COMPETITION AND REGULATION IN GRAIN TRANSPORT

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ABSTRACT: *One possible means of improving the efficiency of current grain transport arrangements which has been suggested is removal of restrictions on competition for available grain traffic between rail authorities and road operators. It is necessary, however, to examine the likely impacts on transport efficiency and equity of unrestricted competition between the two modes before concluding that this approach would be beneficial.*

In this paper the cost structures of rail and road operations are examined to assess the scope for competition between the two modes for the movement of grain. The results suggest that rail transport is likely to have a significant cost advantage in the line haul task where there are few backloads available. Where backloading opportunities exist for road, the two modes may have more similar costs for the grain task. Road transport would appear to have an advantage over rail on branch line routes but the outcome depends largely on traffic volumes (of both grain and other freight) and on the condition of local roads. The significant differences in main line rail and long haul road costs suggest that, even without regulation, railways would have a monopoly over the transport of grain from some areas.

The efficiency and equity implications of removing controls on road/rail competition are also discussed. The existing road pricing system is examined to assess whether the full social cost of road use by gain trucks could be recovered from road operators.

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INTRODUCTION

In October 1986 the Federal Minister for Primary Industry, The Honourable John Kerin, M.H.R., announced that a Royal Commission into Grain Storage, Handling and Transport would be held. This paper draws heavily on a submission which the Federal Bureau of Transport Economics (BTE) made to the Royal Commission (BTE 1987).

In its investigations the BTE found that many of the issues relating to the efficiency of current grain transport arrangements revolved around the general question of road/rail competition. In most States grain traffic is currently reserved to rail. South Australia is the only State where road contractors are able to compete freely for grain freight. In New South Wales road haulage of export grain is precluded by the non-availability of road receival facilities at port. In the other States regulations restrict the distance over which grain can be transported, restrict road cartage of grain to growers only, and/or require permits for the road transport of grain (see Table 1). This restriction of competition can give rise to several sources of inefficiency of which two important ones are:

- the allocation of grain traffic between the two modes may not be based on relative resource costs; and
- the rail authorities, by virtue of their monopoly positions, may not be encouraged to seek out the least-cost method of production.

To examine the potential for cost savings from removal of restrictions on road/rail competition it is necessary first to establish the scope for competition between the two modes in the grain market. The factors which are relevant to a consideration of the most appropriate regulatory approach towards road/rail competition can then be discussed.

In this paper (and in the BTE's submission) the scope for competition between rail and road in the grain market is assessed by reference to the cost structures of the respective modes and especially to how these structures vary as the amount of traffic increases. The ensuing discussion deals with the regulation of road/rail competition in terms of efficiency and equity objectives. The need for regulation to aid efficiency, for example, will largely be determined by the existence or otherwise of efficient market signals; that is, prices which will contribute to an optimal allocation of resources between and within the two modes. The need for regulation to ensure equity will primarily be determined by the likely existence of monopoly power in an open market.

It must be understood, however, that the conclusions on the scope for competition between road and rail presented in this paper cannot be treated as definitive. Data on the cost structure of rail operations in particular are scarce and generalisations were required for the broad purpose of this analysis. The intention of this paper is to highlight some of the issues involved rather than provide clear cut results.

THE SCOPE FOR ROAD/RAIL COMPETITION

In the absence of legislative or other restrictions on road/rail competition, the modal split of grain traffic will, theoretically, be based on the underlying cost structure of the respective modes. How these cost structures or functions behave as the quantity of grain or the distance it is transported varies will largely determine the modal split of grain travelling from different locations to port. Another important factor influencing this modal split will be what is known as the 'density' of traffic on the route, that is, the availability of other commodity traffic to the respective modes.

Road costs

The cost of transporting grain on the existing road system has three main components:

- vehicle operating costs - the financial costs paid by the vehicle owner;
- road damage costs - the deterioration of road pavement caused by grain trucks using roads; and
- externalities - air and noise pollution caused by grain trucks and their contribution to congestion costs and traffic control requirements.

