No. 124

ASPECTS OF FREIGHT TRANSPORT IN IRELAND

Short

November, 1985

The Economic and Social Research Institute

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JACK SHORT

Paper 124

November, 1985

THE ECONOMIC AND SOCIAL RESEARCH INSTITUTE
COUNCIL, 1985-1986

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Price IR£6.50

(Special rate for students IR£3.25)

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JACK SHORT

DUBLIN, 1985

ISBN 0 7070 0075 0

Acknowledgements

The author would like to thank all those who provided helpful comments on earlier drafts of this paper. The referees made numerous suggestions which were not always easy to carry out. As well as the referees, colleagues in the ESRI and the Department of Communications made many useful suggestions for improvement. Barry Reilly gave invaluable computer assistance. The unfailingly patient and accurate work by the ESRI secretarial staff is much appreciated. As usual, the author is responsible for all remaining errors.

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General Summary

Moving goods is an integral part of the operation of a modern economy. The transport of raw materials, semi-finished or manufactured products is often taken for granted and consequently its importance and impacts are perhaps not well understood. This is in contrast to personal transport which directly affects everyone. However, with our existing production and distribution systems and our established location patterns, freight transport would be very difficult to do without. At worst, factories without raw materials, wholesalers, retailers and ultimately consumers without goods. Sudden fuel shortages, for example, can emphasise the importance of, and our dependence on, the existing system of goods transport.

Historically the introduction and development of new transport methods like canals and railways, and in this century, the rapid growth in lorry use have had striking effects, allowing and encouraging specialisation in production and flexibility in industrial location selection. More recent developments have not been quite so marked but are nevertheless significant. These are centred on large productivity increases due, for example, to the development of motorways and greatly improved goods storage and handling methods. Prominent among these are the growth in containers and the use in international shipping, of roll-on, roll-off and lift-on, lift-off transport. These productivity increases can change relative cost structures between regions or countries and can lead to increases in inter-regional or international trade.

In relation to Ireland, freight transport activity increased very rapidly since 1960 due largely to economic growth, but also to other factors, principally the surge in international trade, but population growth, more dispersed industrial location and changes in distribution systems have all contributed to increased freight transport.

The transport of goods is a multifaceted activity and it is dangerous to over-generalise. There are widely differing characteristics in relation to consignment size (from a tanker of crude oil to household shopping), the method of transport used (sea, air, road, rail, pipeline) and distance (local distribution to international). There are different kinds of operators subject to varying operational or legal constraints, as for example, in relation to national or international hauliers or to the hired or own account sectors. These and other conditions create many submarkets in freight transport. Competition within submarkets can often be fierce, while competition between submarkets, at least in the short term, may not exist except for particular consignment characteristics.

Freight transport is a highly visible activity. Lorries are everpresent in cities and on roads. It is true that most people do not like lorries, finding them dirty, noisy and dangerous. In more economic terms, the transport of goods has

external effects, most of which are adverse. Putting values on these, however, is not easy and this study does not attempt to do it. In general, increasing environmental concern is reflected in restrictions on noise and particulate emission levels as well as in weekend or night time lorry bans. Railway protection policies have always been partially based on the social advantages of keeping traffic off the roads.

The geographically dispersed pattern of production and consumption locations demonstrates the essential role of goods transport in our societies. In other senses, however, it is wise not to exaggerate its importance. As a proportion of total production and distribution cost, transport is only occasionally significant, usually being less than 10 per cent and often very much less. Industrial location decisions can be influenced by good transport facilities but they are generally taken on other criteria. The enormous growth in international trade was assisted by improved transport services but factors other than transport costs were far more important in explaining the growth. At the level of the firm it is not inconceivable that a reduction in total production and distribution costs would be consistent with an increase in transport costs, as for example, in more frequent deliveries or smaller consignments. This can be summarised by saying that, though freight transport is important, it must always be seen in conjunction with the activities of which it forms a part.

It is equally true that policy issues in relation to freight transport must not be seen in isolation. As a general example, freight transport costs may have to be increased to reduce adverse environmental effects. More particularly, the taxation of goods vehicles cannot be seen in isolation from the taxation of other road users or indeed from more general taxation concerns. Regulatory policy too should be judged against a broad economic framework and not the rather narrow objectives often given to such legislation.

The freight transport industry is one that has attracted close Government surveillance in many countries. Government regulations have been applied to all modes of transport but in many countries became particularly severe for road hauliers when they began to break railway monoplies in the 1930s. The principal regulatory instruments included restrictions on access, controls on rates, limitations on vehicle and fleet size as well as commodity and area restrictions. Apart from controlled freight rates all of these mechanisms were and still are applicable in Ireland. Many countries are now untangling the web of controls and this is true also of Ireland. However, as in other countries the liberalisation of the industry has been a lengthy affair. It is obvious that some Government intervention is necessary, especially in relation to safety matters but also for issues like licensing, vehicle standards and environmental and related concerns. On the other hand, it is not obvious that the system of economic regulation has brought benefits which justify its costs.

The foregoing paragraphs give a flavour of the scope of the freight transport industry and a selection of the concerns and issues involved. It is evident that it is a wide field and that it would be impossible in a single report to cover all aspects of it. Therefore the approach taken here has been to isolate various components and to treat them separately as fully as possible. It does not pretend to be a complete picture — indeed several subjects are suggested for further work — but it tries to bring together some of the diverse information on the subject.

The study was largely carried out using existing published material. However, an important reason for undertaking the work was the arrival of new information, in the form of data from a series of Road Freight Surveys carried out by the Central Statistics Office. These data provide the first overview of activity in the road freight industry since the early 1960s and are the backbone of much of the analysis in the report.

The findings of the study are set out in detail in the report and summarised briefly and formally in the final chapter. The intention here is to point only to broad trends and to isolate significant or interesting conclusions.

In relation to information on the industry, there are certain data gaps and weaknesses. The gaps are in the international transport domain and in cost data, especially for railways. Weaknesses in existing series are identified and there is scope for making improvements without much additional cost.

However it is measured, freight transport activity has grown rapidly in the past twenty years. Goods vehicle numbers have practically doubled, work done trebled and capacity quintupled. These occurred at a time when car numbers grew very rapidly and major road building activity was limited. Consequently there is evidence of declining efficiency in vehicle use when comparisons are made between similar vehicles.

In the aggregate, most freight transport is now carried out in large vehicles. Nevertheless much of the traffic and transport is still short distance work. These facts lead to the policy implication that some restrictions on the unfettered use of large goods vehicles in urban areas may now be necessary.

The industry structure has shifted towards a greater use of the hired sector, though the Irish situation is still different from that in many European countries. It is indicated that there is scope for the hired sector to further increase its market share, though it is pointed out that proposed liberalising legislation may temporarily slow the present trend. Within the hired sector there has been a dramatic increase in fleet size and, though the number of single vehicle operators is still large, they now have a small share of the total market.

The appropriate taxation structure for goods vehicles is a difficult subject. In this study the subject is approached in terms of achieving a degree of equity between different vehicle categories. This is not to say that the fundamental policy issues relating to payment for infrastructure investment and use are

ignored but merely that they are not extensively developed. The analysis indicates that substantial taxation increases on the heaviest categories of goods vehicles are required for them to cover the costs imposed. In the absence of taxation systems on use these increases must be made to existing road tax.

The railway has, in aggregate, a relatively minor role in internal freight transport, though on particular routes and in certain commodities it is more significant. A cost coverage policy for the railways freight transport business has not been satisfactorily defined by Government and, perhaps as a consequence, the Railway Company's published information is inadequate.

As regards policy it is considered that the arguments in favour of a more liberal frieght transport market are the stronger and that policies of access based on qualitative standards and of operation based on overall efficiency are correct. In this connection the period of liberalisation is considered to have been excessive and has not brought perceptible net gains. For the future it is important that, if standards of access are to be raised, existing and potential operators are treated equally.

Projections of likely developments indicate growth rates in vehicle numbers of about 3 per cent per annum and about 4 per cent per annum in vehicle capacity and work over the next 10 years. Naturally, these projections are extremely tentative and depend on several factors, the most important being the rate of economic growth. Thus they need to be continually updated and reassessed. Policy conclusions deriving from the projections support road development programmes; the continuing growth in trade may require further emphasis be given in these programmes to roads to ports.

Industry demands for flexible and reliable transport services derive from a growing awareness of logistics costs, especially the cost of holding stock. Modern technology allows the possibility of more efficient vehicle and fleet operation as well as greatly improved information exchange on transport and traffic conditions. In the longer term the development of a more transparent market through computerised information about loads may also be possible.

The demands of industry and the possibilities offered by new technologies both place greater demands on, and offer new opportunities to, the freight transport industry itself. As for Government, it has a crucial role in its general regulatory policy and more particularly in how it develops policies which achieve an appropriate balance between transport and environmental concerns. The reactions of Government and the industry to these demands and challenges will shape the development of freight transport in the future.

Chapter 1

INTRODUCTION

Freight Transport in the Economy

The efficient movement of freight is important to the successful operation of businesses, to commerce in general and to the economy. Whether in the receipt of imports or the dispatch of exports, the carriage of raw materials to factories or the distribution of output to wholesalers, retailers and households, the importance of freight transport is crucial. Good transport facilities can aid the development of areas or industries and can increase the scope for greater flexibility with regard to locational decisions and distribution systems. In a sense transport can almost be regarded as a factor of production, for without the ability to move materials into and out of factories production is impossible or pointless.

The transport of goods absorbs a significant share of resources. The cost of freight transport to users was estimated by Barrett (1980) to amount to about 7 per cent of GDP in 1980. The figure for Great Britain was of the same order in 1979 at 8 per cent of GDP (Armitage, 1980, p. 9). Transport costs as a proportion of total manufacturing costs tends to be of the order of 5–10 per cent, depending on the nature of the output, though firm statistical evidence on this point is lacking in Ireland. For bulk commodities with a high weight to value ratio, transport costs will be higher and can, for example, in industries like cement production, give significant benefits to indigenous industries over imported competition. In general though, transport cost is only one of a number of factors determining industrial location. Because transport has such a relatively low share of total industry costs, so that even a 10 per cent reduction of transport costs results in only, at most, a 1 per cent cut in total costs, the pursuit of efficiency in transport provision may not have received due attention in industry.

The transport of freight imposes significant costs on the road system, on other travellers and on society in general. The lorry, which carries most of our freight, is an ever present, almost pervasive influence. Its traffic interference characteristics are well known to other travellers, and it also has substantial environmental effects, causing noise, vibration and pollution as well as being involved in a disproportionate number of accidents. (See for example Hearne (1980)).

This report examines aspects of freight transport in Ireland. It does not purport to deal with all aspects of the industry — which is a multifaceted one — but focuses in a relatively quantitative way, on topics that are amenable to such treatment. The aim is to present data and analysis on several freight transport topics. Where data are lacking or are deficient, suggestions are made for improvements. Where data allow more detailed analyses are undertaken and

relevant policy issues are tackled.

One of the difficulties is that freight transport cannot be studied in isolation. So, for example, the demand and supply of freight transport can depend on factors which have nothing to do with transport. Issues like goods vehicle taxation (which is examined in Chapter 5) cannot be fully understood independent of vehicle taxation and indeed more general taxation concerns.

The report is structured as follows: the remainder of Chapter 1 presents some information on the history and structure of the freight industry. Chapters 2, 3, and 4 deal with the road goods vehicle fleet and its performance. In Chapter 5 the taxation of goods vehicle is examined. Chapters 6 and 7 look at subsectors of the road freight industry. The role of the railway in freight transport is considered in Chapter 8. Chapter 9 contains a discussion of economic issues, while projections of road freight activity are presented in Chapter 10. Finally, Chapter 11 summarises the report's findings and makes several suggestions for further work.

General Historical and Legislative Developments

While the railway played the central role in the early development of internal freight transport between towns, the horse and cart dominated the scene within towns. The lorry began to make an impact in Ireland in the period after the First World War, numbers growing to about 5,000 by 1925 and to over 8,000 in 1931 (cited in Barrett (1982)). Its flexibility, for both urban and inter-urban work was such that it challenged the monopoly of rail on the longer journeys and the horse and cart on the shorter ones.

The horse and cart were the lorry's first competitive casualty but the railway was determined not to be its second. Legislative measures designed to protect the railway's markets were introduced in the 1933 and later Road Transport Acts which, to a significant extent, have remained in force to this day. These concentrated on restricting the number of licensed hauliers, the areas in which they could operate and the commodities they could carry. These restrictions strongly shaped the development of freight transport in the State. The provisions of the 1933 and subsequent Acts are described in more detail in Appendix 1.

The legislation did not, however, prevent the continued growth in road transport; its effect was rather to channel this growth in activity into the use of their own transport fleets by firms. Thus Ireland came to have a relatively high proportion of activity in what is known as the "own account" sector. Meanwhile the railway was not able significantly to increase its role; in fact the total tonnage carried on the railway in 1955 was about the same as in 1925 (Beddy, 1957).

Reports on internal transport commissioned in 1937, 1948 and 1957 strongly supported the maintenance of the status quo. Thus Milne (1948) concluded that: "The provision of adequate public services is of paramount importance to the

social and economic life of the country and the services provided by the independent haulier and merchant user should supplement and not supplant the public services". In a similar vein Beddy (1957) stated that: "... decontrol would give rise to chaotic conditions, to a speculative scramble, to over investment in transport vehicles and to duplication of services." Decontrol was regarded as "an experiment fraught with so many difficulties".

The number of goods vehicles grew rapidly in the early 1950s to about 43,000, though there was little subsequent growth in numbers until the 1970s. There was however scant evidence on activity within the freight industry until the 1964 Road Freight Survey.[1]

Evidence from this Survey that Ireland seemed to have a relatively large own account sector and, simultaneously, a relaxation of the regulatory framework in Britain, led to a gradual change in attitudes in Ireland in the late 1960s. Official policy by 1971, when the first of two liberalising Acts was passed, was that the haulage industry should be liberalised, meaning that access to the profession would be open to anyone who met certain qualitative standards. The 1971 Act relaxed area and commodity restrictions on existing hauliers and removed vehicle weight restrictions. The second liberalising Act was passed in 1978 and allowed licensed hauliers to increase sixfold the number of vehicles operated under each merchandise (existing carrier) licence.

In September 1978 the Minister for Tourism and Transport initiated a study by the Transport Consultative Commission (TCC) on the structure of the road freight haulage industry. The Commission's report was published in July 1981 and recommended the introduction of a more liberal system over a two year period, from the date of acceptance of the report. At the beginning of 1984 the Minister for Communications announced that the Government had accepted the thrust of the recommendations and that freight transport in Ireland was to be liberalised subject only to qualitative controls. In practice the implementation of stated policy has been a very slow process.

While domestic haulage has been tightly controlled, international haulage, which grew rapidly in the early 1970s with the development of Roll-on Roll-off transport facilities, has not been restricted and licences for international haulage are available to applicants who have an International Road Freight Certificate. This appears to have resulted in sharp competition for international traffic and may have led to overcapacity in the sector.

Road Freight Transport traditionally has been tightly regulated in many countries. Such regulatory control generally started in the 1930s when, because of the relative ease of access, the profession became "a haven for the unemployed" (Wilson, (1980)). The United States, Britain and most continental

[1]Sample Survey of Road Freight Transport 1964 — Final Report (Pr. 9572).

countries had regulatory systems which either restricted entry or controlled rates. The liberalisation of the industry has progressed slowly in other countries as well, though Britain now has a system based entirely on qualitative controls. Belgium has liberalised access and France has liberalised short haul transport. However, Germany and The Netherlands maintain close regulatory control on the road freight market, and liberalisation in the United States though it has also been a stated policy aim, is not yet complete.

While freight transport has grown enormously and has undergone many significant changes, data on activity have been particularly scarce. Such a paucity of information may well have contributed to the fear of change that undoubtedly existed. Now, with the advent of a continuing Road Freight Survey a part of this problem will be solved and it is to be hoped the presence of additional statistical information will raise the level of debate on freight transport issues. However, there are still large data gaps, particularly in relation to costs, and until these are filled many of the important policy issues relating to competition between modes and taxation and pricing, cannot expect to be settled.

Structure of the Freight Industry

The legislative provisions described above (and in more detail in Appendix 1) have resulted in an industry structure that can usefully be described by means of a diagram and Figure 1.1 above sets out one way of doing this. The following paragraphs describe the content of Figure 1.1 in more detail.

Freight transport in Ireland is undertaken by road and rail; unlike other European countries there is no significant use of inland waterways or pipelines. Precise market shares for the road and rail modes are not known because the extent of the work done in the Republic by vehicles registered elsewhere is not known. When this work by outside hauliers is excluded, about 88 per cent of the total tonne kilometres[2] in 1980 were undertaken on the road.

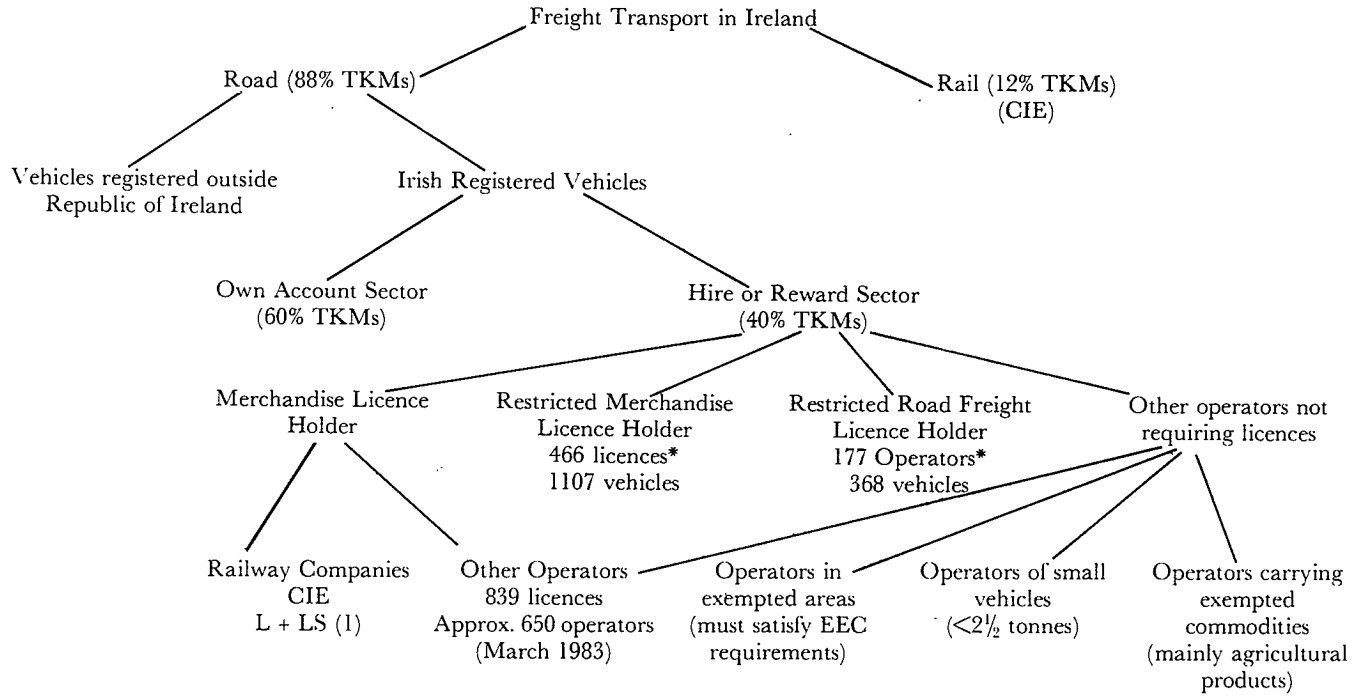
Within the Irish road freight transport industry the principal division is into the Own Account and Hire or Reward sectors. The Own Account sector relates to operators who carry their own goods in their own vehicles, while the Hire or Reward sector consists of those who carry goods for others.[3] The Own Account sector in 1980 accounted for about 60 per cent of the tonne kilometres performed by Irish registered vehicles.

The legislative provisions relating to the Own Account sector derive principally from the 1933 and 1956 Acts. The 1933 Act prevented the carriage of goods for reward without licence and the 1956 Act forbade the leasing of vehicles

[2]A measure which takes account of both the distance travelled and weight carried.

[3]The division is not always clearcut since some own account operators are licensed to carry goods for reward and some hire or reward operators occasionally carry their own goods (see Chapter 5).

Figure 1.1: *Structure of the freight industry in Ireland, 1983*



*At end 1983.

(1) CIE is Coras Iompair Eireann and L + LS is the Londonderry and Lough Swilly Railway Company.

in the Own Account sector. The announcement in February 1984 of the liberalisation of the road freight industry means that these provisions will not apply in the future. The restrictions on leasing will be lifted on the passing of the Act and the restriction on plying for reward will be removed some two years after that, when licences will be freely available, subject to applicants satisfying EEC requirements on access to the occupation of hauliers.

Aside from these restrictions and the Road Traffic and Safety provisions which apply equally to both subsectors, the majority of the legislative provisions affecting Road Freight Transport have related to the Hire or Reward sector. As a result, a range of different licences has developed. These are now looked at in turn.

First, *Merchandise Licences* consist of the original licences issued under the 1933 legislation. Of those now extant (841 in number) two are held by Railway Companies[4] and the rest by private hauliers. The Railway Companies licences are not subject to fleet size or commodity restrictions. The other Merchandise Licences are restricted in respect of the number of vehicles that may be operated (under the 1978 Act) but not in respect of commodities or areas of operation. The material in Appendix 1 describes how the restrictions on these licence holders remained fairly static until the changes in 1971 and 1978. Merchandise Licences have traditionally been regarded as valuable properties and have been sold for amounts as high as £12,000.

The next category of licence, the *Restricted Merchandise Licence* derives from the 1944 Transport Act and allows new operators into the market where an inadequacy of transport is shown to exist. This condition results ususally in the operation of specialised transport vehicles which would not have been supplied by any existing operator. Fleet size and position in the market is also taken into consideration in issuing these licences. The kinds of vehicles licensed in this category include refrigerated transport vehicles, car and caravan transporters and other specialised types of vehicle. Though the 1944 Act allowed for this category of licence, it was not until the 1960s and 1970s that the number started to grow. At the end of 1983 there were 466 licences of this type for 1,107 vehicles.[5]

Restricted Road Freight Licences, (also called Import-Export licences) introduced under the 1971 and 1978 Road Transport Acts, are issued to hauliers in respect of journeys for reward within the State as part of an international journey. These licences disallow point to point haulage within the State. Many international hauliers obtain these licences rather than the restricted Merchandise licence though some operators hold both licences. The number of restricted Road

[4]One each by Coras Iompair Eireann (CIE) and the Londonderry and Lough Swilly Railway Company.

[5]Many of these licences are not being used. It is estimated that 239 of the licences were being used, relating to 635 vehicles.

Freight Licences at the end of 1983 was 368. (This includes an unknown number who also hold Restricted Merchandise Licences.) Each licence relates to only one vehicle and is renewable annually.

Other hauliers, who do not require licences of the above types also exist. First, there are hauliers who operate in the "exempted areas" — areas within 15 miles of the centres of Dublin and Cork and 10 miles of Limerick, Galway and Waterford. Such operators have to satisfy EEC conditions on access to the occupation of hauliers. There was a provision in the 1978 Act to extend by regulation, the radii of the exempted areas by 5 miles and to licence all those operating in these areas. These provisions were never brought into force. It is not known how many firms operate in the exempted areas — thought estimates of 600 have been made, (e.g., 1981 TCC Report, p. 24). Second, there are operators of small vehicles, who were exempted from licensing requirements in the 1978 Act. There are unlikely to be many of these since small vehicles are not preferred by hauliers. Third, there are hauliers who carry exempted commodities. These commodities are related mainly to carriage to and from farms and include cattle, pigs, wheat, oats, barley, milk and turf. The carriage of wheat, oats and barley is exempt from licensing from August to November, so that own account hauliers can carry these commodities for reward during this period.

All operators acquiring licences or operating within an exempted area must obtain a "Road Freight Certificate" a qualification which requires that the recipient is of good repute, sound financial standing and is professionally competent. Hauliers, who held licences before 1975, were automatically given these certificates. While liberalisation will theoretically permit open access to the occupation, a basic entry requirement for all applicants will be a Road Freight Certificate.

A more general consideration overlaying the structure set out above is that there is widely believed to be a considerable amount of illegal haulage — either operating without an appropriate licence or operating outside the terms of it. Indeed, this is a recurring theme in the published reports. The 1939 Tribunal of Inquiry on Public Transport, and the 1957 Beddy report commented on the extent of illegal haulage and both recommended increased penalties for those found to be engaged in it. Moreover, the TCC (1981) Report found that the observance of the law was poor and that there was an urgent need to improve enforcement. Of particular concern is the belief that there are frequent infringements of regulations to maximum speeds and loads.

While it is obvious that the problem can be solved by the application of greater resources to enforcement it should be realised that a share of the enforcement difficulty lies with the present complex licensing system. Similarly, the detection and prosecution of offences on maximum weights is dependent at

present on such a small number of mobile weighbridges that the elimination of the practice is most unlikely, until this number is increased significantly.

Freight Transport Developments, 1964–1980

We turn now to examine in outline the general developments that have occurred in recent years. The years 1964 and 1980 are taken because Surveys of Road Freight activity were carried out in these years. There is no aggregate information on total road freight activity available before 1964 nor is there any information on developments for any of the years between 1964 and 1980.

Table 1.1 below presents broad freight aggregates for the years 1964 and 1980, as well as some general economic indicators.

The table includes data for both road and rail freight transport. Not all the road freight transport is internal as some of the work done was carried out by Irish reistered vehicles while abroad.

The table indicates the very substantial growth in freight activity whether measured by tonnes (an increase of 83%), or tonne kilometres (176%). The greater growth rate in tonne kilometres than in tonnes indicates that average haul lengths have become longer.

During this period imports trebled, real GDP almost doubled and industrial production grew by 132 per cent. Increased output, a growing population, more dispersed industry and the expansion of international trade all contributed to the freight transport growth though undoubtedly the expansion in output and imports are the most important factors. Road investment was virtually static in real terms over the period and in fact declined as a percentage of GNP from 1.5 per cent to 1.1 per cent between 1965 and 1976. Also, road investment has increasingly tended towards maintenance expenditure, rising from 45 per cent of the total in 1964 to 63 per cent in 1980.[6] The road system, particularly in urban areas, underwent few major changes and road widening and realignment were the major developments. While relief roads in a few towns, and improved traffic management techniques assisted the greatly increased traffic flows, there were no major bypasses built, nor were there road building programmes on anything like a European scale.

Investment in road goods vehicles over the period was substantial. In 1980 alone, road goods vehicle investment probably exceeded £50m. In all, nearly 150,000 goods vehicles were purchased between 1964 and 1980. There were major changes in goods handling methods. Automated systems of lifting palletised goods and the widespread introduction of containerised traffic allowed for more rapid and secure dispatch of loads. The Roll-on Roll-off method of freight carriage has facilitated the use of trucks in international haulage.

Distribution patterns have changed. With the development of supermarkets

[6]In 1981 and 1982 these figures declined to 55 per cent and 52 per cent respectively.

Table 1.1: *Freight and economic activity, 1964 and 1980*

	Freight activity (Road + Rail)		*Economic activity (£m; 1975 prices)*			
Year	*Tonnes*	*Tonne kms*	*Industrial production (Base 1973=100)*	*GDP*	*Imports*	*GDP plus imports*
	(million)					
1964	58.0	2064.9	56.8	2202.1	1004.7	3206.8
1980	106.1	5647.2	131.6	4246.7	3021.4	7268.1
Percentage Change (1964–80)	82.9	173.5	131.7	92.8	200.7	126.6
Annual Average Growth (%)	3.8	6.5	5.4	4.2	7.1	5.2

Sources: Road Freight Survey, 1964, 1980; CIE Annual Accounts for rail data; NIE for economic data; ISB for production index.
Note: Overseas road transport is included in the table as is some rail haulage to Northern Ireland. Excluded from the figures is work done by foreign hauliers in Ireland.

and shopping centres retail outlets have become smaller in number and larger in size. Deliveries to households of groceries have virtually stopped and deliveries to wholesalers and retailers are in larger amounts in bigger vehicles.

Changes continue to take place. An increasing awareness in industry of the cost of holding stock is leading to improved stock management and the development of "just in time" delivery and distribution systems. These are placing greater pressure on transport suppliers and will undoubtedly strongly shape the future of freight transport. Logistics is the term that is increasingly appearing in transport literature, with transport being only one part of the process involving the transformation of raw materials into products for final consumption.

Such considerations give a broad overview of the way in which the freight industry has changed. The remainder of this report is given to a more detailed examination of various aspects of the industry.

Chapter 2

THE GOODS VEHICLE FLEET

This chapter looks at the available information on the goods vehicle fleet in Ireland. Statistical difficulties are discussed and their implications drawn out. Several subsidiary pieces of information on aspects of the vehicle fleet are also analysed.

Vehicle Fleet

All vehicles, including goods vehicles, are registered with local licensing authorities — 26 county councils and Dublin, Limerick and Waterford corporations. The Vehicle Registration Unit of the Department of the Environment (DOE) compiles and maintains a computerised national vehicle file, on the basis of data supplied by the local licensing authorities. Each year, a Census of Vehicles which are taxed at the 30th September is undertaken and the results published. Until very recently there has been no other informtion on the size of the vehicle fleet and this series has underpinned almost all analytical work on the goods vehicle fleet.

It is important to emphasise that the annual Census relates only to vehicles which are registered and are under current licence (or are taxed) at 30th September. However, at any time there is a significant number of vehicles which are not taxed and which are on the Department's computerised register of all vehicles. The continuing Road Freight Survey (RFS), initiated by the Central Statistics Office (CSO) in late 1979, has begun to provide some information on the topic. The survey uses the computerised DOE frame of vehicles to draw its sample. This frame consists of all goods vehicles taxed at *any* time since 1978. In the course of the survey the CSO encounter vehicles in the sample that have been scrapped or are no longer in use. Estimates of the number of these are made and subtracted from the total number on the frame. In 1980, the total number of vehicles on the DOE frame was about 91,000 and the CSO estimate of the number that was scrapped was about 8,500. This implied a total of about 82,500 goods vehicles in use, compared with the DOE September Census figure of about 64,500. It seems, therefore, that about 18,000 vehicles or about 22 per cent of the vehicles in use are not taxed at any one time.[7] This has implications for the taxation of goods vehicles which will be pursued more fully in Chapter 5, but for the present attention is focused on the statistical aspects.

