

# Some Aspects of Inland Transport

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Tonight I propose to deal with two subjects which seem to be too large and awkward to fit into a general study of transport yet not sufficiently large and lacking sufficient data to justify separate studies. Since they also, I think, illustrate some of the uses and limitations of statistical methods of a certain kind they seem to be appropriate subjects to be considered at a meeting of this kind. The subjects I propose to consider tonight are expenditure on transport as a proportion of the nation's resources or of its national income, and the question of the cost of road accidents. Both studies will refer to the Irish situation but, as I shall try to show, the problems encountered have a general significance. I hardly need to say that the approach, methodology, views and conclusions expressed are purely those of the author.

## I—EXPENDITURE ON TRANSPORT AS A PROPORTION OF THE NATION'S RESOURCES

It may be useful to have some idea of the expenditure on transport as a proportion of the total resources available because, for example, the low density of population in Ireland and its lack of concentration into large towns and cities may result in an unusually high expenditure on transport and this handicap (if it does in fact exist) might have important implications for planning and policy, e.g., policies aimed at achieving greater concentration of population. However, transport is only a recognised category of national income accounting on the output side for specialist transport firms, e.g., C I E and licensed hauliers, the contribution of firms hauling own goods being shown under the industry concerned. Also wider conceptual difficulties are involved. These difficulties arise from the way in which national income is calculated or estimated. (See Table 1.) National income or output may be measured or estimated first on the output side by aggregating

the incomes accruing to the factors of production, i.e., factor costs, in each sector of origin (agriculture, industry, etc.) or aggregating the net output or net value added by each sector, deduction in effect being made for the value of intermediate products transferred from other sectors so as to avoid artificially inflating national income by double or treble counting

TABLE I — NATIONAL INCOME AND EXPENDITURE 1962

National Income by Sectors of Origin	£ million	Expenditure on Gross National Product	£ million
Agricultural, forestry and fishing	134	Food and drink	190
Industry	151	Alcohol	40
		Tobacco	39
Distribution and Transport	79	Clothing, footwear, etc	52
		Fuel and Power (excl motor spirit)	24
Other domestic output (including rent)	102	Durable household goods	23
		Transport equipment	12
Public administration and defence	47	Other goods	31
Adjustment for stock appreciation	-1	Rent	28
Emigrants' remittances	13	Travel within the State	30
Other	21	Expenditure outside the State	15
National Income	546	Entertainment and Sport	9
		Professional services	16
		Domestic service	7
		Other expenditure	28
		Less expenditure by non-residents	-42
		Total Personal Expenditure	593
Provision for depreciation	37	Net expenditure by public authorities	71
Plus taxes on expenditure	106	Gross domestic fixed capital formation	85
		Changes in stock	+11
Less subsidies	-20	Net expenditure by rest of world	-1
Gross national product at market prices	669		669

Source National Income and Expenditure, 1961. Central Statistics Office, Dublin, 1962

Alternatively, virtually the same result may be obtained by viewing the other side of the coin and considering the nation's expenditure in the various categories of final expenditure, e.g., personal consumption, investment, net expenditure by public authorities

Now, transport cuts across these accepted boundaries in a variety of ways. In total it is desired to estimate the value of the resources used in the provision of transport from whatever source the factors of

production are derived and to express them as a proportion of national income or expenditure. Insofar as transport is expenditure on personal consumption, the corresponding resources being derived from a variety of sectors of origin, there is no conceptual problem of measurement or estimation because the expenditure side represents just that regrouping of resources from diverse origins into categories of final expenditure that is involved in estimating the resources devoted to transport. The total derived for final expenditure on transport is comparable with total final expenditure.

However, transport, in particular goods transport, also appears on the production side of the national accounts and it is here that the difficulties in estimating the total resources devoted to transport (as an end-product) arise.

Thus apart from specialist transport firms which appear in a separate sector transport enters into many sectors on the production side, with consequent dangers of double and treble counting when contributions are aggregated. In particular many productive sectors of the economy undertake transport as ancillary to their activities and such transport is classified as part of the net output of the industry concerned. Also, part of the output of many industries is absorbed by commercial transport on the output side and it may be desirable to classify this as transport since it represents the commitment of real resources to that end.

One possible way out of these problems is to attempt to regard all transport, whether on the consumption side or the production side of the accounts, as final expenditure and this has been done for road transport only by Rudd<sup>1</sup> and Dawson<sup>2</sup>. What in effect they seem to be saying is that when we consider final expenditure, all the goods and services absorbed will have (commercial) transport components (which arise on the output side). These components, added to personal consumption expenditure on transport, i.e., travel by car, bus and passenger train, will then give the true proportion of final expenditure devoted to transport as a single figure. Thus Dawson gives estimates of the total expenditure on road transport in Britain in 1960 as follows —

TABLE 2 — TOTAL EXPENDITURE ON ROAD TRANSPORT GREAT BRITAIN 1960

Class of vehicle	£ million
Cars, motor-cycles and taxis	1,302
Commercial vehicles	1,405
Public service vehicles	315
Pedal cycles	33
Total expenditure at market prices	3,055

From the final figures duplication in the form of expenditure by petrol companies and by vehicle manufacturers to an estimated total of £50 million is to be deducted. With the addition of net investment in new vehicles of £430 million total expenditure at market prices (inclusive of taxation) is £3,430 million which is expressed as about 14 per cent of total domestic expenditure at market prices. Alternatively, with the deduction of taxation of £640 million this expenditure is expressed as a percentage (13 per cent) of total national expenditure at factor cost.