The BTE's analysis of road costs was concerned with the costs of using representative vehicles to transport grain over the existing road system. Externalities are not included in the cost analysis because adequate data are not available. Grain trucks may, however, cause significant environmental impacts and these are outlined and discussed later in the paper.

Vehicle operating costs
Included in vehicle operating costs are fixed costs which must be met whether or not the vehicle is used. These fixed costs include the costs of capital (the vehicle and trailer), registration and

insurance. The variable costs are the costs of fuel, tyres, maintenance and repairs and wages and overheads.

A variety of truck types are used to transport grain, ranging from general purpose rigid farm trucks to six-axle articulated trucks. The cost estimates presented here are for three vehicle types identified as typical of the grain industry (CANAC Consultants 1984). The specifications of these vehicles are reported in Table 2. Table 3 summarises the vehicle operating costs of the three truck types. (The derivation of these cost estimates is explained in detail in BTE (1987, 62-68)).

Road damage and other resource costs
The financial costs shown in Table 3 are based on retail prices and therefore include various taxes and transfer payments. They also include vehicle registration charges which represent a contribution to road damage costs. A first step in deriving resource costs is to adjust retail prices for taxes and subsidies. Table 4 contains the adjusted (resource) price of vehicles, fuel and tyres. A second step is to include the cost of pavement damage. The difference that inclusion of road damage costs and exclusion of taxes and charges makes to the cost of road transport is shown in Table 5.

The damage caused to road pavement by a vehicle is generally related to the axle load of the vehicle. Total annual road pavement costs can thus be allocated between road users using information about vehicle axle loads and the distance these vehicles travel each year. There are problems, however, with assuming a general relationship between axle load and pavement damage. Most important to the investigation of grain transport is the variation that will occur in the pavement damage caused by heavy axle loads as the standard of the road used changes. It has been noted in several studies that local roads will deteriorate at a much faster rate under heavy axle loads than will arterial roads (see the Commission of Inquiry into the New South Wales Road Freight Industry 1980). The costs presented in Tables 4 and 5, being based on arterial road standards, may therefore underestimate the pavement damage costs caused by grain trucks using local roads.

Other factors which may affect the accuracy of the estimates of the resource cost of road use presented in this paper (apart from the exclusion of externalities) include the assumption made that there is no backloading and that pavement damage only occurs when trucks are laden. To the extent that resource costs are associated with the return trip of a grain movement this assumption will result in under estimation of resource costs. On the other hand, labour costs are likely to be overstated in the analysis because allowance was not made for payroll taxes. Similarly, repair and maintenance costs are likely to be overstated because an adjustment was not made for the taxes paid on spare parts.

General characteristics of the cost structure of road grain freight operations

Despite the problems inherent in the data used, the tables provide an indication of the general nature of the cost structure of road grain freight operations. Fuel and wages and overheads account for a major share of total financial costs for all truck types. The other main financial cost is that associated with the purchase of a vehicle.

The relatively low level of fixed costs influences the structure and behaviour of the road freight industry in a number of ways. First, it is a comparatively easy industry to enter and exit and thus tends to be characterised by strong competition for available traffic. Second, it provides few opportunities for gaining economies from scale or distance; average costs do not decline significantly as the amount carried or the distance traversed increases.

Another important characteristic of road grain freight operations evident from the data is the high level of road damage costs. If fully charged to operators, these would add significantly to the cost of road grain freight operations.