Table 2.1 below looks at the difference between the CSO and DOE data in more detail.

[7]Independently, a road-side survey conducted by the DOE in 1979 also found that 22 per cent of goods vehicles had no tax disc or were displaying one that was out of date (McIlraith, 1980).

Table 2.1: *Comparison by unladen weight of vehicles in use (CSO) and taxed vehicles (DOE) 1980*

*Unladen weight tonnes**	*Vehicles (000) In use (CSO) (1)*	*Taxed (DOE) (2)*	*Difference (3)=(1)-(2)*	*Understatement (%) (3)/(1)*
Under 3	52.3	42.2	10.2	19.4
3-5	11.1	9.0	2.1	19.3
5-10	13.8	9.9	3.9	28.1
10 and over	5.2	3.4	1.8	33.8
Total	82.4	64.5	18.0	21.8

*The CSO data are published in metric tonnes, while the DOE data are in imperial units. This difficulty occurs at many places in the report but the difference is not usually very significant as 1 ton=1.016 tonnes. In the table the DOE data have been adjusted to a tonnes basis on the assumption that vehicles are distributed uniformly within weight classes.

Note: Figures may not add due to rounding; the percentages are based on unrounded data.

It can be seen that, while the overall understatement by the Census data of the estimated number of vehicles in use is almost 22 per cent, this varies between unladen weight classes. Generally speaking, the higher the unladen weight the greater the relative understatement, with about a third of vehicles over 10 tonnes unladen not appearing in the Census data.

It can be seen, therefore, that any analysis of the goods vehicle fleet using only the DOE Census data has two serious drawbacks.

First, the figures do not necessarily provide an accurate estimate of the numbers of vehicles in operation, in other words the levels shown by the Census may not be correct. These levels vary between unladen weight classes with the largest vehicles being most heavily underrepresented in the Census data. It is believed that the understatement was unlikely to be as significant a problem in the past (Geoghegan and Brady, 1983, p. 7). Thus, the 1964 Road Freight Survey which also used currently taxed vehicles as its frame is believed to provide estimates close to the actual number of vehicles operating at that time.

Second, there is no indication at this stage of whether the *trends* shown by the Census data provide a valid indicator of trends in the industry. There appears to be no reason to assume any particular form of relationship between the number of vehicles in use and the number that are taxed since failure to pay road tax can depend on whether the vehicle is being used, on the financial state of the business, on the likelihood of not being detected as well as on the cost. These

change over time and the annual Census probably reflects changes in these variables as well as changes in the number of vehicles on the roads.

It is important that the DOE provide more information on the stock of vehicles. Apart from the number of vehicles currently taxed, an aggregate like the number that were taxed at any time in the previous 12 months would provide a more reliable estimate of the number of vehicles in use. This should help dispel the uncertainty that now surrounds the size of the goods vehicle fleet and should allow a realistic assessment of the taxation issues that arise.

While the Census data have the defects outlined above they do provide the bulk of the statistical information on the goods vehicle fleet for the past two decades. Moreover, they have the advantage of *timeliness* with the Census results being available within a few months of the reference date. In contrast, the CSO data do not yet provide a reliable time series and there is a considerable time lag in the availability of data. Also, there is a degree of uncertainty in the CSO figures since the number of scrapped vehicles has to be estimated from the sample

Keeping these statistical difficulties in mind, the remainder of this section focusses on the information that is available from an examination of both sources.

Trends in Vehicle Numbers and Capacity

At the outset, attention is concentrated on the DOE series because it is the only source of time series data on the vehicle fleet and it provides a useful framework for examining trends in freight transport activity. Table 2.2 below presents the number of goods vehicles in three unladen weight categories for the years since 1960.

The total number of vehicles increased by 57 per cent between 1960 and 1982; or at an annual rate of 2.1 per cent; however, the increases in the various vehicle size categories were quite different.

The number of smaller vehicles, that is those less than three tons unladen weight, increased at a lower annual rate of 1.1 per cent indicated also by the drop in their share of total numbers from 85 per cent to 69 per cent of vehicles. The number of medium sized vehicles, those between three and five tons increased rapidly in the early 1960s to almost 9,000 and remained static at about that number with signs in very recent years of a slight decline. The overall annual rate was 1.7 per cent per annum. However, the most striking change has come about in the number of larger vehicles, those of unladen weight in excess of five tons, with a 12-fold increase since 1960. The base in 1960 was very low but though the rate of increase has slowed in more recent years there has been substantial growth (of 12.3 per cent per annum) in this category over the period. Though not shown in the table, the rate of increase for vehicles in excess of 7 tons unladen has been even greater with a 22-fold increase since 1960.

Table 2.2: *Number of goods vehicles (excluding electrically propelled) 1960–1982, DOE Census*

	Number of vehicles			
	Unladen weight (tons)			
Year	*<3*	*3–5*	*5+*	*Total*
1960	36,705	5,400	1,046	43,151
1961	35,455	6,687	1,292	43,434
1962	35,370	7,372	1,560	44,302
1963	35,119	7,923	1,701	44,743
1964	36,163	8,251	1,763	46,177
1965	36,864	8,615	1,951	47,430
1966	35,478	8,569	1,986	46,033
1967	33,588	8,971	2,482	45,041
1968	33,369	9,113	2,685	45,167
1969	33,358	8,939	3,083	45,380
1970	34,410	9,620	4,129	48,159
1971	30,032	9,107	4,770	43,909
1972	29,294	8,938	5,838	44,070
1973	32,384	9,176	6,909	48,469
1974	35,608	8,876	7,875	52,359
1975	35,139	8,669	7,985	51,793
1976	35,515	8,571	8,898	52,984
1977	34,547	8,601	9,657	52,715
1978	39,046	8,721	11,194	58,961
1979	39,951	8,565	12,424	60,940
1980	42,829	8,621	13,006	64,456
1981	45,493	8,078	12,879	66,450
1982	46,405	7,835	13,316	67,556
% Change 1960–1982	+26.4	+45.1	+1,173.0	+56.6
% Average annual growth	1.1%	1.7%	12.3%	2.1%

Source: DOE.

There are two further features of interest in the data. The first is the rather sharp decline in 1971 in the number of smaller vehicles. This is believed to be due to the fact that in November 1970 the taxation rates for cars were increased above the level for small goods vehicles. It was required that owners would pay the higher rates so there was a switch of category by some cars which had been classified as goods vehicles.

The second is the significant increase in the number of vehicles in 1978. This partly reflects the 1978 Road Transport Act which allowed licensed hauliers to increase the numbers of vehicles operated; this is shown in the increase in the number of vehicles in the 5 tons and over category. However, the principal reason, affecting small vehicles, is that road taxation for cars was abolished in 1977 provided the cars were not being used for the transport of goods. Because some were, a number of cars were reclassified as goods vehicles at that time.

These data on vehicle numbers mask the enormous increase in the potential of the vehicle fleet to undertake transport activity. One method of measuring this is to calculate the capacity of the fleet. This is the total maximum load that the goods vehicles could carry if they were all loaded simultaneously. Obviously this is a simplistic measure, being unidimensional, but it gives a better indication of the effect of the change in vehicle numbers. The factors used to relate the maximum load to the unladen weight are those used by McCarthy (1974) and include a capacity allowance for those vehicles that are licensed to draw trailers.

Table A2.1 in *Appendix 2* shows how carrying capacity as defined by McCarthy has changed over the period and how capacity in the various vehicle size categories has altered. The data and growth rates are summarised in Table 2.3 below.

Table 2.3: *Capacity of fleet 1960–1982; DOE data*

	Unladen weight (tons)			*Trailers*	*Total*
	<3	3–5	5+		
1960 (000 tons)	39.9	31.1	12.1	1.8	84.9
1982 (000 tons)	59.2	50.4	204.0	4.7	318.2
% increase 1960—1982	48.2	61.9	1,592.3	154.0	274.8
Annual % increase	1.8	2.2	13.7	4.3	6.2

Source: McCarthy and O'Mahony (1980); DOE Census and own calculations.

It can be seen that capacity, as defined here, increased at over 6 per cent per annum, much faster than the figure of about 2 per cent for vehicle numbers

shown in Table 2.2. This is largely due to the major switch to bigger vehicles but it can be also seen that within each class vehicle capacity grew faster than vehicle numbers, indicating a move towards heavier vehicles within each category.

A criticism of the capacity measures used here, distinct from those that derive from defects in the DOE Census, relates to the factors which are used to determine capacity for each vehicle size category. While these factors are quite precise for the lower unladen weight categories, they are very approximate for the larger sized vehicles. Thus, the estimates derived from them must be quite tentative. A second criticism is that these factors are constant while it is perhaps likely that they change over time, for example, due to technological improvements.

Alternative Data

The comments on the vehicle and capacity data deriving from the DOE Census lead one to ask whether any improvement can be made. There is the possibility that, using RFS data for 1964 and 1980 as the end points and the DOE Census data to provide the trend, a new series of vehicle numbers and capacity can be constructed. A method of doing this is described for both vehicles and capacity in Appendix 2.

It can be seen from the calculations in the appendix that the aggregate capacity estimate for 1980, at 511,000 tons is significantly higher than that of 318,000 tons shown in Table 2.3. These are calculated in different ways and the discrepancy is due to both the different multiplicative factors and the different vehicle populations on which the estimates were based. The difference is reflected most strikingly in the capacity growth rate for vehicles in excess of 5 tons, with a massive 17 per cent increase annuall for over 20 years, compared with 13.7 per cent in the DOE based series.

Using this approach it can be seen that capacity has increased even faster than indicated by McCarthy and O'Mahony (1980) in Table 2.3. This is due both to the faster rate of increase in vehicle numbers and to a faster growth in capacity per vehicle.

Age Profile of Fleet: Scrappage Rate

An indication of the age profile of the vehicle fleet is given in Table 2.4.

These data are characterised by high proportions of very new and very old vehicles. About 37 per cent of vehicles in the fleet were manufactured between 1978 and 1980 while over 20 per cent were manufactured in 1972 or earlier. Examination of the data on work done indicates that the newest vehicles (1978 and later) perform almost 53 per cent of the total work done, while the oldest ones (1972 and before) account for only about 8 per cent of work. Therefore the numerical importance of older vehicles is belied by the relatively small share of work they undertake.

Table 2.4: *Vehicle fleet by year of manufacture (1980)*

Year of manufacture	*No. of vehicles*	*% of vehicles*	*% of work**	*Average age*
1979-1980	16,900	20.5	27.4	.75
1978	13,700	16.6	25.4	2
1977	10,000	12.1	15.6	3
1976	6,900	8.4	8.5	4
1975	5,100	6.2	5.9	5
1973-1974	12,900	15.7	9.5	6.5
1970-1972	10,800	13.1	5.4	9
1969 or earlier	6,200	7.5	2.5	12
Total	82,400	100.0	100.0	4.6

*Share of total tonne-kms worked.
Source: CSO RFS.

The calculation of an average age of the vehicles in the fleet depends on making assumptions about the average age in each class. In general this requires an assumption of a reference date for the survey. This is taken as end June. The average age of a vehicle manufactured in 1979 or 1980 is .75 years, one manufactured in 1978, two years and so on. For the pre-1969 class an arbitrary assumption of 12 years is made. The resulting average is 4.6 years. This is not, of course, the same as the average life of a vehicle, which is of the order of 6–7 years. Also, with fleet size increasing the average age is younger than if fleet size were stable because of a concentration of newer vehicles in the fleet.

Purchase of New Vehicles, Scrappage Rates

The CSO publish a series on new vehicles registered and licensed for the first time. When this series is taken in conjunction with stock figures an estimate of the scrappage rate can be obtained. The series on new commerical vehicles is available monthly and the appropriate figures to use for new vehicles are those registered between 1 October and 30 September of the following year. These figures differ from the calendar year figures, though not usually by very much.

The real difficulty lies in the choice of the stock figures, whether DOE Census or the Road Freight Survey based data. The scrappage rates obtained depend on which data are used as can be seen from the two tables in Appendix 3. Using DOE data, an average scrappage rate of 15 per cent per annum is obtained, while the data derived from the Road Freight Survey indicate a scrappage rate of about 11 per cent. The DOE based rate is higher because the aggregates on

Table 2.5: *Goods vehicle ownership rates by County 1971 and 1981*

County	*Goods vehicles per 10,000 population*		
	1981	*1971*	*% Change in rate*
Monaghan	242	169	43.2
Cork	230	166	38.6
Carlow	225	174	29.3
Louth	224	176	27.3
Waterford	221	173	27.7
Dublin	218	188	16.0
Kilkenny	214	132	62.1
Laois	214	160	33.8
Kildare	189	131	44.3
Tipperary N.R.	189	129	46.5
Limerick	188	125	50.4
Westmeath	185	119	55.5
Wexford	185	130	42.3
Tipperary S.R.	177	135	31.1
Sligo	176	116	51.7
Cavan	175	118	48.3
Wicklow	173	145	19.3
Meath	167	121	38.0
Donegal	165	141	17.0
Kerry	152	105	44.8
Longford	150	128	17.2
Clare	149	87	71.3
Roscommon	148	115	28.7
Offaly	146	115	27.0
Mayo	141	108	30.6
Galway	139	103	35.0
Leitrim	134	99	35.4
Overall	195	149	30.9

Source: DOE Annual Census.

which the scrappage calculations are based are lower, since they exclude vehicles which are untaxed at Census date.

Both sets of figures also show great variation in the annual scrappage figures. These variations arise to a large extent from the difficulties with the annual data

which have already been described. These difficulties affect both data sets and make the use of more refined analytic techniques for examining the age structure of the fleet and the flows onto and off the register of limited value.

Goods Vehicle Ownership by County

Table 2.5 below presents data for 1971 and 1981 on rates of goods vehicle ownership by county — ranked from highest to lowest values in 1981.

It is first apparent that there is a great deal of variation in the rate of goods vehicle ownership. The highest county, Monaghan, in 1981 has a rate which is 80 per cent higher than the lowest, Leitrim. In 1971 a similar situation obtained with Dublin having a level which was 116 per cent higher than the lowest county, Clare.

Apart from the genuine differences in goods ownership rates which the table displays there are reasons for treating the data very cautiously. One is that the area of registration of the vehicle and its area of use may not be the same. Another is that the measure chosen (vehicles per person) is not a very useful indicator on its own, and the size structure of the fleet and the profile of the working population should be also considered. The table is presented largely to emphasise the overall increase in goods vehicle ownership per person and to show the wide diversity in rates that exists within the country. It should be remembered, too, that the data used are the DOE Census data which understate the true figures. Both growth rates and the numbers of goods vehicles per person are therefore likely to be understated in these figures.

Summary

This chapter has presented several disparate pieces of information on the goods vehicle fleet. Statistical difficulties with the number of goods vehicles in use are discussed and new series for vehicle numbers and capacity are developed. It is suggested that more information could be made available by the Department of the Environment which would help clarify the issue. Data on the age structure of the fleet show a fleet which has large proportions of very new and very old vehicles. Information on scrappage rates indicates that between one-ninth and one-seventh of the vehicle fleet is scrapped each year, depending on which data source is used for the annual vehicle stock figure. Finally, goods vehicle ownership rates are shown to vary widely between counties and to have changed in different ways over time.

Chapter 3

VEHICLE FLEET: PERFORMANCE

Introduction

In the next two chapters measures of the goods vehicle fleet's performance are presented. This chapter concentrates on aggregate activity measures for the entire fleet, while the next goes into more detail on some aspects of activity. The base data for the information in these sections are those from the CSO Road Freight Surveys of 1964 and 1980.

The surveys cover all vehicles registered as goods vehicles with DOE, from the smallest service van up to the largest articulated vehicle, though Government vehicles (e.g., the Post Office fleet) are a significant exclusion.[8] The surveys include work done by Irish vehicles abroad but exclude work done by foreign hauliers in Ireland.

Because of the statistical difficulty with the number of goods vehicles, referred to in the previous section, there is a possiblity that the magnitude of the changes shown here overstates slightly the true changes.

Work Done by Goods Vehicles

Table 3.1 below presents the principal developments in aggregate road freight activity between 1964 and 1980.

Table 3.1: *Road freight activity, 1964 and 1980*

	Vehicle Fleet		*Vehicle Fleet Performance*			
Year	*Number (000)*	*Capacity (000 tons)*	*Tonnes*	*Kms (millions)*	*TKms*	*Loaded journeys*
1964	46.2	120.0	55.5	670.4	1,714.6	14.7
1980	82.4	456.1	102.5	1,253.0	5.010.5	16.6
% Increase	78.4	280.1	84.7	86.9	192.2	12.9
Average % increase	3.7	8.7	3.9	4.0	6.9	0.8

Source: CSO, RFS 1964, 1980.

[8]This situation changed in 1984, with the licensing, for the first time, of the vehicles of An Post and Bord Telecom, the newly created semi-state companies dealing with postal and telecommunications services.

The important development in connection with the vehicle fleet has been the more rapid increase in capacity than in numbers, indicating the generally increased size of vehicles.

On the performance side, tonnes lifted and distance travelled have increased by approximately the same amount, in line with the increase in number of vehicles. The "work done" measure increased relatively more than the distance or weight measure because average load and average length of haul increased. This is borne out by the fact that the number of loaded journeys increased by only 13 per cent. The increases shown compare with a growth of 93 per cent in real GDP, 132 per cent in industrial production and 201 per cent in the real value of imports. It can be seen therefore that there is no obvious relationship between the economic variables and the range of aggregate measures shown for road freight transport. This, of course, is not particularly surprising in view of the diverse nature of transport work and the fact that transport data are available for only two years.

From the information in Table 3.1, indications of vehicle performance may be derived. However, it is useful and interesting to first expand the basic introductory data in Table 3.1 somewhat and introduce a classification by size of vehicle. This is because the effects of the very strong move towards heavy vehicles may be hidden in aggregate data. Tables 3.2A and 3.2B present slightly different aspects of the same information. Table 3.2A gives the levels of activity in 1964 and 1980 and shows the changes during the period. Table 3.2B gives the percentage distribution in each category for both years.

Looking first at the number of vehicles, we see that the numbers have increased in all categories but most strongly in the heaviest category where there has been a more than 10-fold increase, so that where vehicles in excess of 5 tons unladen weight comprised 4 per cent of the fleet in 1964 they now make up 23 per cent.

Turning to the three performance measures, tonnes lifted, kilometres travelled and tonne kilometres worked it can be seen that they display similar patterns. For tonnes carried, small and medium size vehicles are now doing less work in aggregate than they did in 1964, with a very large decline of 66 per cent for the medium size vehicles. The consequence of this is that the medium size vehicles now have only 12 per cent of a market they held 65 per cent of in 1964. Kilometres travelled overall increased by about the same amount as tonnes lifted but the pattern in the vehicle size classes was somewhat different. The smallest and largest vehicles now travel further while the medium size ones travel a quarter less. In terms of shares of total distances travelled, the largest vehicles undertake almost half the total distance travelled. The tonne kilometre measure, which is most often used as the best indicator of work done, shows the impact of the heaviest vehicles most strikingly. Work undertaken has increased

Table 3.2A: *Performance measures for goods vehicles in different weight categories 1964 and 1980*

Unladen weight (tonnes or tons)	*Vehicles* 1964	1980	% change	*Tonnes* 1964	1980	% change	*Kilometres* 1964	1980	% change	*Tonne Kilometres* 1964	1980	% change
	(000)			millions			millions			millions		
<3	36.2	52.3	44.6	8.4	6.5	-22.6	337.3	469.1	39.1	224.3	235.6	5.0
3-5	8.2	11.1	34.5	36.0	12.2	-66.1	255.2	195.5	-23.4	1,007.8	411.7	-59.1
⩾5	1.8	19.0	979.5	11.0	83.8	661.8	77.9	588.4	655.3	482.5	4,363.2	804.3
Total	46.2	82.4	78.5	55.5	102.5	84.7	670.4	1,253.0	86.9	1,714.6	5,015.5	192.2

Table 3.2B: *Percentage distribution of vehicles and work of vehicles by unladen weight class 1964 and 1980*

Unladen weight	*Vehicles*		*Tonnes*		*Kilometres*		*Tonne Kilometres*	
	1964	1980	1964	1980	1964	1980	1964	1980
<3	78.3	63.5	15.1	6.3	50.3	37.4	13.1	4.7
3-5	17.9	13.5	64.9	11.9	38.1	15.6	58.8	8.2
⩾5	3.8	23.1	19.8	81.8	11.6	47.0	28.1	87.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: CSO, RFS 1964, 1980.

nine-fold while it has only increased slightly for the smallest vehicles and declined dramatically for the medium sizes ones. Because of this the heaviest goods vehicles undertake 87 per cent of tonne kilometres performed and are thus almost totally dominant when this measure is used.

The decline in work done by the medium sized vehicle must indicate a substantial change of use: away from the carriage of the heaviest types of materials towards more short haul distribution type work.

Performance per Vehicle

There is a thread running through the above figures that is better brought out in a separate table showing individual vehicle performance measures and how they have changed.

Table 3.3 below presents information on several performance characteristics of the goods vehicle fleet.

The first five measures look at performance characteristics of the vehicles. The first three, kilometres and tonne kilometres per vehicle show similar results. These are declining in all vehicle size categories and show a slight improvement overall for the weight and distance measures and a significant one for the work measure.

Before commenting on this it is perhaps worthwhile to point out why all sub-categories can show declines in average performance though overall average performance can increase. This occurs because of the differences in performance between categories and changes in the mix of vehicles in the categories over time. Thus, for example, the tonnes per vehicle measure is down in all categoriés, but in 1980 there are a great many more vehicles in the larger size categories which themselves lift many more tonnes than those in the lower categories. This raises the overall average though average performance in each category disimproves.

Thus, it can be seen that in each category vehicles are carrying less, travelling less and doing less work. The medium sized vehicles have shown the sharpest declines carrying only a quarter of the tonnage per vehicle compared with 1964.

All vehicles are undertaking fewer loaded journeys, the drop for all vehicles being about ⅓ from 318 to 203 journeys per year. The decline is highest for the medium sized vehicles but is over 40 per cent for all categories. One partial cause is that journeys are no longer as can be seen from the measure Kms/Loaded journeys. There was an average increase of 63 per cent in the total distance associated with each loaded journey. This can easily have a disproportionate effect on the number of journeys that can be undertaken in any one day, because of fixed finishing times or limits on overtime. No part of the decline in the number of loaded journeys is explained by a fall in the amount of weekend work which hardly changed between 1964 and 1980 from 7.0 to 6.2 per cent of total work.

Table 3.3: *Vehicle performance measures, 1964 and 1980*

Performance Measure	*Vehicle size (tonnes or tons)* <3	3-5	5 and over	*All vehicles*
Tonnes/Vehicle				
1964	232	4,364	6,250	1,211
1980	124	1,099	4,410	1,244
% change	-47	-75	-29	+3
Kms/Vehicle				
1964	9,325	30,933	44,261	14,517
1980	8,969	17,613	30,968	15,206
% change	-4	-43	-30	+5
TKms/Vehicle (000)				
1964	6.2	122.2	274.1	37.1
1980	4.5	37.1	229.6	60.8
% change	-27	-70	-16	+64
Loaded Journeys/Vehicle				
1964	241	606	568	318
1980	141	243	342	203
% change	-41	-60	-40	-36
Capacity/Vehicle				
1964	1.1	6.1	11.4	2.4
1980	1.3	6.9	16.7	5.6
% change	+18	+13	+46	+133
Tonnes/Loaded Journeys				
1964	1.0	7.2	11.0	3.8
1980	0.9	4.5	12.9	6.1
% change	-10	-37	+17	+61
Kms/Loaded Journeys				
1964	39	51	78	46
1980	63	72	91	75
% change	+62	+41	+17	+63
Load/Capacity*				
1964	91	118	96	158
1980	69	65	77	109
% change	-24	-45	-20	-31

*Defined as Tonnes/Loaded Journey divided by capacity per vehicle shown as a percentage.

The conclusion that all vehicle categories are doing less work, however it is measured, than they did in 1964, has some interesting implications. For one crude indication, suppose that the vehicles in each size category did the same average number of tonne kilometres in 1980 as they did in 1964. The fleet size required to carry out the 1980 workload would have been 57,000 instead of the 82,000 actually used. The capital cost of these extra vehicles could be of the order of £250m. While this is a very rough approximation and excludes factors like increased length of haul, increased loads and possibly increased numbers of drops in multidrop situations as well as changes in labour practices, it does give some idea of the way the fleet is being used. Increased congestion on the roads is clearly the most important factor here. Between 1964 and 1980 the number of cars almost trebled from 254 thousand to 734 thousand. Larger lorries have serious traffic interference characteristics, slowing down movement for themselves and all other traffic. Loading and unloading in urban areas is a major cause of congestion, and increases with the size of the vehicle.

One measure that has increased for all vehicle size categories is the capacity per vehicle with a more than doubling of average capacity per vehicle over the period. How available capacity is being used can be seen in the Load/Capacity measure. This measure is fairly crude and the absolute levels, especially in 1964, show capacity utilisation near or over 100 per cent. This could be interpreted as a tendency to overload or might be an indication of the lack of reliability of the capacity measures for individual vehicle sizes. However, when one considers the changes between 1964 and 1980, it is striking that there are significant reductions in capacity utilisation in all vehicle size categories. This may imply that the cost of extra capacity to hauliers is worthwhile because of the occasions when that capacity is fully utilised, or may indicate that there is excess capacity as a result of over optimistic expectations. One of the difficulties with measures purporting to describe how capacity is used is that they take no account of volume constraints. A full load of lightweight materials could use all the available capacity but could have a low Load/Capacity ratio. This implies that further work is required on the topic before it could definitively be asserted that available capacity is being used less efficiently than in 1964, though the evidence presented here makes this seem likely.

Chapter 4

ROAD FREIGHT TRANSPORT: FURTHER DETAILS

This chapter presents and analyses information on several topics in road freight transport. The topics examined include the type of work undertaken, the pattern of goods distribution, the length of haul, commodities carried and a discussion on empty running and how it might be reduced.

Type of Work

A classification of cehicles to their main type of work is presented in Table 4.1 using both tonnes and tonne kilometres as well as an average distance measure, obtained by dividing tonne-kilometres by tonnes.

The table shows that when work is measured in tonne kilometres the most important activities are the delivery of goods to retail outlets, the delivery of goods to building sites and import/export work which between them account for 60 per cent of total work performed. When the tonnes measure is used the delivery of goods to building sites is responsible for over a third of total tonnage moved.

Looking at the final column, that showing the average length of haul, it is not surprising that Import/Export work shows a distinctly higher figure than any of the other categories. The wholesale distribution sector also has a long average haul of 96kms per loaded journey. At the other end of the scale the heavy building work has a relatively short haul of 25kms.

To make comparisons with 1964 it is necessary to amalgamate some of the groupings in Table 4.1. Table 4.2 below presents the information. Precise comparisons are not possible principally because of the inclusion in 1980 and the exclusion in 1964 of the Import/Export category. This has been dealt with by combining the categories Other Work and Import/Export, a procedure which is not entirely satisfactory but will suffice for the purposes of the table.

The table also uses three indicators of transport activity undertaken — tonnes moved, tonne kilometres performed and an estimated average length of loaded haul.

Looking first at tonnes moved, where there was an overall increase between 1964 and 1980 of 85 per cent, it can be seen that the largest increases occurred in the agricultural sector. The carriage of goods to and from farms increased by about 225 per cent, reflecting the greatly increased agricultural output during the period. Distribution work (retail and wholesale delivery) almost doubled, reflecting increased population and income. Materials transported to and from factories also increased significantly mirroring major increases in manufacturing output. Tonnages moved to and from building sites increased more slowly than other kinds of work, due partly perhaps to the relatively declining importance of

Table 4.1: *Transport activity classified by main type of work of vehicle, 1980*

Main type of work	*Tonne-kms (m)*	*(%)*	*Tonnes carried (%)*	*(kms)*	*Average length of haul†*
Import/Export Work*	867.6	(17.3)	(6.2)	136	
Carriage of:					
Livestock	83.5	(1.7)	1.6	(1.5)	52
Other Farm Produce from Farms	346.1	(6.9)	8.8	(8.6)	39
Fertilisers, Feeding Stuffs etc. to Farms	273.1	(5.5)	5.7	(5.6)	48
Delivery of:					
Goods to Road Works or Building Site	946.7	(18.9)	37.7	(36.8)	25
Goods to Retail Outlets	1,177.7	(23.5)	18.5	(18.1)	64
Goods to Wholesalers	471.2	(9.4)	4.9	(4.8)	96
Materials and Fuels to Factories	355.5	(7.1)	6.8	(6.6)	52
Goods to Households	126.5	(2.5)	4.2	(4.1)	30
Other Work and Unknown	362.7	(7.2)	7.9	(7.7)	46
Total	5,010.5	(100.0)	102.5	(100.0)	49

*Includes work done to and from ports as well as roll-on/roll-off and cross-border traffic.
†Obtained by dividing tonne-kms by tonnes carried.

that sector and also perhaps to the effects of recession in the industry.

The tonne kilometre measure indicates slightly different patterns of increase with the carriage of goods to and from farms, distribution work and materials to factories showing the largest increases. The greater the increases in work done, relative to tonnes lifted, the greater the increased length of haul. This is seen for the materials to and from building sites with an increase (from a low base) of over 50 per cent in average length of haul. All types of work, with the exception of the carriage of livestock and goods from farms showed increased haul lengths.

The reasons for this vary for each sector but a similar overall trend is evident in Great Britain where average length of haul increased by about 30 per cent between 1970 and 1980 (Department of Transport UK 1983). More detailed work on this topic is presented later in the chapter.

