

TAXES AND SUBSIDIES IN TRANSPORT:
SOME UNSETTLED ISSUES

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ABSTRACT:

Relative prices play an important role in user selection of transport mode. Prices do not reflect relative real costs partly because governments influence rail and road transport prices unequally. The concept of a "non-political price" is developed as a benchmark against which actual prices can be measured. Rail and road transport are examined. Large rail deficits are argued to result in part from inability to pass on cost increases because intermodal competition prevents this, coupled with unwillingness to relinquish traffics for which out-of-pocket costs exceed revenue. Resources are not efficiently allocated because rail prices include a subsidy, while road prices include a tax.

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INTRODUCTION AND OUTLINE

The problems associated with efficient resource allocation in the transport sector can be sub-divided into those primarily concerned with the principles or theory on the one hand, and the interpretation of the empirical evidence on the other. The basic theoretical background is discussed briefly in section 2. The usual conclusion is reached that an essential ingredient of any statement about resource allocation efficiency is that the relationship between prices and costs be similar for outputs which are close substitutes for each other. It is felt that this conclusion is not likely to be seriously disputed.

Difficulties arise in the determination of "costs", particularly when some inputs are provided by government suppliers at prices and in quantities which are not in any way determined by market forces. Such "prices" are different from the prices in the non-government sectors, and are conventionally referred to as "taxes" in the road sector. Other "prices" for the outputs of government enterprises fail to earn sufficient revenue to cover costs, and therefore contain an element of "subsidy". Section 3 attempts to establish a definition of "price" which avoids the ambiguity involved in present usage. Establishment of a so-called "non-political price" permits estimation of deviations of actual prices from this non-political price, to enable less ambiguous use of the terms "taxes" and "subsidies".

The definition of the "non-political price" is in terms of the price which would be established in a more-or-less competitive market, or, in the more usual environment of absence of a market, in terms of the criteria used to establish prices of public enterprise outputs in the UK or the prices of regulated public utilities in the USA.

While the data available were very inadequate, some attempt is made in the fourth section to make some rough estimates of the relationship between non-political prices and actual prices in rail and road transport. The available evidence indicates that in rail, actual prices are below estimated non-political prices, whereas the reverse is the case for road. One very likely reason for this is the inability of rail freight to pass on cost increases by price increases because of competition from road haulage, coupled with rail's insistence to maintain or increase market share without adequate reference to costs. The real question is the extent to which attempts to retain traffics have been supported from the public purse.

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The conclusions are briefly reviewed in section 5. The great increase over the last few years in the size of the gap between working expenses and revenues in rail requires a serious examination of the reasons for it. If a major reason is the use of public monies to prevent loss of traffics to competitive modes which do not have similar access to the public purse, inefficiency in resource allocation is ensured. This has not only a static but also a dynamic dimension. If productivity increases are more rapid for some traffics in road than in rail, retention of such traffics by rail implies increasing deficits and increasing inefficiency in resource allocation. It is worth noting that for some traffics, especially those which can be bulk-loaded and unloaded, productivity increases are occurring which favour rail, but this will be obscured by the aggregate result which includes the loss-making traffics.

As with most similar attempts, the paper raises more questions than it is capable of answering. It should be unnecessary to spell out the usual caveat that only the surface has been scratched. The relative absence of research into this area can be largely explained by lack of data. It is to be hoped that railway systems in particular will recognise the need to improve the range and depth of information available on costs for particular traffics, despite the difficulties involved, and to relate such information to revenue earned. Traffics which add more to current costs than to current revenues are either provided in part as a social service, and should be funded accordingly and explicitly, or should be carried by another mode or not at all.

PRICING AND EFFICIENCY IN RESOURCE USE

The Basic Efficiency Argument

It is not necessary to repeat in detail here the well-known propositions and problems associated with the conditions which must be met if an efficient allocation of resources is to be achieved. Earlier statements about marginal cost pricing have proved too fragile, requiring assumptions too remote from real-world situations to be of much use. However, consumers choose between alternatives on the basis of their relative prices, no matter how the relative prices came to be formed. If relative prices do not reflect relative scarcities, efficiency in resource use is not achieved.

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There is a dilemma for those interested in the efficient allocation of resources in a sector of the economy when prices do not everywhere reflect relative real costs in a systematic manner. Quite apart from, and additional to, the objections to the proposition that prices should everywhere stand in the same proportion to (marginal) costs, are the problems which arise when there is no way by which such proportionality can be estimated everywhere. To proceed by arguing that prices should be equiproportional to costs in one particular sector, when this is not so in other sectors, runs into the objections common to all propositions which appear to argue that it is better to observe, or come as close as possible to observing, as many optimal conditions as possible.

A common and useful way out has been to argue that an industrial sector is defined by the fact that cross-elasticities are higher between outputs within the sector than between the outputs of that sector and those of other sectors. The reasons for this may be explained by reference to the resource allocation implications of prices related to costs in various proportions for an output for which demand is perfectly inelastic. The quantity of resources used for such an output would not be a function of the price-cost relationship. If, on the other hand, demand is highly elastic, small changes in price-cost relationships will have significant effects on the allocation of resources. It is then argued to be more important to pay attention to the price-cost relationships of substitutes than to those of less directly related outputs.

Where price-cost relationships are significantly and directly influenced by government activities, as suppliers, regulators, subsidisers or taxers, it is necessary to ensure that such activities affect relative prices of good substitutes similarly, so that substitution does not take place just because government activities have greater effects on one of the substitutes than on the others. If only efficiency considerations are relevant, a "neutral" system of taxes, subsidies, and other government activities implies that the group of producers of substitutable outputs are affected similarly by such activity. It is admitted that it may be difficult to define what is meant by "similarly", but the idea that input costs facing such producers should be similar, and that output prices should be related to input prices in a similar manner, is readily accepted.

The Role of Non-Efficiency Factors

It is frequently argued that the objective of some government activity is the achievement of a non-efficiency objective. These include equity, decentralisation, and the like. It would be unnecessary to make specific mention of these factors if they were not frequently used to justify non-similar treatment of producers of highly substitutable outputs. It seems unlikely that it be the intention to achieve such objectives inefficiently, and efficient achievement again requires equal treatment of producers of substitutes.