Rail costs

There are few publicly available sources of data on the cost of providing transport services by rail. Two main sources of information on rail costs were used to derive the figures presented in this paper. The first was the 'Study of Grain Handling and Transport in the State of Victoria' by the CANAC Consultants (CANAC Consultants 1984). This study utilised a data base of unit costs to estimate the long-run avoidable (or attributable) costs of transporting grain on specific parts of the Victorian rail network, particularly branch lines used exclusively for grain transport. The second source of information was the 'Commonwealth Grants Commission Report on Tax Sharing Relativities, 1985' (CGC 1985). This report analysed the published expenditure accounts of the four State rail authorities and derived unit cost estimates for many relevant parameters. The unit costs quoted in this paper are based on 1983-84 financial data and rail task statistics, converted into December quarter 1986 costs by means of CPI adjustments.

The costs which are involved in the provision of rail services can be classified into the following components:

- train operating costs
  - capital (locomotives and wagons)
  - fuel
  - crew (wages, superannuation and other 'on costs')
  - maintenance (locomotives and wagons);
- track maintenance costs;
- overheads; and
- terminal operating costs.

Attributing a portion of these cost components to a particular rail service such as grain involves identifying those costs which are avoidable; that is, those costs which would not be incurred if the railway withdrew from the grain transport market. Identification of these avoidable costs is particularly difficult in the case of railway operations due to the existence of numerous joint and common costs. These costs, which include management and administration costs, building construction and maintenance costs and the costs of safe working practices, can only be attributed to particular traffics on the basis of arbitrary allocation procedures.

Fixed track maintenance costs are a very important type of joint railway cost where there is more than one traffic type. The methodology used in this study to allocate a portion of total track maintenance costs to grain traffic was to multiply the total annual fixed maintenance cost by the ratio of gross tonnes of grain to the total gross tonnes on the line.

A further problem involved with the estimation of rail costs concerns the cost of terminal activities. These costs include the time taken in such activities as shunting and marshalling and the opportunity cost of rolling stock whilst it waits to be loaded or discharged. Terminal costs will therefore vary greatly with the physical and operationals characteristics of the terminal itself. There are a wide variety of terminals and the problem is finding a 'standard terminal' for cost estimation purposes.

Table 6 outlines the specifications of two hypothetical railway operations in the grain market: a unit train on a main line operation and a local train on a branch line operation. These are the basis for the estimates of long-term avoidable costs provided in Table 7. To put the main line traffic volume used in perspective, there was a total of about 1.2 million tonnes flowing on the main rail line from New South Wales to Victoria in 1979-80 (BTE 1983).

General characteristics of the cost structure of rail grain freight operations

The examples demonstrate clearly the high proportion of fixed costs in railway operations. About 46 per cent of all the costs of the unit train operation are fixed and about 93 per cent of those of the local train are fixed. The high proportion of fixed costs, especially fixed track costs, in railway operations means that, within the capacity limits of a particular line, additional traffic can be accommodated at a small marginal cost. It also means that the unit cost per tonne of transporting grain by rail will be influenced by the amount of grain and other traffic on the rail line used. Each tonne of grain transported on a low density branch line will need to bear a high proportion of the fixed cost of operating that branch line and thus have a relatively high transport cost. Each tonne of grain transported on high density rail lines will bear a much smaller proportion of the fixed costs.

Road/rail modal shares

The data presented above illustrate the marked differences between the cost structures of rail and road transport. Rail transport is characterised by large fixed and sunk costs relative to the variable costs of operation. Consequently, there is scope for rail to gain some economies with respect to traffic density. Road transport operations, by contrast, are characterised by a much greater proportion of variable costs and a lesser proportion of sunk costs than railways. Also, the minimum cost of providing a unit of rail services is high relative to road. This means that the most efficient size of road transport operations is more quickly reached and, so, the economies arising from size are likely to be smaller than for rail transport.

The financial costs per tonne-kilometre of the two modes are summarised in Table 8. It can be seen that the costs of main line rail hauls are less than half the cost of transport by six-axle articulated road vehicles (assuming no backload). This suggests that in a less regulated environment there may not be much competition between the two modes over long distances on main line routes because rail transport should be able to undercut road rates and still cover avoidable costs. Road operators may, however, have an advantage over low density branch line routes.

