

UNIVERSITY OF MANITOBA

AN ECONOMIC ANALYSIS OF THE STRUCTURAL
CASE FOR THE DEREGULATION OF FREIGHT
TRANSPORTATION BY HIGHWAY CARRIER

by

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I remain responsible for any errors that remain.

ABSTRACT

There has been in recent years a re-appraisal of the role that economic regulation plays in particular industries. In the case of motor freight transport, which has developed and matured under economic regulation, the desirability and efficacy of regulation has long been questioned.

Many economists have argued that the motor freight transport industry, if free of regulation, would conform closely to the competitive model and establish a satisfactory position of stable equilibrium. Two interrelated methodologies have been employed to arrive at this conclusion. First, some authors have attempted to identify those structured conditions which, based on a priori theory and empirical evidence, would lead to acceptable conduct and performance. Second, other authors have assessed the conduct and performance of carriers not subject to regulation with the conduct and performance of regulated carriers in order to estimate the effects of regulation on price.

Both of these methodologies, primarily the first, make certain assumptions about the economic characteristics of motor freight transport. These are that motor carrier output is homogeneous, that threshold cost requirements to entry are low, that there exists high factor mobility and high cost variability with respect to output, and that there are no significant economies of scale. In essence, the conventional argument stresses that given ease of entry and exit and the lack of economies of scale, deregulation will result in a motor carrier industry which will not

exhibit significant tendencies toward undue concentration or destructive competition. Implicit in this view is that regulation causes an industry to diverge from its competitive structure and results in non-competitive performance which may be measured readily.

The objective of this study is to challenge these assumptions. It will be argued that the conventional arguments may be inadequate as an analytical and public policy reference point.

The general methodology employed in this study is as follows. First, it is argued that the assumption of output homogeneity is inappropriate. Motor carrier output has a number of dimensions, the most important of which are size of shipment, length of haul, and geographic coverage. Combinations of these three dimensions define a set of sub-industries for which the cross elasticities of demand are assumed to be low. Hence, carriers may be distinguished from one another on the basis of their service. Second, given these sub-industries their structural cost conditions are examined. That is, an attempt is made to ascertain if output heterogeneity on the demand side produces significant differences in the structural cost conditions. Threshold costs, factor mobility, cost variability and indivisibility, and economies of scale are discussed in relation to the output heterogeneity. Differences in these conditions imply differing competitive responses. Hence, the impact of any deregulation measure will not be uniform nor stable across the industry.

The study will focus on the for-hire general freight carrier.

Data indicate that this class of carrier predominates the industry in terms of revenues generated and equipment utilized. Unfortunately, the paucity of Canadian data prevents a detailed analysis of their operations. Therefore, recent U.S. research and a priori reasoning are used to develop the arguments concerning sub-industry structures within the class of carrier.

The analysis up to this point may be considered to assess the impact of structure on behavior. That is, the central question is one of determining if a stable equilibrium would obtain in the absence of regulation. A second line of inquiry relates to the comparison of conduct and performance of regulated carriers to non-regulated carriers. Two studies are reviewed which are representative of attempts to measure the effect of regulation on prices. In essence, these studies attempt to measure the effects of structure on performance based on certain unstated structural assumptions. It is argued that these studies do not employ adequate data nor appropriate model specifications.

The general conclusions of the study may be summarized as follows. The output of motor carriers is not homogeneous but rather has a number of dimensions. The size of shipment, the length of haul, and the extent of geographic coverage are three dimensions of output or service which distinguish one carrier from another. A separate sub-industry can be defined for unique combinations of these characteristics. It is assumed that the cross elasticity of demand for these sub-industries is low.

Threshold costs, factor mobility, cost variability and indivisibility, and economies of scale vary in importance across the

spectrum of output characteristics. In general, carriers which specialize in truckload shipments conform to the competitive model. However, carriers which specialize in less-than-truckload shipments do not. Less-than-truckload carriers require terminal facilities. As the length of haul and geographic coverage increases, the greater the terminal requirements. These terminals represent long-lived, fixed assets which affect the threshold costs, factor mobility, cost variability and indivisibility and economies of scale.

It is argued that for the less-than-truckload carriers threshold costs are increased, factor mobility reduced, and economies of scale are present. The significance of these structural features is a function of the length of haul and extent of geographic coverage. In the absence of economic regulation it is assumed that there exists a real possibility of destructive competition for certain carriers.

A review of studies which compare performance of regulated carriers to non-regulated carriers suggests that no firm conclusions may be drawn from them. The structure of motor transport is too diverse and complex to be incorporated in such models. It follows that it would be inappropriate to frame policy on the basis of this type of research.

In conclusion, it is argued that the arguments for de-regulation tend to over-simplify the benefits to be gained from de-regulation. This is not to say that the present situation is optimal in any sense of the word, but rather to argue that any move towards the de-regulation of motor carriers must be preceded by thoughtful and precise research.

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CHAPTER I

Introduction

Though the motor transport industry has been regulated for over 40 years in the U.S. and Canada, many economists have argued that the trucking industry, if free of regulation, would conform closely to the competitive model and establish a satisfactory position of stable equilibrium. As Wilson has remarked "so firmly engrained is this vision of the motor carrier industry that it has achieved the status of a piece of conventional wisdom. The implication of this view is that economic regulation is therefore entirely superfluous at best and a cause of serious economic waste at worst".¹

One may identify two, though interrelated, methodologies employed by various economists to arrive at the general conclusion. First, some authors have attempted to identify those structural conditions which, based on a priori theory and empirical evidence, would lead to acceptable conduct and performance. Second, other authors have assessed the conduct and performance of carriers not subject to regulation with the conduct and performance of regulated carriers.²

¹George W. Wilson, "The Nature of Competition in the Motor Transport Industry" Land Economics, 36 (November 1960), pp. 387-391.

²For general reviews of the case for de-regulation incorporating both of these approaches see John W. Snow, "The Problem of Motor Carrier Regulation and the Ford Administration's Proposal for Reform" in Paul W. MacAvoy and

This study will concentrate on the first approach with a view to critical analysis of the prevailing views on the structural conditions of the major transport industry. However, in a later section of this study two of the more important studies using the second approach will be examined.

The Structural Case For De-regulation

The literature of the economics of motor transport is rife with comments as to competitive structure of the motor transport industry. For example, Pegrum stated . . . "the economic structure of the motor transport industry is that of a highly competitive industry."¹ Keyes stated that for (the) "motor trucking . . . industry the competitive analysis is valid."² Olson has stated that "without the existence of regulation the motor carrier industry would appear to be one of the best examples of a perfectly competitive industry".³

John W. Snow, eds., Regulation of Entry and Pricing in Truck Transportation (Washington, D.C.: American Enterprise Institute, 1977) pp. 3-43; and James C. Johnston, "De-regulation of Transportation: Its Probable Ramifications" Proceedings: Fifteenth Annual Meeting of the Transportation Research Forum (Oxford, Indiana: Richard B. Cross Co., 1974), pp. 133-137, see also Norman C. Bonsor, "The Development of Regulation in the Highway Trucking Industry in Ontario", Ontario Economic Council, Government Regulation: Issues and Alternatives 1978 (Toronto: Ontario Economic Council, 1978), pp. 103-135.

¹ D. F. Pegrum, Public Regulation of Industry (Homewood, Illinois: Richard D. Irwin, 1959), p. 582.

² L. S. Keyes, Federal Control of Entry into Air Transportation (Cambridge, Massachusetts: Harvard University Press, 1951), p. 413.

³ Josephine Olson, "Price Discrimination by Regulated Motor Carriers", American Economic Review, 62 (June 1972), p. 935.

These views are based on assumed structural characteristics of motor transport in relation to the theoretical model of a competitive industry. For example, Scherer has stated that "homogeneity of the product and insignificant size of individual sellers relative to their market are sufficient conditions for the existence of pure competition - the only basic structure type under which sellers possess no market power".¹

Once again, the literature abounds with references to the homogeneity of the output of motor transport. For example, Farmer has stated ". . . all freight transportation firms sell the same product, ton-miles, and while this output can be differentiated somewhat in quality terms, such as in quality of service rendered . . . it is quite difficult to maintain product differentials over long periods of time".² Olson states, "its products is movement of goods between two points within a given time period . . . some differences in quality may be possible, . . . but they are relatively difficult to maintain".³ As may be noted, where authors recognize any heterogeneity of the output it is deemed to be inconsequential in the longer run. Implied in this view is that all motor transport firms have the potential to produce the identical product of competitors because all carriers are assumed to be using the identical technology.

¹Frederick M. Scherer, Industrial Market Structure and Economic Performance (Chicago: Rand McNally and Co., 1970), p. 10.

²Richard N. Farmer, "The Case for Unregulated Truck Transportation", Journal of Farm Economics, 34 (May 1964), p. 400.

³Josephine Olson, op. cit., p. 395.

Wilson has argued extensively as to the heterogeneity of output on the demand side, however, this analysis has only been used to examine output differences between modes.¹ Recently, some authors have argued that the analysis should be extended to determine if non-transport savings do not create demand heterogeneity within a particular mode. For example, Spychalski has argued that "efforts to ascertain competitive conditions in trucking should begin with recognition of the fact that motor freight carriage, taken en toto, is not homogeneous in terms of either (1) types of service produced, and plant and equipment with which such services are produced, or (2) shippers' requirements or demands for motor freight service".² This issue will be discussed in more detail in the following chapters.

In reference to Scherer's second condition for pure competition - insignificant size of individual sellers relative to their market - many economists simply point out the thousands of regulated and unregulated carriers in existence as evidence that motor transport is inherently competitive.³ While there may be some recognition that for certain geographic markets the number of carriers may be quite small (perhaps only one) any perceived con-

¹George W. Wilson, "On the Unit of Output in Transportation", Land Economics 35 (August 1959), pp. 267-276.

²John C. Spychalski, "Criticisms of Regulated Freight Transport: Do Economists' Perceptions Conform with Institutional Realities?" Transportation Journal, 14 (Spring 1975), p. 7.

³C. John W. Snow, op. cit., p. 3.

centration is related to the effects of entry control of new firms.¹ However, output heterogeneity on the demand side and differences in demand between geographic markets (as well as operating cost differences) may confer monopolistic power on certain carriers in the short run.

Recognizing that some monopolistic power may be gained in certain markets economists have argued that, in the absence of regulation, the relative ease of entry and exit (based on low initial capital requirements and highly divisible, relatively short-lived physical units of operation) and the absence of any significant economies of scale where only one or a few firms could supply all the output demanded in a particular market, would limit this power.²

The arguments concerning ease of entry and exit are related to the economies of scale argument. For example, the presence of significant economies of scale may indicate the need to raise substantial amounts of capital to enter the industry at an efficient scale (this is sometimes referred to as the threshold cost). If, on the other hand, no significant economies of scale are present and the units of capacity are highly divisible, the entry size of the firm may be small and the threshold cost will be relatively low.

¹John W. Snow. op. cit., pp. 3-5.

²John Meyer et al., The Economics of Competition in the Transportation Industries, (Cambridge, Mass.: Harvard University Press, 1959), p. 213; and John Spsychalski, op. cit., p. 6.

As Pegrum has stated of motor transport ". . . the technical operating units are relatively small and may be very small. Operations may be started with a very small investment and expansion may be undertaken with very small increments in investment in direct and almost immediate response to growth in traffic. Most of the facilities are not highly specialized or unalterably committed to a particular geographic area, and they can be readily shifted to any other markets if the law permits this. Physically, the highways or routes are available to all who wish to use them".¹

The implication of Pegrum's argument is that not only are there no significant barriers to entry but, due to the divisibility of inputs and high factor mobility, there are no restrictions to exit. Therefore, the conduct and performance of the industry should conform to the competitive model. Furthermore, the arguments concerning the probability of destructive competition are rejected on the basis of the ease of exit.²

Given these assumed structural characteristics of motor transport, that is, that motor transport is inherently competitive, the structural case is extended to performance analysis. The

¹D. F. Pegrum, Transportation Economics and Public Policy, 3rd ed., (Homewood, Illinois: Richard D. Irwin, Inc., 1973), p. 122.

²Cf. Joe Bain, Industrial Organization, 2nd ed., (New York: John Wiley and Sons, 1968), pp. 469-496 and Frederick M. Scherer, Industrial Market Structure and Economic Performance, (New York: Rand McNally and Co., 1970), pp. 198-200. The subject of destructive or cut-throat competition will be discussed at length in Chapter VI.

implicit assumptions of studies which attempt to assess the effects of regulation on price are that in the absence of regulation the industry would conform to the competitive model and that regulation produces measurable differences in performance. This will be discussed in greater detail in Chapter VII.

The structural arguments for the de-regulation of motor transport will be reviewed in detail in the following sections of the study. To rephrase Spychalski, an attempt will be made to determine if "economists' perceptions conform to institutional reality".

Industrial Organization Theory and the Case for De-regulation

Industrial organization as a discipline of applied economics was largely created and developed by Edward Mason and his students in the 1930's. As with most applied disciplines industrial organization has followed many lines of development. To some economists industrial organization consists of the testing of theoretical market models. To others it is a means of synthesizing theory and empirical fact.¹

Most industrial organization studies are framed by the relationships between industrial structure, the behavior or conduct of firms, and economic performance judged in terms of the norms of economic

¹See James W. McKie, "Market Structure and Function: Performance versus Behavior" Jesse Markham and G. Papenek, eds., Industrial Organization and Economic Development - Essays in Honour of Edward S. Mason, (New York: Houghton Mifflin Co., 1970), pp. 3-25.

welfare. Unfortunately, this analytical scheme is not a completely connected system. That is, most studies do not, and cannot, examine structure, predict conduct uniquely and completely, and infer performance from behavior and how well this performance related to the norms of economic theory.

Therefore, "Bain's paradigm", as this analytical schema is sometimes referred to, has not been fully connected in a linear or other type of sequence. This is not to say that industrial organization lacks research direction but rather that research which is aimed at a higher level of generalization has not fully connected the elements of the scheme.

As McKie points out, most studies of industrial organization tend to focus on either an analysis linking structure and performance directly, or an analysis linking structure and behavior.

"Investigations of economic performance have usually behavioral problems. In this they resemble the abstract theoretical models of the firm and the market under conditions of pure competition and pure monopoly, for which profit maximization is the only behavioral principle necessary: price policy is what produces maximum profits. Questions of behavior become interesting in equilibrium analysis only when there is some uncertainty about the theoretical results. Performance, on the other hand, is more directly dependent upon the properties of the predicted equilibrium."¹

¹Ibid., p. 4.

The industrial organization schema has been applied to regulated industries such as motor transport though the methodology is rarely, if at all, discussed. Once this is done certain analytical deficiencies become more apparent.

If one examines the structural case for the de-regulation of motor carriers the case may be considered to consist of two parts.

First, there is an assumed link between structure and behavior. For example, the structure of the motor carrier industry is assumed not to lead to destructive competition. However, the evidence needed to support this argument requires a great deal of information. In fact, a much more complex specification of an industry's structure is required to analyze behavior than to predict performance in terms of the profit rate.