The popular argument, particularly with respect to "taxes" on road users, refers to "taxes" levied elsewhere in discussions of appropriate tax levels. A favourite gambit is to point to taxes on cigarettes and tobacco, or alcohol, and to state that it is not the objective of such taxes to build cigarette factories or breweries. The purpose is to raise revenue, or perhaps even to reduce consumption of the taxed outputs. Neither of these purposes is efficiently achieved by tax rates which differ widely between different outputs within the group of substitutes. Furthermore, it is difficult to sustain arguments, if all externalities are properly taken into consideration, which regard transport as an undesirable output, the consumption of which should be discouraged.

The argument about similar or equal treatment of substitute outputs is thus not affected by assertions about non-efficiency objectives. These are pursued efficiently only if substitution is based on real cost differences.

Application to the Transport Sector

The technical definition of particular transport modes is of interest to economists only to the extent to which it affects the costs at which services with particular quality characteristics can be performed. Professional users of transport services will substitute one service for another whenever relative prices and relative qualities indicate that such substitution should take place. For some modes, such as rail, prices are the only guide available to professional users, since they have no means of judging the costs incurred. For road haulage, an important consideration is the cost at which the professional user could provide the service himself.

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If the rail service is offered at a price which is less than the cost of supplying it, while the price of the competing road service includes taxes not paid by rail, the user will make a choice on the basis of the subsidy-included rail price and the tax-included road price. More rail services will be consumed, and fewer road services, than would have been the case if government had treated both similarly. At the margin, the real resource cost of rail is greater than the real resource cost of road. A transfer of inputs from rail to road would reduce total real costs of performing any given transport task. The situation is clearly inefficient.

Given that appropriate allowances are made for relevant externalities, a necessary condition for an efficient allocation of resources in the transport sector is that the relationship between prices and real costs be similar for all transport modes. This is also the usual result when non-efficiency criteria are included (other than those which say that rail transport is "good" and road transport is "bad").

So far, nothing has been said about the difficulties which lie in the path of determining what "similar" treatment means. More will be said about this in the next section. However, it is not easy to sustain the argument, even in our present state of ignorance, that anything remotely like similar treatment is accorded to the various transport modes at present. While it may be difficult to determine exactly what similar treatment must mean if efficiency in resource allocation is required, it is unlikely to prove difficult to suggest the direction in which changes must be made if resource allocation is to be less inefficient in the transport sector than it is now.

THE MEANING OF "PRICES", "TAXES", "SUBSIDIES", AND "POLITICAL PRICES"

The Problem of Definitions

Almost all discussions using the concepts of prices, taxes, and subsidies appear to assume that these concepts are sufficiently well understood to require no explicit definition. In many contexts, this is probably justifiable, and causes few problems. Thus a price in a market which is not subject to any explicit and direct government intervention is determined by input costs, demand, and levels of competition. Input and output prices are also affected by taxes and subsidies not directly or implicitly directed at a particular industry, such as income taxes. However, where government intervention is explicitly and directly

involved in the formation of a price, it has been argued that, depending on the extent and effect of such intervention, the price then has at least some of the attributes of a tax (Hotelling 1938, p. 242). The argument was that a railway rate is of essentially the same nature as a tax because it was authorised and enforced by the government (in the USA).

One important distinction between a price and a tax is that the former is paid for some specific good or service, while the latter is paid without the State "... providing any specific counterpart for each specific tax payment" (L. Von Stein 1885, p. 28). Where the State provides some particular output from enterprises owned and operated by it, the charges set by the State could be in the nature of a price if the charges are determined in the same way as prices in the private sector. The difference between a price and a tax does not depend on whether the output is provided by a privately or publicly owned enterprise, but on the exercise of the State's power to determine the basis on which the price is formed.

This is a vast subject, into which we do not wish to delve further than is necessary to make the point that the concepts of "price" and "tax" need careful examination wherever specific government "activities" significantly affect a particular sector of the economy. Since this is the case with the transport sector, it is necessary to examine the meaning of these concepts in the contexts in which they are used.

The "Prices" of the Outputs of Government Enterprises

A perennial argument can be found in the area of charges levied on and expenditure undertaken for the permanent way used by road transport. The extreme view runs in terms of government statements about hypothecation: if a charge is levied and the proceeds are paid into general revenue, the charge is defined as a tax. It then follows that payments out of general revenue to maintain and improve roads are defined as a subsidy (Report of the Board of Inquiry, Victoria 1971, paragraph 6.2). This is in part a problem in semantics, but can also be the source of misunderstanding. Thus if a government monopoly supplier of, say, electricity, were treated in a similar manner, with electricity users being "taxed" at a rate equal to the price they now pay, and then "subsidised" to the extent of the costs incurred by the electricity supplier, the misleading nature of the labels attached to the charges would be obvious.

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From the point of view of the effects of the charge on resource allocation, the name of the charge is irrelevant. Governments can use their powers to determine prices in all sectors of the economy, and are not constrained to do so only in sectors in which they contribute directly by provision of some or all of a particular input or output. The economists' interest is in the effect of such activity on the efficiency with which resources are allocated in a particular sector or sectors, and in the economy as a whole.

So far we have said nothing that would not find wide acceptance. Our purpose is to draw attention to the widespread neglect of the implications of dissecting charges influenced specifically by government activities into prices, defined as charges which would have been formed by a more or less competitive industry in the absence of specific government intervention, and political prices, defined as charges specifically formed by governments. Political prices, then, include actual or notional taxes or subsidies, and are higher or lower respectively than non-political prices. The intention ⁽¹⁾ is to estimate a non-political price, and to compare this with the actual price, to determine whether a political price exists and whether it is higher or lower than the non-political price. Thus when the actual price = the estimated non-political price, neither tax nor subsidy is paid; where the actual price is > the non-political price, a tax is paid; and where the actual price is < the non-political price, a subsidy is paid.

The centrepiece of this approach is the definition of the non-political price, and whether the definition is sufficiently operational to enable such prices to be actually calculated. As will be argued below, the UK guidelines for the pricing of public enterprise outputs, and the USA approach to the pricing of public utility outputs, are prescriptions for the determination of non-political prices. However, before examining these approaches, it is necessary to refer briefly to that part of government activities which would enter into the formation of non-political prices, to distinguish it from that part which

1 We have adapted the concept of "political" prices to our own needs, from an article by E. Barone, "On Public Needs" (1912), re-printed in Classics in the Theory of Public Finance, op.cit., pp. 165/7. Barone uses the term "quasi-political" for "... a price which, without being political, is nevertheless not that economic price which a private entrepreneur would charge" (p. 165).

would enter into the formation of political prices.

