the credit of the succeeding year such sum, not exceeding £10,000, as the Board thinks fit, is to be distributed amongst 29 constituent metropolitan councils in accordance with a scheme of distribution to be adopted by the Board.

Ballarat Tramways (Mileage, 13.85 Miles).

Legislation: Tramways Act 1928.

The Ballarat City Council was authorised under the provisions of the Tramways Act to construct and operate tramways within the municipality, but delegated its powers to the British Insulated Wire Company Limited. That Company subsequently transferred its interests to the Electric Supply Company of Victoria Limited, by which the tramways are now operated and controlled. The Company may, subject to approval of the Governor-in-Council, make by-laws fixing the fares and prescribing conditions relating to the conduct of the business. In 1929, the State Electricity Commission of Victoria, with the approval of the Government, entered into an agreement with the Electric Supply Company of Victoria Limited for the acquisition of the whole of the latter's assets and undertakings in Ballarat. It is understood that legislation is contemplated to formally authorise the operation of the tramways by the Commission.

Bendigo Tramways (Mileage, 8.79 Miles).

Legislation: Tramways Act 1928.

The position in respect of the Bendigo tramways is precisely the same as in respect of the Ballarat tramways.

Geelong Tramways (Mileage, 10.26 Miles).

Legislation: Tramways Act 1928.

The Geelong tramways are owned and operated by the Melbourne Electric Supply Company Limited. The Company may make by-laws, subject to approval by the Governor-in-Council, fixing the fares and prescribing conditions relating to the conduct of the business. The assets of the Melbourne Electric Supply Company Limited will, however, pass to the State Electricity Commission of Victoria in September, 1930, and legislation is now being contemplated to formally authorise the Commissioners to operate and control the tramways.

St. Kilda to Brighton (Officially Described as Electric Street Railway). (Mileage, 5.18 Miles.)

Legislation: Acts Nos. 1956 and 1973.

This line is operated and controlled by the Victorian Railways Commissioners.

Sandringham to Beaumaris (Officially Described as Electric Street Railway). (Mileage, 4.61 Miles.)

Legislation: Acts Nos. 2556, 3110, 3324 and 3627.

This line is operated and controlled by the Victorian Railways Commissioners.

II.

(a) Railways.

(Route Mileage, 5,940 Miles.)

Legislation: Act No. 30, 1912; as amended by Acts No. 10, 1915; No. 43, 1916; No. 60, 1916; No. 30, 1918; No. 26, 1920; No. 33, 1922; No. 73, 1924.

The railways of New South Wales are vested in a body corporate by the name of the "Railways Commissioners for New South Wales," consisting of a Chief Commissioner and two Assistant Railway Commissioners, each of whom is appointed for a period of seven years. The construction of railway lines, authorised by Parliament, is carried out by the Commissioners. The Commissioners are responsible for the operation and maintenance of the railways, and are empowered to "demand reasonable tolls and charges" in respect of passengers and goods, and may make by-laws (which are subject to approval by the Governor) fixing fares and freights, and for the conduct of the business generally. The Commissioners may enter into contracts for the execution of any authorised work, and for furnishing

materials or labour, etc., but they shall not, without the consent of the Governor, enter into any contract in any case where—

- (a) The contract is for the supply, either directly or indirectly, from places outside New South Wales, of materials, locomotive engines, or other motive or tractive power; and
- (b) the contract exceeds the sum of £20,000.

The Commissioners are also empowered to acquire and to work coal mines within New South Wales and to use, sell or otherwise dispose of the coal won from such mine.

(b) *Tramways.*

The tramways of New South Wales, with some comparatively unimportant exceptions, are the property of the Government, and are under the control of the Railways Commissioners, who are responsible for their construction (when approved by the Governor) and for their proper operation and maintenance. The powers of the Commissioners in regard to the making of by-laws, etc., are the same in regard to tramways as to railways. A privately-owned and controlled steam tramway, $3\frac{1}{2}$ miles in length, is operated at Parramatta, connecting with the Parramatta River steamers, which convey passengers and goods to and from Sydney.

III.

(a) *Railways.*

(Route Mileage: 6,447 Miles.)

Legislation: Railways Act of 1914 (as amended by the Railways Acts Amendment Act 1929).

The Government Railways of Queensland are vested in a Commissioner for Railways, who is responsible to Parliament, through the Minister for the Crown for the time being charged with the administration of the Act (generally the Secretary for Railways) for the maintenance and management of the system. The Commissioner is appointed by the Governor-in-Council for a term not exceeding seven years.

The Governor-in-Council may also appoint two Deputy Commissioners, to assist the Commissioner in the general management of the railways, for a term not exceeding three years. The construction of railways is undertaken by the Commissioner. The Commissioner is empowered to make by-laws which, however, are subject to approval by the Governor-in-

Council, fixing the fares and freights to be charged, and generally prescribing the conditions under which the service will be conducted. The Commissioner may enter into contracts, subject to ratification by the Minister, with respect to any work, or other matter enabling him to carry the Act into full effect.

In addition to the railways vested in the Commissioner, there are 112 miles of private tramways of the Queensland Standard Gauge (3 ft. 6 in.), which are the property of the various local authorities and companies as follow:—

<i>Owned by Local Authorities.</i>	
<i>Southern Division—</i>	Mileage.
Belmont Tramway ¹	4
Beaudesert Tramway	32
Mt. Crosby Tramway	5
	— 41
<i>Central Division—</i>	
Aramac Tramway	41
<i>Owned by Private Companies.</i>	
<i>Southern Division—</i>	
Mt. Bauple Tramway	7
Invicta Tramway ¹	9
Tannymorel Tramway	4
	— 20
<i>Northern Division—</i>	
Bowen Consolidated Mine Tramway	3
Trekelano Tramway	7
	— 10
Total	112

(b) *Tramways.*

Brisbane Tramways (Approximate Mileage, 54 Miles).

The tramways in the city and suburbs of Brisbane were purchased by the Queensland Government in 1922, which, under the provisions of the Brisbane Tramway Trust Act 1922, appointed a Trust to control and operate the system until 1st December, 1925, on which date the control passed to the Brisbane City Council.

Rockhampton Tramways (Mileage, 6.65 Miles).

These tramways are controlled by the Municipality of Rockhampton.

1. Not operating at present.

IV.

(a) *Railways.*

(Route Mileage, 2,542 Miles.)

Legislation: The South Australian Railways Act 1887, as amended by Acts No. 512, 1891; No. 612, 1894; No. 912, 1906; No. 988, 1909; No. 1161, 1914; No. 1486, 1921; No. 1773, 1926; No. 1933, 1929.

The South Australian Railways are vested in a Commissioner, who is responsible to Parliament, through the Minister of Public Works, for the proper operation and maintenance of the system. The Commissioner is assisted by a Board of Advice, consisting of the Chief Engineer for Railways, the General Traffic Manager, and the Chief Mechanical Engineer. The Commissioner has power to make by-laws (subject to confirmation by the Governor-in-Council) fixing fares and freights, and generally for carrying out the powers vested in them by, or for more conveniently operating, the Act. The Commissioner is the authority for the construction of railways authorised by an Act of Parliament. The Commissioner is empowered to enter into contracts with any persons for the execution of any work authorised by the Act, or for furnishing materials, labour, etc., provided that no contract for the supply of materials, etc., from places outside South Australia shall be entered into without the sanction of the Governor-in-Council.

(b) *Tramways.*

Legislation: Acts No. 913, 1906; No. 936, 1907; No. 1098, 1912; No. 1286, 1917; No. 1331, 1918; No. 1812, 1927; No. 1839, 1927; No. 1840, 1927; No. 1887, 1928; No. 1888, 1928; No. 1902, 1929.

The tramways in Adelaide and suburbs (route mileage approximately 74 miles) are controlled by a Municipal Tramways Trust, created in 1907. The Trust consists of eight members, of whom two are appointed by the Governor, two by the City of Adelaide, and two by the District Councils. The Trust is empowered to make by-laws fixing fares and charges, and generally for such matters as are necessary for carrying out the purposes of the Act. The by-laws, however, are subject to confirmation by the Governor-in-Council.

V.

(Route Mileage, 4,079 Miles.)

(a) *Railways.*

Legislation: The Government Railways Act 1904-1926.

The Government Railways of Western Australia are vested in the Minister for Railways. The Commissioner, appointed by the Governor for a term of five years, is responsible to the Minister for Railways for the management, maintenance and control of such railways. The Commissioner may, with the approval of the Minister, fix the fares and freights to be charged, and may impose such conditions and regulations with respect to the carriage of passengers, goods, etc., as he deems advisable. It is provided, however, that the Governor may make conditions and regulations superseding those made by the Commissioner.

(b) *Tramways.*

Government Tramways.

Legislation: Tramways Purchase Act 1912.

The Perth electric tramways (route mileage, approximately 37 miles) are Government-owned, and are controlled by the Railways Commissioner. There are also several other Government tramways in Western Australia, these being controlled by the Department of the North-West. The longest is that between Roebourne and Cossack, with a length of 12.50 miles, but this line is not at present in operation. Other short lengths of tramway are operated in connection with jetties at certain ports.

Other Tramways.

In Fremantle, the tramway system (mileage, 8.61 miles) is controlled by the municipal authorities.

A private company controls the tramways of Kalgoorlie and Boulder.

VI.

(a) *Railways.*

Government Railways (Mileage, 653½ Miles).

The Government Railways of Tasmania are controlled by a Commissioner, whose powers are very similar to those of the Commissioners of Railways of the Government-owned railways of the other States.

Private Railways (Mileage, 143 Miles).

The Emu Bay Railway (Burnie to Zeehan) is operated and controlled by a private company.

(b) Tramways.

The electric tramways of Hobart (route mileage approximately 17 miles) are operated and controlled by the Hobart Municipal Council. The Launceston Electric Tramways System (mileage approximately 11 miles) is operated and controlled by the Launceston City Council.

VII.

	Mileage.
The Federal Railways comprise the following:—	
Trans-Australian—Port Augusta (South Australia) to Kalgoorlie (Western Australia)	1,051.45
Central Australian—Port Augusta to Stuart	592.95
Queanbeyan to Canberra (Federal Capital Territory)	4.94
North Australian—Darwin to Katherine River	198.68

The Federal Railways are vested in a Commonwealth Railways Commissioner, who is responsible for their operation and maintenance. The construction of railways is carried out by the Commissioner, after investigation by the Parliamentary Standing Committee on Public Works and authorisation by Act of Parliament. The Commissioner may, subject to approval by the Minister, fix fares and freights, and generally impose such conditions as are considered necessary for the conduct of the business.

The Commissioner is empowered to make contracts for the execution of work, the furnishing of materials, labour, etc., provided that he shall not, without the consent of the Minister, enter into any contracts for the supply, from places outside the Commonwealth, of materials of a greater value than £1,000, or of locomotive engines, or other rolling stock or motive or tractive power, or enter into any contract which exceeds the sum of £5,000. The Minister may at any time in writing request the Commissioner to propose in writing a scheme for effecting an increase of income or a decrease of expenditure, or for carrying out any matter of general policy specified by the Minister, and the Commissioner shall propose a scheme accordingly. If the

Minister approves of the proposed scheme he may direct the Commissioner to take all necessary steps to carry it out. If the Minister does not approve of the proposed scheme he may himself transmit to the Commissioner any proposition for effecting or carrying out such increase, decrease or matter of policy, and thereupon the Commissioner shall take all necessary steps to give effect to the proposition of the Minister. If any doubt or difference of opinion occurs respecting the provisions of this section the doubt or difference may be finally determined by the Governor-General. The Minister may direct the Commissioner to make any alteration in any existing practice or carry out any system or matter of policy, but where any such direction, or any direction or proposition given or transmitted in pursuance of the last preceding section, adversely affects the accounts of the railways, the Commissioner shall notify the Minister thereof from time to time, and the amount of any loss occasioned by the direction or proposition shall, if certified by the Auditor-General, be provided by Parliament in the Annual Appropriation Act and paid to the Commissioner.

REGULATION AND CONTROL OF ROAD MOTOR SERVICES IN AUSTRALIA*

(Prepared from Notes furnished by the Victorian Railways
Department.)

- I. Legislation Affecting Passenger and Freight Services.
 - (a) South Australia.
 - (b) Queensland.
 - (c) Victoria.
- II. Regulation of Road Motor Services in Other Parts of the World.

I.

In South Australia, legislation ("The Motor Transport Control Act") was passed in 1927, under which power was given to prescribe the routes and the conditions of operation of road services (both passenger and freight), but this was repealed in 1928, and, apart from the necessity to obtain a licence, there is no legislation to control or regulate road motor services.

In Queensland, "The Heavy Vehicles Act" prescribes that motor vehicles used for carrying goods or passengers (in excess of seven) for hire or reward shall be registered and the fee prescribed for vehicles operating for hire or reward on routes in competition with the railways is five times greater than in the case of non-competitive vehicles. Vehicles used solely for the carriage of perishable primary products are exempted from the payment of the higher fee. While this Act has a restrictive effect upon competitive vehicles, there is no definite prohibition upon vehicles operating upon any route.

In Victoria, there are two regulatory Acts in force in respect of road motor passenger services—

- (1) The Motor Omnibus Act 1928,
- (2) The Motor Omnibus Act 1929.

Motor Omnibus Act 1928.

In this Act separate provisions relate to the metropolitan area and to urban and country areas respectively.

Metropolitan Area.

With regard to the metropolitan area, it is provided that routes for the operation of motor omnibus services may be prescribed by the Governor-in-Council upon the advice of the

*See also Article on "Legislation for Co-ordination of Transport," on page 165.

Minister for Public Works, who in turn is advised by a Committee (described as the Motor Omnibus Advisory Committee). Before any route is prescribed the Minister is required to—

“Satisfy himself that the condition of the roads to be included in the route is such as to be capable of carrying motor omnibus traffic thereon without unreasonable damage to the roads, and that there are not sufficient other facilities for the conveyance of passengers to, from or within the district proposed to be served.”

A “motor omnibus” is defined by the Act as “any motor car . . . which has seating capacity for not less than eight passengers and plies within the metropolitan area for hire at separate and distinct fares of not more than one shilling and sixpence for each passenger.”

Urban and Country Districts.

The same principles are applicable as in the case of the metropolitan area, i.e., that a licence to conduct a road service shall be granted only if the roads are suitable for motor omnibus operation, and there are not sufficient other facilities for the conveyance of passengers. A “motor omnibus” under the Urban and Country section of the Act is defined as “any motor car . . . with seating capacity for not less than six passengers and used or intended to be used for carrying passengers for reward at separate and distinct fares for each passenger.”

Motor Omnibus Act 1929.

This Act relates to “light motor omnibuses,” which are defined as “any motor car . . . with seating capacity for not more than five passengers and used or intended to be used for carrying passengers for reward.” The provisions of this Act are designed to prohibit, after the 31st December, 1930, the operation of light omnibuses (upon which hitherto no restrictions had been placed) on any of the five principal highways of the State.

The Act, however, permits of these omnibuses operating on any other routes, subject merely to their being licensed.

Road Freight Vehicles.

So far as Road *Freight* vehicles are concerned, no legislation exists in Victoria for their regulation or control, apart from limitation of speed, and a provision (contained in the Highways and Vehicles Act) which limits 4-wheeled vehicles, operating

outside the metropolitan area, to a laden weight of 8 tons if they are competing against the railways, by comparison with the laden weight of 10 tons which is permitted if they are not so competing. It can be said, however, that this has little restrictive influence upon the operations of freight vehicles generally.

II.

Germany.—Applications to establish road motor services are decided by the respective State Governments. Consideration is given to the question of public necessity and the safeguarding of the existing public transport facilities.

Hungary.—The operation of road motor transport services is conditional upon the granting of a licence. The licence is refused if the projected service will considerably endanger the interests of an existing transport undertaking.

Italy.—Permission to operate road motor services is granted only where the lack of transport facilities is felt and when no loss of revenue is likely to result to existing transport organisations.

Norway.—Permits to operate road services may be withheld, or special conditions may be imposed, where this is necessary to protect other public transport services.

Sweden.—Before a licence to operate a road service is granted, the Provincial Government first ascertains whether the projected service will meet a legitimate need without disturbing existing services.

United States of America.—Legislative powers exist in some 41 States for the regulation and control of road motor passenger services, and in some 39 States in respect of goods services, on the general principle that the issue of licences for the operation of such services is contingent upon the granting of a "certificate of public convenience and necessity" by State Commissioners.

LEGISLATION FOR CO-ORDINATION OF TRANSPORT.

- I. New South Wales Transport Act, 1930.¹
 - (a) Transport Trusts.
 - (b) Administration and Management.
 - (c) Control of Privately-owned Motor Omnibus Services.
 - (d) Transport Advisory Committee.
- II. Proposed Ministry of Transport in Victoria.

I.

(a) *TRANSPORT TRUSTS*. — The New South Wales Transport Act, 1930, provides for the establishment of a Metropolitan Transport Trust to take control of the Sydney Tramways, and also a Newcastle and District Transport Trust to assume control of the tramways of Newcastle and district.

