

CHANGES IN NEW ZEALAND ROAD TAXATION AND FINANCING

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ABSTRACT: *This paper focusses on the changes made to New Zealand road taxation by the 1977 Road User Charges Act. Road financing and taxation previous to 1978 is reviewed and the evolution of the taxation changes described.*

The changes in taxation were based on cost allocation studies; these studies are related to the charging base, and a review of road taxation post 1978 follows.

An account of support for, and criticism of, the taxation changes by the agricultural and road transport industries is given. Some results of a study attempting to detect changes in the structure and operation of the rural fleet are reported.

Finally an attempt is made to identify the essential issues in the New Zealand road taxation system within a general framework of roading taxation.

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NEW ZEALAND ROAD TAXATION AND FINANCING PRE 1978

Road Transport Taxation Pre 1978

Previous to the 1977 Road User Charges Act, one aim of road transport taxation was to provide revenue for roading; specific taxes imposed were:

- petrol tax
- mileage tax
- heavy traffic fees.

Another aim of road transport taxation was to generate revenue for the Consolidated Fund and for local authorities via:

- import duties on vehicles and spare parts
- sales taxes on vehicles and spare parts
- registration, annual licence, and warrant of fitness fees
- local authority petroleum taxes

Petrol Tax

Petrol tax has been imposed since 1927, initially to provide revenue for New Zealand roading. By 1930 some of the tax was already being siphoned off into the Consolidated Fund; the proportion of the tax flowing to roading or the Consolidated Fund has fluctuated since that time. Petrol tax refunds were available in some circumstances depending on vehicle ownership or the nature of the operator's business; farm vehicles, for example, have usually been eligible for refunds.

Mileage Tax

Mileage tax had been paid traditionally by non-petrol powered vehicles to compensate for their non-payment of the petrol tax. The mileage tax rate was adjusted up or down with petrol tax changes and revenues from the tax were distributed, at least in the earlier years, between the roading fund and Consolidated Fund in the same proportion as the petrol tax revenue. Mileage taxes varied by type of fuel used (e.g. diesel, electricity), nature of the operator's business, and the gross laden weight of the vehicle. The tax was paid quarterly in arrears based on returns from transport operators.

Heavy Traffic Fees

These fees had been in force since 1924 in recognition of the extra roading costs imposed by heavy motor vehicles. Although fees were payable by all vehicles over 2 tonnes, certain vehicle types and operators paid a lower licence fee (e.g. farmer owned trucks). Fees varied by gross laden weight; the fees had not changed in the 10 years previous to 1978.

Import Duties on Vehicles and Spare Parts

Import duty was levied on new vehicles and spare parts, revenues being directed to the Consolidated Fund. At times, revenues from import duties on tyres and tubes have been diverted to the Central Roothing Fund.

Sales Taxes on Vehicles and Spare Parts

Sales taxes have existed on the price of new vehicles and spare parts. As of 1977, the sales tax level on trucks was 40 per cent.

Registration, Annual Licence, and Warrant of Fitness Fees

As with import duties on tyres, the disposition of revenue from registration and other fixed fees has varied in the past between the Consolidated Fund and the Central Roothing Fund. Since 1967, all revenues have been diverted to the Consolidated Fund, except for drivers licence revenue, a revenue source for local authorities.

Local Authority Petroleum Taxes

This tax was introduced in 1971 and applied to both petrol and diesel. Revenue from the tax remains in the hands of the local authorities.

In summary, a range of taxation items was applicable to road transport. Some measures were designed as general revenue raising mechanisms for both the Consolidated Fund and local authorities. Other items raised funds specifically for the Central Roothing Fund.

Road Financing Pre 1978

Since 1953, monies collected for roading purposes have been aggregated into a Central Roothing Fund administered by the National Roads Board. The National Roads Board was responsible itself for the State Highway systems while municipalities and county councils received subsidies from the Central Fund to carry out a National Roads Board approved roading programme on city streets and county roads respectively.

Table 1 shows the sources and amounts of revenue received into the Central Fund for the years up to 1978.

The roading programme in any year can be broken down into works on:

- State Highways
- municipal streets
- county roads.

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Table 1

Central Roading Fund Receipts 1972-1978 (\$000)

Year Ending 31st March	Petrol Tax	Mileage Tax	Heavy Traffic Fees	Sub Total of Road Taxation Receipts	Consolidated Fund Contribution	Misc. and Interest	Total
1972	73135	5996	10536	89667	10	1932	91609
1973	78608	5782	11265	95655	3000	998	99653
1974	85411	5797	11958	103166	700	1682	105548
1975	85333	6915	12532	104780	1250	3006	109036
1976	80829	7383	13038	101250	16350	3044	120644
1977	85936	7772	13709	107417	21000	3208	131625
1978	106696	9112	10448	126256	10000	3109	139365

Source: Annual Reports of National Roads Board

Finance for State Highway work was derived entirely from the Central Fund; financing of the local authority programmes was from local authority sources subsidised from the Central Fund. Finance for local authorities was obtained from property rates.

The amounts spent on each programme over the 1972-1978 period are shown in Table 2. Not shown here are small amounts paid by Central Government towards "developmental" roading (in the order of several million dollars per annum).