The definition of the non-political price is the price which would be formed in a competitive market in the absence of specific government intervention to influence that price. The difficulty is that government activities, particularly in influencing the prices of inputs at some stage in their production, will not be easily traced by simply looking at the relation between actual price and non-political price at any one stage in the production chain. At its most obvious, an example is the sales tax on motor vehicles which are used as an input to some transport or non-transport output. Is the political price higher than the non-political price just because a sales tax is imposed? Much more difficult is the hidden political price of an input. An example is the siting of a powerstation to re-distribute income rather than to minimise power costs. The electricity input from such a system would be sold at a price higher than the non-political price, but it would be difficult to discover this without fairly extensive research.

It is simpler to examine the problem from the point of view of efficiency in resource allocation. Here we would have little difficulty in accepting the second-best solution of a tax which was as neutral as possible with respect to its effects on resource allocation, e.g. one which levies taxes equi-proportionally⁽¹⁾. Deviations from equi-proportionality might then be measured. However, this too, is hardly operational. Much less information would be required for a definition of non-political prices which included taxes paid undifferentially everywhere, such as income and company taxes. However, many inputs are taxed differentially and could and would appear at many stages of production of the final good⁽²⁾.

In the face of so many difficulties, it is necessary to fall back on a much more restricted approach. The non-political price may be defined as the price which would

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- 1 Problems associated with equiproportional taxes are similar to the objections to the so-called proportionality thesis, which refers to equating p/mc ratios to achieve a second-best efficient resource allocation. See further I.M.D. Little, A Critique of Welfare Economics, esp. chapter 9 (Oxford University Press, 1965).
 - 2 Some of the more intractable problems are avoided by a uniform rate of Value Added Tax.

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have been charged in a more or less competitive market in the absence of any government intervention specific to that industry (see also 2 above). We are aware of the many problems this raises, but would argue that some of the guidelines established by governments and commissions for the pricing of the outputs of public enterprises and public utilities approach very closely to an acceptable and workable definition of the non-political price.

Non-Political Prices and Guidelines for Public Enterprise and Public Utility Pricing

The clearest statement of guidelines for the pricing of public enterprise outputs is still to be found in a 1967 UK White Paper (H.M.S.O. 1967). For present purposes it is enough to draw attention to the objectives of the instructions. Prices were to be based on costs of efficient production. Where other social/political objectives were to be achieved, an estimate of the costs and benefits was to be submitted to government. If the enterprise was permitted by government to pursue such social/political objectives, the cost would be met from general government funds. Ideally, this implies a basic non-political price determination, with deviations explicitly yielding political prices for achieving specified social/political objectives. It should be added that this has not uniformly been achieved in practice. But the principles for establishing a (relatively) non-political price at least exist in theory.

In the US, prices of the outputs of firms regarded as public utilities are subjected to a process of scrutiny by regulatory commissions (see Kahn, A.E. 1970). The stated objective is to ensure fair and reasonable prices for the outputs of firms which are in a secure monopoly position, protected to at least some extent by restrictions on the entry of competitors into the same market.

Estimates of non-political prices cannot be made on the basis of the prices which would have been established by a reasonable competitive industry if no information is available on which such estimates can be based. An example is provided by road supply. It is unreasonable to assume that a road network established under existing institutional arrangements can be meaningfully compared with a network which would have been established by a competitive road supply industry. It seems necessary to cut a number of knots of Gordian proportions by assuming that the existing supply of road space, in terms of its location, quality and quantity, is simply there, so that the problem can be reduced to prices for the existing system. Further problems arise in defining prices for different classes of road users.

Ultimately, we are reduced to accepting revenue from existing prices as the relevant dollar quantity which is to be compared with costs. The non-political price is then derived from the expenditure currently incurred, while the political price is derived from the revenue currently collected.

It is necessary to draw attention to the most obvious difficulties experienced in comparing road and rail. For rail, there is the revenue income from the sale of railway services, and the current costs for any one year, referred to as working expenses. These expenses will include some which, like maintenance of track and vehicles, may include a betterment factor similar in kind to a capital outlay. For road, all expenditure, whether maintenance, betterment, or new construction are lumped together.

There is also the problem of the treatment to be given to the value of the assets in use. What is the value of road space which, in many cases, has been subjected to maintenance and betterment for a hundred years? What is the value of the railway assets, many of which have been subjected to similar treatment? Reference to the "bygones are bygones" argument is not very helpful; nor is any attempt to value such assets in terms of their earning ability. Yet the assessment of railway performance by comparison of revenue earned and working expenses implies that all their assets, including the rolling stock which could readily be sold, is valued at zero.

While it is possible to attempt to cope with these and other related problems, it seems to require a detailed inquiry into relevant principles and practices which, given the defects in the information available from published accounts, is unlikely to reach conclusions very different from those formed on the basis of information about current revenues and expenditures. We are bound to admit that this is a conclusion forced upon us by ignorance and shortage of time.

RAIL AND ROAD TRANSPORT : UNEQUAL TREATMENT OF EQUALS

Introduction

Having highlighted the importance of the concept of "equal treatment for equals" for efficiency in resource use, we now turn our attention to an examination of "price", "taxation", and "subsidy" policy in road and rail transport. While there can be no doubt (at least among economists) that road and rail are "equals" in the sense already defined, namely that each provides highly substitutable services for passengers and freight, there is clear evidence which shows that in Australia they are treated "unequally", and to

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such an extent as to suggest significant and obvious distortion in the efficiency with which transport resources are allocated.

Railways as Government Departments

The railways systems in Australia are the responsibility of State and Commonwealth governments. We are here not concerned with privately owned and operated railways. The usual institutional form of control is that of a government department, but there are departures from this in N.S.W., and W.A. In any case, there is no explicit difference in the objectives pursued by the different organisational structures. Decisions about price and investment policies rest with the respective commissioners who, in turn, are subject to ministerial control.

While the various relevant government acts are very unclear about the principles which are to guide price and investment policies, there are some common elements between the various systems. There is evidence of incompatibility in the principles apparently pursued. Thus all systems accept common carrier obligations in formulating policies. It is also common for annual reports to refer to the need for services to be justified on economic and/or social grounds and at the same time to "operate as commercial organisations responding to the needs of the market" (BTE 1977, p. 36). The incompatibility between the social and commercial obligations is highlighted by the difficulty of supporting social services by cross-subsidisation, in the presence of competition from other modes, especially road. The result has been the attempt to retain or increase market shares by pricing on "what the traffic will bear" criteria, apparently without adequate reference to costs. While part of the failure to recoup costs is undoubtedly due to the pursuit of the social objectives, a large part of the deficit is the result of attempts to retain traffics for which costs are greater than revenues. This is so even if costs refer only to current or out-of-pocket costs.