The Act further provides for the establishment of other country transport districts and the formation of Transport Trusts for such districts by Proclamation of the Governor.

In addition to having the exclusive right to construct, maintain, manage, and operate tramways for the carriage of passengers within its district, the Trust is required to co-ordinate all public road transport and omnibus services operating in this district for the carriage of passengers. It may establish and conduct road transport services for the carriage of passengers, and from a date to be fixed shall assume control of the licensing and regulation of public vehicles for the conveyance of passengers and goods, and the licensing and regulation of the drivers and conductors of such public vehicles.

An important duty of the Transport Trusts appointed under the Act is "to ensure adequate supervision and regulation in the public interest of all public road transport and omnibus services operating in its district *for the conveyance of passengers*" and to take "all necessary steps to co-ordinate all such operations within its district, mitigate wasteful competition and overlapping in service, and take such steps as, in its judgment, are essential to secure to the public safety, regularity, efficiency, and convenience of service at just and reasonable rates."

The Section (No. 12) in which this is stated definitely relates to the carriage of passengers, although it is stated that

Note: 1. Assented to, 6th June, 1930.

there shall be supervision and regulation of *all public road transport*, while Section 15 states that the provisions of the Metropolitan Traffic Act, 1900, and the Local Government Act, 1919, shall cease to have effect in the district of the Transport Trust so far as such provisions relate to the licensing and regulation of public vehicles for the conveyance of passengers *and goods*.

Therefore, the inference is that so far as the conveyance of goods by road is concerned, the Act does not give any greater powers to the Trust than those which are prescribed in the two Acts of 1900 and 1919 referred to.

In other words, a close review and a legal interpretation of the Act is necessary to determine exactly what measure of control the Trusts shall have over road motor goods services.

(b) *ADMINISTRATION AND MANAGEMENT*. — The Act provides for the appointment of a Commissioner of Road Transport, who shall administer the Act and be the Chairman of all Trusts established under the Act. He is to be the medium of correspondence between the Minister, the Trusts, and the Board of Management, and he is required to keep the Minister informed of the operations of the Trusts and of the Board, and report to the Minister any matter requiring Ministerial action.

The Board of Management is in charge of the construction, maintenance, management, conduct, and control of any tramway or other road transport service operated by the Metropolitan Transport Trust and the Newcastle and District Transport Trust.

(c) *CONTROL OF PRIVATELY-OWNED MOTOR OMNIBUS SERVICES*.—The provisions in the Act which relate to the supervision of privately owned omnibus services are of particular interest.

Commencing on a date to be appointed by the Governor, the Trust constituted under the Act is given complete control over the running of privately-owned motor omnibus services.

Application must be made to the Trust for service licences, and in dealing with such applications the Trust is to take into consideration any existing or proposed facilities for the transport of passengers within the locality proposed to be served, the condition of the roads or streets proposed to be traversed, the normal traffic thereon, and all other relevant considerations.

Where the Trust is of opinion that an application for a service licence does not warrant investigation, or where, in the opinion of the Trust, the existing or contemplated facilities for

the transport of passengers are sufficient, the Trust may refuse the application for a service licence.

Where, in the opinion of the Trust, the service upon a route applied for would come into competition with either railway or transport services, the Trust shall obtain reports from the Railway Commissioners and/or the Board, as the case may be, and if a service licence is granted, the Trust shall impose such conditions therein as to fares or otherwise as in the opinion of the Trust are sufficient to prevent undue competition or overlapping of services.

Existing operators at the date of the commencement of the Act are to be issued with service licences, but as soon as practicable after the coming into force of the Act, and from time to time thereafter, the Trust is required to investigate all transport routes within its district, and after due consideration of any representations which any owner of a motor omnibus or any other person interested in such route may make, shall determine what alterations, if any, are necessary in the public interest to any omnibus route, or the fares or time-tables applied on such route in order to avoid competition and overlapping of service, and carry such determination into effect.

Any person aggrieved by a determination of the Trust as to the allocation of a route may appeal to the Transport Appeal Court.

(d) *TRANSPORT ADVISORY COMMITTEES.* — Provision is made for setting up a Transport Advisory Committee or Committees from time to time to enquire and report upon any of the following matters:—

- (a) The internal transport requirements of the State;
- (b) the economic advantages of various forms of transport in various parts of the State by alternative methods; rail, road, or water;
- (c) the prevention of wasteful competition in any particular part;
- (d) the adequacy or otherwise of taxation for the construction and maintenance of roads;
- (e) the charges and conditions of privately constructed transport undertakings not under the control of a Trust formed under the Act;

- (f) the provision of by-pass roads or the adoption of other measures calculated to facilitate transport and relieve traffic congestion and the means available to meet the cost thereof; and
- (g) any other matter connected with the transport of goods or passengers which is referred to it by the Governor.

II.

A Bill for the creation of a Ministry of Transport in Victoria is now before the State Parliament.² The principal aim of the measure is to prevent wasteful competition between various transport services—both for passengers and goods—by co-ordinating them. At present the railways are under separate Ministerial control, the tramways are directed by the Tramways Board under the direction of the Minister for Public Works, country road motor services are controlled by the Country Roads Board, and metropolitan buses are under the control of a Motor Omnibus Advisory Committee, on which the railways, tramways, metropolitan municipalities and private owners are represented. With all these services under one control, it is hoped to eliminate overlapping, and ensure a measure of co-operation which hitherto has not been practicable.

Under the Bill, the Minister of Transport will be responsible for the duties now performed by the Minister of Railways; the existing Melbourne and Metropolitan Tramways Board will be superseded by a Tramways Commissioner (who will be responsible to the Minister of Transport), and the Motor Omnibus Acts will be similarly administered by that Minister. The Motor Omnibus Advisory Committee now functioning will go out of office. The establishment of a Department of Transport, comprising a railways branch, tramways branch, and road transport branch, is provided for. Provision is also made for the appointment of an Advisory Committee of seven members to assist the Minister. The Minister of Transport, or a person acting on his behalf, shall be chairman, and there shall be one member representative of each of the interests concerned, viz.: Railways, Tramways, Country Roads Board, Motor Interests, Metropolitan Municipalities, and Country Municipalities.

A. G. WHITLAM,

Melbourne.

² 1st August, 1930.

A NOTE ON ROAD EXPENDITURE.

The statistical data for roads in Australia are very unsatisfactory. No significant figures for the length of roads can be given, because "road" has such diverse meanings. In some conditions a good road is given by the natural ground, while in others heavy expenditure on every yard is necessary to make it passable even for a bullock dray. The Commonwealth Transport Committee (1929) estimate the total mileage at 280,000, of which nearly half is unformed. The total includes 35,000 miles of "main roads." But the classification of roads as main roads is limited by financial considerations, and main roads shade off into "other roads" by imperceptible gradations of importance. The capital cost of all roads is estimated by the Committee at £150m. and of 406,000 private motor-cars at £100m. When about 75,000 commercial motors and all horse-drawn vehicles are brought into account, the total capital cost of roads and road vehicles must be of the order of £300m., compared with £312m. for the railway system.

For the total annual expenditure on roads, a satisfactory figure is still harder to obtain. The information in the Commonwealth Year Book is very incomplete, and roads are omitted completely from the Commonwealth Transport Bulletin. The difficulty is due in part to the varied and complicated systems of State finance in the matter of roads, and still more to the deficiencies of local government finance, in which road expenditure is seldom separated out from other expenditure on "works." A thorough investigation is required, but with the pressure for economy in Federal administration, there does not appear to be much prospect of this important work being done officially in the near future.

The Commonwealth Transport Committee has collected a good deal of information on road expenditure, but, except in the case of New South Wales, it is very far from complete. This information is contained in the full report of the Transport Committee, which has not been printed. Only a brief reference is given in the printed "summary."

Road expenditure has to be considered from two aspects—the class of road concerned and the source from which the money

is obtained. From both aspects there are wide differences between States, and only a few rough generalizations can be given here.

Roads may be divided into three main classes :

- (a) Main roads, with varying sub-classes of State highways, trunk roads, arterial roads, and tourist roads.
- (b) Developmental roads (in some States).
- (c) Other roads.

For (a) the expenditure is found chiefly by the road-user through taxation of the motor vehicles by the States, and taxation of petrol by the Commonwealth and also by South Australia. A considerable portion comes from local government taxation, falling chiefly on the land holder. A contribution varying much between States comes also from the general taxpayer. The financial arrangements are in continual flux, and the trend is towards the position nearly reached by New South Wales, with the general taxpayer relieved entirely and the road-user paying most of the cost. The Committee estimates that £10 m. was spent by Central Road Authorities in 1927-28, chiefly on main roads, and that about £3 m. of this came from loans.

"Developmental" roads (b) are of minor and decreasing importance, except in Victoria. After construction they will tend to be grouped either with main roads or "other roads" for maintenance. The general taxpayer at present bears the main share of the cost of construction.

The cost of "other roads" (c) falls mainly on the local landholder with very varying contributions from the general taxpayer. The extreme case is Tasmania, where the capital cost has been almost entirely met from loans and the interest as well as some of the maintenance found by the general taxpayer. In general, the tendency is towards putting the cost almost entirely on the local landholder, as is practically done in New South Wales.

A cross classification is that of unemployment relief roads. These may be (a), (b) or (c), but the cost for the most part falls on the general taxpayer.

No satisfactory figure can be given for the total expenditure on roads. The Committee arrived at a definite estimate for New South Wales under the arrangements existing in 1929 of a total road cost, including interest, of about £5 m., of which £2 m. was borne by the road-user, and £3 m. by the local landholder, and only a trifling amount fell on the general taxpayer. We may

very roughly guess the total annual cost for Australia at about £14 m., of which £6 m. is borne by the road-user, and £8 m. chiefly by the local landholder, with a considerable but decreasing contribution from the general taxpayer.

The contribution made by the road-user can be definitely ascertained. The State taxation of motor vehicles amounted to £4.2 m. in 1928-29 and the Commonwealth taxation of petrol was estimated at £1.85 m., giving a total taxation of the road-user as such of about £6 m.

The State taxation varies between States. The following amounts per head of population and per motor vehicle (excluding bicycles) were collected in 1928-29:—

Motor Taxation for Year 1928-1929.

	Per Head.	Per Motor Vehicle.
New South Wales	£0 13 8	£8 2 10
Victoria	0 12 5	7 11 11
Queensland	0 10 3	6 3 6
South Australia*	0 19 7	8 4 11
West Australia	0 13 0	7 3 6
Tasmania	0 8 2	6 13 6

It will be seen that though the amounts per head of population differ very widely, there is no great difference in the amount per motor vehicle, and that the distinctions frequently drawn between States in respect to severity of motor taxation have no substantial basis.

The contribution from the Commonwealth taxation of petrol is under the Federal Aid Roads Act of 1926 by which the Government agreed to provide £2 m. a year for 10 years for certain types of road on condition that the States provided 15/ for every £1 of Federal contribution. The distribution among the States is for three-fifths of the amount in proportion to population and for two-fifths in proportion to area. This allotment, with some special consideration to Tasmania, gave:—

New South Wales	£552,000
Victoria	360,000
Queensland	376,000
South Australia	228,000
West Australia	384,000
Tasmania	100,000

£2,000,000

*Excluding Tax on Motor Spirit.

By the terms of the Federal Aid Roads Agreement the money thus provided was to be used on construction or reconstruction of arterial roads, trunk roads, and main roads of a developmental character. Some relaxations of conditions have taken place for individual States, and further concessions are under consideration. The scheme is not unlikely to end in a Federal grant for any road purpose, to be raised from the taxation of petrol. A combination of taxation of vehicles and of petrol used seems to give the fairest results in taxation of motor-users, and the taxation of petrol is much more easily carried out by the Commonwealth than by the States.¹

The loan expenditure on roads up to June, 1928, was as follows:—

New South Wales	£m. 8.60
Victoria	9.86
Queensland	2.74
South Australia	3.22
West Australia	1.28
Tasmania	4.55
	<hr/>
Six States	30.25

The burden of interest is variously allocated in the different States. The outstanding fact is the heavy load on Tasmania in proportion to population as a result of construction of all roads from loans—a policy only partially excused by the heavy cost of road construction over a very rugged surface under a heavy rainfall.

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1. At present (July, 1930) the Government is being strongly urged to discontinue the Federal Road Grant. Such a step would carry a moral obligation to relieve petrol of the equivalent taxation and would be no help to balancing revenue and expenditure. It would also disturb the considered arrangement for the incidence of motor taxation. On all grounds it appears wiser to continue the grant but to allow it to be used for any road purpose without conditions, so as to relieve the States of an equal expenditure.

AUSTRALIAN OVERSEA SHIPPING.

- I. Australian Conditions.
- II. Liners and Tramps.
- III. Wheat Cargoes and Freight Rates.
- IV. Tramp and Liner Freights.
- V. Indexes of Freight Movements.
- VI. Security of Service and of Cargoes.
- VII. The Liner Services.
- VIII. Competition and Organisation.
- IX. Rationalisation.
- X. The Present Critical Position.

Marshall¹ has somewhere remarked that the ship *still* embodies the most sustained thought, the greatest co-operation in technique, and the highest degree of mechanical and organising genius of man. It is probably because of this fact that international rivalries in ship *building* and in Atlantic speedsters are given so much importance. Prestige is represented by this sport more than by any other. And the management of shipping is scarcely inferior. Shipping and sea transport have indeed been the pioneers of progress since the caravan, and sea-faring people from the ancient Greeks have been pioneers of ideas and of liberty. And just as shipping management has been the pioneer of banking and the prime minister of trade, it is also the pioneer of business co-operation and of technique in organisation generally.

To Australia this technique and management is one of the conditions of progress, and upon the ability and long-sightedness of its personnel depends in no small degree the prosperity of our people. In this article I cannot do more than describe in outline the problem and the organisation that exists for managing the "berth" cargo trade of the regular Liners between Australia and Europe, but as this is the most important, it can serve as an indication of the general position.

The Conference system is described by Marshall, who wrote with all the critical scepticism of 19th century tradition, but with the mind of a scientist. He thought that this system might be abused, and that "the only remedy is to be found in expres-

1. *Industry and Trade*, Book III, Chapter 3, gives the best short account of the economics of shipping. Chapters 4, 5 and 6 are devoted to railways and are deficient only in that motor competition has developed since. It is interesting to note that although the *Encyclopædia Britannica* devotes about a volume altogether to shipping, it has not a paragraph on its economics.

sions of public opinion.'² He did not anticipate such developments as followed the Imperial Shipping Committee's report of 1922, nor, a few years ago, could anyone have anticipated such an organisation as the Australian Oversea Transport Association. This is the same "Conference" idea, extended to include the shippers and the industries which use the ships, and it rests upon the same voluntary co-operation and unanimity of opinion on essentials, after discussion, without which both the ship-owners' Conferences and this latest development would break down. The only effective force in these discussions is the moral force of persuasion exercised by a minority, and the moral force of opinion exercised by the majority.

I.

Every trade has its own peculiar requirements and every country is served by the world's shipping. Australian requirements have, nevertheless, some special and onerous characteristics which make cheap services difficult, and efficient service a matter of particular importance. Australia is not only the most distant continent, but it is on no trade route, so that its transport problem is similar to that of our most inland towns. Australian cargoes cannot be set down and picked up en route to somewhere else; it is itself a terminal. And once the Continent is reached from oversea it takes as long to reach the main ports on the further coast as it does to cross the Atlantic. Moreover, the ports are spread from Fremantle to the north of Queensland, with Tasmania as a diversion. A cargo vessel has commonly to spend four to six weeks discharging and loading around our continental coastline. The number of loading ports has increased and the demand is constantly for more discharge ports in Europe also. The technique of loading and discharging different classes of cargo at and for so many ports is a problem in itself, but what is more important is that the time taken in Australian waters has increased while the ships themselves have become more costly.

The seasonal character of Australian exports makes its transport requirements very onerous. The *average* annual fluctuation of export of wool, meat, wheat, fruit and butter has been forty per cent. in recent years, and the range of these fluctuations is enormous. These cargoes have to be planned for several months in advance, long before seasonal and market conditions are known, and before some of the produce (*e.g.*, fresh fruit) begins to be grown.

² "Industry and Trade," page 435.

Moreover, most of the different cargoes require special service. Wheat can wait for full cargoes and proceed leisurely to one destination. But wool is too valuable; it must travel rapidly to a variety of destinations in relatively small quantities as soon as it is sold. The various refrigerated exports need different temperatures and prompt service to suit every market. The requirements of cheap and efficient service are made more difficult by the costs imposed on shipping by Australian conditions. Port charges have been unnecessarily high,³ and these, together with the labour costs of handling cargo, are certainly higher than in any other competing country, if not in the world. The shipowners bear these costs in the first place, but the cargoes must bear them eventually, and yet the freight rates must be such that the exports can be shipped and sold at a profit to the producers. All these conditions are imperative, and upon them depends the prosperity not only of the industries themselves, but of Australia as a whole.

