Private Trucking: Analysis and Implications

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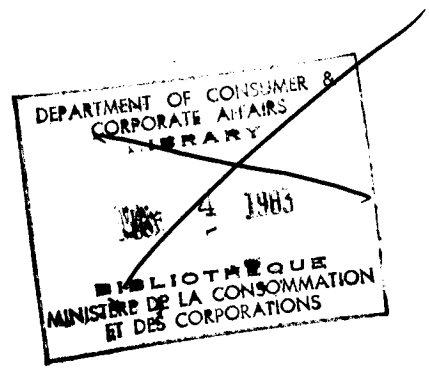

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FOREWORD

This study is one of several undertaken in the Research Branch of the Bureau of Competition Policy as contributions to an interdepartmental review of competition/regulation across major modes of transportation in Canada.

A significant aspect of the study is the contribution it makes, by documenting what is known about private trucking, to the argument that regulation has caused Canadian shippers to turn away from for-hire trucking. Such change has proceeded, notwithstanding the cost burden to private truckers of empty backhauls, until the magnitude of private trucking activity now is estimated to exceed that of its for-hire counterpart. This observation alone is likely to have implications for the delivered prices of many goods-producing sectors of the Canadian economy, for intermodal competition in transport, and for the overall efficiency of trucking, the dominant mode of freight transportation in Canada.

Don McKinley
Senior Policy Advisor
Bureau of Competition Policy

SUMMARY

This study, prepared under the aegis of the Interdepartmental Committee on Competition and Regulation in Transportation, draws together available, though very limited, quantitative and qualitative evidence with respect to private trucking activity in Canada. Private trucking may be characterized as a form of vertical integration -- the integration of transport facilities by a nontransport firm -- and represents the emergence of a substitute service to for-hire trucking.

Analysis of the size, rate of growth and operational configuration of private trucking suggests that important segments of the for-hire trucking industry may not be fully responsive to the price and quality of service needs of many shippers. The apparent growth of private trucking outside an area of inherent advantage (retail/wholesale delivery and bulk-resource shipments), despite cost-increasing legal prohibitions on the solicitation of backhaul traffic and a likely lack of short run transport expertise, connotes significant for-hire rate distortions. A review of factors contributing to the decision to integrate private trucking indicates that a gap between for-hire rates and private costs exerts the dominant influence.

Estimates prepared by the Bureau of Competition Policy show that private trucking accounts for about 67 per cent of over-the-road revenues in Canada. This share exceeds combined railway (freight) and for-hire truck revenues. The Ontario Ministry of Transportation and Communications surveys of trucking activity for the years 1971, 1975, and 1978 provide additional perspective to the analysis of the size and rate of growth of private trucking. Private trucking is shown to represent 37 and 48 per cent of total tonnage in 1971 and 1975 respectively, while the 1978 survey indicates that the private truck share of intercity movements was 51 per cent of total movements, 46 per cent of total metrage and 41 per cent of total tonnage.[1] The Ontario government concluded that the private trucking share of the market had increased since 1971.

Closer inspection of these results reveals important characteristics of the operational configuration of private trucking activity. The Ontario results indicate that private trucking dominates intercity truck movements of manufactured goods and end products. This may be taken to

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1. All measurements in the present study have been converted to metric.

signify a shift in the commodity characteristics from the low- to high-end of the value added scale, and this commodity configuration conforms to that usually identified as general freight. The emergence of private carriage in a market usually served by common carriers using a standard type of vehicle, suggests that the empty backhaul problem of private carriage is not based primarily on the special equipment needs of selected shippers.

It is worth repeating that these results relate to intercity trucking. While there is little doubt that private trucking predominates in local movements, the share of intercity traffic reinforces the view that despite cost-increasing backhaul prohibitions, private trucking is viewed as a viable alternative by many shippers. Moreover, the impact of the backhaul restrictions must include recognition of the fact that the opportunity cost of empty backhaul is magnified as the distance increases.

A comparative provincial analysis of private trucking activity indicates that the link between private trucking and regulation must be clarified. An underlying assumption about regulation is that it inhibits the flexibility of for-hire carriers and acts to increase for-hire rates relative to private costs. It follows that it is not regulation per se that contributes to the growth of private trucking, but rather the effect of regulation manifest in relatively high rates. Where regulation does not result in high rates -- for example, in Saskatchewan where selected less-than-truckload (LTL) rates are prescribed to levels below those found for comparable commodities in unregulated Alberta -- the incidence of private trucking is reduced.

Imperial Oil Limited examined its relative use of private and for-hire trucking in Ontario and Alberta and found that 75 per cent of its petroleum products are distributed by private carrier in Ontario as opposed to 25 per cent in Alberta. Imperial Oil attributed the arresting differential in private truck use to the fact that Ontario for-hire rates are significantly higher than private costs, while selected for-hire rates in Alberta lie below private costs.

These would appear to be highly significant results, for whatever deficiencies exist in estimates of the costs of compliance to government regulations, the simple counting of private and for-hire trucks is a straightforward exercise. These results, however, also raise fundamental questions about the existence of any private trucking in Alberta; in short, what factors induce a firm to integrate vertically in order to obtain inputs that may be obtained in what could be characterized as a competitive market?

This study considers two interrelated answers to this question. First, the 25 per cent share in Alberta may represent the level of total trucking activity where private trucking does have the advantage. Second, models of vertical integration indicate that the for-hire rate/private cost gap must be weighted by a probability term reflecting the probability of making a sale given specific demand conditions. This suggests that it may be in the interest of a firm to integrate vertically to satisfy the demand of high-probability customers and allow the for-hire market to satisfy the demand of low-probability (i.e., infrequent and not substantial) customers.

In conclusion, it may be noted that private trucking has grown relative to for-hire trucking, that the growth is more apparent in regulated markets where regulation serves to increase rates above levels which would obtain in unregulated markets, and that the operational configuration of private trucking has evolved such that it operates in markets where its assumed inherent advantage is not obvious. Though present data limitations do not allow for an analysis of the optimal degree of vertical integration, the growth and emerging operational configuration of private trucking may be clearly identified as an effect of regulation.

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INTRODUCTION

In recent years, the combined effects of high rates of inflation and unemployment in both Canada and the United States have contributed to a political reappraisal of the need for, and efficacy of, economic regulation among various sectors and industries. The emerging consensus among policy makers is that the economic circumstances which gave rise to a need for regulation among many industries may no longer exist and that, at present, regulation likely contributes to lower productivity and higher prices, and inhibits industrial price and output adjustments in response to a rapidly changing economic environment.

A central element of the policy analysis is the identification and quantification of factors affecting economic performance. This study seeks to analyze an important, though poorly measured, indicator of the performance of the Canadian for-hire trucking industry, the size and growth of private trucking. Private trucking may be characterized as a form of vertical integration of trucking services by a nontransport firm and, as such, represents the emergence of a substitute for regulated for-hire trucking. The emergence of a substitute service suggests at the outset that for-hire carriage may not be fully responsive to the price and quality of service needs of many shippers. Recognition that the substitute dominates the total volume of goods moved by truck and that private carriage is restricted legally to be an inefficient service, supports the view that private trucking is an important indicator of for-hire performance.

The inefficiency of private truck operations stems primarily from legal prohibitions with respect to the solicitation of backhaul traffic. In spite of cost-increasing restrictions on private trucking, an apparent gap between for-hire rates and private costs (for a given level of service) encourages entry into private trucking. The growth of private trucking in intercity markets, where its cost disadvantages are the greatest, suggests that for-hire rates distort the allocation of resources.

This study draws together all relevant Canadian data in order to explore the dimensions of private trucking activity. Part I begins with an examination of the legal dimensions of private trucking, suggesting that regulation requires complex definitions in order to separate private and for-hire trucking. Notwithstanding these legal considerations, all private trucking may be viewed as a form of vertical integration. The theoretical dimensions of private trucking as vertical integration are also explored in Part

I, followed by the presentation of selected quantitative and qualitative evidence on the determinants of entry into private trucking. Part II of the study examines the measurement problems associated with comparing private and for-hire trucking in Canada and the United States, and presents national and provincial estimates of private carriage. The range of provincial estimates allows for inferences about the effects of differing forms of economic regulation on the size and rate of growth of private trucking relative to for-hire trucking.

Part I

AN ANALYSIS OF SELECTED CHARACTERISTICS OF PRIVATE TRUCKING

Introduction

Vertical integration is a complex and multi-dimensional phenomenon. Available evidence suggests that unless vertical integration is a function of specific technical or physical conditions, the case for cost savings arising from integration is not clear. Indeed, as Bain points out, the trained observer tends to form a considerable suspicion from casual observation that there is a good deal of vertical integration which, although not actually uneconomical, is not justified on the basis of cost savings -- in particular, the integration of distributive facilities in manufacturing.[1]

Private trucking, or the vertical integration of transport facilities by nontransport firms, is worthy of close examination for three reasons:

> it plays an important role in the movement of freight in the United States [and Canada], it is an economic activity which persists despite apparent cost disadvantages, and the results may be pertinent to the current debate over regulation versus de-regulation of transport industries.[2]

An analysis of private trucking is more complex than implied by Bain because it exists in response and subject to economic regulation. Specifically, private trucking activity increases with the regulation of for-hire trucking and at the same time is subject to cost-increasing regulation (legal prohibitions on solicitation of backhaul) designed to prevent it from making further inroads on for-hire trucking. Private trucking appears to use inherent cost advantages on selected short-haul traffic but these advantages disappear for intercity movements. Taken together, these

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1. Joe S. Bain, Industrial Organization (New York: John Wiley and Sons, 1959), p. 381.

2. Dwight W. Stuessy, "The Economic Determinants of Private Trucking" (Ph.D. diss., George Washington University, 1973), p. 1.

factors imply that vertical integration of private trucking is an important indicator of for-hire performance, although care must be exercised in assessing this relationship.

The Definition of Private Trucking: Legal Considerations

In the most simple terms, private trucking may be defined as that trucking activity which lies outside the legal requirements of for-hire (common and contract) carriage.[3] While this definition does not appear to be particularly illuminating, the distinction becomes apparent when legal, as opposed to illegal, private trucking is discussed.

Many definitions of private trucking utilize both legal and economic concepts. For example, Stuessy states that "private trucking is distinguished in that it is the operation of a non-transport firm moving its own goods, which cannot haul outside or non-company freight as do the for-hire motor carriers."[4] In Edward Smykay's definition, "private carriage consists of (1) control over drivers and equipment by the shipper; (2) bona fide ownership of the commodity shipped; (3) ownership or lease of transport equipment."[5] The Ontario government considers "a business which hauls its own goods in its own truck(s) and employs its own driver(s)...to be a private truck operator."[6] A recent Statistics Canada study on the availability of private trucking data in Canada lists the following definitions:

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3. See Transport Canada, The Institutional Framework of the Canadian Trucking Industry: Part 1 -- The Public Sector, Part 2 -- The Private Sector, TP no. 3027E (Ottawa, April 1979), chapter A (Part 1). This study identifies carriers and/or commodities which are subject to regulation in each province.

4. Stuessy, "Economic Determinants," p. 1.

5. Edward W. Smykay, Physical Distribution Management, 3d ed. (New York: Macmillan Publishing Co., 1973), p. 136.

6. Ontario, Ministry of Transportation and Communications, Truck Transportation in the Province of Ontario -- Phase 1, Description of Operating and Administrative Characteristics (Toronto: Economic Policy Office, 1975), p. 67.

(a) Persons and industrial or business enterprises which perform carriage without being carriers for-hire (International Standard Definitions for Transportation Statistics).

(b) Those carriers which use their own or lease vehicles to carry their own goods for which transportation is only an incidental part of the operation. No compensation is paid or received for these services (Motor Carrier Freight Report).

(c) The private [motor] carrier of property [is]:

1. The private truck operator is primarily engaged in a business other than transportation.

2. The property which he transports is his own and is of such a nature as to be directly incidental to his business other than transportation.

3. The vehicle is owned or exclusively controlled by the private truck operator....[and the driver is] on the company payroll or hired through an agency for that purpose (Private Motor Truck Council).[7]

However, as pointed out by Statistics Canada, all of the above definitions may be applied to anyone who owns a truck or a delivery vehicle for the purpose of transporting his own goods.[8]

It appears that one element of the problem of defining private carriage is the definition of freight. For example, while the case of a repair man hauling his own goods in a van would appear to conform to the general defi-

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7. Statistics Canada, Transportation and Communications Division, "Private Trucking Report -- January 1978," mimeographed (Ottawa, 1978), pp. 4-5.

8. Ibid.

nitions of private trucking, the fact remains that he is not transporting freight; he is transporting his own service equipment. On the other hand, a large retail outlet which delivers its end products to a consumer should be considered as participating in private trucking activity.