Students of industrial organization have found the following structural dimensions useful in examining the link between structure and behavior.¹

1. Distribution of sellers by number and size.
2. Relative ease of entry to, and exit from, the industry or market.
3. Conditions of Demand and Nature of the Product:
 - Differential or homogeneous
 - Consumer or producer; durable or perishable
 - Unit value

¹Ibid., pp. 9-10.

- Methods of distribution
- Intermittent or continuous demand
- Price elasticity
- Short-run income elasticity
- Long-run rate of growth
- 4. Cost conditions and technology:
 - Shape of marginal and average cost curves;
 - weight of overhead costs; cost flexibility
 - Economies of scale
 - Vertical integration
 - Joint or Common products
 - Technolgoical complexity
- 5. Factor market influences; relative factor costs; monopoly and competition in factor markets.
- 6. Locational influences.
- 7. Government regulation of prices, inputs, outputs, and specific taxation.
- 8. Distribution of buyers by number and size.

These basic elements of structure may be given other names but most would be important in any industrial organization study.

Furthermore, they may exist in a very large number of combinations.

Most of the structural case for de-regulation relates to the cost conditions in virtual isolation with little reference to the other important characteristics - especially conditions of demand.

Grouping of the various structural elements may lead to a range of behaviors depending on the elements grouped and their relative importance. For example, assume there are many small producers

in an industry characterized by easy entry, difficult exit, an undifferentiated product, price-inelastic demand, high overhead costs, and stagnant technology. In periods of excess capacity one may expect depression, unremunerative prices, and failure of the market to reach equilibrium. However, would this result obtain if one of the elements were altered, say, the introduction of differentiated product. In such an instance firms may be able to protect themselves by differentiating product, however, an equilibrium may not be reached unless there is some tacit agreement on prices or output. In short, it is very difficult to predict behavior when faced with structural combinations, the relative importance of each are not clear.

The second part of the structural case for de-regulation consists of an assumed link between structure and performance. That is, it is assumed that it is appropriate to measure price differences between regulated and unregulated markets as a measure of performance. This assumes that firms operating in the two markets would be identical in every respect save for regulation. In addition, the form of regulation is assumed to be identical.

The link between structure and performance is generally examined by relating concentration in a particular market to profitability. Profitability is usually gauged in reference to some norm as the long-run rate of interest. However, it has become common practise to compare prices between the two markets. The effect of this methodology is not to gauge economic performance per se but rather attempt to evaluate the effects of

regulation. That is, rather than attempting to assess performance as either good or bad the researcher simply looks for differences between the markets. Obviously, the effects of regulation on performance are a subset of performance in general. In essence, regulation has become a proxy for concentration.

In conclusion, the industrial organization schema offers a useful framework for analysis providing its limitations, both theoretical and empirical, are specified as clearly as possible.

Outline of the Study

Chapter II will review the political economy of regulatory reform. That is, it will briefly discuss the status of the broad regulatory reform movement in the U.S. and Canada, its imperatives, and some possible impediments to regulatory reform. Differences in perspective and policy between the two countries will be highlighted.

Chapter III will profile the Canadian motor freight transport industry. Using highly aggregated Canadian data the size distribution of firms will be presented. In addition, the relative importance of the for-hire general freight carrier is discussed. This chapter will include a brief analysis of motor carrier operations and highlight the importance of terminal functions. A review of the existing regulatory framework within which the industry operates is presented. Finally, the competition to the for-hire general freight carrier, railroads and private motor carriers, is discussed to gauge the competitive impact of these two modes.

Chapter IV will analyze the structure of the industry. It will be argued that output heterogeneity on the demand side defines a set of sub-industries. The dimensions of output discussed are size of shipment, length of haul, and geographic coverage. These continuous variables define a spectrum of sub-industries which have differing structural and competitive characteristics. The structural characteristics discussed are threshold costs, factor mobility, and cost variability and indivisibility. The discussion of economies of scale as a structural characteristic is presented in Chapter V. This will entail a review of the literature.

Chapter VI will discuss destructive competition. That is, given the structural characteristics of motor transport, the analysis will focus on the likelihood of achieving a stable equilibrium. The historical record of destructive competition is reviewed and the modern relevance of the issue is discussed.

Chapter VII reviews two of the more important studies which attempt to measure the impact of regulation on rates. The statistical and methodological shortcomings of this approach are discussed in detail.

Chapter VIII contains the summary and conclusions of the study. It will discuss some of the implications of the results and point out specific areas requiring further research.

CHAPTER II

The Political Economy of Regulatory Reform: Recent U.S. and Canadian Experience.

Introduction

While the terminology has changed somewhat over the years, the arguments for regulatory reform are not new.¹ What is new on the broad regulatory front is the fact that there is indeed a front. That is, there is a growing constituency of policy makers that are willing to translate arguments for reform into legislation.

For the U.S. and Canada the impetus for reform seems to stem from the inflationary pressure of recent years. That is, regulatory reform is seen as a way of reducing prices without significantly increasing unemployment. While the rapid economic changes over the last few years have spurred an interest in regulatory reform in general, the conventional case is still applied to motor transport.

It will be argued that the perspectives on regulatory reform are quite different in Canada than in the U.S. Canada has not had the same ideological commitment to competition as the U.S. Unlike the recent U.S. experience of de-regulatory success, Canada has

¹The terminology has changed in recent years partly, one suspects, due to the efforts of policy makers to remove the negative connotation of "de-regulation" and to the acceptance of the notion that regulation can be made more responsive to changing economic and social circumstances. Hence, the phrase regulatory reform has emerged as a more accurate and less emotive term. One variant of this phrase is "regulatory re-regulation" which tends to leave the reader somewhat bewildered.

experienced de-regulatory failure in terms of its railroads. In addition, Canada seems to be in the unique position of attempting to pass two contradictory pieces of legislation.

It is useful to review the prevailing U.S. and Canadian views on regulatory reform and highlight the imperatives for change. It may be argued that the rigorous structural view taken by U.S. policy makers and the somewhat ambivalent view taken by Canadian policy makers regarding motor transport regulation, reflects an insufficient appreciation of the characteristics of the motor transport industry.

Recent U.S. Views

Though earlier examples may be cited, every U.S. president since Harry S. Truman has recognized administrative problems associated with regulation and has appointed some type of commission or board to evaluate regulation.¹ Each has been unsuccessful at affecting fundamental change.

Though it is beyond the scope of this study to inquire into the reasons why regulatory reform did not gain the seeming importance it has at present, the emphasis on economic efficiency in the light of inflationary pressures is clearly important.

It may be argued that contemporary criticism dates to 1961 when an advisor to President Kennedy produced a popular book of

¹ Canada, Department of Consumer and Corporate Affairs and Treasury Board, Government Evaluation of Regulation: The U.S. Experience (Ottawa: Minister of Supply and Services, 1978), pp. 1-17.

regulatory criticism.¹ From this initial effort, Kennedy delivered a Special Transportation Message to Congress in which he criticized the patchwork of federal transportation policies and recommended specific measures to de-regulate the transportation industries. Nothing came of the proposals.

With the advent of the Kennedy administration, the annual reports of the President's Council of Economic Advisors have called for "regulatory reform". Unlike the earlier period when economists attempted to measure the administrative costs of regulation or to argue that a particular component of the transportation industry had all the structural requirements of a competitive industry, the new research attempted to assess, in dollar terms, the social cost of regulation.²

¹It should be noted that though the inflationary pressures in 1961 did not approach the levels present today. Kennedy was making a stand on "creeping inflation".

²Cf. Thomas Gale More, "The Feasibility of De-regulating Surface Freight Transportation", in Almarin Phillips ed., Promoting Competition in the Regulated Industries (Washington, D.C.: The Brookings Institution).

Ann Friedlaender, The Dilemma of Freight Transport Regulation (Washington, D.C.: The Brookings Institution, 1969).

Larry Darby, "An Evaluation of Federal Regulation of Common Motor Carriage", (Ph.D. dissertation, Indiana University, 1969).

For more recent work see Interstate Commerce Commission, Bureau of Economics, "A Cost and Benefit Evaluation of Surface Transport Regulation" In Paul W. MacAvoy and John W. Snow, eds., Regulation of Entry and Pricing in Truck Transportation (Washington, D.C.: American Enterprise Institute, 1977), pp. 47-91 and "The Costs and Benefits of Surface Transport Regulation: Another View" in Paul W. MacAvoy and John W. Snow, eds., loc. cit., pp. 93-114.

As Wilson has pointed out:

"The studies use widely different and highly suspect techniques, woefully inadequate data, heroic assumptions, and a series of guesses, more or less educated. However, the surprising thing is that despite all of these caveats, there is rather close comparability in the estimates of social costs. In turn, less elaborate estimations arrive at at least roughly similar magnitudes. Without commenting on the acknowledged deficiencies of these estimates, their derivation and the fact that they measure different things even though purporting to be measures of social costs...it is fair to say that (based on these studies) that the social cost of economic regulation of transportation may have been at a minimum between \$3.4 billion in 1969 and higher in subsequent years as freight revenues, ton-miles, and GNP have risen. At least, those who have attempted some quantification appear to agree generally upon the orders of magnitude...." ¹

Studnicki-Gizbert provides a broader view of the regulatory problem:

"The present debate over the usefulness and performance of the regulatory system concentrate on the issue of the costs and benefits of economic regulation from the point of view of economic and administrative efficiency. Given such terms of reference, the results lead to an almost universal condemnation of the regulatory system. The main points are: 1) regulation distorts inter-industry competition; 2) regulation distorts the allocation of resources within the regulated industry; 3) regulation raises prices to transport users; 4) regulation promotes inefficiency and hampers innovation; 5) regulation is inherently associated with administrative delays and high costs to the interests concerned; 6) regulation adversely affects competitive incentives; 7) regulators become over-identified with the regulated firms." ²

¹George W. Wilson, "Economic Consequences of Motor Carrier Regulation" in Allen R. Ferguson and Leonard Lee Lane, eds., Transportation Policy Options: The Political Economy of Regulatory Reform, (Washington, D.C.: Public Interest Economics Foundation, n.d.), pp. 19-36.

²K. W. Studnicki-Gizbert, "The Administration of Transport Policy: The Regulatory Problems" Canadian Public Administration (Winter, 1975), pp. 651-652.

While some of the items mentioned above tend to overlap it seems that the prevailing opinion of regulation is that it has "failed". Regulatory failure has a number of dimensions. Perhaps the most obvious is the failure of a regulated firm in spite of, or according to some, because of regulation. The recent collapse of Penn-Central, Reading, Lehigh Valley, Central RR of New Jersey, Boston, and Maine, and Rock Island clearly reflect this view.¹

The other dimension of regulatory failure stems from the recognition that the regulatory process produces more regulation. For example, Mr. James Miller of the Center of the Study of Governmental Regulation has kept track of the growth of regulation in the Federal Register (which lists new rules daily) and the Code of Federal Regulations (which lists all regulations currently in force). He found that once the period 1970-1977 the number of pages in the Federal Register had increased by 227%, and the pages in the Code of Federal Regulations has increased by 39% in the same period.²

It may be argued that a great deal of pressure has been placed on regulatory reform by the recent decisions of what has been labelled "the new antitrust majority" on the Supreme Court.

¹Cf. Merton J. Peck, "Regulation and the Railroad Crisis", Allen R. Ferguson and Leonard L. Lane, eds., Transport Policy Options: The Political Economy of Regulatory Reform, op. cit., p. 13-18

²"Reforming America's Regulators", The Economist, August 12-18, 1978, p. 61.

The court has shown an increasing deference (since about 1975) to private restraints tolerated by regulators.¹ During the 1960's the Supreme Court (the "Warren Court") generally took the position that the mere fact that an anti-competitive private arrangement had been approved by a regulator did not exempt it from antitrust scrutiny.² The court generally decided that unless the anti-competitive conduct was necessary to make the regulatory scheme work the conduct was not exempt from the antitrust law. In some cases the Supreme Court would still allow an antitrust suit against the approved conduct where it was shown that a less anti-competitive alternative was available.

The new Supreme Court seems to be taking a decidedly different approach. Recent decisions seem to reflect the view that the present Supreme Court sees antitrust as "a dogmatic and inconvenient interloper in orderly regulation mandated by Congress".³ Therefore, the independent antitrust forum of the "Warren Court" which assured scrutiny of anti-competitive practices and mergers where such conduct was approved of by the regulatory agency has gone by the wayside.

¹U.S., Senate, Committee on the Judiciary, The Competition Improvements Act of 1975, Hearings, before a Sub-Committee on Antitrust and Monopoly, Senate on S. 2028, 94th Cong., 1st. sess., 1975, p. 319. Prepared Statement of Donald Baker, Visiting Professor of Law, Cornell Law School.

²No case has arisen where a regulator has "commanded" change which contradicted antitrust law.

³Ibid., p. 322.

Apart from recent numerous bills to allow for greater competition in specific regulated industries the omnibus bill proposed by Senator Edward Kennedy attempts to reaffirm the national dedication to competition at all levels:

"It is the purpose of the Act to reaffirm that the fundamental national economic policy of the United States is free and open competition embodied in the antitrust laws, to establish procedures that strengthen and facilitate the application of antitrust and procompetitive policies by Federal departments and agencies, to minimize anti-competitive behavior in regulated industries, to encourage more vigorous and far-reaching application of the antitrust laws in the policies and practices of Federal departments and agencies, to enable Federal departments and agencies better to restore, maintain, and protect open and vigorous competition in the marketplace... 1

Donald Baker² gave virtually unqualified support for Senator Kennedy's bill and proceeded to identify some areas in which he felt the bill would have the greatest input.³

¹ Ibid., p. 6 (This is taken from the draft version of S.2028).

² Donald Baker joined the Department of Justice in 1966 and rose to the level of Deputy Assistant Attorney General. When the Carter Administration came to power he was "fired" and took up teaching at Cornell. His support for the bill was quite important since he initiated Department of Justice involvement in cases concerning regulated industries. The most important case was the 1975 "Carterfone" case, also known as the telephone attachments case.

³ Baker and George Hay also outlined these areas in a speech to the McGill University Institute for the Study of Regulated Industries in March 1978. However, these areas were determined (prior to 2028) on a strategic basis, that is, to which regulated industries should Justice and the FTC allocate antitrust resources.

"...I think we ought to look at four kinds of situations to understand how it is going to work. One is the naturally competitive industry which has been regulated on economic grounds. Trucking and airlines are the cases in point. And here, they probably would be better if almost all the economic entry and pricing regulations were eliminated. What you want out of S. 2028 is the maximum tilt in favour of competition and flexibility. ¹

Baker felt that for other situations such as "ethical regulation" (standards, licensing) or so-called "natural monopoly", the scope of S. 2028 should be limited. However, Baker argued that the government should not allow licensing policies to serve protectionist purposes and should encourage market-oriented practices in the so-called natural monopolies (such as peak-load pricing for example). The fourth case Baker discussed related to the extension of regulation of natural monopolies to other activities. For example, he argued that the fact that a telephone network is a natural monopoly does not justify the extension of regulations to terminal equipment.