II.

The shipping organisations which have been developed to cater for this trade have passed through many different stages and have marched with the world's progress. Wool, which formerly was sold in London long after it had been accumulated, is now sold regularly at the main ports, and shipped as directly as possible to its numerous destinations. The Liner system of shipping came into vogue soon after the steamship, and ships have become not only means of transport, but cold storage containers, which scheduled itineraries as reliable as the rising sun. There are now 22 of these "Lines," representing seven nationalities and fourteen different groups of interests, counting the Italians and Germans each as one. It is generally recognised that despite its distance and position, Australia is well served by its oversea services.

The bulk of Australian exports are now carried in relatively small quantities by regular liner vessels. But not all the cargoes are so carried. For example, the major portion of our wheat is shipped in tramp vessels that assemble here in the export season and are chartered to carry whole cargoes for a single destination. This is naturally a much cheaper service than the liner service. The tramps are inferior and slower ships; they belong to no one trade and have obligations to no country or group of shippers. In good seasons they come to Australia and in poor seasons they

3. See paper on "Port Charges."

go elsewhere. They are just as essential as the Liners, but for a different class of service.

The cargoes carried by these two services are known as "charter cargoes" and "berth cargoes" respectively. The charter cargoes are those for which a whole ship or part of a ship is contracted for a definite job, usually between one port and another. The "berth cargoes" are those which depend on a regular service and a succession of ships to carry them as they become available. These are the liners, but they also carry small quantities of the "charter cargoes" (wheat, minerals, etc.) to suit both the convenience of the shippers and of themselves. The "stiffening" supplied by such cargo is sometimes important to the loading and ballasting of the ships. The rates of freight on these cargoes are governed directly or indirectly by charter rates, and vary more than berth cargo rates.

III.

When Australia has a plentiful wheat harvest, its exports are naturally increased more than the production, because local consumption is relatively stable. Similarly, the proportion of the wheat carried by tramp vessels is naturally greater. "Parcel" wheat cargoes remain more stable. For example, in 1928-29 the wheat *production* was increased by 35 per cent., but the exports were increased by 60 per cent. on those of the previous year. The "Charter" cargoes of wheat almost doubled on those of the previous year, but the "parcel" cargoes actually decreased. In 1927-28 "parcel" wheat comprised about 38 per cent. of the total exported: in 1928-29 it comprised about 20 per cent. The smaller the harvest, the smaller the quantities the wheat is exported in.

The freight rates for "charter cargoes" are as competitive as any prices for any goods or services anywhere in the world. The competition for Australian cargoes is perhaps less than for other countries, not because of any combination (for there is none) but because Australian loading costs are so high that many tramp owners have withdrawn from the trade.⁴ Evidence in my possession shows the reason: In 1928 the *lowest* expenses varied from 4s. 9d. per ton (according to circumstances) to 9s. 4d., the general level being about 7s. 6d. The *highest* expenses elsewhere in the same year were: Canada (bagged

4. Fifteen different shipowners can be cited. Australian charges represent 27 per cent. of the gross freights received by representative ships. The South African figure is 16½ per cent. and the Indian 9¼ (Chamber of Shipping Annual Report for 1928-29).

wheat) 4s. 6d., bulk, 2s. 11d.; U.S.A., 3s. 9d.; South America, 5s. 1d.; South Africa, 4s. 1d.; India, 2s. 5d. The time spent in loading in Australia averaged about 460 tons per day, while in North America the tons loaded per day were always well over 1000 (assisted by bulk handling)⁵, and elsewhere from 440 in Buenos Aires to 700 in India and 710 in South Africa. The delays and uncertainty of delays due to waterside stoppages has, of course, been an additional reason.

The total cost, including both loading and port charges, and of the time spent has worked out on the average as follows: Australia, 11s. 6d. per ton; North America, 3s. 4d.; South America, 5s. 6d.; South Africa, 5s. 11d.; and India, 3s. 8d. Much of this increase over other countries has taken place since the war. In all other countries post-war charges have been reduced. It is not surprising, therefore, that while charter rates for the world as a whole were in 1928 only 10 per cent. above the pre-war level, the Australian charter rates were from 40 to 62 per cent. higher.⁶

IV.

Towards the end and immediately after the war all freights were extraordinarily high, because of the shortage of shipping and the high cost of replacements. The Chamber of Shipping index of tramp freights shows that with 1920 freights represented as 100, pre-war (1913) freight averaged 23 and 1928 freights about 25. (The index has fallen since.) This, of course, involves heavy losses. The Liner freights to and from Australia were increased during the war, and in 1924 they were about 74 per cent. above the pre-war level. By that time freight rates were falling everywhere, and in conformity with this fall Australian Liner rates were (by 1926) reduced by about 18 per cent. on the average, leaving them roughly at about the same level as the increase in retail prices. There has therefore not been a great deal of difference between the movements of tramp and of liner rates. What excess there is in liner rates is explained by the higher level of costs borne by them, and the proportionately higher increase required in consequence.

It is important to note that these decreases were initiated

5. With bulk handling the tons loaded per day run into several thousands. Canada is geographically suited to this method, because its wheat is accumulated at fewer ports.

6. They have since fallen temporarily for three reasons—

- (a) The general slackness in demand.
- (b) The short Australian harvest, and
- (c) Some ships have carried coal to Australia and were here for any loading.

by the shipowners in conference and on the reasonable expectation that Australian costs would decrease and Australian cargoes increase. Neither of these hopes have been borne out; the costs have not fallen, and the export cargoes have not increased as was anticipated. A high level of imports has been maintained until this year, but the shipowners have suffered the larger part of the cost of their freight rate decreases.⁷

The chief differences between tramp and liner freights are that the former are lower, because they carry lower value cargo at lower costs,⁸ and that tramp rates fluctuate from day to day, while liner rates remain stable for as long periods as possible.

The graph on page 179 gives an indication of the fluctuations in tramp rates throughout each year. The actual charter rates are not available here, and the graph gives the liner "parcel" rates for wheat, which, although based upon charter rates, do not fluctuate quite so much.

It will be noted that the rate rises in the months of greatest demand, and that on the whole it has fallen. The reasons for the fall have been explained in a footnote to the previous section.

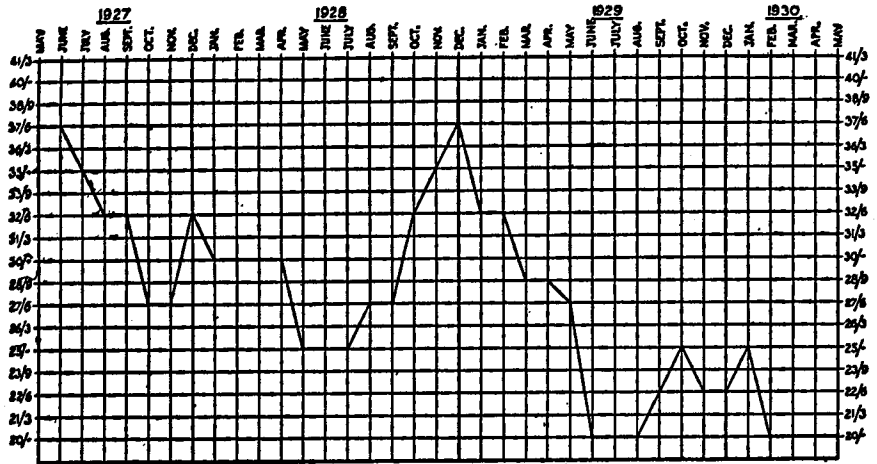
The contrast between the fluctuations and the stability of liner rates is conspicuous. Liner rates are relatively "flat rates," and in Australia over both time and space. The same rates are charged at all loading ports⁹ and at all times of the year.

This principle clearly separates the liner from the tramp, and the liner cargoes from the tramp cargoes, and is an essential characteristic of the former. The "Lines" enter the trade on the basis of regular service, and construct ships adapted to the particular trade on their estimate of the prospects of that trade as a whole (excluding charter cargoes), over the whole of each year. They respond to the needs (for example) of Australian exports, and they fix their freight rates on their prospective carryings and costs over a long period. They could, no doubt, vary their rates with their carryings at different seasons, but this would not suit the shippers. It would unduly concentrate

7. The Delegation representing British Shipowners which visited Australia in March, 1929, brought indisputable evidence of losses during the preceding three years amounting to £2,900,000. No interest on capital was provided for in these losses, and only six representative Lines were accounted for. See *Report of Conference with exporters, etc.*, published by the Commonwealth, 1929. The present position is dealt with later.

8. Tramp rates are higher in proportion to the value of their cargoes. The question of relative rates must remain outside the scope of this paper, but the principles are the same as with railway rates.

9. Irrespective of differences in steaming and local costs. This places all shippers on an equality and avoids friction, but it is used as an excuse by port authorities for not reducing excessive charges in their ports, notably Melbourne. It is required by the Mail contracts.



Parcel rates per ton for wheat, Australia to U.K./Continent.

the marketing of cargoes and lead again to the uncertainty the liner services were established to avoid.

V.

There have been no indexes or other information showing the relative movements in freight rates from Australia as for coastal shipping until the Tariff Board's Report on the Navigation Act, published in March last. This report attempted to deal with the comparative increases in freight rates overseas and interstate, and a graph purporting to indicate the trend of these rates was published at the end of the report.¹⁰ Unfortunately the comparisons made were most misleading, and it becomes obvious that some statement is required. I have, therefore, endeavoured to give here an indication of the movements in both charter and liner rates for Australian cargoes to the United Kingdom since the war. The charter rates are those given as the geometrical averages for each year by the British Chamber of Shipping.¹¹

These figures are in shippings per ton. No similar figures have been available for liner rates, and I have had to construct an index for the purpose of this paper. I have therefore taken the average movements each year for representative cargoes, giving wool twice its "weight" in the average, and using skins, tallow, general cargo, beef, lamb and butter with equal weight for each in addition to wool. For convenience of comparison I have computed both the Chamber of Shipping tramp freight index and the liner freight index (so constructed) on the basis of 1920 = 100. The other years are therefore relative to 1920. The following is the result:—

Indexes of Tramp and Liner Freights from Australia to U.K.

Year.	Tramp Freights.	Liner Freights.
1913-14	17	36
1920	100	100
1921	43	88
1922	30	76
1923	26	68
1924	28	63
1925	28	63
1926	26	58
1927	30	55
1928	27	55
1929	—	55

10. A review of this Report by Professor L. F. Giblin appears in the *Economic Record* for May, 1930.

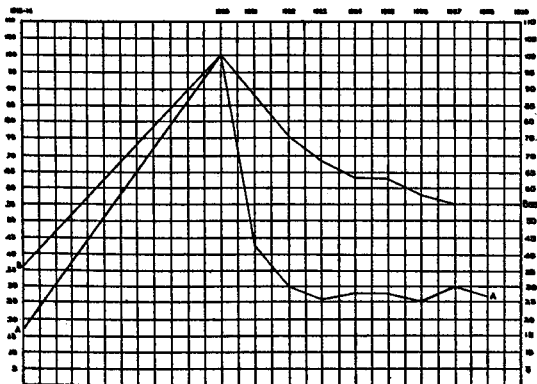
11. Report for 1927-28. On page 79 it is explained that the averages are for tramps. The Tariff Board compared the previous year's figures with certain Australian Liner freight rates.

The figures show that tramp freights increased over the 1913-14 figures by about 60 per cent., and liner freights by about 53 per cent.¹²

The Chamber of Shipping annual report, since received, gives the average tramp freight index for 1929 as 21.3. The reason for this abnormally low rate is given in Footnote 6.

The following graph shows the movement in *each* of the two classes of shipping rates on the figures given above. The fluctuations within the years are not shown. They do not exist for liner rates, and have been shown in the earlier graph for tramp rates.

INDEXES OF TRAMP AND LINER FREIGHTS FROM AUSTRALIA, 1920 = 100.



A—Tramp Freights from Australia to United Kingdom.

B—Liner Freights from Australia to United Kingdom.

Curve A is the Chamber of Shipping geometrical average freight per ton (as published in the Annual Report for 1928-29, p. 183), computed with 1920 as base = 100. It has fallen to 21.3 for 1929.

Curve B is derived from a roughly calculated index of Liner Freights based on the movements in the freight rates for wool, skins, tallow, general cargo, beef, lamb, mutton, and butter, averaged simply but with double weight given to wool. It has been level since 1927.

12. On a very crude basis the Tariff Board estimated the Australian coastal freights increased by 83 per cent. This is obviously not excessive in the circumstances of coastal shipping, but the Board's estimate of a 73 per cent. increase in overseas freights was based on charter freights between 1913 and 1927, which was an abnormal year. The Board ascertained from the Liner representatives that their freight rates had not altered since 1927, and applied this to charter rates which have declined. It then compared the tramp rates so (wrongly) quoted with coastal liner rates crudely estimated.

VI.

The liner system has grown in response to the requirements of modern cargoes, including refrigerated cargoes. These requirements are for speed, safety, regularity and for the carriage of relatively small quantities of goods, as and when they are available, and when and where the markets require them. The shippers need to *rely* upon getting the kind of accommodation they need as nearly as possible when and where they want it and for the discharge ports they happen to desire. Obviously it is impossible to fulfil all of these requirements at all times for every shipper, and when all the circumstances are taken into account it is rather surprising how near the services come to meeting every need. It can be done only by some degree of deliberate co-operation through the Conference system, and it can only be done well by the fullest degree of co-operation with shippers, through a further conference system such as has now been established in Australia.¹⁸ The A.O.T.A. has adopted the principle stated by the Imperial Shipping Committee, that "the shippers want the ship on the berth without fail, and the shipowners want the cargo on the berth without fail." Stability of freight rates having been secured as a condition of stability of service, the next step towards stability is to get security of cargoes. This, of course, is impossible with seasons and market conditions continually changing, but the nearest approach can be gained by securing whatever cargo is available.

It has been found necessary to give some inducement to shippers to be loyal to the services that give them security, and to protect the shippers who do so, against competitors who might gain some advantage by deserting the regular lines and undercutting those who are loyal. This is because, in the "peaks" of the seasons, tramp ships are liable to come in from any part of the world, offer tempting rates below what the liners can afford to receive, and capture some of the carrying. Were the liners to vary their rates and to charge more in the ebb of the seasons, this would not happen, but the shippers do not want that. Because *some* shippers are not long-sighted enough to recognise their own best interests, some "tie" is required in the interests of all, including the shipowner, the shipper, and the country itself.

In the early stages of the liner system the only method open to the shipowners was what is known as the "rebate" system,

18. The Australian Overseas Transport Association, of representatives of shipowners and of shippers respectively with Joint Committees in each State. A pamphlet describing the organisation, its policy and its objects, can be had by writing to the Secretary, the Sydney Chamber of Commerce.

under which the shippers paid freight rates based on some insecurity, and those who gave security and did not go outside the Lines with "berth cargo" received a rebate on the freight already paid. This system has become obsolete with the growth of Shippers' Associations, and of agreements to confine berth cargo shipments to the berth vessels on consideration of paying lower rates of freight than are charged to others. Naturally the system had to have time to grow, and to be understood.¹⁴

VII.

The British Chamber of Shipping reported in 1927 that there were then 564 regular liner services for the United Kingdom to all parts of the world. The gross revenue was estimated in 1928 to be about £140,000,000, but the Chamber reported that it would require an increase of 30 to 40 per cent. in the world's oversea trade to employ shipping as well as in 1913, "whereas it is at present doubtful whether it has increased as much as 10 per cent." The repercussions are, of course, felt in Australia.¹⁵

The liner services have been described by their distinguishing characteristic—regularity. But the system is not rigid; nor are the Australian services confined wholly to Australia. Some of the mail steamers earn revenue in the European summer, when our passenger demands are low, by becoming tourist vessels. Some of the cargo lines are associated with the New Zealand trade, and others with the other continents. A complete Australian service would be economically impossible if it were confined to the Australian trade.

The oversea services can be classified into four main groups, in the order of their rigid adherence to the Australian trade, and in the elasticity they provide to meet our greatly fluctuating

14. It has been much misunderstood in Australia, and no doubt abuses have existed. Such contracts were probably illegal until this year. But it is now recognised that some system is required for honest people, and the Federal Parliament, without opposition and amid general approval, has this year passed an Act (*The Industries Preservation Act 1930*) enabling appropriate contracts to be made if approved by the "A.O.T.A." The proposed contracts are described in the pamphlet mentioned previously. The Victorian Railways last year introduced a system of discriminating freights between Albany and Melbourne in favour of traders who consign their goods exclusively by the railways. This seems to contravene Section 7 (b) of the Australian Industries Preservation Act 1906-10, amended this year to allow of similar contracts for oversea shipping. The N.S.W. Railways are being authorised by State law to make similar discriminations.