Evolution of the 1978 Changes

The 1978 changes were brought about by the 1977 Road User Charges Act. The stated objectives of the Act were:

"(i) To structure the taxation system on heavy motor vehicles as an instrument of transport policy.

(ii) To base the taxation system on a principle of 'user pays'. In other words, to ensure that the user of the roads paid for the amount of use made of the roads and for the costs this usage imposed on the roading network.

(iii) To provide 'an assured source of income to the National Roads Board to meet its expenditure on roading'."

Table 2

Breakdown of Road Financing by Programme 1972-1978
(\$'000)

Year Ended 31 March	State Highway Programme	Local Authority Programme	
	From Central Roading Fund	From Local Authority Sources	From Central Roading Fund
1972	47005	39530	33642
1973	53669	43970	39304
1974	52615	44448	39307
1975	60264	51595	44276
1976	67509	60553	47406
1977	65073	66327	48232
1978	74164	77772	56858

Source: Roading Statistics, National Roads Board.
 Annual Reports of National Roads Board.

Prior to the Act, a major stocktaking of New Zealand transport policy had been undertaken in 1973 by Wilbur Smith and Associates for the New Zealand Ministry of Transport. The study pointed the way towards increased competition in New Zealand land transport, and successive Governments have moved further in the competitive direction. The first two objectives of the Act therefore, were associated with, in essence, road-rail competition, and resource allocation within the road transport industry.

N.Z. Railways had been protected from road transport competition since 1936 via a distance limit; if goods could be transported by railway over a distance of 30 miles or more, the railway mode had to be used. This limit was extended to 40 miles in 1961; in the meantime certain commodities had become exempt from the restriction (e.g. livestock). In the mid-seventies there existed a strong current of opinion to increase the limit still further. Any extension of the limit would increase the presence of heavy vehicles running over long distances. Because such heavy vehicles would be using the roads more, it seemed appropriate that such vehicles should pay an appropriate share of their "track" costs, so that Railways were not put in a disadvantaged position.

The New Zealand Transport Policy Study (1973, P. 4-47) had previously estimated that the road user charges existing in the early 1970's for large trucks on long distance haulage were "only about half the cost of providing, maintaining and expanding the road system to accommodate present and future traffic". Cars were paying more than their appropriate share. However, the study also showed that when road user charges and other road transport

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taxes (sales tax etc.) were added together, then total taxes on heavy vehicles were of a similar order to their share of total road costs. This meant that the prices for road transport probably were not distorting resource use (at least, not as influenced by road taxation). Although this may have been true with respect to an average vehicle, taxes imposed on specific vehicle types or vehicles operating in specific ways, were thought not to reflect their marginal resource costs with respect to roading.

The Policy Study identified a number of inequities in the way in which various taxation measures were applied. As the mileage tax was supposedly the counterpart of the petrol tax for non-petrol powered vehicles, inequities related to timing of payment, total use versus "on road" running only, the accuracy of the mileage reported, and the lower tax on large diesel vehicles engaged in long distance transport compared with the petrol tax; this latter anomaly arose due to the large rebates given diesel powered vehicles due originally to their greater economy and a lower drain on overseas funds.

In addition, because the petrol tax was related to consumption, some account was taken of trailer usage; on the other hand, mileage tax made no allowance for trailers.

The heavy duty licence fee scale was structured so that heavy vehicles did pay more than lighter vehicles. However, the scale favoured the heavier vehicles; firstly, the fees did not increase proportionately for vehicle gross weights over 11 tonnes; secondly, no account was taken of axle loadings. Also, distance travelled was not taken into account. The sales tax of 40% applied to powered vehicles only (and not to trailers).

A good case was made, therefore, that the pre 1978 taxation system contained numerous anomalies (Anon, 1979) and was not in the interest of ensuring neutralised taxation between land transport modes. Efficient allocation of resources within the road transport fleet was also seen as threatened by a system of taxation that had evolved in different directions over many years.

Thus, the first motivating force for altering the road taxation base was the concern that the road transport industry paid its fair share of track costs; this was seen as important in any relaxation of road-rail competition. A restructuring and improvement of the taxation system, so that heavy vehicles were taxed appropriately, was interpreted as a system that took account of both distance travelled and axle loadings.

The second motivating force was that concerned with security in road financing. Road user charges had not kept pace with roading expenditure, largely due to inflation and static petrol sales. This necessitated annual contributions from the Consolidated Fund (see Table 1). The uncertainty regarding the absolute level of funding in any particular year created

problems in planning and executing efficiently the annual roading programme. Hence, it was seen as necessary to increase taxation from road users and to be able to adjust the taxation system so that revenues could meet any government approved budget for roading expenditure.

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Cost Allocation Studies

The 1973 Transport Policy Study recommended a cost allocation study to "relate policies on taxation to an equitable allocation of responsibilities among classes of highway beneficiaries, particularly among vehicles of different sizes and weight". Deliberation on Ministry of Transport proposals in 1974 for new scales of Heavy Traffic Fees aimed at a more equitable taxation of petrol and diesel vehicles resulted in the National Roads Board carrying out further work on cost allocation; only allocation between vehicle types was attempted.