Not only is the relationship between the carrier and the cargo important in defining private trucking, but the relationship between shipper, cargo and service offered must be clarified as well. For example, an Alberta committee reviewing motor transport regulation in that province noted that:

> the private carrier versus for-hire carrier confrontation is compounded in Alberta by the lack of legal definition of "for-hire" and "private carriage." The result is that both operate in a similar fashion. (For example, under present regulations, if a private carrier maintains cargo insurance, it too can operate as a for-hire carrier for the same licence fee.) This permits obvious cost advantages for a private carrier, allowing increased utilization.[9]

The "obvious cost advantages" referred to above relate to the ability of such a carrier to avoid the common carrier obligation. That is, private cum for-hire carriers are not forced to accept any and all traffic offered to them.[10]

The confusion between for-hire and private carriage exists whether or not a province regulates entry or rates for for-hire carriers. In a regulated province, however, such as Ontario, the legal versus illegal dimension of private trucking comes into play.

In May of 1976, the Legislative Assembly in Ontario appointed a Select Committee to enquire into the unlicensed (i.e., unregulated) transportation of goods by motor carriers in that province.

> At the time this Committee was established, it was alleged that substantial

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9. Alberta, Report of the Select Committee of the Legislative Assembly, Reviewing Intra Provincial Trucking Regulations (Edmonton, March 1977), p. 62.

10. Ibid.

> unlicensed, unregulated for-hire transportation existed. Why was there so much unlicensed for-hire transportation occurring and what should be done about it? These were clearly the fundamental questions which led to the formation of this Committee.[11]

The members of the Select Committee identified five types of unlicensed for-hire transportation. Four were considered as legal: carriers carrying exempt commodities; carriers operating with certain types of vehicles, or carrying selected commodities which are implicitly exempt from law because they are not mentioned; carriers operating within regulation-exempt geographic areas; and truckers which own a truck, but operate under the operating authority of another carrier.[12] The fifth type of unlicensed for-hire transportation referred to those individuals/carriers which were not specifically or implicitly exempt from regulation but conspired to make it appear as if they were exempt. Within this fifth category, the Select Committee identified two primary methods by which carriers feign private operations: buy/sell and trip leasing operations.

Buy/sell arrangements are those in which the carrier buys the shipment from the shipper and sells it to the customer at a price that reflects his original outlay plus transportation expenses. The effect of such an arrangement is to allow the carrier to act as a private trucker.

> The Committee does not generally subscribe to the buy and sell type of transportation arrangement which has the effect of camouflaging a for-hire transportation operation as private carriage. The Committee recognizes at the same time that goods, particularly agricultural commodities, are bought validly by a trucker and sold by the trucker to whomever he can. The arrangement is not, however, subject to a direction by the shipper as to where the goods are to be "sold." While this need is recognized, the nominal buy and sell

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11. See Ontario, Final Report of the Select Committee of the Legislature on Highway Transportation of Goods, A Public Policy Direction for Highway Transportation of Goods (Toronto, 1977), Chapter 4, p. 43.

12. Ibid.

> transportation transaction must be eliminated.[13] (emphasis added)

Hence, another dimension of the shipper/carrier/cargo/ service relationship emerges. The carrier may be the owner (and, implicitly, the shipper), but the point of sale and price must be determined by the owner independently of previous owners. The Committee was of the opinion that

> "buy and sell" transportation arrangements which reflect only transportation costs in the price of the goods to the consignee, or do not involve a cash payment from the carrier to the shipper for the goods, or do not provide two bona fide bills of sale are...a for-hire transportation service.[14]

Turning to leasing and trip leasing, it again becomes apparent that the quality of service offered and the control of the service influence the definition of private trucking. The Committee noted that leasing is a very broad concept which has no statutory definition. While leasing per se was seen to be a legitimate business consideration as an alternative to purchasing a vehicle, leasing arrangements which could be considered as for-hire arrangements were identified as a problem.

> The lessor may provide directly or indirectly a driver for a vehicle, or he may provide cargo insurance. It is vehicle leasing with other services which has become the problem in Ontario, because the provision of particular services, when considered with the provision of the vehicle, add up to the same service that is offered to the public by a for-hire [carrier]....The licensed for-hire carrier provides a consignor of goods with a vehicle, cargo insurance, and a qualified driver for the vehicle and moves from A to B for price $X. The agreement may be for one load, or to move several loads on a continuing basis.[15]

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13. Ibid., p. 44.

14. Ibid., p. 45.

15. Ibid., p. 50.

Thus, as another dimension of the definition of private trucking, the consignor must have some real responsibility for the vehicle and control over the driver. The private carrier may lease the equipment, but the leasing arrangement must place control in the hands of the consignor. An essential element in proper leasing arrangements in Ontario is the separation of the vehicle and the driver.

The term "vehicle-trip leasing" refers to the lease of a vehicle to a lessee for a one-way trip. This issue was of particular interest to the Committee as it epitomized the problem of unlicensed operations.

> We believe that there is nothing inherently unstable with a lessor leasing a vehicle to a shipper...for a single trip, as long as no control exists over the driver, or put another way, as long as the lessee takes full control of the vehicle for the duration of the trip....So long as the driver and vehicle are thus separate, the legitimate shipper may legally choose one-way shipments....the return of the vehicle to the "point of receipt" is irrelevant as long as the "driver pool" and the lessor are unrelated entities.[16]

In conclusion, the Committee felt that the advantages of an effective regulatory system outweighed the disadvantages of declaring trip leasing of commercial motor vehicles illegal, and thus recommended that such arrangements should be made contrary to law.

The upshot of this discussion is that, at least in Ontario, there appears to be substantial concern over the avoidance of licensing requirements. However, the issues discussed above have a much more direct significance. Analysis reveals that shippers have at their disposal a variety of methods to circumvent the use of for-hire carriers. Both of the methods outlined allow a shipper to act as a private carrier, either directly or by the use of proxy buy/sell arrangements. The Committee implied that these activities were "pervasive,"[17] yet could offer no explana-

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16. Ibid., p. 51.

17. The Committee estimated that unlicensed activity accounted for about 10 per cent of for-hire revenues. While this level of activity may be important at the margin, it does not appear to be pervasive.

tion for their growth. Despite the legal convolutions presented above, which describe private activities as being essentially for-hire services, the issue remains that these carriers/shippers did not choose to use the for-hire alternative.

Private Trucking as Vertical Integration: Economic Considerations

At the outset of this paper it was suggested that private trucking may be viewed as a form of vertical integration, that is, a nontransport firm incorporating a transport function as part of its production/distribution process. Framing an analysis of vertical integration within the theory of vertical integration carries with it the advantage of isolating elemental factors which contribute to the understanding of private trucking. The theory itself, however, must be modified to reflect the conditions within trucking markets.

> The study of vertical integration has presented difficulties at both the theoretical and policy levels of analysis. That vertical integration has never enjoyed a secure place in value theory is attributable to the fact that, under conventional assumptions, it is an anomaly.[18]

It is generally argued that a determinant of vertical integration is the desire of producers to obtain a secure supply of inputs at stable prices which approximate costs.[19] Many of the existing studies, however, view vertical integration as an outgrowth of bilateral monopoly or the presence of monopoly on one side of the market. Private trucking as vertical integration takes place in what may be considered as a (structurally) competitive market and appears to arise with greater frequency in regulated markets. If regulation, as is commonly assumed, reduces uncertainty about factor inputs, the question arises as to why regulation of trucking appears to increase the incidence of

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18. Cf. Oliver Williamson, "The Vertical Integration of Production: Market Failure Considerations," American Economic Review 59 (May 1971): 112-23; and Frederick M. Scherer, Industrial Market Structure and Economic Performance (Chicago: Rand McNally and Co., 1971), pp. 240-48 and quotes cited therein.

19. See Scherer, Industrial Market Structure, pp. 240-48.

private trucking activity. In order to examine these issues more closely, selected highlights of a recent study by Imperial Oil Ltd. are examined below.

The Imperial Oil study. Imperial Oil analyzed its distribution systems for bulk petroleum products in Alberta and Ontario in order to assess the impact of regulation (Alberta does not regulate rates or entry for intraprovincial undertakings while Ontario regulates entry).[20] Despite the presence or absence of regulation in these two provinces, Imperial Oil manages the fleets in the same manner with respect to types of vehicle, maintenance, hours of operation, driver pay, etc. The significant difference in the operations arises from the proportion of total output transported by private and for-hire vehicles.[21]

Imperial Oil moves 75 per cent of its Ontario volume by private fleet, compared to 25 per cent in unregulated Alberta. The report attributes the arresting incidence of private trucking in Ontario relative to Alberta to the differences between for-hire rates and private costs in each province. The question arises as to why there would be any private trucking at all in Alberta, given that its trucking industry operates within a competitive environment. In order to understand this apparent anomaly, it is instructive to present a theoretical analysis of vertical integration in competitive markets (e.g., private trucking in Alberta) and return to a discussion of the impact of regulation on the for-hire sector both in Ontario and Alberta.

The theory of vertical integration in competitive markets. In his theoretical analysis of the factors contributing to vertical integration in competitive markets, Carlton suggests that the randomness of demand for a firm's output may

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20. Imperial Oil Ltd., "Cost of Compliance with Significant Regulations Governing Distribution of Bulk Petroleum Products" (Paper prepared for the Economic Council of Canada, May 1980).

21. Ibid., p. 1. "These two provinces were chosen, not only because they are representative of two important regions of the country, western and central Canada, but also because different approaches to trucking regulation in the two provinces provide a useful contrasting of the costs of compliance and the wider economic effects of regulation."

induce it to integrate vertically.[22] He assumes there are two types of firms: Stage 1 (e.g., manufacturers) firms require factor inputs from Stage 2 (e.g., truckers) firms in order to produce their final output. Demand facing an individual Stage 1 firm is random during any market period. If it is assumed that the factor input is the transportation service and the Stage 1 firm has the option of producing some of the input itself (i.e., private trucking), it follows that the Stage 1 firm bears the risk of having unused (or underutilized) input at the end of the market period.

> Every time a Stage 1 firm observes a customer demand for its product, it attempts to obtain the factor input necessary to produce the customer's demand for the final product. The Stage 1 firm has to use up its own holdings, if any, of the input, and then when its holdings are depleted it enters the Stage 2 factor market....The Stage 1 firm randomly frequents a Stage 2 firm to try and obtain the necessary inputs to satisfy its customer.... For any given level of factor holdings by Stage 1 firms, we can imagine the Stage 1 and Stage 2 firms competing in their respective markets on price and probability of satisfaction until the market reaches a competition equilibrium.[23]

An important feature of this simplified exposition is that the amount of the input that Stage 1 firms desire to hold affects the stochastic nature of demand that Stage 2 firms see.[24] Vertical integration of Stage 1 firms affects the risky environment in which Stage 2 firms operate.

Carlton suggests that there are two offsetting considerations involved in the decision of a Stage 1 firm to produce the input itself. First, since it costs C to pro-

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22. Dennis W. Carlton, "Vertical Integration in Competitive Markets Under Uncertainty," Journal of Industrial Economics 3 (March 1979): 189-209. Though Carlton is concerned with the determinants of backward integration, his model is extended easily to the present case of forward integration.

23. Ibid., p. 195.

24. Ibid.

duce the unit of output (assumed to be equal for Stage 1 and Stage 2 firms),[25] the Stage 1 firm will save Pint - C by producing the input, given that Pint is the Stage 2 firm market price.[26] Second, the Stage 1 firm must bear the risk of producing C but not using it given demand fluctuations. By producing the input for itself, the Stage 1 firm bears the risk of the unsold input, while if the firm goes to the factor market it is the Stage 2 firm which bears the risk.

> This will definitely be an incentive to integrate vertically if the expected profit is positive when a Stage 1 firm holds enough input to satisfy one customer when evaluated at the equilibrium associated with no vertical integration. It is straightforward to calculate the profit functions and to derive the condition where there will be an incentive to integrate.
>
> $$[1 - Pr(O)]\ Pint - C$$
>
> where $1 - Pr(O)$ = probability of at least one customer purchasing from the Stage 1 firm;
>
> Pint = price of the intermediate product when purchased in the Stage 2 market; and
>
> C = cost of producing the input.[27]

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25. Conditions of constant returns are assumed.

26. See Carlton, "Vertical Integration," pp. 191-93. The noteworthy features of competitive equilibrium under uncertainty are that: (1) the probability that a customer will be unable to purchase the good definitely exceeds zero; (2) the price will always exceed marginal cost since the revenue must exceed the marginal cost of production to compensate not only for the cost of production but also the unused but available productive capacity; (3) the total amount demanded and supplied will not be equal.

27. Ibid., p. 197.

If a Stage 1 firm produces the input, its costs increase (with certainty) by C. The saving to be derived by avoiding the Stage 2 factor market must exceed the cost if the Stage 1 firm is to produce any of the input.[28]

The incentives for vertical integration come about when Stage 1 firms have reason to anticipate a marginal, as opposed to an average, probability of using the input.