Length of Haul, Regional Aspects

Table 4.3 below provides information on length of haul for 1964 and 1980. It is presented in terms of the cumulative number and percentage of tonnes being

Table 4.2: *Goods moved 1964 and 1980 by main types of work*

	Tonnes			*Tonne-kms*			*Length of haul**		
	1964	*1980*	*%*	*1964*	*1980*	*%*	*1964*	*1980*	*%*
	(Millions)		*Change*	*(Millions)*		*Change*	*(kms)*		*Change*
Materials to and from Building Sites	26.7	37.7	+41	426.2	946.7	+122	16	25	+56
Materials and Fuels to Factories	3.9	6.8	+74	153.7	355.5	+131	39	52	+33
Carriage of Livestock	1.2	1.6	+33	81.0	83.5	+3	67	52	-22
Carriage of Goods from Farm	2.7	8.8	+226	104.6	346.1	+231	39	39	—
Carriage of Goods to Farms	2.7	5.7	+111	97.5	273.1	+180	36	48	+33
Distribution Work	14.2	27.6	+94	720.0	1,775.4	+147	51	64	+25
Import/Export	4.0	6.4	+258	131.4	867.6	+836.3	33	86	+161
Other Work		7.9			362.7				
Total	55.5	102.5	+85	1,714.5	5,010.5	+192	31	49	+58

*Obtained by dividing tonne kms by tonnes.

moved distances no longer than the upper limit of each group.

Table 4.3: *Cumulative number and percentage of tonnes carried by length of haul 1964 and 1980*

	Length of Haul				
Cumulative Totals	*Less than 10 kms*	*Less than 50 kms*	*Less than 150 kms*	*Less than 500 kms*	*Total*
1964 (m. tonnes)	21.1	45.3	53.9	55.5	55.5
%	38.0	81.6	97.1	100.0	100.0
1980 (m. tonnes)	25.3	75.6	95.5	102.2	102.5
%	24.7	73.8	93.2	99.7	100.0

Source: Geoghegan and Brady (1983)

The proportion of tonnage moving less than 10 kms has declined to 25 per cent though the absolute amount has increased somewhat. The principal change occurred in the 10-49 km category where tonnage doubled in absolute terms and was responsible for half the tonnes moved in 1980.

It can be seen that relatively small amounts of freight move long distances — only 6.8 per cent of tonnes travel over 150 kms (about 93 miles), though this proportion has more than doubled since 1964. As has been discussed this increase in haul length is partially but not entirely due to international road freight transport.

Somewhat similar information can be presented showing inter- and intra-regional movements. Table 4.4 below presents data on the flows into and out of each planning region in 1980 and shows the proportion of total traffic terminating in the region of origin.

It can be seen from the final column that high proportions of freight originate and terminate in the same region. The highest figure is for the South West (which also showed a similar trait in 1964). The lowest is for the Midlands, though it is still high at 71 per cent. The net flow column shows that, overall, there is little evidence of imbalance in the total flows in and out of the regions with net flows accounting for quite small proportions of the total movements.

Analysis by Length of Haul

The average length of haul has increased significantly between the two Road Freight Surveys. Using tonne kms divided by tonnes as an average distance measure, length of loaded haul increased by 58 per cent from 31 kms in 1964 to

Table 4.4: *Regional data on freight transport 1980*

Planning region	*Originating tonnage*	*Terminating tonnage*	*Net flow (-=outward)*	*Origin and destination in region*	*% of originating traffic terminating in the region*
		millions of tonnes			
East	29.1	27.3	-1.9	22.7	78.0
South East	14.3	14.5	+ .2	10.8	75.5
South West	22.3	22.7	+ .4	20.0	89.7
Mid West	9.4	9.7	+ .3	7.5	79.8
West	7.0	7.5	+ .5	6.0	85.7
North West/Donegal	4.5	4.6	+ .1	3.8	84.4
North East	7.8	7.4	- .4	5.6	71.8
Midlands	7.5	7.9	+ .4	5.3	70.7
Total	101.9	101.6	- .3		

Source: RFS (1980), CSO.

49 kms in 1980.[9] It is useful to examine changes in length of haul in more detail to see whether any underlying trends or tendencies emerge.

The questions that may be asked are of the following kind:

1. Did changes in the vehicle fleet result in changes in the length of haul of vehicles, in particular unladen weight classes or did all vehicle types travel further?
2. Has length of haul changed because of changes in the tonnes lifted in each sector (industry, transport and other) or has it increased for each sector?
3. Were journey lengths longer for all types of work (using the classification in Table 4.1), or was the increase in average length due more to a change in the mix of journeys in each category?
4. Did length of haul change because the mix of types of journey changed or were goods carried further on all types of journey? In this context type of journey can be taken as either end to end or split delivery and collection journeys.

The method of analysis is the same for all four questions, and follows that of Cundill and Shane (1980).

The overall change in length of haul (ΔH) can be broken into three components and written as

$$\Delta H = \sum_{i=1}^{N} p_i^o \, \Delta h_i + \sum_{i=1}^{N} \Delta p_i h_i^o + \sum_{i=1}^{N} \Delta p_i \, \Delta h_i \qquad (1)$$

where

p_i^o = proportion of tonnes carried in category i in 1964.
h_i^o = length of haul in category i in 1964.
Δp_i = change in proportion of tonnes lifted in category i between 1964 and 1980.
Δh_i = change in length of haul (tonne kms/tonne) in category i between 1964 and 1980.

The summations are carried out separately over the different unladen weight, type of owner, type of work and type of journey categories.

The term $\Sigma_{i=1}^{N} p_i^o \, \Delta h_i$ indicates the share of the change in the overall average haul made up by changes in haul length in the categories being examined. A high value indicates that length of haul is increasing for most categories.

A high value for the term $\Sigma_{i=1}^{N} \Delta p_i \, h_i^o$ indicates that the increase in trip length is due primarily to increases in the proportions of trips with long haul lengths.

A high value for the term $\Sigma_{i=1}^{N} \Delta p_i \, \Delta h_i$ would indicate changes in the proportion of trips in particular classes and a simultaneous change in the length of trips in these classes.

[9]It is worth noting that the exclusion of international journeys from the 1980 data gives an average increase of only 12 km or 30 per cent per trip.

These calculations provide the data for the following table.

Table 4.5: *Composition of changes in length of haul 1964–1980*

Analysis by	*No. of Categories*	*Component* $\Sigma\ p_i^o\ \Delta h_i$	$\Sigma\ h_i^o \Delta p_i$	$\Sigma\ \Delta h_i^o\ \Delta p_i^o$	*Total* ΔH
Unladen weight	3	6.8	9.9	1.3	18.0
Type of owner	3	16.2	0.6	1.2	18.0
Type of work	7	9.8	2.2	0.1	12.0*
Type of journey	2	17.9	0.1	0.1	18.0

*Excludes international journeys. Figures may not add due to rounding.

The first line of the table indicates that changes in the vehicle mix were more dominant in explaining the increased average length of haul than changes in the length of haul in the different vehicle size categories, though both had a significant effect.

The second line, the analysis by type of owner, indicates that changes in length of haul in the individual owner type categories contributed almost all the increased length of average haul. Changes in the tonnage mix contributed hardly at all to the increased length of haul.

The analysis by type of work, which excludes international journeys from the 1980 data, leads to the conclusion that the greater share of the increase in length of haul has come about because of changes in haul lengths in all categories rather than due to changes in the mix of types of work.

Finally, the fourth line of the table indicates that when type of journey is being considered (end to end or split delivery and collection) the overall change in length of haul has come about entirely because of changes in the haul lengths in the two categories and not at all because of changes in the proportions carried on end to end or split delivery and collection journeys.

The principal general conclusion from this type of analysis is that haul length changes in the individual categories examined explain almost all the change in overall haul length. The only exception is where the changes in the proportions of total tonnage carried on the heavier vehicles (those over 5 tonnes), are more dominant in explaining the increase in overall haul length than the separate increases in each vehicle size category.

Commodities Carried

Table 4.6 and 4.6A show commodities carried in national road transport in EEC countries in1980, giving both the total tonnes lifted and the percentage distribution.

Table 4.6A: *Commodities carried: national transport in EEC countries 1980*

	Group of goods (NST chapters)									
	Agricultural products live animals	*Foodstuffs animal fodder*	*Solid mineral fuels*	*Petroleum products*	*Ores and metal waste*	*Metal products*	*Building materials*	*Fertilisers*	*Chemical products and paper and pulp*	*Transport equipment Glass textiles, other*	*Total*
					million tonnes						
Germany	93	186	45	143	14	53	1,495	8	186	266	2,490
France	125	152	13	84	22	24	731	35	27	142	1,356
Netherlands	34	67	1	20	2	6	145	5	23	48	351
Belgium	19	35	7	17	3	8	175	9	9	27	311
Luxembourg	—	1	—	1	—	—	13	—	—	1	17
UK	105	198	70	75	16	52	463	14	51	328	1,372
Ireland	9	22	3	6	—	1	41	4	2	14	101
Denmark	23	36	—	14	2	2	74	5	7	25	188

Table 4.6A: *Commodities carried national transport in EEC countries; % distribution 1980*

	Group of goods (% Distribution)										
	Agricultural products live animals	*Foodstuffs animal fodder*	*Solid mineral fuels*	*Petroleum products*	*Ores and metal waste*	*Metal products*	*Building materials*	*Fertilisers*	*Chemical products and paper and pulp*	*Transport equipment Glass textiles, other*	*Total*
					million tonnes						
Germany	3.8	7.5	1.8	5.8	0.6	2.1	60.0	0.3	7.5	10.7	100.0
France	9.2	11.2	1.0	6.2	1.6	1.8	53.9	2.6	2.0	10.5	100.0
Netherlands	9.7	19.1	0.4	5.8	0.5	1.8	41.4	1.4	6.4	13.6	100.0
Belgium	6.3	11.4	2.4	5.5	1.1	2.5	56.3	2.9	2.9	8.7	100.0
Luxembourg	2.1	5.9	1.1	5.1	1.5	1.0	77.9	0.6	0.5	4.3	100.0
UK	7.7	14.4	5.1	5.5	1.1	3.8	33.7	1.0	3.7	23.9	100.0
Ireland	8.5	21.8	2.7	5.9	0.8	0.7	40.9	3.5	2.2	13.5	100.0
Denmark	12.4	19.4	0.2	7.3	1.0	1.0	39.3	2.4	3.6	13.3	100.0

Source: Eurostat (1982).

The most important category in all countries is building materials with, for example, 60 per cent of all internal road freight transport in Germany being of this kind. This work is mostly short haul as can be seen by looking at the tonne kilometre measures, when the above proportion drops in Germany to 30 per cent, and similarly in other countries. Foodstuffs account for a relatively high proportion of total tonnes lifted in most countries, especially so in Ireland.

There are some doubts about the comparability of the classification which prevent more in-depth analysis. It must also be remembered that the data relate solely to the road mode, which though dominant in Ireland is far less so in other European countries.

Empty Running

Table 4.7 presents data on the amount of empty running by the goods vehicle fleet.

Table 4.7: *Total distance travelled and proportion of empty running, 1964 and 1980 by business of owner*

	Total distance travelled (millions kms)		*Empty running (%)*	
Business of owner	1964	1980	1964	1980
Agriculture	52.7	78.4	35.0	47.1
Industry	238.1	483.3	28.9	33.9
Building and Construction	24.6	43.8	43.2	41.3
Distribution	215.5	326.1	26.9	33.9
Other	72.2	124.3	53.7	37.2
Subtotal (own account*)	603.1	1055.9	30.4	35.6
Licensed hauliers	67.2	197.2	39.9	34.6
Total	670.3	1253.0	31.3	35.4

*1964 Definition: includes unlicensed hauliers.
Source: CSO, RFS 1964, 1980.

It can be seen that empty running accounts for over a third of the total distance travelled and that this proportion has increased by over 4 percentage points since 1964. In this sense vehicles are being used less efficiently. Obviously a certain amount of empty running is unavoidable, but the amounts are very high in some sectors — for example, the Agriculture and Building and Construc-

tion sectors have empty running rates in excess of 40 per cent. The nature of the work would largely explain this with loaded trips to a farm or a building site unlikely to result in a backload. There has been a significant increase in empty running from 27 per cent to 34 per cent in the distribution sector which may reflect more dispersed patterns of distribution.

When comparisons are made between licensed hauliers and others it can be seen that licensed hauliers have reduced empty running by over 5 percentage points and the others have increased by about 6 percentage points. Licensed hauliers now have a slightly lower rate of empty running than other operators. This is what would be expected in view of the legislative ban on backloading for reward by own account operators. What is perhaps surprising is how little the two sectors differ.

Turning to vehicle size, Table 4.8 looks at empty running for different classes of vehicle.

Table 4.8: *Empty running by size of vehicle*

Unladen weight (tonnes)	*Empty as percentage of total*
<3	31.0
3-5	34.9
5-10	39.8
10+	38.3
Overall	35.4

It can be seen that empty running increases with size of vehicle up to 10 tonnes' unladen weight. Many vehicles in the 5-10 tonnes category operate in the sectors with the highest rates so that the amounts of empty running are linked to their kind of work.

Empty running is one element in any study of utilisation of capacity. Underutilisation of available capacity has already been commented on in chapter 3. Obviously, empty running is the extreme form of capacity underutilisation.

Reducing Empty Running

Cundill and Hull (1979) present analyses of empty running in the UK. Their model suggests that far more loaded return journeys could be undertaken profitably. This would result in a small but worthwhile reduction in total transport costs. The research indicated that those in the industry felt that the reasons for excess empty running were that there was an inadequate information exchange

about loads and that some operators were unwilling to carry return loads, even though it would be profitable.

On the first of these two reasons, the evidence from the continuing Road Freight Survey in Britain indicates that operators whose base is in a town will have higher load factors out of their base area than out of other towns. This is not surprising as it is difficult for operators to make enquiries about consignments in areas remote from their base. It is also understandable that consignors first contact local hauliers. The solution to the problem of poor information flow is easiest for regular loads because once the information is available to hauliers no more need be done. Irregular flows might be handled by some type of clearing house arrangement. At present many potential matches must be lost because of inadequate information.

The second reason that operators are unwilling to carry return loads despite the financial gains, is due to the risks and problems inherent in obtaining a return load — such as the disruption of existing schedules caused by unknown loading and unloading times. For the consignor, the problems can include those of dealing with an unknown haulier, uncertainty over service quality and an insufficiently low rate to compensate for the extra risks. These uncertainties largely arise from the poor quality of the "clearing house" arrangements.

The study concludes that "the difficulties associated with return loading could be eliminated by an improved information system which ensured that all available loads and vehicles were matched" once this was allied to guarantees to the operator on loading times and rates, and to the consignor on service levels.

This discussion is relevant in an Irish setting. As an illustration the table below shows the pattern of road goods' movements between Cork and Dublin in 1980.

Table 4.9: *Tonnes lifted and journeys made between Cork and Dublin 1980*

		Journeys (000)		
Movement	*Tonnes lifted (000)*	*Loaded*	*Empty*	*Total*
Dublin-Cork	353	38	9	47
Cork-Dublin	236	27	15	42
Total	589	65	24	89

Source: CSO.

Because of sampling constraints it is likely that the errors associated with these aggregates are quite high. However, they can be taken at face value for the present.

First, the greater tonnage moved in the Cork direction necessitates some underutilisation of capacity on the return leg to Dublin. This is shown by the fact that 36 per cent (15 out of 42) of Cork–Dublin trips are empty compared with only 19 per cent (9 out of 47) of Dublin–Cork trips. However, in all, 27 per cent of trips between the two cities are empty with 9,000 from Dublin to Cork and 15,000 from Cork to Dublin. Without further details on types of vehicle and on loads as well as data on timing, it is impossible to say what proportion of loads could have been matched with return loads. It is likely, however, that there is considerable scope for improving matching of loads to return loads. The table and discussion merely point to the possibility of improved vehicle utilisation. More detailed studies in the cities themselves would allow a more precise indication of the extent of spare capacity.

Summary

This chapter has presented an overview of some relevant aspects of the road freight transport market in Ireland. The main findings in the tables and accompanying text centre on details of the kind of work being done, its regional distribution and on length of haul and empty running.

Building and Construction related work, retail distribution and import/export work are now the principal sectors of the road freight transport industry. The greatest changes have been in international work, which was virtually non-existent in 1964 and in the generally increased length of loaded haul on all types of work.

Nevertheless, a very large share of total tonnage moved is on journeys within the same Planning Region. The analysis by length of haul indicates that, except for the largest vehicles carrying a greater proportion of total tonnage, the explanation for increased overall haul length lies in increases in all categories examined rather than in changes in the share of total tonnages carried in different categories.

The information presented also shows an increasing tendency for goods' vehicles to travel empty; in this connection the trends in the Transport and Own Account sectors are different, with the transport sector reducing and the Own Account sector increasing its empty running. It is suggested that there is scope for reducing the amount of empty running through the availability of better information about loads.

Chapter 5

TAXATION OF GOODS VEHICLES

Introduction

This section focuses on the taxation of goods' vehicles. The various forms of taxation to which vehicle owners are subject are set out and reviewed. An attempt is made to define a system of vehicle use taxation which would cover the road costs imposed. The implications of such a system on present vehicle taxation are spelled out. Possibilities of including charges for environmental damage in the taxation system are also examined. Mention is made of the proposed EEC directive on vehicle taxation and the enforcement of existing taxation regulations is briefly discussed.

Taxation System: Elements

The owners of goods vehicles contribute to taxation in a number of ways. Ownership taxes consist of VAT (at 23%) and excise duty.[10] Taxation on use consists of annual vehicle taxation (formerly Road Fund Tax), and excise duty on fuel. The taxation yield in 1980 from excise duty on the purchase of vehicles was £7.6m, and from annual vehicle taxation was £8.3m. The yield from fuel taxes is less certain and is estimated by Feeney (1980) to be £57m while data from the 1980 RFS indicate a figure of about £27m.

This chapter is concerned principally with taxation on the use of vehicles and the two principal taxes involved are briefly reviewed.

Vehicle Taxation

The annual taxation of goods vehicles is based on the unladen weight of the vehicle and not, as in some countries and as proposed in an EEC directive, on the Gross Vehicle Weight. The method of charging is roughly linear in unladen weight and the levels set in 1952 were revised only in 1973 and again in 1983.

Table 5.1 shows the tax rates since 1952 by unladen weight class, and they are also illustrated in Figure 5.1 in both nominal and real 1952 values.

It is interesting to note that in 1973, rates were increased for unladen weights up to about 8 tons and were decreased above that. For an unladen weight of 11 tons the decrease was of the order of £250 per annum. It is also noteworthy that the 1983 rates, though higher than the 1973 ones are still below the rates struck in 1952 for unladen weights in excess of about 9 tons. In real terms, road tax for goods vehicles has declined dramatically over the period as can be clearly seen

[10]Excise duty is levied at a rate of 11½ per cent of the chargeable value of new vehicles and at a rate of 25 per cent on spare parts. Moreover, new goods vehicles imported from Third Countries attract an import duty ranging from 11 per cent (light vehicles) to 22 per cent (heavy vehicles).

Table 5.1: *Road vehicle taxation 1952–1983 by unladen weight*

Unladen weight	*Actual taxation*			*Taxation in real terms (1952 values)*			*Unladen weight*
	1952	*1973*	*1983*	*1952*	*1973*	*1983*	
	£						
Below 12 cwt.	15	25	28	15	10	3	<12 cwt.
12–16 cwt.	20	31	34	20	12	3	12–16 cwt.
16–20 cwt.	24	37	41	24	14	4	16–20 cwt.
1 ton–2 tons	30 + 4 per quarter	37 + 6 per quarter	41 + 7 per quarter	30	14	4	1–2 tons
2–3 tons	46 + 6 ,,	61 + 8 ,,	69 + 8 ,,	46	24	6	2–3 tons
3–4 tons	70 + 8 ,,	93 + 8 ,,	101 + 10 ,,	70	36	9	3–4 tons
4–5 tons	102 + 10 ,,	125 + 10 ,,	141 + 10 ,,	102	48	13	4–5 tons
5–6 tons	145 + 15 ,,	165 + 15 ,,	181 + 17 ,,	145	64	16	5–6 tons
6–7 tons	205 + 20 ,,	225 + 20 ,,	249 + 22 ,,	205	87	23	6–7 tons
7–8 tons	285 + 25 ,,	305 + 20 ,,	337 + 22 ,,	285	118	31	7–8 tons
8–9 tons	385 + 30 ,,	385 + 20 ,,	425 + 22 ,,	385	149	39	8–9 tons
Over 9 tons	505 + 50 ,,	465 + 20 ,,	513 + 20 ,,	505	180	47	Over 9 tons

Source: DOE.

from the second half of Table 5.1 and from Figure 5.1. If the 1952 rate of £505 were applied to vehicles of 9 tons the 1983 taxation would be in excess of £5,500. It should be pointed out that the 1952 rates were very severe and the changes introduced in 1973 brought vehicle taxation into line with the system in the UK. However the increases in 1983 only succeeded in bringing real taxation rates on heavy vehicles up to less than a third of the rates in 1973.

Fuel Taxes

Taxes on fuel consist of excise duty on both diesel and petrol. Almost all large goods vehicles use diesel while a significant share of the smaller ones use petrol. Diesel fuel taxes in total in 1980 yielded about £29m, but a share of this was in respect of diesel cars, private bus hire and other bus services not entitled to rebates. However, it is not possible precisely to quantify this share. The evidence from the RFS indicates a figure of about £22m in diesel fuel taxation from goods vehicles but this may be a little low since goods vehicles are responsible for the greater share of diesel consumption. Most of the difference between the Feeney (1980) estimate of £57m and the RFS derived estimate of £27m arises from petrol excise, due to the discrepancy between RFS and AFF estimates for travel by small goods vehicles.

Diesel fuel taxes have increased rapidly in recent years, as Table 5.2 demonstrates.

Table 5.2: *Excise rates on diesel 1959–1983*

Date	*Excise rate pence/gallon*	*Index April 1959 = 100*	*Index in real terms*
April 1959	10.8	100	100
April 1964	12.0	111	95
May 1965	13.3	123	100
March 1966	14.9	138	112
April 1968	16.6	154	113
May 1969	17.7	164	113
February 1980	35.9	332	63
January 1981	49.5	458	72
July 1981	53.1	492	71
March 1982	60.0	556	73
January 1983	70.1	649	76
April 1983	73.4	680	78

The striking features of these rates are, first the very lengthy period between May 1969 and February 1980 when excise duty did not increase at all and second the rapid rate of increase that has occurred since then, with five further increases from February 1980 to April 1983. However, the recent increases have not been quite so severe when looked at in real terms, as can be seen from the final column in the table.

Excise duty on petrol at April 1983 was higher than on diesel at 103.2 pence per gallon. Petrol has always had a higher excise rate though since February 1980 when petrol excise was 61.6 pence per gallon diesel excise has increased more rapidly than petrol excise.

Taxation System: Overview

It is evident from the previous section that the system of taxing goods vehicles has not followed any particularly logical or obvious course during the past 30 years. The principal taxes on vehicle use — road tax and fuel tax, both declined in real terms for a large part of the period; then, in 1973, road tax for goods vehicles was cut further and the system's progressiveness was reduced considerably. Fuel taxes declined in real terms until the early 1980s when a slight increase in real terms took place.

It is clear that the primary concern in recent years has been with revenue considerations. Goods vehicles escaped taxation increases for many years and it was as if suddenly a lucrative new revenue source was discovered.

The concern with revenue has perhaps misdirected vehicle taxation policy. This is particularly true for goods vehicles, which, in general, have a series of impacts that are different from those of motor cars. The general belief that vehicle owners pay too much in taxation is often, by extension, applied to all particular classes of road user. The hypothesis that road users, in particular goods vehicles, pay too much needs to be tested. On the basis of some reasonable assumptions this can be done.

However, it is not particularly easy to make explicit statements of the purposes and appropriate yields from vehicle use taxation. Among the difficulties are questions of road pricing and externalities. This is especially true for road pricing where there is an extensive and complex literature. It is not the intention, nor is it possible, to treat these issues in detail. The aim in this section is rather more modest, and principally derives from equity considerations in the taxation of different goods vehicles.

As a starting point, an introductory principle for a goods vehicle taxation system is made and its implications and weaknesses are drawn out.

This principle is that each category of road user should pay in taxation an amount which, at least, covers road expenditure made on its behalf. In particular, this is to apply to each category of goods vehicle. This principle is not new

— it forms the basis of the goods vehicle taxation system in the United Kingdom and has influenced the proposed EEC directive on vehicle taxation. However, before attempting to apply this principle in Irish circumstances two issues are discussed.

The first is that the proposed principle suggests that taxation should cover expenditures when clearly it is costs that should be covered. However, defining and measuring real road costs raise difficulties that cannot be satisfactorily dealt with without recourse to another variable which will bear a reasonably direct relationship to costs. Other costs, not related to road costs, like environmental and congestion costs are dealt with later.

The second question is more difficult and asks why a pricing principle based on average cost, rather than marginal costs should be proposed. One practical reason is that it is easier to apply since the marginal costs are difficult to define and to estimate. Another reason derives from the fact that, because of decreasing average costs in uncongested road use, marginal pricing does not cover total costs. Since the marginal costs of use are low, and the fixed costs of building roads are high, marginal cost pricing will provide a totally inadequate financing base. Raising the required revenue in general taxation is not always possible and users may have to pay a sum in excess of marginal costs. Average cost is not necessarily the best choice but is eminently practical. The allocative effects (in terms of the suboptimal use of roads) of not using marginal cost pricing is not likely to be large since the difference between marginal and average cost pricing, in terms of its share of total vehicle operating costs, is certainly small. Furthermore, the elasticity of demand for freight transport is low and pricing deviations from marginal costs will not have a disincentive effect on users. In any case, marginal cost pricing for goods vehicles requires similar treatment for cars, as otherwise the taxation system could cause distortions in purchase decisions. Marginal cost pricing for cars would lead to such a collapse in taxation revenue that it would be unrealistic to consider it in present circumstances.

The next section goes on to examine the allocation of road expenditures to different classes of road users. The methodology is employed by Feeney (1980) and (1983) and closely follows British guidelines (HMSO (1976)).

Allocation of Expenditures to Different Users

The method of allocating costs to different users has five main steps. These are set out in detail in Appendix 4, and Table 5.3, below, summarises the calculations for 1980.

The table shows that vehicles below 5 tons unladen weight cover their track costs, while those above do not. The overall conclusion is that goods vehicles do not cover the track costs imposed. The discrepancy is very great in the higher unladen weight categories with vehicles over 10 tons unladen covering only

Table 5.3: *Allocated expenditures and taxation revenues for goods vehicles 1980*

Unladen weight (tons)	*Expenditures (£m)*	*Revenues (£m)*	*Revenue to expenditure ratio*
Below 3	4.6	11.4	2.5
3-5	4.3	4.7	1.1
5-7	6.8	4.6	.7
7-10	11.4	8.2	.7
10 and over	16.7	10.4	.6
Total	43.9	39.1	.9

Source: Calculations in Appendix 4. Figures may not add due to rounding.

about 60 per cent of the road costs imposed.

A general point is that there are severe difficulties in compiling the data and tables. Estimates of the total mileage performed by vehicles vary widely. The estimates of the various factors and the expenditure allocations to each are also subject to margins of error that cannot easily be quantified.

Nor is it entirely clear how underestimates on one side affect the other; for example, underestimates of the yield from fuel taxation may imply understatement of distance travelled, and therefore underallocation of costs. It is evident that an understatement of taxation revenue need not feed back into a cost understatement of the same order of magnitude. In fact, rough calculations indicate that an understatement of taxation revenue of £1m results only in an extra allocation to costs of less than £0.1m.

Thus, if tax revenues are understated by say £3m, the net effect on the revenue/expenditure ratios is to add almost £3m to the revenue figure. However, it is noteworthy that even adding £3m in taxation will not be enough to make goods vehicles in 1980 net contributors. Therefore, unless the distribution of the £3m to the different vehicle size categories is very skewed, the general conclusions about the heaviest vehicles still stand, though they are modified somewhat.

In summary, the approach taken provides a general illustration of the available methodology. The conclusions that the largest vehicles were almost certainly not covering their costs in 1980, while the smallest ones were paying more than double the expenditure allocated appear quite robust to reasonable changes in most of the input variables.

Developments since 1980

Both fuel excise taxes and road tax have increased since 1980. In the case of

fuel tax on diesel the rate of taxation has increased from about 36 to 73 pence per gallon, in real terms an increase of about 24 per cent. Road tax was increased in the 1983 budget by nominal amounts of between 10 and 15 per cent. Using these tax rates and 1983 estimates of road expenditure Feeney (1983a), in a reworking of his 1980 data, concluded that all classes of goods vehicles were covering their costs in 1983.

It is possible approximately to replicate the work of the last section and see how it applies to 1983. However, further assumptions have to be made, since RFS data on vehicle numbers or performance are not available for 1983. Thus, 1980 vehicle numbers and performance data have to be used. A summary of the calculations is presented in Table 5.4 below. Further details are in Appendix 4, Table A4.6.

Table 5.4: *Road expenditure and taxation revenues goods vehicles 1983*

Unladen weight (tons)	*Allocated expenditure (£m)*	*Taxation revenue*			*Revenue to expenditure ratio*
		Fuel	*Road tax*	*Total*	
			(£m)		
Below 3	8.1	15.43	3.66	19.09	2.4
3–5	7.0	6.94	1.67	8.61	1.2
5–7	10.0	6.39	1.78	8.17	.8
7–10	16.9	11.28	3.27	14.55	.9
10 and over	24.4	14.86	3.90	18.76	.8
Total	66.4	54.90	14.28	69.18	1.0

It can be seen that the overall picture has changed to the extent that goods vehicles in general now appear to cover their total allocated expenditures. Within vehicle categories, the position is similar, in outline, to that for 1980, with vehicles under 5 tons unladen covering their costs and those over failing to do so. The share of allocated costs covered by the heaviest vehicles has increased from about 60 per cent in 1980 to between 80 per cent and 90 per cent at present.

Conclusions of Analysis

From the above analysis it appears that large goods vehicles do not cover the

road expenditures made on their behalf. To cover these costs increases in taxation are required, which must be applied to vehicle taxes rather than fuel taxes. This is because the existing distortions cannot be dealt with by fuel taxes alone since vehicle taxes can be selectively applied to different vehicle size categories. The Table 5.5 below indicates the increases that would be required in road tax to achieve equality between road expenditure and taxation revenue. The data, of course, are subject to the qualifications expressed earlier and therefore the increases should be seen as orders of magnitude only.