15. I estimate roughly that the gross freight received by all overseas shipping has been about £20,000,000 a year. It is now being reduced at the rate of at least £1,000,000 a year, because of reduced imports, embargoes and virtual prohibition. The oversea ships are not allowed to engage in the coastal trade either for cargo or passengers, except upon impossible conditions. This is a national policy intended to protect the interstate services which, at Australian costs, could not compete with oversea ships. It naturally limits the revenue of oversea ships and tends to increase both coastal and oversea freights.

demands per carriage. These are (a) the chief mail liners,¹⁶ (b) the scheduled passenger and cargo liners, (c) the non-scheduled liners, and (d) the tramps. Occasionally the non-scheduled ships serve as tramps, or take part charters for wheat and other non-berth cargoes, and this provides greater elasticity still. These ships are perhaps the most important, in that they give regularity when it is required. They are no less efficient and superior to the tramps, and they are used in conjunction with other regular services, where seasons and busy periods can be "fitted in" with the slacker seasons in Australia. Some Lines have both scheduled and non-scheduled vessels, and obviously the larger the interests served the better the whole can be managed. The various amalgamations and groupings of recent years can be explained by this reason alone. A Company that is confined to the trade between two countries, or to and from one country only, has difficulty in competing with others whose costs are reduced by constant adjustments of sailings to suit the changing conditions of different parts of the world.

The costs of providing efficient services for Australia are therefore shared with the costs of providing them for other countries. Were it not for the size of the interests serving Australia, and for the so-called "Combines," we should have to pay higher freights or have less efficient service, neither of which we can afford. The liner services give the elasticity of the tramps, together with the benefits of regularity and stability of freight rates and real responsibility for the country's external transport. The Oversea shipowners are committed as irrevocably to the prosperity of Australia as any internal interest, and as companies they have invested much more heavily than any of the individual producers.

VIII.

It is commonly supposed that all effective competition between these large interests has been eliminated. If it were, the problem of rationalisation would be simple, but the efficiency of the service might be less. The Conference system does not eliminate competition except from freight rates; it *diverts* price competition into service competition, and competition continues to such an extent that waste is caused. The Australian trade has

16. The Orient Company received from the Australian Government £130,000 a year for the carriage of mails (the P. & O. Company is paid by the British Government). The total payments for oversea mails are about 10 per cent. of the whole payments for conveyance. Railways receive £566,000; other inland transport £719,000, and coast shipping £50,000 (Budget estimates for 1929-30).

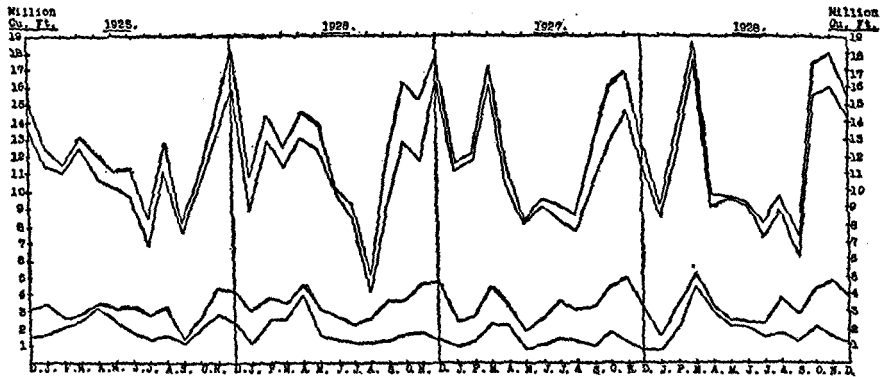
been over-tonnaged, partly (it is true) because of over-optimistic anticipation of the growth of our exports, but also because of competition between the large groups for the trade that was expected and has been available. Tonnage has now to be reduced, and wasteful "service" also; so far that has meant unnecessary calls at ports, bringing with it the disservice of unnecessary delay in despatch from individual ports to the overseas destination.

The shipowners themselves have reached a stage when freight rates must either be increased to such an extent as to destroy some part of the trade (or at least prevent expansion), or they must control their own competition.

This is no easy matter. It is one thing to form large groups and quite another thing to unite these large groups. Adversity can do it and is doing it to some extent in many industries, but with shipping the difficulties are rather special. The traditions of shipping are strong and they are all against it. The national interests associated with shipping are powerful enough to prefer national independence: economic loss is preferred to the loss of prestige and national dependence. The problem is not unlike that of the League of Nations.

Moreover, the *private* interests of the various companies are so interwoven with other interests outside shipping that the sacrifice required may seem too great. Finally, the job cannot be done for the trade of one country alone, and as has been explained, the shipping companies do not confine even their shipping to Australia. The job is too big, and for the sake of Australian economics the best must be made of the situation, and only such closer organisation and contact as is possible can be attempted.

The rationing of tonnage must be proceeded with on some basis, and with the co-operation of the shippers, who are now actively engaged in the forecasting of their requirements, considerable progress is being made. But the scope of the problem can be gauged from the following graph, showing the fluctuation in Australian exports (of berth cargoes only) for 4 years. No two years are quite the same, and the variations throughout the year are prodigious. It says something for the efficiency of management in the past that tonnage supplied (shown by the top curve) has been adjusted so closely to the cargoes to be carried.



Seasonal fluctuations in liner cargoes and tonnage provided (Australia to U.K., Continental, and intermediate ports). The four curves, in order from the base upward, represent (a) refrigerated cargoes shipped, (b) refrigerated space provided, (c) all cargoes shipped, and (d) all space provided. The fluctuations would be more extreme were it not that cheap cargoes are shipped in greater proportion in the slacker months.

IX.

The problems at the time of writing have been intensified by the slump in imports and by the tariff and embargo policy of the Federal Government. In 1929, the problem was to make economies amounting to above £1,000,000 a year. About half of this amount was represented by port charges in excess of requirements, by income taxation charged on gross receipts, and by Customs duties on ships' stores. It had been hoped to save about £500,000 a year by rationalisation,¹⁷ and active preparations were commenced in 1929 in anticipation of the Contract System, now made legal by the Federal Parliament. It is well, however, to note the obstacles which have to be faced, and which are to some extent being overcome.

The first essential is to know what cargoes require to be carried, and every effort is being made, both by the shipowners and the shippers concerned, to get the best forecasts possible. A technique is being developed. The obstacles might indeed appear insuperable, for seasonal and market conditions are both constantly changing. The following experience of this year will illustrate the problem.

An abnormal fruit crop required the chartering of three special vessels from outside the Australian services. These were difficult to get, because the freights even on a full cargo one way only are not attractive, and the vessels suitable for the trade are scarce.¹⁸ Wool sales were postponed and offerings reduced because of market conditions, causing heavy losses to ships which had to leave relatively empty. The oversea meat market improved suddenly, and exporters wanted refrigerated space immediately, on ships crammed with fruit. When the space was provided by readjustments the market fell away again, and the space was not required. Flour exporters never know far ahead how much flour they can sell abroad and where it is to be shipped.

The least difficult cargo for which space can be rationed is wool, and fortunately this is the chief of the export cargoes. A summary account of its problems will illustrate the position. The trade is well organised, and most of the wool is sold on an ordered plan. If wool alone were to be carried the following procedure would be followed:—

17. Assuming the gross freight revenues of the British and Continental Lines to be about £1,000,000 a year, every 1 per cent. saved would represent £100,000.

18. Every possible vessel was secured, but one preferred to "lay up" rather than to accept the conditions, the guarantees being uncertain until it was too late to fix a definite charter. The exporters did not know their complete requirements until the fruit was picked. The weather and its effects varied almost to the last minute.

Estimates are available of the total wool to be *offered* at each sale. To these must be added the wool shipped on private account or for sale abroad. The total shipments from each port each week are estimated, this being the amount offered, less wool not sold, less wool not available in time for the vessels to load. Of the *total* wool to be shipped, no one can tell until the wool is sold how much will be sent to the United Kingdom or to the Continent (and to each port), and how much to Asia and elsewhere. The small amounts bought for local consumption can be neglected. Estimates have to be made on previous experience.

It might be thought that on these estimates the wool could be allotted to certain ships for definite loading and discharge ports, and now that the idea of rationalization is in the air, some people expect to see two ships load wool where a dozen did before. Why cannot a wool ship fill up at one port like a wheat ship, and get away for its numerous destinations? The answer is that the shippers have different interests and requirements. *Each* (and there are many) wants his wool sent quickly to a variety of destinations and by the vessel he chooses. A British ship may not carry German wool or an Italian French wool, nor in all cases may a London ship carry wool for Hull, and so on. The choice of the shippers must be restricted, but their liberty and convenience must be respected.

In addition there are the problems of the shipowners and their agents. Ships cannot be scheduled to fit wool sales only, even if the sale dates were known far enough ahead. Each Line has also its own local interests to consider. Finally, there are the obligations to discharge cargo, and to cater for other cargoes from Australia, in which refrigerated space plays an important part. Different refrigerated cargoes cannot be carried together, nor can the cargoes be kept waiting for a week or more. They need cold storage and to catch markets. A port may have to be visited to load "stiffening" (heavy cargo to give ballast). There are severe limits, especially at the beginning, to any system of rationing shipping space, but the work is being done. It is fair to say also that it is being done with remarkable goodwill on the part of the Shipping Companies and of their Agents in Australia. It involves not only considerable work and expense, but no small amount of sacrifice at the moment in the common interest. Such sacrifices cannot be adjusted equally, and long views are required to make the scheme work.

The problems are these:—(a) to reduce tonnage to the amount actually required, with the smallest possible margin for unexpected and spasmodic increases in exports, (b) to reduce the non-berth cargo carried to the minimum, consistent with the "parcel" requirements of shippers, and (c) to reduce avoidable calls at loading ports.

X.

The extraordinary circumstances of this year are forcing the pace, and each of these problems has now to be tackled with special energy. The programme of the A.O.T.A. has to be expedited, and in the knowledge that half of the economies planned for last year must be postponed. These are the *then* excess charges on shipping and cargoes¹⁰ which no doubt the ships and cargoes must continue to pay. It is impossible, however, for the shipowners to reduce their costs to the extent of 25 per cent. (which is about the prospective loss of revenue due to decreased imports) *in addition* to the economies previously contemplated. To the extent to which the shipowners maintain present freight rates, and have to bear present and prospective losses, they will be investing in the future prosperity of Australia.

At the time of writing the position is very critical, and the problems before the A.O.T.A. are as follows:—

(a) While there is now no legal impediment to the making of contracts for the exclusive shipment by liner vessels of all berth cargoes, such contracts must be at fixed rates of freight and must be approved by the A.O.T.A. The rates and other conditions can be varied by the parties, but only with the approval of the A.O.T.A., and the standard Agreement provides that they are continuous unless three months' notice is given to terminate on 30th June in any year. The contracts are to be between individual shippers and the shipping companies.

(b) The shipowners are to be bound under the proposed contracts both to the rates prescribed and to carry tonnage for "the ordinary requirements of the trade." The shippers are not bound to supply any definite quantities of cargo and sufficiently reliable estimates of requirements are not available.

(c) The shipowners have never yet bound themselves by contract to either of these obligations (except for certain minor

¹⁰ See the paper on Port Charges. If the shipowners are to expedite their own economies, it is at least fair that the port authorities should do the same. It will be interesting to compare their responses to decreased revenues with the actions of the shipowners.

cargoes) and obviously this is a most unsuitable time to enter upon such liabilities.²⁰

(d) The object of the contracts is to enable the shipowners to ration their tonnage and to reduce expenses, but before any effective rationing can be undertaken, virtually the whole of the berth cargo must be *known* some months beforehand, and be reliable for shipment when the time comes. Certain classes of shippers are not yet convinced that it is in their interests to accept the contracts.

(e) The shipowners have been bearing the cost of adverse exchange on the remittance of freights prepaid in Australia. While the shippers are receiving the benefit of this exchange in the remittances received from their exports, they are for the most part unwilling to pay freights in sterling equivalent. In one or two cases their export values have fallen.

(f) The shipowners are therefore receiving reduced freight rates on such Australian exports as are prepaid. These are now confined to all refrigerated cargoes. For all other cargoes payment is made in terms of English sterling on shipment or discharge at the option of the shippers.

Negotiations with the various exporting interests have been protracted, partly because the same restrictions on imports which have hampered the shipowners have also annoyed the principals of wool-buyers who normally sell woollen goods to Australia. Negotiations were virtually complete when the Federal Budget imposed further restrictions and further costs on shipowners, including taxation on their fuel. The Council of the A.O.T.A.²¹ had been summoned to finalise the contract system at existing rates of freight for the 12 months ending June 30, 1931, but had to be postponed, and the future is still uncertain.

J. B. BRIGDEN.

Sydney.

20. At the A.O.T.A. Council on May 22 the shipowners' representatives stated that this year was the worst in the history of their Australian trade. Ships would have to be brought out virtually empty to lift exports, and the future is most uncertain.

21. The Council of the A.O.T.A. is composed of the Chairmen of the State Committees and of one other member appointed by each. These Committees represent shippers and shipowners respectively in each State. The second member from each Committee of Shippers is chosen so that as far as possible each export industry is represented on the Council as well as each State. The Executive operates in Sydney under the authority from the Council and is constituted to represent export industries. It has power to co-opt other representatives of export industries as may be required. A majority of each group (of shippers and shipowners' representatives) is required for any decision.

INTERSTATE SHIPPING.

- I. Introductory.
- II. History of Interstate Shipping.
- III. Australian Conditions.
- IV. The Effect of the War.
- V. The Navigation Act.
- VI. The Organisation of Interstate Shipping.

I.

Australia, with her enormous coastline, greater than the distance Sydney is from London, her small population, innumerable small ports, seasonal trade and extensive maritime and industrial legislation, Imperial, Federal and State, presents to those who are courageous enough to undertake the provision of regular and efficient coastal transport, a problem of very great magnitude.

Prior to the " 'fifties" the trade of Australia has been almost entirely dependent upon coastwise transport by the small sailing vessels which traded round its shores. The records show that as late as 1844 the entire steamship fleet of Australasia as a whole amounted to only seven auxiliary steamers, with a combined tonnage of but 1,102 tons. By 1850 the population had grown and trade was rapidly increasing, and shortly after this steamers were brought out in ever-increasing numbers. In 1870 the population had increased to 1,647,756, and railways began to be built to traverse the undeveloped country and parts which had been previously fed entirely by shipping.

As has been pointed out by Mr. M. H. Belz, of Melbourne University, in his paper on "The Theories of Population," the growth of the Australian population may be divided into three distinct periods—(1) The pre-gold period up to 1850, (2) the gold rush period, 1850 to 1860, and (3) the "normal" period since 1860. Close study will reveal the intimate connection which exists between the growth of the population and of the mercantile marine as regards periods (1) and (2), but unfortunately in later years, owing to many causes, there have been factors which have operated detrimentally to the normal growth of the mercantile marine.

The Australian mercantile marine has been built up by private enterprise and, except for small payments for the car-

riage of mails, without Government assistance. It may be said without exaggeration that its growth from babyhood to manhood has taken place within the brief span of one man's life. The history of the development of the Australian mercantile marine would provide subject matter for several volumes, but it is only possible here to attempt the most inadequate outline. Those who are sufficiently interested would be well repaid by reading such works as Mr. Gregory Dickson's *Australian Steamships, Past and Present*, and the publications of the individual shipping companies, of which considerable use has been made in the preparation of this paper. An equally interesting study would be to compare the development of the different States, the effect of the gold rushes to Western Australia and Victoria, the many other factors affecting the population and trade in each State, and the corresponding growth in the coastal services.

II.

The earliest official records of shipping in Australia date from 1822, but until comparatively recent years the records unfortunately did not separate oversea from purely Interstate shipping. Coghlan, in his *Seven Colonies*, remarks that in that year the total tonnage, including the Interstate trade, which entered and cleared Australian ports, was but 268 vessels, aggregating 147,869 tons. In 1841 the figure had increased to 552,347 tons; one decade later it had risen to 1,088,108 tons, and thirty years later still it had risen to 5,363,657 tons. The *Official Year Books* show that the tonnage engaged in the Australian Interstate and coastal trade amounted in 1907 to 184,574 gross tons, and in 1918 to 208,700, but in 1927—only nine years later—it had grown to 398,894 gross tons. In 1926-27 the total inward Interstate movement of shipping amounted to no less than 24,200,488 tons, of which vessels solely Interstate provided 7,422,571 tons. In other words, the tonnage moving solely Interstate was equal to one and a half times the combined oversea and Interstate tonnage in the Australian trade in 1881.

The first steamer to arrive in Australia was the *Sophia Jane* (256 tons), which anchored in Sydney Harbour on 13th May, 1831, but it is recorded that until 1839, when the Hunter River Steam Navigation Co. was established, there was no legally organised steamship company in Australia. The

Australasian United Steam Navigation Company can be traced back to the Hunter River Steam Navigation Company. The latter Company was dissolved in 1851 and the Australasian Steam Navigation Company came into existence. It was proposed to run steamers not only to the various States but also to New Zealand. Services were extended to New Zealand, and in 1858 the Company inaugurated a mail service between Melbourne and Wellington. In 1869 services followed to Fiji and to New Caledonia. The Queensland Steam Navigation Company was absorbed in 1869. In 1885 the Company suffered a severe loss in the wreck of the *Cahors*, and owing to this and other losses and keen competition, it was sold out to the British India and Queensland Agency Ltd., but the properties held by the A.S.N. Company were not included in the purchase, and forty-one vessels of the A.S.N. Company, together with four steamers of the Queensland Shipping Company, were merged into one company, which was called the Australasian United Steam Navigation Co. Ltd. The Company now runs a regular passenger service between Melbourne and Queensland ports, a general cargo service, and in conjunction with the Union Steam Ship Company a passenger service to Fiji.