The cost allocation study, carried out by the Board's Axle Weights and Loadings Committee, analysed the different kinds of roading work required for each of the road classes (State Highways, roads of municipalities, and roads of counties). The study concluded that the heavy vehicle sector was not providing roading funds proportionate to the costs they imposed on roads. For total roading expenditure in 1974/75, it was estimated that 45% could be attributed to heavy vehicles. This proportion would vary each year as the items in the National Roads Board budget, and the relative numbers of vehicle types in the traffic stream, changed from year to year. For example, as the maintenance expenditure increased as a proportion of total roading expenditure, the proportion attributable to heavy vehicles increased.

As an example of cost classifications and allocations used, reference is made to the county road analysis (Table 3). For county roads the allocation to heavy motor vehicles approximated 63% in both years examined (1974/75 and 1976/77). By contrast, the State Highway corresponding allocation was 41-46%, and the municipal sector 32-36%. Over all roads, the costs allocated to the heavy vehicle sector were 45-50%, the municipal sector (with lower relative numbers of heavy vehicles in the traffic stream) being offset by the county sector (with higher proportions of maintenance and strengthening in roading expenditure).

The study concluded that, since heavy vehicles contributed only 27.5% to the Central Roothing Fund in 1975/76, road taxation should be restructured so that heavy vehicles contributed proportionately more (approximately 50%) to the Central Roothing Fund.

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Table 3

Example of Cost Allocation: The County Roading Programme

Item	Description	Combined % of Item	% of Subitem		% of Item	
			Heavy Vehicles	Cars	Heavy Vehicles	Cars
1	<u>General Maintenance</u>					
(a)	Pavement	66	90	10	59.4	6.6
(b)	Shoulder	15	50	50	7.5	7.5
(c)	Verges	6	19	81	1.1	4.9
(d)	Marker Posts, Lighting and roadway marking	4	19	81	0.8	3.2
(e)	Drainage	9	19	81	1.7	7.3
					70.5	29.5
2	<u>Reseals</u>					
(a)	Surface Texture	14	70	30	9.8	4.2
(b)	Cracking	55	100	-	55.0	-
(c)	Ageing	31	19	81	5.9	25.1
					70.7	29.3
3	<u>Bridging</u>				33.6	66.4
4	<u>Minor Construction</u>				50	50
5	<u>Major Construction</u>					
(a)	Strengthening	65	90	10	58.5	6.5
(b)	New Works *	35	52.2	47.8	18.3	16.7
					76.8	23.2
6	<u>Loan Charges</u>				25	75
7	<u>Flood Damage</u>	As per total allocation				
	* New Works					
	Land Purchase	1)				
	Culverts and Formation	18) 59	19	81	11.2	47.8
	Basic Pavement	40)				
	Pavement for HMV	41	100	-	41.0	-
					52.2	47.8

Source: National Roads Board, Axle Weights and Loadings Committee, "Cost Allocation Study for Assessment of Heavy Traffic Fees".

Cost Allocation and Road User Charges

The restructuring of the Heavy Traffic Fees did not eventuate; instead an entirely new system of road user charges was proposed, based on the cost allocation principles determined by the Axle Weights and Loadings Committee.

The idea was for each cost item in the National Roads Board budget for any particular year to be divided into three categories:

- .. Driver related costs (e.g. lighting, signs, landscaping, signals etc.)
- .. Space related costs (e.g. road widening, basic provision of road, passing lanes)
- .. Strength related costs (e.g. pavement overlays, bridge strengthening)

The approximate breakdown into these three categories for the 1977/78 budget year is shown in Table 4.

The \$1 driver cost for heavy vehicles is apportioned between heavy vehicles according to distance travelled by powered vehicles, trailers being exempt from any driver cost. The \$7 space cost for heavy vehicles is apportioned on the basis of distance travelled and vehicle weight (increasing weights were seen as increasing size and hence the area of road used; also speed of heavier vehicles was considered lower). The strength cost is apportioned on the basis of vehicle weight, type of vehicle, axle type and numbers, and distance travelled.

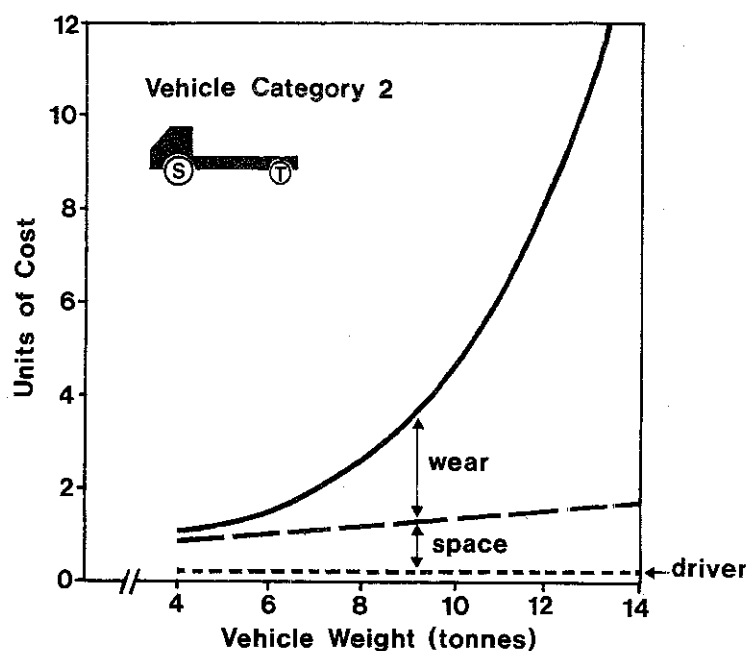
Hence, for each of 45 heavy vehicle types, a cost curve could be constructed as a function of vehicle weight (see, for example, Figure 1). As vehicle type changes via increasing axle numbers, the curve moves to the right.