Recent U.S. experience in de-regulating air carriers brought about by the dynamic leadership of Alfred Kahn, has indicated that there is sufficient flexibility in regulatory system to allow for reform without the introduction of new legislation. This type of flexibility is now appearing in other independent regulatory agencies. For example, the chairman of the Interstate Commerce Commission (ICC) has recently proposed short-range de-regulation

¹U.S. Senate, Committee on the Judiciary, The Competition Improvements Act of 1975, Hearings, op. cit., p. 314.

of truckers entering new markets. This will be accomplished without changes in legislation though a second stage will require legislative changes.¹ He stated that the trucking industry should be de-regulated where regulation is not useful for freight transportation. In addition, it was felt that the trucking industry was mature and more competition was needed.²

In conclusion, it may be stated that due to a variety of factors, including a band-wagon effect, that policy makers accept the need for regulatory reform in general and for the de-regulation of trucking in particular. The notion that trucking in a "naturally competitive" industry is at the heart of the proposed reforms.

Recent Canadian Views

Canada has not had the same sort of commitment to competition as the U.S. To state this point in another manner, Canada has traditionally accepted the desirability and indeed assumed need for government intervention. "Government ownership, large firms in banking, finance, transportation and some resource industries, often closely related to or directed by government, substantial foreign ownership behind a protective tariff wall . . . these have persisted as dominant character-

¹"Trucking Controls", Toronto Globe and Mail, November 9, 1978.

²Ibid., See Appendix 1.

istics of the Canadian economy despite the major changes that have taken place over the last century".¹

As Skeoch has pointed out, Canada has tended to accept the need for large firms in the business sector and for a substantial degree of government support and direction to the economy. An interesting aspect of this view has been not to reject business as bad per se. This attitude has been revealed by exemptions to competition legislation which has traditionally excluded services, transportation coming within the jurisdiction of parliament, labour unions, certain market schemes, etc. "At the very least it is clear that there is no Canadian public policy commitment to a general rule of competition in Canada. To assume that there is (or has been) is to misread the history of combines legislation and to simplify it out of all relation to reality of the vagaries of government policy and administration..."²

It would seem that in recent years the Canadian view on the regulatory system has been affected by the same forces that have been at work in the U.S. To reiterate, ". . . the regulatory process has been faulted for being insensitive to public needs and opinions while, on the other hand, doubts have been expressed concerning the efficiency and effectiveness of

¹L. A. Skeoch, ed., Mergers, Consolidations and Big Business, (Oxfordshire: The Ditchly Foundation, 1970), p. 62.

²L. A. Skeoch, Restrictive Trade Practices in Canada (Toronto: McLelland and Stewart, 1966), pp. 148-149.

particular regulations, standards, or guidelines. More specifically, with the onslaught of serious inflationary problems, it has been argued that regulations may be unnecessarily adding to prices and costs".¹

There is another feature of the Canadian scene which has spurred efforts at examining regulation in Canada and that is the prevalence of overlapping regulatory jurisdictions and the conflicts imposed by such an interface. This problem has been accelerated in recent years by the shift of economic power in Canada, as well as the desire of provinces to assume greater control of their economies.

For example, on July 12, 1978 the Prime Minister asked the Economic Council of Canada to undertake a number of studies of specific areas of regulation. "As you know, there has developed in Canada a strong concern that increasing government regulation might be having serious adverse effects on the efficiency of Canadian firms and industries and on the allocation of resources and the distribution of income. You will recall that First Ministers, in February, 1978, ' . . . agreed that the whole matter of government regulation should be referred to the Economic Council of Canada for recommendations for action in consultation with the provinces and the private sector'. In

¹Canada, Department of Consumer and Corporate Affairs and Treasury Board, Government Intervention in the Marketplace and the Case for Social Regulation, (Ottawa: Department of Supply and Services, 1977), p. 1.

addition, First Ministers expressed concern about the overlapping of federal and provincial regulatory jurisdictions".¹

While it will take some time for the Canadian position on the broad regulatory front to emerge, the conflict between transportation regulation and the competition policy indicates the problems to be faced.

In order to explore the conflict it is useful to begin with the MacPherson Commission Report.² The MacPherson Commission was called upon to inquire into and report upon the problems relating to railway transportation in Canada and the possibility of removing or alleviating inequities in the freight rate structure.³

It has been pointed out the primary concern of the MacPherson Commission was somewhat more broad than indicated by the title. "This was to free railways from the 'dead hand' restrictive rate regulation that appeared to prevent them from effectively meeting the growing competition of road transportation and abandoning uneconomic services. Keeping the railways running had always required massive support from the public coffers. There had been a valid rationale for this sort of regulation when rail

¹Letter from Prime Minister Trudeau to Dr. Sylvia Ostry, Chairman of the Economic Council of Canada, July 12, 1978.

²Canada, Royal Commission on Transportation Report (Ottawa: Queen's Printer, 1961). Hereinafter cited as "MacPherson".

³Ibid., Vol. 1 and Appendix A.

virtually monopolized the transportation field".¹

What had started as an investigation of railway rates ended in a broad sweeping recommendation for greater competition.

"In brief, the broad aim of public transportation policy should be to ensure - consistent with other goals of national policy - that all the various modes of transportation are given a fair chance to find their proper place within a competitive system²

. . . national transportation has been a great deal more pre-occupied with the question of how effectively the transportation system was functioning as an instrument to fulfill national policy objectives, than with the question of how well it was functioning as an economic enterprise. There were, of course, good reasons in the past this was so. In our view, however, that there are now equally good reasons why it should no longer be so".³

This new commitment to competition was carried over to the National Transportation Act of 1967. The other main feature of the legislation was the formation of a single trans-modal regulatory authority which emphasized a commitment to competition. It should be pointed out that the new commitment to competition was born out of a continuing railway crisis. The Law Reform

¹Law Reform Commission of Canada, The Regulatory Process of the Canadian Transportation Commission (Ottawa: Minister of Supply and Services, 1978), p. 7.

²MacPherson, op. cit., Vol. 1 p. 29.

³Ibid., p. 30.

Commission noted that railway rates had been frozen since 1959 and this meant that by 1967 taxpayers were paying up to \$100 million per year to cover railway deficits.¹

Clearly, the Transportation Act of 1967 was based on the notion of regulatory failure and its escalating social costs. Therefore, rather than attempting to regulate the entire system the government would grant the railways pricing freedom and if it was felt that certain regions had to be served in the national interest, it would be "cleaner" to pay a direct subsidy for the service.

As the Law Reform Commission notes, the failure of the National Transportation Act of 1967 was primarily due to certain ambiguities of the legislation in terms of coverage and certain ambivalence to promote competition in transportation.

"This (Act is somewhat schizophrenic: it says we are going to have competition, but at the same time we are going to lay an extremely heavier hand on that competition and see that it does not get out of control. I think we will wind up getting the worst of both worlds. We will not benefit from the advantages possible under a competitive system in those areas where competition will work effectively; neither will we get the benefit of regulated system for which the transportation system seems to call".²

It is argued that since 1967 the criticisms of the existing system (as recently demonstrated by an inadequate number of box

¹Law Reform Commission, op. cit., p. 8.

²Mr. Max Saltzman, Commons Debates, December 21, 1966, pp. 11482-3 in Law Reform Commission, op. cit., p. 17.

cars to move grain) has led the government to shift away from an emphasis on competition. For example, Mr. Marchand, the former Transport Minister, stated in 1974:

"We said (in 1967) . . . that transportation should work in the same way as other things in other sectors of the economy. We suggested that we should have competition between the railway companies as well as competition between the railways and the trucking industry and between the trucking industry and the shipping industry . . . I can tell you now in all honesty from my experience that this fundamental principle is wrong in Canada . . ." ¹

A long awaited government policy statement in June, 1975 reinforced Mr. Marchand's statements. It argued that due to significant changes in the social and economic environment of the world since 1967 a need for an integrated approach to transportation problems was required. In other words, a fundamental review of the role of competition dictated that competition could now be viable only in some segments of the transportation system and should not be a primary factor in transportation regulation generally. "The objective selected was an accessible, equitable, and efficient system rather than economic, efficient, and adequate".²

The content of the policy statement of June, 1975 was incorporated into Bill C-33 which amends the National Transportation

¹Mr. Jean Marchand, Commons Debates, March 7, 1974, p. 265 in Law Reform Commission, op. cit., p. 17.

²Law Reform Commission, op. cit., p. 18.

Act of 1967. While the word "competition" is still included in the wording of the Act the clear import of the legislation is to reduce the primacy of competition in favour of regional development, adequate service to small communities, etc.

It may be argued that the policy shift since 1967 was based on "de-regulation" failure. That is, it was assumed that by allowing the railways the necessary pricing freedom that competition would, between rail and its major competitor, motor transport, produce an efficient system and significantly improve the financial position of the railways. The railways were essentially given this freedom in 1967, however, the results were not as expected. As Heads has pointed out:

"Canadian experience has shown that freedom from regulation will not necessarily solve the financial problems of the railways. Although the railways have received compensation for services provided as a public duty, particularly in respect of passenger transportation and branch lines, the industry has not been able to generate sufficient funds to produce rates of return which would attract new investment. Theoretically, this can be attributed to a combination of failure to exploit fully the new flexibility in pricing; and possibly the development of new supply and demand conditions that make it impossible for the railways to earn rates of return considered normal in other industries".¹

As will be discussed later in this study it would seem that the failure to understand the economics of the competition from motor transport is partially responsible for the results of de-regulation.

¹ John Heads, Some Lessons From Transport De-regulation in Canada, (Ottawa, Canadian Transport Commission, Economic and Social Analysis Branch, 1975), p. 7.

There is, at the same time, a movement in Canadian public policy towards less regulation in the economy generally. This view is embodied in the proposed State II Amendments to the Combines Investigation Act. Given the historical exclusion of transportation sector from the Act one would expect this policy shift merely to reflect historical inconsistencies about what is, and what is not, subject to the Act. However, two policy thrusts of the Act have an immediate impact on transportation. First, it is envisaged that the proposed Competition Act would be laws of "general application". Second, the Act, which had incorporated services in the Stage I Amendments, would now incorporate all regulated industries, which would be exempt from the Act only on very specific grounds.

Perhaps the best way briefly to discuss the Act is to analyze the preamble to the legislation.¹ The preamble is composed of three paragraphs. The first serves to place the Competition Act within the context of certain basic goals of Canadian public policy such as efficient allocation of resources, stimulates innovation, expands trade opportunities, etc. The second paragraph deals with certain factors which are necessary

¹Cf. Canada, Department of Consumer and Corporate Affairs, Proposals for a New Competition Policy for Canada, (Ottawa: Minister of Supply and Services, 1977), p. 15-16. While the proposed legislation has gone through a number of alterations the preamble has remained constant. The economic rationale for the legislation may be found in Economic Council of Canada, Interim Report on Competition Policy (Ottawa: Queen's Printer, 1969), and L. A. Skeoch and B. C. McDonald, Dynamic Change and Accountability in a Canadian Market Economy (Ottawa: Minister of Supply and Services, 1976).

to achieve the overall public policy goals. Factors mentioned are the creation of a flexible dynamic, and adjustable economy with emphasis on the removal to mobility, the discouragement of concentration and the predatory exercise of power, thus reducing the need for detailed economic regulation. The third paragraph makes the promotion of competition a matter of national policy by means of the introduction of general laws of general application. The Act clearly has an efficiency orientation which recognizes that competition may be tempered if it conflicts with economies of scale or real savings of resources.

The intent of the regulated conduct section of the Act requires that all regulated industries be subject to the Act.

Exemption from the Act would be allowed if:

- (a) Anti-competitive conduct must be expressly required or authorized by a public agency not appointed by regulated persons.
- (b) The regulatory agency must regulate expressly in a manner set out in the regulatory statute.
- (c) The application of the Competition Act would seriously interfere with the attainment of the primary objectives of the regulatory law.¹

The three exemptions have produced a great deal of controversy on two grounds. First, the import of the exemptions is not clear. For example, are the three exemptions exclusive,

¹Canada, Department of Consumer and Corporate Affairs, Proposals for a New Competition Policy for Canada, p. 87.

mutually inclusive? Furthermore, each exemption is not well defined. The first exemption was intended to bring, for example, professional associations with self-regulatory powers from provincial legislation under the Act. However, there are cases where regulatory boards are composed of members of the industry as well as government representatives. The question arises as to how many industry members are required to bring the association under the Act. The second exemption was designed to reinforce the first. That is, many self-regulatory professions do not regulate in a manner spelled out in statute but rather they regulate by regulations to an act or by by-laws. The third exemption may also produce contradictions. For example, if the primary objective of the regulation is orderly marketing of agricultural produce, application of the Act would seriously impair this by prohibiting production quotas.

The second reason for the controversy regarding the regulated conduct section is that federal regulatory agencies would be required to pursue their objectives in a manner least restrictive of competition. Furthermore, the proposed Competition Policy Advocate (presently the Director of Investigation and Research) would have powers of intervention before regulatory agencies. Therefore, actions of regulatory agencies such as the CTC would be open to competitive impact analysis.

Members of regulated industries have expressed concern because certain types of market conduct which though not subject to detailed regulation, have tacit or implicit approval by

government. Examples of this are rate bureaus in trucking, the involvement of airlines in non-transport operations (travel agencies), etc.

Though neither of the two pieces of legislation listed above have been passed, the interface could introduce some very important adjustments as far as transportation sector is concerned. It should be noted that this interface is not necessarily contradictory. For example, the Competition Act seeks to promote competition in order to achieve "efficiency". However, where competition would prevent the attainment of real savings to the economy competition would be tempered. The National Transportation Act would seek to reduce competition in order to make certain portions of the transportation system more "efficient". It may be argued that the introduction of criteria such as regional development to the National Transportation Act may increase rather than decrease the degree of regulation of transportation.

Summary

This chapter examined the notion of regulatory reform, its imperatives, and recent U.S. and Canadian views on the topic. It was argued that while the imperative for reform may be similar for the two countries, the views on the nature and extent of reform were different.

It was argued that the U.S. has adopted the conventional argument in pursuing the de-regulation of the motor transport industry. No middle ground opinion was encountered, that is,

the U.S. is pursuing de-regulation of motor carriers and not reform. Canada seems to be somewhat more ambivalent in pursuing regulatory reform. In the case of the transportation industries the import of proposed legislation is reform and re-orientation of regulation as opposed to de-regulation. On the other hand, proposed Competition Policy legislation may introduce de-regulation into the system.

CHAPTER III

A Profile of the For-Hire Motor Transport Industry

Introduction

In this chapter the profile of the motor transport industry is presented. Using Canadian data it will be shown that the industry is both large and diverse. The most important segment of the industry is the for-hire general freight carrier in terms of revenues generated and equipment operated. Some analysis of motor carrier operations are presented. However, the paucity of information does not allow for in-depth treatment.

The regulatory framework within which carriers operate is also presented. It will be agreed that in the absence of rather detailed knowledge of de facto and de jure regulation no firm conclusion as to the extent of economic regulation in Canada may be made. Differences in regulatory treatment by federal and provincial authorities are discussed.