It may be noted that the National Income Accounts for the United Kingdom<sup>3</sup> give the contribution of transport and communication (including railways, etc.) to total output as £1,867 million, equal to 8½ per cent of gross national product and consumers' expenditure on transport and transport equipment as £1,604 million, equal to 7 per cent of gross national product at market prices.

Now I would not claim to be a national income statistician and Rudd and Dawson are clearly aware of some danger of duplication, but it seems that there are dangers and possible errors in their estimates as the following simplified example will show. A completely closed economy with no imports or exports is assumed, with no public sector, no capital investment (all final expenditure thus being personal consumption) and with labour as the only factor cost. It is further assumed that there are only three industries for the sake of simplicity one of which is transport, which is assumed to supply all personal transport and all specialised commercial transport, the other two industries A and B having their own transport sectors  $t_a$  and  $t_b$ , selling only to themselves. A model of this simplified economy in the form of an input-output flow table is then given in Table 3.

TABLE 3—SIMPLIFIED INPUT-OUTPUT FLOW MODEL

Sales by industry \ Purchases by industry	A	$t_a$	B	$t_b$	T	Total	Final Consumption	Total Output
A	—	5	50	5	25	85	200	285
$t_a$	10	—	—	—	—	10	—	10
B	50	—	—	—	25	75	200	275
$t_b$	—	—	10	—	—	10	—	10
T	30	—	30	—	—	60	25	85
Intermediate Products	90	5	90	5	50	240	425	665
Labour	195	5	185	5	35	425	—	425
Total Input	285	10	275	10	85	665	425	1,090

In the table the sales and purchases by industries A, B, etc. and

transport between themselves are set out, together with the contributions of each industry to final expenditure. It may be noted that the total (gross) inputs for each industry necessarily equal total (gross) outputs.

Now the significance of this model is that net national income (= net national expenditure) is equal by definition to labour costs which equal 425 units, and are just sufficient to absorb the resources available for personal consumption. Of this net national income of 425 units, 45 units, about 10 per cent of the total, are contributed by transport. If, however, gross expenditure on transport is taken, as seems to have been done in Table 2, this includes the resources absorbed from other industries, and accounts for 105 units. A comparison then with net national income suggests that transport absorbs about 22 per cent of national income. In fact, the 105 units gross input into transport are more comparable with the 1,090 units of total (gross) input and total (gross) output, except that this figure reflects the number of times output as a whole crosses industrial boundaries, whereas the resources absorbed into transport may have crossed industrial boundaries more or less frequently than this.

This is not to say that the degree of over-estimation involved in Table 2 is necessarily as great as indicated in the model, but this exposition does indicate that one is only on sure ground when considering final *gross* expenditure on transport and the *net* output of transport at factor cost, these two to be estimated independently and *not* added.

From Table 1 the estimates of final personal expenditure in Ireland at current prices for 1960 give personal expenditure on travel within the State as £30 million to which might be added expenditure on transport equipment of £12 million, a total of £42 million equal to some 8 per cent of personal expenditure on consumers' goods and services, i.e., inclusive of indirect taxation of commodities or 6 per cent of gross national product at current market prices. On the output side the net output attributed to transport was estimated at £17 million in 1960 equal to 3 per cent of net national product at factor cost, although the contribution of transport to national income is under-stated in this estimate because the transport activities of other sectors of origin are not separately shown and included under transport. Somewhat inconclusively, therefore, transport accounts for about 6 per cent of gross national product at market prices on the final expenditure side and might account for a similar percentage on the output side. For the reasons given above, however, I do not believe that these two figures can be added to give one final figure expressing the importance of transport in the national economy.

It is possible to make further estimates which may cast some further light on these figures

It has been estimated from data on fuel consumption, etc that the vehicle mileage carried out on Irish roads in 1960 was as follows —

TABLE 4 —ESTIMATED VEHICLE MILEAGE IN IRELAND, 1960

Class of vehicle	Annual vehicle mileage
	millions
Cars and taxis	2,000
Motor-cycles	200
Goods vehicles	675
Public service vehicles (buses)	50
TOTAL	2,925

Source Inland Transport in Ireland A Factual Survey Economic Research Institute Dublin, 1962

Now in 1960 the average size of car registered in Ireland was 9 6 h p and assuming, for want of any better assumption, that annual vehicle mileage does not vary with car size, this may be equated with 1,000 cc in vehicle operating cost tables. These give running costs (fuel\*, oil, tyres and maintenance) as 2 69 pence per mile to which must be added depreciation of perhaps 1 22 pence per mile on a straight line basis (a £550 car with an assumed life of 100,000 miles) giving estimated expenditure on operating private cars of £33 million. To this sum must be added licences and insurance totalling some £10 million giving total expenditure on private cars of £43 million, an unknown proportion of this being, of course, for business use, rather than final consumption.