The Howard Smith Line, or, to give it its present name, the Australian Steamships Pty. Ltd., owes its origin to Captain William Howard Smith, who arrived in Australia in 1854 in the *Express*, of only 136 tons nett, which he placed in the Melbourne-Geelong trade. He before long realised the possibilities offering in the trade between Melbourne and Sydney, and having sold his interests in this vessel in 1862, proceeded to England and purchased the *Kief*, which he renamed the *You Yangs*. Further vessels were added and the service was extended to Queensland. This Company also runs a regular service between Melbourne and Queensland ports with the *Canderra*, in addition to a fleet of general cargo carriers, and prior to the extension of the Queensland Railways, was one of the Companies which held the contract for the carriage of mails between many of the ports of that State.

The Adelaide S.S. Co. can be said to have come into being on account of the success achieved by the *Flinders* in the Adelaide-Melbourne trade. Her owners, having observed the need for tonnage to carry goods and passengers between the States, were largely instrumental in the founding of the Company in 1875. The Gulf trade was subsequently added to its activities, to be followed by a passenger and cargo service to

West Australia. In 1893 further developments took place, the Company extending its operations to Queensland in fulfilment of a contract with the Colonial Sugar Refining Co. for the carriage of raw sugar from Queensland ports to Southern ports. The Company, after having owned a fine fleet of passenger steamers, decided to abandon the passenger trade, partly on account of more passenger steamers having been placed in the Interstate trade and partly because of the unprofitable trading results so far as its passenger services were concerned, and it was not until last year that it re-entered this trade with the motor vessel *Manunda*, of 9,115 tons gross, which it had had specially built for the trade.

The firm of Huddart Parker Ltd. dates in reality from the arrival of Captain Peter Huddart in 1852, and Mr. T. J. Parker in the following year. The latter commenced business in Geelong as a merchant and coal importer. The former was one of the first to engage in the carriage of coal from New South Wales to Victoria. In those days no coal was available in Victoria, and it had to be imported from New South Wales. This was first done by means of sailing craft, and by the "seventies" Huddart Parker and Company had a fleet of these craft regularly plying between the two States. It is of interest to note that three of the four founders of the firm were first associated as shipowners in the *Express*, which had been brought out from England by Captain Howard Smith. In 1876 the firm of Huddart Parker and Co. was established. In 1880 Huddart Parker & Co. purchased their first steamer, the *Nemesis*, built at Whitby, where in 1764 Captain Cook's famous vessel, the *Endeavour*, had been built. Two years later they had entered the Sydney trade, and in 1889 also entered the Tasmanian trade, having been requested by the Tasmanian Woolgrowers' Agency Company to carry a cargo of valuable stud sheep from Launceston to Melbourne. In 1893 they established a service to New Zealand. Last year this Company brought on to the coast another fine passenger and cargo vessel, the M.V. *Westralia*, built on the Clyde specially for the Australian coastal trade.

The McIlwraith McEacharn Line did not engage in the Interstate trade until 1882, but for many years prior to that it had traded regularly between London and Australia, and in 1879 was one of the pioneers in providing special facilities for the carriage of frozen meat. Its first venture in the Interstate trade was to run two vessels with cargoes of coal; these vessels also made occasional voyages to England with wool cargoes. Its

entrance into the passenger trade was brought about by the Gold Rush to West Anstralia. The Company fitted out the *Eddystone* specially for passengers and cargo and placed her on the run to the West, thus inaugurating the regular passenger service between Sydney and Fremantle. This vessel was the forerunner of the fine steamers *Katoomba* and *Karoola*, owned by the same Company.

The Melbourne Steamship Company made its debüt in the Port Phillip trade, but in 1885 entered the Interstate trade and provided a cargo service between Melbourne, Sydney and Newcastle. In 1897 was added a passenger and cargo service between Sydney and Fremantle, and in 1902 a cargo service between Melbourne and Sydney *via* Tasmania and Twofold Bay.

Space will not permit of even the most cursory survey of the other Interstate Lines, such as the Tasmanian Steamers Ltd., James Paterson, the Patrick and the Holyman Lines, nor of the many Intra-State Lines, such as the North Coast Steam Navigation Company and the Illawarra and South Coast Steam Navigation Company, Western Australia State Shipping Service, and the Tasmanian State Shipping Service, but brief reference must be made to the Union Steam Ship Company of New Zealand Ltd.

This Company started operations in Dunedin in 1875 with a fleet of 5 steamers, aggregating but 2,126 tons. At its jubilee it possessed no less than 84 vessels with a gross tonnage of 268,115 tons, including the R.M. motor ship *Aorangi*, which was added in 1924 and whose tonnage (17,494 tons) is more than eight times the combined tonnage of the original fleet. This Company entered the Inter-Colonial trade between New Zealand and Australia in 1877 with the steamers *Wakatipu* and *Rotorua*, and the following year purchased from Messrs. McMeckan, Blackwood and Co. four of their vessels, which were then running in that trade. In 1904 the Company had the *Loongana* especially built for the Tasmanian Service, and now, in conjunction with Huddart Parker Ltd., owns the Tasmanian Steamers Pty. Ltd., which has added the *Nairana*. This vessel, built prior to the War, was requisitioned by the British Government off the stocks and during the War performed notable service as a seaplane carrier.

III.

Reference has already been made to two important facts, (1) that the services have been built up by private enterprise

without financial assistance from any Government apart from small payments for the carriage of mails; (2) the vast coastline which has to be catered for, extending over a length of 12,210 miles, giving 244 square miles of territory for each mile of coast, as compared with only 24 square miles in the case of England and Wales. The coastal maritime transport is severely handicapped by the fact that Australia has a scattered population of less than 7,000,000 people, equivalent to less than two persons per mile compared with South Africa, which has over six, or India, with three. Australia possesses innumerable little ports which must be catered for, but offer very little in the way of passengers or cargo. Seasonal trades, such as sugar and fruit, produce a sudden heavy demand for tonnage which does not exist during the rest of the year, and to cope with these a large fleet has to be maintained, much of which is idle for lack of trade during portions of the year. To transport the sugar from Northern Queensland necessitates the maintenance of numerous small craft and lighters to lift the sugar from the many small ports which the larger steamers are unable to enter. These small craft are only in operation for six months in the year, and for the other six months must lie idle and suffer deterioration. West Australia in itself offers a serious problem, inasmuch as its exports by sea (which consist almost entirely of timber) to Eastern States amount to but one-third of its imports by sea from those States.

The passenger accommodation, like all other transport, is subjected to very severe strain at holiday times, and during the racing seasons. Tourist traffic to the various States is only seasonal, and steamers built for certain routes cannot always be diverted to others, owing to size, draft, bunker capacity and so forth. The passenger accommodation is only fully utilised at these rush seasons; at other times the steamers have to proceed with a large percentage of space unoccupied. Owing to seasonal trades which have to be catered for, it is necessary to maintain much greater cargo tonnage than would otherwise be required, and this results in many steamers having to proceed voyage after voyage with a high percentage of their cargo space empty. Steps taken to reduce this waste to a minimum whilst meeting the demands of seasonal trades and small ports are referred to later.

The States are becoming more self-contained, railways have been extended, air services inaugurated and motor travelling has rapidly developed. It is usually reckoned that transport

by sea should be cheaper than by rail, but the railways in Australia, being Government concerns, not only do not have to make a profit, but need not even make the ledger balance, any deficit being met by the public purse. Statistics show the enormous losses made by the railways, and it does not require much imagination to see the difficulty which faces those who provide transport by sea. These hurdles in themselves would be sufficiently difficult to negotiate, but unfortunately the shipping industry has for many years been severely hampered, and has suffered enormous financial loss owing to strikes, not only on the part of one or other Maritime Unions, but on the part of other Unionists (*e.g.*, Coal Miners, Timber Workers, etc.), who, by dislocating the industries in which they are employed, thereby render idle ships which transport the produce of those industries. Vessels that are rendered idle by strikes or lack of trade are not only deprived of their earnings, but are incurring heavy liabilities in the shape of harbour dues and suffer serious deterioration, and if laid up for any considerable period must undergo survey and overhaul involving very heavy expenditure before they can again be placed in commission.

When the running costs of steamers are considered it is found that here again the lot of the shipowner is, contrary to common opinion, far from a happy one. It is perhaps safe to say that no industry in Australia is more governed by legislation and regulations than is the Shipping Industry. The industry must not only observe the Imperial Merchant Shipping Act of 1894 so far as it applies, the Commonwealth Navigation Act, the Commonwealth Sea Carriage of Goods Act, the State Acts, where vessels trade purely intra-State, the Federal and State Seamen's Compensation Acts, the Workers' Compensation Act and other Acts too numerous to recite here, but it is also governed by innumerable Federal Awards which prescribe the wages, conditions, hours of labour, holidays and a thousand and one other things in respect of its various employees afloat and ashore. The Navigation Act prescribes *inter alia* the accommodation and victualling to be provided for the crew, sick pay, manning of steamers. Taking all these into conjunction it will be seen that the Shipping Companies have very little actual control over running expenses. One, well acquainted with the practical difficulties which the Shipping Companies have to face, after enumerating the many controls, naively summed up the position by remarking: "All that the so-called shipowner has to do is to find the necessary money if he can." Every

expense connected with the running of a steamer has increased to an alarming extent; the cost of new tonnage to replace existing tonnage when it becomes uneconomical to run, or to augment existing tonnage, for some years rose to such a height as to render the purchase of steamers practically prohibitive, and even now it is from two to three times the pre-War figure.

IV.

It has been generally admitted that up to the commencement of the Great War, the Interstate Companies provided a coastal fleet which would compare favourably with that in any other part of the World. They were then called upon to face a series of blows which were almost paralysing in their intensity. Many of their ships, including their fine passenger ships, were requisitioned by the Imperial Government for War Service in far off seas. No less than 45 per cent. of their total tonnage was so requisitioned. Many of the steamers never returned, and the rest were not returned to their owners in many cases until two years after the Armistice. The Commonwealth Government ordered all Australian ships, which had not been requisitioned by the Imperial Government, to return to Australia, and in 1916 the Government further decreed that none was to be allowed to leave Australia without a Government permit and that freight rates were not to be raised beyond those current on 18th May, 1916, unless sanctioned by the Government. This is probably a record for the whole of the British maritime trade, as it meant that between 1914-18, whilst freight rates had soared to stupendous heights elsewhere, they remained in Australia on a pre-War basis. This placed the Australian owners at a great disadvantage as compared with other nations whose vessels were able to obtain the high freights ruling overseas and were thus able to some extent to make provision with a view to replacing losses and to restore their diminished and war-worn fleets. In 1918 the whole of the Australian shipping not already requisitioned by the Imperial Government was requisitioned by the Commonwealth Government at Blue Book rates, and was not released to its owners until two years later. It is pleasing to mention that the Shipping Controller officially placed on record that the "Australian Shipowners did their level best to carry on the shipping business in the interests of the country as a whole and almost daily sank their own interests to carry on the interests of their country."

In giving evidence in 1920 before the Select Committee on Sea Carriage, he stated that Australian Shipping was in a very critical position as regards future provision for carrying on the trade, but not as regards the Companies themselves, as they could have sold out and made large profits. That Committee in its report to the Government also stated that the total charter money received from the Government by the whole of the Interstate Companies in respect of requisitioned tonnage would, if 25 per cent. of it could be set aside for replacements at the then ruling costs, only enable two cargo vessels to be built, not being nearly sufficient to properly maintain the whole fleet of from 80 to 90 vessels.

V.

It will thus be seen what a serious blow the War had dealt the Australian Mercantile Marine. The great services rendered by it in every part of the world during the War is set forth in detail in the *Official History of the Australian Navy and Mercantile Marine in the Great War*. On having their vessels released from Government control the Australian shipowners set to work to reorganise their services, but had almost immediately to face another severe setback, and during the post-war period generally they had to cope with greater difficulties and a bigger depression than in any previous part of their history. The Commonwealth Navigation Act, which had received the Royal Assent shortly before the outbreak of war, but had at the request of the British Government been suspended, was now proclaimed, and the first clauses came into operation on 1st July, 1921. The Act cast additional burdens upon the Companies, as it provided for increased crews' quarters, additional manning, and involved many structural alterations. The Companies, at heavy expense, did everything requisite to comply with the Act, but once more were confronted with still heavier expenses brought about by Awards of the Arbitration Court, which followed thick and fast on top of one another until the cumulative effect of all these various burdens had become such as to call forth the following remark from the Tariff Board in December, 1929:—"The financial result of trading by the Companies under existing conditions is such that any action which might further jeopardise their position would have a serious effect on their future operations—so serious, indeed, as to possibly bring about a reduction of the present Interstate shipping services and even to imperil the continuance of an Aus-

tralian Mercantile Marine." It might have been expected that the Maritime Unions, which enjoyed higher wages and better pay than is enjoyed by those in other countries would have shown their appreciation by refraining from strikes or harassing tactics, but unfortunately the industry has suffered severe financial loss, and on many occasions has been entirely disorganised through these causes. It was also reasonable to expect that some sympathy would have been extended to an industry which had rendered such service, both before and during the War, and had suffered so severely, but there were some who, possibly because they were not fully acquainted with the true position, expressed dissatisfaction with the services provided and clamoured for a reduction in freight rates. That both these complaints were ill-founded has been made clear in the Report of the Tariff Board in December, 1929. After the fullest investigation it reported that the passenger services "had been adequate to the normal demands and all that could justifiably be expected of the Shipping Companies," and as regards the cargo services it reported that its enquiry had shown that the Companies had no case to answer. Sir George Buchanan, in his report to the Commonwealth Government in 1926, had also stated: "In the Interstate trade Australia is provided with as fine a service of steamers as can be found in the world, and one capable of great development in the future."

The Royal Commission on the Navigation Act in 1924 unanimously reported that it was evident that the profits made by the vessels of the Interstate companies could not be regarded as excessive. The Tariff Board two years later also reported, that it was satisfied that, having regard to all the circumstances, including the financial position of the Australian Shipping Companies, the passenger and cargo rates could not be regarded as being unduly high.

VI.

A word remains to be said as to the organisation of Interstate Shipping. In view of the many questions affecting the Interstate companies generally, there was formed in 1899 the Australian Steamship Federation, the objects of which, to use the words of the founder, the late Mr. W. T. Appleton, are:—"To watch over and protect the general interests of shipping; to collect and disseminate information on all matters affecting shipping interests in the Commonwealth, and to establish a code of practice whereby the transactions of business between owners, shippers and consignees may be simplified and facilitated."

We have seen how, from 1918 to 1920, the fleets of the Interstate companies were all pooled under Government control. The Shipping Controller at the time of their release requested that in order to eliminate waste of tonnage the existing arrangement with the Government, whereby the Interstate vessels are run collectively, should be continued. This recommendation was endorsed by the Select Committee on Sea Carriage, and the Interstate shipowners agreed to continue to operate in this manner and are doing so to this day. That the community has gained is shown by the following extract from the Report of the Tariff Board:—"This merging of interests by the Companies in connection with the running of the services has been of immense gain to the Australian public." "It has made for 'rationalization' of the services, without which arrangement it is doubtful whether they could have been maintained under the same conditions of efficiency and at the same freight rates and fares as now obtain." The oversea shipping companies are now taking steps to bring about a similar "rationalization" of the tonnage which trades to and from Australia.

In 1926, according to a recent report of the Tariff Board, of the aggregate profit made by Interstate shipping companies no less than 73.8 per cent. was derived from sources other than shipping; in 1927 the small profit derived from shipping had almost dwindled away, and in 1928 the operations of the interstate trading actually resulted in a loss. Due, however, to prudent and business-like management and sound investment in the past, the Companies have not been compelled to close down as so many unfortunately have had to do in other parts of the world. During the last decade, notwithstanding the most adverse conditions, they have placed a considerable quantity of additional cargo tonnage on the coast and have brought out the magnificent passenger vessels *Manunda*, *Westralia*, *Ormiston* and *Orungal*.

The Australian Mercantile Marine has suffered the greatest vicissitudes, but is struggling to overcome the enormous obstacles that now confront it. It has in the past emulated the great traditions of the British Mercantile Marine, and, according to authorities well qualified to form an opinion, has provided services equal to those in any other part of the world.

A. S. ELFORD.

Melbourne.

AUSTRALIAN PORT CHARGES.

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- XI. Conclusion.

I.