Having identified the for-hire general freight carrier as the most important segment of the industry, the nature of competition from railroads and private carriage is discussed. It is argued that while these two modes are competitive with truckload general freight movement, they are not competitive to less-than-truckload movement. In addition, it will be argued that truckload general freight movement is much more competitive with railroads than usually assumed.

The arguments developed in this chapter tend to lend support to the conventional view of the overall composition of

the industry. That is, that general freight truckload movement is subject to competition whereas less-than-truckload is not. Chapter IV will argue that the benefits of de-regulation of this segment may be questioned.

Industry Profile

The motor industry is both large and complex.¹ Until very recently, published data on the motor transport industry were sparse and if available were considered to be unreliable. In 1974 Statistics Canada undertook a census of fore-hire motor carrier firms² with the intention of building a base year of data from which to launch an accurate and comprehensive publication.³

In 1974, census forms were mailed to some 26,878 carriers and/or establishments. Of this total 13,186 reports were utilized in the publication, the other 13,692 being considered

¹The motor transport industry, in its broadest sense, supplies transportation services for the movement of goods or people in either private or for-hire vehicles. In the carriage of passengers the private motor car is the dominant form. Various estimates suggest that about 85% of all passenger miles stem from the private motor car. On the freight side it is estimated that there are over one million trucks and trailers registered in Canada and about 90% are in the private sector. This study is, of course, directed toward the "for-hire" freight sector.

²Any carrier which, for compensation, undertakes the transport of goods.

³Statistics Canada, Motor Carriers Freight 1974, 53-222 (Ottawa: Ministry of Industry, Trade and Commerce, 1976). This publication excluded household goods movers.

as out of the scope of the survey or being out of business. These carriers earned \$2.97 billion and employed about 125,000 persons including working owners.

Though estimates vary, the growth of motor transport has been, in absolute and relative terms, remarkable. Comparisons of ton miles between modes tend to be poor indicators of the relative "importance" of various modes such as rail, water, pipeline. This is due to the fact that ton-mile estimates are biased by the type of commodity each mode is most likely to carry. "Rail, for example, tends to be better suited to carry long haul bulk shipments than are trucks. The latter tend to handle consumer and manufactured and semi-manufactured products".¹ Table III.1 indicates the growth in ton-miles for the various carriers.

Table III.1

Canadian Transport Market²

<u>Mode</u>	<u>1960 Billion Ton-Miles</u>	<u>% of Total</u>	<u>1970 Billion Ton-Miles</u>	<u>% of Total</u>	<u>% Change</u>
Rail	65.4	39.6	111.0	35.3	+ 70
Road	15.6	9.5	35.8	11.5	+ 130
Water	56.9	34.5	78.8	25.3	+ 39
Pipeline	26.8	16.4	86.9	27.9	+ 212
Total	164.7	100.0	313.5	100.0	+ 89

¹R. K. House and Associates, Manitoba For-Hire Trucking Industry Productivity Study - Report (Winnipeg: Manitoba Department of Industry and Commerce, February 1974), p. 3. This is not to suggest that rail and truck are not competitive for all commodities. This question will be dealt with in greater detail further on.

²Ibid., p.2. See also Transportation Development Agency, Highway Systems in Canada, (Preliminary Draft), (Montreal: Transportation Development Agency, October 1973), p. 7.

In 1970, total transport revenues in Canada, for all commodities carried in the motor transport industry came to \$1.50 billion as compared to \$1.45 billion for rail. In 1969, 40 per cent of the total expenditure in freight transportation was related to trucking as compared to 29 per cent for rail and 31 per cent between water and pipeline.¹

As the above comments indicate motor transport is a leading mode of transport. Table III.1 shows the total ton-mile shipped by motor transport increased 130 per cent between 1960 and 1970. Case estimated that for the period 1970-1980 motor transport would grow at the rate of 6 per cent per year.² In addition, he felt that the growth in trucking would, in general, follow the growth of the Gross National Product. Therefore, it would seem safe to say that motor transport is a leading mode of transport in both absolute and relative terms and that its further growth prospects are significant.³

Having discussed the industry in aggregate terms it is worthwhile to disaggregate the published industry data. There are several ways of accomplishing this, some not being compatible or capable of being cross-classified; however, the

¹R. K. House and Associates, op. cit., p. 2.

²Allen Case, Transportation 1980, The Outlooks and Issues For Canadian Transportation in the Next Decade. (Ottawa: Department of Finance, May 1970).

³It is beyond the scope of this study to chronicle in detail the growth in motor transport. For more detailed discussion see E. T. Steeves Trucking in Canada 1957-1967. Paper presented to the Annual Meeting of the Canadian Trucking Associations, (Ottawa: Statistics Canada, 1969).

most common method is to examine characteristics by revenue class.

In 1974 Statistics Canada added 4,991 firms to its 1972 universe, these being known as Class "0" carriers. These carriers were added to the universe in 1974 if they were not provincially or territorially licensed in 1972. These Class "0" carriers did not represent a revenue class per se but rather spectrum of carriers to be added to the analysis. The 1972 and 1974 groupings are as follows:

TABLE III.2

Class	Gross Operating Revenues	Establishments 1972		Establishments 1974	
		Grouping	% Total	Grouping	% Total
Class 1	\$2,000,000	130	1.0	192	1.5
Class 2	\$500,000-\$1,999,999	380	2.9	607	4.6
Class 3	\$100,000-\$499,999	1,382	10.5	2,394	18.2
Class 4	\$25,000 -\$99,999	2,398	18.2	5,506	41.8
Class 5	\$25,000	3,905	29.6	4,487	34.0
Class "0" add in 1974		<u>4,991</u>	<u>37.9</u>	<u>-</u>	<u>-</u>
		13,186	100.0	13,186	100.0

Per cent may not add to 100 due to rounding.

Source: Statistics Canada, Motor Carriers Freight, op. cit., p. 12-13.

Table III.2 indicates the substantial size disparity in number of firms by revenue class, affirming the notion that motor transport is composed of small firms. However, in terms of operating revenue and equipment utilized (all trucks) the numerical disparity is overshadowed by a productive disparity.

Table III.3

Total Operating Revenues and Total Equipment
Operated by Revenue Class, 1974

<u>Class</u>	<u>Total Operating Revenue (\$000,000)</u>	<u>% of Total</u>	<u>Total Equipment Operated</u>	<u>% of Total</u>
Class 1	1,545	52.1	72,889	49.0
Class 2	572	19.3	28,048	18.9
Class 3	509	17.2	26,154	17.6
Class 4	272	9.2	15,674	10.5
Class 5	<u>68</u>	<u>2.3</u>	<u>5,911</u>	<u>4.0</u>
	\$2,966	100.00	148,676	100.0

Source: Derived from Statistics Canada, Motor Carriers Freight, 1974, op. cit., p. 16.

As Table III.2 and Table III.3 indicate, Class 1 carriers account for about 1.5 per cent of the total number of carriers, but account for over 50 per cent of the operating revenues and almost 50 per cent of the equipment operated. At the other end of the spectrum Class 5 carriers account for about 34 per cent of the total number of carriers but only 2.3 per cent of total operating revenues and only 4.0 per cent of the equipment utilized. If one were to group Class 1 and Class 2 carriers this new category would account for about 6 per cent of total carriers (1974 grouping), but about 70 per cent of total operating revenues and total equipment operated.

Nationally, the industry is not highly concentrated. However, a regional or provincial breakdown would indicate some concentrated markets.

Each of the revenue classifications may be subdivided as follows:

(a) By common and contract carriers. A common carrier transports for compensation the goods of others. A contract carrier undertakes to transport the goods for one or a limited number of shippers.

(b) The common and contract carriers may be further subdivided by the type of commodity. This is generally considered to be an indication of the characteristics of the firm. The general commodity classifications are general freight, household goods, bulk liquid, dump (sand, gravel, snow), forest products (logs, lumber) and "other commodities" (such as cars).

(c) It is possible to subdivide the revenue classes by province of domicile. That is, the province in which the firm or enterprise is registered.

(d) In addition, it is possible to classify revenue classes by range of operation. This usually refers to local (hauls less than 15 miles), inter-city (hauls greater than 15 miles), and off-highway.

A classification by primary revenue source of the carrier by jurisdiction of operation is possible. These jurisdictions are intraprovincial, interprovincial, and international (or extraprovincial).

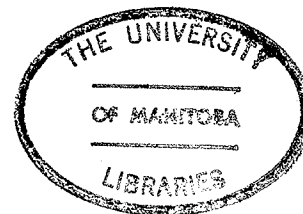
Ideally, one would like to incorporate size of shipments data with the revenue classifications. As will be discussed later, the size of shipment category is an important dimension of output.

Unfortunately, few of these possible classifications are available in published form.¹ For those available, the types of revenue data and operational characteristics vary by revenue class. Furthermore, there is a substantial degree of aggregation which may mask important operating cost differences. For example, the published data tend to aggregate common and contract carriers. Contract carriers may be specialized commodity carriers which would tend to have different operating characteristics.

The availability of these types of data is crucial to meaningful research on motor transport operating characteristics. It is regrettable that so little data are available for a transport mode as important as motor freight.

Rather than presenting tables of motor transport data it may be more expedient to outline the general view of motor transport operations and comment on the importance of selected characteristics. While many of the overviews of the industry are similar, relatively little effort has been devoted to examining the analytical significance of these characteristics. John Snow provides the following overview of regulated carriers:

¹Statistics Canada has recognized the nature of this problem and is proceeding to link computer tapes. That is, Statistics Canada personnel are attempting to combine the financial operating data (Motor Carriers Freight) with Shipment data (For-Hire Survey). While such a linked tape will provide a most interesting data base the number of carriers involved will represent a very small sample. However, the sample will include virtually all Class 1 and Class 2 carriers.



"The specialized commodity carriers are similar firms that specialize in truckload shipments . . . which do not require the use of terminals. These carriers often rely on owner-operators . . . to provide the actual transportation of freight. General freight carriers usually specialize in smaller shipments which require terminal facilities to consolidate shipments into loads large enough to utilize their trucks efficiently. These carriers also carry large shipments, but in many cases such freight is handled by a separate truckload division. General freight carriers account for about two-thirds of the total revenue of the ICC regulated trucking industry. The truckload shipment carriers compete to a significant extent with the railroads. The carriers of smaller shipments do not compete with railroads, since railroads do not carry small shipments to any significant extent . . . (while LTL rates are considered to be non-competitive due to the existence of rate bureaus) private carriage and railroads place a competitive discipline on truckload rates".¹

Of the 13,186 carriers which reported in 1974, 3,545 were engaged in the transport of general freight. The remaining 9,591 carriers could be classified as specialized freight carriers: 857 in the transportation of bulk liquid, 4,441 in dump trucking, 1,539 in transportation of forest products; and 2,754 in "other commodities" (such as automobiles). In terms of operating revenue general freight

¹ John W. Snow, "The Problem of Motor Carrier Regulation and the Ford Administration's Proposal for Reform", Paul W. MacAvoy and John W. Snow, eds., Regulation of Entry and Pricing in Truck Transportation, (Washington, D.C.: American Enterprise Institute, 1977), pp. 3-43.

See also Paul O. Roberts, "Some Aspects of Regulatory Reform of the U.S. Trucking Industry" in Proceedings of a Workshop on Motor Carrier Economic Regulation (Washington, D.C.: National Academy of Sciences, 1978), pp. 470-502.

Jerold M. Muskin, "De-regulation-Reassessing the Assumptions" in Proceedings, loc. cit., pp. 350-363.

John C. Spsychalski, "Criticisms of Regulated Freight Transport: Do Economists' Perceptions Conform with Institutional Realities?" Transportation Journal (Spring 1975), pp. 5-17.

carriers accounted for 57 per cent of the total and carriers of "other commodities" accounted for 23 per cent of the total. The remaining 20 per cent was divided between bulk liquid carriers (5 per cent), dump truck operations (9 per cent), and forest product carriers (6 per cent).¹

Though precise data are lacking, it seems clear that general freight carriers tend to be much larger firms than the special commodity carriers. For example, on average, the general freight establishment uses about 25 pieces of equipment (trucks, tractors, semi-trailers, full-trailers, other) whereas bulk liquid carriers use about 8 pieces of equipment, and dump truck operators use about 3 pieces of equipment. Most of the Class 1 carriers are assumed to be general freight carriers. Of the 130 Class 1 carriers, 90 establishments reported the major type of operation to be general freight carriage (about 70 per cent). Within the 130 firms there are 118 which are classified as intercity (hauls of greater than 15 miles) and of these 118 a total of 86 are general freight carriers (about 72 per cent).

In contrast, of the 380 Class 2 carriers only 167 (about 44 per cent) are classified as general freight carriers. Of the 380 firms 342 were classified as intercity carriers and of these 126 were general freight carriers (about 52 per cent).

Therefore, it may be stated that of all commodities general freight is the most important in terms of contribution to total industry operating revenues; that based on all equipment utilized

¹Statistics Canada, Motor Carriers Freight 1974, op.cit., p.7.

general freight carriers would seem to be significantly larger than the specialized commodity carriers; that the bulk of general freight revenues are generated within the Class I carriers; and that the bulk of these revenues were generated on intercity transport.¹ Unfortunately, it is impossible to incorporate data on the weight of shipments. However, the figure that 70 per cent of all shipments are "small shipments"² will be accepted.

Snow mentions the fact that general freight carriers consolidate freight and make extensive use of terminals. While many economists recognize the importance of terminals to general freight operations, they have not discussed the analytical significance of the terminals.

Importance of Terminal Operations

Charles A. Taff has called the terminal the "center of truck operations".³ Terminals assume greater importance for carriers which specialize in less-than-truckload (LTL) traffic than for carriers which specialize in truckload (TL) traffic.⁴ Taff has pointed out that ". . . basically, the terminal serves as a consolidation point for LTL traffic, although the larger carrier may designate certain terminals as consolidation (break-bulk) terminals.

¹Statistics Canada does not provide a breakdown of share of operating revenues accounted for by types of carriers. However, this breakdown is provided for the small carriers.

²A small shipment is defined as under 10,000 pounds (ICC definition).

³See Charles A. Taff, Commercial Motor Transportation, 3rd ed., (Homewood, Illinois: Richard D. Irwin Inc., 1961), p. 327.

⁴It is generally accepted that TL specialized commodity carriers use terminals but to a much lesser degree than general freight carriers.

This is done when there are numerous smaller intermediate points where LTL shipments are picked up and carried to the designated consolidation terminals".¹

Terminals are an integral part of the motor carrier operating system. The number of terminals any particular carrier operates is a function of the type of traffic, distances, and weights involved for specific geographic markets. The number of terminals may be used as a measure, albeit imperfect, of the geographic coverage of a firms operations.

Chow noted that simple correlation coefficients for revenues and number of terminals and route miles were very high; .97 and .90 respectively. Partial correlation coefficients which controlled for the length of haul and average shipment weight were somewhat lower; .96 and .82 respectively.² It appears that general freight revenues are positively correlated with the number of terminals as well as route miles.