Table 5.5: *Changes in road taxation for heavy goods vehicles to cover total expenditure 1983*

Unladen weight (tons)	*Shortfall* (£m)*	*Existing road tax (£m)*	*% increase required*
5–7	1.8	1.8	100
7–10	2.3	3.3	70
10+	5.6	3.9	144
Total (5 and over)	9.7	9.0	108

*Expenditure — Revenue from Table 5.4.

For goods vehicles in excess of 5 tons unladen weight, it would be necessary to more than double Road Taxes to cover total expenditure. For the heaviest class, an increase of 144 per cent in Road Tax would be required to cover total expenditure. While these are large increases, the amounts represent a small share of total operating costs. For example, the road tax on goods vehicles is only about 3 per cent of the annual standing costs of the largest category of goods vehicle.[11]

It can be seen from Figure 5.1 that the tax rates in 1973 and 1983 increased linearly for vehicles with unladen weight above 6 tons. This was a simplification of the 1952 rates which increased linearly only after 9 tons, and indeed at a much higher rate. In terms of attempting to recoup road damage or discourage the use of the heaviest vehicles the taxation system is not now as finely tuned as it was. The empirically observed law which states that road damage increases with the fourth power of the axle weights is better reflected in a taxation system similar to the 1952 one than the more recent ones. In conclusion, the relative differences in tax rates at present do not fairly reflect the impact of the various sizes of goods vehicles on the roads.

[11]Irish Transport and Distribution Managers' Handbook (IMI).

The indications of the taxation increases required are quite broad and do not represent a detailed schema for the future taxation of goods vehicles. Such a schema requires further work which should take account of the number of axles on vehicles, since road damage characteristics decline as the number of axles increases. Nevertheless, the evidence is such that immediate increases of the orders of magnitude suggested would bring about an improvement in the equity of the system.

The question of overloaded vehicles will not be dealt with in any detail. It is, however, worth pointing out that if the fourth power law is reasonable, a vehicle which is 10 per cent overloaded increases the road damage by over 45 per cent. It is evidently important for the road system that overloaded or badly loaded vehicles are detected. There must, therefore, be a strong economic justification for increasing the number of weighbridges available for this purpose.

Relationship between Road Tax and Fuel Taxes

Ideally, a system whereby taxes are paid on use and not on ownership is preferable. The road tax system is a tax on use in the sense that if the vehicle is not used at all then no tax need be paid. If, however, it is used very infrequently the tax must still be paid. High fixed (or near fixed) taxes encourage the use of the vehicle. Thus, very low rates can be accepted for loads. If, on the other hand, each trip is charged for in such a way that the costs are covered, the practice of low prices is discouraged to some extent. The problem is one of implementation. Toll roads are one mechanism whereby road users can pay as they use the infrastructure. Without toll roads, the present situation of fixed (or near fixed taxes) and fuel taxes is preferable to fuel taxes alone. In the medium term new technologies offer the possibility of monitoring vehicle performance and consequently developing road pricing systems. Meanwhile toll roads offer possibilities that should not be disregarded, especially for new or upgraded facilities. In the absence of both of these, the only way to improve the equity of the present system is to increase the road taxes as indicated.

Taxation: Other Purposes

Influencing Structure of Goods Vehicle Fleet

The question of how the taxation system should influence the allocation of vehicles into various size categories is a rather difficult one. In principle goods vehicles should cover their full social costs and the system should be so graduated that this is done in a reasonably equitable way between different vehicle size categories. At present, the purchase of large vehicles is profitable for operators partially because these vehicles do not even cover road expenditure made on their behalf.

Since it is also likely that social costs increase with vehicle size, it would seem

that much steeper graduation of the road tax system is justified. Revenue potential from larger vehicles increases much faster than taxation or indeed than overall costs. For example, going from one class of large vehicle to the next increases payload by 25 per cent but standing costs by only about 8 per cent.[12] This would indicate that the present road tax structure acts as no disincentive at all to the purchase of very large vehicles. Though fuel taxation, too, bears relatively more heavily on the larger vehicles because of their greater weight, it is unlikely that fuel costs, in particular the taxation content, have much impact on vehicle purchase decisions.

Harmonising Competition between Road and Rail

It is not proposed to dwell at this stage on the question of taxation as a means of equalising the terms of competition between rail and road. Chapter 8 deals with rail traffic and a number of the issues involved are briefly discussed there, though in general, there is not enough reliable information to be definitive on the extent to which each mode covers its direct and more indirect costs.

Environmental Effects

The possibility of the taxation system compensating for environmental damage caused has been discussed by Armitage (1980). The three possibilities examined were a general environmental tax, a specific tax related to a particular nuisance (like noise) and finally a local environmental tax related to nuisances from goods vehicles in particular areas.

The difficulty with each of these is that there is no guarantee that the objectives would be attained. First, the relative inelasticity of transport demand could not reduce the numbers of vehicles significantly. Second, there is no easy link between environmental change and the taxation rate. Third, there is no simple mechanism whereby sufferers can be compensated. Finally, there is no guarantee that the worst offenders (particularly noisy or dirty vehicles) would be caught.

Armitage concludes that environmental taxes are not the best way to address the problem. Regulatory control on the quality of the vehicles is a more effective and more equitable system. Stricter manufacturing standards in relation to engine noise levels and particulate emissions are more effective in countering the environmental damage than taxes. Armitage, in this context, has a general conclusion that, since the heaviest lorries are the greatest offenders, taxation, when in doubt, should be higher rather than lower on these vehicles.

Congestion Effects

Traffic congestion imposes costs on society, principally in the form of slower journey times, but also in increased operating costs and in adverse environ-

[12]Irish Transport and Distribution Managers' Handbook (Class 16 to Class 17).

mental effects. Goods vehicles clearly are a major contributor to increased congestion and the question arises as to whether the taxation system can serve any useful purpose in reducing or containing congestion. The answer must be that a general tax on all goods vehicles is an inefficient way of attempting to reduce congestion. Congestion is area related and attempts to reduce it are best carried out separately in areas affected, for example, by restrictions on the use of goods vehicles, or by special systems of local taxation.

Vehicle Taxation in the European Economic Community (EEC)

Taxation of goods vehicles is the subject of an EEC directive. The draft directive, the adoption of which has been under discussion for almost a decade, proposes a tax system based on each vehicle size category's marginal cost of the use of infrastructure, deducting the diesel fuel taxes and weighting by the annual distance travelled. In addition a budgetary supplement may be added, partially for revenue purposes but partially because the marginal cost cited declines and average costs would not be covered by the proposed tax. The system is based on laden weight and treats vehicles of each axle configuration separately. Because of the myriad of systems for paying for infrastructure that exist in Europe and also because of widespread concern with differing terms of competition, the EEC directive has not yet been adopted. To wait for the EEC system to be adopted could involve a lengthy delay. In the interim the inequity in the system could, at least approximately, be reduced by adopting the proposals in this chapter.

Enforcement

Evidence that road tax due is not fully paid emerges from the 1980 Road Freight Survey and from the goods vehicle taxation receipts.

In Chapter 2 we saw how the CSO Road Freight Survey and DOE Census provide different estimates of the numbers of goods vehicles operating and how this difference was largely due to the exclusion of vehicles untaxed at census date from the DOE data. The published CSO data on vehicle numbers do not provide disaggregation into vehicle size categories corresponding to different taxation categories that would allow an exact estimate of taxation due. However, an approximate calculation can be carried out based on the data in Table A4.4 in Appendix 4 which indicated that an average of £107 per vehicle was actually paid compared with an average liability of £150. The total estimated amount of unpaid taxation therefore, is about £3.5m for 1980.

Apart from the obvious conclusion that there is significant tax evasion (about 25 per cent of tax due) there is a possibility that legitimately explains part of the discrepancy. If a vehicle is unused during a taxation period no vehicle taxation need be paid. Proof that the vehicle was not used is obviously difficult to provide and DOE accepts as sufficient a signed statement from a Garda witnessing the

licensee's own statement. This is evidently a rather easy system to abuse and consideration should be given to possible improvements.

One possibility is that vehicle taxation should be paid irrespective of the use of the vehicle. While there would be hardship (in the event of illness or breakdown or lack of business) it perhaps would help to ensure a higher payment rate. Another, and perhaps the main alternative, lies in improved enforcement of existing regulations. Finally, the penalties for having an out-of-date tax disc were until recently so low as to make it worthwhile to risk being caught.

Further Remarks and Summary

The goods vehicle taxation system has evolved in a way that has been based more on revenue considerations than on any other specific objectives. Taxes on use have recently gravitated almost entirely towards fuel taxes. This has the disadvantage that the road damage characteristics of larger vehicles cannot be adequately paid for through fuel taxation alone. On the basis of the evidence in this chapter there is a strong case for significantly higher taxation for the heavier goods vehicles. Because more sophisticated systems of road pricing are not available, it is necessary that this takes the form of sharp increases in road tax. Though the effect on firms with fleets of particularly large vehicles could be significant in terms of increases in their transport costs, this should be weighed against the hidden subsidies to these vehicles that exist at present. Special taxation concessions for vehicles engaged exclusively, or almost so in international haulage, on the grounds that the majority of their mileage is performed outside the country is not, at present, a real possibility. The difficulty is that this procedure is not acceptable to the EEC Commission since it is understood and accepted that vehicles circulating internationally are subject to the normal rates of vehicle tax in their country of registration.

Finally, there is also scope for improved enforcement of the regulations in relation to road tax and to overloading, though it should be pointed out that the 1984 Road Traffic (Amendment) Act has greatly increased penalties for offences.

Chapter 6

ROAD FREIGHT TRANSPORT: OWN ACCOUNT AND HIRE OR REWARD SECTORS

Introduction

This section examines some information on the Hired Haulage/Own Account classification of the road freight market and investigates the scope for an increased market share for the hired sector. The data for this come almost entirely from the CSO Road Freight Survey, though some international data are also presented.

Hire or Reward and Own Account Sector

The classification of road freight transport into the own account and hire or reward sectors has always attracted more attention than any other. The large own account sector has prompted debate about the excess costs of this and about the inadequacy of the hired haulage sector. Much of the debate has been carried on in a data vacuum since there was no information on aggregate activity between 1964 and 1979.

A preliminary point, in relation to the classification is worth making. The usual categorisation of road freight transport is into "own account" and "hire or reward". This referred, in 1964 and subsequently, to the *use* of the vehicle — whether for carrying a firm's own goods or carrying goods for others. In the 1980 RFS the comparable categorisation is by *owner* of vehicle and divides them into Transport (i.e., hauliers) and others. For the most part the two ways of doing this give the same result though there is a small number of people who are not professional hauliers who can carry for reward by virtue of having a merchandise road freight licence. Similarly, there are some professional hauliers who carry their own goods. These differences are small (2.3 per cent and 0.3 per cent of tonne kms respectively) and this report uses the categorisation Transport and Others, or Hire or Reward and Own Account more or less interchangeably.

Table 6.1: *Total market and share held by professional transport, 1964 and 1980*

Year	*Tonnes (millions)*	*Transport share %*	*Kms (millions)*	*Transport share %*	*Tonne kms (millions)*	*Transport share %*	*Loaded journeys (millions)*	*Transport share %*	*Vehicles (000)*	*Transport share %*
1964	55.5	19.6	670.4	10.0	1,714.6	17.1	14.7	9.5	46.2	4.3
1980	102.5	25.1	1,253.0	18.1	5,010.5	38.1	16.6	13.2	82.4	7.6

Source: CSO Road Freight Surveys, 1964 and 1980.

Table 6.1 above summarises the main developments between 1964 and 1980. Whichever measure is used the Transport sector has increased its share of work done. The single most commonly used measure is that of tonne kilometres, and hauliers have nearly two-fifths of the total road market when this indicator is used. Other measures indicate smaller shares for the Transport sector, so that at a minimum it has only about 8 per cent of vehicles.

Though not shown in Table 6.1, hauliers in general have larger vehicles (they have 37 per cent of the vehicles in excess of 10 tonnes unladen weight and only 1 per cent of the 52,000 vehicles below 3 tonnes), carry larger loads (11.7 tonnes compared with 5.3 for the own account sector) and travel further with each load (103 kilometres compared to 71).

The market share held by the sector in different haul length categories provides an insight into the evolution of the legislative framework for road freight haulage. The data are summarised in Table 6.2.

Table 6.2: *Tonnes carried by transport and other undertakings, 1964 and 1980 in different haul length categories*

Haul length	*Transport*		*Other*		*Percentage carried by transport*	
	1964	*1980*	*1964*	*1980*	*1964*	*1980*
kms		*(million tonnes)*			*%*	
0- 9	5.6	6.7	17.8	18.6	24	26
10- 49	3.4	9.7	18.7	40.6	15	19
50-149	1.5	5.6	6.3	14.2	19	28
150+	0.4	3.6	1.8	3.4	18	51
Total	10.9	25.7	44.6	76.8	20	25

Source: CSO, 1964 and 1980 Road Freight Surveys.

In 1964 the Transport sector's highest share of work occurred when the distances were shortest. This was a direct effect of the 1933 legislation which limited many hauliers' region of operation. The passage of the 1971 Act removing area restrictions from hauliers with merchandise licences and the growth in international traffic (principally taken up by licensed hauliers) shows both an overall growth in market share and a greatly improved share in the longer distance hauls. It is interesting that, because the weight moved on very short hauls (below 10 kms) has not changed greatly, growth in tonnages moved has been concentrated almost entirely in the longer haul categories.

The types of journey undertaken by the two sectors are somewhat different. End to end journeys (that is, journeys without intermediate collections or deliveries), not surprisingly perhaps, form a greater share (83%) of Transport Operators' work than they do for Own Account operators (70%).

There is some evidence that Transport operators use their vehicles more efficiently. On end-to-end journeys, Transport operators run 39 per cent of their miles unladen while the corresponding figure for Own Account operators is 48 per cent. That this difference exists is not surprising in view of the legislative prohibition on backloading for Own Account operators. What perhaps may be surprising is how high the empty running figure is for Transport operators. Very roughly, the implication is that only one loaded journey in four results in a backload.

International Comparison

Ireland has a relatively small hire or reward (or professional Transport) sector by comparison with other EEC countries as Table 6.3 below demonstrates. It can be seen that the Transport sector in Ireland has a quite significantly lower share of the market than other EEC countries with the exception of Luxembourg. Different structures of demand can explain part of the variation but even when different length of haul is examined, Irish hauliers' market share is generally lower in the shorter haul lenghts.[13]

Table 6.3: *Share of tonne-kilometres for hire or reward transport in EEC countries, 1980 (National Transport)*

Country	*Percentage tonne-kms*
Federal Republic of Germany	58
France	51
Netherlands	66
Belgium	42
Luxembourg	21
United Kingdom	61
Denmark	68
Ireland*	32

*Transport firms.
Source: Eurostat (1982).

[13]Geoghegan and Brady (1983), p. 23.

A more specific comparison is provided in Table 6.4 below, where the share of total tonnage in different commodity groups moved by the Hire or Reward sector is shown for national transport in both the United Kingdom and Ireland.

Table 6.4: *Hire or Reward by commodity, national transport in Ireland and the United Kingdom, 1980*

Commodity	*Tonnes lifted*		*Hire or reward share*	
	UK	*Ireland*	*UK*	*Ireland*
	million		*%*	
Agricultural products, live animals	105.0	8.6	53.5	39.5
Foodstuffs, animal fodder	197.8	22.1	36.9	17.8
Solid mineral fuels	70.2	2.1	59.8	21.1
Petroleum products	75.2	6.0	19.1	2.9
Ores and metal waste	15.5	0.3	42.6	22.2
Metal products	52.3	0.7	70.6	55.5
Building materials	462.7	41.4	49.5	27.6
Fertilizers	13.8	3.5	75.4	48.7
Chemical products, paper and pupl	50.7	2.2	68.0	46.5
Transport equipment, glass, textiles, others	328.5	13.7	55.3	38.9
Total	1,371.7	101.3	49.9	27.6

Source: Eurostat (1982).

It is striking that the proportions of total tonnage carried by the Irish Hire or Reward sector are lower for every single commodity grouping. This structural shift may be partially due to different geographical or economic conditions but the greatest part of it is clearly more likely to be due to the different legislative frameworks under which the industries have operated in the two countries. While comparing these frameworks briefly is not simple, in essence British road freight transport licensing has been completely liberalised since the 1968 Transport Act. It can only be a matter of speculation whether the Hire or Reward market shares in the UK, in the various commodity groups, are in any sense optimal. The wide variation in these shares shows that, even if there were an optimal market share for the Hired sector it would vary for different commod-

ities. It is therefore, at this stage, impossible to say what market shares are likely to be achieved in Ireland by the Transport Sector in the future. All that can be said is that, if the UK experience is anything to go on, there is considerable scope for an increased market share for the Hired sector.

From the table it can be seen that the commodities with the highest shares in the Hire or Reward sector, that is chemical products, metal products and fertilisers in the UK have also the highest shares in Ireland. These industries, especially the first two, are relatively young, and for Ireland these percentages may indicate that new firms are now more inclined to buy in transport than use their own. Also, the commodities where the Hired sector is weakest, petroleum products and foodstuffs, are the same in both countries. This type of work is mainly of a distribution kind and it falls more naturally into the Own Account sector.

Choice of Own or Hired Transport

It is often argued that there are excess costs associated with a firm maintaining its own fleet. Certainly when there are restrictions on backloading and on vehicle financing the direct financial costs of operating and purchasing fleets will be greater. In an environment with no special restrictions on either sector the position should not necessarily be different, and the operating costs should probably be similar for both categories. Factors like excess capacity or lack of managerial expertise could cause costs to vary between firms. It is possible that because transport is not always an explicit cost centre in firms which have their own transport and because overhead costs are absorbed centrally that such firms may not always have accurate estimates of the costs of their transport.

There are several non-financial reasons for firms using Own Account transport. Surveys in Britain (see, for example, Foster (1978), Table B.8) and in Ireland (Report of the Transport Consultative Commission, 1981, pages 45–47) give roughly similar reasons for firms maintaining their own fleets. These reasons centre on the control of service levels, staff, cash and costs and the reliability of service that can be given. Cost is often only mentioned as a subsidiary factor and is frequently not known in Own Account transport. Advertising of products on vehicles is often cited as a reason for maintaining Own Account fleets. One reason that seems to occur in Irish surveys, but not in British ones, is that firms are committed (by agreements with unions) to retaining their own fleet irrespective of differences in costs.

Scope for Hired Haulage to Increase Market Share

Longer haul end-to-end journeys represent the most vulnerable sector of the "Own Account" business. Hauliers now handle 52 per cent of tonnes carried over 150 kms and 28 per cent of tonnes carried between 50–150 kms and it is

likely that, based on European experience, these percentages can be pushed higher. Structural rigidities seem, however, to play a large part in preventing a move to what is widely acknowledged to be a more effective form of transport. New firms appear to prefer to use bought-in transport rather than their own transport, though numerical evidence of this fact is confined to the observations that most international freight movements are undertaken by transport firms, and that transport firms seem to have a higher share of traffic in newer products.

From the comparison with the UK it is clear that the question of an optimal market share for the Hired sector is not easily answered. The market share will vary by type of transport and will depend on local circumstances as well as the general regulatory framework.

However, if the Hired Sector is to increase its market share it is essential for it to realise that the structure of demand is changing. Transport is being seen in industry as one part of what is known as logistics. Logistics encompass, not just transport of raw materials, semi-finished and finished products, but also distribution and inventory management. With a growing realisation of the costs of excess stock, firms are moving towards more sophisticated systems of stock control. As a result, transport costs could increase though total logistics' costs could decline. These demands by industry place greater reliance than ever on transport quality especially in relation to factors like meeting deadlines. The Hired Sector has to respond to these demands by supplying the kind of flexible, reliable service that industry needs.

Effect of Liberalisation

The announcement of the liberalisation of the industry, in line with the recommendations in the TCC (1981) report, was made in February 1984. The effects of liberalisation in the short and longer run could well be very different. In the short run the advantages of cost reductions (by permission to backload and by relaxation of restrictions on leasing) will fall more to the Own Account than the Hired sector. Consequently, the observed switch to hired transport may be halted, at least temporarily, especially in view of the existing rigidities in the Own Account sector. However, new manufacturing firms will probably continue to use bought-in transport and new market opportunities for the hired sector will still be available. In the longer term, the continued development of more professional standards of competence in the hired sector, an increasing desire of businesses to concentrate on their principal functions and a reduction in structural rigidities should see a resumption of the present trend towards hired transport.

Summary

This chapter has examined the principal sub-categories of the road freight

Transport market in Ireland, the Hire or Reward sector and the Own Account sector. Differences in the type and manner of work undertaken are pointed out. The data indicate that the Hired sector has obtained a relatively large share of new work, particularly in the international sphere and in the transport of commodities like chemicals and metal products. If UK experience is a guide, it has also scope for significantly increased market participation in the carriage of most commodity groups. It is pointed out that emerging demands from industry place great emphasis on reliable flexible services and if hired haulage is to develop it is essential that it reacts positively to these demands. The short- and medium-term effects of liberalisation could well be different; in the short term the hired sector may not increase its share of the market, though in the medium and longer term it should do so.

Chapter 7

ROAD FREIGHT TRANSPORT: THE LICENSED HAULAGE INDUSTRY

Introduction

This section focusses on the Licensed Haulage Sector of the road freight transport industry. This sector is not quite the obverse of the Own Account sector examined in the previous section, since the Licensed sector contains only those operators who hold one of the Licence types[14] discussed in Chapter 1; it, therefore, excludes those in the Hire or Reward sector who are operating without licences. These exclusions account for about 7 per cent of the work done and about 20 per cent of the vehicles in the Hire or Reward sector. In this section, the underpinning data are first critically appraised and then various facets of the available information on licensed hauliers are discussed. Developments in fleet size, commodities carried, financial performance and productivity measures are explored. The position of the railway road freight companies are analysed and the concluding sections examine some economic and policy questions.

Data Availability and Difficulties

Since 1952 the CSO has carried out an annual survey of Licensed hauliers for the Minister of Transport under regulations made under the 1933 Transport Act. Apart from the 1964 Road Freight Survey it provides the only statistical material on the road freight industry between 1952 and 1979. Revisions to the series, carried out in 1969 mean that a consistent series on licensed haulage only exists from that time. Though the survey relates to a small section of the road freight industry it is a section that has grown rapidly and has changed significantly and consequently it is worthwhile to examine the information from the survey in more detail.

There is some doubt that the Licensed Hauliers Survey provides an accurate picture of activity in the licensed sector. The reasons that have been put forward for this are principally that the survey is not "grossed up" to deal with non-response and that the questionnaire[15] cannot accurately be answered by most hauliers. While these criticisms are valid they may not be so damaging as to undermine the survey's usefulness.

Indeed it is worthwhile for at least three reasons to continue with this inquiry

[14]Merchandise (Existing Carrier) Licence, Restricted Road Freight Licence, Restricted Merchandise Licence.

[15]This questionnaire requries a haulier to give aggregate activity and financial information for the previous calendar year. These figures may be estimated and are probably no better than informed guesses in some instances.

and to analyse its results. These are that the survey is the only source of information on financial aspects of the Road Freight industry, that it provides unique information on the size and structure of individual fleets and finally that the trends shown over time may be such that they are not invalidated by any defects in the data.

Nevertheless, there is scope for improvements in the survey. Improved timeliness, reduced non-response and the introduction of grossing up procedures to deal with non-response are all possible. In view of the impending liberalising legislation, a joint review by the CSO and the Department of Communications of the coverage, conduct and analysis of this inquiry would be beneficial and should be undertaken. The data from the inquiry are examined in the remainder of this chapter.

General Trends

The basic data on the licensed sector since 1969 are presented in detail in Appendix 5 (Tables A5.1-A5.3B). Separate figures are shown for Railway companies and for Other Licensed Hauliers, partly because of the very different trends in the two subsectors but also because the services provided by the two kinds of operator are significantly different. Table 7.1 below summarises the main trends in these data.

Using the measures shown, the work performed by the licensed sector has increased sharply over the thirteen year period — tonnes carried by 41 per cent, miles travelled by 103 per cent, vehicles operated by 50 per cent, and receipts in real terms by 90 per cent. However, employment in the sector has shown a small increase of only about 5 per cent which obviously indicates rapidly rising productivity.

The greater relative increase in miles travelled than in tonnes carried indicates longer average journey length. This is partially due to international haulage which is predominantly carried out by the licensed sector but is also due to changing patterns of distribution.

From the tables in Appendix 5 it can be seen that, for all measures the most significant annual increase occurred in 1978. This was largely because the 1978 Road Transport Act permitted licensed operators to expand their fleets and also because economic conditions at the time were quite favourable.

These aggregate figures hide divergent trends in the two main subsectors of the licensed haulage market — the Railway Companies and other Licensed Hauliers. The Railway Companies' road freight activity has been declining since about 1973 while that of other licensed hauliers has grown continuously. The Railway Companies reduced their vehicle fleet by 55 per cent and employment by 62 per cent between 1969 and 1982. The other measures used also showed large declines of around 50 per cent in this sector. These data will be examined later in this section, but before that some other developments in the

Table 7.1: *Trends in licensed haulage, 1969–1982*

Year	*Aggregates*					
	Vehicles (000)	*Tonnes (million)*	*Miles (million)*	*Employment*	*Receipts (£m)*	*Real Receipts* (£m)*
1969	2.1	9.6	50.9	4,800	9.6	9.6
1982	3.2	13.5	103.2	5,000	100.1	18.2
% change 1969–1982	50	41	103	5	943	90
Annual % change	3.2	2.6	5.6	0.3	19.8	5.0

*Deflated by Consumer Price Index, values in 1969 terms.

industry are presented. First, we examine the size structure of the fleets run by licensed hauliers.

Fleet Size

The most striking development since 1969 has been in the size structure of the fleets owned by the licensed operators. Table 7.2 presents the information showing the number of operators in each fleet size category and the percentage distribution within fleet size categories for each year from 1969 to 1982.

From the table it can be seen that, though the number of operators has hardly changed at all, the number of operators within the different fleet size categories has altered significantly. The number of one vehicle operators has more than halved, to the extent that they now comprise only 1/3 of operators as against nearly 80 per cent in 1969.

The large number of small operators belies their importance when other measures are taken into account. For example, single vehicle operators in 1982 had only 9.6 per cent of the plated vehicles surveyed, carried 11.8 per cent of tonnes and took in 7.4 per cent of receipts. In contrast to the decline in one vehicle operators, the numbers of operators in all other fleet size categories show increases. The most striking occurs when the two largest fleet size categories are amalgamated and one sees that where only 3 per cent of operators had four or more vehicles in 1969, this had risen to 32 per cent by 1982.

A key feature of the table is the increase in 1978 in the number of operators with four or more vehicles, from 70 to 157. This shows the rapid expansion undertaken by licensed hauliers immediately the 1978 Road Transport Act was enacted. This is confirmed by the 40 per cent increase in sales of commercial vehicles in 1978. Prior to 1978 the trend had been towards a more gradual increase in fleet size, but the increases permitted under the 1978 Act were quickly availed of. The impact of that Act and its efficacy are returned to in the concluding part of this chapter.

Commodities Carried

Table A5.4 in Appendix 5 presents some details on the commodities carried by the licensed hauliers, showing separately the amounts carried in each of the categories for Licensed Hauliers and Railway Companies, and the changes between 1969 and 1980.

In general, the commodities carried analysis is not particularly informative. One reason for this is the size of the residual category "other goods". It accounts for nearly half of the tonnes carried and for the Railway Companies represents over 70 per cent of goods carried. It would be more useful if a commodity breakdown in line with the international goods classification system, which is used in the Road Freight Survey were adopted. The existing classification reflects the

Table 7.2: *Fleet size classification for licensed hauliers (excluding railway companies) 1969–82*

Year	Size of fleet 1 Vehicle	2 Vehicles	3 Vehicles	4–5 Vehicles	6+ Vehicles	No. of operators total
1969	615	107	36	15	8	781
	78.7%	13.7%	4.6%	1.9%	1.0%	100%
1970	570	103	35	19	8	735
	77.6%	14.0%	4.8%	2.6%	1.1%	100%
1971	556	107	48	21	10	742
	74.9%	14.4%	6.5%	2.8%	1.3%	100%
1972	504	132	48	21	16	721
	69.9%	18.3%	6.7%	2.9%	2.2%	100%
1973	487	143	40	21	20	711
	68.5%	20.1%	5.6%	3.0%	2.8%	100%
1974	481	136	54	27	26	724
	66.4%	18.8%	7.5%	3.7%	3.6%	100%
1975	470	142	56	33	25	726
	64.7%	19.6%	7.7%	4.5%	3.4%	100%
1976	486	158	55	30	29	758
	64.1%	20.8%	7.2%	4.0%	3.8%	100%
1977	499	167	63	38	32	799
	62.5%	20.9%	7.9%	4.8%	4.0%	100%
1978	379	172	81	81	76	789
	48.0%	21.8%	10.3%	10.3%	9.6%	100%
1979	346	168	75	102	89	780
	44.4%	21.5%	9.6%	13.1%	11.4%	100%
1980	310	157	105	109	97	778
	39.8%	20.2%	3.5%	14.0%	12.5%	100%
1981	280	163	94	108	106	751
	37.3%	21.7%	12.5%	14.4%	14.1%	100%
1982	257	155	116	124	119	771
	33.3%	20.1%	15.0%	16.1%	15.4%	100%

work originally done by licensed hauliers, largely concentrating on building and construction work and certain agricultural products. This has quite clearly changed, as can be seen by the decline in the amount of sand and gravel hauled between 1969 and 1980. There is little to be gained by dwelling on this topic

except to recommend an updating of the goods classification used in the annual survey.

Productivity Measures

Table 7.3 below presents a series of what can be described as productivity indicators for the licensed haulage industry. Because of the differences in the two main subsectors, results are shown separately for Railway Companies and Other Licensed Hauliers. Data for 1969 and 1982 are compared and since, in general, 1982 was a depressed year, the derived growth rates are somewhat lower than if, for example, 1980 data were used.

Looking first at the productivity measures per person engaged it can be seen that there has been rapid growth in real receipts and in distance travelled per person. These indicate the improved productivity in the sector. Real receipts per person for Other Licensed Hauliers increased faster and are at a significantly higher level than in Railway Companies. The physical measures show greater increases in distance than in weight terms, since distance travelled increased much more than weight carried. Again levels are much higher for the other licensed hauliers.