It must be remembered that the road and rail cost figures shown in the tables are based on 'average' or 'typical' costs. Costs on individual rail lines and roads can vary markedly depending on such things as the density of traffic, the loads carried and the condition of the track or road. Thus, it might be the case that a branch rail line can compete with road transport with respect to grain transport because the branch line carries a significant level of traffic and the competing road transport is over very poor roads which inhibit the use of the most efficient road transport vehicles. A general statement, based on these costs, about the future viability of rail branch lines cannot be made. Each case must be considered on its own merits.

A major distinguishing feature of rail transport is that the rail authorities own both the vehicles and the track on which they run. This is in marked contrast to road transport, where ownership of vehicle and track are in different hands. To the extent that road transport operators are not paying the full costs of roads, in an unconstrained market they would have an unfair cost advantage over those rail authorities that were attempting to cover the full costs of their operations. An efficient pricing mechanism would ensure that all relevant costs were included in the cost structure of road transport and that the costs were, therefore, reflected in the pricing policies of road operators. The competitive position of line haul rail transport would, in general, be improved if these pricing policies were practised. Again, however, it is important to note that each situation needs to be examined individually.

TABLE 1 REGULATIONS AFFECTING THE MODAL SPLIT OF INTRASTATE GRAIN TRANSPORT

Item	*New South Wales*	*Victoria*	*Queensland*	*Western Australia*	*South Australia*
Approximate percentage of grains carried by road[a]	0	30	8-15	20	50
Availability of road receival facilities for grain at port	None, but facilities planned for Port Kembla and Newcastle	Yes	Yes	Yes, but not at Kwinana	Yes
State regulation limiting road haulage of grain	Nil	. Carriage restricted to rail beyond 60 km . Farmers can use their own truck for prescribed grains (wheat, barley, oats) . V/Line also uses road for line haul movements, 'closed lines' and consolidation movements	. Carriage restricted to rail beyond 120 km . Permits are issued to road contractors to supplement rail capacity in peak season	. Carriers regulated to nearest facilities outside port area . Farmers can use own trucks to any destination	Nil
Legislation	None	*Transport Act* 1983	*Transport Act* 1960-1981	*Transport Act* 1966-1982	None

a. Figures relate to 1985-86, except for Queensland where the data are the average of the three-year period to 1985-86.

Sources Royal Commission into Grain Storage, Handling and Transport (1986). NRFII (1984, 267).

TABLE 2 TYPICAL ROAD VEHICLE TYPES AND SPECIFICATIONS FOR TRANSPORT OF GRAIN

	Contractor			
	6-axle articulated configuration		*Owner operator*	
Item	*Three-axle prime mover*	*Three-axle trailer*	*Three-axle rigid tipper*	*Two-axle rigid tipper*
Vehicle				
Engine type	diesel	..	petrol	petrol
Rear axle configuration	2xdual wheels	all dual wheels	2xdual wheels	dual wheels
Tare mass (tonnes, including fuel)	8.5	6[a]	7	5.4
Age at purchase (years)	0	0	6	6
Purchase price ($ 1986 prices)	135 000[b]	45 000[c]	22 500[d]	14 300[d]
Residual value (per cent)	60	60	0	0
Load (including 5 per cent overload) (tonnes)	24		13.4	9.2
Gross vehicle mass (tonnes)	38.5		20.4	14.6
Life of vehicle (in-farm service, years)	4	8	10[g]	10[g]
Utilisation (km/year)	150 000	150 000	9 000	9 000
Average speed (km/hour)	70[h]		40	40

a. Does not have any fuel.
b. Original estimate by CANAC Consultants was $110 000 in 1984 prices (or $124 300 in 1986 prices).
c. Approximately equal to the original CANAC Consultants' estimate of $40 000 updated to 1986 prices using the CPI.
d. The price includes stamp duty.
f. CANAC Consultants used 12 years.
g. CANAC Consultants used 9 years.
h. CANAC Consultants used 75 kilometres per hour.
.. Not applicable.