Wyckoff has pointed out that "the terminal is more than simply a loading, consolidation, and unloading facility. It is a local extension of the company in that area".³ The branch management aspects of terminal operations include pick-up and delivery operations, sales functions, and until quite recently, all billing and rate setting operations.

¹Ibid., p. 328.

²Cf. Garland Chow, "The Economics of Motor Freight", (Ph.D. dissertation: Indiana University, Graduate School of Business, 1977), pp. 221-222.

³D. Daryl Wyckoff, Organizational Formality and Performance in the Motor Carrier Industry, (Lexington, Massachusetts: D.C. Heath and Co., Lexington Books, 1974), p. 15.

In order to examine the terminal operations it is instructive to follow the movement of a typical intercity LTL shipment.¹

First, the freight is collected by a city pickup and delivery driver as the result of a shipper's request. A bill of lading is prepared by the shipper which indicates the name, location, consignee's name and location, billing terms, specified routing, number of items, and commodity being shipped. Pickups can be made at the terminals of connecting carriers or, less frequently, may be delivered by the shipper to the outbound terminal.

Upon delivery to the outbound terminal the freight is unloaded and checked. Once the pickup and delivery driver has checked the condition, description, marking, and number of pieces, it is again checked at the terminal and weighed. At this stage the bill of lading is transferred to the rating operation. The rate is determined by tariffs on weight, commodity type, designated service and origin and destination. This bill is known as the waybill and is collected for each outbound trailer.

Generally, the freight has moved to a staging area and is loaded into the trailer for intercity movement. Depending on the volume and origin and destination it may be necessary to consolidate shipments through terminals known as "break-bulk" terminals.² Shipments may be rehandled at the dock platforms while in other cases it remains in the trailer and additional freight is added.

¹Ibid., p. 16-18.

²To break-bulk may be defined as the separation of a composite load into individual shipments and route to different destinations. It also refers to rehandling of freight en route.

Upon arrival at the destination terminal the shipments are unloaded, checked, and then loaded into pickup and delivery trucks or a connecting carriers' truck for final delivery.

Any terminal may be considered as an inbound and outbound terminal and may also perform the break-bulk transfer. There seems to be an increasing number of "break-bulk terminals" only.¹ These terminals operate in distinction to "revenue terminals" that primarily originate and/or terminate shipments.

Table III.4

Category of Operating Expense as Percent of
Total Operating Expenses, Class 1 and Class 2 Carriers, 1974

	<u>Class 1</u>		<u>Class 2</u>	
	<u>All</u>	<u>Intercity</u>	<u>All</u>	<u>Intercity</u>
Transportation Expense	59.5	59.1	66.6	67.2
Garage and Maintenance	10.4	10.2	11.4	11.7
Terminal	12.9	13.9	4.9	3.6
Traffic and Sales	1.7	1.8	1.2	1.4
Claims and Insurance	3.1	3.2	3.1	3.4
Administration	<u>12.3</u>	<u>11.8</u>	<u>12.5</u>	<u>12.6</u>
	100.0	100.0	100.0	100.0

Figures may not add to 100.0 due to rounding

Source: Statistics Canada, Motor Carriers Freight, op. cit., p.

As may be seen from Table III.4 above the importance of terminal expenses varies significantly between Class 1 and Class 2 carriers. Given that total revenues are highly correlated with the number of terminals, the above would seem to indicate that on average Class 1 general freight carriers (which tend to offer intercity LTL carriage) operate a greater

¹Ibid., p. 18.

number of terminals. When intercity carriers only are examined the terminal expenses percentage share increases slightly for Class 1 carriers and decreases slightly for Class 2 carriers. Furthermore, it will be noted that "transportation expenses" increase significantly for Class 2 carriers reinforcing the presumed Class 2 traffic pattern of relatively greater TL intercity movement. In the absence of shipment data and commodity classification the above results cannot be considered definitive. Unless otherwise specified the scope of operations referred to in this study will refer to intercity, general freight.

Regulatory Framework

As a consequence of the provisions of the British North America Act each province in Canada has the right to regulate interprovincial trucking in the manner which the provinces consider appropriate. As has been discussed in the previous section, prior to 1954, extra-provincial regulation took place in a legal vacuum. With the passage of the Motor Vehicle Transportation Act of 1954 the federal government delegated the responsibility for extra-provincial regulation to the provinces and there it has remained. Each of the provinces has produced its own brand of regulatory policy and this system has been the subject of a good deal of criticism and debate.

The National Transportation Act of 1967 attempted to alleviate the problem of overlapping jurisdictions and excessive regulation but making provision for the federal government to resume control of extra-provincial regulation. The so-called Part III provisions were "pro-

claimed" in 1970 but have not, to this date, been implemented.¹

All provinces have the authority to regulate both inter and intraprovincial for-hire motor carriers (i.e., common and contract carriers). However, the degree and type of control exercised varies considerably from province to province.

The differences in regulatory control varies on a number of dimensions. First, one may examine the incidence of so-called economic regulation which is usually interpreted as entry and rate regulation.² In addition to rate regulation there may be provisions for rate filing which requires carriers publish rates. Second, it is argued that a clear distinction must be made between de jure and de facto regulation. This distinction may also be discussed at the level of administrative vigor. For example, even though Manitoba is considered to be a province which regulates entry some will argue that closer inspection will reveal that entry control is exceedingly lax. Therefore, there may be a qualitative and quantitative distinction between "regulating" provinces such as Manitoba and Saskatchewan.

Based on information received from the Canadian Trucking Association, Maister prepared the following table:

¹The implementation has been delayed by the reluctance of the federal government to act in the face of concerted opposition by trucking firms and the provinces. However, the government has attempted to "rationalize" the regulatory structures through the CCMTA (Canadian Council of Motor Transport Authorities). In essence, the federal government has agreed not to implement Part III if the provinces move to coordinate and rationalize regulatory practices.

²Unlike other utilities the rate of return on capital is not the object of regulation in Canada.

Table III.5

Canadian Trucking Regulation, 1976

Province	Intraprovincial		Interprovincial	
	Entry Regulation	Rate Regulation	Entry Regulation	Rate Regulation
British Columbia	Yes	Yes ¹	Yes	No ²
Alberta	No	No	Yes	No
Saskatchewan	Yes	Yes ²	Yes	No
Manitoba	Yes	Yes ²	Yes	No ³
Ontario	Yes	No ³	Yes	No ³
Quebec	Yes	Yes ¹	Yes	Yes ¹
New Brunswick	Yes	No ³	Yes	No ³
Nova Scotia	Yes	No ³	Yes	No ³
Prince Edward Island	Yes	No ³	Yes	No ³
Newfoundland	Yes	Yes ⁴	Yes	Yes ⁴

1. Filing of rates with approval required for all increases.
2. On intraprovincial traffic, Saskatchewan and Manitoba prescribe rates.
3. Filing of rates required.
4. Though Newfoundland's regulatory agency has the power to regulate routes on extraprovincial traffic, there is some doubt whether this power has ever been effectively applied. Even on intraprovincial operations, the power to disallow rate increases has rarely been exercised.

Source: David H. Maister, "Regulation and the Level of Trucking Rates in Canada" in Proceedings of a Workshop on Motor Carrier Regulation (Washington, D.C.: National Academy of Science, 1977), p. 202.

Maister estimated that approximately 44 per cent of tons transported in Canada in for-hire operations were subject to some form of rate regulation.

As the above table indicates, there may be significant differences in regulation between so-called regulating provinces. Bonsor has noted that ". . . the actual use of entry and rate regulation, where applicable, is not homogeneous across jurisdictions. Quebec,

Manitoba and Saskatchewan tend to control rates in a relatively vigorous manner in comparison to British Columbia. Entry into the industry tends to be more tightly controlled in Quebec and Ontario than in other provinces. It should be borne in mind that the impact of regulation will vary across sectors of the trucking industry in a given province".¹

Bonsor expands on this point by noting it was difficult to determine precisely the degree of entry control imposed by the Ontario Highway Transport Board. In the course of his research he found that some classes of licences, especially general merchandise licences, were more difficult to obtain than others. Therefore, apart from any problems in comparing regulatory programs between provinces, the first step of determining the vigor of regulation within any one province turns out to be a difficult exercise.

There are dimensions of regulation other than those encompassed under the term "economic regulation". These are generally classified as administrative or health and safety regulations. However, the impact of these regulations may be of greater significance to the operating characteristics of the firm than so-called economic regulation. For example, it may be argued that weight restrictions, which tend to vary by province, assume importance on the cost side.² Unfortunately, no research has been carried out

¹Norman C. Bonsor, Regulation of the Highway Trucking Industry", Ontario Economic Council, Government Regulation Issues and Alternatives 1978 (Toronto: Ontario Economic Council, 1978), p. 119.

²Cf. R. K. House and Associates, Manitoba For-Hire Trucking Industry Productivity Study (Winnipeg: Manitoba Department of Industry and Commerce, 1974), pp. 155-160

on the relationship between these so-called non-economic dimensions of regulation and motor carrier industry performance between provinces.

The total dimension of regulation (economic or not) may be further subdivided into federal and provincial spheres, bearing in mind that there may be some variation in both federal and provincial regulation.

Table III.6 lists the bulk of regulations which apply to motor carriers. This table also breaks down the regulations as they relate to three classes of carriers; common, contract, and private carriers. For the purpose of this discussion only common and contract are considered. As may be noted there is very little regulation the common carrier is subject to that the contract carrier is not.

While one may suspect that federal programs are applied evenly through the provinces this need not be the case. For example, in the case of subsidies, carriers in the Maritimes receive a direct subsidy of 17½% of the rate for moving freight from any point in the Maritimes, and 30% of the Maritimes part of the movement originating with the Maritimes destined to other points in Canada.¹ In addition, the federal labour code applies only to extraprovincial carriers. Usually the provincial minimum wage and hours of work restrictions are less stringent than the Federal Labour Code.

¹Archer Consulting Ltd., The Influence of Regulation upon Common and Private Carrier Costs (Pointe Claire, Quebec: Archer Consulting Ltd., 1973), p. 10.

Therefore, while it is acknowledged that there may be differences in the efficacy of provincial regulation the fact remains that there may be a differential impact of federal legislation. This by no means exhausts the levels of regulation since the effects of municipal regulation have been excluded. This would include such factors as noise and exhaust pollution standards, specified routing for access and egress etc. These conditions are by no means standardized as well.

Table III.6

Distribution of Trucking Regulation
by Federal and Provincial Authority

<u>Type of Regulation</u>	<u>Regulatory Authority</u>	<u>Class of Carrier</u>		
		<u>Common</u>	<u>Contract</u>	<u>Private</u>
<u>A. Entry or Expansion</u>				
Proving need	P	X	X	
Obtaining Permit	P	X	X	
Interline Agreements	P	X		
Acquisition	F/P	X	X	
Subsidies	F	X	X	
Tariff Filing	P	X	X	
Tariff Revision	P	X	X	
Insurance	P	X	X	X
Labour Regulations	P	X	X	X
Vehicle Licences	P	X	X	
<u>B. Operations</u>				
Permits - Routes	F/P	X	X	
LTL/TL	P	X		
Customers	P		X	
Dangerous Goods	F/P	X	X	
Livestock	F/P		X	X
Agriculture	F/P	X	X	X

<u>Type of Regulation</u>	<u>Regulatory Authority</u>	<u>Class of Carrier</u>		
		<u>Common</u>	<u>Contract</u>	<u>Private</u>
Highway Weights	F/P	X	X	X
Bridge Weights	F/P	X	X	X
Vehicle Dimensions	P	X	X	X
Federal Labour Code	F	X	X	
Oversize Loads	F/P	X	X	X
Provincial Labour Code	P	X	X	X
Reciprocity	P	X	X	
Customs	F	X	X	X
Agriculture Regulation	F	X	X	X
Health Regulation	F/P	X	X	X
Sales and Fuel Tax	F/P	X	X	X

Railroad and Private Motor Carrier Competition

One aspect of structure that has been studied extensively is the degree of product substitution arising from alternative modes of transport. Two modes of traffic which compete with motor transport are railroads and private motor carriage.

Apart from the economies of scale debate, the degree of intermodal competition between railroads and motor carriers has been the subject of considerable debate. The intermodal competition argument has two dimensions; the degree of intermodal competition that presently exists; and the appropriate division of traffic between railroads and motor carriers.

Studies which have attempted to measure cross-elasticity between railroads and motor carriers have not produced consistent results.¹ For example, Sloss, using Canadian data, and Morton, using

¹James Sloss, "The Demand for Intercity Freight Transport: A Macroeconomic Analysis" Journal of Business, 44 (January 1971), p. 64. Alexander Morton, "A Statistical Sketch of Intercity Freight Demand", Highway Research Record, 269 (Washington, D.C.: 1969), pp. 47-65.

American data, have estimated the cross-elasticity of intermodal substitution to be approximately minus one.²

Chow argues that the major drawback of these studies is the use of highly aggregated data. He argues that large portions of general freight traffic are secure from railroad competition.² He argues that ". . . over 30 per cent of the tonnage of general freight carriers were LTL shipments producing 60 per cent of revenue and 95 per cent of the shipments. At present, this type of traffic is immune to direct rail competition. Railroads have virtually eliminated their less-than-carload services (LCL) which required freight house handling and concentrated on carload (CL) traffic".³ He also noted that small shipment by rail LCL dropped from 22,164 thousand tons in 1950 to 1,100 thousand tons in 1971. This is less than 2 per cent of motor carriage tonnage of such shipments.

Railroads may compete by offering CL rates or piggyback rates that compensate for service disadvantages of shipping in larger quantities. It is difficult to determine the competitive nature of CL or piggyback to TL and LTL rates, but in general the rates

¹Eugene Perle, The Demand for Transportation Regional and Commodity Studies in the U.S. (Chicago: Chicago Press, 1964), pp.52-53. A negative cross-elasticity suggests that an increase in truck rates would cause a reduction in rail volume. It would seem to be illogical to expect trucks to force railroads out of business by increasing rates. However, since WW II the motor carrier industry has increased its market share despite rate increases. Morton found the same results and suggested the negative relationship could be corrected by insertion of a time-trend to obtain a meaningful cross-elasticity. This author would suggest the trend variable to be included should be the decline in railroad service and improvement in truck service.

²Garland Chow, "The Economies of Motor Freight" (Ph.D. dissertation: Indiana University, 1977), p. 148. See also James Kneafsey, Transportation Economic Analysis (Lexington: D.C. Heath and Co., 1975), pp. 251-252.

³Ibid., p. 148.

would seem to be much less competitive for LTL service. The degree to which rail services are competitive with TL services is open to question. However, as Snow pointed out it is generally agreed that railroads do compete with TL services.¹

In terms of the second dimension of intermodal competition, the appropriate division of traffic between railroads and motor carriers, most studies examining this issue suggest that railroads have an inherent cost advantage over all but the shortest inter-city distances.