Tonnes carried per vehicle have declined, mirroring the results of Chapter 3, which indicated the declining efficiency in vehicle use.

Earnings, as measured by real receipts per tonne or per vehicle increased substantially and more rapidly for hauliers than for railway companies. On the other hand, real receipts per mile actually declined over the period. For Railway Companies the increases in cost to customers (as measured by receipts per unit of output) have been lower than for other hauliers and one can only suggest why this might be. For a start, the pay levels in the railway companies seem to have been higher and pressure to narrow the gap must have existed. Service characteristics may be important, but the different nature of the work done is a factor that cannot be left out of consideration.

What do these data tell us of the cost of freight transport to users over the period 1969-1982. Taking real receipts as costs, we see that cost per mile has not increased. The cost per tonne carried increased by 35 per cent, though when one remembers from Chapter 4 that the average length of haul increased by 58 per cent between 1964 and 1980, it is likely that the cost per tonne/kilometre has not increased in real terms over the 1970s. The licensed haulage industry has been able to keep its real prices stable because of improved productivity. For example, persons employed per vehicle declined from 2.3 to 1.6 over the period. One might also try to deduce that the switch to hired haulage could not have come about if its costs had risen faster and that, therefore, own account transport must have become relatively more expansive. This, however, is speculative and other factors like service quality have an important bearing on the choice.

Table 7.3: *Productivity measures for licensed road haulage 1969–1982*

	Total licensed sector			
Measure	*1969*	*1982*	*Percentage change 1969–1982*	*Annual growth rate*
Real receipts*/Person (£)	10,970	19,880	81.2	4.7
Tonnes/Person	1,992	2,681	34.6	2.3
Vehicle miles/Person	10,585	20,507	93.7	5.2
Tonnes/Vehicle	4,522	4,255	-5.9	-0.5
Miles/Vehicle	24,030	32,548	35.4	2.4
Real receipts/Mile (£)	1.036	.969	-6.5	-0.5
Real receipts/Tonne (£)	5.507	7.41	34.6	2.3
Real receipts/Vehicle (£)	24,903	31,553	26.7	1.8
	Licensed hauliers (excluding railway companies)			
Measure	*1969*	*1982*	*Percentage change 1969–1982*	*Annual growth rate*
Real receipts/Person (£)	12,318	21,601	75.4	4.4
Tonnes/Person	2,944	2,974	1.0	0.1
Vehicle miles/Person	16,539	23,838	44.1	2.9
Tonnes/Vehicle	5,339	4,350	-18.5	-1.6
Miles/Vehicle	29,994	34,861	16.2	1.2
Real receipts/Mile (£)	.745	.906	21.6	1.5
Real receipts/Tonne (£)	4.184	7.26	73.5	4.3
Real receipts/Vehicle (£)	22,340	31,591	41.4	2.7
	Railway companies			
Measure	*1969*	*1982*	*Percentage change 1969–1982*	*Annual growth rate*
Real receipts/Person (£)	10,085	13,717	36.0	2.4
Tonnes/Person	1,419	1,631	14.9	1.1
Vehicle miles/Person	6,675	8,583	28.6	2.0
Tonnes/Vehicle	3,860	3,728	-3.4	-0.3
Miles/Vehicle	18,156	19,611	8.0	0.6
Real receipts/Mile (£)	1.511	1.598	5.8	0.4
Real receipts/Tonne (£)	7.105	8.408	18.3	1.3
Real receipts/Vehicle (£)	27,428	31,341	14.3	1.0

*All receipts are shown in 1982 values, with the CPI used as the inflator.

Railway Companies

The Railway Companies are now two in number, comprising Coras Íompair Éireann (CIE) and the Londonderry and Lough Swilly Railway Company, though even as recently as 1958 there were five railway companies operating road freight services. Of the two companies, CIE is by far the larger and most of the activity discussed here refers to it. Policy in CIE has always been to operate road services as complementary to the railway by working to and from railheads and by refraining from competing directly on routes served by rail. Thus the road freight services operated by CIE are essentially different to those provided by other licensed hauliers. This is illustrated by the fact that the vehicles are smaller and travel shorter distances. While total traffic on the railway has increased over the 1960s and 1970s it has not done so at the same rate as road traffic. This has affected CIE's road freight business because of its link with railway traffic. The additional road traffic that has been taken by licensed hauliers has in large measure gone to companies other than CIE. The changes in Railway Companies share of the total licensed sector is shown in Table 7.4 below. The data relate to a longer time period than those shown earlier.

Between 1951 and 1970 the Railway Companies maintained (or increased) their share of licensed haulage activity. Since 1971 the Railway Companies have declined in importance under all measures used. Absolute decreases of over a half have occurred in the number of vehicles and in the distance travelled and

Table 7.4: *Railway companies in road freight transport, selected years 1951-1952*

Year	*No. of* vehicles	*% of licensed* sector	*Vehicles miles* ('000)	*% of licensed* sector	*Receipts* (£000)	*% of licensed* sector
1951*	799	42.1	13,655	44.4	1,409	55.2
1956*	944	47.0	15,180	44.1	1,917	57.3
1961*	993	47.5	17,589	44.7	2,753	57.4
1966	1,029	49.5	18,373	40.1	4,009	57.4
1970	1,064	49.4	18,286	37.8	5,714	56.2
1976	769	35.6	14,119	19.5	10,150	33.4
1980	673	22.0	11,503	11.4	13,612	17.6
1982	481	15.2	9,433	9.1	15,075	15.1

*The 1951, 1956 and 1961 figures are not strictly comparable with the later figures. This is due to a definitional change in 1969 when certain categories of small operators were excluded from the survey. This is minimal for the distance and receipts measure and no more than 10 per cent for the vehicle numbers.

over two-fifths in weight carried since 1970. Though receipts have increased in nominal terms they have decreased in real terms by about 50 per cent when the figures are deflated by the Consumer Price Index.

The significant turning point in the role of the railway companies' road freight operations occurred in 1974. At that time the Government decided that CIE road freight operations would not be subsidised. Since then the road freight operations have declined steadily with large falls in tonnage carried in 1974, 1975 and 1980.

It must be borne in mind that the data from the Licensed Hauliers' Survey probably understates total activity. The Railway Company data are almost certainly accurate and so the market share figures in Table 7.4 above are likely to be overstatements of the Railway Companies actual position.

It is interesting to focus briefly on the competitive position of CIE in road freight haulage. The situaton is akin to many in the transport area generally, with keen rivalry between established, strongly unionised firms — often protected by regulation or subsidy — and non-unionised competing firms with more flexible operating practices.

In this particular instance the competition to CIE comes from not only the licensed hauliers referred to throughout this section but unlicensed hauliers who can legally operate only within close proximity of the centres of large urban areas.

It has been argued for many years that competitive pricing decisions in the road freight industry are made by firms who cut costs by stepping outside the existing regulations. Thus, unscrupulous firms can reduce labour costs by exceeding the limits on hours of work, reduce maintenance costs by driving unsafe vehicles, and reduce operating costs by exceeding speed and loading regulations. The less the level of enforcement, the greater likelihood of these actions. While a State-owned company may tend to adhere to the existing regulations, however poorly enforced, similar behaviour cannot be expected from all other firms in such a highly competitive industry. This undoubtedly puts the State-owned company at something of a disadvantage.

This is not to suggest that all competitive losses by Railway Companies have been due to illegal competition, but merely to state it as a relevant factor. Enough data are not available to determine definitively whether well-run firms — operating within the law — have lower costs for similar work, or provide a better service.

Economies of Scale

One issue that has not been examined is whether economies of scale exist in road freight transport. The question, as considered here, centres on whether the incremental costs of providing freight transport decline as fleet size increases.

While this is an interesting question in itself, it is important in a policy context because it can throw some light on Government policies which attempt to restrict fleet size.

Evidence from other countries is that there are few, if any, economies of scale in freight transport. For example, in Great Britain, Bayliss and Edwards (1971) tested for three kinds of scale economies — economies of scale in overheads, in variable costs, and in fleet capacity utilisation through servicing larger markets. The authors found that total annual mileage run was the most important factor determining fleet costs, and that in general there was no indication of any type of scale economy with the exception of fleets of up to 5 vehicles. A study for the European Conference of Ministers of Transport (ECMT) Round Table 23 (1974) confirms that evidence on an optimum fleet size is inconlusive. However, neither the Bayliss/Edwards nor the ECMT studies are the last word on the subject. There are particular difficulties for such studies in transport including the measuring of size and output, the effect of regulation on costs and on whether to use time series or cross sectional analysis.

It is not possible to go into the issue in depth with the data available in Ireland. The items of cost (expenditures on wages and salaries, fuel and repairs and maintenance) that are available all show unit costs rising with fleet size. These data, considered naively, might be taken to indicate the existence of diseconomies of scale. Also, looked at simplistically, the developments in the market provide contradictory indications, since the largest company is rapidly getting smaller and many of the smaller ones are getting larger. However, these trends must be considered in conjunction with the regulatory framework that has dominated road freight transport for almost 50 years. When one does this the separate effects of regulatory changes and cost structures are not easily distinguished and one can only conclude that the presence or absence of scale economies cannot be determined from the available data. The continued proliferation of small operators, not just in Ireland, is evidence that economies of scale, if they exist, are evidently not so significant that monopolies are formed. Consequently, policy should be to allow operators have whatever fleet size they want, since there is no evidence of any gains from restrictions in fleet size.

While this is now stated policy in Ireland it is taking a long time to find its way into legislation. The mechanisms chosen to bring about a gradual change from the previously controlled system were the 1971 and 1978 Acts which allowed existing hauliers first to increase their areas of operation and vehicle sizes and then to increase their fleet sizes. Thus existing hauliers have been given 14 years to adjust to the final liberalising measures which will eliminate barriers to entry. Once these measures are made law it will take another two years before complete liberalisation is achieved. This raises the question as to whether such a long

liberalising period was or is necessary. The next section looks at this, in particular the 1978 Act.

Policy Issues; Effects of 1978 Act

The previous discussion indicates that there is nothing to be gained by restricting the number of vehicles that may be operated by individual hauliers. Irish policy has gradully found its way around to this viewpoint, though the legislation to implement it has not yet been passed (Feb. 1985). The mechanisms by which this policy has gradully been applied are the two Acts of 1971 and 1978, though the latter is the more relevant in the present context. In this Act licensed hauliers were allowed to increase their fleets sixfold. It was principally intended as an interim measure giving licensed hauliers an opportunity to expand and develop before the market was completely liberalised.

The evidence is that many hauliers did increase their fleet size, even though financial costs were extremely high. At the same time, the market was growing rapidly, particularly for international traffic. Hauliers probably took an optimistic view of the future and also perhaps felt that it was necessary to expand as a kind of protection against the threatened total liberalisation of the industry. As a result of the expansion in capacity and the subsequent slowdown in traffic growth there is almost certainly over-capacity in the vehicle fleet and this undoubtedly is to some extent due to the 1978 Act.

However, what would the effects of an alternative Act have been? It is likely that any Act along the lines of the 1978 one, allowing a multiplicative increase in fleet size, would also have resulted in over-capacity. Between 1977 and 1982 the average number of vehicles per operator increased from 1.9 to 3.5 and this increase could probably have been achieved (though in a different fashion) under any other legislative change similar to the 1978 Act.

Therefore, the important alternative to consider what effect the complete liberalising of the industry by removal of the barriers to entry would have had. In other words, what would the effects have been if this had been done in 1978 rather than the Act which was passed? Or, putting the question another way, since complete liberalisation is now envisaged — what were the gains, to society or to anyone else, by introducing the Act of 1978 and delaying by 8 or 9 years the introduction of complete liberalisation?

First, the intended and actual beneficiaries of the Act were licensed hauliers who were to be given a further opportunity to develop in preparation for the full liberalisation of the industry; the losers continued to be transport users and society because of the excess costs which still remained. For example, licences were still valuable and the restrictions on own account transport financing and backloading continued to impose extra costs. One cannot be sure that the benefits have outweighted the costs. There is little doubt that the licensed sector

is now more professional and better organised than it was before but this would probably also have occurred if complete liberalisation had been undertaken more quickly. Even with the gradual process of liberalisation there has been a significant recent upheaval in the freight transport market — with several firms leaving the market. Would this have been much worse in the event of total liberalisation? Obviously, it is impossible to be sure but the safeguards in terms of qualitative entry standards make it seem somewhat unlikely. In any case, it is fairly certain that the existence of the industry would not have been threatened.

On balance, since a 15 year liberalising period is extremely lengthy, it seems likely that the strong opposition of the existing professional hauliers to proposed liberalising measures has been given undue weight in considering the optimum method of organising the freight market. In future, with theoretically liberalised access, it is important to ensure that if these access standards are to be raised, existing hauliers are not given easy exemptions from new conditions. Otherwise the qualitative access conditions become a new barrier to entry.

Conclusions

This detailed examination of the licensed sector was facilitated by the availability of data over a reasonable time span. While the quality of the data is open to question is was worthwhile to examine the trends, some of which at least are robust enough to withstand the defects in the data. It is suggested that the Annual Survey of Licensed Hauliers, on which most of this section was based could be improved in several ways and that this should be examined by the CSO and the Department of Communications. This appears to be especially relevant in the context of a liberalised freight market when monitoring of trends in the new situation will be an important tool in the continuous process of policy review.

The principal developments in the licensed sector have been the decline in the size of the CIE fleet and the change in size structure of the other licensed firms. A large part of the latter is due to the 1978 Road Transport Act which allowed licensed hauliers with merchandise licenses to expand their fleets. Hauliers' receipts increased substantially in real terms during the 1970s and productivity measures, with the exception of vehicle utilisation measures, showed increases. Though the evidence is not complete, the indications are that the cost to users of licensed haulage services did not increase in real terms during the period. The decline inthe market share of the Railway Companies may be partially explained in terms of competitors who do not uphold loading and safety regulations, but there are other factors involved.

Policy in relation to licensed hauliers is discussed. There appears to be constant returns to scale in the haulage industry, attempts by Government to interfere with desired fleet size cannot be justified. The chosen method of

liberalising — in particular the 1978 Road Transport Act — is analysed and it is suggested that the method was not necessarily optimal. The slow pace of liberalising suggests too much weight was given to the views of existing hauliers.

Chapter 8

RAIL FREIGHT TRANSPORT

This chapter examines the role of rail freight in internal freight transport in Ireland. The issues covered include the freight market share held by the railway, a historical look at aggregate rail carryings and the commodities carried, an analysis of the competition between rail and road and an examination of the policy issues relating to the financial performance of the railway.

The Railways Market Share

The share of total internal freight traffic held by rail has been a controversial issue in transport debates in recent years. This has been principally due to the lack of information on road freight carryings. With the publication of the 1980 Road Freight Survey data it is possible to provide some information on the share of total road and rail freight movements held by the railway. Table 8.1 below presents the data for 1964 and 1980.

Table 8.1: *Freight transport by road and rail 1964 and 1980*

	Tonnes				*Tonne Kms*			
	Rail	*Road*	*Total*	*% by rail*	*Rail*	*Road*	*Total*	*% by rail*
		(Millions)					*(Millions)*	
1964	2.5	55.5	58.0	9.3	350.3	1,714.6	2,064.9	17.0
1980	3.6	102.5	106.1	3.5	636.7	5,010.5	5,647.2	11.3

Source: CSO. RFS; 1964, 1980. Sexton (1967).

The 1980 road data includes work done outside the country by Irish hauliers. There is not a precise estimate of this though 578 million tonne kms were performed by hauliers on international journeys. If this figure is excluded the market share held by the railway is about 12.6 per cent of tonne kms. This is an upper limit for three reasons. First, the 578 million tonne kms were not all performed outside the country, second, there is an amount of rail freight transport to Belfast which should be excluded from the rail freight figure, and third, there is an unknown amount of foreign vehicle activity on Irish roads . Such calculations are somewhat academic and it can be taken that the figures shown provide a reasonable picture of the orders of magnitude involved.

From the table it can be seen that, though both tonnes carried and work done increased between 1964 and 1980, the market share held by rail fell sharply. The

railway now has less than 4 per cent of tonnes lifted and about 11 per cent of work performed, significant changes from the corresponding figures of 9 and 17 per cent respectively in 1964. Thus, in an aggregate sense the railway now plays a relatively minor role in the internal freight market. Such a view would not, however, gain universal acceptance and it is worthwhile to consider the overall significance of such market share figures.

Freight transport is a very heterogeneous activity. In the aggregated way it is being presented here, the distribution of groceries to households in an urban area is the same as the carriage of cement from Platin to Wexford. Clearly, the railway has no interest in the former type of traffic though it is a suitable mode for the latter. Also the railway is a relatively small radial network which does not link directly all major destination pairs. The question then can validly be asked whether markets in which the railway does not compete or traffic in areas it does not service, should be included in any consideration of market shares? It is reasonable to suggest that the answer to this question depends on the purpose to which the information is to be put. On the one hand, from CIE's point of view as an operator, the markets in which it does not compete are clearly of no interest to it. By concentrating only on traffics of immediate interest to itself, marketing effort can be directed towards the market segments to which it identifies opportunities. On the other hand, from the point of view of transport policy and the role of the railway in general the aggregate figure is obviously a significant one. Therefore,a discussion of the railways' role in freight transport must look at its overall impact on the market, while not forgetting its specific impacts on certain routes or areas. More specific market share calculations are now possible because of the data from the 1980 Road Freight Survey. These relate to links between Dublin and a number of major provincial cities and towns. Data for some centres are amalgamated to preserve confidentiality.

Table 8.2 presents the total road and rail market and rail percentage share for traffic between Dublin and each of the towns listed for both 1964 and 1980.

The striking feature of these data is the large decline in the railway's share of total traffic between the towns. The falls from 43 per cent of Dublin originating traffic to a share of 11 per cent, and from 38 per cent to 18 per cent for Dublin destination traffic represent major erosions of overall market share. The traffic on the relatively shorter distances to Drogheda, Kilkenny, Waterford and Wexford is now virtually entirely by road. Rail has higher market shares on the longer distances through this is nothing like as pronounced as in 1964. For example, the Dublin-Sligo market did not increase greatly but the rail share fell from 74 per cent to 17 per cent. The Waterford-Dublin rail traffic is the only one to have shown any growth in market share, largely due to the development of Waterford port. In terms of carryings, Rail traffic has declined substantially on every link except the Cork route where a slight fall has occurred in rail traffic

Table 8.2: *Road and rail traffic on certain routes radiating from Dublin 1964 and 1980*

	Originating in Dublin				*Terminating in Dublin*			
	Tonnes (000)		*% by rail*		*Tonnes (000)*		*% by rail*	
Town	*1964*	*1980*	*1964*	*1980*	*1964*	*1980*	*1964*	*1980*
Drogheda	101	157	18	2	249	192	47	0
Kilkenny/ Wexford/ Waterford	152	267	33	5	70	269	19	28
Galway/ Athlone	135	223	40	10	14	59	19	4
Limerick	91	178	54	14	43	57	49	12
Sligo	93	111	74	17	15	34	7	33
Cork	136	407	44	13	71	298	34	21
Tralee	23	32	74	59	4	18	16	33
Total	732	1,374	43	11	466	927	38	18

Source: CSO; CIE; Sexton (1967).

from Dublin and a significant increase in traffic to Dublin. However, rail has a smaller share of the total traffic due to the more than threefold increase in total traffic between the two cities.

The rail market share is higher (18 against 11) on the trips into Dublin principally because of the influence of the Waterford traffic, though there are higher proportions in return journeys from both Sligo and Cork.

It should be noted that the inter-urban movements being discussed represent a relatively small shares of total freight movements, as Table 8.3 below demonstrates.

Table 8.3: *Share of total traffic accounted for by movements between Dublin and provincial centres*

	Road	%	*Rail*
1964	1.3		19.6
1980	1.9		8.8

Source: CSO; CIE Annual Accounts.

It can be seen that such movements have become relatively more important for road transport and significantly less so for rail. Rail traffic is now heavily concentrated on bulk movements (e.g, cement, mineral ores) which do not involve use of the links above.

In conclusion, while market share measures depend on the purpose for which they are intended, it can be seen that the railway has a small and declining share of the total aggregate market and of the inter-urban links examined.

The next section presents some data on the railways performance over the past twenty years.

Rail Freight: Trends

The data in Appendix 6 shows the tonnes carried and the ton-miles performed on the railway system since 1960. There are some statistical difficulties with continuity but the errors are probably relatively small and occur in the early part of the period. The pattern shown by the data indicates that between 1960 and 1980 freight carryings on the railway increased by 42 per cent from 2.5 million tonnes to over 3.5 million tonnes. Between the Road Freight Surveys of 1964 and 1980 rail freight carryings increased by 37 per cent and tonne kilometres by 82 per cent indicating an increase of 33 per cent in average haul length.

Most of the growth in tonnes carried occurred between 1966 and 1972 with little growth during the 1970s. There has, however, been some increase in tonne kms performed as a result of the increasing average length of haul.

Commodities Carried

Commodity classifications going back to 1960 are difficult to obtain as consistent data are not published on this topic. Table 8.4 shows a full comparison over the period 1968–1980 and includes estimated totals for 1960.

Drink traffic has remained fairly constant reflecting the long-standing agreement between CIE and Guinness for the distribution of their products. About 60 per cent of Guinness production for home consumption is shipped by rail. Beet traffic has halved from 442,000 tons to 233,000 tons though beet production increased by 21 per cent from 950,000 tonnes in 1960 to 1,154,000 in 1980. The loss of traffic for railways is due to the growth and flexibility of road haulage allied to the seasonal nature of the beet traffic making it a marginal traffic for the railway.

Fertiliser traffic on the railways increased sharply between 1960 and 1970. However, a decline in rail carryings set in and continued until 1980. The distribution patterns for fertilisers changed sharply in the mid 1970s with the closure of Goulding's Dublin plant. This led to a proliferation of import centres resulting in the growth of road transport of fertilisers. McKinsey (1980)

Table 8.4: *Commodities carried on the railway, 1960–1980*

Category	*Year ended 31st March*							*9 months ended*	*Year ended 31st December*						
	*1960**	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*31/12/74*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*
Tons Carried							*Thousands*								
Ale, Beer, Stout	176	200	199	211	228	235	211	223	170	229	208	210	206	203	198
Beet and Beet Pulp	442	310	348	287	288	346	327	331	195	271	307	284	260	224	223
Cement	414	880	878	775	745	959	1,006	995	693	757	794	729	793	807	654
Fertiliser	158	402	395	343	397	362	359	307	190	254	282	307	304	280	367
Mineral Ores	n.a.	94	240	362	625	549	630	658	523	640	612	774	1,025	1,026	999
Petrol and Oil	48	205	220	142	168	221	266	273	204	268	261	267	309	297	293
General Freight	n.a.	910	992	1,025	943	1,017	834	885	739	966	1,016	938	892	902	837
Total	2,518	3,001	3,272	3,145	3,394	3,689	3,633	3,672	2,714	3,385	3,478	3,509	3,789	3,739	3,571

Source: CIE, Annual Accounts.
*Full classification for 1960 not available.

estimates that rail carried 17 per cent of the total fertiliser market in 1979, a share which had declined from 39 per cent in 1970.

Cement is carried on the railway in both bulk and bagged form. The railway carries about 50 per cent of total bulk sales of cement and about 75 per cent of bagged cement from the factories at Platin and Limerick. Cement sales fluctuate with the level of economic activity and present railway carryings reflect the depressed state of the building market, with the levels of the early 1970s unlikely to be attained for some time.

Petrol and oil is carried for a limited number of customers. This market grew strongly in the 1960s and less so since. Established distribution patterns for petrol and oil militate against significant increases in this traffic unless oil finds off the coast give rail new opportunities.

The mineral ores classification in Table 8.4 includes the new Tara mines traffic from Navan to Dublin. Quigley Magnesites transport raw materials from Bennetsbridge to Ballynacourty and the end product, magnesite, from Ballynacourty to Cork. The only mineral ores carried prior to 1970 was the Silvermines to Foynes traffic which still exists. While this type of traffic is particularly suited to rail' loads are not carried a great distance as none of the hauls involved is much over 50 miles, though this has been the main growth area over the period shown.

Goods handling methods are now highly automated following investment in equipment between 1976 and 1980 of about £15m. The result is improved utilisation of railway wagons and containers. Storage for cement and fertiliser has been provided (formerly the wagons were used) allowing a smoother seasonal flow especially of the fertiliser traffic.

Competition between Road and Rail

The railway's monopoly of longer distance transport has long gone. Though CIE is the only supplier of rail transport there is a close substitute in the form of road transport. As we have seen, road is now the dominant mode and appears to be gradually eroding the railway's share of the total freight transport market. The liberalising Acts of 1971 and 1978, and particularly the former, have given an impetus to the road mode, since restrictions on area of operation were removed in that Act. Competition between road and rail is best analysed at a disaggregated level because of the widely differing characteristics of subsectors of the total transport market. At this stage neither comparable commodity analyses, nor journey and distribution characteristics nor the price information which allow a detailed understanding of these submarkets are available. Thus the comments are restricted to five general considerations of elements of competition in the freight market.

First, competition between rail and road occurs not just in relation to the price of a consignment. Quality of service variables are extremely important in freight transport. The length of time a consignment takes to deliver, the amount and type of handling involved and the security of the consignment are all factors that matter to varying degrees for different consignments. There is a limited amount of quantitative work that can be done on these topics and one can only make general remarks about them. On speed of transport, it is obvious that the road will provide a faster door to door service over most distances in Ireland. This can have implications for asset utilisation where, for example, a fast turnaround of containers is important. In many cases the additional journeys to and from a railhead are obviously impractical because of the amount of handling involved, and rail often has no real competitive chance unless a special siding is provided at one end.

Second, though competition on price exists, it is not an easy topic on which to obtain information. A very general indication is provided by the data on receipts per ton for both the road and rail modes.

Table 8.5: *Receipts per ton for road and rail freight 1969 and 1980*

	Receipts per ton (£)	
	Road	*Rail*
1969	.98	1.88
1980	5.19	3.56
% increase in current terms	430	89
% increase in real terms	36	-51

Source: CIE Annual Reports: Annual Survey of Licenced Hauliers.

The data are somewhat crude because they are collected from different sources and relate to different modes of transport and different commodities. However, the trend shown is very striking. Road freight receipts per tonne for licensed road hauliers increased by 36 per cent in real terms while rail freight receipts fell by 51 per cent. Different lengths of haul and different relative changes in them are partial explanatory factors. So are the changes in the commodity mix carried on the railway towards bulk commodities. However, neither these factors nor defects in the licensed hauliers data are likely to be so great as to invalidate a general conclusion that the railway is maintaining its traffic by keeping rate increases to a minimum.

A *third* issue is the question of costs. There are a number of points:

(a) Costs for rail freight are not readily obtained. Accounting procedures in CIE treat rail freight and passenger costs together, and there is no allocation of costs between the two services. British Rail are expected to cover the avoidable costs of freight operations by freight revenue. There is no such stipulation for CIE. One consequence is that there are no financial measures by which rail freight can be judged. This is a serious defect and should be remedied. While it is a matter for government to set targets and to demand relevant information, one would think that no business should operate without knowledge of the costs, however defined. These should be made public.

(b) Road freight costs generally refer to accounting costs and do not reflect opportunity costs or indeed social costs. Thus environmental costs (like pollution, noise and vibration) or congestion costs are not reflected in any figures that are available.

(c) Rates in road freight follow financial costs — otherwise businesses become insolvent. This is not true of rail freight, where the evidence is that rates are linked more to what the market will bear than to costs (however defined).

The conclusion one is forced to is that there is a completely inadequate picture on costs, not just social costs but direct financial costs for each mode. This makes an assessment of the competitive position very difficult. It is essential that more information on costs be made available by CIE so that the financial position of rail freight can be validly assessed.

Fourth, the strong bargaining position of purchasers of transport services is an important feature of the market. Purchasers first have the option of buying their own transport if hired haulage cannot meet the required standards. Then, sharp competition between hauliers forces prices down. Evidence that many pricing decisions are dictated by the buyer confirms their strong position. This situation applies even more to the railway as it is heavily dependent on a small number of large customers who have the option of switching to the road mode and the loss of any of whom would be a major blow to the railway.

A *final* point is that the development of sophisticated techniques to mathematically model the competition between road and rail is well advanced in the United States; Wilson (1980); Friedlaender and Spady (1981) provide two examples. However, the dissimilarities with the situation in Ireland are so great that the direct application of their methodology would not be particularly fruitful. For one thing the data are not available and, in any case, the structures are so vastly different (for example, any haul of less than 200 miles is regarded as a short haul) that the work would need such substantial adaption that it is beyond the scope of this report.

Financial and Policy Aspects

The financial performance of the railway is obviously important to this discussion. The railway freight business is not profitable on any reasonable apportionment of costs. On the most optimistic costing scenario, with the freight system seen as an adjunct to a passenger railway, McKinsey (1980) estimated that the avoidable loss on freight transport was of the order of £9.6m in 1979, on receipts of only about £11m.

These figures were disputed by CIE but they have not provided any others, and as a point of departure for the discussion, they are being taken as reasonably indicative of the actual cost situation.

From a policy point of view a continuing loss of around £10 million raises a number of issues, the most important of which is why taxpayers should subsidise freight transport on the railway? The usual answers to this are that the railway performs a vital social role in the distribution of goods, and that it keeps heavy traffic off the roads.

In regard to the distribution of goods for social reasons the report on Transport Policy by Foster (1980) says (p. 66) that "CIE should be required to provide a nationwide parcels and sundries service since we doubt if this could be left to private enterprise." On the other hand, McKinsey (1980) recommended that CIE's rail sundries business should be shut down as it was endemically loss-making and had no prospect of recovery. McKinsey did not consider that the social arguments were significant. These positions are not in conflict however. The Foster recommendation that CIE should provide a nationwide parcels service for social reasons does not depend on rail. Thus, there are other ways of meeting this social objective than through the railway or indeed through CIE, whatever about the validity of the claim that private enterprise would not handle the business.