> when a Stage 1 firm is deciding whether or not to hold one unit of the input itself, it is not concerned with average probability of being able to use any unit of input. It is precisely because Stage 1 firms can use their own input to satisfy "high probability" demand and use the Stage 2 market to satisfy low probability demand, that incentives for vertical integration occur.[29] (emphasis added)

This theoretical construct is related to the analysis of the determinants of private trucking discussed below, though the material presented implicitly removes some of the simplifying assumptions. What this construct does, however, is indicate that the rate-cost gap must be weighted by a probability factor. Thus the ultimate private trucking configuration is a function of the for-hire rate/private cost gap and the demand probabilities. When factors such as economies of scale, or costs of inventory holdings are introduced, or when Stage 2 firms outnumber Stage 1 firms, the analysis becomes more complex.

Vertical integration and the effects of regulation. In order to adopt the foregoing in an analysis of the incentives to integrate private trucking activity, it is necessary to modify the expression [1 - Pr(O)], the probability that at least one customer frequents the firm. What is required is that the satisfaction of demand undertaken by

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28. This relationship may be simplified to the following:

$$[1 - \exp(\frac{L}{N1})]\ Pint - C$$

where L = number of customers and N1 = number of Stage 1 firms. The equality is more likely to hold the smaller the number of Stage 1 firms and as the customer per firm ratio increases.

29. Carlton, "Vertical Integration," p. 198.

Stage 1 firms include a quality dimension; that is, that the demand conditions include such elements as timely delivery, reduction in loss and damage, etc. These demand factors would alter the private/for-hire configuration. For example, the probability that at least one customer would attempt to purchase output from the firm is greater than zero. However, if the ultimate sale is in jeopardy because the firm cannot deliver the goods immediately, the probability of incurring cost C remains the same but the probability of a sale declines. A similar situation arises when the demanders of the input have high variability in demand; vertical integration here becomes one mechanism to avoid costs associated with someone else's demand variability.

On the basis of such a construct, it is clear that some private trucking activity will exist in a competitive environment such as Alberta. For selected firms their demand structure is such that it is optimal for them to integrate private trucking for a small portion of their customers and allow regulated truckers to absorb the risk associated with the random consumers.

This raises questions with respect to the impact of regulation. The formula and its modification form a useful starting point. If regulation increases Pint - C above the gap that would exist in a competitive market, then the potential savings of vertical integration increase. Since regulation restricts the choice that Stage 1 firms have in the Stage 2 market (e.g., a manufacturer may only select for-hire carriers which have the operating authority to serve a selected region or route), the probability of losing the sale increases; that is, regulation tends to shift the risk of the sale back to the Stage 1 firm.

Regulation may also alter the value of C to the extent that C is not equal between the Stage 1 and Stage 2 firms. The cost of providing private trucking services exceeds for-hire costs simply because existing regulation prohibits private firms from soliciting backhauls. However, the price of for-hire trucking services may be high enough relative to costs to encourage manufacturers to integrate vertically. Notwithstanding the inherent advantages of private trucking for select intracity movements, the growth of private trucking in intercity movements suggests that while private trucking may be cost effective, it is not efficient because the backhaul problem is magnified as distance increases.

It may be noted that the term "regulation" as used above implies that regulated carriers may influence upward prices beyond the level which would obtain in a competitive

market. This is a variation of the producer protection hypothesis of regulation; that is, regulation promotes or sustains cartel-like pricing behaviour. But this need not be the case; indeed, regulation may be so rigid as to reduce prices below competitive levels. As indicated in Part II, the form of provincial regulation impacts upon the private/for-hire mix. For example, Ontario LTL rates tend to be the highest in Canada, while Saskatchewan (which regulates entry and prices) tends to have the lowest rates, lower in fact than rates for selected comparable commodities in Alberta. It may be noted, however, that the pattern of demand and the relative distances involved affect the various provincial values of C. For example, the greater distances between cities in Saskatchewan and Alberta would magnify the cost disadvantage of regulatory-imposed one-way hauls of private carriers.

In order to examine the impact of regulation on for-hire capacity utilization, Chow analyzed shipments in Ontario and Alberta and found that while Ontario has greater (natural) traffic balance than Alberta, for-hire capacity utilization in Alberta is significantly greater.[30] The results suggest that regulation reduces the capacity utilization of for-hire carriers in Ontario by restricting their ability to change output configurations in response to swings in demand. Further, it has been argued that motor carriers in Ontario exhibit higher risk and higher rates of return than comparable carriers in Alberta.[31] To the extent that private trucking is a function of high rates in the LTL general freight for-hire segment, the fact that Ontario exhibits the highest LTL rates in Canada lends indirect empirical support for the material presented above.[32]

In conclusion, it is clear that the model could be made more sensitive to the realities of the trucking indus-

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30. Garland Chow, Rate and Cost Analysis of For-Hire Trucking: Provincial Comparisons (Ottawa: Consumer and Corporate Affairs Canada, 1982), Appendix C.

31. See Andrew Klymchuk, "Motor Carrier Rate of Return Analysis: Selected Markets" (Paper prepared for the Interdepartmental Committee on Transportation Competition and Regulation, 1979).

32. See Research Branch, Bureau of Competition Policy, Trucking Industry: Analysis of Performance (Ottawa: Consumer and Corporate Affairs Canada, 1982), Chapter II and sources cited therein.

try; however, the rate/cost relationship remains as the cornerstone to the explanation of the existence of private trucking.

Conclusions. Increasing rates and/or a decline in service in the for-hire sector are definite incentives for firms to integrate private trucking facilities. As pointed out by R.B. Taylor of the Canadian Manufacturers' Association, transport costs are always the determining factor, with service considerations a distant second. However, once service benefits become apparent and the organization adjusts to them, it is difficult to revert to a lesser service level.[33]

The theoretical construct developed above raises serious questions with respect to the social consequences of vertical integration. Clearly, consumers are generally better off in the absence of vertical integration, given that it involves higher input costs. Moreover, price-increasing for-hire regulation must be viewed as an important factor in the decision to integrate vertically, and to the extent that social welfare is improved by a reduction in vertical integration, the reduction/removal of regulation is tied to improved welfare. In short, the amount of private trucking will be reduced by regulatory reform of for-hire carriage, designed to lower rates and increase service to shippers.

The Economic Determinants of Private Trucking: An Overview

Stuessy suggests that at least five cost-based hypotheses may be put forward to account for the size and rate of growth of private trucking. These are:

1. Private trucking is a reaction to rate discrimination on the part of for-hire carriers.

2. Private trucking results from a small shipment/short-haul pattern of freight demand.

3. Private trucking represents an attempt to remove uncertainties from the production/distribution process.

4. Private trucking is related to firm size.

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33. Ibid., Chapter III.

5. Private trucking provides a better quality of service than for-hire trucking.[34]

Each of these hypotheses will be examined in light of Canadian evidence with respect to private trucking.

Rate discrimination. A discriminatory rate structure provides incentives for a firm to integrate vertically into private trucking operations. Stuessy argues that rate discrimination practised by for-hire carriers is inversely related to the elasticity of demand for motor transport of each shipment. A shipment's elasticity of demand for motor transport is inversely related to commodity value and directly related to length of haul and shipment weight. Hence, rate discrimination is a positive function of a shipment's commodity value and a negative function of a shipment's weight and length of haul.[35] The decision to integrate into private trucking is a rational reaction to rate discrimination if a firm can supply its own transport at costs below for-hire rates. It is suggested that firms with inelastic demands for transportation, which ship goods of high value in small shipments over short distances, have the freight profile which indicates private carriage may be economical.

The above reaction to rate discrimination is qualified to the extent that firms must be large enough or, put another way, have sufficient freight volume to sustain private carrier operations, and discriminatory rates are high relative to private costs. The latter qualification is most important since the relevant differences relate to private costs and for-hire rates, not for-hire costs.

Using the Census of Transportation data, Stuessy tested the hypothesis and found that it was supported. Each type of rate discrimination -- commodity, distance and weight -- was investigated separately. The only modification related to weight discrimination; for very small shipments, private trucking was found not to be an alternative

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34. Stuessy, "Economic Determinants," p. 64. In addition to Stuessy, this discussion draws heavily on the work of Walter Y. Oi and Arthur P. Hurter, Economics of Private Truck Transportation (Dubuque, Iowa: Wm. C. Brown Co., 1965), and Garland Chow, "The Economics of Motor Freight" (Ph.D. diss., Indiana University, 1977).

35. Stuessy, "Economic Determinants," p. 66. See also Josephine Olson, "Price Discrimination by Regulated Motor Carriers," American Economic Review 62 (June 1972): 935.

to for-hire carriers since private costs were greater than discriminatory rates.[36]

Though Canadian data do not allow for testing of the hypothesis in the same manner as above, fragmentary data relating to the characteristics of the shipper and shipment tend to support Stuessy's results. For example, an Ontario Ministry of Transportation and Communications study of shippers noted that

> cost was most often reported as a factor influencing model choice....The reason most often given by private trucking operators [for entering private trucking] was cost saving, given by 57% of the operators responding.[37]

In addition, it was observed by R.B. Taylor of the Canadian Manufacturers' Association that

> firms in the survey were apparently not very responsive to common carrier rates, although there was more willingness to switch away from common carriers in response to rate increases than to switch away from private trucking in response to rate reductions.[38]

It appears that the service factors mentioned by Taylor are important inducements to firms with respect to private truck operations. That is, the service differentials achieved by private trucking may be so significant as to make firms reluctant to revert back to for-hire carriage.

Short-haul/small shipments. Stuessy's second hypothesis suggests that private trucking results from a small shipment/short-haul pattern of freight demand. Unfortunate-

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36. Stuessy, "Economic Determinants," p. 126.

37. See Ontario, Ministry of Transportation and Communications, Truck Transportation in the Province of Ontario -- Phase 2, Survey of Shippers (Toronto: Economic Policy Office, 1975), pp. 101-03.

38. Ibid., p. 179. This reference is taken from an analysis of a Statistics Canada study entitled "Private Trucking in Canada, 1974." The Ontario government conducted its survey of shippers to correspond to, and add observations to, the federal study.

ly, the logic of this argument is somewhat circular in that it is suggested that as a consequence of the small shipment problem -- the reluctance of for-hire carriers to move small shipments over relatively short distances -- private carriage may emerge out of necessity.[39] However, it is argued that private costs are lower than for-hire costs for that type of shipment.[40]

This difference in costs results from an absence of terminal facility expenses in private trucking. Though private carriers tend to have higher line-haul costs (due to the use of smaller vehicles, smaller loads, and the inability to solicit backhauls),[41] this is likely to be more than offset by lower terminal expenses:

> Terminal costs are especially significant for short hauls and small shipments. For this size shipment, much of the cost of pickup and delivery are independent of the weight of shipment. Thus, some variable costs are converted to fixed costs for small shipments. These converted fixed costs along with the capital investments of pickup and delivery fleet and terminal structure, weight heavily on small volumes of output since the ratio of terminal to line-haul costs is high in this range. Private carriers, however, do not incur these terminal costs. Hence, their cost structure is less encumbered at low outputs [tonne-kilometres] than for-hire carriers.
>
> As output 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 and their costs begin to

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39. Terms such as "small shipments" and "short distances" are not well defined. Generally, a small shipment is of LTL size (4 536 kg in the United States) and usually much smaller. Short distances are usually referred to as those round trips which can be made in one day or less.

40. This contention is subject to the condition that the short-haul/small shipments are made on a regular basis.

41. Stuessy, "Economic Determinants," pp. 70-74.

> exceed those of the for-hire carriers at larger outputs.[42] (emphasis added)

Whereas the first hypothesis proposed a rate-push factor which induces firms to enter private trucking, the second hypothesis suggests that there is also a cost-pull factor.

Stuessy tested the second hypothesis and found that

> costs per unit for any motor carrier were shown to be high for small shipments/short hauls due to the burden of terminal costs. [Since]...private carriers have low terminal costs, they have a cost advantage. However, as shipment distance and weights are increased...the higher line-haul costs of private carriage cause them to become the high cost carrier.[43]

Once again, though Canadian data do not permit the testing of this hypothesis, fragmentary data tend to support Stuessy's conclusion.

> The principal role of privately operated trucks is for city cartage, according to the respondents to our survey. Of those surveyed with private truck operations, 60.6% considered that the main role of their fleet was for city cartage, while a smaller proportion, 20.2% viewed the role of trucking as being short and long hauls....The maximum range of privately operated trucks was reported to be 100 miles [161 km] or less by 70.4% of the respondents with private trucks. Only 29.6% of the respondents regularly used their trucks for distances in excess of 100 miles [161 km], and none for distances in excess of 1 000 miles [1 610 km].[44]

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42. Ibid., p. 71.

43. Ibid., p. 154.

44. Ontario, Ministry of Transportation and Communications, Truck Transportation, Phase 2, pp. 95-96. It may be noted that the 161 km limit relates to both intra- and intercity operations.

In general, different commodity characteristics such as weight, volume, value, etc., entail different transportation requirements. Two methods may be used to classify shippers into groups with like characteristics: industry and commodity groups.

These broad categories (as indicated in Table 1 and correlated in Table 2) developed by Ontario government researchers are useful in correlating the industry and commodity groups. For example, the industry group foodstuffs and beverages consists of perishable commodities and is likely to require speedy delivery using special vehicles. Furniture and electrical machinery are both highly liable to damage. Machinery (except electrical) and transportation equipment are considered to be representative of large and awkward commodities, while distributors fall into a separate category because of the variety of commodities and the nature of the business.