Meyer et al. indicated that truck costs exceed rail costs after a distance of 100 miles.² Harbeson found a rail cost superiority over truck for all distances and piggyback superiority at approximately 100 miles.³ Woods and Domenich calculated the breakeven distance between railroad CL and motor carrier TL costs to be 200 miles.⁴

Available data suggests that motor carriers compete with railroads for traffic moving much further than the 100-200 miles.

¹ John W. Snow, op. cit., p. 8.

² John R. Meyer, et al., The Economies of Competition in the Transportation Industries (Cambridge, Massachusetts: Harvard University Press, 1959), p. 190-191.

³ Robert W. Harbeson, "Toward Better Resource Allocation in Transport" The Journal of Law and Economics, 12 (October 1969), pp. 331-333.

⁴ Douglas W. Woods and Thomas A. Domencich, "Competition Between Rail and Truck in Intercity Freight Transportation", Proceedings - Twelfth Annual Meeting of the Transportation Research Foundation, (Oxford, Indiana: Richard B. Cross Co., 1971), pp. 151-153.

The distances which traffic moves is very sensitive to the type of commodity. (It should be noted that the studies listed above based estimates on a representative shipment characteristic). Unfortunately, Canadian data do not merge commodity type, weight of shipment, and distance. However, based on the available data, motor carriers of fabricated materials (which will be assumed to be small shipments) earn about 66 per cent of their transportation revenues for hauls of up to 400 miles. However, about 10 per cent of the revenue is earned in hauls of greater than 1,000 miles. If one examines this breakdown in terms of "end products - inedible" the figures change significantly. For example, about 54 per cent of revenues of this commodity class are earned in hauls of up to 400 miles but over 20 per cent of revenues are earned in hauls of greater than 1,000 miles.¹ (It is assumed that the end product category is composed of small shipments).

Rakowski, after removing 5 commodity groups that are users of water transportation, suggested that trucks have a greater share of total freight tonnage than do rails up to 400 miles in distance and approximately 55,000 pounds in total shipment weight.² The clear implication of these data are that long-haul traffic, which would move by rail if the cost comparisons are correct, are in fact moving by general freight LTL carriers.

¹Statistics Canada, For-Hire Trucking Survey 1974 (Ottawa: Industry, Trade and Commerce, November 1976), p. 38.

²James P. Rakowski, "Competition Between Railroads and Trucks" Traffic Quarterly, 30 (April 1976), pp. 287-289.

The possibility that the cost comparisons are inaccurate may be one explanation for the differences in the actual traffic distribution to the expected cost-based distribution. For example, cost advantages must be adjusted for quality of service. The service adjustment would seem to be especially sensitive to the value per ton. Meyer¹ used \$2,500 per ton, Harbeson² used \$414 and Woods and Domencich³ used \$740 per ton for high valued goods. The distribution of freight above these average values may account for truck participation.

Part of the discrepancy may be accounted for by under-estimation of rail service disadvantages. For example, Boyer argued that some studies of railroad-motor carrier cost comparisons excluded the greater damage costs incurred by the rail shipper. He argued that once this factor was adjusted for no railroad rate reduction would divert significant amounts of motor carrier traffic.⁴ Others have argued that railroad regulation has prevented the railroads from exploiting their inherent cost advantage. However, recent studies have shown that the railroad motor carrier cost differential may be narrower than supposed. Ton mile costs for strictly TL carriers (such as U.S. owner operators etc.) were found

¹ John R. Meyer, et al., op. cit., p. 192.

² Robert W. Harbeson, op. cit., p. 330.

³ Douglas Wood and Thomas A. Domencich, op. cit., p. 266.

⁴ Kenneth D. Boyer, "The Price Sensitivity of Shipper's Mode of Transport Selection and the Intermodal Allocation of Traffic" (Ph.D. dissertation, University of Michigan, 1975), pp. 20-43.

to be comparable to current CL rates for some traffic considered to be rail secure.¹

In conclusion, it may be argued that railways are effective competitors only on long haul, TL type of traffic. However, it seems that on this length of haul and shipment size that the cost advantage of railways does not deter significant motor carrier competition.

Perhaps the most interesting, but least known, intermodal competition arises from private carriers. Despite certain regulatory restrictions on private motor carriage, primarily the inability to solicit non-company back-haul traffic, the rise of private motor carriage is taken as prima facie evidence of the poor performance of the for-hire industry.²

Canadian data on private motor carriage are virtually nonexistent. Rakowski³ in his analysis of the 1967 U.S. census concluded that there was an extremely heavy usage of private trucking for short-haul operations with a distinct drop as length of haul increases. Furthermore, he concluded that the shipment sizes of private motor carriage are in the 20,000 to 60,000 pound range. When private carriage is expressed as a per cent of total highway traffic by shipment size and length of haul, it rarely falls under

¹Garland Chow, *op.cit.*, p. 157. Also see D. Daryl Wyckcoff and David A. Maister, The Owner-Operator: The Independent Trucker, (Lexington: Massachusetts: D.C. Heath and Co., 1975), pp. 41-52.

²Cf. John W. Snow, "The Problem of Motor Carrier Regulation and the Ford Administration's Proposal for Reform", *op.cit.*, pp.10-14.

³James P. Rakowski, "Characteristics of Private Trucking in the United States" ICC Practitioners Journal, 41 (July-August, 1974), p. 573-574.

10 per cent. For example, about 55 per cent of all traffic in the 10,000 to 29,999 pound category, moving under 200 miles, is carried by private carriage. As shipment size and length of haul increases the share drops markedly.

In terms of types of commodities Chow argues that the majority of commodities moved by private carriage appear to be comparable to traffic moved by general freight carries in TL shipment.¹

While it is beyond the scope of this study to develop a detailed analysis of the rise of private motor carriage there appear to be a number of factors that account for the rise of private motor carriage.

First, it may be argued that for short hauls private motor carriage has a cost advantage over the for-hire carriers. Stuessy attributes this to the lower terminal costs.

"Terminal costs are especially significant for small weight and short distance movements. When distances are short, line haul costs per trip or per hundred weight mile are relatively small and terminal costs are a large share of total movement costs. Likewise, because much of the terminal costs are independent of weight and because the line haul portion of costs per trip are a linearly declining function of weight, terminal costs per trip for a small shipment are a greater percentage at small weight brackets than for large shipments. The lack of terminal operational and capital costs make (private motor carriage) costs lower than for-hire motor carrier costs at small outputs. As output (weight times distance, or ton-miles) increases, the line haul costs become more important in the total cost picture. Private carriers, incurring higher line haul costs eventually lose the advantage created by the absence of terminal expenses . . ." ²

¹Garland Chow, "The Economics of Motor Freight", op.cit.,p.159.

²Dwight Stuessy, "Cost Structure of Private and For-Hire Motor Carriage", Transportation Journal, 15 (Spring 1976), p. 41. See also Dwight Stuessy, "The Economic Determinants of Private Trucking" (Ph.D. dissertation, George Washington University, 1973).

Line haul costs are higher for private carriage because of the utilization of smaller vehicles and lower load factors. The higher line haul costs are a function of regulation which restricts the goods a private carrier may transport to his own goods and the prohibition against soliciting for other than his own goods for back haul traffic (or exempt commodities).

Private motor carriage growth is generally assumed to be a function of the existence of non-competitive and discriminatory rates by for-hire motor carriers. Stuessy tested this hypothesis and found that the incidence of private motor carriage is directly related to discrimination based on shipment weight, length of haul, and value of commodity. That is, private trucking will emerge when private carrier costs are below discriminating rates.¹

The price discrimination argument must be tempered by analysis of cost and service features. As Sutton and Weitz point out the "early" rationale for private motor carriage was service failure. However, as the for-hire industry matured the rationale for private carriage shifted to cost considerations.² Given a mature for-hire industry the implication is that shippers demand a particular type of service which is not available from for-hire carriers at reasonable rates.

Table III.6 indicates the range of regulation that private, common, and contract carriers are subject to. As may be noted,

¹Dwight Stuessy, "The Economic Determinants of Private Trucking", op. cit., pp. 90-127.

²Robert M. Sutton and Donald W. Weitz, Case Studies of Private Motor Carriage (Washington, D.C.: U.S. Department of Transportation, 1973), pp.3-8.

private carriers are not affected by a great deal of regulation the cost importance of which is not easily determined. Therefore, apart from specific operating cost advantages private motor carriage may gain significant advantages from being able to avoid specific regulations (economic and non-economic regulation).

In conclusion, it may be argued that private motor carriage is a significant competitor for TL traffic moving over all distances and a relatively insignificant competitor for intercity LTL traffic. Were private motor carriers freed from backhaul restrictions they would probably solicit more long-haul TL traffic. Any shift towards the LTL traffic would probably alter the cost structure of private carriage so that differences between private motor carrier cost structure and for-hire cost structure would decrease.¹ Finally, more research needs to be done on the affect of regulations on growth in private trucking. This must include some analysis of cost savings due to avoiding regulation.

Summary

This chapter has presented a profile of the large and diverse for-hire motor freight transport industry. Canadian data indicated a substantial size disparity between firms though the concentration does not appear to be very high.

¹See Dwight Stuessy, "The Economic Determinants of Private Trucking" op.cit., pp.200-217. Stuessy argues that deregulation would not significantly alter the competitive position of private motor transport.

It was concluded that for all types of carriers the intercity general freight carrier dominated the industry. It was found that this type of carrier tended to be among the largest carriers measured by revenue. Particular attention was paid to the terminal operations of these carriers. Many economists recognize the importance of terminal operations to the intercity general freight carrier but have not attempted to relate terminal operations to other characteristics of the firm. U.S. research indicated that the number of terminals were highly correlated to revenues and may be considered as a measure of geographic coverage. The implication of these results is that as the intercity general freight carrier increases in size, additional terminal facilities are required.

An overview of the regulatory framework within which the for-hire carrier operates indicate that there were significant differences in de facto and de jure regulation. By virtue of the overlapping regulations of the federal and provincial governments, and the variance in efficacy of provincial regulation, it was found to be difficult to arrive at a conclusion as to the full extent of motor carrier regulation in Canada.

Having determined that the general freight segment was the most dominant type of carrier, the intermodal competitive environment in which the firm operates was examined. Particular emphasis was paid to railroads and private motor carriage. It was argued that studies which have attempted to measure the cross-elasticity of demand between road and rail have not produced consistent results. The use of highly aggregated data and insufficient attention to service quality differences may be considered to

produce these results. Studies which have attempted to measure the cost advantages of rail over motor carrier do not conform to the existing reality. It was concluded that motor transport was a major competitor for certain types of traffic considered to be rail secure. The studies were considered to be lacking in their treatment of railway versus motor carrier service advantages. It was concluded that railways are effective competitors on long haul, truckload type of traffic.

Private trucking was considered to be the major competitor to the for-hire sector. The size and importance is now known^t precisely, however, it is considered to be a very important mode of transport. It was concluded that the type of commodities carried by private carriage was comparable to general freight truckload movement. Private carriage was found to have specific cost advantages over for-hire transport over rather short distances. This was found to be related to the reduced need for terminal facilities. Comparison of regulation applicable to private carriage with that of for-hire indicated that private carriage could obtain cost advantages by the avoidance of certain types of regulation. The significance of these cost advantages could not be determined.

In conclusion, this chapter supports the conventional view as to the overall structure of the industry. It was noted that only certain segments of the for-hire sector are subject to external competition. The less-than-truckload general freight carrier did not appear to face external competition. The upshot of this view is that the truckload general freight segment of the industry is already competitive and that de-regulation would have its most

beneficial impact on the less-than-truckload segment of the industry. Chapter IV discusses the heterogeneous nature of the less-than-truckload segment of the industry and argues that the competitive benefits of de-regulation may be questioned.

CHAPTER IV

The Structure of Motor Freight Transport

Introduction

This chapter will develop arguments which question the conventional views of the structure of motor transport. Specifically, it will be argued that output homogeneity on the demand side may be used to define segments of sub-industries which may exhibit different structural characteristics. Each of these sub-industries will exhibit different competitive behavior in the absence of regulation.

It is argued that there are three important dimensions of service; size of shipment, length of haul, and extent of geographic coverage. These are continuous variables which define a continuum of motor carrier operations.

These motor carrier operations defined by these characteristics will be analyzed in relation to their threshold costs, factor mobility, and cost variability and indivisibility. It is convenient to segment the carriers by combinations of TL and LTL (to represent the size of shipment dimension), by long haul and short haul, and by extensive and limited geographic coverage. Particular attention will be paid to the importance of terminal operations and the development of the systems approach in motor carrier operations.

It will be argued that once this structure has been defined in this manner the expected behavior which follows from the structure does not conform to the conventional view. That is, there may be a propensity towards destructive competition and/or economies of scale. These will be discussed in greater detail in Chapter V and Chapter VI.

Economic Dimensions of Service

Given that many of the conclusions regarding the nature of competition in motor freight transport are a function of the treatment of the unit of output it is necessary to examine the homogeneity assumption.

If in fact there are significant differences in the output between carriers one may conceive of the industry as being composed of separate industries or sub-industries each of which may exhibit different structural characteristics. Therefore, it may be argued that each of these sub-industries may exhibit different competitive behavior.

Such a view is not new. However, the amount of empirical evidence to support such a contention is conspicuously sparse. As Smith has pointed out in his study of concentration . . . "since small, medium, and large firms in the trucking industry produce a heterogeneous output, the problem of ascertaining whether smaller or medium-sized firms are more efficient as the larger sized firms is exceedingly complex".¹

The methodological problems of determining the uniqueness of the output are substantial. One of the more important problems is the recognition that the motor freight firm may be a multi-product firm. Apart from the problem of allocating costs to output, which

¹Jay A. Smith, "Concentration in the Common and Contract Motor Carrier Industry - A Regulatory Dilemma" Transportation Journal (Summer 1973), p. 31. Also see R. W. Burdick "A Study of Diversification in the Motor Carrier Industry", Transportation Journal 9 (Summer 1970), pp. 16-32.

tends to be arbitrary, is the problem of using a single variable to describe the diversity of output. The standard treatment is to assume that though carriers may have a different product mix, those carriers producing a similar product produce a similar product mix.

One method of determining the uniqueness of the output and hence providing the justification for labelling sub-industries is to measure the cross-elasticity of demand for the output in question with other outputs. While such studies have been attempted on an intermodal basis¹ no studies exist on the cross-elasticities on an intramodal basis.

The bulk of research in this area has been to analyze shippers' preferences for a particular service.² While a great deal of this work is useful it tends to suffer from inaccurate or overlapping characteristics. Furthermore, revealed preferences may be a function of the availability and quality of existing services.

¹R. Fosbrooke and G. Hariton, Transport Demand Elasticities (Ottawa: Canadian Transport Commission, Economic and Social Analysis Branch, September 1975).

²Cf. Charles Hilton, "An Evaluation of Motor Carrier Services" (Ph.D. dissertation, Michigan State University, 1973).

William S. Christenberry, "Development of a Company Level Freight Modal Split Model Using Shipper Perceptions of Transport Service Characteristics" (Ph.D. dissertation, University of Tennessee, 1976).

Fareh A. Salek, "An Empirical Examination of Industrial Buyer Behavior: A Motor Carrier Selection Application" (Ph.D. dissertation, Ohio State University, 1970).