Total receipts from the operation of public service vehicles in 1960, were some £6½ million, and if it is accepted that costs per vehicle mile for motor-cycles are one-third of those of a private car the annual expenditure on motor-cycles can be estimated at £1 million.

Personal expenditure on rail travel (or receipts from passenger fares) was some £4 million in 1960-1961 giving total personal expenditure on inland transport as follows —

TABLE 5 —ESTIMATED PERSONAL EXPENDITURE ON INLAND TRANSPORT IN IRELAND 1960

Class of vehicle or travel	Expenditure £ million
Cars and taxis	43
Motor-cycles	1
Public service vehicles	6
Passenger train	4
	54

\*Petrol being charged at 4/10½ per gallon, which can be regarded as a representative price in Ireland

Considering that this estimate includes an unknown quantity of personal transport on business account it is similar to the £42 million estimate in the national accounts, from which expenditure on business account is excluded

The gross expenditure on commercial transport in Ireland, corresponding to the kind of estimate made in Table 2, may be derived very roughly for the goods vehicle mileages shown in Table 4 by expanding expenditure by licensed hauliers in the same ratio as total vehicle mileage is to vehicle mileage by licensed hauliers, making adjustments for average size of vehicle, etc. The answer comes out very roughly at £50 million for 1960 to which some £5 million expenditure on rail goods transport might be added

Now a comparison with the £17 million contributed to net national income or to net output by transport suggests that this estimate of £55 million is indeed too high because of the gross elements in it. It must be remembered, however, that it includes, or attempts to include, all commercial road transport including that carried out by non-specialist transport firms on their own account

### *Conclusions*

Having said all this it may be asked what conclusions may be drawn on this rather confused and confusing subject

On the whole the idea of expressing the importance of transport as a single figure in relation to national income or some other aggregate seems to encounter too many conceptual and statistical pitfalls to be practicable. All that can be said it seems is that in Ireland, transport accounts for about 6 per cent of gross national product at market prices on the final expenditure side and possibly a similar percentage on the net output side

Concerning steps to clarify and improve coverage of transport in the national income sense, much depends on the uses to which such information is likely to be put. The most likely development seems to be the incorporation of transport into input-output tables for use in considering the future growth of the economy, and for this present coverage, conceptually at least, seems to be adequate

For a clearer picture of commercial transport on the output side, however, it might be worthwhile to separate transport on own account into a sub-division for the industry concerned.

## II —ROAD ACCIDENTS

Having concerned ourselves with a wide all-embracing kind of study I now turn to the question of road accidents and their costs, which has been categorised, somewhat rudely, as "measuring the immeasurable".

The question of road accidents and their costs is of some importance principally because injury and damage are inflicted by one person on another and because one cannot be sure that people fully know the probable consequences of their actions, so that some action and intervention by government is appropriate

Ideally in this situation what is required is to know the amount and the directions of action by Government that could be considered worthwhile devoting to the reduction of road accidents. To do this it is necessary to know two things, the weight or price that can be attached to various kinds of accidents, and the efficacy of the various measures to reduce them. If, for example, the monetary weight attached to an accident is assumed to be £100 and a particular measure reduces accidents by one a year, it is worthwhile adopting that measure if it costs less than £100 a year.

Strong objections can and have been made to the idea of attaching weights and values to accidents and to human life and suffering, and as will become apparent later on, there is considerable force in these objections and to some extent they must be accepted. However, it must be emphasised that by its action (or inaction) on accidents the community or government is implicitly or unconsciously placing some quantitative weight on accidents and it is preferable, therefore, to make this process as explicit and as conscious as possible.

In considering the role of government in this field it is important to start from a wide point of view and to gradually narrow the problems down, because wide philosophical issues are ultimately involved. In its broad attitude to accidents (as compared with its narrower rôle in the punishment and deterrence of offenders against the law) it is important that questions of blame are not taken into account, because the aim in considering accidents is not only to protect the individual from the wrong-doing of others but to protect him from himself and from his own negligence. Government or the responsible authority must in this situation take human behaviour as given at any particular time and attempt to reduce its adverse consequences.

The main ways in which road accidents may be reduced are as follows—they are generally referred to as the three E's—education, enforcement and engineering. A word about these approaches is appropriate because a certain amount of confusion between them may exist.