While this means that some traffics are retained only by prices which are below out-of-pocket costs, it is also possible that some traffics are priced below the level at which they would still be retained by rail. Insufficient information is available to reach firm conclusions. However, it seems clear that railways are still attempting to retain traffics for which inherent advantage lies with other modes. An unkind observation would be that competition for traffics is fought with taxpayers' money. Some traffics which could be carried by other modes without deficit can only be retained by rail by "subsidy". The economic wisdom of this

must be in serious doubt! The evidence for this is examined in the next section.

Railway Performance : Some Indicators

It is not possible to elicit much information about railway costs, other than in terms of very broad and fairly inadequately defined categories. In particular, it is difficult to give meaning to capital costs, which contain historical costs, are sometimes written down more or less arbitrarily, and have other components of doubtful relevance. We have therefore not concerned ourselves with estimates of the value of the capital stock, and have concentrated on working expenses. These include expenditure on maintenance of way, works, and rolling stock, and on so-called traffic expenses associated with the operation of freight and passenger services. The evidence shows that working expenses have risen at a much faster rate than revenues. It has been argued that the main reasons for this was the rapid increase in the wage and salary components, the relatively poor productivity performance, the declining revenue per tonne-kilometre of freight carried and from the losses on passenger traffic (Dodgson, 1978, esp. p. 12). Reference has also been made to the effects of high maintenance costs of obsolete equipment, continued provision of uneconomic services, and a number of other factors increasing costs (BTE 1977, p. 36).

While these comments have concentrated on the effect of cost increases on net revenue, we will argue that the increasing deficits are more readily explained by the level of competition from other modes, which prevented cost increases being passed on in higher prices.

Table 1 shows working expenses, gross revenue, and the resulting deficits or surpluses at current prices for all Australian government railways for the period 1950-51 to 1975-76. Table 2 shows deficits or surpluses at current prices for each system for the same period. As can be seen from Table 1, deficits or surpluses did not reach significant magnitudes until 1972-73. Table 2 shows that the performance of the system as a whole is dominated by NSW and Victoria. NSW changed from small surplus to deficit in 1972-73, and this deficit increased rapidly to reach \$153 million in 1975-76. Victoria reached a deficit of \$124 million in the same year.

Table 3 shows freight tonnes carried by each of the systems and for all systems for the period 1958-59 to 1975-76. The shorter period is the result of absence of statistics for freight disaggregated into commodity classes for the largest system, NSW. For the period as a whole, total traffic

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TABLE 1

Australian Railways. Working Expenses and Gross Revenues (current prices)
for the period 1950/51 - 1975/76

Year	\$ ('000) working expenses	\$ ('000) Gross Revenue	Surplus + ('000) Deficit -
1950/51	225,542	211,288	- 14,254
1951/52	296,344	279,048	- 17,296
1952/53	323,108	309,668	- 13,440
1953/54	336,368	339,726	+ 3,358
1954/55	344,954	347,442	+ 3,038
1955/56	369,844	354,370	- 15,474
1956/57	384,714	375,696	- 9,018
1957/58	372,950	357,900	- 15,050
1958/59	369,992	369,980	- 12
1959/60	388,270	388,434	+ 164
1960/61	400,692	416,476	+ 15,784
1961/62	404,494	415,128	+ 10,634
1962/63	406,634	425,018	+ 18,384
1963/64	435,138	463,796	+ 28,658
1964/65	458,518	483,770	+ 25,252
1965/66	461,905	475,998	+ 14,093
1966/67	478,920	511,325	+ 32,405
1967/68	499,871	528,219	+ 28,348
1968/69	527,612	545,029	+ 17,417
1969/70	562,968	586,633	+ 23,665
1970/71	618,689	602,171	- 16,518
1971/72	674,149	639,595	- 34,554
1972/73	754,540	641,928	-112,612
1973/74	903,281	692,871	-210,410
1974/75	1146,533	811,348	-355,185
1975/76	1306,117	941,918	-364,199

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TABLE 2

Deficits or Surpluses (current prices) on working account by system
1950/51 - 1975/76

Year	N.S.W. \$('000)	VIC. \$('000)	QLD. \$('000)	S.A. \$('000)	W.A. (\$'000)	TAS \$('000)	C/W \$('000)
1950/51	+560	-3418	+690	-5340	-3925	-1344	-562
1951/52	+9780	-10853	-2578	-8089	-4254	-1538	+236
1952/53	+12448	-4288	-3988	-6240	-96940	-1650	-36
1953/54	+12744	-488	+2240	-4432	-6374	-1342	+1010
1954/55	+9928	+1268	+1358	+4948	+4750	-1510	+1640
1955/56	+964	+1988	-5122	-5324	-5680	-1454	+4000
1956/57	+6674	-3622	-2236	-4406	-6434	-1826	+2730
1957/58	+3798	-4440	-4395	-5579	-6606	-1298	+3470
1958/59	+9656	+82	-2630	-4488	-6582	-1016	+3874
1959/60	+14144	-704	-5364	-5134	-4122	-1110	+2346
1960/61	+18372	+2720	-3998	-2872	-1660	-1226	+2184
1961/62	+17512	-698	-3582	-3358	+252	-1472	+2158
1962/63	+23830	-122	-192	-3302	-1656	-1072	+722
1963/64	+25072	+4266	+5792	-1396	+11833	-1226	+1041
1964/65	+26018	+878	+808	-1949	-619	-1638	+1452
1965/66	+15543	-1417	+51	-3252	+3340	+1561	+775
1966/67	+28343	+1124	+3568	-3546	+4608	-1709	+17
1967/68	+30027	-5721	+6583	-6366	+5029	-2130	+925
1968/69	+23397	-10652	+11024	-5631	+611	-2087	+758
1969/70	+29671	-13446	+12301	-5475	+1084	-2082	+493
1970/71	+9157	-20,343	+5010	-8079	+2264	+63	-402
1971/72	+2785	-25964	+5039	-10918	+1098	-4262	-2332
1972/73	-44111	-39212	+4361	-30820	-3745	-4987	-3246
1973/74	-87206	-72910	-12257	-20920	+3710	-7924	-7206
1974/75	-123861	-113362	-44238	-32151	+4613	-11709	-1479
1975/76	-153425	-124553	-35170	-41255	+11138	-13924	-9661