Table 4

Breakdown of \$100 in Total Roading Budget 1977-78
(\$)

Cost Category	Vehicles over 3.5 tonnes	Other Vehicles	Total
Driver Costs	1	14	15
Space Costs	7	44	51
Strength Costs	34	0	34
	<u>42</u>	<u>58</u>	<u>100</u>

Source: Report of the Working Party on Road User Charges, P. 13.



Source: Report of the Working Party on Road User Charges (1979).

Figure 1

Cost Curve Components for Vehicle Category 2 -
2 Spaced Axles, 1 Single Tyred, 1 Twin Tyred

The reason for the exponential like appearance of the costs due to strength is the adoption of the principle that road wear increases as the fourth power of the axle weight.

The New System of Road User Taxation

The new taxation system came into effect on 1 April 1978, just after an extension of road rail competition from 40 miles to 150 kilometres. A new distance tax system applied to all vehicles of greater than 3.5 tonnes gross laden weight in the case of petrol powered vehicles and trailers, as well as all non-petrol powered vehicles. Petrol powered vehicles less than 3.5 tonnes continued to pay petrol tax.

This meant that all petrol powered vehicles over 3.5 tonnes could claim a rebate for petrol tax irrespective of ownership or nature of their business operation. The proportion of total revenue required from light vehicles was conveyed to the Roading Fund via the petrol tax, and the

remaining revenue paid into the Consolidated Fund. The distance tax replaced mileage tax and heavy traffic fees, both of which were discontinued.

Each heavy vehicle subject to the new distance tax was obliged to prepurchase from New Zealand post offices a distance licence; the charge for such a licence was based not only on the distance prepurchased (in multiples of 1000km) but on the category of vehicle (as determined by its axle numbers, configuration, and spacing), and its weight. The scale of charges for any given vehicle type was based on the relationships as shown in Figure 1.

Operators were required to display their prepurchased distance licence on their windscreen; they were required also to fit hubodometers, or distance recorders, to their vehicles.

Licensed weights could be changed in the medium to long term by specifying a different gross weight when prepurchasing distance; in the short term supplementary licences for specified distances could be purchased for carrying weights greater than that originally specified. Refunds could be claimed for travel on non-public roads.

As the new system meant overall taxation levels would increase for heavy vehicles, a number of concessions were made:

- (i) the new distance tax was to be phased in over a two-year period by undersetting the charges initially. Contributions from the Consolidated Fund would make up the shortfall in these two years
- (ii) sales tax for heavy vehicles would be reduced from 40% down to 10%; sales tax was reduced to 30% on 1 April 1978, 20% on 1 April 1979, and 10% on 1 April 1980
- (iii) as the largest vehicles would bear the highest taxation increase (because of the strength-axle weight relationships used), the scales were 'tilted' in favour of the heavy vehicles; this situation was to apply for a limited, but unspecified period
- (iv) heavy traffic fees were not collected for March 1978 and were halved for the three months ending February 1978. This was to allow operating capital for prepurchasing of licences.

Road Financing Post 1978

On 1 April 1979, 1980, 1981 and 1982, distance taxes were raised by 20%. However, the removal of the tilting of the scale of charges (as of January 1983) has not yet been undertaken. Also, the charges are still lower than originally envisaged due to inflation of roading cost prices

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eroding the effect of the 20% increments. Grants from the Consolidated Fund continue to be made to make up the total fund required.

Table 5 shows the revenues received into the Central Roothing Fund for the three years before and the four years after the taxation change.

The Central Fund total expenditure is now determined by the government prior to the financial year. Once this amount is determined, it is guaranteed regardless of road taxation receipts.

Table 5

Central Roothing Fund Receipts 1976-1982 (\$'000)

Year Ended 31st March	Petrol Tax	Mileage Tax	Heavy Traffic Fees	Distance Tax	Sub Total of Road Taxation Receipts	Consolidated Fund Contribution	Misc. and Interest	Total
1976	80829	7383	13038	N.A.	101250	16350	3044	12064
1977	85936	7772	13709	N.A.	107417	21000	3208	13162
1978	106696	9112	10448	N.A.	126256	10000	3109	13936
1979	109447	1126	N.A.	48301	158874	14000	3542	1764
1980	87470	N.A.	N.A.	51234	138704	24000	4732	1674
1981	120900	N.A.	N.A.	68400	189300	16000	4893	2101
1982	128535	N.A.	N.A.	82533	211068	35000	5790	2518

Note: N.A. = Not Applicable

Source: Annual Reports of National Roads Board

During the past few years, the government approved level of expenditure on roads was barely enough for maintenance; little new construction work has commenced. In rural areas maintenance programmes are subsidised at a lower rate than construction works so that a greater proportion of roading costs has had to be borne by the local authorities. Some local authorities were undertaking some roading work without a Central Fund subsidy: one county had introduced a law allowing it to levy tolls on some roads associated with logging traffic.