In connection with keeping goods traffic off the roads, Foster's view is that there are "certain identified bulk traffics which should be restricted to rail at a fair price". This is somewhat platitudinous since there is no amplification of what a fair price is. If these prices are cost related then rail may be more expensive and users would have to be forced to use the railway. On the other hand, if rail prices have to be kept in line with those in the competing mode (and there is no reason for industry to expect otherwise) there is an implicit subsidy to freight users of the railway. Most of these users are large private companies and it seems somewhat anomolous that their transport costs should be subsidised by the state. These companies choice of mode will be independent of social considerations and if the railway cannot offer rates that are cheaper than road they will use the alternative. Thus the social commitment to the freight railway is a one-way thing, implicitly made on taxpayers behalf by CIE. The assumption made is that this commitment provides a worthwhile social gain, since the alternative

(having goods travel by road) would impose extra costs on society in terms of greater congestion or road damage. This question can only be answered fully at a micro level — by looking at the particular impact of transferred traffic on individual sections of a network. In the aggregate, it does not appear that an extra 3 or 4 per cent of tons would greatly overload the system, though it must be remembered that on busy routes marginal traffic contributes disproportionately to congestion.

If policy is to be directed towards a greater use of rail freight transport for social reasons, the question of how this is best achieved needs examination. Though the evidence is not conclusive it appears that the free operation of "market forces" will result in yet more traffic on the roads. To retain or increase rail freight traffic, the choices lie between a combination of some form of compulsion, higher road user charges and increased rail subsidies. Any form of compulsion would seem to have little practical change of success and, realistically, can be dismissed fairly readily. There is little to be said for raising the cost of all road freight transport, though as we have seen, there is a strong case for higher taxation for heavier goods vehicles. In New Zealand, a levy is imposed on all goods vehicle trips in excess of 150 km, though this is being gradually reduced so that by 1987 the choice of mode will be left to the market. The implementation of such a proposal here sounds impractical in view of our very different system of regulation and in any case it would be very difficult to implement and monitor. If goods vehicle taxation beyond the level of average social costs is not warranted the main alternative is the continuation of subsidy to the railway.

One of the features of the railway is that it exhibits economies of scale to traffic density. In other words, extra units of traffic on the railway can be handled at increasingly lower costs. At present Irish railways carry less freight per kilometre of track than any other country in the EEC except Greece (see Appendix 7) and there is capacity for significantly increased carryings. This should be to the advantage of rail allowing it to offer cheap services which make a net contribution to costs. However, once road users are paying their full social costs, the encouragement of extra freight traffic to the railways by strategies which reduce profits or increase losses cannot be justified.

The effect on modal split of the adoption of an economically efficient system of marginal cost pricing by both modes must be speculative. If the figures used in this report are reasonable it appears there would be a greater increase in rail prices than in road prices to arrive at a system of marginal cost pricing. Thus, rail would lose traffic with the extent of the loss depending on the cross price elasticity of demand.

Concluding Remarks

In the aggregate the railway has a fairly limited role in freight transport in

Ireland, though in particular markets and locations its impact can be significant. Carryings have increased over the past twenty years but not as rapidly as road freight carryings. The type of traffic carried has shifted towards bulk commodities, and partly, but not entirely because of this, revenues per ton have declined in real terms. The rail freight business loses significant sums of money even when costs are assigned to freight in a favourable way. Competitively the railway is in a relatively weak position because of the greater flexibility of the road mode. Its heavy reliance on a small number of large customers is both an advantage and disadvantage but on balance is probably more of a disadvantage because of the strong bargaining power of these customers. The inadequate picture in relation to costs for both road and rail make judgements on the long-term future of rail freight premature. However, if social costs are seen to be covered by road users then there is no serious justification for continued subsidies to rail freight operations.

Chapter 9

GENERAL ECONOMIC ISSUES

This chapter considers general issues relating to freight transport supply and demand. It also considers the arguments put forward for the regulation of the supply of freight transport.

The Demand for Freight Transport

The demand for freight transport, unlike the demand for consumer goods , is a derived demand, with freight movements arising from demands in other sectors of the economy. This demand is determined by many factors including industry location and output, agricultural output and consumption, the level and composition of imports and exports, changes in stock levels, and the patterns of wholesale and retail distribution. In the short run, cyclical and seasonal factors are very important but in general the principal determinants of freight transport demand are physical goods production and distribution.

The measurement of transport demand poses some difficulties. The usual physical measures of output are tonnes or tonne kilometres (in imperial units-tons or ton miles) but the non-homogeneity of the output causes problems in aggregation. In transport no two journeys or loads are the same. The characteristics of a journey which involves moving 1 tonne 10 kilometres can be very different from those in moving 10 tonnes 1 kilometre. Even journeys involving similar loads between the same points can be different because of weather and traffic conditions. There are special considerations relating to, for example, the fragility or perishibility of goods and to the movement of dangerous or valuable goods that cannot be reflected in aggregate data. Moreover,time is a factor that cannot easily be taken into account in the physical measures. While data and other considerations limit the disaggregation that can be shown, the problem of the heterogeneity of the output is one that continually arises in studies of freight transport. Value measures of output are rare, partly because such measures are often not available since many of the services (e.g., in the own account sector) are not sold on the open market, and partly because markets are distorted by licensing systems, tariff controls and subsidy to such an extent that prices do not relfect relative values.

Despite the heterogeneity of the output, it has been found empirically in many countries that the aggregate derived demand for freight (as measured by tonnes or tonne kms) is closely related to real GDP or an index of output like the index of industrial production. This is partly because locational patterns, once established, tend to be reasonably stable and partly because stock changes are

often relatively small compared to total production.[16] Simple mathematical models have been used successfully in the US and elsewhere. These models often take the form

$$Y=aX^b$$

or

$$Y= a+bX, \text{ where}$$

Y is aggregate demand for freight transport in tonnes or tonne kms, X is real GDP or some variant on it, and a and b are constants. Such models are useful in making projections and are discussed in more detail when this topic is addressed in Chapter 10.

While freight transport bears a close relationship to national output the nature of this relationship can change during the different stages of development of an economy. It has been found (European Conference of Ministers of Transport, Round Table 16) that the demand for freight transport grows more rapidly during a country's early stages of industrialisation. With increased mechanisation in production the increase in freight transport slows down in comparison with the expansion of total production. The more the significance of the basic materials and producer goods sector recedes the more the growth slows. In technical terms, this is equivalent to saying that the elasticity of transport demand with respect to output declines over time. This means that, as an economy develops, each successive 1 per cent increase in output results in a declining percentage increase in transport demand. It has been found that, as an economy reaches an advanced state, the magnitude of these percentage increases in transport demand declines to near unity, implying that each one per cent increase in output also results in a 1 per cent increase in transport demand. In more mathematical terms, a declining elasticity is consistent with the linear formulation of the relationhsip between GDP and transport demand

$$Y=a+BX, \text{ with } a < 0.$$

A constant elasticity is consistent with the formulation

$$Y=aX^b.$$

An elasticity of 1 implies b=1.

These results are not easily examined for Ireland, because of a lack of suitable data on transport demand. Fleet capacity measures have bveen used as indicators of transport activity with erratic indications of the elasticity of freight transport with respect to final demand. One of the problems is that fleet capacity

[16]An increase in GDP could be manifested as an increase in stocks — leading to little increase in transport demand. Conversely, an increase in transport demand could arise from a running down of stocks.

is a supply side variable and is influenced, at least in the short term, by factors other than transport demand.

The influence of price (i.e., the rate or tariff level) on freight demand is difficult to determine, especially in the longer run. In the short run freight transport demand is highly price inelastic in the sense that large decreases in price will not generally result in significant changes in the quantity of freight to be moved. Price is, however, likely to influence modal choice where there is competition between modes, implying that sharp changes in the relative price of competing modes will have a significant effect on the market share of the individual modes.

While price is evidently important, less quantitative factors are also of great relevance; these include speed of delivery, security of load, method of goods handling and reliability of service. The quality of transport infrastructure in terms of the available choice of routes or modes, can influence location decisions and thereby the demand for transport.

The Supply of Freight Transport.

It is evident that, as on the demand side, the supply of freight transport is very heterogeneous, with the many sub-markets being supplied by different modes, different kinds of operator or different kinds of vehicles. It is worth noting too that while demand is often denominated in tonne kilometres, in practice supply can only be measured in terms of available capacity, usually denominated in tonnes.[17] One conclusion is that it is difficult to know whether supply and demand are in equilibrium, since for example a constant demand could necessitate increasing capacity due to, say, slower speeds.

Government intervention can affect transport supply, by placing barriers to entry, by limiting the use of available vehicle capacity as in the backloading restrictions on own account firms, or by more fundamental adjustments to the extent or use of the infrastructure. The longer term effect of these types of restrictions on, for example, firms' locational decisions, is difficult to estimate, but in the shorter term the effect is to raise the equilibrium price of transport by shifting the supply curve to the left, assuming the outcome of the regulation is that supply is at a lower level than it otherwise would have been.

Restrictions on Transport Supply

Though stated policy is now in favour of a relaxation of some existing barriers to entry it is worthwhile to review the arguments for the retention of such restrictions.

[17]Theoretically, capacity in tonnes could be transformed into potential tonne-kms making assumtions about aspects of utilisation for different size vehicles. However, in practice this is not easily done.

Intervention on the supply size, particularly in road transport, has been justified over the years for a variety of reasons, the principal of which have been

(a) The dangers of uneconomic price cutting
(b) Fluctuations in demand
(c) Protection of the railways
(d) Control of road use

Each of these is examined in turn. The treatment is largely based on that of Munby (1965).

(a) *The Dangers of Uneconomic Price Cutting*

This argument goes as follows: The road freight market is composed of many different operators, all of whom have a limited view of the market. Optimistic assessments of prospects can result in over investment. Over capacity develops and prices are set below an economic level. This leads to confusion and bankruptcies in the industry. This would be to the ultimate detriment of consignors who would gain immediate advantages in particular quotations at the expense of the general failure of the industry to meet their demands. This case, as a general one, has most force in industries which have high fixed costs relative to operating costs, and where capacity provision is expensive or involves long lead times. While freight transport has high fixed costs releative to operating costs, capacity provision is not expensive. The basic capacity unit is a lorry and a driver which is not very costly and does not take very long to provide. Therefore the danger of price cutting leading (because of low profits) to a shortage of capacity seems to be exaggerated, since capacity can be increased quickly.

One possibility is that more competitive pricing could lead to qualitative changes in the industry, for example, towards smaller units using inexperienced drivers and with lower standards of maintenance and safety. While this is a possibility there are at least two reasons why the undesirable features of such changes should not persist. The first is that the qualitative barriers[18] to entry, as well as regulations on working conditions and vehicle fitness should ensure that the industry is not flooded by incompetent operators who have failed in other sectors. The second is that the customer will demand standards of service, which, if they are not forthcoming, will result in the custom being taken elsewhere.

In general the harmful effects of bankruptcies to an industry like road haulage can be exaggerated and there does not seem to be any strong argument that

[18]For example, EEC Directive 74/561 and 74/562 on access to the industry, require that those wishing to engage in the industry

— are of good repute
— are of appropriate financial standing
— satisfy the professional competence requirement.

applies to road haulage as distinct from other industries why those who are prepared to establish a freight transport business should be prevented from doing so.

A permanent state of excess capacity in the industry, because of free entry, does not seem very likely. The inefficient firms will be forced to bankruptcy and excess capacity will be eliminated relatively quickly. Increased capacity in freight transport occurs gradually, not at all similar to manufacturing plants or elsewhere in the transport sector where the minimum size unit can have a significant impact on existing capacity.

(b) *Fluctuations in Demand*

The argument in the preceding paragraph that permanent instability is unlikely to arise in the road haulage industry has primarily been structured in terms of the cost profile of the industry. Demand has not been considered. It can be argued that the structure of demand, in particular seasonal fluctuations and imbalances in the flows of goods between regions may cause instability in the industry which need to be legislated for. The argument is that capacity grows to meet peak demand, whether seasonal or in a trade imbalance between localities. The result is overcapacity in off peak periods, which leads to uneconomic pricing ending in bankruptcy and instability. While such effects can occur to an extent, it should be realised that price differentials between the peak and off peak are desirable because they encourage better use of capacity and can smooth out fluctuations or imbalances. It should also be realised that it is a real advantage to the economy to have cheap off peak services. This does not imply that the normal haulier will be unable to earn an adequate return, as if rates fall during the off peak they can rise during the peak.

Greater flows in one direction are exactly analogous to the seasonal peaks discussed in the previous paragraph. Capacity in the direction of the heavier flow will be more fully utilised and in general rates will be higher in that direction. On the return leg, with less demand, greater competition forces prices down, resulting in benefits for consignors. If losses are made on the return leg they should be compensated by profits on the outward leg.

(c) *The Protection of the Railways*

The arguments for the protection of the railways have, with some differences in emphasis over time, tended to concentrate on the issues that are not directly measurable by financial means. In other words they have tended to focus on a broader concept of costs than that shown in conventional accounts. While many of these non-measurable social costs have been made more explicit in recent years the arguments in favour of protection for the railway have continued to concentrate on them. In the 1930s the railways themselves were highly regulated

and the competition from the emerging road mode was uncontrolled in that there were no standards for lorry maintenance or behaviour. Thus, the argument of unfair competition could be sustained to some extent at least. The arguments since then, deriving from the fact that the restrictive legislation at the time did not succed in protecting the railway, have been similar though somewhat more sophisticated. They have focused more (qualitatively rather than explicitly) on the costs imposed by goods vehicles. These costs take the form of damage to roads, increased congestion and higher accident rates, as well as a range of environmental costs that road vehicles impose and do not pay for. These arguments have often been presented by a strong interest group, with an exaggerated view of its importance in the market. Furthermore the arguments have always gained political force when allied to the severe unemployment consequences of any major decisions against the railway.

The problem does partially centre on costs. A situation where both modes operate under conditions of equal or nearly equal competition has always been difficult to bring about. The evidence in regard to costs is inconclusive in that railway charges are below marginal costs (see Chapter 8) and road freight transport charges (at least for some classes of vehicles) are below average costs, (Chapter 5). The approach taken by the Armitage Committee in Britain was that traffic should be encouraged to use rail by increasing taxation on the heaviest lorries since it seemed unlikely that they were covering their full costs. However, once road users are paying their full costs (including social costs), the encouragement of traffic onto the railway would appear to be better based on subsidy than on excessive taxation of road goods vehicles or on barriers to entry. Because of this, restrictions on, for example, backloading cannot be justified since they unnecessarily impose extra costs on road freight transport.

In an Irish setting, the general arguments for the protection of the railway was discussed in detail by Foster (1980). Foster concluded that for each specific argument there were stronger counterarguments. Specifically in relation to freight, the carriage of dangerous goods by rail was examined. The conclusions were that it would be impossible for all such goods to travel by rail, that the road mode could in any case improve its safety standards, that there was no guarantee that a serious rail based accident would not occur and that the costs of retaining the railway for this reason would not be worthwhile.

(d) *Control of Road Use*

The control of road use is a more recent reason for attempting to limit the number of goods vehicles in operation. In Germany, for example, it is a crucial element in their restrictive policy towards road freight. The argument is that existing roads are heavily congested. Building more roads is increasingly difficult due to both space limitations and opposition by environmental and other

groups. It is therefore necessary to ration use of the network.

In this regard, it is evident that there can be no justification for restrictions on backloading in view of the extra vehicles required to carry the existing stock of goods.

The most crucial issue is how road vehicles can be made to pay their full costs. Ideally, a system of road charges with an appropriate congestion tax would ensure that goods vehicles paid their full costs. In practice, this may not be so easy to achieve. The next best option lies in placing some restrictions on the operation of goods vehicles in particular areas. The least attractive alternative is a solution based on general supply restrictions.

In summary, this argument appears to present the strongest case for intervention by the state in the supply of freight transport and it has become increasingly relevant in recent years. The other reasons advanced above for controlling the supply of freight transport have been used for many years.

More recent reasons justifying intervention have included constraints on the availability of fuel and environmental reasons.

The former assumes greater public importance at times of shortage but in general little has been done to intervene. Indeed, in Ireland the move to larger vehicles has caused a more rapid increase in fuel consumption than would be indicated by vehicle numbers. While the rising cost of fuel has led to improved vehicle performance this does not appear to have been as rapid for goods vehicles as for motor cars.[19] Intervention has only justification in the case of extreme shortage of supply. In such a case contingency plans to determine priorities are necessary and have been drawn up in several countries.

The environmental issue has links with that on control of road use. Goods vehicles have numerous detrimental effects on the environment including pollution, vibration and general noise intrusion. Restraint on goods vehicle use, usually in urban areas or at certain times has followed in many cases. In general, quantifying the costs of the environmental disadvantage of the lorry is fairly intractable and the solutions thus far devised have not been based on full economic evaluations.

Stricter manufacturing standards and closer enforcement of existing standards are consequences of greater environmental concern and can reduce some of the adverse effects of goods vehicles. However, in urban areas especially controls on the unfettered use of goods vehicles have been introduced in several places and is a subject which warrants detailed investigation in some Irish cities and towns.

[19]Between 1976 and 1982, there is no improvement shown in fuel consumption for goods vehicles in the costing tables produced for hauliers.

Chapter 10

PROJECTIONS

Introduction

The purpose of this chapter is to present projections of the number of goods vehicles as well as the carrying capacity of and the tonne-kilometres worked by the commercial road haulage fleet. Projections of these kinds are useful for a variety of reasons. Because of the traffic interference characteristics of goods vehicles, road capacity planning necessitates an explicit recognition of the truck content in traffic flows. Greater capacity has to be provided at a given service level if the truck content is high. Additionally, most structural damage to roads is caused by heavy lorries and the designed pavement strength of roads is, therefore, dependent on the goods vehicles using the roads. Though goods vehicles comprise only 8 per cent of the vehicle fleet, they perform about 18 per cent of vehicle kilometres and 94 per cent of standard axle kilometres.

It is not solely for road investment purposes that goods vehicle projections are useful. The increases in the size of goods vehicles have focused increasing attention on their contribution to congestion as well as their detrimental environmental effects. Estimates of likely future numbers of such vehicles, if present policies are pursued, allows a clearer assessment of some of the practical difficulties involved. The impact on urban areas of increased lorry numbers, for example, is a significant problem that has not been satisfactorily tackled in this country, though the Dykes Act in 1973 in Britain forces local authorities to make plans to reduce the environmental intrusion of lorries.

This section first looks at previous projections of goods vehicle numbers and capacity, then discusses the difficulties in making projections. Projections for 1990 and 1995 are then computed and finally, the policy and other implications of these projections are drawn out.

Previous Work

Forecasts by Blackwell (1969), McCarthy (1974) and McCarthy and O'Mahony (1980) of aspects of the goods vehicle fleet, its capacity and performance have relied on developing a relationship between a transport supply variable (usually vehicle capacity) and a macroeconomic variable such as an index of production or a national output measure. The underlying principle of such models is that the supply of transport is determined by general economic conditions and that forecasted levels of economic activity will determine the level of transport supply. It is interesting to examine this hypothesis in the light of the projections made in this fashion in the past.

Blackwell (1969) projected the capacity of the fleet, the ton miles performed and the number of vehicles using an iterative approach so that consistency between them was obtained. The following table compares his estimates with the outcomes as observed from the 1980 Road Freight Survey.

Table 10.1: *Actual outcomes and Blackwell projections for 1980*

	Blackwell estimates (E)	*Actual outcome (A)*	*Percentage error ((A-E)/A)100*
Capacity (tonnes 000)	251	461	45.6
Tonne kms (millions)	4,119	5,010	17.8
Vehicles	56,100	82,400	31.9

Source: Blackwell (1969) (Tables 5, 11, 14); CSO, RFS (1980).

Blackwell's estimates were based on very little data, only having a consistent series from 1960 to 1967 for vehicles and capacity. What is interesting though, is that his forecasts of the economic variables, GDP and imports were remarkably accurate. Yet there were relatively large errors in his transport related forecasts especially in the vehicle numbers and capacity measures. McCarthy (1974) projected carrying capacity on the basis of a double log formulation of the relationship between capacity and final demand. His projections and the actual outcome are compared below.

Table 10.2: *McCarthy projections and actual 1980 values of final demand and capacity*

1980 Values	*Growth in final demand (% p.a.)*	*Carrying capacity (000 tons)*
Projected	4.0	240
Actual	4.1	310

Source: McCarthy (1974); CSO RFS and NIE.

It can be seen that, as with Blackwell, the economic variable was projected accurately but carrying capacity was not. The percentage error (i.e, error/actual) was about 23 per cent.

McCarthy and O'Mahony (1980) repeated the 1974 work, though this time using a simple linear formulation of the relationship between final demand and carrying capacity. The forecasts for 1980 and 1982 showed errors of 4 per cent and 7 per cent when the correct value of final demand is inserted in the equation. The estimates (at the lowest economic growth rates) are closer to the actual values because even the lowest economic growth rate was too optimistic.

Efforts at projecting capacity in terms of its own behaviour in the past are interesting to examine. The 1960–1972 growth rate in capacity (using McCarthy's capacity series) shows a growth rate of 6.1 per cent. If this rate is projected to 1980 we get a total growth rate of 60.7 per cent and an estimated capacity of 278,000 tons as against the actual of 310,000 and McCarthy's forecast of 240,000. Blackwell could also have projected the 1980 capacity on the basis of the growth rate in capacity 1960–1967, a rate of 5.8 per cent, forward to 1980, giving a total growth rate of 108.5 per cent or a level in 1980 of 263,000 tons, again better than his own estimate of 251,000.

Difficulties with Projections

Data

Projections of the road vehicles fleet's performance in the past have relied exclusively on the DOE annual Census data. The discussion in Chapter 2 has highlighted the principal difficulty with the DOE data — as that it excludes vehicles which are untaxed at Census day. Moreover, the understatement of vehicle numbers is not constant in different unladen weight classes and is significantly greater for heavier vehicles.

The information from the series of Road Freight Surveys is the source of these criticisms of the DOE data. However, the RFS data are not yet themselves sufficiently refined to provide an entirely reliable series. Consequently, the series linking 1964 to 1980 which have been constructed in Chapter 2 are based on assumptions which are quite tentative.

Models

The conventional method of forecasting in this area is to try and derive a mathematical relationship between the variable of interest and a broadly based macroeconomic variable on which it is thought to depend. These relationships, once found, are assumed to hold in the future. The macroeconomic variable is estimated and the derived value of capacity or vehicle numbers automatically falls out. Using this method solely for prediction implies the assumption that the economic variable is easier for some reason to forecast than the transport one. It also includes the more fundamental assumption that the relationships derived from the past continue to hold in the future — an assumption which we have already seen to be dubious. Nevertheless, such models can provide valuable

insights into the underlying structures and can also be used in policy simulation exercises.

The models used are generally of a very straightforward kind — usually simple linear regressions of vehicle capacity on final demand. These models, however, may not be appropriate and can give misleading projections when the true relationship is of a different form. More sophisticated models can be tested, for example, various forms of lagged models where capacity in one year is taken as a function of capacity the year before and a macroeconomic variable. Such models, in general, provide better fits to existing data and, certainly in the short term, are better performers as forecasters. In the longer term, lagged models become virtually equivalent as predictors to the simple linear models, and have a high dependence on the initial value of the dependent variable.

Other Factors

The factors determining the future size of the goods vehicle fleet and its performance are numerous. Inevitably, a variable like final demand cannot hope to capture them all. Location patterns and the resultant distribution patterns can change without any change in final demand. Increases or decreases in stocks can result in less or more freight transport respectively without affecting final demand. Legislative provisions, and expectations about change, can have important effects on vehicle purchase decisions. Changes in permitted maximum weights and dimensions of goods vehicles can affect numbers. Improvements or disimprovements in the efficiency with which vehicles are used can strongly affect numbers. Increasing car numbers can increase congestion thereby requiring more goods vehicles to do the same work. Restrictions on vehicles of certain types can result in switches to vehicles of a different kind. Taxation policy can affect decisions about size and type of vehicle. Changes in methods of goods handling can affect the efficiency of use of goods vehicles. These factors represent a selection of those determining the future size and composition of the vehicle fleet. The decisions by individual hauliers to replace vehicles or introduce new ones are based on their own perceptions of the market and may not be connected to aggregate developments at all. Economic growth can be concentrated in high value, low volume goods, and therefore the physical volume of goods transported need not have a defined relationship with value measures like GDP (even scaled for price effects).

It can be seen, therefore, that there is a complex range of factors influencing fleet size and its utilisation in the future. This should serve as a further general caveat that mathematical models can provide, at best, only a fairly broad idea of what might be likely to occur.

PROJECTIONS: Introduction and Data

In spite of the caveats on existing data, and on the usefulness of mathematical models, it is necessary to provide indications of likely growth rates in freight transport over the next decade or so. These indications must be regarded as very tentative and should be continuously revised and updated.

The projections are carried out on the basis of the data series constructed in Chapter 2 for vehicles and capacity. A third series on work done is compiled in a similar way, and Appendix 8 contains the data and a description of how the series was constructed.

The following table presents a summary of these data, showing also the annual average compound growth rates for various periods.

Table 10.3: *Fleet performance and macroeconomic data 1960–1982*

	RFS data			*DOE data*		
Year	*Vehicles (000)*	*Capacity (000 tons)*	*Work (million tkms)*	*Vehicles (000)*	*Capacity (000 tons)*	*Final demand (£m)*
1960	43.2	90.5	1,435.2	43.2	84.3	2,546.1
1965	48.1	128.4	1,761.4	47.4	119.2	3,343.2
1970	52.4	181.3	2,251.0	48.2	156.5	4,341.9
1975	61.0	274.8	3,269.1	51.8	212.0	5,251.9
1980	82.4	461.6	5,010.5	64.5	310.9	7,268.1
1981	87.9	479.2	4,817.7	66.5	309.2	7,386.5
1982	92.2	510.8	4,530.9	67.6	318.2	7,302.0
Growth rates (% per annum)						
1960–1980	3.3	8.5	6.5	2.0	6.7	5.4
1970–1980	4.6	9.8	8.3	3.0	7.1	5.3
1975–1980	6.2	10.9	8.9	4.5	8.0	6.7
1960–1982	3.5	8.2	5.4	2.1	6.2	4.9
1970–1982	4.8	9.0	6.0	2.9	6.1	4.4
1975–1982	6.1	9.3	4.8	3.9	6.0	4.8

Source: RFS and own calculations.

Looking at the growth rates in the table, a number of points are worth noting. First, capacity and work have almost always grown faster than vehicle numbers. This is principally because vehicles have become so much larger. Second, for each of the periods examined capacity has grown more rapidly than work undertaken. This is consistent with the decline in efficiency of the fleet already discussed, but may also be partially due to an over-rapid expansion of fleet size than was warranted by demand. Third, it is worth noting that the growth rates in final demand have been greater than those in vehicle numbers and less than the work and capacity rates, except when one considers the growth rates based

on 1982. Indeed, general consideration of these latter growth rates indicates that 1981 and 1982 saw declines in the rates of growth (in some cases actual declines) bringing trends over the lengthier periods down — quite significantly in some cases. Fourth, comparing the growth rates derived from the RFS and the DOE, data show consistently higher growth rates for the RFS derived series. Thus, the understatement in the DOE series is an increasing one which has important implications because it raises difficult questions when one attempts to make forecasts for the future.

The general question to be asked is what is likely to happen to these rates of growth in the future. Even a superficial knowledge of both the economic and transport areas would suggest that the rates of growth experienced in the past will not continue through the 1980s. The growth in the 1960s and 1970s was rapid due to factors, for example, like increasing industrialisation, the growth of international trade, some liberalisation of the road freight market and the overall increase in living standards. Certainly, since 1980 there has not been growth on a scale comparable to the past and it seems unlikely to resume again at the earlier levels. In general, therefore, transport demand resulting from rapid economic growth seems unlikely in the immediate future. Independent of macroeconomic trends, there appears to be enormous scope for rationalising transport services and for the more efficient use of existing resources, growing congestion will counteract this to some extent. On balance, the economic situation will probably continue to restrain growth to a lower level than in the past. The next few paragrpahs attempt to make the implications more explicit in terms of the number of vehicles, their capacity and the work they will do in the future.

Results

As a starting point, a similar approach to earlier studies is taken. Mathematical relationships are derived between the variable of interest and the macroeconomic variable, final demand. These relationships are projected forward on the basis of assumptions about the underpinning economic situation. Each of the variables, capacity, vehicle numbers and work done is examined separately. The estimates derived are considered for consistency and their implications discussed.

Capacity

The conventional approach has been to estimate an equation

$C_t = a + bX_t$ or $C_t = aX_t^b$ where
c_t is Capacity in year t,
X_t is final Demand in year t and
a,b are constants to be estimated.

This approach, while it gives models with good fits, indicated by high values of R^2, does not appear to capture the essential nature of the data, as can be seen from examination of residual plots, as well as from consideration of the Durbin-Watson statistic. Also, as we have seen, the forecasting ability is poor.

When one considers that capacity in any year is strongly influenced by capacity in the previous year — with only the addition of new and the scrapping of old capacity affecting the total — one is led to consider an alternative approach. For example, one can consider models where capacity in any year depends on capacity the previous year as well as on a macroeconomic variable. Such models, called lagged models, are found to provide better fits, with high R^2, reasonable DW statistics and intuitively make sense since capacity is a cumulative type of variable. Using the data to 1982 the following model is obtained (t values in parentheses).

$$C_t = -32{,}439.4 + 16.45^{X}_{t} + .872C_{t-1}$$
$$(-3.5)\ (3.9)\ (15.9)$$
$$R^2 = .997;\ DW = 2.05$$

There is no improvement by including population as an explanatory variable; nor is there any by putting in a term in C_{t-2}, or adding a lagged final demand term. Appendix 9 contains a list of the mathematical models tested.

The presence of the constant in the estimating equation is somewhat anti-intuitive and suggests that the model is not quite correct at low values of C_t.

Using this equation for projection presents difficulties for the years being considered — 1990 and 1995 — since almost the entire "weight" falls on the X_0 value, that is the value of Final Demand in the year 1982. This figure is a tentative estimate of this stage, casting further doubts on the likely reliability of

Table 10.4: *Capacity projections 1990 and 1995*

Year	*Low*	*High*
	(000 tonnes)	
1990	696.4	772.3
1995	808.4	990.0
% Increase 1982–1990	38.8	53.9
Annual average	4.2	5.5
% Increase 1982–1995	61.1	97.3
Annual average	3.7	5.4

these forecasts. In any case, the values of C_t indicated by the equation for 1990 and 1995 are as follows, based on a low growth assumption of 2 per cent per annum in final demand and a high rate of 4 per cent per annum.