### *Education and propaganda*

In this respect the fundamental problem of road accidents is the small probability of a serious accident occurring to the individual. Thus in 1960 in Ireland there were some 4,300 road accidents involving



5,750 casualties killed and injured sufficiently seriously as to be detained in hospital, fatalities accounting for about 300 of these. It has been estimated that some 2,900 million motor vehicle miles were carried out in Ireland in 1960 and with a population of about 2,830,000 the casualty rate was only 1.9 per million vehicle miles or a chance of about 1 in 500 that the average person will become a casualty in the course of a year. The death rate was only 1 per 100 million vehicle miles or a 1 in 10,000 chance that the average person will be killed in the course of a year. With such small probabilities of serious or fatal accidents occurring, the subjective valuation of the individual risk is probably indeterminate, the cautious individual presumably attaching a high value to probability X consequences, the incautious person presumably attaching a low value to this product.

In this situation the role of education and propaganda is to acquaint the individual with the risks, or even to exaggerate them and to encourage kinds of behaviour which minimise these risks without demanding undue sacrifices on the part of the individual. The role also would be to standardise behaviour particularly that of drivers so that the solutions to various conflicts, e.g., between vehicle and pedestrian, become more predictable and better known by all parties. Thus it has been shown by the Road Research Laboratory in Britain that pedestrians when crossing the road or motorists passing another vehicle, with a third vehicle approaching, carry in their minds when making judgments a picture of an average vehicle, under-estimating the speed of a fast vehicle and over-estimating the speed of a slow one.

### *The law and its enforcement*

Having attempted to improve behaviour as far as possible by propaganda it is still necessary to go beyond this and to deter potential offenders by specifying certain categories of behaviour as illegal and attempting to enforce the law. There are difficulties in this process however. Thus only broad categories of offence, dangerous driving, careless driving can be specified by law (although backed by more detailed codes of behaviour that may be used in evidence), the evidence in misbehaviour and in accidents is often highly perishable, and the incidence of misbehaviour and accidents being widely spread both spatially and temporally, enforcement is difficult and expensive. Finally there is the perennial problem of deciding whether the enforcement and penalties should refer to the behaviour itself or to its consequences which may be a matter of chance. To counteract the difficulties of enforcement there has been some tendency to increase penalties severely, e.g., the 1962 Road Traffic Bill in Britain, so that enforcement X penalty should have a deterrent effect. However this

gives rise to complaints of persecution, which will be considered further below, on the grounds that to compensate for the difficulties of enforcement penalties are made unduly severe in relation to the offence

### *Improvement of the road system*

Finally the improvement of the road system in order to reduce accidents is appropriate but there are some difficulties in estimating the effects of changes in the road system on accidents, principally because the number of accidents at any one site are generally too small to obtain statistically significant results, i e., one cannot be sure that a particular change is not due to chance. These difficulties may be largely overcome by studying accidents at a particular site before and after changes over a period of years, using a similar set of sites as "controls". Alternatively, a large number of roads of different characteristics may be studied simultaneously to discover the accident rates pertaining to different road conditions, e g., three lane roads and dual carriageways

In these three approaches to reduction in accidents it is important that they be kept separate otherwise confusion may result. In particular there is a tendency for one set of people to attribute accidents almost exclusively to human behaviour, whilst another set attribute accidents almost exclusively to the deficiencies of the road system and often regard legal enforcement as persecution—generally of the motorist<sup>41</sup>. Since many accidents are multi-causal in the sense that both human behaviour and road deficiencies are factors in accidents, it is inappropriate to consider *the* cause of accidents, the only scientific way is to operate on human behaviour taking the road system as given, and to operate independently on the road system taking human behaviour as given.

However, enough has been said, I think, to show that there are no simple and easy co-efficients that would give a relationship between such and such an expenditure, such and such a reduction in accidents. Although there is considerable scope for scientific and statistical method in this field, the approach must be highly exploratory with few obvious certainties of success.

### *The weights to be given to accidents*

We now come to perhaps the most difficult part of accident reduction—the weight, monetary or otherwise, that should be given to accidents.

The community faces the virtual certainty of a predictable number of its members being killed or injured, and a predictable quantity of its property being damaged in the course of a year. What weight should it attach to this?

Perhaps the easiest way to start to answer this question is to consider the ways in which it has been attempted in the past. The pioneer work in this field seems to have been that by Professor Jones<sup>5</sup> in 1946, in which he uses war-time data to estimate the costs of road accidents occurring in the years 1935 to 1938 in Britain. Jones bases his costs for injury and damage on court awards in compensation to blameless parties.

A later approach was that by the Road Research Laboratory in estimating the cost of road accidents in 1952<sup>6</sup>, to be accompanied by other comparable studies in other countries. After estimating the costs of damage to property from a sample of insurance claims and the cost of medical treatment from health service records, the approach was to regard the individual casualty as a producing and consuming asset during his life. Thus when a person of working age was injured the loss to the community (of which he was a part) was the loss of his output for the period of his injury, or if handicapped, the fall in the value of his output. This was relatively uncontroversial but this view of the individual as a producing and consuming asset produced some odd and controversial results when considering his death. An example of the kind of results obtained is set out in Table 6.