TABLE 3

Freight Tonnes ('000) carried all commodities by rail system 1958/59 - 1975/76

Year	N.S.W.	VIC.	QLD.	S.A.	W.A.	TAS.	C/W	System Total	Total System Freight Index
1958/59	19699	9295	8060	4206	3913	1137	1403	47713	100
1959/60	22127	9687	7747	4036	4532	1190	1479	50798	106.4
1960/61	24104	10976	7548	4536	4833	1191	1737	54925	115.1
1961/62	24050	10350	7711	4615	6342	1095	1956	55119	115.5
1962/63	23641	10840	8215	4502	4792	1164	2227	55381	116.1
1963/64	25814	13132	9205	5178	5187	1154	2475	61325	128.5
1964/65	27888	12595	10040	5089	5229	1090	2919	64840	135.7
1965/66	27004	12156	10049	4789	6384	1072	2976	64430	135.0
1966/67	29275	12075	10185	4876	6763	1079	4121	69484	145.6
1967/68	30745	11116	11133	4368	8910	1162	3627	71061	148.9
1968/69	31871	11316	12975	5003	8934	1242	3301	80143	167.7
1969/70	33442	11835	14439	5888	10665	1258	4824	82351	172.6
1970.71	33204	12490	15418	5990	13244	1201	4382	85929	180.1
1971/72	31800	11609	18963	5919	13648	1278	4054	87271	182.9
1972/73	31004	11475	24666	5781	13706	1554	4225	92411	193.7
1973/74	32651	11370	25401	6607	14839	1828	4270	96966	203.2
1974/75	33476	11057	30208	6738	16514	1731	4102	103465	216.8
1975/76	31234	10804	44118	6139	17647	1610	3804	104355	218.7

has increased by 118%. Tables 4(a) to 4(c) show revenue per passenger journey and per freight tonne for each of the three largest systems. Table 4(d) shows these data for all systems. Over the period 1952/3 to 1975/6, revenue per tonne increased relatively little. For NSW, revenue per tonne was relatively unchanged from 1952/3 to 1973/4. By contrast, revenue per passenger carried increased steadily over the whole period, recording a 350% increase by 1975/6. For Victoria, revenue per freight tonne had increased by only 20% between 1952/3 to 1974/5. In Queensland, freight revenue per tonne increased by 23% between 1952/3 and 1966/7, and then declined, recording a net increase of about 6% by 1975/6. For all systems, revenue per tonne shows little change between 1953/4 and 1973/4.

Some care must be taken in interpreting these data. Length of haul may have varied during the period (see also Dodgson 1978, p. 7), but it is doubtful whether this could be sufficiently important to explain the absence of significant increases in earnings per tonne over a period during which retail prices rose by about 140%. We examined a breakdown available by commodity class, showing revenue per tonne by all systems except for NSW. This is shown in Table 5 for the period 1958/9 to 1975/6 and indicates that, for the different commodity classes, earnings per tonne have shown greatly varying rates of change over the period. Thus the category "all other commodities" shows a decline in revenue per tonne for most of the period to 1974/75, with wool showing a similar pattern. A fairly high level of competition has existed in these areas. Wheat has increased most markedly, and is a commodity class for which there is relatively little competition from road. However, coal, coke and briquettes also show a decline for most of the period, and only increased in recent years. The most plausible explanation for this commodity class would be the very great increase in productivity resulting from economies of scale, permitting the use of specialised equipment.

It is reasonable to conclude that competition in some areas has prevented rate increases. It may also be the case that rates in less competitive areas have not been increased to take full advantage of the railways' comparative advantage. In the more competitive fields, railways have apparently used their access to the public purse to set rates to maintain market shares without reference to costs. Table 6 shows freight tonnes carried by commodity class, for all systems for the period 1958/9 to 1975/6. It can be seen that there has been a steady increase in the volume of the more important classes, including the category "all other commodities" which is likely to be one of the more competitive categories.

TAXES & SUBSIDIES IN TRANSPORT

TABLE 4(a)

Revenue per passenger journey and per freight tonne.
N.S.W. Railways 1952/53 - 1975/76

Year	Revenue per passenger journey \$	Revenue Index	Revenue per tonne \$	Revenue Index
1952/53	0.13 average		5.09 average	
1953/54	0.12 } 0.12 =	100	5.24 } 5.22 =	100
1954/55	0.12		5.34	
1955/56	0.13	108.3	5.53	105.9
1956/57	0.17	141.6	5.52	105.7
1957/58	0.18	150.0	5.21	99.9
1958/59	0.18	150.0	5.12	98.1
1959/60	0.18	150.0	5.20	99.7
1960/61	0.19	158.3	5.23	101.1
1961/62	0.19	158.3	5.10	97.8
1962/63	0.18	150.0	5.35	102.4
1963/64	0.18	150.0	5.60	107.2
1964/65	0.18	150.0	5.54	106.1
1965/66	0.18	150.0	5.07	97.2
1966/67	0.20	166.6	5.10	97.8
1967/68	0.20	166.6	5.19	99.5
1968/69	0.22	166.6	5.03	96.4
1969/70	0.23	183.3	5.25	100.05
1970/71	0.23	191.6	5.29	100.09
1971/72	0.36	300.0	5.41	103.6
1972/73	0.36	300.0	5.19	99.5
1973/74	0.38	316.6	5.17	99.1
1974/75	0.45	375.0	5.76	110.3
1975/76	0.54	450.0	6.67	127.7

DOCWRA & KOLSEN

TABLE 4(b)

Revenue per passenger journey and per freight tonne
Victorian Railways 1952/53 - 1975/76