The growth rate assumptions for final demand 2 per cent and 4 per cent per annum result in significantly different figures for final demand at the end of the forecast period and consequently quite a wide spread in the forecasted variable. The annual growth rates over the period to 1990 or to 1995 vary between 3.7 per cent and 5.5 per cent annually depending on whether economic growth is lower or higher. On each set of assumptions, the growth rates between 1982 and 1990 and 1982 and 1995 are fairly close. The net effect is an increase in capacity of between 61 and 97 per cent by 1995 over the over the 1982 level.

Vehicles

A similar approach to that for capacity yields a preferred estimating equation

$$V_t = 2.179X_t + .8513\ V_{t-1}$$
$$(3.1) \qquad (13.4)$$
$$R^2 = .988\ DW = 2.15$$

What this equation says is that the number of vehicles in the fleet in any year can be represented by taking 85.1 per cent of the number of vehicles the previous year and adding 2.179 times the current year figure for Final Demand. Using this equation, and taking low and high figures of 2 per cent and 4 per cent cumulative growth in Final Demand, the following table gives the projected number of vehicles in 1990 and 1995.

Table 10.5: *Goods vehicle numbers; projections for 1990 and 1995*

Year	*Vehicles ('000)* *Low*	*High*
1990	111.6	121.2
1995	123.9	146.6
% Increase 1982–1990	21.0	31.5
Annual Average	2.4	3.5
% Increase 1982–1995	34.4	59.0
Annual Average	2.3	3.6

The projections are on the basis of RFS data and are very tentative. The growth rates in vehicle numbers as shown here are in all cases slower than those for capacity in the previous table, due to the gradually increasing size of vehicle.

Feeney (1983b) carried out projections based on DOE data, using a method based on the share of total vehicles on the DOE register in different weight categories and assuming constant capacity within each unladen weight class over time. His results are summarised in the table below:

Table 10.6: *Goods vehicles; Feeney projections for 1990 and 1995*

	Vehicles ('000)	
Year	*Low*	*High*
1982	67.6	67.6
1990	78.6	84.1
1995	90.0	102.9
Growth Rates (%)		
1982–1990	16.3	24.5
Annual Rate	1.9	2.8
1982–1995	33.3	52.3
Annual rate	2.2	3.3

Source: Feeney (1983b).

The high and low growth rates for the macroeconomic variable, Final Demand, were quite similar[20] to those used above. In general, while the absolute levels of vehicle numbers shown differ significantly, the growth rates are reasonably close. For example, in the low projection to 1990 Feeney anticipates a growth rate of 1.9 per cent per annum and the projections here expect a rate of 2.3 per cent. Feeney's rates are consistently somewhat lower, probably because of the assumption that there is no capacity growth per vehicle in each unladen weight class and the known differences in the two data sets used.

Work

In attempting to forecast the work done by the Irish goods vehicle fleet it must be recalled that the data foundations are decidely shaky. Only two relaible data points are available — with the constructed series in Appendix 8 being the result

[20]Growth of 1¾ per cent p.a. to 1985, and low and high figures of 2¾ per cent and 4 per cent respectively after that.

of several assumptions. However, it is useful to provide indications, even rough ones, of how the demand for freight transport will grow.

Again the modelling approach provides the starting point. In this instance, models linking work to the macroeconomic variable have not been very successful. The models are not particularly satisfactory because of poor values of the Durbin-Watson statistic, possibly implying a misspecification of the model. The problem is probably that there are missing variables. It is clear that factors like congestion or locational changes or efficiency developments are not included in the model. At this stage there are not suitable proxy variables available either and consequently the most satisfactory specification was obtained by a general least squares model with a second order autocorrelated error structure. The model, with t-statistics in parentheses, is

$$W_t = .192\ C_t^{.7755}$$
$$(-4.1)\ (23.7)$$
$$R_2 = .97\ DW = 2.18$$

The model is not an intuitively very satisfactory one, in that the demand variable is being modelled in terms of capacity, the supply variable. However, this model gives a better fit and has better statistical properties than ones where a macroeconomic variable like Final Demand is used as the independent variable. The form of the model indicates a constant elasticity of work with respect to capacity. This elasticity can be interpreted as meaning that a one per cent increase in capacity results in a .78 per cent increase in work — in other words capacity always increases relatively faster than work. One difficulty here is that this model is based on the experience of the past where growth was rapid and was expected to be rapid. It can be argued that capacity increased, not just to meet existing demand, but also to cater for anticipated future demand. Moreover, a great part of the increased capacity has been in the form of heavier vehicles which, as earlier evidence shows, are being underutilised. Therefore, increases in demand reflected, for example, in similar journey patterns but heavier loads need not require similar increases in capacity. On the other hand, a continuation of existing trends towards more dispersed locations coupled with increased congestion could require a faster growth in capacity than in work. On balance the latter scenario is more plausible and it would seem that an elasticity of less than one is the more appropriate. However, it must be emphasised that the equation remains very tentative because there are almost certainly other important variables involved and because the data are so poor.

Taking the equation then as given, the following projections for work are derived.

Table 10.7: *Work by goods vehicles: projections for 1990 and 1995*

Year	*Million tkms* "Low" *Growth*	"High" *Growth*
1990	6,523.0	7,068.0
1995	7,322.6	8,568.9
Growth Rates (%)		
1982–1990	44.0	56.0
Annual Rate	4.7	5.7
1982–1995	61.6	89.1
Annual Rate	3.8	5.0

These projected rates are substantially lower than the growth rates shown for the period up to 1980. This perhaps seems intuitively reasonable because of the rapid economic growth up to 1980 and the consequent increase in freight transport demand.

Consistency of Forecasts

The following table summarises the forecasts to 1995 using both the low and high growth rate assumptions.

Table 10.8: *Summary of forecast aggregates for 1995 and growth rates 1982–1995*

	Aggregates		*Annual Growth Rates (%)*			
	Low	*High*	*Low*	*High*	*Low*	*High*
Capacity (000 tonnes)	808.4	990.0	61.1	97.3	3.7	5.4
Vehicles (000)	123.9	146.6	34.4	59.0	2.0	3.6
Work (m tkms)	7,322.6	8,568.9	61.6	89.1	3.8	5.0

The table illustrates the range of growth rates to 1995 shown by the models constructed, varying from a low of about 34 per cent in vehicle numbers to a high of 97 per cent in capacity. It can be seen that capacity and work increase faster than vehicle numbers implying that vehicles continue to increase in size. Work

and capacity grow at roughly similar rates though this is determined by the model. Fleet performance indicators are summarised in Table 10.9 below.

Table 10.9: *Performance indicators 1982 and 1995*

Indicator	*1982*	*1995*		*% Change 1982–1995*	
		Low	*High*	*Low*	*High*
Capacity/Vehicle (tonnes)	5.5	6.5	6.8	18.2	23.6
Work/Vehicle (000 tkms)	49.1	59.1	58.5	20.4	19.1
Work/Capacity (000 tkms/tonnes)	8.9	9.1	8.7	2.2	-2.2

Consideration of the percentage changes in the final two columns shows significant increases in capacity per vehicle and in work per vehicle. These both reflect the continued increase in the number of larger vehicles. The slight decline in work per available tonne capacity (at the higher rate of economic growth) is determined by the model, since the rate of change work/capacity is very small.[21] A different specification of the relationship between work and capacity which implied a more rapid decline in work per tonne capacity could well provide a more realistic forecast. At this stage, not enough is known of the determinants of demand for freight transport to provide a significantly improved assessment. In any case, the use of the models is intended at this stage to provide an indication of likely orders of magnitude rather than a firm forecast of future activity levels.

As can be seen from the most recent data, there are declines in the amount of work undertaken in 1981 and 1982. Clearly, a continuation of this trend inevitably must affect vehicle numbers and capacity. Therefore, the forecasts based on the models would give estimates that are too high. It crucially depends on the duration and effects of the present recession. If it continues then the levels shown are likely to be too high — if not and if growth on the lines shown is attained than the forecasts could be more realistic. A further factor is that the purchase of new vehicles has been concentrated more in smaller vehicles in 1982 and 1983. This would suggest that the proportion of large vehicles in the fleet is going to stabilise rather than increase. Consequently the capacity and vehicle number projections shown are likely to be upper limits.

[21]This can be seen by looking at the rate of change of work/capacity for 1982 and 1990:

$$\frac{d}{dc}\left(\frac{w}{c}\right) = \frac{d}{c}\left(aC_t^{-.22}\right) = -a'C_t^{-1.22};$$

This takes values of -4.6×10^{-9} in 1982 and -2.9×10^{-9} in 1995, both of which are very small.

Policy Implications

What do increases in fleet size, capacity and work of the orders of magnitude shown imply? Some implications for roads investment policy, for the freight industry itself and for the environment are briefly reviewed.

Roads Investment

The Road Development Plan for the 1980s, which determines the present priorities in road investment, did not use specific forecasts of vehicle numbers or activity in drawing up its priorities. The view instead was that "the continued growth in traffic highlights the urgency and importance of implementing a satisfactory road development plan" (p. 19). Thus, it cannot be said what levels of traffic the plan was drawn up to cater for. However, the trends on which the investments were based, while decelerating somewhat, are still going to be evident through the 1980s and into the 1990s. The continued move to larger vehicles, allied to possible relaxations in their maximum weights and dimensions, have important implications for the future designed pavement strength of roads.[22] The evidence presented here would, in general, seem to indicate that, as far as freight vehicles are concerned, continued growth in vehicle sizes and numbers over the next 10 years is likely.

The extent and nature of this growth would appear to indicate a need for heavy investment in roads over the next decade, bearing in mind the rather low investment levels in the 1960s and 1970s. The pattern of growth suggests that higher road design standards may be necessary in view of the heavy vehicle content. More specific statements on road investment cannot be made from aggregated data of the form used here. Naturally, specific investment proposals have to be reviewed separately, though the orders of magnitude presented here can be used in specific instances, when the special circumstances of each project are first taken into account. Two specific areas of concern, however, relate to urban roads and roads to ports. In the former case, one implication of the projections presented would seem to suggest increased justification for the programme of planned by-passes. In the case of roads to ports, more detailed work is required to establish detailed patterns of demand; since the efficient movement of the very large amount of trade undertaken is clearly of great economic importance both now and in the future, more rapid development of improved access routes to ports should perhaps become a priority area for the future.

Road Freight Transport Industry

The projections above are based on forecasts of growth in overall demand. As mentioned earlier, numerous other factors can influence the size of the vehicle

[22]Especially since the plan was drawn up on the assumption that the maximum axle weight of 10 tons would be retained for its duration.

fleet in the future. As far as the road freight industry is concerned the implications of the growth outlined above are not very clear. Much of the growth is in direct response to demand — in the form of an increased tonnage of goods to be moved and in the likely increases in average length of haul — but some will probably occur because of increasing inefficiency in the use of the vehicle fleet. Over the years, more time and therefore more vehicles will be needed to undertake a similar amount of work; this is likely to be especially true where urban collections or deliveries are involved. It is also likely that available capacity will be underutilised because of the continuation of the tendency by operators to purchase large vehicles. Policy measures to curb this tendency, within the liberated framework of likely policy for the next decade, would appear to centre on taxation and on use restrictions for larger vehicles.

Environmental Effects

The impact, especially on urban areas, where significant road development is unlikely, of a 30–40 per cent increase in the number of goods vehicles and a 70–80 per cent increase in the capacity of these vehicles, is likely to be serious.

Most obviously, congestion will undoubtedly increase rapidly, partly because the growth in vehicle numbers will be accompanied by growth in car numbers probably of a similar order of magnitude. Goods vehicles' traffic interference characteristics are such that their contribution to increased congestion will be far greater than their increase in numbers alone would indicate. This suggests that specific measures to deal with goods vehicle traffic will be necessary. Possibilities include various forms of restrictions on the use of goods vehicles in urban areas. The Dykes Act in the UK, which requires local authorities to make plans to reduce lorry nuisance, is one example of what can be done.

The other detrimental environmental effects of the lorry will also increase. Again, these apply almost entirely in urban areas. The principal available policy measures, in addition to measures mentioned above centre on improved manufacturing and operating standards, which must be accompanied by stricter enforcement of existing legislation.

Chapter 11

SUMMARY AND FURTHER WORK

Introduction

This chapter briefly summarises the main contents of each of the ten previous chapters. Some issues that have not been developed are discussed in the final paragraphs, and indications are given of areas where further work would be useful.

Summary

Chapter 1

The importance of freight transport in the economy is first outlined. It is pointed out that demands by industry to reduce costs, especially stock costs, are placing increasing pressure on the freight transport industry to provide more flexible and reliable services.

The growth of freight transport activity and its legislative framework are described in detail. Very briefly, the developments in internal freight transport can be summarised as follows: a restrictive legislative environment for licensed road haulage, with limitations on access and on many aspects of operation dates from the 1930s: this restrictive stance gave rise to a large own account sector: since about 1970 policy has gradually changed and some quantitative controls have been relaxed; present policy, for which legislation is being prepared, is that access and operations are to be subject only to qualitative controls.

Since the 1960s there has been rapid growth in freight transport with tonnages moved nearly doubling, and work done almost trebling. These increases were largely due to rapid economic development and the sharp increase in international trade which occurred during the period. Though freight transport increased significantly, the infrastructure did not undergo major imrovements between 1960 and 1980. Freight handling methods became increasingly mechanised with the introduction of containers and pallets and lift-on lift-off and roll-on roll-off transport.

Chapter 2

Statistical difficulties in defining the number of goods vehicles are discussed and new series for vehicle numbers and capacity are developed using data from the CSO Road Freight Surveys. It is suggested that more information could be made available by the Department of the Environment on untaxed vehicles to help clarify the position. Between 1960 and 1982 the vehicle fleet increased at over 3 per cent per annum and its capacity at about 8 per cent per annum. Data are presented on the age structure of the fleet, on ownership rates by county, and

on scrappage rates for vehicles. In broadest outline these data indicate a fleet comprised of large proportions of very old and very new vehicles with widely different patterns of ownership in different areas and an annual scrappage rate of between one-seventh and one-ninth of the fleet.

Chapter 3

The performance of the road fleet in 1980 is analysed and compared with that for 1964. The main findings are that capacity increased more than five-fold, work done almost trebled and distance travelled and tonnes lifted almost doubled. The move to larger vehicles is evident in that 87 per cent of work is now done by vehicles in excess of 5 tonnes' unladen weight compared with 28 per cent in 1964. Average performance per vehicle indicates very significant downward trends in productivity per vehicle, with vehicles in each size category doing less work (however measured) than in 1964. When this is combined with increased vehicle capacity, there is evidence of inefficiency in the use of the vehicle fleet though further work is required to clarify this more precisely.

Chapter 4

This chapter looks at some further details of road freight activity. The most important sectors are now Building and Construction, Retail Distribution and Import/Export work. Length of haul has increased for all types of work, though local transport is still dominant in Irish freight movements. The section examines empty running by goods vehicles and concludes that there is scope for reducing it, for example, through the availability of better information about loads.

Chapter 5

The taxation of goods vehicles is analysed in detail. A methodology is applied which concludes that in 1980 goods vehicles were not paying enough in taxation to cover road expenditure made on their behalf. By 1983 this situation had changed to the extent that goods vehicles in general were paying for road expenditure although larger vehicles were not. Consequently, significant increases in road tax for large vehicles are recommended. The principles underlying the taxation of goods vehicles are analysed and are found to be dominated more by revenue considerations than anything else. Questions of equity in treatment between vehicles of different categories play a relatively minor role.

Chapter 6

Differences in the kind of work performed by the Own Account and the Hire or Reward Sectors are examined. General comparisons with EEC countries and more particular, ones with the UK indicate a structural shift to Own Account

transport in Ireland. The extent to which the Own Account market share can be captured by professional hauliers is examined. The main opportunities lie in long haul transport and in transport of the newer type of products. It also depends on the extent to which the haulage industry can adapt to the emerging demands of industry for increased flexibility and reliability.

Chapter 7

Information on the Licensed sector is explored in depth. Data difficulties are examined and some proposals for improvement made. The principal developments since 1970 have been the decline of the CIE fleet and the change in size structure of the fleets of licensed hauliers. The 1978 legislation is assessed and it is concluded that the Act has probably not led to improved efficiency or reduced transport costs. Consequently, the delayed progress towards liberalisation does not appear to have brought overall benefits.

Chapter 8

The role of the railway in internal freight transport is analysed. A declining market share and a shift in the type of work being done are two significant developments. The position on rail costs is found to be very unsatisfactory since little information is made available by CIE. Full evaluation of the costs, including social costs, of the railway, must await such information. However, rail freight operations do not seem to cover even their avoidable costs and this represents a sizeable subsidy to the railway's customers. Such subsidy cannot be justified if road users pay their full social costs.

Chapter 9

Economic issues relating to the transport of freight are discussed. The relationship between economic growth and the growth in freight transport is explored. The question of restrictions on the supply of freight transport is examined and the various arguments put forward for such restrictions are analysed. In general,the conclusion is that the older arguments for supply restriction are not soundly based and that, of the newer ones, only that based on the shortage of available road space, has any real validity. In any case, general supply restrictions are not necessarily the best way of dealing with this problem.

Chapter 10

Projections of the size of the fleet, its capacity and the work it is likely to be doing are presented for 1990 and 1995. These are tentative because of difficulties with data, the unreliability of similar mathematical models in the past and the uncertainty surrounding the many other factors that can affect these aggregates in the future. However, these caveats aside, up to 1995 vehicle numbers are

expected to grow annually by between 2.4 per cent and 3.6 per cent, capacity by between 3.7 per cent and 5.4 per cent and work done by between 3.8 per cent and 5.0 per cent, depending on the rate of growth of the economy. The faster growth rate in capacity than in vehicle numbers indicates that capacity per vehicle continues to grow over the period. The policy implications of these projections include continued road investment, probably with emphasis on routes to ports. Also,there is a need to examine the social costs imposed by goods vehicles in urban areas, perhaps with a view to introducing measures to control vehicle access.

Further Work

This report could not have attempted to cover all aspects of freight transport in Ireland. Many subjects remain unexplored and much further work could usefully be done. The following paragraphs list some of these areas.

Costs in road and rail freight are important and have been referred to in Chapters 5 and 8. Undoubtedly, further work is needed to assess the costs of freight transport, both to industry and more generally to society. More information on direct and other costs is, therefore, needed for both the railway and the road. Social costs, the quantification of which are notoriously difficult, need at least to be recognised. In particular, the impact of freight transport in urban areas, needs close examination to see what measures can be taken to improve the situation. This should be a priority area for further research. As a step to improving the data the possibility of the CSO industrial inquiries containing questions on transport costs should be investigated.

A second question relates to the efficiency of the road freight transport industry. The evidence that vehicles are being used less intensively, that they travel empty more often and that available capacity is more underutilised than in 1964 poses difficult policy questions that have not been fully answered here. On the one hand, it can be argued that by leaving the market decide, a solution which is optimal in some sense is obtained. On the other, it can be said that the market is not a transparent one, that competitors do not have knowledge of each other's actions and that decisions by individual hauliers are made in the light of imperfect knowledge of the market and with little cognisance of the social costs imposed. While the former interpretation is to be roughly the basis for policy in the future, any acceleration in the trends described in this study should be a matter of concern. To provide better data here more information on capacity utilisation, especially volume utilisation, is necessary. This could be obtained in the Road Freight Survey.

Third, it is essential to clarify the uncertainty concerning the number of vehicles in use. This has impacts on several parts of this study including the taxation and projection sections. Related to this is the question of the differences that

arise when different sources of information are used to estimate vehicle mileages. There is scope and need for clarification here also.

Fourth, there has been very little work done on the relationships between economic activity and freight transport by sector. This work would provide a clearer understanding of how freight activity is generated. It requires a close examination of production and industrial data as well as freight transport data.

Fifth, the international freight transport market has not been explored in any detail in this report. The main reason is that it was not possible satisfactorily to describe quantitatively the position. However, this a vital area in view of Ireland's dependence on international trade and is worthy of fuller study.

Sixth, there is a belief that there is wholesale disregard of existing road freight legislation including licensing, speeding and loading regulations. There is the possibility of compiling a substantial body of evidence on this topic, for example, by carrying out short-term intensive surveys. This would be worthwhile since, if the hypothesis is true, it is likely that there are sizeable extra costs being imposed.

Seventh, the possibilities in freight transport for using more advanced technology appear to be extensive, at least in the medium term. This applies both to road and rail freight. For rail they offer possibilities in signalling, marshalling, and in information on wagons which could lead to improved asset utilisation. For road vehicles possibilities for introducing systems of road pricing are beginning to be developed in the United States. Vehicle efficiency, partly using on-board micro-computers, can be substantially improved. Better information on the flows of goods, perhaps deriving from computerised data banks could lead to a longer-term reduction in the amount of empty running. Furthermore, improved vehicle scheduling and utilisation for individual fleets (see for example Harrison and Wills (1984) where substantial reductions in fleet size were obtained without appreciable reductions in workload) can bring about significant efficiency improvements.

Finally, there is need to investigate the changes that the emerging trends in industry will necessitate in freight transport. Put simply, these trends concentrate on reducing the capital tied up in stocks. Reduced stock levels will require far greater flexibility and reliability from transport firms. How the freight transport industry will respond to these demands is an important subject and the outcome will shape the development of the industry in the future.

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Appendix 1

LEGISLATIVE FRAMEWORK FOR FREIGHT TRANSPORT 1933-1983

In a move designed principally to protect the railway from the rapidly growing competition, the Road Transport Act of 1933 introduced a system of licensing for those carrying merchandise for hire or reward. The Act confined the carriage of goods for hire or reward to the existing statutory transport companies, who were given licences entitled Merchandise Licences and those private hauliers who were operating at the time, given licences called Merchandise (Existing Carrier) Licences. The Act made it illegal to carry for reward without a Merchandise Licence except in certain designated areas (called "exempted areas") near the main ports and towns. The licences issued to private hauliers limited them to the areas, the goods and the number and size of vehicles they were operating at the time. The transfer of licences was subject to control so as to prevent large firms growing by mergers or amalgamations. Most licensed firms were very small — indeed in 1938, 83 per cent of licences were for only one vehicle. A further provision in the 1933 Act allowed the railway companies to purchase the businesses of private licensed hauliers. In fact, by the end of 1938 almost 400 of the 1,336 licences originally issued had been acquired by the railway companies.

Further Road Transport Acts in 1934 and 1935 consolidated the 1933 Act by clarifying aspects of the licensing system. The Transport Act 1944 contained provisions relating to road freight haulage, in particular, tightening up the definition of "carriage for reward", allowing limited increases in the sizes of vehicle permitted under a merchandise licence, increasing the penalties for infringements of the Road Transport Acts, and introducing a new category of licence — the Restricted Merchandise Licence. These latter licences could be issued in cases where an inadequacy of transport was shown to exist. Other than licences for carrying newspapers, very few of these were issued until the 1960s and 1970s with the arrival of more specialised services and the growth in the use of refrigerated transport in international work.

The Transport (Miscellaneous Provisions) Act, 1955 exempted carriage of milk products from the merchandise licensing system, and the Road Transport Act, 1956 precluded own account operators from leasing or renting commercial vehicles, excempt in certain circumstances. Transport Acts passed in 1958 and 1959, respectively, exempted farmers from the provisions of the 1933 Act for the local carriage of livestock and permitted increases in vehicle size.

A gradual policy of liberalisation began with the passing of the 1971 Road Transport Act. This Act abolished the vehicle weight, area of operation and

commodity restrictions on holders of Merchandise (Existing Carrier) Licences. However, the number of vehicles that could be operated was still restricted. The carriage of livestock for reward was also freed from the restrictions of the road transport legislation. A new category of licence, a Restricted Road Freight Licence, was introduced to allow foreign hauliers to collect or deliver goods.

In 1977, regulations entitled European Communities (Merchandise Road Transport) Regulations were introduced to give effect to EEC requirements on access to the occupation of haulier. These qualitative requirements necessitated that hauliers be of "good repute, sound financial standing and professional competence" before being issued with a merchandise licence. Existing licensed hauliers who held licences before 1 January 1975 and operators within exempted areas who proved that they had a haulage business prior to 1975 were deemed to have satisfied the EEC requirements. All Irish operators meeting these requirements are issued with a Road Freight Certificate.

The stated policy of liberalising the industry was continued with the passing of the 1978 Road Transport Act. This Act allowed holders of Merchandise (Existing Carrier) Licences to expand their fleets six-fold and removed from licensing control the carriage of goods for reward in vehicles of $2\frac{1}{2}$ tonnes or less. The Act also provided for the extension of the exempted areas in Dublin, Cork, Galway, Limerick and Waterford. A new category of licence, called a Merchandise (New Area) Licence was to be introduced for hauliers in these areas who held a Road Freight Certificate.

However, though applications from hauliers for these licences were received, the orders required under the 1978 Act were not made. The legal position in relation to hauliers operating in exempted areas is that the areas as defined in the 1933 and subsequent Acts remain, though in practice it is likely that the wider limits proposed in the 1978 Act apply.

The present position is that the liberalisation of the Road Freight Industry, subject only to qualitative controls, was announced by the Minister for Communications (formerly Transport) on 2 February 1984. The implications are that, on the passing of the Act, existing hauliers will be allowed to operate the kind and size of fleet they want and that the leasing restrictions on Own Account operators will immediately be withdrawn. Two years after passing the Act, the industry will be completely liberalised with Own Account operators being permitted to hire for reward, and access to the occupation open to anyone with a Road Freight Certificate.

In addition to the legislative measures mentioned above, goods vehicle operators are subject to the Road Traffic Acts, principally that of 1961, as well as to the regulations made under that Act. Included in these regulations are the Road Traffic (Construction, Equipment and Use of Vehicles) Regulations 1963 to 1983. These relate to the maximum dimensions, including sizes and weights of

vehicles in various classes and also to the lighting, maximum speeds and licensing and registration of vehicles. There is now a scheme of compulsory testing of vehicles in excess of approximately 1½ tonnes' unladen weight under the European Communities (Vehicle Testing) Regulations 1981. A further EEC input occurred with the implementation of an EEC regulation (No. 543/69) governing drivers' hours and conditions of work (the Tachograph regulations).

Finally, responsibility for the enforcement of regulations relating to the carriage of dangerous goods rests with the Department of Labour. The Dangerous Substance (Conveyance of Petroleum by Road) Regulations, 1979 and the Dangerous Substances (Conveyance of Scheduled Substances by Road) (Trade or Business) Regulations, 1980 provide the underpinning regulatory framework for the carriage of dangerous goods by road.

Appendix 2

ALTERNATIVE DATA ON VEHICLE NUMBERS AND CAPACITY

Vehicles

The starting points are the 1964 and 1980 RFS data, and the DOE Annual Census of registered vehicles. The 1964 and 1980 RFS data are taken as the correct estimated totals of goods vehicles operating. A series is constructed

Table A2.1: *Capacity of goods vehicles 1960–1982, from DOE Census*

	Capacity (tons)				
	Unladen weight (tons)				
Year	*Below 3*	*3–5*	*5+*	*Trailers*	*Total*
1960	39,906	31,141	12,053	1,845	84,910
1961	38,102	39,425	14,961	2,223	94,780
1962	37,809	43,875	18,035	2,636	102,540
1963	37,390	47,758	19,462	3,085	107,930
1964	38,070	50,518	20,141	3,208	112,320
1965	38,955	53,186	22,164	3,395	119,220
1966	38,088	53,195	22,516	3,327	117,890
1967	36,770	56,457	28,459	3,488	126,120
1968	36,766	57,770	30,831	3,356	129,950
1969	37,522	56,862	35,859	3,128	135,040
1970	39,153	61,649	51,334	3,496	156,480
1971	36,278	58,819	58,006	3,352	159,990
1972	35,916	57,960	71,163	3,323	173,090
1973	38,574	59,883	92,699	3,185	194,350
1974	40,552	57,666	109,581	2,888	211,090
1975	40,476	56,173	112,670	2,713	212,030
1976	42,155	55,526	127,543	2,846	228,070
1977	42,619	55,743	139,085	2,942	240,390
1978	47,316	56,582	166,239	3,664	273,800
1979	49,013	55,345	188,786	3,885	297,030
1980	52,969	55,522	198,297	4,084	310,870
1981	56,487	51,909	196,403	4,389	309,188
1982	59,160	50,403	203,970	4,686	318,219

Sources: DOE Census; McCarthy and O'Mahony (1980) and own calculations.

linking 1964 to 1980 on the basis of the differential growth rate between the two series. The annual cumulative growth rate in vehicle numbers as shown by the RFS was 13.7 per cent and by the DOE annual Census was 12.1. The ratio of these rates, 1.016 is the factor that must accumulatively be applied to the growth in the DOE series to provide a series linking 1964 to 1980. In symbols

$$\hat{V}_t=(1.016)^t V_t$$

where V_t is the number shown on the DOE register. This ensures that growth rates between successive years in the estimated series are related to growth rates in the DOE series since

$$\frac{\hat{V}_{t+1}}{\hat{V}_t}=(1.016)\frac{V_{t+1}}{V_t}$$

The construction of this series depends on the assumption that the observed understatement in 1980 came about gradually over the period. While this may be somewhat unrealistic, in that the understatement may be more concentrated in recent years because of the effects of recession or increased taxation, there is no quantitative evidence of this and the assumption made is a practical one in the circumstances.

The calculations described were carried out separately in each of the three unladen weight classes and then added to give an estimated number of vehicles operating for each year. The figures for 1981 and 1982 are from the RFS for these years. The data are shown in Table A2.2 below.

Estimates of the capacity of the fleet have been obtained using factors linking the unladen weight of vehicles to their maximum laden weight. McCarthy (1974) and McCarthy and O'Mahony (1980) used factors derived from a British study while Blackwell (1969) used RFS factors.

Here, factors are derived from the 1964 (i.e., the same as Blackwell's) and the 1980 and subsequent Road Freight Surveys. Because these factors changed over time, different factors have been used for each year for each unladen weight class. The factors for years between 1964 and 1980 were interpolated geometrically. The factors for 1960 to 1964 were (for no particularly strong reason) left at the 1964 level.