Note All costs are financial costs.

Source Based on CANAC Consultants (1984) but adjusted by BTE on the basis of current information. BTE (1987).

TABLE 3 UNIT FINANCIAL OPERATING COSTS FOR TYPICAL GRAIN TRUCKS, 1986 PRICES[a]

	Type of truck					
	Six-axle articulated		*Three-axle rigid*		*Two-axle rigid*	
Cost item	*¢/km*	*Per cent*	*¢/km*	*Per cent*	*¢/km*	*Per cent*
Capital						
Vehicle	12.2	12.2	32.2	28.1	20.6	21.4
Trailer	2.3	2.3	..	..	..	..
Registration	1.4	1.4	5.7	5.0	4.1	4.3
Insurance	5.0	5.0	3.3	2.9	3.3	3.4
Fuel[b]	25.4	25.4	25.1	21.9	25.1	26.1
Wages and overheads	32.9	33.0	22.5	19.7	22.5	23.4
Maintenance and repairs	9.1	9.0	12.6	11.0	12.6	13.1
Tyres	7.8	7.8	13.0	4.4	7.9	8.2
Administration	3.8	3.8	..	..	..	..
Total	99.9	100.0	114.4	100.0	96.1	100.0
Loading and unloading cost ($/trip)	35		14		14	

a. Assumed utilisation rates are 150 000 kilometres per year for the six-axle articulated vehicle and 9 000 kilometres per year for the rigid vehicles.
b. Average of fuel consumption when loaded and when unloaded.
.. Not applicable.

Note Figures may not add exactly to total due to rounding.

Source BTE (1987).

TABLE 4 SUMMARY OF RESOURCE COSTS OF TYPICAL GRAIN TRUCK OPERATIONS, 1986 PRICES

(cents per kilometre)

	Type of truck		
Cost item	*Six-axle articulated*	*Three-axle rigid*	*Two-axle rigid*
Capital			
Vehicle	10.1	31.7	20.1
Trailer	2.1	..	..
Insurance	5.0	3.3	3.8
Fuel	16.4	16.2	16.2
Tyres	6.6	11.4	6.9
Wages and overheads	32.9	22.5	22.5
Maintenance and repairs	9.0	12.6	12.6
Administration	3.8	..	..
Pavement damage cost[a]	15.1-28.3	13.2-24.8	8.2-15.4
Total resource cost	101.0-114.3	110.9-122.5	90.3-97.5

a. Pavement damage cost estimates are based on Luck and Martin (1987). It is assumed that there is no backloading and that pavement damage occurs only when trucks are fully laden, that is, for one kilometre in every two kilometres travelled.
.. Not applicable.

Source BTE (1987).

TABLE 5 UNIT RESOURCE COSTS AND FINANCIAL COSTS OF ROAD TRANSPORT, 1986

(cents per net tonne-kilometre)

	Type of Truck		
Item	*Six-axle articulated*	*Three-axle rigid*	*Two-axle rigid*
Financial cost	8.3	17.1	20.9
Resource cost	8.4-9.5	16.6-18.3	19.6-21.2

Source BTE (1987).

TABLE 6 EXAMPLES OF GRAIN TRAIN OPERATIONS: TASK SPECIFICATIONS

	Train operation[a]	
Specification	*Unit train on main line*	*Local train on branch line*
Locomotives		
Class A (2450 HP)	2	..
Class T (1000 HP)	..	1
Wagons		
Bottom discharge	36	..
Open 4 wheel	..	12
Train gross weight (tonnes)	2 900	484
Train tare weight (tonnes)	920	220
Locomotive utilisation (km/yr)	80 000	60 000
Wagon utilisation (km/yr)	50 000	30 000
Fuel consumption (litres/1000 GTK)	4.6	6.0
Crew size	2	2
Traffic volume (1000 gross tonnes/yr)	1 910	28

a. Assumed that grain wagons travel fully laden in one direction and empty on the return journey.