Year	Revenue per Passenger Journey \$	Revenue Index	Revenue per tonne \$	Revenue Index
1952/53	0.12 } average		4.21 } average	
1953/54	0.13 } 0.12 =	100	4.92 } 4.65 =	100
1954/55	0.13 }		4.84 }	
1955/56	0.14	116.6	4.71	101.2
1956/57	0.15	125.0	4.71	101.2
1957/58	0.14	116.6	4.68	100.6
1958/59	0.16	133.3	4.76	102.3
1959/60	0.17	141.6	4.72	101.5
1960/61	0.18	150.0	4.84	104.0
1961/62	0.18	150.0	4.97	106.8
1962/63	0.18	150.0	4.89	105.1
1963/64	0.18	150.0	4.84	101.5
1964/65	0.20	166.0	5.03	108.1
1965/66	0.21	175.0	5.05	108.6
1966/67	0.23	141.0	5.24	112.6
1967/68	0.23	191.0	5.19	111.5
1968/69	0.23	191.0	5.17	111.1
1969/70	0.24	200.0	5.21	112.0
1970/71	0.25	208.3	5.17	111.1
1971/72	0.29	241.6	5.47	117.6
1972/73	0.35	291.6	5.40	116.1
1973/74	0.37	308.3	5.45	114.1
1974/75	0.39	325.0	6.50	120.4
1975/76	0.50	416.6	7.44	160.0

TAXES & SUBSIDIES IN TRANSPORT

TABLE 4(c)

Revenue per passenger journey and per Freight tonne.
Queensland Railways 1952/53 - 1975/76

Year	Revenue per Passenger Journey	Revenue Index	Revenue per Tonne	Revenue Index
	\$		\$	
1952/53	0.23 } average		5.71 } average	
1953/54	0.25 } 0.24 =	100	6.14 } 5.99 =	100
1954/55	0.26 }		6.14 }	
1955/56	0.26	108.3	6.29	105.0
1956/57	0.30	125.0	7.21	120.3
1957/58	0.29	120.8	7.36	122.8
1958/59	0.29	120.8	7.19	120.0
1959/60	0.28	116.6	7.40	123.5
1960/61	0.33	137.5	7.64	127.5
1961/62	0.36	150.0	7.40	123.5
1962/63	0.36	150.0	7.26	121.2
1963/64	0.36	150.0	7.38	123.2
1964/65	0.36	150.0	6.94	115.8
1965/66	0.34	141.6	7.21	120.3
1966/67	0.37	154.1	7.40	123.5
1967/68	0.36	150.0	7.30	121.8
1968/69	0.34	141.6	6.93	115.6
1969/70	0.34	141.6	6.65	111.0
1970/71	0.32	133.3	6.32	105.5
1971/72	0.32	133.3	5.76	96.2
1972/73	0.43	179.1	5.02	83.9
1973/74	0.32	133.3	5.26	87.9
1974/75	0.31	129.1	5.46	91.2
1975/76	0.42	175.0	6.34	105.8

DOCWRA & KOLSEN

TABLE 4(d)

Revenue per passenger journey and per freight tonne.All Systems

1952/53 - 1975/76

Year	Revenue per Passenger \$	Revenue Index	Revenue per tonne \$	Revenue Index
1952/53	0.14		4.91	
1953/54	0.14	100	5.29	100.0
1954/55	0.14		5.35	
1955/56	0.15	107.1	5.44	105.0
1956	0.18	128.5	5.58	107.7
1957/58	0.18	128.5	5.48	105.7
1958/59	0.19	135.7	5.41	104.4
1959/60	0.19	135.0	5.43	104.8
1960/61	0.20	142.8	5.49	105.9
1961/62	0.21	150.0	5.41	104.4
1962/63	0.20	142.8	5.51	106.3
1963/64	0.20	142.8	5.59	107.9
1964/65	0.21	150.0	5.55	107.1
1965/66	0.21	150.0	5.43	104.8
1966/67	0.23	164.2	5.47	105.5
1967/68	0.25	178.5	5.30	102.3
1969/70	0.26	185.7	5.28	101.9
1970/71	0.26	185.7	5.18	100.0
1971/72	0.34	242.8	5.20	100.3
1972/73	0.37	264.2	4.95	95.6
1973/74	0.39	278.5	5.12	98.9
1974/75	0.45	321.4	5.72	110.4
1975/76	0.56	400.0	6.61	127.6

TABLE 5

Revenue per tonne by selected commodity classes, all systems except N.S.W. 1958/69 - 1975/76

Year	All other commodities		Wheat		Other agricultural commodities		Coal, Coke & Briquettes		Other Minerals		Wool		C.P.I.	
	Rev. per tonne	Rev. Index	Rev. per tonne	Rev. Index	Rev. per tonne	Rev. Index	Rev. per tonne	Rev. Index	Rev. per tonne	Rev. Index	Rev. per tonne	Rev. Index		
1958/59	9.7		4.21		4.04		3.15		5.30		15.23			
1959/60	9.5	9.7	4.05	4.18	4.18	4.22	2.89	100	3.02	5.31	5.27	15.03	15.16	100
1960/61	9.9		4.28		4.44		3.02		5.19		15.21			
1961/62	9.9	102.1	4.44	106.2	4.50	106.6	3.01	99.7	4.71	89.4	14.71	97.0	103.9	
1962/63	9.4	96.9	4.68	111.96	4.40	104.3	2.90	96.0	4.88	92.6	14.85	98.0	104.1	
1963/64	9.6	99.0	4.72	112.9	4.56	108.1	2.87	95.0	4.37	82.9	14.67	96.7	105.1	
1964/65	9.0	92.8	5.03	120.3	4.54	107.6	2.74	90.7	4.14	78.6	15.06	99.3	109.0	
1965/66	9.0	92.8	5.36	125.8	4.78	113.3	2.78	92.1	4.80	41.1	14.43	95.2	113.0	
1966/67	9.2	93.0	5.30	126.8	4.87	115.4	2.81	93.0	3.91	74.2	14.34	94.6	116.0	
1967/68	9.4	96.9	5.87	140.4	4.88	115.6	2.88	95.4	3.57	67.7	15.00	98.9	119.8	
1968/69	9.0	92.8	5.76	137.8	5.15	122.0	2.88	95.4	3.46	65.7	14.82	97.8	123.0	
1969/70	8.7	89.7	5.44	130.1	5.75	136.3	2.69	89.1	3.26	61.9	13.10	86.4	126.9	
1970/71	8.5	87.6	4.98	119.1	5.45	129.1	2.82	43.4	3.05	57.9	12.62	83.2	132.9	
1971/72	8.7	89.7	5.36	128.2	5.22	123.7	2.91	96.4	3.02	57.3	12.57	82.9	142.0	
1972/73	8.3	85.6	5.58	133.5	5.28	125.1	2.65	87.7	3.09	58.6	11.92	78.6	150.6	
1973/74	8.3	85.6	5.76	137.8	5.36	127.0	3.06	101.3	3.89	64.3	13.66	10.1	170.1	
1974/75	9.1	93.8	6.69	160.0	5.58	132.2	3.60	119.2	3.58	67.9	15.91	103.2	198.5	
1975/76	11.7	120.6	7.73	184.9	6.19	146.7	4.19	138.7	3.91	74.2	13.92	91.8	224.2	