> Despite the fact that the above groups are broad and somewhat arbitrary, it is interesting to note the difference in transport modes being used by shippers in different industry or commodity groups....
>
> Private trucking is used by a relatively high percentage of shippers in the "food and beverage" and the "wood, lumber, and paper industry groups"....Private truck is used more often by distributors and the "low value, high volume" groups.[45]

The above conclusions were based on the actual number of shippers using each mode; hence it should be noted that small and large shippers carry the same weight in the calculation of the percentages.

It would be a heroic leap to relate these industry and commodity factors to the small shipment hypothesis. In fact, there appears to be mixed evidence concerning the size of shipment commodity carried by private truck. For example, evidence presented below suggests that in 1971 there was very little difference in the gross weight of for-hire trucks and private trucks. (The 1971 study is discussed in greater detail in Part II of this report.)

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45. Ibid., pp. 22-24.

Table 1

Relationship Between Industry Group and Commodity Group Characteristics

Industry group	Commodity group characteristics
1. Foodstuffs and beverages	1. Foodstuffs and beverages
2. Petroleum, chemicals	2. Petroleum, chemicals
3. Furniture, electrical machinery, etc.	3. Awkward units
4. Tobacco, textiles, rubber, plastic	4. Distributors
5. Lumber, wood, paper, etc.	5. Low value, high volume
6. Machinery (except electrical), transport equipment	6. Low volume, high value
7. Stove, primary metal, fabricated metal	7. Others

Table 2

Comparison of Ranking of Industry and Commodity Groups by Use of Common and Private Carrier

Rank	Common		Private	
	Industry	Commodity	Industry	Commodity
1st	3	6	5	1
2nd	4	3	1	4
3rd	6	5	7	5
4th	2	4	3	7
5th	7	2	4	2
6th	5	7	2	3
7th	1	1	6	6

In his study of U.S. private trucking, Rakowski noted that

> (1) There is an extremely heavy usage of private truck for short-haul operations, with a distinct drop in the share as length of haul increases.
>
> (2) The incidence of private truck is concentrated in the shipment sizes between 10 000 and 60 000 pounds [4 536 and 27 216 kg].[46]

In terms of commodities, Rakowski found the top 15 commodities carried by private carriage to be comparable to traffic moved in truckload (TL) lots by general freight carriers. Therefore, in terms of size of shipment and type of commodities, private trucking appears to be comparable to truckload freight movement. Oi and Hurter, on the other hand, concur with respect to the effect of distance on private carriage but do not come to any conclusions about shipment size.[47] However, a third study conducted by Bernard Sigg[48] found significantly lower costs in every cost category for private trucks relative to for-hire. The debate as to the size of shipment is important in the sense that it has a bearing on the opportunity cost of an empty return trip, and the cost forgone is a function of weight and distance.[49] Notwithstanding the inherent cost advantage, a firm committed to private trucking can reduce transport expenses in other ways. For example, by concentrating on short-haul traffic, a firm may reduce on-the-road repair expenses, driver layover and insurance costs.

In recent years, however, there has been a concern that the differential impact of regulation may affect for-

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46. James P. Rakowski, "Characteristics of Private Truck Operations in the U.S.," ICC Practitioner's Journal 41 (July-August 1974): 573 as quoted in Chow, "Economics of Motor Freight," pp. 158-59.

47. Oi and Hurter, Economics of Transportation, pp. 179-80 and 182-83.

48. Bernard Sigg, "The Economic Efficiency of Private Motor Transportation," in Proceedings of the Fifteenth Annual Meeting of Transportation Research Forum (Oxford, Ind.: Richard B. Cross Co., 1974), pp. 439-42.

49. Cf. Stuessy, "Economic Determinants," p. 74.

hire carriers in a way that increases the cost effectiveness of private trucking. Tables 3 and 4 list the main elements of for-hire regulation in Canada. They indicate that private carriage is largely free of the regulation applying to for-hire carriage. Table 3 speculates upon the relative impact of these regulations upon these carriers.

While Table 3 indicates the relative importance of selected regulations upon private motor carriage operation, it is not possible to determine the orders of magnitude in a precise way. There can be little doubt that regulation confers some advantage on private carrier operations; however, it would be simplistic to suggest that private trucking should be regulated on the same basis as for-hire trucking on equity considerations. As long as there is an inherent advantage in private carrier operations, these operations will exist in conjunction with for-hire operations. A relevant variable for analysis of private trucking is rate of growth. It may be hypothesized that while some degree of private trucking will exist under most regulatory schemas,[50] the impact of regulation will be felt on the rate and nature of growth in private trucking. This is examined further in Part II.

In conclusion, the relationship between private trucking and the small shipment/short-haul pattern of demand is a complex one, and it is made more so when commodity analysis is suffused with the small shipment problem. One relationship which does emerge is that private local operations appear to correspond to the distribution function of wholesale and retail trade, while private intercity operations appear to correspond to what has been considered a traditional area of private activity, TL bulk/crude materials. Such apparent relations, however, are static, and in Part II it is argued that private trucking has expanded its boundaries considerably as a result of the relatively poor performance of for-hire carriers.

Removal of uncertainties from production. Turning to the hypothesis that private trucking represents an attempt to remove uncertainties from the production/distribution process, it is necessary to examine uncertainties resulting from fluctuations in supply, quality and prices. Stuessy argues that a firm can reduce its supply uncertainties in three ways: (1) forward contracts, (2) inventory accumula-

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50. Ibid., pp. 200-17. Stuessy argues that deregulation would not significantly alter the position of private carriage.

Table 3

Size and Importance of Selected Regulatory Programs on Private Carriers

Regulatory program	Impact on private carriers	Extent of cost impact
1.0 Federal Labour Code	Major advantage	Varies widely, depending on present operating conditions.
2.0 Workmen's Compensation	Major advantage	Could amount to 1% of common carrier's total costs.
3.0 Maritime Freight Rate Assistance subsidy	Major disadvantage	Common carriers collect additional 17½% to 30% of revenue earned in the Maritimes.
4.0 Licensing	Major advantage in some provinces	On Quebec/Ontario operations, Quebec private carriers would save $1 400 licence fees, or between 2% and 3% of total operating costs.
5.0 Federal sales tax	Minor disadvantage	Negligible
6.0 Provincial sales tax	Minor advantage	Negligible
7.0 Provincial fuel tax	None	None
8.1 Insurance	None	None
8.2 Permit restrictions	Minor advantage	Negligible
8.3 Tariff filing	Minor advantage	Negligible

Source: Archer Consulting Ltd., "The Influence of Regulation Upon Common and Private Carrier Costs, mimeographed (Pointe-Claire, Que., March 1973), p. 2.

Table 4

Regulatory Elements in a Motor Carrier Operation
by Mode of Carrier

Type of regulation	Level of regulation	Motor carriers							
		Common	Contract	Private	Cartage	Passenger	Courier	Specialized	Household goods
Entry or expansion:									
Proving need for service	P	X	X		X	X	X	X	X
Obtaining operating permit	P	X	X		X	X	X	X	X
Arranging for interline agreements	P	X							X
Permission for acquisition	FP	X	X		X	X		X	X
Subsidies	F	X	X						X
Filing of tariffs	P	X	X		X	X	X	X	X
Revising of published tariffs	P	X	X		X	X	X	X	X
Insurance	P	X	X	X	X	X	X	X	X
Labour regulations (age, etc.)	P	X	X	X	X	X	X	X	X
Obtaining vehicle licences	P	X	X		X	X	X	X	X
Operations:									
Permit limits - routes	FP	X	X		X	X		X	X
- interline	P	X							
- LTL/TL	P	X	X			X	X	X	
- customers	P		X		X			X	
- dangerous goods	FP	X	X		X				
- livestock	FP		X	X				X	
- agriculture	FP	X	X	X				X	
Highway weights	FP	X	X	X	X	X		X	X
Bridge weights	FP	X	X	X	X	X		X	X
Vehicle dimensions	P	X	X	X	X	X		X	X
Oversize loads	FP	X	X	X	X			X	
Federal labour code	F	X	X			X		X	X
Provincial labour code	P	X	X	X	X	X	X	X	X
Safety code	FP	X	X	X	X	X	X	X	X
Lord's Day Act	F	X	X	X	X		X	X	X
Licence reciprocity	P	X	X			X		X	X
Regulatory reporting	FP	X	X			X		X	X
Customs	F	X	X	X	X	X	X	X	X
Agriculture regulation	F	X	X	X				X	
Health regulations	FP	X	X	X	X	X		X	X
Sales and fuel taxes	FP	X	X	X	X	X	X	X	X
Municipal by-laws - hours	M	X	X	X	X			X	
- weights	M	X	X	X	X	X		X	X
- noise	M	X	X	X	X	X	X	X	X
- pollution	M	X	X	X	X	X	X	X	X
- zoning	M	X	X	X		X		X	

Source: Archer Consulting Ltd., "An Abridged Definition of the Highway Transport Industry in Canada," mimeographed (Pointe-Claire, Que., n.d.).

X Indicates that this regulation applies.
F Federal.
P Provincial.
M Municipal.

tion, and (3) vertical integration.[51] Vertical integration, according to Stuessy, offers the most direct and comprehensive way to reduce supply uncertainties since it combines features of forward contracts and inventory substitution.[52]

The rational profit-maximizing firm will vertically integrate if it can reduce the total cost of production and distribution. Since fluctuations of prices and/or disruption of supplies can be costly to the firm, it will attempt to control those inputs most crucial to its survival. The importance to a firm of transportation service depends on the need for dependability and the share of transportation in total costs.

> Wide variations are apparent in the total transport costs for different commodities and the percentage of sales accounted for by private truck operations. The variations are not statistically significant except for the "low value-high volume" commodity group which includes significantly few firms with freight transport expenses in excess of $1 million per year. The same commodity group includes the largest proportion of time spending in excess of three percent of sales on private truck operations; however, the result is not statistically significant.[53]

The Ontario Ministry of Transportation and Communications found that smaller firms are more likely to spend in excess of 5 per cent of sales on private trucking than larger firms. This is indicative, statistical problems notwithstanding, of the greater relative importance of supply disruptions to smaller firms.

The Ontario Ministry also noted that private trucks are used less frequently for inbound movement of goods than outbound movements.[54] However, an analysis of

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51. Ibid., p. 76.

52. Ibid.

53. Ontario, Ministry of Transportation and Communications, Truck Transportation, Phase 2, p. 176.

54. Ibid., p. 108.

the dependence of firms on either private or common carrier outbound movements indicates that while distributors are more likely to use common carriage than any other class, the same holds true for private carriage to a greater degree.

The impact of firm size. Turning to the relationship between firm size and private trucking, it is hypothesized that a firm must exceed a certain size for private trucking to be profitable. Once firms have passed this threshold size a negative relationship may develop between firm size and private trucking since the traffic patterns may be altered. For example, the firm may consolidate shipments to obtain lower TL rates, or gain sufficient market power to influence rates downward.

Stuessy states that distance and weight are positively related to firm size: the smaller the firm the greater the proportion of traffic which is small shipments/short haul. Using cross-sectional data, he found that the incidence of private trucking is negatively related to firm size. While the absolute use of private trucking increased with firm size, relative usage could not be maintained as firms shifted their larger shipments/long-haul traffic to for-hire carriers.[55] These results are supported by the above-mentioned Ontario study.

> [F]irms with fewer than 100 employees (a proxy for output) were most likely to be private truck oriented...while firms with more than 1 000 employees were least likely to ship most of their output by private truck....One other factor deserves mention...larger firms may ship over longer distances where private trucking is inappropriate.[56]
>
> Firms with $10 million or less in annual sales (the smallest sales category) appeared to be more likely to ship 50 per cent of their output by private truck.[57] (emphasis added)

It is noted that smaller firms appear to be less willing to switch between common and private carriers than larger

55. Ibid., p. 183.

56. Ibid., p. 97.

57. Ibid., Table c.24.f.

firms. For example, 75 per cent of the larger firms and 63 per cent of the smaller firms would not switch to for-hire trucking in light of rate increases and decreases.[58]

Quality of service considerations. The last hypothesis relates to the quality of service offered by private carriage. According to Stuessy, "shippers state that better quality, in the form of service and versatility, is second only to high for-hire rates as a reason for entry into private trucking."[59] The higher quality of service usually attributed to for-hire trucks is reduced due to the relative operating differences between for-hire and private carriers; that is, for-hire carriers cannot provide the same quality of service as private carriage at rates competitive with private costs.[60]

There are a number of dimensions to the differences in quality of service. For example, the notion of promptness implies more rapid and more flexible delivery times. Since private carriers tend to have no pick-up and delivery or terminal and handling aspects to their operations, the total trip time may be reduced. This is especially true if regulation forces the for-hire carrier to use circuitous routes. In reference to flexibility, private carriers are able to perform off-hour deliveries at a lower cost than for-hire carriers, again because they have no terminal and handling expenses.