.. Not applicable.

Source BTE (1987).

TABLE 7 EXAMPLES OF GRAIN TRAIN OPERATIONS: LONG TERM AVOIDABLE FINANCIAL COSTS FOR A TWO-WAY TRIP
(1986 prices)

	Train operation			
	Unit train on main line		Local train on branch line	
Cost category	$/train km	per cent	$/train km	per cent
Train operating costs				
Loco capital	3.9	11	1.1	1
Wagon capital	5.1	14	0.0[a]	0
Fuel[b]	4.3	12	1.0	1
Crew[c]	3.2	9	3.2	3
Loco maintenance	4.0	12	0.8	1
Wagon maintenance	2.7	7	0.9	1
Sub-total	23.2	64	7.0	7
Overheads	2.3	6	0.7	1
Track maintenance				
Fixed[d]	7.7	21	96	92
Variable	3.1	8	0.6	1
Total	36.3	100	104	100
Cost/GTK	1.9¢		30¢	
Cost/NTK	3.6¢		79¢	

a. Open four-wheel wagons were assumed to have no capital value.
b. Distillate price assumed to be 49¢/litre.
c. Two-man crews assumed.
d. Traffic volumes were equivalent to 500 and 40 round trip train journeys per year for the main line and branch line operations respectively.

Note Figures may not match exactly to totals due to rounding.

Source BTE (1987).

TABLE 8 UNIT FINANCIAL COSTS OF RAIL AND ROAD TRANSPORT, 1986
(cents per net tonne-kilometre)

	Transport mode				
	Rail		*Road*		
	Branch line	*Main line*	*Six-axle articulated*	*Three-axle rigid*	*Two-axle rigid*
Cost per tonne-kilometre	79[a]	3.6	8.3	17.1	20.9

a. Track maintenance dominates this cost.

Source BTE (1987).

EFFICIENCY AND EQUITY CONSIDERATIONS

The analysis presented in the preceding section suggests that removal of existing restrictions on the transport of grain would result in a transfer of some grain traffic from rail to road, particularly where backloading opportunities exist. This section is concerned with assessing the likely implications for economic efficiency and social welfare of such a change in the modal split of grain traffic.

An industry will be efficient when it is no longer possible to increase total output or social welfare by transfering resources from one activity or sector (or mode of transport) to another. Such a situation will occur when, at the margin, the price paid for a good or service equates with the cost of the resources used in its production and with the value the community attaches to its production.

In a perfectly competitive market, allocative efficiency would result naturally from the process of competition. Perfect knowledge and rationality would guarantee that the price paid for a good or service would reflect both its marginal value (given the existing distribution of income) and resource cost. Resources would move freely between sectors until the above equality between costs and values was attained; stability would then result.

These conditions do not characterise the market for grain transport services. Departures from the competitive model occur to a significant extent. At a minimum these departures indicate some need for government involvement to improve the price mechanism which influences the allocation of resources between the modes, thereby ensuring that the benefits of open competition can be maximised.

One of the main sources of departure from the competitive model in grain transport is the apparent divergence between the market price for road grain freight services and the short run marginal social cost of these services. The Inter-State Commission recently found that rail does cover the short-run marginal cost of most freight services that are competitive with road (ISC 1986), but various studies into the recovery of Australian road costs have shown that heavy vehicles, such as those used in the transport of grain, are not contributing revenue sufficient to cover all costs, including the costs of the road damage they cause.

The paper presented to this Forum by Luck and Martin (1987) outlines the extent to which current charges on road use cover the costs associated with this use. They show that neither six-axle articulated nor three-axle rigid truck operators contribute enough in the form of fuel excise, registration and licence fees and other taxes on road use to cover even the pavement damage (short run avoidable cost) caused by their vehicles. Therefore, these vehicle operators currently also make no contribution to the road costs which are joint or common to all road users. Operators of two-axle rigid trucks, on the other hand, contribute more in taxes and other road charges than their share of road costs (Luck and Martin 1987, Tables 1 and 5).