One of the most controversial subjects in shipping and commercial circles during the last few years has been that of Australian port charges. Particularly since the visit to Australia of the British Shipping Delegation, headed by Sir Alan G. Anderson, in April of last year, has this subject been in the forefront of the economic problems of Australia. Comparisons of Australian port charges with those of other countries have been made from time to time, purporting to show on the one hand, "that, generally speaking, Australian charges are twice as much as the next most expensive port in competition with Australia," and on the other, that our charges are less than in other ports, particularly British ports.

It is suggested that in few, if any, of these comparisons are the conditions strictly comparable; for instance, how can we fairly compare port charges at Australian and British ports without adjustment, in the case of the British charges, for the enormous expense involved in the construction and maintenance of "docks" proper, any more than we can fairly compare, with-

out adjustment, the cost of loading wheat in bags in Australia with wheat loaded in bulk at Montreal?

The object of this paper is not to make comparisons between the port charges at Australian and other ports—there is neither time nor material for that at present—but generally to discuss the factors which govern the principal charges at present levied at our main ports in their relation to oversea shipping in particular.

For this purpose, the substance of the paper, together with most of the figures submitted, have been more or less extracted from the *Report on Co-ordination of Transport in Australia* by the Commonwealth Transport Committee in 1929. This has been done for the following reasons:—(1) The Committee appears to have covered the ground so completely and concisely as to leave little further to be said on most of the points dealt with; and (2) Having just returned from an extended tour abroad, it would be impossible, in the few days available for the preparation of this paper, to collect the necessary data and prepare an entirely original report thereon.

Much of the remaining material has been extracted from documents kindly loaned me by Professor J. B. Brigden, Deputy Chairman of Executive, Australian Oversea Transport Association, Sydney.

II.

As the methods of control existing at the ports in Australia have been fully described in the fairly recent reports of Sir George Buchanan and recommendations made by him as to the principles which should apply, it is proposed to briefly note only the salient features in each State, in order that the financial relationship existing between port authorities and State Governments may be more readily followed. Only slight modifications would require to be made in their constitutions, in order that the main ports may be administered in accordance with the principles laid down by Sir George Buchanan.

(a) *New South Wales.*

I. Sydney is controlled by a Trust, consisting of three Commissioners—all Civil Servants—appointed by the State Government, and in them are vested all property and the exclusive control of the port and shipping. Prior to the passage of the Sydney Harbour Trust (Amendment) Act of 1928, all works constructed and all other expenses incurred in carrying out the provisions of the Act were paid for by money voted for that purpose by Parliament. All moneys collected by the

Commissioners were paid to the State Treasury, and any surplus not required for the purposes of the Trust were absorbed into consolidated revenue. By the passage of the Act mentioned, the control of the Trust has not been removed from Parliament, but the accounts of the Trust have been separated from those of the State and any cash surplus is to be allocated to a separate fund. The Trust has not as yet been credited with the accumulated surplus, which by 1928 had amounted to £1,690,437, although this may be done when the capitalisation of the Trust is reviewed by the N.S.W. Government. Immediately the Act was passed the economic conditions began to make the surplus disappear. There has been since, something over £100,000 nominally available, but the Trust considered that all of it was required for replacements.

II. All other ports in New South Wales are administered by the Navigation Department of the State, while all works at these ports are carried out by the Public Works Department, through its Harbours and Drainage Branch.

The pilotage of all ports, including Sydney, is performed by the State Navigation Department, which also collects the "Harbour and Light Rate" levied on all vessels entering ports in New South Wales.

(b) *Victoria.*

I. Melbourne is administered by a Harbour Trust of five members appointed by the Government, one being chairman and one each representing shipowners, exporters, importers, and primary producers respectively. The property of the port is vested in the Commissioners, and the finance and development policy is not controlled by the State Government, except that the port's borrowing powers are limited to £4,000,000,¹ that alterations in rates, tolls and charges must be approved by the Governor-in-Council, and that one-fifth of the gross revenue of the Trust is required to be paid to the consolidated revenue of Victoria. For 1928 this contribution amounted to £143,648. The amount paid over by the Trust to the Government (yearly) from 1877-1928 (52 years) has been £2,905,116. The charge was first levied to recoup the State for assets handed over and valued at £650,000. The principle of exacting a proportionate part of the year's revenue is altogether wrong, as whenever the Trust requires additional revenue to meet increased costs of working and interest (which during the past 14 years has

1. Hobart and all the New Zealand ports are in a similar financial position to that of Melbourne, in that they raise such loans as may be required; of course, within the limit of their borrowing powers.

amounted to £192,056 p.a.) it must raise 25 per cent. more than is actually required, to provide for the Government moiety. Only the Melbourne Harbour Trust is required to contribute a percentage of its revenue to the Government, and this financial provision, as far as is known, does not prevail in any other part of the world.

Although the State Government has restricted the borrowing powers of the Melbourne Harbour Trust, it has not fixed the rate of the contributions to be made to the Sinking Fund or the Depreciation and Renewals Fund.² By making payments at a large rate into the abovementioned funds, and with the assistance of surplus revenues, the Harbour Trust has been able to carry out a large port development programme virtually out of revenue.

II. Geelong is controlled by a Trust constituted somewhat similarly to that of Melbourne, except that the Government retains control of the Trust's policy.

III. Other Ports in Victoria.—All other ports in Victoria, except Warrnambool, are administered by the State Government, through the Department of Ports and Harbours, which department also controls that portion of Port Phillip which is not included within the sphere of operations of the Melbourne or Geelong Harbour Trusts, dredging and maintaining the channels, lights and jetties within that area. This department controls pilotage at the outer ports, determining the rates to be charged, and also levies tonnage rates on all vessels entering the ports in Victoria.

(c) *South Australia.*

All maritime matters in South Australia, including the management of all ports, are controlled by the South Australian Harbours Board, consisting of three Commissioners appointed by the Government. All revenues collected by the Board are paid into the Treasury to the credit of the General State Revenue, and all funds required by the Board are provided from the money voted by Parliament for the purpose. The Board has no autonomy whatever.

(d) *Western Australia.*

I. Fremantle.—The Port of Fremantle is managed by a Trust consisting of five members appointed by the Government. Shipowners are not directly represented on this Board, but there are a Merchants' representative, a Primary Producers' repre-

² For 1928 it contributed £132,000 to the Sinking Fund and £59,000 was set aside for depreciation.

sentative, and two representatives of the Waterside Workers, one being a tally clerk and the other a night watchman. All revenues are paid into a special account in the Treasury, the surplus being credited to Consolidated Revenue of the State after charges for working and maintenance costs, interest and sinking funds have been met. The Trust is not credited by the Treasury with any interest earned by the Sinking Fund. A surtax of 20 per cent. was imposed in 1919 to recompense the Harbour Trust for loss of revenue due to war conditions, and since the inception of the charge merchants have paid a surtax on their goods on an amount of £257,626, and shipowners on an amount of £129,525. In 1921 the Fremantle Harbour Trust Commissioners recognised that the surtax was no longer needed, and recommended the Government to abolish it, but without success. This recommendation was repeated by the Commissioners in 1922, 1923, 1924, and 1925, but still without success, and the surtax continues. From 1919-1928 the gross revenue balance received by the Harbour Trust was £1,987,803, and the surplus revenue during the same period £841,653, which was paid into consolidated revenue, in addition to usual payments in respect of interest, sinking fund, and reserve for repairs. At Fremantle the harbour authority carries out in its entirety the functions of wharfinger, and employs labour and itself handles all goods discharged or shipped. This is apparently the only port in Australia where the functions of wharfinger are performed by the port authority. Sir George Buchanan considers that "this system does much to establish the port as an efficiently conducted concern." He further states that "in consequence of the method of storage, forty-eight hours allowed for deliveries after completion of a ship's discharge was found to be sufficient," and "If every port authority in Australia undertook wharfingering, the gain to trade would be incalculable." There are no figures at hand whereby this interesting innovation can be compared with systems prevailing in other Australian main ports, but it certainly appears to warrant investigation, along with the many other details of cargo handling at ports. From the very important aspect of de-casualisation of waterside labour, it may offer considerable possibilities.

II. Other Ports in Western Australia.—All other ports in Western Australia with the exception of Bunbury, which is controlled by a Harbour Board of five members, appointed by the Government, are managed by the State Government, through

either the Railway Department or the Harbour and Light Department.

(e) *Queensland.*

I. Brisbane.—The port of Brisbane is controlled by the Marine Department, and all maintenance and other work is carried out by the Harbours and Rivers Department. With the exception of two wharves, owned by the railways and one owned by the Brisbane City Council, all the wharves are privately owned, and that owned by the municipality is leased to shipping agents. On account of the foregoing, the port charges levied by the Government at Brisbane are relatively light, yielding just sufficient revenue to meet working expenses, and for this reason Brisbane and other Queensland ports have not been included amongst those whose financial positions are outlined. The question of establishing a Port Trust of Brisbane will probably have to be considered in the near future.

II. Other Ports in Queensland.—The more important outports of Queensland are controlled by Harbour Boards, whose development policies are controlled by the State Government, from whom approval must be obtained before construction works involving loan expenditure can be put in hand.

(f) *Recommendations.*

The Commonwealth Transport Committee recommended that "the main ports where the bulk of the overseas trade is handled should be controlled by boards or trusts, having adequate knowledge of importing, exporting, and shipping problems." It is suggested that a small trust, constituted as follows:—

State Government	1 member,
Primary Producers	1 member,
Exporters and Importers	2 members,
Shipping Associations	2 members,

with an efficient full-time chairman and freedom from the restrictions of a Government department, would bring every incentive to economy and efficiency in the management of the port, and that only upon such a representative body can a Government successfully devolve the desirable autonomy.

The finances of the major ports should be kept separate from those of the State, but the financial and developmental policy of the Port Trusts should, perhaps, be approved by State Governments after investigation by a transport authority. The rates of the sinking and depreciation funds should also be determined.

“Port rates should be revised and so adjusted that the estimated revenue be only that required to meet working costs, interest charges and approved reserves.”

The authorities supporting this principle are so numerous that it is unnecessary to recapitulate them. The general manager of the Port of London Authority, in a pronouncement on the subject in April, 1929, declared: “The object of the Port Authority is so to assess the dues and charges that the revenue thus raised is just sufficient to carry on, it being borne in mind that money paid by one section of the trade should not be used to subsidise another section.”

III.

The revenues of the Port Authorities are obtained for the most part from dues levied on goods and on shipping, and fall under the following heads:—

(a) Port Dues.

(b) Tonnage Dues, or Wharfage Rates on Ships.

(c) Wharfage Rates on Cargoes.

(a) *Port Dues*.—Port dues are paid by the shipowner for the use of water channels, artificial aids to navigation, and protection works generally; they covered also the cost of maintaining the coastal lighthouses until they passed under the Commonwealth control. The due is named in Queensland “The Port Rate” or “Tonnage Due”; in New South Wales it is called “Harbour and Light Rate”; in Victoria it is “Tonnage Rate”; and in South Australia, “Port Rate.” In all cases, with the exception of Western Australia, where it is on the *gross* tonnage, it is levied by State Government departments, according to the net register tonnage of the vessel. This rate must not necessarily be paid each time a vessel enters port, but when paid at any port in a State it frees the vessel from any further payment at any port in that State for a period varying from thirty days in Queensland to six months in New South Wales, Victoria, and South Australia.

The charges imposed are as follows:—

Port.	Amount.	Period.
Brisbane	6d. per ton net	30 days
Sydney	4d. per ton net	6 months
Melbourne	6d. per ton net	6 months
Adelaide	6d. max. per ton net	6 months
Fremantle	1d. per ton gross	3 months

The Commonwealth rate is 9d. per net ton for three months.

When the Commonwealth Lighthouse Service in 1915 took over from the States the work of maintaining the coastal lighthouses, the Hobart Marine Board abolished its rate altogether, and a reduction was made in Western Australia. Later, the charge in Western Australia was increased slightly to the present amount, and based on the *gross* tonnage.

In other States no change was made in the rate, nor has any increase since been made. It has not been possible to ascertain what portion of the proceeds of the ports rates in various States has been applied to the upkeep of the port lights, but in most cases it will be small. The Australian Oversea Transport Association (West Australian Joint Committee) have prepared a statement in which State light dues paid by oversea shipping companies in Western Australia for the year 1928 are shown as £17,664, whilst the cost of upkeep of this service appears to have been approximately £1500 to £2000. The cost of maintaining the other activities of the various Marine Departments, which were paid for by the proceeds of this rate, has increased about 75 per cent. since 1915, while the State Governments, excepting Western Australia, have made no increase in the rates charged. It is certain that had the State departments not been relieved of the cost of maintaining the highway lighthouses, there must have been a substantial increase in the port rates in all States. These rates yield about £250,000 per annum for all States, and the Commonwealth light dues yield annually about £180,000. To a certain extent shipowners are still paying double dues for one service rendered, but while operating costs remain at their present level the amount now contributed by shipping towards the upkeep of the Commonwealth and State lights and State ports and waterways does not appear to be much larger than it would have been had the States retained the control of the coastal lights and increased their port rates in proportion to the increased cost of working.

However, it is considered that the full port rate should not be levied at a port under the control of a trust whose finances are kept separate from the State finances, where the services rendered by the State in the matter of channel maintenance and port lighting are negligible; thus it does not appear reasonable that a vessel visiting only the Port of Sydney, in New South Wales, should pay the full harbour and light rate

levied by the State Department of Navigation. The revenue from the State harbour and light dues is spent almost completely outside Port Jackson, and on services not used by oversea shipping.

In Victoria these dues contribute about £70,000 per annum, whereas it is estimated by the Australian Oversea Transport Association (Victorian Joint Committee) that the total expenditure by the State for all facilities used by oversea shipping cannot be more than £40,000 per annum.

(b) *Tonnage Dues.*

Tonnage dues or wharfage rates on ships, which are known by various names in various ports, *e.g.*, quayage and berthing dues, are a payment by ships for the use of a wharf for loading and/or discharging their cargo; thus in Sydney a vessel entering the port and proceeding to an anchorage in the harbour would be required to pay the State "Harbour and Light Rate," but would not become liable to pay the Sydney Harbour Trust "Tonnage Rates" until she had actually berthed at a wharf. It may be pointed out that the rentals of leased wharves in Sydney are 50 per cent. in excess of the tonnage rates which would be received if the wharves were *continuously* occupied.

The tonnage rates levied by the port authorities at the main ports have been increased roughly 100 per cent. above pre-war level, the general pre-war rate being $\frac{1}{2}$ d. per ton per day on a vessel's net register tonnage, whilst the present rates are generally $\frac{3}{4}$ d. per ton per day on the *gross* tonnage of a vessel.

(c) *Wharfage Rates on Cargoes.*

Wharfage rate per ton on cargo landed or shipped is paid to the port authority by the consignor or consignee of goods. At all ports, except Hobart, and the ports in Victoria, wharfage is paid both on exports and imports, while in Western Australia the produce of the State is free from payment of export wharfage rates. In the ports of Victoria wharfage is levied on imports only, and in consequence the neighbouring States feel some embarrassment. In other States the charge on exports is one-half or some other proportion of the charge for imports, the result being that ports with only an export trade are seriously embarrassed financially. In other words, imports, *e.g.*, in Victoria, in addition to paying a high Customs duty, are required to subsidise the export trade. It should be a universal principle that everything using the port should contribute to the port revenue. Sir George Buchanan suggests that if

the principle of allowing exports the free use of ports were sound, it would be merely logical to allow them also the free use of the railways.

Another anomaly peculiar to Victorian ports is that all goods imported by the Government (including Commonwealth, State, railways, and all Government departments) are exempted from paying the ordinary wharfage rates. This freedom from payment for services rendered has been equal to a grant of £308,164 during the past sixteen years, an average of £19,260 per annum. The trust has repeatedly asked the State Government to give the trust an amendment of its Act, providing:—

- (1) That goods belonging to His Majesty's Governments shall pay ordinary port charges.
- (2) Limitation of the amount payable by the trust to the consolidated revenue.

The Commonwealth Transport Committee estimates that wharfage rates on cargoes have increased on the average about 50 per cent. since 1913.

IV.

It will be noted that these names applied to harbour charges vary widely among the States. It would facilitate discussions and comparisons were a uniform system of nomenclature adopted. Steps in this direction have been and are still being taken by the Conferences of the Interstate Harbour Authorities. The schedules of charges on ships and goods also vary widely, and very often refer to different services, therein making comparisons most difficult. If each main port is to exist as a separate entity, it will not be possible, owing to varying working costs, for uniform rates of port charges to be made, although uniform rates as well as uniform systems of rating would perhaps be an advantage.

The Commonwealth Transport Committee suggests that such uniformity in charges could be effected by the fixation of rates, etc., by a central transport authority, and the transfer of surplus funds from some ports to meet deficits at others. This does not appear to be either necessary or practicable.