R. E. Evans and W. R. Southard, "Motor Carriers' and Shippers' Perceptions of the Carrier Choice Decision", The Logistics and Transportation Review 10 (1974).

Charles A. Taff, Commercial Motor Transportation (Homewood, Illinois: Richard D. Irwin, 1969).

Many other studies are to be found in standard traffic management and physical distribution texts.

Based on a review of other work in the area and his experience in dealing with motor freight transport management, Chow identified the following dimensions of trucking output which appeared to be the most significant for general freight carriers:

- (a) the size of shipment the carrier is willing to move;
- (b) the distance of haul; and
- (c) geographic coverage.

He listed three other characteristics which were considered to be less important:

- (d) time aspects (speed, frequency, etc.);
- (e) reliability; and,
- (f) information and advisory services.¹

The first three dimensions will be discussed in some detail.²

An approach to estimating substitutability is "to deduce and make rough estimates of the non-transport savings resulting from a particular type of service".² Since shippers are assumed to be willing to pay for additional quality of service any estimate of the non-transport savings would provide an indication of how much shippers are willing to bear under the circumstances.

The Size of Shipment Dimension

Chow's thesis focuses primarily on general freight carriers

¹Garland Chow, "The Economics of Motor Freight" (Ph.D. Dissertation, Indiana University, Graduate School of Business, 1977), p. 102.

²While the importance of the second three characteristics cannot be denied the fact remains that it is virtually impossible to obtain data about them.

³Ibid., p. 106.

which move less-than-truckload and truckload movements of general freight with the former predominating.¹ If only general freight carriers are considered the question arises whether the size of shipment variable is relevant, given a common carrier obligation to serve the general public. He argued that since carriers may adopt a long and short run marketing strategy that influences the type of freight tendered to the firm for shipment, that the size of shipment is important.

The size of shipment is usually measured by weight though the volume of the shipment is an important consideration. Given that measuring volume tends to be a more difficult measurement problem, the size of shipment usually refers to weight only. The weight of shipments is usually broken down into TL and LTL categories with TL being anything over 10,000 pounds.² It is frequently argued

¹Cf. John C. Sychalski, "Criticisms of Regulated Freight Transportation: Do Economists' Perceptions Conform with Institutional Realities?" Transportation Journal 14 (Spring 1975), p. 7. Sychalski argued that motor freight firms tend to specialize in one of three categories or maintain separate operating divisions if the carrier operates in more than one category. These categories are: truckload movements of specific types of packaged and bulk commodities, LTL and TL general freight, and LTL package shipments. In effect this classification reflects the argument that the capacity to handle various types and sizes of shipments defines service quality. John Snow made a similar argument when he stated that ". . . general freight carriers usually specialize in smaller shipments . . . these carriers also carry large shipments, but in many cases such freight is handled by a separate truckload division". John W. Snow, "The Problem of Motor Carrier Regulation and the Ford Administration's Proposal for Reform" John W. Snow and Paul W. MacAvoy, eds., Regulation of Entry and Pricing in Truck Transportation (Washington, D.C.: American Enterprise Institute, 1977), p. 5.

²ICC definition of LTL/TL.

that TL and LTL segments define separate sub-industries where the structural conditions in the LTL segment are conducive to concentration whereas in the TL segment they are not. (Snow implies that the TL versus LTL services are not close substitutes). Hence, the argument concerning the competitive outcome of each sub-industry is a function of the substitutability of the output.

In order to determine the economic value of different transportation products, a straightforward application of the inventory analysis model developed by Meyer et al to demonstrate the value of lower minimum shipment sizes may be used.¹ Chow suggested that by replacing the minimum weights used in the Meyer rail-truck comparison by minimum weights for TL or LTL service, the model could be applied to a hypothetical set of carriers specializing in service characterized by different shipment sizes or by a carrier providing both TL and LTL service.

Chow's analysis produced a surprising result. Specifically, it was found that shippers on average are willing to pay for more than the measurable benefits. That is:

"The LTL class rates and TL commodity rates probably represent what large shippers with bargaining power are paying while small and medium shippers probably utilize class rates completely. The revenue differential paid to the carriers . . . exceeds by far the largest inventory savings computed. In fact, the large shippers are paying a larger difference to get purportedly lower inventory savings (if the assumption

¹ John R. Meyer et al., Competition in the Transportation Industries (Cambridge: Harvard University Press, 1959), pp. 348-53.

that large shippers are dominant users of commodity rates is correct). The revenue-inventory savings comparison indicates two things; shippers must value LTL service for reasons other than inventory savings or we have under-estimated the value of inventory savings by using the wrong parameter" ¹

In conclusion, he argued that "TL and LTL service represent significantly different levels of service, enough to warrant a sizeable demand for LTL service even when the lowest profitable price is charged for TL service".²

The Length of Haul

In discussing the length of haul dimension an attempt to focus on the qualitative as well as the quantitative aspect of the length of haul must be made. That is, a frequency distribution of the length of haul may indicate a central tendency regarding the average length of haul, but it does not deal with the preference of single versus joint line movement.

Given that transportation provides time and place utility, a long haul movement is inherently different from a short haul movement. Any preference for single line as opposed to joint haul movement is a function of the value of service. Locklin has pointed out that:

¹Garland Chow, "The Economics of Motor Freight", op. cit., p. 117.

²Ibid., p. 118., See Appendix B.

"There is an abundance of evidence that shippers prefer to ship by a motor carrier which provides one carrier service . . . Shippers are reluctant to make shipments that involve interchange with one or more connecting carriers when it can be avoided. Problems of tracing shipments and of collecting loss and damage claims account for the reluctance to employ the services of carriers who cannot complete the movement of the shipment to destination. ¹

A number of factors contribute to the lower quality of service deemed to exist in the case of joint carrier service (also known as interlining). The major problem seems to be the rehandling of freight between carriers and the increase in shipping time and loss and damage. This is not to argue that joint line service is inferior in all cases. One may hypothesize about single line service which produces the same sort of problems as joint line service. The inherent appeal of a single line service is based on the control, and more importantly, the accountability of a single carrier.

Another problem relating to joint line movement is the reluctance of carriers to cooperate in order to provide the service. This may stem from the presence of competition on some lines and compatibility problems which arise if equipment must be interchanged.² However, Chow's perusal of interline agreements suggested that much of the joint line short haul service is complementary with single line long haul movement. That is, the long haul carrier provides the line haul movement between two key points while the short haul carriers

¹D. Phillip Locklin, Economics of Transportation, 7th ed., (Homewood, Illinois: Richard D. Irwin, 1972), pp. 644-45.

²Garland Chow, op. cit., p. 121. Also see Charles A. Taff, Commercial Motor Carrier Transportation, (Homewood, Illinois: Richard D. Irwin, 1969), pp. 219-220.

assemble and distribute freight to smaller traffic generating points around the key points.

In conclusion, it is argued that . . . "motor carriers are producing different products with respect to length of haul. Joint service by short haul carriers as a substitute for long haul service is viewed as a lower quality of service which must cost at least as much as single line service. Joint line service is a potential substitute that is available to shippers with longer haul demand when the quality and price of single line service become unacceptable due to monopolistic behavior".¹

Geographic Coverage

Geographic coverage is defined as the number of direct points served by a carrier. The greater the coverage the greater the ability of a carrier to accommodate the shipping needs of a large number of shippers.

Coverage may be defined to incorporate several dimensions. For example, coverage has a density dimension, that is, coverage to points within a given area. In addition, there is an extensiveness dimension which refers to the length and width of the route structure and network. Length of haul is related to the extensiveness since length of haul is limited by route structure.

Chow argues that extensive coverage will differentiate one carrier's service from another simply by making available service

¹Garland Chow, op. cit., p. 122.

to locations not served by another carrier. It is argued that the single line movement is preferred, as indicated previously. However, there may be cost advantages to the shipper in terms of using a limited number of carriers.

For example, the Interstate Commerce Commission, Bureau of Accounts, developed variable cost estimates for single and two line movements by length of haul and weight.¹ It was shown that a cost advantage of single line carriers diminishes with larger weights and longer hauls. This may be considered to reflect the spreading fixed terminal costs over larger weights and distance and the reduced probability of platform handling. There was a substantial cost differential for weight brackets below 5,000 lbs. over all distances suggesting a distinct cost advantage for the single line carrier for the movement of LTL traffic.

Chow argues that additional information about the importance of geographic coverage is meager. However, Lawrence has argued that extensive point coverage is a major determinant of a firm's LTL service demand and a major factor in its marketing strategy.² It is difficult to develop a reliable measure to distinguish between

¹Interstate Commerce Commission, Bureau of Accounts, Cost of Transporting Freight by Class I and Class II Motor Common Carriers of General Commodities - Central Region - 1971, (Washington, D.C.: Government Printing Office, 1973), Table 13.

²Michael L. Lawrence, "Economies of Scale in the General Freight Motor Common Carrier Industry: Additional Evidence", Proceedings - Seventeenth Annual Meeting of the Transportation Research Forum, (Oxford, Indiana: Richard B. Cross Co., 1976), p. 171.

differences in geographic coverage by carriers. Lawrence suggested using the number of terminals on the assumption that a carrier would require a fixed facility at each traffic point in order to carry out consolidation activities. Unfortunately, this is not necessarily true for a carrier may rely on agents, etc. to perform some of the consolidation functions without using a fixed facility.

In conclusion, it is argued that ". . . like length of haul, several carriers with less coverage in combination can produce the the same time and place utility that a carrier with extensive coverage can produce. The qualitative evidence, though not rigorous, suggests that shipper costs incurred in using many carriers as opposed to fewer, infers a real quality of service advantage upon high coverage carriers".¹

Defining industry boundaries (or in this case sub-industry boundaries) presents many practical problems for the researcher. Many of these problems involve a measure subjective or judgemental appraisal. However, this problem is not unique to transport analysis.

The view is taken that any particular carrier produces a cluster of services characterized by multiple and identifiable dimensions of service. Dimensions such as length of haul, size of shipment, and geographic coverage are physical traits which are assumed to be readily identifiable by shippers and distinguish the product of one carrier from another.

¹Garland Chow, op. cit., p. 129.

Because the physical characteristics of trucking may vary on a continuous scale it is difficult to measure structural characteristics in discrete quantities which are appropriate to each sub-industry. However, an analytical framework which focuses on examining the changes in structural characteristics as the composition of the industry changes. For example, how are threshold costs related to the length of haul and geographic coverage? Threshold costs to enter that sub-industry characterized by long hauls and extensive geographic coverage may be significantly different from those of entering another sub-industry. This type of analysis will be the subject of the following section.

Structural Cost Characteristics

The previous section examined the demand heterogeneity of the output of motor carrier firms. It was concluded that there were several dimensions of service which serve to distinguish carriers. Given that the variables considered were continuous, a continuum of optimal size firms may exist as the variables change.

This section will examine the supply side of output. That is, an attempt will be made to relate structural conditions such as threshold costs, factor mobility, and cost indivisibility with the output dimensions.

The conventional view of motor transport is that the initial investment required to enter the industry is relatively small and not particularly risky. This view is based on the assumption that revenue equipment (trucks) form the basis of the capital investment. Furthermore, this view is reinforced by the arguments that there

are no economies of scale and service is homogeneous. Given that economies of scale exist (discussed in the following chapter) and that there is output heterogeneity, it is worthwhile to re-examine the notion of "threshold costs" as a barrier to entry.

Threshold Costs

The methodology of this section is to conceptualize the relationship between levels of threshold costs and the dimensions of output. Where possible empirical observations will be used to substantiate the relationships conceptualized.

Capital inputs may be considered to consist of revenue equipment and support investments (such as terminals, etc.). Revenue equipment includes trucks, tractors, trailers, etc. Tractors and trailers are generally used on line-haul operations, while trucks are primarily used for pick-up and delivery operations.¹

Prices for a tractor and trailer combination may vary widely. Tractor price is a function of type of power unit, horsepower, transmission, etc. For example, though diesel engines are more costly than gasoline engines they are much more durable and cheaper to operate on long-haul routes. Trailers vary in price according to length, number of axles, weight, etc. A U.S. Small Business Administration Report stated that on the basis of 100 trucking loans

¹Trucks may form the largest part of equipment if the carrier specializes in local freight. That is, less than 15 miles according to Canadian definitions.

the average price of a tractor-trailer combination was \$25,000 - \$35,000 in 1973.¹

An option to purchasing new revenue equipment is to purchase used equipment. The prices of used equipment are substantially lower than for new equipment. Though no data are available it seems reasonable to assume that financial institutions would be reluctant to finance used equipment. The reason for this reluctance may be that depreciated revenue equipment does not represent good collateral. Of course, the financial institution may finance the purchase of used equipment if the potential entrant makes a substantial cash down payment. In conclusion, it may be stated that entry into motor transport at the single vehicle level is not restrictive.

The other component of threshold capital inputs is support or so-called loading inputs. This includes such items as terminal facilities, freight handling systems, etc. Of these, terminal facilities are the most important. In Chapter III terminal facilities were discussed and the relationship between operating revenues and number of terminals examined. This relationship was based on U.S. Class I general freight carriers which specialized in LTL intercity traffic. If the carrier specializes in TL traffic only the need for terminal facilities is minimized.

¹Eileen K. Bagwell, "Work, Stability, are Keys of Drivers Given Finance Aid", Transport Topics, June 18, 1973, p. 81. With inflation and vehicle design changes required by federal safety and energy regulations the cost of a tractor-trailer combination has increased substantially. It should be noted that specific tractor-trailer configurations may be related to highway and bridge weight regulations which vary between provinces.

The physical size of any terminal may be measured by the number of doors or loading bays. "For a terminal performing local consolidation and dispersion doors are needed for the following traffic flows: outbound traffic to be located for destination terminals, inbound traffic to be loaded on delivery vehicles, traffic to be unloaded from line haul vehicles, traffic to be unloaded from pick-up and delivery vehicles, and traffic to be unloaded from interline arrivals".¹

The actual number of doors is a function of the number of destinations, the number of inbound trucks, the number of trucks for local delivery, etc. However, an additional dimension to the terminal operation is the rate of loading and unloading. The number of doors required may be calculated by dividing unloading rates per hour by loading rates (subject to the constraint of total loading time). The required number of doors decreases as the average terminal loading and unloading rate increases. However, a significant increase in rates may only be possible with the use of mechanized freight handling equipment which may increase capital investment. Finally, the rate at which inbound and outbound traffic coverage will have an impact on the total number of doors.

Therefore, it may be argued that there is a correlation between terminal sizes (by number of doors) and the level of service offered by the carrier. In general, as geographic coverage increases, both

¹Garland Chow, "The Economics of Motor Freight", op. cit., p. 190. Also see American Trucking Association Inc., Shipper-Motor Carrier Truck Planning Model (Washington, D.C.: n.d.) pp. 22-49.

in terms of distance and extensiveness, the greater the number of doors required. Maintaining these service standards implies some balance is required between short term traffic in balances and capacity. It would seem reasonable to expect some excess capacity in terminals to exist.