These estimates may, however, still understate the divergence between the market price and social cost of transporting grain by road. A variety of other costs are associated with the use of roads by heavy axle load vehicles. These costs include:

- Damage caused to local roads by heavy vehicles. As was outlined in the previous section, the lower pavement strength of these roads implies that the damage caused by heavy axle loads will be greater.
- The environmental and other social costs of heavy vehicles travelling through urban areas on their way to port. The data in Table 9 show that, even if only 15 per cent of grain exports travelled by road a large number of additional truck movements would be experienced in the urban areas surrounding port. At Newcastle, for example, an additional 13 000 heavy vehicle trips would be experienced (26 000 if the return trip were counted

separately). If a peak in grain transport occurred (for example, 50 per cent of total truck movements take place over a 3 month period), this would imply an additional 16 trucks per hour on Newcastle's roads (32 trucks per hour if the return journey were counted separately). The impacts on noise and air pollution and on road congestion can therefore be significant.

To the extent that charges paid by road transport operators are less than the short-run marginal cost of road use, in a competitive market more grain would travel by road than is economically efficient. This could result in a misallocation of resources between the two modes. It could also mean that the other road users who are paying more than the short run marginal cost of their road use, or the taxpayer, would effectively be subsidising grain transport costs.

To price road use efficiently so that charges levied on road users reflect the various pavement, environmental and social costs they cause, is very difficult. Prices would have to vary not only with the distance travelled but also with the functional and area class of the road. Existing road pricing arrangements do not allow for this type of differentiation. In any case, such a system would need to apply to all road transport, not just grain. Some form of regulation of grain transport may, therefore, be justified in this second-best situation as a means of achieving the modal split between rail and road which would occur if there were competition and all the economic and social costs associated with road use by heavy vehicles were charged to the road operators. Clearly, this does not mean a total ban on road transport of grain. All it implies is that in certain areas or across certain distances where the social costs of road transport of grain may greatly exceed prices paid, the appropriate policy response may be to restrict the use of roads by grain transport operators (but only when the solution of improved road pricing cannot be implemented). Restriction of road based grain receival facilities at ports located in major urban centres is an example of such a policy.

TABLE 9 ESTIMATED NUMBERS OF DAILY GRAIN VEHICLE TRIPS TO VARIOUS EXPORT PORTS AND REQUIRED ROAD RECEIVAL RATES TO HANDLE 15 PER CENT OF CURRENT GRAIN EXPORTS

	Assumed even annual flow[a]			*Assumed peak flow*[b]		
Port	*Daily trips*	*Trips per hour*[c]	*Required receival rate (tpd)*	*Daily trips*	*Trips per hour*[c]	*Required receival rate (tpd)*
Sydney	86	11	2 064	172	22	4 128
Newcastle	67	8	1 608	134	16	3 216
Geelong	77	10	1 848	154	20	3 696
Brisbane	67	8	1 809	144	16	3 618
Fremantle	89	11	2 537	178	22	5 074

a. Assuming a 200 day working year with no peak flow.
b. Assuming 50 per cent of total traffic is delivered within three month (50 working day) period.
c. Assuming a single, 8 hour shift.

Source BTE (1987), Appendix V.

Efficiency is also concerned with the organisation of resources within each firm or mode of transport. In a perfectly competitive environment firms would be forced to employ the least-cost combination of resources (for example, incorporate the benefits of new technologies) in order to protect their position in the market. Inefficient production by any firm in a perfectly competitive market would not allow it to survive.

The competitive nature of the road freight industry is a strong disciplinary influence on the efficiency of road freight operators. Where these operators are able to compete with rail authorities this may also encourage efficiency in rail freight operations. However, where the rail authority has a cost advantage over road operators, such that it can exercise monopoly power, the discipline of potential competition on cost efficiency may be weak. It is in these markets in particular that unregulated competition may not be an adequate policy approach to the industry.