Although the rates payable by shipowners for the use of wharves have increased slightly over 100 per cent. above pre-war level, during the same period that the rates on goods have increased by about 50 per cent., yet at Australian ports the proportion of the port revenues arising from dues on ships is still much lower than at British ports. Thus for every £100 received in port revenue from dues on ships, the goods handled by the ships pay at—

London	£106	0	0
Liverpool	76	0	0
Glasgow	159	0	0
Bristol	150	5	0
Sydney	309	0	0
Melbourne	282	0	0
Adelaide	250	0	0
Fremantle	239	0	0

Thus on the above figures ships pay at the United Kingdom ports 45 per cent. of the port revenue received from ships and goods, while in Australia only 27 per cent. would be paid by the shipowner.

It would appear reasonable that, if a reduction be made in port charges, the reduction should not be confined to dues on shipping, but relief should also be given to the owners of the goods. Representations to this effect were recently made to the Government of New South Wales by the newly-formed Australian Oversea Transport Association (New South Wales Joint Transport Committee).

V.

The financial position of the ports in New South Wales, Victoria, South Australia, and Western Australia is given in the following summaries of Revenue and Expenditure for the year 1927-28:—

(a) *Main Ports of Australia.*

	Melbourne.	Sydney.	Adelaide.	Fremantle.
Capital Expenditure ..	£7,500,000	£11,590,431	£5,249,556	£2,444,235
	(about)			
Capital Debt	3,726,800	11,590,431	5,249,556	2,444,235
Revenue	737,935	1,078,292	448,562	535,503
Working Expenses ..	194,769	344,400	113,269	278,945
Interest	167,489	584,814	253,743	97,537
Sinking Fund	133,000	—	—	23,171
Depreciation Renewals and Insurance Fund	80,000	—	21,900	2,000
Surplus	152,677	149,478	59,650	133,850
Total surplus, £495,655.				

Remarks.

Melbourne.—The surplus given above includes £143,648 paid into the Consolidated Revenue of Victoria, the balance, viz., £9029, being the actual surplus remaining with the Harbour Trust.

Sydney.—The surplus (if any) is now to be credited to the Sydney Harbour Trust, but as past surpluses were due to heavy imports for which there are now no prospects of continuance, there is no surplus and the prospect is of a deficit.

Adelaide and Fremantle.—The surpluses are absorbed into the Consolidated Revenues of the States.

Statement of Revenues and Expenditure of all Ports of New South Wales, Victoria, South Australia, and Western Australia:

(b) New South Wales.

Sydney Harbour Trust and N.S.W. Navigation Department, 1927-28.

	Sydney Harbour Trust.	Other Ports. in N.S.W. N.S.W. Navigation Department.	Totals.
Capital	£11,590,431	£6,401,214	£17,991,645
Revenue	1,078,292	310,183	1,388,475
Expenditure, Working System	308,615	134,826	443,441
Renewals	35,385	—	35,385
Public Works Expenditure ..	—	261,625	261,625
Total Working Expenses . . .	344,000	396,451	740,451
Interest	584,814	327,759	912,573
Total Expenditure	928,814	724,210	1,653,024
Profit	149,478	—	—
Loss	—	414,027	264,549

Notes.

(a) Interest absorbed over 54 per cent. of the revenue and the surplus 14 per cent.

(b) The surplus for the previous year was £193,939, and for the year before that £163,330.

(c) A Sinking Fund is now required, and the surplus is now long to go into State Revenue (1928 Harbour Trust Act).

(d) While no Sinking Fund was provided against the Capital Debt, a total of £1,690,437 has been taken into revenue by the State. Had this been used as a Sinking Fund (with accumulated interest on the Fund), the net debt would now be about £2,000,000 less.

(e) It is estimated by the A.O.T.A. that not more than 60 per cent of the liability can be attributed to deep-sea shipping.

(f) The capitalisation of the Harbour Trust is to be reviewed by the Government of N.S.W.

(g) It is worth noting that the Wharfage Rates on Cargoes are much lower for Outports (where large losses are made) than for Sydney (where almost equally large profits have been made). For example:

	Sydney. Outports.	
Inward General Rate Per Ton	4/-	3/4
Outward " " " "	1/6	1/-
Wheat, per ton	9d.	6d.
Wool, per bale	9d.	6d.

(For details, see *Statistical Register for N.S.W.*, 1926-27, p. 462.)

(c) *Victoria.*

	Melbourne.	Geelong.	Other Ports in Victoria.	Totals.
Loans Outstanding	£3,726,800	£622,805	£268,891	£4,618,496
Revenue	727,935	57,411	82,691	868,037
Working Expenses	194,769	29,030	123,844	347,643
Interest	167,489	26,026	10,657	204,172
Sinking Fund	133,000	—	—	133,000
Depreciation and Renewals Fund	80,000	—	—	80,000
Profit	152,677	2,355	—	155,032
Loss	—	—	51,810	103,222

Note.—The total assets of the Melbourne Harbour Trust are valued at over £8,000,000. It is in an extraordinarily sound position, especially by comparison with other Australian public utilities, and is obviously the most efficient of the port authorities.

(d) *South Australia.*

	Adelaide.	Port Pirie.	Other Ports.	Totals.
Capital Expenditure	£5,249,556	£720,600	£1,177,873	£7,147,839
Revenue	448,562	108,614	93,858	651,034
Working Expenses	113,269	10,775	37,090	161,134
Interest	253,743	25,874	56,547	336,074
Depreciation Fund	—	—	—	30,000
Profit	—	—	—	161,138

(e) *Western Australia.*

	Fremantle.	Bunbury.	Other Ports.	Totals.
Capital Expenditure	£2,444,235	£452,385	£1,966,057	£4,862,677
Revenue	535,503	33,267	94,163	662,933
Working Expenses	278,945	17,540	58,701	355,186
Interest	97,537	—	169,910	267,447
Sinking Fund	23,171	—	—	23,171
Depreciation Fund	2,000	—	—	2,000
Profit	133,850	—	—	133,850
Loss	—	—	118,721	118,721

(f) *Summary of All Ports.*

	Profit.	Loss.
New South Wales	—	£264,549
Victoria	£103,222	—
South Australia	161,138	—
Western Australia	15,129	—
Totals	£279,489	£264,549
Net surplus for four States =	£14,940.	

VI.

The foregoing financial statements indicate that, at the four main ports, a surplus of £495,655 resulted from operations for 1927-28.

A further examination shows that the State Navigation Department of New South Wales made a profit of £26,000 from the Pilotage Service at the Port of Sydney, and it is estimated that the payments of "Harbour and Light Rate" made by vessels using Sydney only exceeded the cost of the services rendered by the Navigation Department to those vessels by about £25,000. The South Australian Harbour Board and the Fremantle Harbour Trust also make a profit out of pilotage, but those profits are included in the combined surplus of £495,655 shown above. Thus the whole profit made at the four ports considered would be for 1927-28 about £547,000.

It is emphasised that consignors and consignees of goods are the larger contributors to the revenues of the ports, and that shipowners are responsible for less than one-third of the above surplus.

When the cost of maintaining all ports in the States is considered it is noted that while there have been fairly large surpluses in Victoria and South Australia, the profit in Western Australia was small, while in New South Wales there was a very substantial deficit to be met from Consolidated Revenue.

In May, 1923, a conference of the Prime Minister and State Premiers subscribed to the principle that a profit should not be made out of harbour charges naturally affecting freights, and if revenue had to be raised at all it should be derived from some other source. It is not clear whether the main ports only were referred to or whether the intention was to apply the principle to all the ports in a State.

If the main ports only are to be considered it would appear that the rates charged at these ports have not yet been adjusted to make the revenues conform to the above-stated principle, but if all ports in a State are to be considered, then the desired state of affairs has been almost attained in Western Australia, while in New South Wales a great deal more revenue will have to be obtained in order to meet the annual expenditure. In Victoria and South Australia shipping is undoubtedly taxed to provide State revenue. If the ports as a whole are considered, the total revenues are approximately equal to the cost of the services rendered.

VII.

As outports in all States have been established for developmental purposes, it would seem reasonable that losses sustained at these ports should be met from Consolidated Revenue, as State Revenues will be enhanced from other sources as a result of the settlement and development of the areas served by such outports, otherwise their establishment would not be justifiable on economic grounds, and must be the result of Government policy. In either case it would appear reasonable that losses at such ports should be recouped directly from State Revenues, and not by the taxation of trade at the main ports, where the bulk of the overseas shipping is handled. The time has now arrived when each port should be accounted for separately and when the shipping of any one port should be relieved from the burden of subsidising other ports.

The Commonwealth Transport Committee came to the conclusion that financial assistance required by outports should be given directly from State funds. If this principle be accepted, a reduction of Port Charges at the main ports should follow. Before the extent of such reduction can be determined, a careful investigation will be necessary, as at most main ports considerable extensions of the port facilities are either in progress or are contemplated. These will increase interest charges, while the rationalisation of shipping would result in some reduction in revenue arising from "Port Dues," and to a lesser extent from "Tonnage Dues."

The financial position outlined above shows that the losses incurred at the outports in Australia practically balance the profits made at the ports of Sydney, Melbourne, Adelaide, and Fremantle. Also that in South Australia the outports show a small profit. The loss in Victoria is not large, but in Western Australia the loss amounts to £118,721, while in New South Wales the loss is very large, amounting to £414,027 per annum.

In the case of Western Australia, where distances are great and there are no other means of communication, the establishment of outports is the only means by which development can proceed.

In New South Wales this is not the case, and in view of the heavy annual charge which the outports are on the Revenue of that State it would appear desirable that some Transport Authority should make a thorough investigation into the advisability of closing down certain of them.

The financial position of certain outports in New South Wales is set out below, and the final column in that statement gives the extent to which its State Government actually subsidises the trade of the ports.

In this statement (prepared by the Commonwealth Transport Committee) the Revenue, Maintenance Cost and Trade Tonnages are the average per year for the last four years. The capital expenditure is that at the end of the year 1927-28.

The revenues from Harbour and Tonnage Dues have been increased by 15 per cent. to include the proportion of Revenue secured from Harbour and Light Rates, this being done on the assumption that half of the receipts from the latter rate is contributed by vessels using Sydney only of the New South Wales ports, and the balance has been considered as earned at each of the outports pro rata with its earnings of Harbour and Tonnage Rates. The cost of pilot services has not been included in the expenditure. The loss on these services is about £5000 per annum at Newcastle and £26,000 at other outports combined.

	Capital Expenditure.	Revenue.	Maintenance.	Interest.	Loss.	Trade Tons.	Loss per Ton of Trade.
Tweed	£97,193	£1,396	\$8,947	\$4,946	£11,384	£16,605	13/8
Richmond River	438,969	9,177	19,560	22,132	32,515	101,720	6/5
Clarence River	474,502	5,066	13,704	24,199	32,807	68,150	9/11
Coff's Harbour	443,545	4,309	3,250	22,620	21,561	35,445	12/2
Nambucca River	58,304	983	10,930	2,793	13,823	13,310	20/9
Newcastle . . .	2,255,645	143,789	98,550	115,037	69,798	6,465,908	0/2½

Since many of the outports were established the modern development in road transport has occurred, and it now appears that economies would result were certain groups of outports connected together by roads or railway, and only one port of each group maintained as a port.

Alternatively, the hinterland of some ports might possibly be worth extending and developing by the building of railways and roads to an extent which will ultimately yield trade sufficient to permit the revenue of the ports to meet working expenses and interest. Otherwise it would appear to be in the interest of the State as a whole to close down some ports and develop road or railway outlets for the produce of the districts.

VIII.^a

Fremantle.—The present rates of pilotage at Fremantle are in respect to—

1. Vessels from the Sea to Gage Roads;
2. From Roads to Berth in the Harbour;
3. From Berth in Harbour to Roads;

^a Abstracted from Statements of A.O.T.A.

all being compulsory, and plus 20 per cent. surtax. Shipowners have contended for the last 25 years that no Pilots are necessary from the Sea to Gage Roads. The fact that there is no compulsory pilotage from Roads to Sea emphasises the absurdity of the compulsory charge from Sea to Roads. The compulsory Pilotage charge for the portion from Sea to Gage Roads, viz., £21, forms the bulk of the charge for Pilotage, the other two items totalling £14 in all. In December, 1924, the Harbour Trust Commissioners themselves announced that the Outer Pilotage was unnecessary, and would be abolished, but they were overruled, and the service continues.

Melbourne.—Under the peculiar system in vogue in Melbourne, Pilotage is nominally under the control of the Marine Board, which is composed of twelve members. By arrangement with the Pilots, the Board fixes the Pilotage charges on rates which will provide such salaries and expenses as the Board considers proper. The Board has no representation for those who pay the charges levied, although many other interests are represented. The charges for Pilotage to Melbourne have been increased to such an extent that a vessel of 10,000 net tonnage now has to pay 123 per cent. more than in 1914. The maximum rate was abolished in 1918. (The rates have recently been slightly reduced and an enquiry is proceeding on control.)

With the exception of statutory deductions of 4 per cent. paid to the Consolidated Revenue for administrative expenses, the State gets no benefit from these increases, but the incomes of the pilots have been greatly increased, and are markedly in excess of the earnings of pilots elsewhere in Australia.

The present rates are designed to provide salaries of £1250 per annum for 22 sea pilots, and salaries of £850 per annum for five "Melbourne Harbour" or river pilots, and the expenses of maintaining the service. In 1928 the sea pilots received salaries averaging £17 in excess of the amount laid down by the Board, and the river pilots salaries £141 in excess.

The expenses of maintenance authorised by the Board totalled £33,730 for the year, and included items for capital expenditure on ships, interest on capital invested in plant, and reserve fund for extraordinary expenditure, all apparently under the control of the pilots.

It appears that the ownership of the pilot vessels and plant is in the hands of the sea pilots themselves, and that the pilotage charges are made high enough, not only to pay salaries of £1250 or more, and to provide liberal "expenses," but to pay for the vessels and plant.

The repayments of loans on vessels and for reserve totalled £4036 in 1928, and the total receipts by the sea pilots for their expenses equalled £1350 per pilot. The earnings of the pilots vary from year to year, and although a "reserve" of £5198 has been accumulated, it is not used or intended for the purpose of equalising earnings.

As there is no representation of those who pay, there is a natural disinclination to reduce salaries. This system is obviously open to abuse, and some more independent assessment of salaries and expenses is required. In other ports the pilots are paid salaries which are determined in relation to the salaries of masters of Interstate vessels.

It is contended by the shipowners' representatives that there is now no need for separate river pilotage, the cost of which service in 1928 was £6413, or over 8 per cent. of the total pilotage receipts. It is also desired that the prohibition of the navigation of the river by oversea vessels at night should be removed. The position is that oversea shipping is required to pay for the improvements effected, and is not allowed to use them at night.

These restrictions are harassing, and cause delay, with its attendant expense. The Marine Board as at present constituted is regarded as obsolete, and it is suggested that the Pilots be placed under a new body to be appointed, upon which there should be representatives of the Merchants, Oversea Shipowners, Pilots, and the Government.

An alternative, and one which is followed in some of the States, would be to place the Pilots under the control of the Harbour Authority—the Melbourne Harbour Trust.

Pilots' Salaries in Principal Ports of Australia.

		Per Annum.	
Sydney	Minimum	£550	} Plus allowance for expenses
	Maximum	£700	
Melbourne and Geelong	Harbour Pilots	£991	
	Deep Sea Pilots	£1267	
Newcastle	Minimum	£550	
	Maximum	£700	
Brisbane	Minimum	£525	
	Maximum	£700	
Adelaide	Uniform	£600	
Fremantle	Minimum	£450	
	Maximum	£600	
Launceston	Head Pilot	£801	
	Harbour Master Pilot .	£500	

In New Zealand Pilots at the principal ports receive salaries ranging from £450 to £600 per annum.

IX.

In many countries, including not only European countries but Canada and the United States, oversea shipping is exempted altogether from income tax, on a reciprocal basis. In the case of vessels trading between U.K. and Australia, it is claimed that they are subject to taxation in both countries. The shipowner wishes to avoid this "double taxation" on the same earnings.

The following are the income tax charges in the five States for 1928:—

Queensland	2/4 4-5	in the £ on	7½	%	
New South Wales ..	3/-	" " " "	5	%	(now 3/3)
Victoria	1/6	" " " "	5	%	(now 1/7)
South Australia	2/-	" " " "	5	%	
Western Australia ..	1/3	" " " "	5	%	plus 15 %

The Commonwealth tax was 1s. in the £ on 7½ per cent. (now 1/2.4).

The total Federal and State income taxation on oversea shipping in 1928 showed an increase of 282 per cent. over 1914.

The practice of assessing the taxable income of Oversea Shipping Companies on a percentage of gross receipts no doubt arises from the difficulty of ascertaining the profits of such companies from the business done in Australia or in any one State. This is a very real difficulty, but in order to overcome the present inequitable position, which sometimes means that shipowners are taxed on losses, it is urged that the recommendations of the Imperial Economic Conference of 1923 be adopted, providing for acceptance of a certificate from the taxing authority in the shipowners' home country as the basis for assessment. Taxation would then be levied on actual trading results and not on a statutory percentage of freights, fares, etc., or turnover.