TAXES & SUBSIDIES IN TRANSPORT

TABLE 6

Freight Tonnes ('000) carried by commodity class 1958/59 - 1975/76

Year	Wheat	Other Agricultural Produce	Coke, Coal & Briquettes	Other Minerals	Wool	Fertilisers & Manure	Cement	Timber	Livestock	All other commodities
1958/59	3897	5895	14402	3446	576	1918	686	1669	2722	12467
1959/60	4710	5516	15320	4559	581	2097	1589	1559	2321	12507
1960/61	6844	5776	16159	5276	544	2117	1875	1744	2161	12595
1961/62	7172	5698	16863	5234	541	2235	1756	1509	1907	12164
1962/63	6766	5596	15995	5092	509	2360	1824	1585	1887	13764
1963/64	8442	5649	17225	5685	561	2720	2240	1735	1952	14985
1964/65	5950	6303	18650	6139	551	2936	2349	1803	1936	16186
1965/66	6840	5686	20612	6035	499	3132	2340	1708	1749	16126
1966/67	8513	5623	21083	7670	520	3161	2277	1630	1293	16709
1967/68	7714	5678	22560	9201	529	2662	2345	1549	1549	17493
1968/69	7655	5488	24125	10781	574	2640	2342	1469	1707	18960
1969/70	8728	5108	26211	12711	601	2397	2589	1783	1725	20492
1970/71	9798	6044	25725	14856	566	1985	2609	1658	1364	21324
1971/72	9171	6478	27824	14880	549	1886	2557	1581	1329	21019
1972/73	6220	5391	32572	16525	469	2213	2825	1488	1465	23312
1973/74	7200	5248	33983	16861	444	2382	2785	1448	1172	24847
1974/75	10036	6347	39380	17050	454	1745	2488	1287	1312	23362
1975/76	10433	5962	39688	17740	588	1440	2131	1213	1595	23485

TAXES & SUBSIDIES IN TRANSPORT

It must be remembered that regulation of inter-modal competition has become progressively less effective in retaining traffic for rail, so that rate competition has become the dominant factor.

It is clear that, even if capital costs are taken out altogether, the "political price" (i.e. the actual price) is below the "non-political price". Furthermore, railways do not pay excise taxes on fuels used, sales taxes on equipment, nor are they subject to company tax or local government rates. The net result is therefore much greater than indicated by our calculations. It is likely that some commodity classes actually earn revenues which exceed their working expenses. Indeed, it has been said that revenues from coal transported for export in Queensland greatly exceed all costs associated with it. If this is so, the extent to which other traffics fail to cover their working expenses is even greater than is indicated by the overall result. Railways' share in some traffics is being maintained or even increased not only by access to the public purse, but also by internal cross-subsidisation. The "true" deficit for competitive traffics is then much greater than appears from the aggregate data.

Road Transport : Taxes and Prices

The major problem here is with the treatment of payments for road use, and the expenditure undertaken by road supplying authorities. By and large, the owners/providers of road transport services meet all the costs associated with the operation of their vehicles, including the taxes and fees levied on them by governments. The question is the extent to which such taxes and fees can be viewed as payments for road use.

So far as the rates, fees, and taxes levied by State governments are concerned, practically all are paid into funds earmarked for expenditure on roads. Taxes levied by the Commonwealth government are regarded by government in the same way as other taxes and paid into the General Revenue Fund. Payment to the States for road expenditure purposes are then viewed as "subsidies". In terms of the concept of a "political price", the view taken by governments is of little relevance. Furthermore, our concern is with effects on resource allocation between producers of substitutes, and this effect exists regardless of the name given to charges and expenditures. Since we have no means of knowing what a competitive road space supply industry would charge, we have no alternative but to regard the difference between the revenue raised by fuels taxes and the sum of payments to the States for roads as the

"political price". It should be added that if such fuels taxes are "pure" taxes, they would also have to be paid by the railways. Likewise, the other taxes paid by road transport, especially the taxes on vehicles and equipment, would also have to be paid by railways. However, the "political price" in road is well above the "non-political price", whereas the opposite is the case in rail, even if only fuels taxes are taken into consideration. This is hardly a matter in which there can be great dispute.

Table 7 shows motor fuels tax collections and allocations to the States for roadworks for the period 1950/1 to 1977/8. For no year during the period did allocations to the States exceed 78%, and currently they are running well below 50%. Again, these data are well known and not in any way contentious. They are of particular interest when they are put side by side with the data for railways, and highlight the extent to which there is unequal treatment of equals. The argument that allowance should be made for the capital costs of roads (BTE 1977, Chapter 8) has a number of problems associated with it, but in any case is not very relevant here because the capital costs of rail have been similarly ignored (admittedly, this is a very crude approach, with many additional problems).

Whether an identical relationship between political and non-political prices should be reached by imposing similar taxes on rail as on road, or by paying similar subsidies to road as to rail, is another question. Substitution between transport and non-transport activities (especially location and scale of operation) can take place, and an intuitive judgement would be that no subsidy element should be included.

An additional problem is the question of an efficient structure of charges for road users. While we have referred to global aggregates for collections and disbursements, a comparison with rail would require a break-down of these aggregates into the revenues and costs associated with each user class (Kolsen, Ferguson and Docwra, 1975). The usual argument is that heavy road vehicles do not meet their "appropriate" share of costs. As with rail, there are great difficulties in assessing the costs created by any particular user class. Again as with rail, in the absence of such break-downs, we have to fall back on the aggregated data available.