It may be argued that the loss and damage claims for private carriage are probably less than those of for-hire carriage. This is likely a function of the reduced handling required for private carriage as well as the fact that the private carriage driver/handler is a company employee and is assumed to be responsible for the load. Moreover, the fact that the driver is a company employee suggests that he can offer superior customer relations in terms of order taking, replacement and service.

Stuessy did not test these quality of service hypotheses due to lack of data. However, he argued that these hypotheses were in fact cost-based in that a for-hire carrier could not, or would not, provide the service at a price competitive with private carriage.

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58. Ibid., p. 174.

59. Stuessy, "Economic Determinants," p. 83.

60. Ibid., pp. 83-87.

Table 5

Factors Affecting the Modal Choice of Private Trucking

Factor	N	% Responding
Low cost	18	62.1
Speedy delivery	13	44.8
Ready availability	9	31.0
Distance	6	20.7
Loss and damage	4	13.8
Nature of goods	3	10.3
Service	3	10.3
Other	7	24.1

Source: Ontario, Ministry of Transportation and Communications, Truck Transportation, Phase 2, Table V.10.

The Ontario Ministry of Transportation and Communications study provides some support for the above contentions. Table 5 indicates the factors that contributed to the choice of private-trucking-oriented shippers.[61] While the frequency responses were similar to those of for-hire-oriented firms, low cost was indicated more frequently by private-oriented shippers.[62] Table 6 indicates that once the choice has been made, similar factors would influence entry into private trucking. Private carriers gave cost saving (57 per cent of respondents) as the most important influence. Speedier deliveries and more reliable deliveries ranked second and third, with 47.3 and 37.6 per cent respectively. Better control of shipments and greater flexibility in time of deliveries ranked fourth at 34.4 per cent each. The responses to these factors accounted for about 70 per cent of the total. It should be noted, however, that the average firm gave more than two reasons for entry into pri-

61. These shippers are defined as those which ship 50 per cent or more of their outbound traffic in private trucks.

62. Ontario, Ministry of Transportation and Communications, Truck Transportation, Phase 2, pp. 103-04.

Table 6

Reasons for Entry into Private Trucking

	N	%	Rank
Cost factors:			
Cost saving	53	57.0	1
Two-way hauls	21	22.6	
Low value per weight/volume	6	6.5	
Large amount of merchandise to move	7	7.5	
Service factors:			
Better control over shipments	32	34.4	4
Speedier deliveries	44	47.3	2
More reliable deliveries	35	37.6	3
Greater flexibility in time of deliveries	32	34.4	4
Special nature of goods	8	8.6	
Regulation or legal matters	-	-	
Tax advantage	1	-	
No union problems	6	6.5	
Poor common carrier service	6	6.5	
Goods damage by common carrier	1	-	
Publicity value of trucks	7	7.5	
Own drivers neater, politer	6	6.5	
Use drivers as salesmen	1	-	
Other	15	16.1	

Source: Ontario, Ministry of Transportation and Communications, Truck Transportation, Phase 2, Table V.12.

vate trucking. While cost was the single most mentioned factor, service factors were more frequently stated for entering private trucking. Sixty-one per cent of private trucking firms indicated at least one service factor as being important in affecting entry.[63]

The Ontario survey noted that almost 60 per cent of the shippers had engaged in private trucking activity for ten years or less.[64] Another survey noted that 59 per cent of the firms increased the size of their fleets in the last two years; furthermore, 59 per cent indicated that they planned to increase fleet sizes within the next two years.[65] These results suggest that private trucking has not only grown rapidly, but is likely to continue doing so.

Conclusions. This section has examined the economic determinants of private trucking and has shown that fragmentary Canadian data support the five cost-based hypotheses outlined by Stuessy. The picture of private trucking which emerges is that of shippers using their own trucks over relatively short distances. There appears to be some question, however, as to the size of load and commodity carried.

The need to resolve the apparent confusion as to the size of shipment carried by private carriers assumes great importance from a policy perspective. For example, it has been argued that private carriage serves to influence downward truckload for-hire rates;[66] however, it appears that private carriage is a function of a small shipment/short-haul pattern of traffic. James Snow presents a number of case studies of U.S. shippers that have switched to private carriage, which provide useful insights into the apparent weight contradictions. In general, it appears that the case studies support the hypotheses presented by Stuessy. For example, Snow notes that a manufacturer of in-

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63. Ibid., p. 106.

64. Ibid., p. 107.

65. "Private Trucking in Canada," as cited in Ontario, Ministry of Transportation and Communications, Truck Transportation, Phase 2, p. 169.

66. James W. Snow, "The Problem of Motor Carrier Regulation and the Ford Administration's Proposal for Reform," in Paul W. MacAvoy and James W. Snow, eds., Regulation of Entry and Pricing in Truck Transportation (Washington, D.C.: American Enterprise Institute, 1977), p. 5.

dustrial and mining machinery uses private carriage because of high LTL for-hire rates.[67] A small manufacturer ($5 million sales) of industrial glass ships 85 per cent of its output by private carriage, in spite of the fact that it runs 38 per cent empty mileage; its costs are still lower than those obtained through the use of for-hire carriage.[68] A textile manufacturer uses private carriage selectively where cost serving may be obtained.[69]

Common to these examples is the important feature that the type of shipment is usually LTL. As well, Snow notes that the firm is willing to trade shipment time in order to save costs. That is, each of the firms discussed above will wait until it has a full load (TL) before dispatching its own trucks. Hence, shipment time-standards are relaxed to accumulate loads and achieve high equipment utilization.

Snow also discusses a number of case studies in which the shipper wanted premium service but was unable to attain it. For example, he notes that a furniture manufacturer ships between 85 and 90 per cent of its finished products by private carriage even though it can generate backhaul on only 10 per cent of its trips.[70] Here, the shipper is not willing to trade shipment time-standards in order to allow specialized carriers time to consolidate loads. Even though specialized carriers' rates are below private carriage costs, the shipper uses private carriage because specialized carrier service is inferior to his requirements. It is argued that a common carrier will not move the traffic because rate regulation will not allow the carrier a sufficient return on that type of freight.

The thrust of Snow's argument is that it is rate inflexibility[71] relative to shippers' rate-service tradeoffs which has an important impact on the decision to enter private trucking. However, one implication of this discussion is that if shippers are willing to accumulate loads for

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67. Ibid., p. 12.

68. Ibid.

69. Ibid., p. 13.

70. Ibid., p. 12.

71. It has been argued that LTL rates are much more inflexible than TL rates both in Canada and the United States. Cf. Snow, "Motor Carrier Regulation," pp. 12-16.

intercity trips, it is not surprising that gross vehicle weights may conform to common carrier weights.[72] The fact that shippers incorporate a quasi-terminal function for intercity movements suggests that an inherent cost advantage may be reduced as weight, distance and terminal expenses increase.

The degree to which private trucking is an indicator of the poor performance of for-hire trucking is not easily determined. As indicated above, it is a function of shipper requirements interacting with for-hire characteristics. However, the emergence of a substitute service (private trucking) for a market-oriented service (for-hire trucking) suggests that cost-conscious shippers find the private alternative more appropriate. Moreover, regulation of the for-hire sector appears to be a contributory factor in the shift to private trucking, implying that a reduction/removal of regulation would reduce the size of private trucking. To the extent that private trucking is a more costly alternative to intercity for-hire trucking (and the for-hire rate/private cost gap is an important determinant of private trucking), private trucking is a significant indicator of for-hire sector performance.

Summary and Overview

Part I of this study has examined the legal and economic dimensions of private motor carriage. Selected quantitative and qualitative information suggests that the decision to integrate private trucking is a function of a gap between for-hire rates and private costs. While private trucking has an inherent advantage in what may be characterized as intracity movements, the advantage disappears for intercity movement. This is so because the intercity carriers require terminal activities and the regulatory-imposed cost of one-way hauls is magnified by the distance involved. With the single exception of Alberta, all provinces prohibit private carriers from soliciting backhaul even when such traffic is available to a private carrier operating among multiple plants under single ownerships.

In Part II the role of private trucking is examined with particular emphasis on intercity movements. Data are presented on the size and rate of growth of private trucking, as are some insights into the impact of regulation on private trucking activity.

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72. Assuming, of course, similar size vehicles.

Part II

MEASURING THE SIZE AND IMPORTANCE OF PRIVATE TRUCKING IN CANADA: AN OVERVIEW

Despite the apparent significance of private trucking, researchers have found it difficult to determine accurately its size or rate of growth relative to the for-hire sector. (See Appendix A for a brief description of the development of trucking data in Canada.) Many of the estimates have been considered unsuitable for comparative purposes[1] for the following reasons: first, most of the studies have had to use relatively unreliable data bases; second, there exists a problem in accurately defining what is, or is not, a private carrier; third, and perhaps most important, there is an apparent variability in the estimates. As an example of this last point, private trucking estimates have been found to range from one-tenth to nine times the size of for-hire trucking, depending upon the output measure used; in short, the estimates tend to vary according to what is being measured (e.g., trucks, truck registrations, tonne-kilometres or fuel consumed).

Measurement Problems Associated with the Comparison of For-Hire and Private Trucking Activity: U.S. National Estimates, 1946-1970

It is possible to illustrate how different estimates of private trucking activity may arise by referring to one study in particular, Dwight Stuessy's doctoral dissertation, which was completed in 1973.[2] What distinguishes this study from others is that it makes use of the 1963 and 1967 editions of the U.S. Transportation Census, which specifically include data on the private motor carrier mode.

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1. See Dwight W. Stuessy, "The Economic Determinants of Private Trucking" (Ph.D. diss., George Washington University, 1973); Ontario, Ministry of Transportation and Communications, Truck Transportation in the Province of Ontario -- Phase 1, Description of Operating and Administrative Characteristics, and Phase 2, Survey of Shippers (Toronto: Economic Policy Office, 1975); McNeal, Hildebrand, and Associates, Western Canada Origin-Destination Survey, 1978, report prepared for Transport Canada (Vancouver: McNeal, Hildebrand and Associates, 1978).

2. Stuessy, "Economic Determinants," pp. 3-25.

Table 7

Truck Registrations in the United States, 1967
(000s)

Intercity freight		Local freight		Nonfreight		All U.S. truck registrations
Regulated:	337	Regulated (parcel, etc.)	54	Personal, commercial, government	11 998	.
Common	316					
Contract	21					.
Nonregulated:	625	Nonregulated (delivery, etc.)	3 186			.
Private	544					.
Exempt	81					.
Totals	962		3 240		11 998	16 200
Total freight truck registrations	4 202					

Source: Calculated from Stuessy, "Economic Determinants," p. 9.

Table 7 is derived from the dissertation.[3] Of the approximately 16 million trucks registered in the United States in 1967, almost 12 million were registered as either personal, commercial (tow trucks, winches, etc.) or government vehicles. The remaining 4 million trucks were registered as intercity freight or local freight vehicles. In turn, the two freight categories were divided into regulated and nonregulated segments. Of the intercity freight registrations, the regulated segment included trucks used by common and contract carriers, and the unregulated segment included private trucks and exempt trucks (for-hire carriers which are exempt from regulation -- principally agriculture cooperatives).[4] Of the local freight registrations, the regulated trucks represented primarily those used for parcel service, and the nonregulated trucks represented those used for delivery service.[5]

Given the data in Table 7, one may draw the following conclusions with respect to trucking registrations in 1967:

(a) Private intercity truck registrations account for about 57 per cent (544/962 x 100) of intercity freight truck registrations.

(b) Private intercity truck registrations account for about 13 per cent (544/4 202 x 100) of all freight truck registrations.

(c) Private local truck registrations[6] are over three times (3 186/962) more numerous than all intercity freight truck registrations.

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3. Ibid., p. 9.

4. Ibid., p. 7.

5. Ibid.

6. It has been assumed that local freight nonregulated truck registrations may be considered as private local truck registrations, that is, primarily delivery vehicles. This is, of course, a strong assumption since the local freight nonregulated truck registrations may contain for-hire truck registrations not subject to regulation. If one assumes that of the 3 186, one half are true private truck registrations (i.e., 1 593), then the combined local and intercity registrations [(e) below] would equal 51 per cent of all freight truck registrations [(1 593 + 544)/4 202 x 100].

(d) Private local truck registrations are about 76 per cent (3 186/4 202 x 100) of all freight truck registrations.

(e) Private intercity and private local truck registrations account for about 89 per cent [(3 186 + 544)/4 202 x 100] of all freight truck registrations.

(f) Private intercity truck registrations represent 3.4 per cent (544/16 200 x 100) of all trucks registered in the United States.

(g) Private local truck registrations represent 19.7 per cent (3 186/16 200 x 100) of all trucks registered in the United States.

(h) Private intercity and private local truck registrations account for over 23 per cent [(3 186 + 544)/16 200 x 100] of all trucks registered in the United States.

It is obvious that it is possible to produce a variety of private trucking estimates from the data contained in Table 7, the impact of these estimates depending on what is being measured and the assumptions made.