Table A2.2: *Estimated number of goods vehicles 1960–1982*

	Number of vehicles				
	Unladen weight (tons)				
Year	*Less than 3*	*3–5*	*Over 5*	*Total*	*Annual % Change*
1960	36,705	5,400	1,046	43,151	
1961	35,455	6,687	1,292	43,434	0.7
1962	35,370	7,372	1,560	44,302	2.0
1963	35,119	7,923	1,701	44,743	1.0
1964	36,163	8,251	1,763	46,177	3.2
1965	37,329	8,752	1,998	48,079	4.1
1966	36,378	8,844	2,082	47,304	-1.6
1967	34,874	9,407	2,664	46,945	-0.8
1968	35,083	9,708	2,951	47,742	1.0
1969	35,133	9,674	3,470	48,277	1.0
1970	37,095	10,577	4,758	52,430	8.6
1971	32,783	10,172	5,628	48,583	-7.3
1972	32,381	10,143	7,053	49,577	1.0
1973	36,247	10,579	8,546	55,372	11.7
1974	40,358	10,396	9,974	60,728	9.7
1975	40,328	10,315	10,355	60,998	0.4
1976	41,274	10,361	11,815	63,450	4.0
1977	40,654	10,563	13,129	64,346	1.4
1978	46,529	10,881	15,583	72,883	13.4
1979	48,206	10,857	17,708	76,771	5.2
1980	52,330	11,102	18,981	82,413	7.3
1981	56,800	11,400	19,700	87,900	6.7
1982	60,200	11,000	20,900	92,200	4.9
Growth % 1960–1982	64.0	103.7	1,898.1	113.7	
Annual Average rate	2.3	3.3	14.6	3.5	

Table A2.3: *Estimated carrying capacity of fleet 1960–1982, derived data*

	Unladen weight									
	Less than 3 tons			*3–5 tons*			*Over 5 tons*			
Year	*No. of vehicles*	*Factors*	*Capacity*	*No. of vehicles*	*Factors*	*Capacity*	*No. of vehicles*	*Factors*	*Capacity*	*Total capacity (tons)*
1960	36,705	1.040	38,173	5,400	7.592	40,997	1,046	11.191	11,706	90,876
1961	35,455	1.040	36,873	6,687	7.592	50,768	1,292	11.191	14,459	102,100
1962	35,370	1.040	36,785	7,372	7.592	55,968	1,560	11.191	17,458	110,211
1963	35,119	1.040	36,524	7,923	7.592	60,151	1,701	11.191	19,036	115,711
1964	36,163	1.040	37,610	8,251	7.592	62,642	1,763	11.191	19,730	119,982
1965	37,329	1.055	39,382	8,752	7.547	66,051	1,998	11.475	22,927	128,360
1966	36,378	1.069	38,888	8,844	7.502	66,348	2,082	11.765	24,495	129,731
1967	34,874	1.084	37,803	9,407	7.457	70,148	2,664	12.063	32,136	140,087
1968	35,083	1.100	38,533	9,708	7.413	71,965	2,951	12.369	36,501	146,999
1969	35,133	1.115	39,173	9,674	7.369	71,288	3,470	12.682	44,007	154,468
1970	37,095	1.131	41,954	10,577	7.325	77,477	4,758	13.004	61,873	181,304
1971	32,783	1.147	37,602	10,172	7.281	74,062	5,628	13.333	75,038	186,702
1972	32,381	1.163	37,659	10,143	7.238	73,415	7,053	13.671	96,422	207,496
1973	36,247	1.179	42,735	10,579	7.195	76,116	8,546	14.017	119,789	238,640
1974	40,358	1.196	48,268	10,396	7.152	74,352	9,974	14.372	143,346	265,966
1975	40,328	1.212	48,876	10,315	7.109	73,329	10,355	14.736	152,591	274,796
1976	41,274	1.229	50,726	10,361	7.067	73,221	11,815	15.110	178,524	302,471
1977	40,654	1.247	50,696	10,563	7.025	74,205	13,129	15.492	203,394	328,295
1978	46,529	1.264	58,813	10,881	6.983	75,982	15,583	15.885	247,536	382,331
1979	48,206	1.282	61,800	10,857	6.941	75,358	17,708	16.287	288,410	425,568
1980*	52,300	1.300	68,700	11,100	6.900	76,600	19,000	16.700	316,400	461,500
1981*	56,800	1.265	71,880	11,300	6.926	78,270	19,500	16.875	329,060	479,210
1982*	60,200	1.367	82,320	11,000	6.761	74,370	20,900	16.946	354,180	510,870
% Increase			115.6			81.4			2,925.6	462.2
Overall										
Annual			3.5			2.7			16.8	8.2

*These capacity figures are for vehicle size category in tonnes. It was not possible to adjust to a tons basis.

These factors, which are calcualted separately for vehicles in each unladen weight class, are then applied to the estimated number of vehicles in each unladen weight class for each year. These data are shown in detail in Table A2.3 and summarised in Table A2.4 below.

Table A2.4: *Capacity estimates 1960–1982, RFS based*

	Capacity (000 tons)			
	Unladen weight (tons)			
	Below 3	*3–5*	*5+*	*Total*
1960	38	41	12	91
1982	82	74	354	511
Growth (1960–1982) (%)	115.6	81.4	2,925.6	462.2
Annual Rate (%)	3.5	2.7	16.8	8.2

(Numbers may not add due to rounding: percentages are calculated on exact figures).

Appendix 3

SCRAPPAGE RATE FOR GOODS VEHICLES

Table A3.1: *Scrappage rate for goods vehicles 1960–1982: (DOE Census data)*

Year (Oct. to Sept.)	*Vehicle stock at start* (V_t)	*New vehicles purchased* (I_t)	*Scrappage* S_t $I_t+V_t-V_{t+1}$	*Percentage scrappage rate* ($S_t/V_t \times 100$)
1960–61	43,151	5,694	5,411	12.5
1961–62	43,434	6,720	5,852	13.5
1962–63	44,302	6,535	6,094	13.8
1963–64	44,743	7,609	6,175	13.8
1964–65	46,177	7,717	6,764	14.6
1965–66	47,130	6,323	7,420	15.7
1966–67	46,033	6,143	7,135	15.5
1967–68	45,041	6,972	6,846	15.2
1968–69	45,167	8,375	8,162	18.1
1969–70	45,380	9,014	6,235	13.7
1970–71	48,159	7,994	12,244	25.4
1971–72	43,909	8,295	8,134	18.5
1972–73	44,070	9,391	4,992	11.3
1973–74	48,469	8,453	4,563	9.4
1974–75	52,359	6,943	7,509	14.3
1975–76	51,793	7,719	6,528	12.6
1976–77	52,984	8,679	8,948	16.9
1977–78	52,715	12,255	6,009	11.4
1978–79	58,961	13,961	11,982	20.3
1979–80	60,940	12,569	9,053	14.9
1980–81	64,456	11,691	9,697	15.0
1981–82	66,450	10,643	9,537	14.4
1982–83	67,556			
			Average	1.50

Sources: DOE Census; CSO.

Table A3.2: *Scrappage rate for goods vehicles 1960–1982: (RFS based data)*

Year (Oct. to Sept.)	*Vehicle stock at start (V_t)*	*New vehicles purchased (I_t)*	*Scrappage S_t $I_t+V_t-V_{t+1}$*	*Percentage scrappage rate ($S_t/V_t \times 100$)*
1960-61	43,151	5,694	5,411	12.5
1961-62	43,434	6,720	5,852	13.5
1962-63	44,302	6,535	6,094	13.8
1963-64	44,743	7,609	6,172	13.8
1964-65	46,177	7,717	5,815	12.6
1965-66	48,079	6,323	7,101	14.8
1966-67	47,304	6,143	6,502	13.7
1967-68	46,945	6,972	6,175	13.2
1968-69	47,742	8,375	7,840	16.4
1969-70	48,277	9,014	4,861	10.1
1970-71	52,430	7,994	11,841	22.6
1971-72	48,583	8,295	7,301	15.0
1972-73	49,577	9,391	3,596	7.3
1973-74	55,372	8,453	3,097	5.6
1974-75	60,728	6,943	6,673	11.0
1975-76	60,998	7,719	5,267	8.6
1976-77	63,450	8,679	7,783	12.3
1977-78	64,346	12,255	3,718	5.8
1978-79	72,883	13,961	10,073	13.8
1979-80	76,771	12,569	6,927	9.0
1980-81	82,413	11,691	6,204	7.5
1981-82	87,900	10,643	6,343	7.2
1982-83	92,200			
			Average	11.4

Sources: Own estimates of vehicle stock: CSO.

Appendix 4

ALLOCATION OF EXPENDITURES TO DIFFERENT USERS

1. The method takes into account, not just the total distance travelled by each vehicle type, but other factors related to the size, the weight and the road damage characteristics of vehicles of each type. To take these characteristics into account, four "performance factors" are used; these are shown below along with the vehicle characteristic they attempt to represent.

Performance Factor	*Characteristic*
Vehicle kms.	— Distance
Passenger Car Unit (PCU) kms	— Size
Gross Vehicle Weight (GVW) kms	— Weight
Standard Axle kms.	— Damage

2. Total road expenditure (on maintenance, improvements, overheads, lighting and policing) must be further divided into subcategories so that expenditure in each subcategory can be allocated on some reasonable basis to one or more of the performance factors above. Thus, for example, a maintenance item like grass and hedge cutting is allocated to the distance-related performance factor, while patching of roads is assigned entirely to the damage-related factor. In this way, total expenditure is allocated among the four performance factors, as shown in Table A4.1 below.

Table A4.1: *Allocation of road costs to performance factors, 1980*

Performance factor	*Total estimated expenditure (£m)*
Vehicle kms	70.4
PCU kms	34.5
GVW kms	26.3
Standard Axle kms	20.8
Total	152.0

Source: Feeney (1980).

3. Next, data on the total annual distance travelled must be obtained for all vehicles. For goods vehicles this information is required for each unladen weight class. It is here that the point of departure with Feeney (1980) is

reached. He used vehicle number data from the DOE Census and vehicle performance data from a series of counting programmes run by An Foras Forbartha (AFF).[23] This study uses data from the CSO RFS, both on vehicle numbers and on goods vehicle performance. The differences between DOE Census data and RFS vehicle number estimates have already been examined in Chapter 3 and need not be developed any further.

However, AFF data on aggregate distances travelled by non-goods vehicles (which are not available from the RFS) are used. This is somewhat inconsistent but can be justified by the lack of any realistic alternative.

4. The PCU kms, GVW kms and Standard Axle kms are derived from the data at 3 above. For each of the three, a set of weights or multiplicative factors are applied so that the original distances for each vehicle type and category are scaled up to take into account the greater size, weight or road damaging characteristics of each vehicle category. In this way the original distance sets are transformed into three further sets, giving a measure under each factor for each vehicle type and size. These can be presented in percentage terms to give, within each performance factor, the relative allocation to each vehicle type and, within goods vehicles, to vehicles of different sizes. The multiplicative weights are those of Feeney (1980) and the results of these calculations are shown in Table A4.2 below.

The final line of the table indicates goods' vehicles market share in each performance cateogry. It can be seen that goods vehicles (using the mixture of data sources already described) undertake only 7.5 per cent of total distance travelled, but account for 91 per cent of Standard Axle kilometres.

Within the goods vehicle size categories the impact of the separate factors can be seen. Goods vehicles in excess of 10 tons' unladen weight perform 19 per cent of total goods vehicle kilometres but undertake 41 per cent and 46 per cent respectively of the weight and road damage-related distances.

5. The costs derived for each performance factor in Table A4.1 above can now be allocated to goods vehicles in accordance with the proportions in the last line of Table A4.2. The total for each performance factor is distributed among the goods vehicles of different classes in accordance with the percentages in the first part of Table A4.2. Totals are accumulated to obtain the costs to be allocated to each weight class. These totals are shown in Table A4.3 below.

It can be seen that 64 per cent of total cost is assigned to the two heaviest vehicle classes, though these categories together account for only 14 per cent of the fleet. On the other hand the smallest vehicles comprising 64 per cent of the fleet are assigned only 11 per cent of the costs.

The effect of using CSO goods vehicles' performance data instead of AFF performance data has been to assign, in total, a smaller share of total

[23]See for example Devlin (1981).

Table A4.2: *Allocation of performance factor distances to goods and other vehicles, 1980*

Unladen weight (tons)	*Performance factor*			
	Vehicle kms	*PCU kms*	*GVW kms*	*St. Axle kms*
		(%)		
Below 3	37.4	29.4	7.2	0.2
3-5	15.6	15.3	10.9	6.5
5-7	12.3	14.5	13.8	17.3
7-10	15.7	18.5	27.6	29.9
10 and over	19.0	22.4	40.5	46.2
Total (%)	100.0	100.0	100.0	100.0
Goods vehicles total (m. kms)	1,253	3,192	18,812	920
Other vehicles (m. kms)	15,437	16,795	16,118	90
Total (m. kms)	16,790	19,987	34,930	1,010
Goods vehicle share (%)	7.5	16.0	53.9	91.1

Sources: Feeney (1980); RFS (1980).

Table A4.3: *Road costs assigned to goods vehicles, 1980*

Unladen Weight (tons)	*Assigned costs (£m)*	*Share of costs (%)*	*Share of vehicles (%)*
Below 3	4.6	10.5	63.5
3-5	4.3	9.8	13.5
5-7	6.8	15.5	8.6
7-10	11.4	26.0	8.0
10 and over	16.7	38.0	6.3
Total	43.9	100.0	100.0

expenditure to goods vehicles. However, using RFS vehicle number data instead of DOE data affects the allocation of these costs within vehicle weight categories. The result is that a greater share of the costs is assigned to heavier vehicles than under Feeney's methodology.

Allocation of Taxation Revenues

The next stage is to allocate the taxation receipts among goods vehicle categories. The taxes considered are those on operating, i.e., fuel and vehicle road taxes; exise duties on new vehicles or parts are not included since these are strictly ownership taxes and are not relevant to this exercise.

Fuel

The estimates of fuel excise are derived from RFS data on fuel used, taking into account a change in excise rates during 1980. However, the RFS-based data may understate the total yield in fuel taxation from goods vehicles and this must be kept in mind throughout the analysis.

Road Tax

Average road tax rates for vehicles in each unladen weight class are estimated and multiplied by the total number of vehicles to give estimates of total road tax due. Taxation amounts due, rather than amounts paid, are taken since it appears to be the more correct procedure in this instance. The fact that there are significant amounts of road tax not paid is an enforcement problem and is separate from an assessment of the taxation system *per se.*

The data for fuel and road tax revenue are shown in Table A4.4 below. The fact that the fuel excise data derived from the 1980 RFS may understate somewhat the total yield is further developed later.

Table A4.4: *Taxation yield from fuel and road taxes: goods vehicles, 1980*

Unladen weight (tons)	*Fuel tax*			*Road tax*			*Taxation Revenue*
	Petrol	*Diesel*	*Total*	*Per vehicle*	*Vehicles*	*Yield*	
		(£m)		*(£)*	*(000)*	*(£m)*	*(£m)*
Below 3	5.03	3.18	8.21	60	52.3	3.14	11.35
3–5	0.06	3.21	3.27	130	11.1	1.44	4.71
5–7	0.02	2.98	3.00	220	7.1	1.56	4.56
7–10	0.05	5.27	5.32	430	6.6	2.84	8.16
10 and over	0.00	6.97	6.98	650	5.2	3.38	10.36
Total	5.15	21.61	26.76	150*	82.4	12.36	39.13

*The actual amount *paid,* £8.33m., when divided by 82,400 vehicles gives a figure of £107.
Source: RFS 1980; Revenue Commissioners for rates.

Comparison of Expenditures and Revenues

We are now in a position to compare total road expenditure costs and total taxation revenues for each vehicle size. Table A4.5 presents the data, and the analysis is continued in Chapter 5 where Table 5.3 contains the same information.

Table A4.5: *Allocated expenditures and taxation revenues for goods vehicles, 1980*

Unladen weight (tons)	*Expenditures (£m)*	*Revenues (£m)*	*Revenue to expenditure ratio*
Below 3	4.6	11.4	2.5
3–5	4.3	4.7	1.1
5–7	6.8	4.6	.7
7–10	11.4	8.2	.7
10 and over	16.7	10.4	.6
Total	43.9	39.1	.9

Table A4.6: *Allocation of road expenditure to performance factors, 1983*

Vehicle size (tons)	*Performance factor*									
	Vehicle kms		*PCU kms*		*GVW kms*		*St. Axle kms*		*Total*	
	%	(£m)	%	(£m)	%	(£m)	%	(£m)	%	(£m)
<3	37.6	3.2	29.4	3.3	7.2	1.5	0.2	0.1	12.2	8.1
3–5	15.3	1.3	15.3	1.7	10.9	2.3	6.5	1.7	10.5	7.0
5–7	12.9	1.1	14.5	1.6	13.8	2.9	17.3	4.4	15.1	10.0
7–10	15.3	1.3	18.5	2.1	27.6	5.9	29.9	7.6	25.5	16.9
10+	18.8	1.6	22.4	2.5	40.5	8.6	46.2	11.7	36.7	24.4
Total	100.0	8.5	100.0	11.3	100.0	21.2	100.0	25.4	100.0	66.4

Appendix 5

DATA ON LICENSED HAULIERS

Table A5.1: *Performance data for all licensed hauliers 1969–1982*

Years	*Vehicles*	*Receipts*	*Tonnes*	*Miles*	*Persons engaged*
		(£'000)	('000)	('000)	
1969	2,118	9,597	9,577	50,895	4,808
1970	2,155	10,165	9,511	48,361	4,850
1971	2,247*	11,533	9,743	49,995	4,893
1972	2,135	13,292	10,388	53,666	4,999
1973	2,211	16,408	10,893	58,236	5,228
1974	2,240	20,593	10,978	62,522	5,316
1975	2,153	24,241	10,427	63,777	4,546
1976	2,158	30,433	11,229	72,253	4,396
1977	2,259	39,413	11,631	81,514	4,359
1978	2,721	51,734	13,638	93,068	4,748
1979	2,770	63,303	13,722	91,527	4,908
1980	3,059	77,413	14,847	101,110	5,112
1981	2,948	87,731	16,072	115,556	4,922
1982	3,171	100,055	13,494	103,210	5,033
% Change 1969–1982	49.7	Current 942.6 Real 89.7	40.9	102.8	4.7
% Annual Average	3.2	Current 19.8 Real 5.0	2.6	5.6	0.3

*1971 estimated.
Source: Central Statistics Office.

Table A5.2: *Performance data for licensed hauliers (excluding railway companies) 1969–1982*

Years	*Vehicles*	*Receipts*	*Tonnes*	*Miles*	*Persons engaged*
		(£'000)	('000)	('000)	
1969	1,051	4,272	5,611	31,523	1,906
1970	1,091	4,451	5,854	30,075	1,851
1971	1,147	5,199	5,931	32,239	1,901
1972	1,138	6,334	6,523	35,089	2,085
1973	1,216	8,652	6,729	39,596	2,422
1974	1,314	12,099	7,394	46,296	2,592
1975	1,330	14,862	7,281	48,832	2,379
1976	1,389	20,283	8,157	58,134	2,527
1977	1,529	28,814	8,479	68,423	2,797
1978	2,011	40,582	10,592	80,083	3,320
1979	2,112	50,672	11,009	78,572	3,566
1980	2,386	63,801	12,658	89,607	3,778
1981	2,383	73,737	13,968	104,576	3,741
1982	2,690	84,980	11,701	93,777	3,934
% Change 1969–1982	155.9	Current 1889.2 Real 261.9	108.5	197.5	106.4
% Annual Average	7.5	Current 25.9 Real 10.4	5.8	8.7	5.7

Table A5.3: *Rail companies in road freight transport*

Years	*Vehicles*	*Receipts*	*Tonnes*	*Miles*	*Persons engaged*
		(£'000)	('000)	('000)	
1969	1,067*	5,325	4,119	19,372	2,902
1970	1,064	5,714	3,868	18,286	2,999
1971	1,100*	6,334	3,872	17,756	2,992
1972	997	6,958	3,928	18,578	2,914
1973	995	7,756	4,231	18,639	2,806
1974	926	8,494	3,652	16,226	2,724
1975	823	9,379	3,211	14,946	2,167
1976	769	10,150	3,142	14,119	1,869
1977	721	10,599	3,152	13,091	1,562
1978	710	11,152	3,046	12,985	1,428
1979	658	12,631	2,713	12,955	1,342
1980	673	13,612	2,189	11,503	1,334
1981	565	13,994	2,104	10,980	1,181
1982	481	15,075	1,793	9,433	1,099
% Change 1969–1982	-54.9	Current 183.1 Real -48.5	-56.5	-51.3	-62.1
% Annual Average	-5.9	Current 8.3 Real -5.0	-6.2	-5.4	-7.2

Table A5.4: *Commodities carried by licensed hauliers, 1969–1980*

	Tonnage ('000 tonnes)							
	Sand, gravel, etc.	*Manufactured building materials*	*Fertilizer, feedstuffs, etc.*	*Beet*	*Solid fuel*	*Cereals*	*Other goods*	*Total*
Licensed Hauliers								
1969	2,524	358	522	489	169	271	1,278	5,611
Percentage	45.0	6.4	9.3	8.7	3.0	4.8	22.8	100.0
1980	1,672	1,103	2,098	990	277	795	5,723	12,658
Percentage	13.2	8.7	16.6	7.8	2.2	6.3	45.2	100.0
Percentage change in tonnes, 1969–1980	-33.8	208.1	301.9	102.5	63.9	193.4	337.8	125.6
Railway Companies								
1969	930	542	304	74	33	58	2,181	4,120
Percentage	22.6	13.2	7.4	1.8	0.8	1.4	52.9	100.0
1980	44	433	96	38	—	—	1,578	2,189
Percentage	2.0	19.8	4.4	1.7	—	—	72.1	100.0
Percentage change in tonnes, 1969–1980	-95.3	-20.1	-68.4	-48.6	-97.6	-97.6	-27.6	-46.9
Total								
1969	3,453	898	827	563	201	328	3,459	9,730
Percentage	35.5	9.2	8.5	5.8	2.1	3.4	35.5	100.0
1980	1,716	1,536	2,194	1,028	277	795	7,301	14,847
Percentage	11.6	10.3	14.8	6.9	1.9	5.4	49.2	100.0
Percentage change in tonnes, 1969–1980	-50.3	+71.0	+165.3	+82.6	+37.8	+142.4	+111.1	+52.6

Source: Central Statistics Office, Dublin.

Appendix 6

RAILWAY DATA

Table A6.1: *Railway data 1960–1980*

Year ending	*Tons* carried*	*Ton† miles*	*Receipts*	*Train miles*
	('000)	('000)	(£'000)	
31 March 1960	2,518	194.2	4,270	
31 March 1961	2,686	206.9	4,590	
31 March 1962	2,561	202.5	4,650	
31 March 1963	2,592	205.5	4,800	
31 March 1964	2,604	208.0	4,950	
31 March 1965	2,461	204.2	5,050	
31 March 1966	2,497	230.2	5,062	
31 March 1967	2,745	252.0	5,357	2,935
31 March 1968	3,001	308.4	5,599	3,171
31 March 1969	3,272	332.2	6,057	3,157
31 March 1970	3,145	308.9	6,178	3,131
31 March 1971	3,394	333.6	6,557	3,269
31 March 1972	3,689	353.5	7,558	3,245
31 March 1973	3,633	345.2	7,685	3,154
31 March 1974	3,672	347.5	8,088	3,300
9 months Dec. 1974	2,714	276.3	6,087	2,411
December 1975	3,385	347.5	8,447	2,824
December 1976	3,478	363.7	9,952	2,686
December 1977	3,509	364.7	10,285	2,750
December 1978	3,789	385.5	10,903	2,965
December 1979	3,739	385.6	10,957	3,143
December 1980	3,571	389.4	12,511	3,212
% Change 1960–1980	41.8	100.5	193.0	9.4††

Source: CIE Annual Accounts.
*Includes livestock.
†There is a discontinuity in 1968 in this series that results in a slight overstatement of changes between periods prior to and after 1968.
††1967–1980.

Appendix 7

RAILWAY USE IN EEC COUNTRIES

Table A7.1: *Use of railways for freight transport in EEC Countries*

Country	*Length of track*	*Freight tonnage*	*Tonnes /km*
	(kms)	*('000 tonnes)*	
Germany	28,517	338,396	11,866
France	33,906	214,501	6,326
Italy	16,133	58,143	3,604
Netherlands	2,880	21,802	7,570
Belgium	3,978	64,851	16,312
Luxembourg	270	14,577	53,989
United Kingdom	18,028	154,671	8,579
Ireland	1,987	3,629	1,826
Denmark	2,461	4,936	2,006
Greece	2,461	3,646	1,482

Source: Eurostat *Statistical Abstract.*

Derivation of Series

(i) 1960–1980

The 1964 and 1980 Road Freight Survey data are used to provide estimates in the three vehicle size categories, of the number of tonne-kms performed per vehicle in each class.

Geometric interpolation provides a series of similar factors for the years between 1964 and 1980. These trends are also continued back to 1960. This gives average tonne kilometres per vehicle for each of the three vehicle size categories.

The estimated number of vehicles in each weight category, as described in Appendix 2, is used. Within each weight category for each year the number of vehicles is multiplied by the average tonne kilometres per vehicle to give a total estimated figure for work done for each vehicle class for each year.

(ii) 1981–1982

Road Freight Survey data are used for both the aggregate work data and the estimated fleet size in each of the vehicle size categories. Multiplicative factors can then be derived though they are not needed. These factors indicate rapid declines in average vehicle usage patterns over the years 1980–1981. This makes all the more tentative the aggregate data derived in the manner described above, since average vehicle utilisation must depend more on economic circumstances than is indicated above.

Appendix 8

ESTIMATED WORK PERFORMED 1960–1982

Table A8.1: *Estimated tonne kms performed by fleet 1960–1982*

	Unladen weight									
	Less than 3 tons			*3–5 tons*						*Total*
Year	*Vehicles*	*Factors*	*Work (m Tkms)*	*Vehicles*	*Factors*	*Work (m Tkms)*	*Vehicles*	*Factors*	*Work (m Tkms)*	*work (million Tkms)*
1960	36,705	6.72	246.7	5,400	164.60	888.8	1,046	286.5	299.7	1,435.2
1961	35,455	6.58	233.3	6,687	152.80	1,021.8	1,292	283.4	366.2	1,621.3
1962	35,370	6.45	228.1	7,372	141.83	1,045.6	1,560	280.2	437.1	1,710.8
1963	35,119	6.33	222.3	7,923	131.65	1,043.10	1,701	277.2	471.5	1,736.9
1964	36,163	6.20	224.3	8,251	122.20	1,007.8	1,763	274.1	482.5	1,714.6
1965	37,329	6.08	227.0	8,752	113.43	992.7	1,998	271.1	541.7	1,761.4
1966	36,378	5.96	216.8	8,844	105.28	931.1	2,082	268.1	558.2	1,706.1
1967	34,874	5.84	203.7	9,407	97.72	919.3	2,664	265.1	706.2	1,829.2
1968	35,083	5.72	200.7	9,708	90.71	880.6	2,951	262.2	773.8	1,855.1
1969	35,133	5.61	197.1	9,674	84.20	814.6	3,470	259.3	899.8	1,911.5
1970	37,095	5.50	204.0	10,577	78.15	826.6	4,758	256.5	1,220.4	2,251.0
1971	32,783	5.39	176.7	10,172	72.54	737.9	5,628	253.7	1,427.8	2,342.4
1972	32,381	5.28	171.0	10,143	67.33	682.9	7,053	250.9	1,769.6	2,623.5
1973	36,247	5.18	187.8	10,579	62.50	661.2	8,546	248.1	2,120.3	2,969.3
1974	40,358	5.07	204.6	10,396	58.01	603.1	9,974	245.4	2,447.6	3,255.3
1975	40,328	4.97	200.4	10,315	53.85	555.5	10,355	242.7	2,513.2	3,269.1
1976	41,274	4.88	201.4	10,361	49.98	517.8	11,815	240.0	2,835.6	3,554.8
1977	40,654	4.78	194.3	10,563	46.39	490.0	13,129	237.4	3,116.8	3,801.1
1978	46,529	4.68	217.8	10,881	43.06	468.5	15,583	234.7	3,657.3	4,343.6
1979	48,206	4.59	221.3	10,857	39.97	434.0	17,708	232.2	4,111.8	4,767.1
1980	52,330	4.50	235.6	11,102	37.10	411.7	18,981	229.6	4,363.2	5,010.5
1981	56,800	3.84	218.3	11,400	35.30	401.9	19,700	213.1	4,197.5	4,817.7
1982	60,200	2.81	169.0	11,000	26.90	296.4	20,900	194.5	4,065.4	4,530.9

The work figures shown relate to the number of vehicles in the unladen weight categories denominated in tonnes. It was not deemed worthwhile to make adjustments to the basic data. In any case, the only figures that are used in the projections are the aggregate ones.

Appendix 9

LIST OF MATHEMATICAL MODELS TESTED

Dependent Variable	Independent Variables	Models Tested
C_t	X_t	linear, multiplicative
	X_t, P_t	linear
	X_t, C_{t-1}	linear, multiplicative
	X_t, C_{t-1}, C_{t-2}	linear
	X_t, C_{t-1}, X_{t-1}	linear, multiplicative
	X_t, X_{t-1}, C_{t-2}	linear, multiplicative
V_t	X_t	linear, multiplicative
	X_t, P_t	linear
	X_t, V_{t-1}	linear, multiplicative
	X_t, V_{t-1}, X_{t-1}	linear, multiplicative
	X_t, X_{t-1}, V_{t-2}	linear, multiplicative
W_t	X_t	linear, multiplicative
	C_t	linear, multiplicative
	P_t	linear, multiplicative
	C_t, X_t	linear
	X_t, W_{t-1}	linear

Variables

C_t = Capacity (RFS based series)
X_t = Final Demand at constant 1975 prices
V_t = Number of Vehicles (RFS based series)
P_t = Population
W_t = Work done in tonne-kilometres (own series).

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