TAXES & SUBSIDIES IN TRANSPORT

TABLE 7

Motor Fuel Taxes and Roadworks Allocations to the States

Year	Motor Fuel Taxes Total Australia \$m	Commonwealth Roadworks Allocations to the States \$m	% Returned to the States
1950/51	52	28	53.8
1951/52	53	30	56.6
1952/53	55	30	54.5
1953/54	60	33	55.0
1954/55	66	45	68.2
1955/56	75	52	69.3
1956/57	93	61	65.6
1957/58	106	70	66.0
1958/59	110	78	70.9
1959/60	117	88	75.2
1960/61	125	92	73.6
1961/62	132	102	77.3
1962/63	143	111	77.6
1963/64	157	120	76.4
1964/65	172	134	77.9
1965/66	217	144	66.4
1966/67	239	154	64.4
1967/68	251	166	66.1
1968/69	273	176	64.5
1969/70	291	197	67.7
1970/71	360	224	62.2
1971/72	451	251	55.7
1972/73	478	282	59.0
1973/74	635	317	49.9
1974/75	679	372	54.8
1975/76	863	424	49.1
1976/77	955	434	45.4
1977/78 (est.)	1127	475	42.1

Note:- 1. Motor Fuel Taxes shown comprise Gross Customs and Excise Duty on Motor Spirit and Automotive Distillate plus, from 1975/76, the estimated revenue received from the road user on account of the production levy imposed on locally produced crude oil.

2. The Roadworks Allocations to the States include grants for Beef Cattle Roads from 1961/62 to 1976/77 inclusive.

Source: Queensland Main Roads Department

THE "POLITICAL PRICE" IN RAIL AND ROAD : SOME
TENTATIVE CONCLUSIONS

In the third section we gave a definition of the "non-political price", which was a price based on costs in a manner similar to that put forward in the 1967 UK White Paper. This, in turn, was in many respects similar to a price established in a relatively competitive market. It was also similar to prices established in the regulated public utilities in the USA. The objective of this definition was to enable a determination of the extent to which prices in rail and road transport compare with this "non-political price" benchmark.

The data available to us had all the defects associated with large aggregates. It was therefore necessary to ignore many of the areas of potential internal cross-subsidisation within each of the modes. It is worth pointing out that in the case of road, such cross-subsidisation is confined to costs of and payments for the use of roads, while in rail it can extend to the costs and payments for use of motive equipment, rolling stock, and all current outlays associated with the provision of a transport service.

The overall conclusion is clear enough: the political price in rail is below the non-political price, whereas the opposite applies in road. This is merely another way of stating that rail services as a whole are subsidised, while road services as a whole are taxed. This is not a novel or even contentious conclusion. What is of much greater interest is the apparent acceptance by governments that, despite the obviously deleterious effects on resource allocation efficiency, this price is regarded as being justified by some political objectives which are being achieved, without being specifically judged as being worth the cost.

To give some indication of the magnitude of the difference between actual prices charged, and the prices which would have to be charged to cover working expenses, in NSW the price of all services would have had to be increased by approximately 50% in 1975/6, on the unlikely assumption that demand was perfectly inelastic over that price range. It may be argued that the major cause of the deficit is to be found in the passenger operations of the railways. Since cost break-downs are not available, we are only able to examine the probability of this. For NSW, the period 1952/3 to 1975/6 shows that revenue per passenger journey has increased by 350%, while revenue per freight tonne increased by only 28%.

TAXES & SUBSIDIES IN TRANSPORT

It is difficult to imagine what differential productivity increases in freight could account for differences of such magnitude. The presumption is that the increase in revenue per freight tonne of 28%, when compared with the increase in revenue per passenger journey of 350% and a CPI increase of 140% , was insufficient to cover cost increases in the provision of freight services. In turn, the most likely reason for this is the existence of inter-modal competition, and the apparent insistence to maintain market shares without reference to costs, which prevented the appropriate increases in freight rates. Thus for the systems for the period 1952/3 to 1975/6 freight rates increased 28% while over the same period the volume of freight tonnes carried increased by 133%. By contrast, the 350% increase in revenue per passenger journey was associated with a decline in the journey index from 100 in 1952/3 to 65.58 in 1975/6 (Table 8).

It should not be necessary to add that while the conclusions are regarded as the most plausible, a great deal of additional research is necessary. Perhaps those who disagree with the conclusions will be moved to provide evidence to the contrary. One conclusion which is not in dispute is the lack of information provided. This applies particularly to the railways. There can be only relatively few economic activities of this magnitude which are carried out in competition with substitutes which create such a large demand for public monies without any detailed analysis of the reasons or any other real attempt at justification.

We conclude with the usual apologies. The paper was written in considerable haste to meet a deadline, and we fear that it may contain evidence of this. Any errors are to be blamed on this haste as well as on our ignorance.

TABLE 8

Passenger Journeys ('000) All Systems 1952/53 - 1975/76

Year	Passenger Journeys ('000)	Passenger Journey Index
1952/53	497,620	100
1953/54	510,681	102.62
1954/55	516,857	103.85
1955/56	514,737	103.43
1956/57	499,516	100.38
1957/58	494,330	99.33
1958/59	485,018	97.46
1959/60	478,715	96.20
1960/61	444,862	89.39
1961/62	443,319	89.08
1962/63	442,328	88.88
1963/64	447,781	89.98
1964/65	440,978	88.61
1965/66	459,997	92.43
1966/67	454,735	91.38
1967/68	452,818	90.99
1968/69	447,437	89.91
1969/70	450,122	90.45
1970/71	452,530	90.93
1971/72	403,816	81.14
1972/73	399,993	80.38
1973/74	373,618	75.08
1974/75	349,960	70.32
1975/76	326,354	65.58

TAXES & SUBSIDIES IN TRANSPORT

REFERENCES

B.T.E. (1977) Bureau of Transport Economics, Cost Recovery in Australian Transport 1974-75.

Dodgson, J.S. (1978), The Economics of Australian Railway Deficits, University of Wollongong, Economic Research Bulletin, 1978.

H.M.S.O. (1967) Nationalised Industries: A Review of Economic and Financial Objectives Cmnd. 3437.

Hotelling, H. (1938), "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates", Econometrica, 6.

Kahn, A.E. (1970), The Economics of Regulation, Vol.1, Esp.Ch.2. (John Wiley and Sons, Inc. N.Y. 1970).

Kolsen, H., Ferguson, D., Docwra, G. (1975) Road User Charges: Theories and Possibilities, B.T.E. Occasional Paper No. 3., July 1975.

Report of the Board of Inquiry into the Victorian Land Transport System, Govt. Printer, Melbourne, 1971.

Stein, L. Von (1885), "On Taxation", Here taken from R.A. Musgrave and A.T. Peacock (Eds), Classics and the Theory of Public Finance Macmillan and Co. Ltd., London, 1962, p.28.

Sources for Tables 1 to 6, and 8: Commonwealth and State Yearbooks.