Stuessy also presents data on the relative size of private trucking measured in ton-miles (expressed here as tonne-kilometres).[7] While these data are not complete, they provide an additional perspective on the measurement problem.[8] Of the 2 576.5 billion intercity tonne-kilometres generated in 1967, the motor carrier mode accounted for about 22 per cent (567.2 billion tonne-kilometres) of the total. Regulated intercity carriers accounted for 8.6 per cent (221.2 billion tonne-kilometres) of the total, and nonregulated intercity carriers accounted for 13.4 per cent (346.0 billion tonne-kilometres). Within the nonregulated segment, private intercity carriers accounted for 11.3 per cent (301.1 billion tonne-kilometres) of the total.

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7. Stuessy, "Economic Determinants," Table 2.1, p. 9 and Table 2.2, p. 11.

8. Only intercity freight ton-mile data were available.

Local freight output was estimated to be less than 56.9 billion tonne-kilometres.[9] This is considered to be an upper bound estimate since it was assumed that the loads and load factors of local and intercity carriers were equal. Local carriers, however, are likely to experience lower load factors and utilize trucks of much smaller capacity than those used in intercity movement.

Given the tonne-kilometre information the following conclusions emerge:

(a) Private intercity tonne-kilometres account for about 53 per cent (301.1/567.2 x 100) of total motor freight carrier intercity tonne-kilometres.[10]

(b) Using Stuessy's estimate of 56.9 billion local tonne-kilometres, and assuming that private local tonne-kilometres are in the same proportion to total local tonne-kilometres as are private local registrations to total local registrations, then private local carriers account for over 55 billion tonne-kilometres of the total.[11]

(c) Taking (a) and (b) above, it appears that private intercity and private local carriers account for about 57 per cent [(301.1 + 55.8)/(567.2 + 56.9) x 100] of total freight tonne-kilometres.

The foregoing analysis of private truck registrations and tonne-kilometres serves to underscore the need for proper specification of the base of measurement. Nonethe-

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9. Stuessy, "Economic Determinants," p. 9ff.

10. Ibid., p. 11.

11. It appears that a correlation exists between registrations and tonne-kilometres. For example, private intercity truck registrations account for about 56 per cent of total intercity freight registrations and for 53 per cent of total intercity freight tonne-kilometres. Since private local registrations (i.e., local nonregulated) account for about 98 per cent of local freight truck registrations, it was assumed they would account for .98 of local tonne-kilometres. Similar ratios exist for regulated common truck registrations to intercity registrations, and regulated common carrier tonne-kilometres to total intercity tonne-kilometres.

less, the results indicate that whether measured in terms of registrations or tonne-kilometres, private trucking plays an important role in the movement of freight. The most appropriate basis of comparison between for-hire and private carriers relates to intercity freight movement, and the results reveal that private trucking accounts for over 50 per cent of the relevant measure.

For-Hire and Private Trucking Compared: Canadian National Estimates, 1957-1967

The conventional view of private trucking activity in the postwar period is that the share of private trucking declined to 1970 and thereafter increased markedly. It will be shown that Canadian and U.S. estimates indicate a similar pattern up to 1970 and although no U.S. data exist for the period after 1970, the Canadian data indicate a substantial growth of private trucking.

Table 8 presents Stuessy's estimates of U.S. private and for-hire shares of tonne-kilometres from 1946 to 1970. It may be noted that the private and exempt share rose from 62.9 per cent in 1946 to 67.0 per cent in 1958 and declined thereafter. Stuessy attributes this post-1958 slippage to a general decline in the rate of growth of trucking after 1958, as well as to the removal of selected tax provisions with respect to for-hire carriage. Assuming that the removal of taxes was reflected in for-hire rates, the declining position of private trucking is consistent with the determinants discussed previously. However, these estimates do not reflect the changes that occurred in the private urban (or local) segment. As noted earlier, the inclusion of private local has a significant impact on both the estimates of freight tonne-kilometres and truck registrations.

As shown in Table 9, Canadian data indicate that a similar decline in private intercity occurred over the period from 1957 to 1967.[12] Moreover, the data suggest substantial differences in the configuration of private trucking activity between Canada and the United States. For example, it appears that the share of private intercity

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12. Statistics Canada officials are reluctant to place total confidence in these estimates, though they have indicated that the earlier estimates are considered to be accurate. The relative constancy of private and for-hire shares suggests that the conversion of the absolute figures to percentage terms reveals some analysts' earlier regression coefficients.

Table 8

Tonne-Kilometres of U.S. Intercity Carriers

Year	Percentage of total tonne-kilometres	
	Regulated	Private and exempt
1946	37.1	62.9
1950	38.0	62.0
1954	33.9	66.1
1958	33.0	67.0
1962	36.2	63.8
1966	39.1	60.9
1970	40.5	59.5

Source: Stuessy, "Economic Determinants," p. 19.

Table 9

Licence Categories of For-Hire and Private Carriers

Year	Share of total				
	For-hire	Private intercity	Private urban	Private total	Farm
1957	.06	.26	.34	.60	.35
1958	.06	.24	.36	.60	.34
1959	.06	.24	.36	.60	.34
1960	.06	.20	.40	.60	.34
1961	.06	.21	.39	.60	.33
1962	.06	.20	.41	.61	.33
1963	.06	.20	.40	.60	.34
1964	.06	.20	.41	.61	.33
1965	.06	.20	.41	.61	.33
1966	.06	.20	.41	.61	.33
1967	.06	.20	.41	.61	.33

Source: Statistics Canada, Transportation and Communications Division, "Private Trucking Report -- January 1978," mimeographed (Ottawa, 1978), p. 18.

trucking in Canada is smaller than in the United States. While the U.S. private intercity carriers accounted for 56.1 per cent of all freight truck registrations in 1967, their Canadian counterparts accounted for 20 per cent, declining from 26 per cent in 1957. A comparison of local carriers (private urban) indicates that U.S. local carriers accounted for 75 per cent of freight truck registrations in 1967, while Canadian local carriers accounted for about 41 per cent.

While Canadian private intercity carriers declined in terms of share of licences, the decline was compensated for by a rise in private urban registrations. Over the ten-year period (1957-1967), the total private share increased marginally, while the for-hire share remained remarkably constant. Table 10 presents the shares of vehicle kilometres of Canadian for-hire, private and farm trucks. The results indicate that both the for-hire and the private total shares have increased over time, though the growth in for-hire is more pronounced. Once again, the pattern exhibited in terms of private registrations is apparent in terms of vehicle kilometres: the share of private intercity vehicle kilometres has declined, while the share of private urban vehicle kilometres has increased.

Table 10

Vehicle Kilometres of For-Hire and Private Carriers

	Share of total vehicle kilometres				
Year	For-hire	Private intercity	Private urban	Private total	Farm
1957	.18	.35	.29	.64	.17
1958	.20	.33	.32	.65	.15
1959	.21	.34	.30	.64	.14
1960	.21	.30	.34	.64	.15
1961	.22	.31	.33	.64	.14
1962	.22	.30	.34	.64	.14
1963	.21	.31	.33	.64	.15
1964	.22	.30	.34	.64	.14
1965	.22	.30	.34	.64	.14
1966	.22	.31	.34	.65	.14
1967	.21	.31	.34	.65	.14

Source: Statistics Canada, "Private Trucking Report," p. 20.

Finally, Table 11 presents the shares of loaded tonne-kilometres for Canadian for-hire and private carriers. In this instance the pattern is reversed; that is, the share of private intercity loaded tonne-kilometres has declined markedly since 1957, and no compensating growth is apparent in the loaded tonne-kilometres of private urban carriers. It may be noted that for-hire carriers exhibited a substantial growth in the share of loaded tonne-kilometres, from 56 per cent in 1957 to 65 per cent in 1967.

Table 11

Load Tonne-Kilometres of For-Hire and Private Carriers

	Share of total load tonne-kilometres				
Year	For-hire	Private intercity	Private urban	Private total	Farm
1957	.56	.30	.11	.41	.03
1958	.60	.28	.10	.38	.03
1959	.66	.22	.10	.32	.02
1960	.64	.22	.11	.33	.03
1961	.65	.22	.11	.33	.02
1962	.65	.22	.10	.32	.03
1963	.64	.23	.10	.33	.02
1964	.64	.23	.10	.33	.02
1965	.65	.23	.10	.33	.02
1966	.64	.23	.10	.33	.02
1967	.65	.23	.10	.33	.02

Source: Statistics Canada, "Private Trucking Report," p. 19.

From the Canadian information presented above, it may be concluded that while for-hire registrations and vehicle kilometres have remained constant, tonne-kilometres have increased markedly, indicating that for-hire carriers have increased capacity utilization over time. In the case of private motor carriage, registration and vehicle kilometre shares have increased, while loaded tonne-kilometres have fallen. This suggests that private carriers have become less efficient over time. The growth in registrations and vehicle kilometres of private urban carriers, and the apparent stability of tonne-kilometres, suggests that these carriers have maintained their share of total tonne-kilometres. The growth and behaviour of this segment of the industry is consistent with the economics of private truck-

ing and the apparent growth of the small shipment problem.[13]

The share of Canadian private trucking activity appears to have declined until 1970, and thereafter to have grown significantly.[14] While a number of reasons have been advanced for the growth in private trucking, the increasing spread between for-hire rates and private costs must be viewed as an important factor. As pointed out in a recent article on declining U.S. for-hire trucking, "a contraction of the $36.5 billion regulated sector of the economy appears inevitable, an ironic development for an industry that has fought ICC's moves toward deregulation by contending that service has more effect on business than price," and "it looks as if more and more companies are beginning to carry their own goods instead of paying common carriers the increasingly higher costs of doing it for them."[15]

Provincial Regulation and the Growth of Private Trucking in Canada After 1970: Survey of Studies

The Skoulas study. In 1978, Transport Canada and Consumer and Corporate Affairs Canada, in cooperation with the Canadian Transport Commission, were asked by Cabinet to undertake a series of studies to examine the state of competition/regulation in the transport sector. For its part, Consumer and Corporate Affairs Canada felt that a wide-ranging examination of the overall importance of transportation to the economy would add an important perspective to the modal studies undertaken by the three groups. Thus, the Research Branch, Bureau of Competition Policy, asked Dr. N. Skoulas to undertake such an analysis using input-output data.[16] In the course of his research, Dr. Skoulas

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13. See A. Schuster, "An Econometric Analysis of Less-Than-Truckload Carriers" (Ph.D. diss., Ohio State University, 1977), vol. II.

14. See "Where the Missing Truck Freight Is Going," Business Week, December 24, 1979, pp. 43-44. The article notes that the growth in truck leasing, a key indicator of private trucking activity, has been "noticeable for the last 10 years."

15. Ibid., p. 44.

16. Nicholas Skoulas, Transport Costs and Their Implications for Price Competitiveness in Canadian Goods-Producing Industries (Ottawa: Consumer and Corporate Affairs Canada, 1981).

noted that national estimates of for-hire and private trucking could be generated on the basis of relative fuel consumption, which could in turn be transformed into revenue estimates for both private and for-hire trucking.

The focus of the Skoulas analysis relates to linking the physical quantities of gasoline and diesel fuel consumed by the trucking industry to the corresponding operating revenues in 1974 and 1975. All energy commodities were transformed into a common unit (the BTU), and the division of revenue by the BTU figure resulted in a conversion factor to be used in the following manner. Assuming that the structure of the for-hire industry may be applied to private trucking, the multiplication of the conversion factor by the BTUs consumed per industry group produces an estimate of total operating revenue for private trucking. A summary of these findings is given in the Table 12.

When the estimates of private trucking activity are placed in the context of national modal shares (see Table 13), private trucking emerges as the dominant transport mode in Canada.

The Skoulas estimates of private trucking activity in Canada have been developed on the basis of selected restrictive assumptions, and it is likely that the national private/for-hire shares are sensitive to changes in these assumptions. It may be noted that the estimates of private trucking relate to both intra- and intercity movements, a fact likely to suggest to the trained observer that the estimates are biased, inasmuch as it is the growth of intercity private trucking that is the relevant perspective from which to draw conclusions about the efficiency of for-hire operations. A global estimate provides a useful basis for the analysis of private trucking. It may be noted that such an estimate will not be unduly biased by the proportion of intracity traffic relative to intercity traffic, as this type of traffic makes use of smaller vehicles moving over shorter distances.

Due to data limitations, Skoulas did not estimate private trucking activity with respect to Fishing, Hunting and Trapping. Moreover, estimates of private trucking activity within Retail and Wholesale Trade, Agriculture, Metal Mines, Mineral Fuels and Nonmetal Mines and Quarries were made soley on the basis of gasoline consumed by the industries. Both of these influences are likely to exert a downward bias on the estimates.

Table 12

Estimates of Trucking Operating Revenues, 1974

	Private ($000)	For-hire ($000)	Total ($000)	Private share of total (%)
Primary industries	1 907 186	374 203	2 281 389	84
Manufacturing	4 318 421	2 087 296	6 405 717	67
Subtotal	6 225 607	2 461 499	8 687 106	72
Unallocated operating revenue	10 575	838 101	848 676	1
Total	6 236 182	3 299 600	9 535 782	65

Source: Skoulas, Transport Costs, Table B.1, Appendix B.