In terms of the level of total expenditure on roads, New Zealand roading expenditure has declined in real terms from the late 1960's, reversing the increasing real expenditure on roads in the 1950's and 1960's. A recent

Australian study has shown that such a pattern was not unusual for developed countries in the 1970's (Anon, 1982a). However, the same study reported that over the 1973-78 period, New Zealand had the lowest expenditure per kilometre of total road as well as per kilometre of sealed road, for the six countries studied.

CRITIICISMS AND SUPPORT

Road Transport Interests

Individual road transport operators and their industry group, the New Zealand Road Transport Association, have expressed dissatisfaction with the system from 1978 to the present time. The aspects of the new system receiving most adverse criticism from the industry and its Association have included:

(i) The high administrative burden of the distance tax, both within the transport industry and government.

A 1980 estimate of the administrative cost for industry and government was over \$4 million to collect a \$60 million tax; this did not include enforcement costs and would be viewed by many in the trucking industry as an underestimate. Also important have been the carriers' objections related to the 'fiddliness' of the system of buying licences, purchasing supplementary licences, claiming rebates etc

(ii) Quality and quantity of enforcement and the prevalence of evasion.

Fourteen methods of evasion were documented by the Association in 1981. The Association believes evasion and cheating are common. Enforcement is either ineffective or costly, penalties are applied inconsistently, there is an inability to differentiate between isolated transgressions and continual abuse, and there is a lack of balance regarding enforcement procedures between highways and rural roads.

(iii) The prepayment of charges.

The cost of financing additional working capital associated with prepayment of charges was seen as a drain on the industry. This criticism was linked with initial delays in processing rebate claims.

(iv) The use of hubodometers.

Hubodometers are viewed by the industry as being susceptible to tax evasion, are not entirely reliable or accurate, and add to the administrative burden. Early problems with the hubodometer related to their siting and permanency on the vehicle.

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(v) Different loading characteristics.

Inequities could be seen to arise where two vehicles of the same type and licensed to the same gross laden weight, would pay the same distance tax but would cause different degrees of road wear due to different average load factors stemming from regional or commodity differences. This was brought about in so far as the strength component of the scale of charges was associated with an average load factor.

(vi) The fourth power relationship.

The Association does not accept the fourth power relationship based on the A.A.S.H.O. tests and see the cost allocation methods as requiring further investigation.

The alternative suggested by the Road Transport Association is a two tier taxation system:

- (1) a fuel tax at source with refunds for off road use; plus;
- (2) a graduated licence fee, based on gross vehicle weight and axle configuration, with payment made on a quarterly basis.

Farming Interests

After initial objections the farming industry, represented by Federated Farmers of New Zealand (Inc.) saw the distance tax as a move towards a more equitable user pays system of road taxation. However, farmers were seen to be highly dependent on road transport, used the larger vehicles over long distances and had an inability, compared with other sectors, to pass on increased transport costs. It was assumed that increases in taxes would be passed on to farmers in their entirety; this was because the road transport industry in New Zealand has been licensed for many years and maximum rate schedules, based on costs, are set. Although the schedules are commonly used, a considerable amount of road transport is carried out under contract arrangements (estimated by Harlick (1980) to be 30-55%). Combining this with competition from ancillary vehicles, a degree of price competition would appear to exist in New Zealand rural road transport; nevertheless, most of the tax increase would be likely to be passed on to farmers.

In addition, it was feared that the degree of backloading possible in the transport of rural commodities was less than with non-rural goods, so creating inequities within the system. Dairy companies were particularly concerned because of their low load factors. Federated Farmers sought from government an assurance that remote rural areas affected by the tax burden would not be disadvantaged by the change.

As of the beginning of 1983, Federated Farmers still supported the new taxation system. However, they have expressed areas of concern relating to:

- (i) the pre-payment system
- (ii) the robustness and long term accuracy of hubodometers
- (iii) the potential inequity existing between rural and urban carriers due to lower load factors in rural transport.

The farmers oppose a fuel related tax for heavy vehicles because:

- (i) As laden weight increases, fuel consumption increases but at a slower rate; the heavier trucks would not pay an appropriate amount for the damage they created
- (ii) Trucks operating in rural areas have a higher fuel consumption than urban orientated trucks (due to terrain and road surface).

Also, farmers see a move away from a distance related tax to a set licence fee as favouring non-rural trucking due to a higher utilisation potential associated with urban and interurban road transport.

A STUDY OF ROAD USER CHARGE EFFECTS

Introduction

A study carried out by the Agricultural Economics Research Unit at Lincoln College over the first two years of the new tax system has reported on the effect of the distance tax on the rural licensed trucking fleet (King et al, 1982). The study was carried out under contract to the National Roads Board in conjunction with a study on traffic generation by rural land use. The study on the distance tax was prompted by the need to assess whether the taxation change was influencing the structure and operation of the rural fleet. Stacey (1978) had indicated potential changes and improvements as:

- (i) operations at higher load factors
- (ii) a minimisation of unnecessary trips
- (iii) greater use of full trailers
- (iv) a higher proportion of trailers in the fleet
- (v) doubled backing of empty trailers
- (vi) higher numbers of axles per vehicles.