It is difficult to determine the capital costs of a terminal facility since costs will vary by volume of freight, quality of service rendered, and geographic differences in building costs. Any observed variations in terminal costs may also be due to degree of mechanization. Chow suggests that based on observations of terminal openings the modal cost per door appears to be from \$8,000 to \$10,000 with the cost per door doubling if mechanized handling equipment is used.¹

In conclusion, both revenue equipment costs and terminal capital costs, are not relatively large. These costs would not be out of the range of many potential entrants. However, this is a "reduced argument" in the sense that it ignores systems effects. This will be discussed below.

Systems Effects

The previous chapter profiled the motor carrier industry and noted the importance of terminal operations. Implicit in this view is that carriers providing higher standards of service in terms require a system of terminals to provide the service. The growth of the systems concept in motor transport is not well documented. It

¹Garland Chow, "The Economics of Motor Freight", op. cit., p. 198.

may be argued that the notion of motor transport systems paralleled the development of "physical distribution management" as a management specialty.

Physical distribution management is a relatively new management specialty and relates to

"...(a) broad range of activities concerned with the efficient movement of goods from the end of the production line to the consumer, and in some cases includes the movement of raw materials from the source of supply to the beginning of the production line. These activities include freight transportation, warehousing, material handling, protective packaging, inventory control, plant and warehouse site selection, order processing, market forecasting, and consumer service".¹

The present status of physical distribution management is one of relative maturity. Smykay argues that an analogy between mass production techniques in the 1930's and physical distribution in the 1970's is appropriate. He argues that physical distribution management will increase in importance for the reason that "...in business a need exists for the development of an exacting logistical network. Physical distribution deals with the tangible aspects of material, space, and time".²

A good deal of the literature of physical distribution management deals with market penetration and competitive advantage. For example, Smykay notes that by shipping in CL (rail) lots a firm may cover a substantial market. However, the firm may also serve the entire area by LTL shipments if it established an inventory distribution center. This may reduce the consolidation of shipments problems

¹Edward W. Smykay, Physical Distribution Management, 3rd ed., (New York: MacMillan Publishing Co., 1973), p. 5.

²Ibid., p. 21.

and may reduce overall inventory stocks.¹

A study carried out by Stanford University listed a number of factors which have fundamentally altered transportation requirements in general and motor carriers operations in particular.² These were: (a) changes in industrial location and growth; (b) changing shipment characteristics and (c) the increasing importance of physical distribution management. The shift of manufacturing to outlying (non-metropolitan areas), the shift to smaller but more dense shipments, and the distribution cost awareness of firms have tended to impose technological and operational requirements on motor carriers firms. In turn, the motor carrier industry has responded with technological changes in the size, durability, load carrying capacity of revenue equipment, and operational characteristics.

It has been noted that the number of terminals are correlated to operating revenue. In the absence of a detailed analysis of operating authorities it would be difficult to relate the size of carrier to a presumed degree of systems design. However, one may draw some conclusions as to the systems requirements by reference to the route pattern. That is, geographic coverage is not only a function of the number of points served but also the spatial distribution of points. For example, if one were to examine route maps of carriers (stratified by length of haul groups) one would expect to find that small carriers exist within every mileage bracket.

¹Ibid., p. 83-84.

²Stanford Research Institute, Evaluation of Potential Effects of U.S. Freight Transportation Advances on Highway Requirements, (Washington, D.C.: U.S. Department of Transportation, 1972), pp. 139-153.

However, in the long haul class the smaller carriers would have a route system shaped like a thin line whereas the largest carriers would have a route system blanketing key points in several regions, (i.e., a very wide band). As the length of haul decreased the route pattern of smaller carriers would shorten and widen whereas the largest carriers would blanket one or more regions, serving key points and/or distribution communities.

The overall impact of the systems effect may be summarized as follows. With the emergence of motor transport systems a mix of terminal facilities and revenue shipment is required. In the case of terminal facilities a range of facilities are required from consolidating points to break bulk terminals. Within the range of facilities different technology is applied in terms of freight handling equipment (e.g. drag lines). In the case of smaller carriers terminal facilities may be converted warehouses or function as warehouses in addition to terminal functions. In the case of revenue equipment one must now refer to equipment "fleets" consisting of a mix of trucks and tractor-trailer combinations. There must be systems coordination of the fleet relative the route and terminal systems subject to the relative operating costs of each type of revenue equipment.

It is very difficult to measure the aggregate threshold costs for motor carrier firms because of the level of cost is a function of the degree of service provided. Based on the previous section it may be inferred that the terminal and revenue equipment considerations may be very small depending on the level of service. For example, a firm may operate with a very small fleet of vehicles and

no terminal facilities if only TL shipments are moved. The importance of terminal facilities increases if the firm operates in the LTL segment of the market. However, if a small number of points are served these costs would not seem to be prohibitive. As geographic coverage and length of haul increases the terminal requirements and revenue equipment fleet size increases.

As Harrison noted "to expand means, primarily, to expand geographically . . ."¹ It is a basic postulate of location theory that as distance increases the flow of products decreases since transport costs mitigate differences in relative prices for a commodity between two points. It is more difficult for LTL carriers to build maximum loads, ceteris paribus, as distance increases. Large LTL carriers are likely to operate a wide system of terminals in order to obtain consolidation benefits and achieve maximum vehicle loads.

Chow analyzed terminal costs (land and structures), revenue equipment costs (trucks), and other expenses of a number of Class I carriers specializing in LTL service.² The carriers were stratified by length of haul.

He found that the "threshold costs for entering any length of haul market are negligible providing the service area is limited. Immediate entry into longer haul more extensive markets require larger investments. Large capital investments from \$20 million to \$200 million are observed for the largest carriers in each mileage bracket above 100 miles. These amounts may be reduced if economies

¹A. J. Harrison, "Economies of Scale and the Structure of the Road Haulage Industry", Oxford Economic Papers 15 (November 1963), p. 300.

²Garland Chow, "The Economies of Motor Freight", op. cit., p. 232-236.

of scale do not justify the size carriers observed, by short term rental and leasing of productive resources, and buying used assets".¹

Factor Mobility

The competitive view of motor transport requires mobility of input factors. Factors of production which cannot be transferred to alternative uses or different markets imply that a firm will not be able to adjust capacity to changing demand conditions.

Terminal facilities (and associated requirements such as offices, freight handling equipment, garages, etc.) would seem to be much less mobile than revenue equipment. Terminal assets are fixed in a geographic sense in that they are only transferable to another user at a particular location. While some of the components of the facility may be stripped and transferred the building is fixed.

In addition, the terminal assets seem to have a relatively long life. While data on the life of terminal assets are exceedingly scarce one report suggests that they may range up to 50 years.² While it is possible to vary the dimensions of terminals and to rent out any unused capacity it is inappropriate to argue that system capacity is divisible by adding or subtracting individual terminals

¹Ibid., p. 233. A detailed analysis of the reduction in threshold costs which may result due to the leasing and the purchase of used facilities and equipment is beyond the scope of this study. However, it is possible that this type of operation may reduce threshold costs (at original cost) by 50 per cent. Of course, replacement cost could be expected to be higher.

²Jack Faucett Associates, Inc., Capital Stock Measures for Transportation, (Washington, D.C.: U.S. Department of Transportation, 1972), pp. 3-40.

since the quality of service is altered.

Capital investment in terminal facilities may represent a very substantial portion of a carrier's assets. Based on this analysis of selected U.S. Class I carriers Chow concluded that "... the relative importance of fixed assets embodied primarily in land and structures is above 20 per cent industry wide but individual carriers can greatly exceed or go below that figure on book cost. Large LTL carriers with extensive networks of terminals are observed to be on the high side, as much as 50 per cent. When adjusted for depreciation allowances the relative importance of fixed assets loom even larger".¹

Therefore, the notion that trucking assets are mobile and have relatively short-lived lives may not be true in the case of terminals. This lumpiness of assets is usually associated with economies of scale. The fact that LTL carrier assets may be distinguished from TL carrier assets suggests that an additional comparison may be made in terms of investment risk as a function of asset sale value. This risk is related to threshold cost because suppliers of capital will want to reduce the probability of losing a portion of their investment in the case of business failure. The loss probability will be reduced if the major assets of the firm are capable of being sold quickly.

Unfortunately, no research has been carried out on the differential risk across a spectrum of firm sizes and operations. There

¹Garland Chow, "The Economics of Motor Freight", op. cit., p. 229.

has, however, been considerable research done on the risk involved in motor carriage per se. For example, Levine and Wang compared a group of publicly held motor carriers to unregulated industries on the basis of five financial ratios. The analysis indicated poor performance of motor carriers relative to the unregulated industries. This may be interpreted to support a high risk hypothesis.¹ More direct evidence may be found in the work of Silberman who agreed that, on the basis of similar analysis, that the motor carrier industry exhibited a degree of risk in significantly above that found in unregulated industries.²

The conclusion one may arrive at is that financing may be more accessible in the case of TL entry. That is, since revenue equipment are good collateral and fixed terminals are not, the LTL entrant may face significantly higher threshold costs. One may extrapolate from this conclusion and argue that entry will be on very small scale and concentrate on TL operations and/or LTL operations with very limited geographic coverage.

Cost Variability and Indivisibility

Under perfect competition, costs always equal prices, marginal

¹Harvey Levine and Nai Chi Wang, "Motor Carrier Financing and Earnings Regulation: The Other Side of the Coin", ICC Practitioners Journal, 42 (November-December, 1974), pp.30-25. Cf. James R. Nelson, "Motor Carrier Regulation and Financing of the Industry" ICC Practitioners Journal, 41 (May-June,1974), p. 482.

²Irwin H. Silberman, The "Sum of Money" - A Five Year Analysis, (Merrick, New York: Irwin H. Silberman and Associates, 1974), p. 100.

cost and minimum average cost being equal and the same as price. All of the costs are directly identifiable with the products; costs and output of the firm and adjustable to the price which the firm accepts as given. These precise relationships will not obtain, however, when competition departs from the model of perfect competition.

It is frequently asserted that motor transport displays a very low ratio of fixed to variable costs. The implication of this statement is that since virtually all costs are related to output motor carriers should be able to smoothly expand or contract output in response to demand conditions. Hence, the possibility of destructive competition cannot arise.

A number of studies have examined the importance of variable costs but it is generally accepted that over 90 per cent of costs are variable with output. Other estimates find variable costs to be much lower. For example, Shirley found variable costs to be approximately 65 per cent.¹

The estimates differ primarily because they measure cost variability over different periods of time. For example, ICC estimates are purportedly long run measures of cost whereas the Shirley estimate is clearly short run.² The ICC methodology has

¹Robert K. Shirley, "Analysis of Motor Carrier Cost Formulae Developed by the Interstate Commerce Commission". Transportation Journal 8 (Spring 1969), p. 25.

²ICC, Bureau of Accounts and Cost Finding, Explanation of the Development of Motor Carrier Costs with Statement as to Their Meaning and Significance, Statement No. 4-59 (Washington, D.C.: 1959), pp. 74-77.

been criticized by a number of authors such as Meyer et al and Friedlander. Friedlander points out that the cost functions used by the ICC are actually a hybrid formulation between a short run and a long run cost function.¹

This discrepancy between short run and long run cost functions assumes great importance if short run variable costs determine rates.

For example, Locklin agreed that:

"In the short run, however, motor carriers have a substantial proportion of their costs fixed or constant. This can be seen by considering the case of an individual who undertakes to engage in for-hire transport with only one or two vehicles. If he finds it difficult to obtain business, he is tempted to take any business at a cut rate price... Under these circumstances he recognizes that interest on investment in vehicles, property taxes on the vehicles, motor vehicle registration fees, and at least part of the depreciation on vehicles are fixed costs and are incurred whether he moves any traffic or not. Short run variable cost, rather than long run costs will determine what rates he charges. The situation which we have described often occurs in the trucking industry..."²

The short run determination of fixed and variable costs is an inexact process. For example, depreciation is generally considered a fixed cost. However, there are other costs which do not conform to a category as easily. For example, some costs (such as dockworker wages) may be fixed to a certain level of utilization but then become variable costs. Some costs are subject to managerial discretion, and may vary with output but not in any direct proportion.

¹Ann Friedlander, "The Dilemma of Freight Transport Regulation, (Washington, D.C.: The Brookings Institution, 1969), pp.82-83.

²D. Phillip Locklin, Economies of Transportation, 7th ed., (Homewood, Illinois: Richard D. Irwin, Inc., 1972), p. 652.

Clearly one of the more important problems is the overstatement of fixed costs over a short time such as a year. This occurs because not all fixed costs expire with the time period.¹ Though many criticisms may be levelled at Shirley's segregation of fixed and variable costs the fact remains that he shows that the ICC assumption of 10 per cent constant costs is not appropriate if carriers have planned or unexpected overcapacity.

Economic theory states that variable costs is a floor below which prices cannot fall. However, this assumes that inputs and costs are perfectly divisible. In all modes of transportation cost indivisibilities arise because of joint products. With the production of more than one output, joint and common costs must be assigned on an arbitrary basis to individual shipments. The pricing floor represents the portion of variable costs that can be attributed to it. Any divergence between marginal cost and total cost may be considered to represent fixed costs which may or may not be divisible but cannot be escaped.

For the general freight LTL carrier the consolidation and movement of a number of shipments produces common costs which must be allocated to the costs of the haul. This allocation may be very difficult. For example, terminal function may be composed of divisible and indivisible activities relative to particular shipments. Loading may be considered as a divisible cost, however, costs associated with the maintenance of the terminal and supervision of

¹W. A. Lewis, "Fixed Costs", Denys Munby, ed., Transport, (Middlesex, England: Penguin Books, 1968), p. 64.

the shipment handling are common costs.

As far as the LTL carrier is concerned most of its costs would be common costs. One implication of this is that there would be a tendency for aggregate revenues to be less than divisible and indivisible costs. As Sychalski points out:

"If carriers are possessed of substantial cost and asset indivisibilities, long-lived assets, and some excess capacity were to enter into pervasive and intense intramodal rate competition, and if marginal costs...were employed as floors for the establishments of rates in a majority of the numerous sub-markets served by each carrier, it is obviously conceivable, if not highly probable, that the general level of rates would, ceteris paribus, gravitate toward marginal costs, thus producing aggregate revenues equal or greater than total divisible costs, but less than the sum of divisible and indivisible costs. Carriers party to such a state of disequilibrium and seeking to pursue an economically rational course of action would, individually, find themselves capable of maximizing short run gains...by accepting traffic at rates equal to or greater than marginal cost but less than average cost...." ¹

One would expect to find high cost variability, in TL long haul carriers and the converse for LTL carriers. Though one would expect fixed costs to be greater than the usual 10 per cent the importance of joint and common costs may increase this significantly.

Summary

The chapter examined the methodology and the structural implications of output homogeneity on the demand side. It was argued that there are three, inter alia, important dimensions of service; size

¹ John C. Sychalski "Criticisms of Regulated Freight Transport: Do Economists' Perceptions Conform with Institutional Realities?", Transportation Journal 14 (Spring, 1975), p.8.