Table 13

Operating Revenue by Transportation Mode

Transportation mode	Operating revenue ($000 000)	Percentage share of total
Railway[a] (freight)	2 141.72	15.62
Air carriers[b] (freight)	99.95	0.73
Water transportation[c]	1 048.18	7.64
Pipelines[d]	884.97	6.46
Trucking		
For-hire[d]	3 299.60	24.07
Private[e]	6 236.18	45.48
Total	13 710.60	100.00

Sources:

[a]Statistics Canada, Railway Transport, cat. no. 52-207 (Ottawa, 1977), Table 8.

[b]Statistics Canada, Air Carrier Financial Statements, cat. no. 51-206 (Ottawa, 1974), Table 2.

[c]Statistics Canada input-output tables (includes a small portion of revenue from passenger services).

[d]Statistics Canada input-ouput tables.

[e]Estimate of this study.

Skoulas also provides estimates of private trucking activity on industry and commodity bases, both in terms of revenue and share of delivered price.[17] While these estimates may appear quite small, they clearly indicate that private trucking costs are as important as the transportation charges by all other modes.

17. Ibid., Appendix A.

Statistics Canada study. The Transportation and Communications Division of Statistics Canada initiated a study designed to assist in the evaluation of measures of private trucking activity.[18] One such measure, truck registrations, was considered to be promising because all provinces require vehicles using the provincial road systems to be registered. Hence, it seemed feasible to determine not only the total number of trucks, but also the number of non-for-hire vehicles, which would include private trucks.

The Province of Manitoba was asked to provide a copy of its 1974 truck registration computer tapes to Statistics Canada for analysis. After segmenting licence categories, the known number of for-hire vehicles was subtracted from the total, yielding the number of non-for-hire vehicles. Moreover, it proved to be possible to refine this estimate in terms of the number of carriers. (The results are summarized in Tables 14 and 15.)

While Statistics Canada analysts were most encouraged by the results -- inasmuch as it seemed entirely feasible to extend the research effort to other provinces -- the view of private trucking presented was rather limited. For example, the results indicate that the number of non-for-hire trucks is about 30 times the number of for-hire vehicles; the proportion of private freight carriers included in the non-for-hire total could not be determined accurately.

Tables 14 and 15 highlight again the definitional problems involved in estimating private trucking activity. For example, of the 105 606 trucks registered in Manitoba in 1974, about 92 per cent (97 207) were identified as either farm trucks or commercial vehicles. These totals are included in the non-for-hire category given in Table 15.[19] A comparison of the C1 category (Commercial Vehicle) with the PSV-P1 category (Public Service Vehicle) indicates that the ratio of non-for-hire to for-hire is approximately 11 to 1, suggesting that about 92 of every 100 trucks may be considered as private-use vehicles. While the private truck share is overstated, as it includes private-use vehicles as well as intra- and intercity private freight carriers, this estimate highlights an apparent dominance of private carriage.

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18. Statistics Canada, "Private Trucking Report."

19. It is customary to exclude farm trucks from estimates of private trucking, though the reasons for doing so are unclear. See Stuessy, "Economic Determinants," p. 9.

Table 14

Number of Carriers and Trucks by Licence Class, Manitoba, 1974

Licence class	No. of carriers	No. of trucks
A5 (trucks)	28 308	45 349
A6 (farm trucks)	41 181	51 858
"C" (commercial vehicles):		
C1	608	6 436
C2	145	181
C3	18	26
C4	9	16
PSV (public service vehicles): for-hire		
P1	240	552
P3	4	4
P4	89	1 071
P5	14	91
P6	8	22
Total	70 624	105 606

Source: Statistics Canada, "Private Trucking Report," p. 23.

Table 15

Truck Fleets Registered by Size
Manitoba, 1974

Trucks registered	Carriers		
	For-hire	Non-for-hire	Total
1-4	346	69 223	69 569
5-9	106	622	728
10-14	20	123	143
15-19	10	52	62
20-24	10	25	35
25-29	5	20	25
30-34	3	9	12
35-39	6	5	11
40-44	-	4	4
45-49	-	2	2
50-54	1	3	4
55-59	2	3	5
60-64	3	-	3
65+	10	11	21
Total carriers	522	70 102	70 624
Total trucks registered	3 743	101 863	105 606

Source: Statistics Canada, "Private Trucking Report," p. 24.

Western Canadian surveys, 1974 and 1978. In April 1973, British Columbia, Alberta, Saskatchewan and Manitoba, in conjunction with the federal government, agreed to examine truck traffic patterns in western Canada. This agreement culminated in "The Western Canada Truck Traffic Survey, 1974."[20] At the same time, the federal and provincial governments concluded highway-strengthening agreements which increased the allowable weight limits for selected portions

20. Trimac Consulting Services Ltd., "The Western Canada Truck Traffic Survey, 1974," mimeographed (Calgary: Trimac Consulting Services, 1975). The data in this study refer to 1973.

of the highway network in western Canada. By 1978, the federal and provincial governments agreed to commission another origin-destination survey which would replicate the earlier one and allow policy makers to assess key traffic variables before and after the highway-strengthening program.[21]

Both surveys were conducted by sampling carriers at highway weight stations over a one-week period in the month of May. Moreover, carriers were sampled on a 24-hour basis in order to obtain an accurate estimate of traffic patterns. The 1974 survey utilized 17 highway weight stations as data collection points, while the 1978 survey utilized 18 weight stations. In addition to data required for the engineering evaluation of load limits, data were collected on origin/destination, size and type of vehicle, and the ratio of freight capacity to vehicle utilization. The data obtained related to truck traffic on the primary highway network, and served to highlight interregional, interprovincial and intercity flows.

Table 16 indicates the substantial changes in the aggregate measures found between the 1974 and 1978 surveys.

Table 16

Aggregate Comparison of Weight-Related Measures

Measures	1973	1978	Change
Number of trucks	28 813	52 014	80.5%
Number of laden trucks	23 601	36 405	54.3%
Payload (000s kg)	313 746	541 060	72.5%
Capacity (000s kg)	475 210	929 149	95.5%
Tonne-kilometres (000s kg)	97 861	247 982	153.4%
Payload/laden vehicle (000s kg)	13.3	14.9	11.9%
Tonne-kilometres/laden vehicle (000s)	4.15	6.82	6.4%
Payload/capacity (%)	66.0%	58.2%	

Source: McNeal, Hildebrand, and Associates, Origin-Destination Survey, p. 139.

21. McNeal, Hildebrand, and Associates, Origin-Destination Survey.

While a substantial increase in capacity occurred, the volume of freight moved did not increase by an equivalent amount. Nonetheless, the authors suggest that demand (measured in tonne-kilometres) increased more rapidly than supply (measured in capacity).[22]

The data with respect to the change in private trucking activity between 1973 and 1978 indicate that the share of private trucking increased in every province but Saskatchewan (see Table 17). Moreover, it is clear that the province with the lowest proportion of private trucking activity is Alberta, with about 17 per cent of total trucks in that province. It is only in Saskatchewan that the growth in private trucking was less than the growth in the total number of trucks. While this result appears to be contrary to the view that regulation likely results in an increase in private trucking activity, there is some indication that Saskatchewan attempted to discourage private trucking activity between 1973 and 1978.

More importantly, a recent study[23] indicated that not only does the entry and rate regulation in Saskatchewan result in significant cross-subsidization, but the level of LTL rates on selected commodities are below those found in Alberta for similar commodities. Therefore, the lower incidence of private carriage in Saskatchewan is supported by the theory that lower rates reduce the for-hire/private cost gap.

Table 18 presents the aggregate data on vehicle trips by licence category for 1973 and 1978. In total, the private/for-hire market shares appear to remain relatively constant at about 20 and 75 per cent respectively. However, these figures tend to mask the changes taking place within the provinces in terms of licence categories. Moreover, the apparent bias in terms of the number of vehicles sampled in Alberta suggests that the aggregate growth in private trucking may be understated.

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22. Ibid, p. 123.

23. James J. McRae and David M. Prescott, The Structure of Rates in the Canadian For-Hire Trucking Industry: A Further Analysis (Ottawa: Regulation Reference, Economic Council of Canada, July 1979).

Table 17

Licence Class Percentages by Province, 1973 and 1978

	B.C.		Alta.		Sask.		Man.	
	1973	1978	1973	1978	1973	1978	1973	1978
Public	66.0	60.1	82.6	80.8	71.8	71.2	63.8	65.9
Private	27.0	31.0	14.2	16.7	27.0	24.0	28.0	30.9
Contract	-	6.3	-	0.0	-	4.0	-	0.3
Government	0.5	0.0	0.4	0.6	0.4	0.6	0.6	0.5
Farm	4.9	2.5	2.13	1.2	0.5	0.0	7.4	2.0
Other	9.3	0.2	0.7	0.7	0.2	0.6	1.6	0.4
Total	100	100	100	100	100	100	100	100
Total trucks	857	1 245	14 102	23 390	8 373	12 488	5 841	9 128

Sources: Trimac Consulting Services, Truck Traffic Survey, Table 5.4 and McNeal, Hildebrand, and Associates, Origin-Destination Survey, Table F.2.

Note: Unlike the 1978 survey, the 1973 survey did not contain information on contract carriers. Therefore, these would likely be under "other." In addition, those 1973 licence classes which could not be identified ("missing") are likely included in "other."

Table 18

Comparative Distribution of the Number of Vehicle Trips by Licence Class

Licence class	1978 Trips	1978 %	1973 Trips	1973 %
Common	39 172	75.4	21 718	75.4
Contract	624	1.2	-	-
Private	11 061	21.3	6 033	20.9
Government	231	0.4	129	0.4
Farm	558	1.1	794	2.8
Other	304	0.6	105	0.4
		100		100

Source: McNeal, Hildebrand, and Associates, Origin-Destination Survey 1978, p. 105.

The Ontario commercial truck surveys, 1971, 1975 and 1978. Over the last decade the government of Ontario has on three occasions decided that an analysis of trucking activity within that province was required for policy-making purposes. While the specific questions addressed in each study are somewhat different, and the methodologies and data collected reflect these differences, there is little doubt that the three surveys present a most useful time series from which to analyze private trucking activity.

1. The 1971 study. In 1971, the Ontario government commissioned a study which was designed to assist the province in formulating its position relative to the proposed implementation of Part III of the National Transportation Act.[24] Part III provided for the transfer of regulatory authority over extraprovincial trucking to a federal body from the provincial agencies.

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24. V.M. Stechishin of the Canada Transportation Service Division, and The M.W. Menzies Group Limited, Part III -- An Appraisal of the Potential Impact to Ontario from Implementation of Part III of the National Transportation Act (Toronto: Ontario Ministry of Transportation and Communications, December 1971), vol. I, p. 2.

In order to assess the impact of the proposed regulatory change, government officials felt that data relating to truck traffic by commodity, tonnes carried and type of carrier were required. The Stechishin-Menzies study provided this information, though no mention is made of the research methodology employed. It may be noted that this study, unlike the 1975 and 1978 studies, purports to cover the entire province.

The authors stated that "[private trucking] is estimated at almost one-half of total inter-city tonnage in Canada."[25] Once again, no evidence or citation is presented to support this estimate, though one may assume that the authors felt that an Ontario private trucking estimate below the national average would imply a healthy industry in that province. Table 19 indicates the share of private and for-hire trucking by origin/destination. Nothwithstanding the low share of private trucking to/from the Atlantic provinces, it appears that the share of private trucking is relatively constant at about 35 per cent. Overall, for-hire trucking accounts for about 63 per cent of total tonnes and private trucking accounts for about 37 per cent. It is

Table 19

Distribution of Metric Tonnage by
Class of Carriage and Province

To or from	Tonnes total (000s)	% For-hire	% Private
Atlantic provinces	601	88.2	11.8
Quebec	13 386	63.3	36.7
Prairie provinces	5 129	65.8	34.2
B.C.	522	67.2	32.8
Canada	19 638	64.8	35.2
U.S.	2 914	64.6	35.4
Total extra	22 552	64.8	35.2
Intra-Ontario	59 037	60.9	39.1
Total Ontario O/D	81 589	62.0	38.0
Overhead	7 391	73.0	27.0
Grand total	88 980	62.9	37.1

Source: Stechishin and The M.W. Menzies Group, Implementation of Part III, vol. II, pp. 9-10.