Broadly speaking, with many other simplifying assumptions, the assumption in Table 6 is that a person's present value is the discounted value of the net income stream (excess of output over consumption) over the remainder of his expected life if he had not been killed. Broadly speaking a person starts off by being a net consumer when a child (but with a long productive life ahead), a net producer when an adult, declining towards the status of a net consumer at retirement age. The capital value of his future net output if he had not been killed is therefore high as a child, reaches a maximum when a young adult and declines until it is negative at ages of retirement. Because they work for rewards less than those of men the productive status and the valuation of death of women is much lower than that for men, only being positive from ages 10 to 30. In fact the overall loss from all road deaths was only positive in this study because more men, particularly in their more productive ages, tend to be killed on the roads than women or children, if road deaths followed the general age-sex distribution or rather the general pattern of dependency, the loss from road deaths in this form of accounting would tend to be zero.

Now there is a certain amount of logic in this scheme of valuation in that valuations depend on the number of years lost by premature death and survivors are sometimes made better off in a narrow sense by the death of certain people, also the values attached to deaths only accounted for £10 million out of a total estimated cost of accidents of £72 million.

TABLE 6 —LOSS FROM THE DEATH OF MALES IN ACCIDENTS OCCURRING IN 1952

	(a) Age Last Birthday years	(b) Average Expectation of Life (years)	(c) Average Expectation of Working Life	(d) Unrealised Output (c x £632)	(e) Unrealised Consumption (b x £233)	(f) Net Loss Per Male Killed	(g) Number Killed	(h) Total Net Loss £000	(i) Total Net Loss Discounted to Present (1952)* £000
19	0—4	65	45	28,395	15,080	13,315	233	3,102	887
	5—9	62	45	28,395	14,384	14,011	218	3,954	908
	10—14	57	45	28,395	13,224	15,171	113	1,174	573
	15—19	52	44	27,764	12,064	15,700	232	3,642	1,316
	20—29	45	37	23,347	10,440	12,907	721	9,305	3,983
	30—39	36	28	17,666	8,352	9,314	455	4,238	2,095
	40—49	27	19	11,989	6,264	5,725	405	2,318	1,340
	50—59	22	10	6,310	5,104	1,206	333	402	261
	60—79	10	1 5	947	2,320	-1,373	701	-962	-791
	80—	3	0	0	696	-696	149	-104	-96
							3,560	26,709	10,476

\*The discounting factor is  $\frac{1}{(1+R)^n}$  where R=the rate of interest (4 per cent in this case) and n= the average expectation of life. For simplicity of calculation it is assumed that the whole of the loss due to the death of one person falls at the mid-point of the remainder of that person's life after accident.

in Britain in 1952 Nevertheless this narrow mechanistic view of human life and suffering has proved sufficiently repugnant and unrealistic as to demand another look at the whole problem

In such a situation as this the economist turns naturally to the idea of a market in the form of insurance premiums or insurance claims imperfect though that market is

From data from insurance companies in 1960 it has been estimated that the total motor insurance premium paid in Ireland in 1960 totalled some £4,200,000 and claims paid out totalled some £3,250,000, being based on court awards and other settlements made to persons who could establish some degree of blame against an insured person in a road accident Although third party insurance is compulsory in Ireland, these sums can be only part of the total burden of accidents as would be settled by the courts and insurance companies irrespective of blame Thus many casualties may not be able to establish any degree of blame against an insured vehicle, and even comprehensive insurance policies (accounting for about 35 per cent of the total) which compensate the holder irrespective of his blame, have certain limits to compensation, e g , in the case of death, and impose some burden on the insurer in the form of loss of bonuses, payment of first part of any claim, etc Claims are only made against these policies therefore if damages and loss are substantial

Motor insurance premiums may be used, however, to build up a notional weight that the community might give to road accidents One could perhaps suggest a weight of £5 million to £10 million per annum as the sum that the community would be willing to pay in order to eliminate road accidents if that were possible

A further aspect of road accidents that arises is the question of consistency in attitude towards different forms of accident, since road accidents are by no means the only kind of exposure to risk of death, injury and damage, and a priori there seems no reason why government or society should differentiate between death and injury say on the road and in an industrial accident In particular much is made of the apparent inconsistency between the attention given to the smaller number of air accidents or rail accidents where many tend to be killed or injured in a single accident, and the comparative indifference to the steady flow of road accidents each with a small number of casualties It seems to me that there is in fact a difference between the two kinds of accident in that in the air or rail accident its avoidance is technically more feasible and controllable than in the case of road accidents, and investigation more worthwhile in order to avoid future occurrence Nevertheless there may well be some inconsistency in attitude to accidents perhaps because in the large, spectacular kind of accident, the individual is

generally passive and cannot be blamed, whereas in road accidents questions of blame are always likely to intrude and to divert attention from more scientific and systematic attacks on road casualties

### *Conclusions*

In this somewhat tentative and inconclusive inquiry it is suggested that there is no such simple statistically identifiable concept as the cost of road accidents and that the problem must be approached by considering what the community might be prepared to pay in order to avoid road accidents, if that were possible. Having established an arbitrary weight for this, which might with discussion be put at some £5 to £10 million a year for Ireland, it is possible to consider the directions by which accidents may be reduced, their efficiency in doing so, and thus the sums that might be worthwhile spending in each direction.

