

UNIVERSITY OF MANITOBA

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

by

ANDREW BERNHARD KLYMCHUK

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF ARTS

DEPARTMENT OF ECONOMICS

WINNIPEG, MANITOBA

JANUARY, 1979

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

BY

ANDREW BERNHARD KLYMCHUK

A dissertation submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
of the degree of

MASTER OF ARTS

©1979

Permission has been granted to the LIBRARY OF THE UNIVER-
SITY OF MANITOBA to lend or sell copies of this dissertation, of
the NATIONAL LIBRARY OF CANADA to microfilm this
dissertation and to lend or sell copies of the film, and UNIVERSITY
MICROFILMS to publish and abstract of this dissertation.

The author reserves other publication rights, and neither the
dissertation nor extensive extracts from it may be printed or other-
wise reproduced without the author's written permission.

ACKNOWLEDGEMENTS

This thesis could not have been completed without the assistance of a select group of people.

It is difficult to describe how grateful I am to my advisor Professor Ralph Harris. His tireless encouragement and guidance were invaluable to the preparation and completion of this thesis. I am also grateful to Dr. Garland Chow of the University of Maryland who provided me with many useful references as well as copies of his published and unpublished papers. Finally, Mr. Adam Hrabinski of the Manitoba Department of Industry and Commerce provided constructive comments.

I am unable to express any appreciation to representatives of the motor carrier industry or their trade associations. Perhaps in the future these groups will develop an appreciation of the benefits that might be derived from cooperation in academic research.

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.

TABLE OF CONTENTS

<u>Chapter</u>		<u>Page</u>
I	INTRODUCTION	1
	The Structural Case for De-regulation.....	2
	Industrial Organization Theory and the Case for De-regulation.....	7
	Outline of the Study	12
II	THE POLITICAL ECONOMY OF REGULATORY REFORM.....	14
	Introduction.....	14
	Recent U.S. Views.....	15
	Recent Canadian Views.....	22
	Summary.....	33
III	A PROFILE OF THE MOTOR FREIGHT TRANSPORT INDUSTRY..	35
	Introduction.....	35
	Industry Profile.....	36
	Importance of Terminal Functions.....	45
	Regulatory Framework.....	49
	Railroad and Private Motor Carrier Competition...	55
	Summary.....	63
IV	THE STRUCTURE OF MOTOR FREIGHT TRANSPORT.....	67
	Introduction.....	67
	Economic Dimensions of Service.....	68
	Size of Shipment.....	70

<u>Chapter</u>	<u>Page</u>
The Length of Haul.....	73
Geographic Coverage.....	75
Structured Cost Characteristics.....	78
Threshold Costs.....	79
Systems Effects.....	82
Factor Mobility.....	87
Cost Variability and Indivisibility.....	89
Summary.....	93
V ECONOMIES OF SCALE: A REVIEW OF THE LITERATURE.....	96
Introduction.....	96
Introduction to Economies of Scale.....	96
Review of the Literature.....	102
Summary.....	120
VI DESTRUCTIVE COMPETITION.....	122
Introduction.....	122
Historical Review.....	122
Relevance of Destructive Competition.....	131
Summary.....	142
VII MEASURING THE EFFECTS OF REGULATION.....	145
Introduction.....	145
The Producer Protection Hypothesis.....	146
The Sloss Study.....	153
The Maister Study.....	164

<u>Chapter</u>		<u>Page</u>
	Summary.....	172
VIII	SUMMARY AND IMPLICATIONS.....	174
	Summary.....	174
	Implications for Competition.....	178
	Implications for Further Research.....	180
	APPENDIX A.....	182
	ICC Motor Carrier Industry Profile.....	182
	APPENDIX B.....	185
	A Note on Economies of Scale.....	185
	BIBLIOGRAPHY.....	188

LIST OF TABLES

<u>Table Numbers</u>		<u>Page</u>
III.1	Canadian Transport Market.....	37
III.2	Distribution of For-Hire Motor Freight Transport Firms by Revenue Class, 1972 and 1974.....	39
III.3	Total Operating Revenues and Total Equipment Operated by Revenue Class, 1974.....	40
III.4	Category of Operating Expense as a Percent of Total Operating Expenses, Class 1 and Class 2 Carriers, 1974.....	48
III.5	Canadian Trucking Regulations.....	51
III.6	Distribution of Trucking Regulations by Federal and Provincial Authority.....	54
V.1	Summaries of Existing Economic Studies of Motor Freight Economies of Scale in the U.S.	105

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.