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In particular, the study sought to establish:

- (i) the trend in vehicle types, particularly with respect to axle numbers
- (ii) the trend in load factors, and whether load factors varied between regions, vehicle types, or type of commodity carried

Methodology

Methodologies used were:

- (i) personal interview of rural road transport operators (March 1978, April 1979, March 1980)
- (ii) two week logging of representative vehicles (May 1978, May 1980).

Four New Zealand counties were selected broadly representative of differing land uses. All licensed operators carrying out rural cartage were surveyed (representing approximately 1100 vehicles).

Results

Trends in Vehicle Types

The powered rural fleet was dominated by type 2 (2 axle) and type 6 (3 axle) vehicles. A summary of fleet composition changes in each of the four counties is given in Table 6. The total rural fleet in the four counties grew from 1086 in 1978 to 1187 in 1980.

Since results in Table 6 depict the total fleet rather than a sample, the trend towards greater numbers of axles in the fleet appears to be widespread, applying to both powered and unpowered vehicles and consistent over all four counties. Whilst no firm conclusions can be drawn regarding causality, it is the author's opinion that the distance tax had at least some impact. However, the general opinion of transport operators was that the distance tax was only a minor consideration when choosing a replacement vehicle. Truck-trailer ratios in all four counties were constant over the period (56:44).

The addition of tag axles to trucks or trailers was uncommon (6 tag axles were reported fitted over the two year period out of a total fleet of about 1,100).

Table 6

Summary of Fleet Composition Changes

County		Southland		Ashburton		Wairoa		Matamata	
		1978	1980	1978	1980	1978	1980	1978	1980
Proportion of Vehicles in Powered Fleet (%)	Type 2 (2 axle)	65	63	56	51	37.5	34	52	44
	Type 6 (3 axle)	30	34	38	42	52	55	43	51
	Other	5	3	6	7	10.5	11	5	4
Proportion of Vehicles in Unpowered Fleet (%)	1 Axle	16	14	10	10	11	11	16	15
	2 Axle	80	80	76	70	78	67	68	57
	3 Axle	4	6	14	21	11	22	16	28

Source: King et al (1982): "Effect of Road User Charges on Rural Transport", Vol. 3 of "Rural Transport Studies", Bulletin 59, National Roads Board, Wellington.

Trends and differences in load factors

Fifty five vehicles were logged in 1978 and 40 in 1980. Vehicle load factors were calculated on the basis of an average percentage of maximum possible load carried by the vehicle. On this basis load factors averaged 34.9% in 1978 and 35.5% in 1980, the difference being insignificant. However, load factors varied by county and by principal vehicle use (see, for example, Table 7).

However, if load factors were calculated as a proportion of licensed gross weights instead of maximum possible gross weights (with both numerator and denominator including the tare weight of the vehicle) then the differences were much less. Accurate data on tare and licensed weights were available on only 33 of the 40 vehicles logged in 1980 - the average load factors of these vehicles calculated by three different methods are given in Table 8.

Livestock vehicles within this group licensed on average at 6% below their gross weight (bulk vehicles 2.5% below and general vehicles 2% above). If these 33 vehicles can be considered representative, the road taxation system can be considered to be equitable for livestock vehicles and vehicles carrying other commodities.

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Table 7

Differences Between Load Factors for Different Vehicle Uses

	Estimate of difference in population means*
Bulk (43.3%) Vs Livestock (31%) (n=22, n=37)	12.3 ± 3.50%
Bulk (43.3%) Vs General (34.5%) (n=22, n=36)	8.80 ± 3.50%
General (34.5%) Vs Livestock (31%) (n=36, n=37)	3.50 ± 3.50%

(* Using Tukey's Test; 95% confidence level).

Source: King et al, (1982).

Table 8

Load Factors for Different Vehicle Uses, 1980

	Load Factor Using Gross Weight (Tare excluded)	Load Factor Using Gross Weight (Tare included)	Load Factor Using Licensed Weight (Tare included)
Livestock (n = 13)	32	58	62
Bulk (n = 6)	48	64	64
General (n = 14)	34	59	58
Mean (n = 33)	36	60	61

Source: King et al, (1982).

No significant differences were apparent for different vehicle types. However, vehicles that averaged daily runs of over 250 kilometres had significantly higher load factors (39%) than those running less than 250 kilometres per day (33%).

Also, no vehicle used a supplementary licence or changed its licence weight over the logging period.

The 35% average load factors determined for rural transport are likely to be lower than for urban goods transport. For example, a 1973 survey of Auckland urban truck operators showed load factors of 40-42% measured as a proportion of possible load (Nicholson, pers. comm.). When tare weights are included for the smaller trucks operating in urban areas, and licensing patterns of urban trucks established, differences may not be significant. However, this is speculative and the possibility remains of some rural/urban inequity.

Effect on Farms

An associated study sought to assess the impact on farms of similar size and type at different levels of remoteness from servicing centres/markets/ports. The more remote farms portrayed higher levels of transport costs and a higher proportion of cash expenditure spent on transport. Also, the more remote farms were associated with higher estimates of road user charges (approximately three times greater than more centrally located farms). The absolute values estimated for road user charges were not high in relation to total transport costs or total cash expenditure (for remote farms 10-20% of total transport costs and 0.9-2.3% total cash expenditure). The question of how much more remotely located farms are paying compared to the pre-1978 distance tax was not addressed in the study.