However, because of the many detailed measures that might conceivably be taken to reduce accidents, and the difficulties in assessing their effectiveness, such an approach would need to be exploratory, although even on a speculative basis, the expenditure of say £50,000 to £100,000 a year, i.e., 1 per cent of the annual weight given to road accidents, might be well worthwhile.

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### DISCUSSION

*Mr J McCarthy* It gives me great pleasure formally to propose a vote of thanks to Mr Reynolds for reading his paper on "Some Aspects of Inland Transport"

I think his first contribution lies in the very fact that he has raised the question of trying to establish expenditure on transport as a proportion of the nation's resources. Admittedly he has pointed out a number of conceptual difficulties and the fact that there are statistical pitfalls in

establishing such a figure. Nevertheless, I feel, the importance of the figure should be stressed as it would be of value not only for the reasons Mr Reynolds states in the beginning of his paper but also because it would establish orders of magnitude when the question of total cost incurred on transport is being considered. As an aside I might query the wisdom of trying to establish such a total figure lest an attempt be made to minimise it! There are possibly good economic reasons why such an attempt should not be made.

If time were to permit, I feel we would be interested to hear Mr Reynolds' views on the question of international comparisons of transport expenditure as a proportion of National income. I recognise that in the brief survey carried out of the statistical problems involved he did not raise this issue. As one concerned with the operation of transport I would also like to know how Mr. Reynolds would approach the treatment of subsidies, both direct and indirect, when assessing the expenditure figure on transport as a proportion of the nation's resources.

In conclusion I would like to thank the speaker once again for his contribution.

*Mr E T Sheehy* I think that a paper like Mr Reynolds' is to be welcomed chiefly because it puts the subjects it deals with on the plane of intelligent discussion. More often, emotion and prejudice colour what is said on them. The remainder of my remarks relate to Part II of the paper.

Mr Reynolds appears to shy away from attaching a monetary weight to road accidents, but I feel that his figure of £5—£10 million is in effect a rough shot at it. I think it is fair enough to take a minimum of £5 million as representing what the community loses in road accidents, the chief items being material damage, hospital treatment and loss of earning power. There are other costs, too, but some are practically imponderable. For instance, there is usually a duality of aim in road traffic administration, to seek to improve traffic flow and to reduce accidents. Sometimes, these aims are not compatible except at a staggering cost, and so it happens that measures taken to reduce accidents can affect adversely the economy of transport. Speed limits and pedestrian crossings are examples. Other possible charges are enforcement and insurance administration (as distinct from claims paid).

An estimate of the overall cost of road accidents to the community is useful in that it sets a general picture, but one must go to other figures to appreciate what is involved in suffering and death. During the last 10 years for which statistics are available, over 50,000 people were killed and injured in road accidents. Over 2,800 were killed, and of these more than 400 were children (under 15 years of age). On hearing these figures, one can only ask "What can be done to reduce them?"

But first let us see what is being done. On the side of road construction, while improved roads improve traffic flow and the amenities of driving, they have a road safety value also. Properly aligned roads mean good sight distance, easier bends and less strain on the driver. Good surfaces reduce the danger of skidding and reduce driver fatigue. The value of better street lighting is self-evident. Traffic control devices such as road signs and markings, traffic lights and pedestrian crossings, have a high safety content. The work of road construction has been going on at an increasing tempo according as the revenue from motor taxation has gone up.

Police control in cities is primarily to assist traffic flow, but it has a safety value also, and of course police enforcement generally has the ultimate aim of reducing accidents. Some of the new traffic control measures recently announced, such as speed limits and higher standards of lighting equipment, are primarily road safety measures. Driving tests are due to start in the near future.

Propaganda has been stepped up considerably. It takes the form of general exhortations to take care or specific appeals and advice linked to particular aspects of road behaviour or regulations.

It would not be feasible to assess the annual cost of all this work. Some of the items which have road safety as a primary aim can be costed, but the road safety element in other items could not be so treated.

Now, as to future action. It would indeed make the administrator's job an easy one if he could hire a group of statisticians and other technicians and tell them to work out a scientifically based list of remedies showing in order of priority those most calculated to give the best return in accident reduction for the money spent. But I am afraid it is not as simple as all that. Even if it were possible to do so (which I doubt) it would take so long that the public might justifiably suggest that a lot of lives were being lost and a lot of people injured while the perfect solution was being developed.

Of course, the administrator should equip himself with all the information available on the subject, and should before recommending a course of action assess as well as he can its value and its cost to the community. He will have to take account of factors such as public reaction and how that reaction can, if necessary, be changed by propaganda. Again, if on reviewing his sources of information, he feels that they are seriously inadequate, he should examine the possibility of improving them at reasonable cost.