Finding some mechanism which can be used to encourage monopolists to seek the lowest cost method of producing a service is very difficult.

One possible option is the setting of efficiency targets. Another is to require the rail authorities to publish (or give growers access to) details on the cost of providing their services, as this would give growers an opportunity to assess the efficiency of rail grain freight operations and bring pressure to bear when inefficient practices are evident.

The monopoly position that rail authorities could maintain in a deregulated environment also has possible implications for the 'fairness' with which growers are treated in the transport market. An unregulated railway monopoly will be able to increase the freight rates on grain at least to the extent of its cost advantage over road transport in particular markets. Growers located in markets where rail has a significant cost advantage over road could well be allocated a large share of the railway's fixed costs, enabling the rail authority to offer lower freight rates for commodities with a higher elasticity of demand. This allocation of fixed costs may not be considered equitable in view of the cost of providing rail services to grain growers in such markets.

One approach in response to this potential exploitation of 'captive' growers is to have legislation requiring that ruling rates be tested against 'stand-alone costs'. Stand-alone costs refer to the cost of a particular service in isolation, for example, the cost of a railway only providing grain services to a particular location. It is used by the Interstate Commerce Commission in the United States as a 'surrogate' for competition, to test the reasonableness of rates set by railway companies in markets where they have monopoly powers. Any charges above this level are considered to be unfair.

However, the relevance of stand-alone costs as a measure of the reasonableness of rates has been disputed (see Tye 1984). A railway which provides a number of services in combination will be able to provide a particular service at lower cost than could a single service operation. This implies that the stand-alone cost will always be higher than the cost a multi-service railway will experience in providing grain services to a particular market. To the extent of this cost difference, the stand-alone cost test will not be a strong discipline on the monopolist's pricing.

CONCLUSION

The relaxation of State restrictions on the road transport of grain might lead to lower prices for growers in some areas. However, with current road pricing and rail financing arrangements, other groups in the community might pay for this reduction through higher freight rates and reduced road quality, or through taxes to finance road maintenance costs and higher rail deficits.

Any consideration of grain transport regulation should take into account these pricing arrangements and also the potential for monopoly powers in the industry.

REFERENCES

Bureau of Transport Economics (BTE) (1983), *Australian Rail Freight Movements 1979-80,* Information Paper 8, AGPS, Canberra.

__ (1987), *Competition and Regulation in Grain Transport: Submission to Royal Commission,* Reference Paper 124, BTE, Canberra.

CANAC Consultants (1984), *Report on a Study of Grain Handling and Transport in the State of Victoria,* 2 vols, CANAC Consultants Ltd, Montreal.

Commission of Inquiry into the New South Wales Road Freight Industry (G.J. McDonell, Commissioner) (1980), *Charges, Licensing, Safety, Environment, Industry Organisation, Training,* vol. 4, Sydney.

Commonwealth Grants Commission (CGC) (1985), *Report on Tax Sharing Relativities 1985,* 2 vols, AGPS, Canberra.

Inter-State Commission (1986), *An Investigation of Cost Recovery Arrangements for Interstate Land Transport,* AGPS, Canberra.

Luck, D.P. and Martin, I.J (1987), 'Road Pricing and Cost Recovery', paper to be presented at the Australian Transport Research Forum, July, Brisbane.

National Road Freight Industry Inquiry (NRFII) (T. May, Chairman) (1984), Report, AGPS, Canberra.

Royal Commission into Grain Storage, Handling and Transport (1986) *Issues for the Royal Commission's Inquiry,* Discussion Paper no. 1, Canberra.

Tye, W.B. (1984), 'Stand Alone Costs as an Indicator of Market Dominance and Rail Rate Reasonableness under the Staggers Act', *International Journal of Transport Economics,* vol. 11, no. 1, April, 21-40.