DISCUSSION

Apportioning Costs Between Users and Non Users

It is a common belief that road users should pay for most roading expenditure. However, the question of the share of expenditure to be borne by users and non users of roads remains an important issue.

Non users can be considered to be responsible for payment of some kind due to roading providing non user utility. This utility may be gained through access by landowners (particularly in rural areas), but the total population also benefits through greater national security, and a stronger economy due to greater exploitation of resources. Therefore, ratepayers and taxpayers can be considered as justly contributing towards the provision of roads.

The utility gained by ratepayers and taxpayers is difficult to measure and therefore allocation of financial responsibility between users and non users may be controversial.

The proportion of roading revenue provided by each New Zealand group over the past decade is given in Table 9. Whether the ratepayer and road user proportions can usefully be related to the relative costs of providing access and inter-community highways depends largely on the definitions of access and inter-community roads.

CHANGES IN NEW ZEALAND ROAD TAXATION

Table 9

Proportions of Roothing Revenue Provided by
Road Users, Ratepayers, and General Taxpayers
(%)

Year Ending 31 March	Road Users	Ratepayers	General Taxpayers
1972	69	31	0
1973	67	31	2
1974	70	30	0
1975	66	33	1
1976	57	34	9
1977	55	34	11
1978	59	36	5
1979	61	34	5
1980	54	36	9
1981	61	34	5

Source: Roothing Statistics, National Roads Board

The government (or general taxpayer) contribution has been variable over the years and has been greatest in years when the road user contribution has been relatively low; the New Zealand Road Transport Association has been pressing for a 1/6 government contribution on the basis of general or national benefits from roading. Government has refused to accept such a principle and maintains that the government contribution to roading expenditure has been in the form of a short term 'subsidy' granted to assist shortfalls (pre 1978) and to cover the two year period whilst the road user charges scale was adjusted upwards.

Rural ratepayers do not appear to have been vocal in pressing for a larger Central Roothing Fund contribution to local authorities. In fact, a tendency in recent years for some local authorities to undertake some roading activities without a Central Fund subsidy may work against them acquiring larger subsidies in the future.

In summary, it would seem that the issue of the relative responsibility of road financing between users and non users has not been a major issue in New Zealand; it may be in the future.

Apportioning Between Users

The collection of monies from road users to partly finance road maintenance and improvements is, in itself, only one part of road transport

taxation. In many counties total tax revenues collected from the road transport operation (via sales taxes, petrol taxes, drivers' licenses etc.) do not find their way back into roading (or into the road transport industry in other ways) but rather are seen as a means of generating revenue for the Consolidated Fund. It is desirable from an economic standpoint to construct a land transport taxation system that is neutral in its influence between transport modes; also, from an economic or efficiency viewpoint it is necessary to devise a taxation system that does not result in a pricing system that distorts the use of resources either towards or away from the transport sector in comparison with land transport competing activities such as warehousing, feeding livestock in a drought, investing in additional container ports, etc.

Ideally, roads should exist where a sufficient demand exists to meet costs of supply; the standards of different pieces of roads would reflect the willingness of road users to pay for varying degrees of different road attributes (e.g. width, surface condition etc.). However, this ideal is never attained in practice. The use of a road can not be parcelled neatly into components and the extraction of appropriate taxes based on willingness to pay from different kinds of users is extremely difficult. Walters (1968, P.3) describes the "road problem" as arising "from the indivisibilities or lumpiness inherent in highways, and from the fact that highway services are specific in time and space with no possibility of storing".

Because decisions on road investment can not be guided satisfactorily from the demand side, decisions have to be taken by roading authorities on behalf of road users. Although the construction of the New Zealand roading programme is largely decentralised, the entire roading programme in any year has to be approved by central Government. Kerr (1979) has estimated that no more than 15% of direct roading expenditure is subjected to systematic appraisal methods, and whilst political factors are possibly uppermost in the setting of the level (and priorities within the roading programme), an increasing awareness is being shown regarding a more formalised investment appraisal approach together with the collection of appropriate data so that monies spent on the roading programme are associated with returns likely to be gained by spending in other areas.

Although the Central Roading Fund is self balancing, it balances around an expenditure level set by central Government; while road user charges are "earmarked" for the fund, government also is still contributing to the fund. This is because of the "phasing in" period of the distance tax. The 20% increases in each of the past four years have not matched increases in roading costs.

The New Zealand road user charges system is a means whereby the finance required for an approved roading programme can be allocated between different types of users. Various approaches can be adopted for apportioning the user revenue required between different vehicle types. Such approaches allocate shares on bases of specific roading cost associations with the requirements of, or benefits to, different vehicle types. As with the

user/ non user allocation, obtaining an entirely equitable system via such methods is very difficult, and requires abundant data on different aspects of roading costs, vehicle types and numbers, and frequency and location of vehicle use. Even then assignment procedures usually require a number of assumptions that may be contested.