Here I should mention the difficulty, often overlooked, of suddenly expanding an organisation. It is necessary to have quite an amount of specialised knowledge in a subject like road traffic before you can deal



with it intelligently and capably, and this places practical limits on what can be done in a given time and indeed on the way in which you do it

The programme for the immediate future has been determined in broad outline by the Oireachtas, which as recently as 1961 passed an Act providing for speed limits, driving tests and other innovations. Of course, in implementing a particular provision, a certain latitude is generally available, and one must assemble and assess all the information that can be got before deciding on the final shape of the measure to be taken. On all of the measures there is a reasonable fund of knowledge, but certainly on none sufficient to say that, if you spend £x, there will be a reduction in accidents giving a saving of £y. Indeed I doubt if any country is in that happy position.

Apart from legal measures, a considerable expansion in the education field is envisaged, and road improvement, including the provision of traffic control devices, will proceed.

Concurrently with the implementation of the 1961 Act, various studies are in progress. For instance, a commission is examining the problem of drinking and driving. Information has been and will be collected on speeds of classes of vehicles and on vehicle speeds on particular roads. Some studies have been made of the effects of road improvements, and of the value of traffic control devices. Individual local authorities have been collecting various data on traffic and parking in their areas. The value of different forms of road safety propaganda is being appraised. It should be feasible to devote more time and attention to such studies according as the job of implementing the 1961 Act nears completion. Specific studies of this kind are of high value and should be the basis for further road safety measures, but I do not think that we shall reach the happy position of relying on statistics for the overall answer.

On balance then, I would be inclined to invert Mr Reynolds' conclusions and to say that, while it is feasible to get a reasonable idea of the overall cost of road accidents, it is not possible to gauge what will be the results in £s d of particular proposals for accident reduction and thereby establish a priority list.

But let me hasten to say that I think his paper was well worth while. I personally found it very thought-provoking and I am sure that further objective studies on the accident problem cannot but do good. I have pleasure in seconding the vote of thanks to him.

*Dr T J Beere* In part II of his paper Mr Reynolds refers to the fatality rate from road accidents in Ireland as one per 100 million vehicle miles. I have recently been reading the January issue of "Flight" in which there is some examination of the comparative safety of the different modes of transport in the United States based on figures for passenger

fatalities per 100 million revenue passenger miles. Figures are given for the year 1951 and for the years 1956-1961. The average rate for motor cars in the years 1956-1961 is 2.4 compared with 4.9 for aviation, 1.7 for motor buses and 1.4 for rail. It is interesting to note that as compared with the year 1951 there had been a reduction of about two-thirds in the accident rate in aviation and railways and of one-quarter in the case of motor buses, while motor cars had remained practically the same. Unfortunately, these figures are not comparable with those in Mr Reynolds' paper as the Irish figure relates to vehicle miles and the U.S. figures to passenger miles. If we assume an average of  $2\frac{1}{2}$  passengers per vehicle it would look as if there was no great difference between the U.S. and Irish fatality rates for road accidents.

With the imminence of speed limits we are probably all interested in the possible effects in the accident rate. Perhaps Mr Reynolds could give us some information of the contribution, if any, which speed limits have made to road safety in other countries if, indeed, there has been any effort to measure this on any sort of scientific basis.

Mr Reynolds, in the first part of his paper, sets out to measure the expenditure on transport in Ireland as a proportion of the nation's resources. I would like to suggest that we should go a step further and make some effort to measure the proportion of this expenditure which is really necessary to meet the country's reasonable requirements both for business and pleasure purposes.

It is essential to the community that there should be transport services of a satisfactory volume and quality to meet both our commercial needs and our enjoyment of life. To the extent that our resources, whether of manpower or capital, are used in the provision of transport very greatly in excess of what is reasonably required to satisfy these needs there is a wastage of resources—on the assumption, of course, that such capital and manpower can be better utilised in some other direction.

One of the outstanding characteristics of transport is the perishability of the product whose output cannot be stored for future use. No matter how economically a public transport undertaking may be carried on, there is some wastage of resources by the under-utilisation of the facilities provided—facilities which often cannot be reduced below a certain minimum. The extent of this wastage can be seen from the figures for the utilisation of seats and wagon space. Under-utilisation is an inevitable feature of public transport in a country with a sparse rural population. There is also a wastage of private transport, again through under-utilisation, or rather, I should say, from over-provision. There is probably also a considerable wastage of the national resources in the way transport facilities are used, or rather misused, by the

customer Few firms have transport managers or have made any serious study of the subject In many cases there is reason to believe that savings could be effected by quite simple changes in the method of packing, by the use of containers, by speedier loading arrangements at the factory, even by the judicious selection of the day or hour in which consignments are dispatched Our geographical position and the expansion of our export trade makes it all the more necessary to effect every possible economy