If these recommendations are put into operation, it is claimed that there will be no escape from taxation by the shipowner when profits are earned. Moreover, the present method of assessment can be retained for casual vessels, and taxation may still be collected on the casual vessel's earnings, and held until it is proved that it was not properly charged.

Customs Duty on Ships' Stores.

Although the tax on oil consumed on the coast is no longer levied, other ships' stores intended only for consumption in the vessel carrying them, and which, therefore, are not landed, are subjected to import duty. The statement has been made that no other country imposes such a charge.

Customs Duty on Vessels or Equipment of Port Authorities.

One of the essentials for the development of Australian Ports is that the work should be done as cheaply as possible. The imposition of a high duty of 35 per cent. on British-built or 45 per cent. on foreign-built dredges was presumably due to the desire to foster shipbuilding in Australia. The effect of the tariff has been merely to add 35 per cent. to the costs, to the prejudice of Harbour Authorities directly and indirectly to the prejudice of the sea-borne trade of Australia. In this connection, Port Authorities in the several States during the last few years have paid the following amounts as duty on vessels or port equipment:—

New South Wales	£9,712
Western Australia	13,134
South Australia	3,438
Victoria	24,449
Queensland	17,285
Tasmania	8,885
Total	£76,903

The Commonwealth Government has been requested to amend the Tariff to give Harbour Authorities relief from this heavy burden.

X.

At the four main ports, whose financial positions are set out above, it is estimated that the revenue received from overseas Shipowners for 1928 was as follows:—

(a) *Port and Tonnage Dues.*—The total collected was £664,923, of which 70% may be taken as levied on overseas vessels—£465,500.

(b) *Pilotage Dues.*—The total collected was £180,000.

(c) *Commonwealth Light Dues* yielded for Australia in 1928 3.6d. per ton of overseas trade and 1d. per ton of coastwise trade.

(d) *Commonwealth Income Tax*, at 1s. in the £ on 7½ per cent. of gross earnings would, on freight at 70s. per ton, amount to 3.15d. per ton of cargo.

(e) *State Income Tax* in New South Wales was 3s. in the £ on 5 per cent. of gross earnings, and in Victoria was 1s. 6d. in the £ on 5 per cent. of gross earnings. A mean of these two rates, levied on freight at 70s. per ton, would yield 4.7d. per ton.

(f) *Customs Duty on Ships' Stores* yields £86,000 per annum, which on an oversea trade of 10,573,433 tons is 1.95d. per ton.

(g) *Quarantine Charges* become negligible when expressed in terms of Tonnage of Trade.

The sum of all the above charges levied on shipping, based on an oversea trade of approximately 8,000,000 tons, and assessing income tax on an average freight of 70s., would amount to less than 3s. per ton of goods handled, made up thus:—

Port and Tonnage Dues	1s. 2d.
Pilotage	5.4d.
Commonwealth Light Dues	3.6d.
Commonwealth Income Tax	3.15d.
State Income Tax	4.7d.
Duty on Ship's Stores	1.95d.

2/8.8d.

From the above it will be seen that the total effect on freight rates of all Government charges on shipping is relatively small, although in the aggregate the amount is quite considerable. Port Charges being one only of the numerous items on a ship's expense account, it is not to be expected, nor is it practicable, that a reduction in these charges alone would have any corresponding effect on the freight rates, but savings effected in this item, together with economies in other directions, may bring about a decrease, or at least prevent an increase in freight rates. Before port charges are reduced proper provision should certainly be made for capital depreciation and replacements. The position in Sydney and Adelaide is very bad in this respect.

XI.

It will be observed from the foregoing that Legislative action (involving a loss of revenue) will be necessary before effect can be given to the many matters which demand attention. Owing to the straightened condition of the finances of our various Governments and with the prospect of decreased receipts due to the prohibition of certain imports, higher duties, and exchange difficulties, it is extremely doubtful whether any relief can be anticipated in the near future. The real problem at the moment is to avoid increases in port charges because of decreased revenue from both ships and cargoes.

The formation of the A.O.T.A. in June last, a voluntary self-supporting organisation of representative shippers and ship-owners' representatives, having for its objective the securing

of economies in the costs of Australian Oversea Shipping services as an alternative to increased freights, should prove of inestimable value in keeping a watchful eye for possible reductions in our port costs.

When the title of this paper was handed to me, it was intended that port charges, not including cargo handling charges, should be discussed, but having regard to the relative importance of these two items in a ship's disbursements and to the fact that cargo-handling is almost entirely under the control of the ship-owner, it is strongly urged that a close investigation is warranted into the methods employed and the charges made for these services.

In statements Nos. 2 and 4 of the report of the Oversea Shipping Conference in April, 1929, the only item of the operating expenses which showed a definite tendency to increase was "Cargo Charges, including cost of Loading and Discharging."

Statement No. 2.	Percentage of Earnings.		
	1928.	1927.	1928.
Port Charges and Canal Dues	15.842	15.949	15.539
Cargo Charges, including Cost of Loading and Discharging	20.520	21.614	22.262
Statement No. 4.			
Port Charges	8.27	8.39	8.45
Cargo Charges, including Cost of Loading and Discharging	14.10	16.84	18.29

It is submitted that these figures support the above contention, and while it is not possible without a detailed investigation, to state definitely and precisely the economies which might be effected under this heading, it is perhaps interesting to note that, on the basis of our trade for 1928, a saving of each 1d. per ton in the handling cost of overseas cargo (10,575,433 tons) would represent £43,750 per annum, and if interstate cargo is included (making a total of approximately 23,000,000 tons), the saving would represent a sum of £96,000 per annum.

Rationalisation of oversea shipping is imperative, and will doubtless considerably reduce expenses, particularly that of Port Charges, but it is the field of cargo-handling that seems to offer the greatest scope for economies.

Wrapped up with the subject of cargo-handling is despatch. If despatch is slow, port authorities must of necessity provide more quay space than would be required if despatch were accelerated. The bearing that this fact has upon port finance and costs is obvious.

Despatch to be of much benefit to "liner" traffic, must be constant, but in the case of the highly competitive "tramp,"

freight rates will respond much more quickly to lower costs. Freight rates which are the same to and from each main port in Australia, have fallen considerably during recent years, but our "Port Charges" and "Cargo Handling Costs" have not fallen as at many foreign ports. Australia being geographically at a disadvantage with her competitors as regards the principal markets of the world, has in consequence to pay higher freight rates. Every effort, therefore, should be exerted to discount this one disadvantage by, where possible, conferring advantages upon commerce rather than further handicapping it.

A. G. WHITLAM.

Melbourne.

A NOTE ON THE DEVELOPMENT OF CIVIL AVIATION.¹

The development of civil aviation in Australia is subject to the provisions of the Air Navigation Act passed by the Commonwealth Parliament in 1920. The Act is administered by the Department of Defence through the Controller of Civil Aviation. The regulations under the Act provide for the registration and periodical inspection of aircraft, the licensing of aerodromes, the examination and licensing of personnel engaged in flying and in the maintenance of aircraft and the rules of the air.

The Commonwealth Government has provided and is maintaining suitable aerodromes and emergency landing grounds over the following aerial highways:—

Route.	Length (miles).
Perth—Derby	1,467
Derby—Wyndham	610
Perth—Adelaide	1,453
Adelaide—Sydney	790
Sydney—Brisbane	550
Brisbane—Charleville	444
Charleville—Camooweal	825
Camooweal—Daly Waters	475
Daly Waters—Birdum Creek (railhead of railway from Darwin)	50
Cloncurry—Normanton	215
Melbourne—Hay	233
Mildura—Broken Hill	189
Melbourne—Charleville (via Cootamundra)	900

Existing air services may be divided into (a) subsidised and (b) commercial services. The following table sets out full particulars regarding the subsidised services.

1. This note has been prepared on information supplied by Colonel H. C. Brinnesad, Controller of Civil Aviation.

SUBSIDISED AIR SERVICES.

Contractor.	Service.	Distance (miles)	Contract Period.	Subsidy Rates.
West Australian Airways Ltd.	Perth to Derby. and	1,467	3 years from 10/6/'30.	2s. 7d., 2s. 6d., and 2s. 5d. per mile for 1st, 2nd, and 3rd years, representing annual expenditure of £19,707., £19,071 and £18,435 respectively.
West Australian Airways Ltd.	Derby to Wyndham.	600	Do. (for 8 months per year.)	3s. 3d. per mile, or £6,825 per annum.
West Australian Airways Ltd.	Perth to Adelaide.	1,453	5 years from 2/6/'29.	12s. 8d. per lb. of air mails conveyed, with payment guaranteed as for minimum mail loading of 600 lbs. per single trip, or £39,520 per annum.
Queensland and Northern Territory Aerial Services Ltd.	Brisbane to Camooweal and Norman- ton.	1,484	3 years from 10/6/'30.	2s. 9d., 2s. 8d., and 2s. 7d. per mile for 1st, 2nd and 3rd years, representing annual expenditure of £20,578, £19,935, and £19,292 respectively.
Larkin Aircraft Supply Co. Ltd.	Camooweal to Daly Waters.	475	3 years from 20/2/'30.	3s. 4½d. per mile, or £8,336 per annum.
Total air-line distances, 5,479 miles.				Total estimated expenditure on air service subsidies for 1930-31 = £95,600.

(Note: All services are maintained once weekly in each direction).

It will be noted that the total subsidies for the current year are expected to amount to £95,600. According to a return presented in Parliament by the Minister for Defence (Honourable A. Green) on June 3rd last, the total subsidies being paid at that time amounted to £120,000 per annum (see *Commonwealth Parliamentary Debates*, 1930, number 18, page 2433). The reduction is due to the elimination of subsidised services between Adelaide and Cootamundra and Broken Hill and Melbourne, and to a reduction in the subsidies granted to the other services, except the Perth—Adelaide and Camooweal—Daly Waters services.

The commercial services are as follows:—

- (a) Brisbane to Sydney, 500 miles, maintained daily in each direction by Australian National Airways Limited.
- (b) Sydney to Melbourne, 480 miles, maintained daily by Australian National Airways Limited.
- (c) Brisbane—Townsville, via Rockhampton, 728 miles, maintained twice weekly in each direction by the Queensland Air Navigation Company Limited.
- (d) Salamaua and the Edie Creek "Goldfields" in New Guinea, 70 miles, maintained daily by New Guinea Airways Limited.

These services convey passengers and freight and also air-mails under contracts from the Postal Departments.

Four other shorter services are also operating as follows:—Adelaide—Renmark, Adelaide—Eyre Peninsula, Adelaide—Broken Hill, and Brisbane—Toowoomba. Three additional commercial services are planned for 1930, as follows:—Melbourne—Launceston and Hobart, 475 miles; Adelaide—Sydney direct, and Southern Queensland to the Northern Rivers District of New South Wales.

It is too early to say whether the whole of these commercial services will prove to be profitable ventures. There is, however, sufficient evidence to indicate that they are being run efficiently to time-table.

A study of the map of Australia will show that the present air services starting from Wyndham in the north-east of Western Australia proceed along the coast to Perth, and thence to Adelaide. There is no service from Adelaide to Melbourne, but when the Adelaide—Sydney service is opened, Western Australia will be linked up with Sydney, and the service will be complete through Brisbane, Central Queensland, to Birdum

Creek, in the Northern Territory. Thus the continent will be almost encircled. The development of air transport has been rapid during the last three years. For all services, subsidised and unsubsidised, the following information is available (figures in thousands) :—

	1928.	1929.	Total since 1922.
Number of flights	77	149	286
Number of miles flown	1,633	3,646	8,017
Number of passengers carried	45	104	193
Weight of freight carried (lbs.)	1,038	2,185	3,633

It is clear from these figures that the years 1928-29 account for much more than half the total. In 1929 the subsidised services accounted for 685,000 of the miles flown, 7,821 of the passengers carried, and 212,000 lbs. of the freight carried. The volume of traffic handled by the commercial services was thus much greater than that handled by the subsidised services. Another indication of the increasing activity in recent years is to be found in the fact that the number of registered aircraft rose from 67 in 1926 to 232 at May 31st, 1930. Finally, it will be of interest to note that during the nine years 1921-29 the number of fatal accidents on scheduled trips of regular air services was only two, while the number of miles flown amounted to 2,691,000. There were, however, 21 fatal accidents with other flying, for a total mileage of 5,960,000.

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BIBLIOGRAPHY.

(a) ROADS AND RAILWAYS.

- ACWORTH, SIR W. M. *Elements of Railway Economics*. (Oxford, 1924).
- CUNNINGHAM, W. J. *American Railroads*. (A. W. Shaw, 1922.)
- DIXON, F. H. *Railroads and Government*. (Scribner, 1922.)
- FENELON, K. G. *Economics of Road Transport*. (Allen and Unwin, 1925.)
- FRANKEL, S. H. *Railway Policy of South Africa*. (Hortors, Johannesburg, 1928.)
- JACKMAN, W. T. *Economics of Transportation*. (A. W. Shaw, 1926.)
- JOHNSON, E. R., and VAN METRE, T. W. *Principles of Railroad Transportation*. (Appleton, 1926.)
- JONES, E. *Principles of Railway Transportation*. (Macmillan, 1926.)
- KIRKALDY & EVANS. *History and Economics of Transport*. (Pitman, 1927.)
- KNOOP, DOUGLAS. *Outlines of Railway Economics*. (Macmillan, 1925.)
- LAMB, D. R. *Modern Railway Operation*. (Pitman, 1926.)
- MAIRET, G. *Trade, Transport and Finance*. (Macmillan, 1923.)
- PHILLIMORE, F. *Motor Road Transport for Commercial Purposes*. 2nd Edition. (Pitman, 1920.)
- RIPLEY, W. Z. *Railroads: Rates and Regulations*. (Longman, 1920.) *Railroads: Finance and Organisation*. (Longman, 1915.)
- SHARFMAN, I. L. *American Railroad Problems*. (Century, 1921.)
- SHERRINGTON, C. E. R. *Economics of Rail Transport in Great Britain*. 2 vols. (Arnold, 1928.)

REPORTS, ETC.

PARLIAMENT OF THE COMMONWEALTH, AUSTRALIA.

Commonwealth Bureau of Census and Statistics. Australian Statistics of Transport and Communications, Bulletin 18.

Commonwealth Railway Operations. Annual.

Royal Commission on Uniform Gauge, 1921.

Royal Commission on the Constitution, 1929.

STATE GOVERNMENTS, AUSTRALIA.

Annual Reports of the Commissioners for Railways.

Royal Commission on the Working of the Victorian Railways as a Business Undertaking, No. 19, 1917.

Report of Royal Commission on Railway and Tramway Services of New South Wales, 1924.

Royal Commission on Control, Management, Working and Financial Position of the Victorian Railways, 1928.

MISCELLANEOUS.

Reports of Royal Commission to Inquire into Railways and Transportation in Canada, 1917.

Annual Reports of Railways Economics Bureau, Washington, D.C.

British Ministry of Transport. Taxation and Regulation of Road Vehicles, 2nd Interim Report, 1922. Road Conveyance of Goods by Railways Companies, 1921, Cmd. 1228.

Board of Trade, London. Handbook on Road Transport, 1918.

ARTICLES.

Journal of Political Economy, Vol. 27, 1919.

Hytten, T. *Railway Maintenance Expenditure in Australia, Economic Record, IV., 7, Nov., 1928. The Railway and the Road Motor, Economic Record, V., 8, 1929.*

(b) *SHIPPING.*

CUNNINGHAM, BRYSSON. *Port Administration and Operation.* (Chapman & Hall, 1925.) *Cargo Handling at Ports.* (Chapman & Hall, 1926.) *Port Economics.* (Pitman, 1926.)

- JOHNSON & HUEBNER. *Principles of Ocean Transportation*. (Appleton, 1920.)
- GREGORY, DICKSON. *Australian Steamships*. (Richards, 1928.)
- HARDY, A. C. *Seaways and Sea Trade*. (Routledge, 1927.)
- JONES, C. *British Merchant Shipping*. (Arnold, 1922.)
- McELWEE, ROY S. *Ports and Terminal Facilities*. (McGraw Hill, 1926.) *Port Development*. (McGraw Hill, 1926.)
- TODD, J. A. *The Shipping World*. (Pitman, 1929.)
- ZIMMERMANN, E. W. *Ocean Shipping*. (Pitman, 1922.)

REPORTS, ETC.

PARLIAMENT OF THE COMMONWEALTH, AUSTRALIA.

- Royal Commission on the Navigation Act*, 1921.
- Commonwealth Government Shipping Activities*, 1926.
- Buchanan, Sir George. *Transport in Australia*, 1927.
- Committee on Co-ordination of Transport in Australia*, 1929.
- Overseas Shipping Conference*, 1929.
- Tariff Board, Report on Interstate Shipping*, 1929.

MISCELLANEOUS.

- Reports of the Imperial Shipping Committee, London*, 1922 onwards.
- Wellington Harbour Board. Discussion on Shipping Freights and Charges, with special reference to the Flat Rate System*, 1928.

Published by the Melbourne University Press in association
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