The New Zealand road pricing system is cost allocation based and would fit into the approach labelled 'technical' by Kolsen et al (1975, P.4). It is aligned to the long run marginal cost concepts of economists in that the charges are set to cover more than the costs of an individual journey; they are set to cover the cost of the entire roading programme in any one year (maintenance and new investment). Provided investment is steady this method approaches a long run marginal cost system, although payments for roads are made earlier (in the year in which they are improved), while there is no allowance for depreciation of capital invested in other roads. It is a pay as you go system.

On the other hand the charges do include recovery of joint costs from each journey made; this has been identified as one of the theoretical weaknesses of the New Zealand system by Starkie (1979).

While much concern is expressed regarding cost allocation procedures, such procedures appear to result in rough 'equity' between road users. In the face of the difficulties in attempting to construct procedures for extracting contributions from users according to willingness to pay, ability to pay, or even according to benefits received, the cost allocation system has to be given a considerate hearing.

The addition of the third tier (tonne/km) to the normal tax system (license fee and fuel tax) has often been criticised for its failure to improve equity (significantly, or even at all) at the expense of a high administrative cost. By incorporating the distance measurement and axle loadings into the charges, increased equity should ensue. But this is undoubtedly at a significant cost in administration and enforcement. This is the real issue in New Zealand, as indeed it has been in attempts elsewhere to "refine" procedures for apportioning road user costs.

As illustrated earlier, some attempt was made to monitor the fleet structure and operation of the road transport industry after changes in road taxation in New Zealand in 1978. Objective data on changes in administration and enforcement costs would have been of great value to decision makers today in addressing the cost-equity tradeoff.

Whilst equity is at the base of what might be seen as an elaborate user pays system, the use of the fourth power formula for apportioning the strength component of roading costs has not been applied in entirety. The tilting of the distance tax in favour of the heaviest vehicles remains embedded in the taxation scales. Technical arguments can no doubt be made

as to the inappropriateness of relating all road damage to axle loadings; such arguments are probably having some impact on the decision to 'untilt'. On the other hand, the presence of the distance tax is probably one reason why the government is considering currently further removing restrictions on road transport competing with rail; the temptation to 'untilt' at the same time as removing distance restrictions must be very great.

CONCLUSION

This paper is descriptive of the New Zealand road taxation changes introduced in 1978. It has concentrated on the road freight industry as opposed to passenger transport and on rural rather than urban issues.

The introduction of axle loadings and distance travelled into road user charges is seen by most groups in New Zealand as being an appropriate and equitable means of apportioning revenue required from road users. However, the administrative procedures and costs, together with enforcement issues, still prove a barrier to complete acceptance.

The government mood of encouraging increasing competition of road transport with New Zealand Railways is a factor supporting the continuation of the distance tax as is the support of the farm lobby. It is possible that a full implementation of the distance tax by "untilting" of the charges now favouring heavy vehicles could form part of a revised land transport policy. However, technical arguments regarding the fourth power relationship implicit in the original concept may condition the full implementation.

The financing of roads with respect to Central Fund security and planning would appear to have been improved by the changes. However, a government contribution is still being injected into the fund due to the rapid escalation of roading costs and increases in the distance tax having been restricted to 20% per annum.

The distance tax would appear to have had some effect on the structure of the licenced goods vehicles industry associated with rural transport, by encouraging a greater number of axles per vehicles. Load factors have not appeared to change (at least in the first two years); some evidence is available to suggest the distance tax system is not inequitable regarding different commodities carried by rural operators; the possibility of rural/urban inequities remains.

LIST OF REFERENCES

- Anon (1979). "Report of the Working Party on Road User Charges", Government Printer, Wellington.
- Anon (1982a). "Road Financing in Selected Countries", Occasional Paper No. 49, Bureau of Transport Economics, Canberra.
- Anon (1982b). "Land Transport Licensing and Regulation", Discussion Document prepared by the Ministry of Transport, Wellington.
- Harlick, R. (1980). "Rural Transport", Proceedings of Conference of New Zealand Agricultural Economists, Wellington.
- Kerr, R.L. (1979). "Roothing Within the New Zealand Economy", N.Z. Roothing Symposium, National Roads Board, Wellington.
- King, R.L., Chudleigh, P.D., and Young, S.I. (1982). "Effect of Road User Charges on Rural Transport", Volume 3, "Rural Transport Studies", Bulletin No. 59, National Roads Board, Wellington.
- Kolsen, H.M., Ferguson, D.C., and Docwra, G.E. (1975). "Road User Charges: Theories and Possibilities", Occasional Paper 3, Bureau of Transport Economics, Canberra.
- National Roads Board (1977). "Cost Allocation Study for Assessment of Heavy Traffic Fees", Axle Weights and Loading Committee, Wellington.
- Stacey, A.F. (1978). "Recent Changes in the Funding of the National Roads Board", "Paper to Australian Road Federation Conference, Melbourne.
- Starkie, D.N.M. (1979). "Charging Freight Vehicles for the Use of Roads", Australian Road Research, Volume 9, No. 2.
- Walters, A.A. (1968). "The Economics of Road User Charges", International Bank for Reconstruction and Development, Occasional Paper No. 5, John Hopkins Press.
- Wilbur Smith and Associates (1973). "New Zealand Transport Policy Study", Volumes 1 and 2, Prepared for Ministry of Transport, Government of New Zealand.