It is accepted that some industries, by the nature of their business, have good reasons for using their own transport Other firms, however, have not such good reasons and have never even gone to the trouble of assessing the real cost of providing their own transport as compared with the cost, say, of a package deal with C I E

Accepting that the private car has come to stay and that certain types of industry may be best served by having their own transport facilities, there is still considerable scope for savings in transport and more and more of our efforts must be directed to this end

*Mr Honohan* said that the attempt to determine the cost in the case of a death arising from an accident by the device of considering the person concerned as a producing and consuming asset was similar in kind to the attempts which were made from time to time to estimate the cost of emigration It was interesting, however, to note that while Mr Reynolds proceeded by what might be described as a prospective method (ascertaining the discounted value of the future which was prematurely cut short), the estimates in the case of emigration were invariably arrived at by a retrospective process (determining what had already been "spent" on the emigrant) It seemed to the speaker that one of the principles underlying Table 6 implied virtually not only a closed economy so far as migration was concerned, but also one of full employment If such a method were to be adopted for this country, account would have to be taken of the probabilities of emigration and unemployment which were of such importance here Mr Reynolds was, in effect, in agreement with the Emigration Commission in dismissing this approach In the course of its observations (pars 315-317 of its Report) the Commission stated that it was idle to pursue this question and that while it was true that the man-power of a country was one of its economic assets, there was no immediate loss if at any time part of this asset was not being utilised and it were removed by emigration, indeed there was, in fact, a gain in the sense that there would be a smaller claim on available resources

*Mr D O'Riordan* said that Mr Reynolds' paper was an extremely interesting one although he had to confess that in its technical aspects

the portion of the paper dealing with expenditure on transport as a proportion of the nation's resources was somewhat above his head. More facts and figures about public transport and more public discussion on the subject were very desirable both from the point of view of assisting the authorities concerned to formulate the best policies and to educate the public to the need for change and the reasons for decisions that might at first sight be unpopular.

The present transport policy was governed by the Transport Act, 1958 and new legislation to replace that Act would have to be enacted before 31st March, 1964. As those present were aware C I E had put in hand a very comprehensive study which covered not only their own public transport operations but the operations of firms providing their own transport. The only sector of the transport industry which on present plans would not be covered was haulage for reward by hauliers licensed under the Road Transport Act, 1933.

There were some 960 hauliers' licences in force and leaving out a number of small licences of a special kind and of no economic significance there were in all some 780 licences of which some 650 were authorised to carry all classes of merchandise and about 100 were authorised to operate throughout the State, the remainder were confined to areas varying from a single county or an area of 20 or 30 miles radius to substantial areas enabling them to reach most parts of the country.

These hauliers were also limited to a particular standard lorry weight which effectively limited the number of lorries that could operate and in fact most of them were entitled to operate only one lorry.

The transfer of licences other than to close relatives or on death or intestacy was subject to the Minister's discretion. The policy had been to prevent transfers which would lead to amalgamation of licences and the building up of large businesses and also against the transfer of licences out of the districts in which the businesses were currently operated.

According to the statistics published in the Irish Trade Journal and Statistical Bulletin the licensed hauliers in a group operated more lorries than C I E and their turnover was not substantially smaller than that of C I E Road Freight Services.

Criticisms had been made of the restrictions imposed on licensed hauliers. Mr Reynolds himself in another context had suggested that the effect of these restrictions discouraged efficiency in transport and added to its cost. There had been growing pressure from the licensed hauliers themselves for some measure of liberalisation.

Apart from the general statistics published in the Irish Trade Journal, however, there was very little information available on the operation of the hauliers and in particular it was not possible to measure the

extent, if any, to which the operation of present policies increased the cost of transport or impeded transport users. In considering the formulation of new transport policy, it would be very desirable to have the maximum information on the activity of the licensed hauliers with a view to determining the extent, if any, to which it might be desirable to grant some measure of liberalisation and what the effects of doing so might be.

He had seen references within the last few days to the results of a survey of road transport carried out in Britain and he wondered if any steps could easily be taken here to obtain more accurate information about the activities of the licensed hauliers.

*The President* conveyed the vote of thanks of the meeting to the speaker. He said that, while this paper emphasised the advantages of quantification as applied to a particular field of activity, he did not believe that the whole problem of producing totals which would be formally related to those in the national accounts had yet been solved. It was well to remember, too, that very considerable margins of error existed in most estimates of expenditure on transport. This was particularly true in relation to the division between personal expenditure and business expenditure on private cars. Certain conventional allocations were often made and these conventions, in fact, differed much from country to country. One could not, for example, compare the Australian statistics where the expenditure on all private cars was treated as capital formation to the results from this country where a considerable proportion was allocated to personal consumption expenditure.

In his view there was one serious gap in our national statistics in that we had no adequate information at all in relation to road freight transport. The Central Statistics Office had made an attempt several years ago to carry out a survey of this sector of the economy but for various reasons had not been successful in doing so. He hoped that, in the very near future, it would be possible for his office to make such a survey which he felt would close a serious gap in the statistics.