25. Ibid., vol. II, p. 1.

Table 20

Percentage Distribution of Metric Tonnage by Type of Carrier, 1971

	Common	Contract	Total for-hire	Private	Total all carriers
Building materials:					
Metal	73.7	1.6	75.3	24.7	100
Wood	44.9	12.6	57.5	42.5	100
Cement	62.5	2.3	64.8	35.2	100
Other	56.1	1.2	57.3	42.7	100
Machinery:					
Agricultural	60.1	-	60.1	39.9	100
Other	51.4	2.2	53.6	46.4	100
Vehicles:					
Automotive	76.1	7.4	83.5	16.5	100
Other	51.6	5.3	56.9	43.1	100
Chemicals:					
Petroleum	27.8	3.8	31.6	68.4	100
Other	66.0	2.3	68.3	31.7	100
Manufacturers:					
Furniture	73.1	6.3	79.4	20.6	100
Hardware	72.8	1.7	74.5	25.5	100
Paper	81.3	3.3	84.6	15.4	100
Packaged material	67.6	6.5	74.0	26.0	100
Other	66.1	5.8	71.9	28.1	100
Agricultural products:					
Field	44.7	9.6	54.3	45.7	100
Fruit & vegetables	35.5	-	35.5	64.5	100
Foodstuffs:					
Refrigerated	59.7	3.2	62.9	37.1	100
Prepared	73.9	3.8	77.8	22.2	100
Animal	60.8	-	60.8	39.2	100
Mine	85.2	2.2	87.5	12.5	100
Scrap	41.5	0.5	42.0	58.0	100
Pulpwood, etc.	20.5	8.7	29.2	70.8	100
All other	65.8 58.6	5.3 4.3	71.1 62.9	28.9 37.1	100 100

Source: Stechishin and the M.W. Menzies Group, Implementation of Part III, vol. II.

noteworthy that the intra-Ontario private trucking share (39.1 per cent) is higher than that found to/from the other provinces and the total of extraprovincial tonnes.

Table 20 presents the distribution of metric tonnage by type of carrier and commodity. (It may be noted that the overall shares correspond to those presented in Table 19, and the examination of intra-Ontario tonnes would yield a higher share of private tonnes). Casual observation of this table indicates that private trucking is dominant for such commodities as Petroleum, Fruit and Vegetables, Scrap and Pulpwood. The dominance of the private trucking share appears related to specialized shipping requirements; for example, petroleum tankers may be required to make drop-off deliveries to a number of service stations on very short notice. Similarly, it may be assumed that fruit and vegetable traffic requires timely pick-up and delivery. Clearly, this survey suggests that private trucking appears dominant in the bulk, low-value commodity market.

Table 21 presents data relating to the number and share of vehicles used in the movement of goods by private and for-hire carriers. Private trucking accounts for about two-thirds of all movements, while the reverse appears to be the case when semitrailers and full trailers are considered. Multiple trailer movements appear to be evenly divided between for-hire and private carriage, while private trucking appears to account for about three-quarters of the tractor movements.

Table 21

Number of Vehicle Movements
by Class of Carriage, 1971

	For-hire	%	Private	%	Total
Trucks	540.9	32.7	1 114.6	67.3	1 655.9
Semitrailers	3 221.4	67.0	1 587.3	33.0	4 808.7
Full trailers	15.7	68.9	7.1	31.1	22.8
Multiple trailers	217.7	51.7	203.6	48.3	421.3
Tractors	5.6	24.0	17.7	76.0	23.3
	4 001.3	57.7	2 930.3	42.3	6 931.6

Source: Stechishin and the M.W. Menzies Group, Implementation of Part III, vol. II, p. 21.

These tentative results support the pre-1970 view of private trucking; that is, private carriage utilizes smaller vehicles for short hauls in the bulk, low-value segment of the market. The high proportion of tractors stands in contrast to the low proportion of semitrailers, though it may be assumed that the increased frequency of private hauls requires this configuration.

2. The 1975 study. In 1975 the government of Ontario commissioned another study of trucking activity within the province, with the purpose of obtaining the necessary data for a review of the Ontario Bridge Formula weights.[26] Since the survey was designed to relate truck weights to highway load limits, a methodology was selected which would provide data on loaded trucks only. The survey sample collection points were highway weight stations located on primary highways; secondary and tertiary highway traffic was excluded. Data were not obtained on truck movements taking place over the weekend or at night.

In total, 9 250 vehicles were selected (from 44 truck inspection stations) and data collected on the class of carriage (private or for-hire), goods carried and the origin/destination of the shipment. It is worth noting that the data relate only to intercity movements; local carriage was excluded. Given the importance of private carriage in local freight movements, it may therefore be expected that the total private share was underestimated. Moreover, to the extent that private carriage is subject to a higher incidence of empty backhauls compared to for-hire, it may be expected that the number of private trucks sampled was not fully representative of private activity. Finally, to the extent that private trucks travel at night or on weekends, the share is further reduced.

The authors of the study were cognizant of the potential biases in the data. However, they felt that

> in spite of these limitations, high confidence can be placed in the survey results with regard to the relative shares [sic] of private and for-hire trucks on the road, since none of the

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26. Ontario, Ministry of Transportation and Communications, Truck Transportation in the Province of Ontario -- Phase 1, Description of Operating and Administrative Characteristics, and Phase 2, Survey of Shippers (Toronto: Economic Policy Office, 1975).

limitations is likely to affect the aggregate percentages significantly.[27]

The results indicate that of the 9 250 vehicles sampled, the for-hire and private shares were 57 and 43 per cent respectively. The aggregate results were broken down by region, with northwestern Ontario indicating the highest percentage of for-hire trucks, and southwestern Ontario indicating the lowest percentage. In terms of commodities moved, private trucking dominated in the movement of forest products, metals and petroleum products, while for-hire trucks tended to move general freight, automobiles, auto parts and LTL shipments.

The 1975 study also presented information with respect to gross weights of private and for-hire carriers, as well as medium distances travelled. It was noted that the gross weight of for-hire trucks was only slightly above that obtained for private trucks -- 33 113 kg and 32 342 kg respectively. Moreover, the medium for-hire distance travelled was only 40 km above that of private trucks. These two results do not seem to conform to a priori notions of private trucking activity and, the authors' assurances notwithstanding, in 1977 an Ontario Select Committee noted that "to the extent that the exclusion of empty movements biases the medium weight downwards, particularly for private carriage, the apparent conclusion may not accurately reflect the situation."[28] To the extent that the survey relates only to intercity trucking activity, it is to be expected that the medium distances are not substantially different.

The 1975 study indicates that the share of private trucking increased[29] over the 1971-75 period and that the growth did not appear to be attributable to any one com-

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27. Ibid., Phase 1, p. 11.

28. Ontario, Final Report of the Select Committee of the Legislature on Highway Transportation of Goods, A Public Direction for Highway Transportation of Goods (Toronto, 1977), Chapter 3, p. 73.

29. Using the medium weights of private and for-hire vehicles in 1975 and multiplying these by the numbers of vehicles, it may be concluded that private accounted for 42.5 per cent of the total freight surveyed, for-hire for 57.5 per cent. This implies a decrease in the percentage of freight carried by for-hire carriers over the 1971-1975 period from 62.9 per cent to 57.5 per cent.

Table 22

Ontario Commercial Truck Survey, 1978
Selected Data

Survey period	26 weeks (May to early November, 1978)	
No. of vehicles surveyed	9 666	
Aggregate estimates (for 1978, major highways only)	(millions)	
Total truck movements	9.8	
For-hire trucks	5.0	
Private trucks	4.8	
Total metrage	3 862	
For-hire trucks	2 086	
Private trucks	1 776	
Total payload metric tonnage	99	
For-hire trucks	59	
Private trucks	40	
Total empty metrage	786	
Total empty truck movements	2.6	
Average payload	(tonnes)	
Total sample	10.1	
For-hire trucks	12.1	
Private trucks	8.1	
For-hire/private ratio (%)	For-hire	Private
No. of truck movements	49	51
Metrage	54	46
Tonnage	59	41
Load factor (%)	Truck movement	Metrage
Empty	26.6	20.4
Partially loaded		
1/4 load	8.6	4.9
1/2 load	7.9	7.6
3/4 load	6.9	5.7
Full	50.0	61.4
Average trip length	(kilometres)	
Total sample	393	
For-hire trucks	418	
Private trucks	354	

modity.[30] The most relevant portion of the 1975 study, the Survey of Shippers, indicated that private-oriented shippers were not only pleased with their private trucking experience, but intended to expand such activity over the next two years. As indicated below, the 1978 study confirms that a significant shift did take place.

3. The 1978 study. In 1978 the Ontario government felt that a highly reliable data base on trucking activity was required to deal with current and future studies relating to trucking regulation, reciprocity, highway capacity and productivity.[31] To this end, a survey was carried out during the period from May to early November, 1978. Inspectors interviewed a total of 9 666 truck drivers at 37 truck inspection stations in Ontario. Despite the fact that the total truck traffic passing inspection stations could not be ascertained, it was felt that a significant portion of intercity traffic did pass the 37 stations. Once again, the data obtained related only to trucking activity on major highways.

Table 22 presents selected summary statistics of the 1978 survey. It may be noted that the ratio of for-hire to private trucks was found to be 49 to 51 per cent of truck movements, 54 to 46 per cent in terms of kilometres travelled and 59 to 41 per cent in terms of tonnage carried. The study concludes that "in comparing the results of this survey with some earlier surveys (1971 and 1975) done in Ontario,...the share of private trucks has increased vis à vis the share of for-hire trucks."[32]

The average weight per load of the sample was found to be 10.1 t, with for-hire trucks indicating an average load of 12.1 t and private trucks, 8.1 t (including empty trucks).[33] This result is conditioned by two important factors: first, the relatively high proportion of private trucks running empty; second, the increased use of

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30. Ontario Select Committee, Highway Transportation of Goods, Chapter 2, p. 75.

31. Ontario, Ministry of Transportation and Communications, Ontario Commercial Truck Survey, 1978 (Toronto: Economic Policy Office, 1980).

32. Ibid., p. iv.

33. If nonempty trucks only are considered, the average weight per load is 16.1 t for for-hire trucks and 11.6 t for private trucks.

straight trucks as opposed to tractor trailer combinations by private truckers (77 per cent of the total). Therefore, these results indicate not only an increased use of private trucks, but also the relative inefficiency of the private activity.

A comparison of the three Ontario studies (1971, 1975 and 1978) reveals that from 1971 to 1978 a substantial increase in private trucking activity in terms of truck movements took place, with private trucking increasing its share to 51 per cent from 42 per cent (see Table 23). While the tonnage share did not increase as markedly due to the factors mentioned above, the 1978 metrage figure indicates that almost one half of intercity highway metrage in 1978 was accounted for by private carrier.

Table 23

Share of Truck Movements, Tonnage and Metrage by For-Hire and Private Carriers in Ontario, 1971, 1975 and 1978

	Truck movements (%)			Tonnage (%)		Metrage (%)
	1971	1975	1978	1971	1978	1978
For-hire	57.7	57.8	49.4	62.9	59.3	54.0
Private	42.3	42.2	50.6	37.1	40.7	46.0
	100	100	100	100	100	100

In terms of the origin/destination of freight by private and for-hire carriage, Table 24 indicates that from 1971 to 1978 the intraprovincial for-hire tonnage share rose marginally and the private share fell. In the case of extraprovincial movements, the for-hire tonnage share fell in every case except that of Ontario-West traffic, while the reverse held true for private trucking.

Table 25 shows that in 1978, while for-hire tonnes exceeded private tonnes in each of the five commodity categories listed, private truck movements exceeded for-hire movements in three of the five commodity categories: Live Animals, Food, Beverages, Tobacco; Fabricated Materials, Inedible; and End Products, Inedible. Although these data

Table 24

Intra/Extra Provincial Truck Traffic by Type of Carrier

	For-hire						Private					
	1971		1975		1978		1971		1975		1978	
	N	Tonnage (%)	N	Tonnage (%)	N	Tonnage (%)	N	Tonnage (%)	N	Tonnage (%)	N	Tonnage (%)
Intraprovincial	-	61	59	-	50	63	-	39	41	-	50	37
Extraprovincial												
Ontario-Atlantic	-	88	71	-	53	68	-	12	29	-	47	32
Ontario-Quebec	-	63	49	-	42	47	-	37	51	-	58	53
Ontario-West	-	66	78	-	72	73	-	34	22	-	28	27
Ontario-U.S.	-	65	55	-	47	52	-	35	45	-	53	48

N Number of truck movements.

- Data not available.

cannot be directly compared with the 1971 and 1975 results, it appears that private trucking activity has entered the manufactured goods commodity market, and that its previous concentration on bulk commodities has been reduced. An examination of the ten top-ranked commodity groups indicates that in the Crude Materials, Inedible group, for-hire trucking accounts for about three-quarters of the total truck movements while private accounts for about one quarter. Notwithstanding for-hire's dominance in Miscellaneous End Products, Motor Vehicles and Parts, and Crude Materials, Inedible the for-hire/private share appears to correspond roughly to the overall split.

Table 25

Distribution of Truck Traffic by Type of Carrier, 1978

Commodity group	For-hire		Private	
	N (000s)	Tonnes (000s)	N (000s)	Tonnes (000s)
Live animals, food, beverages, tobacco	809	9 985	1 227	8 829
Crude materials, inedible	608	10 103	500	5 886
Fabricated materials, inedible	1 317	21 558	1 699	18 182
End products, inedible	715	4 993	1 102	4 717
Motor vehicles & parts	563	5 052	200	1 370
Misc. end products	839	7 048	260	1 331
Total	4 851	58 739	4 988	40 315

Finally, turning to the type of vehicle employed by the type of carrier, Table 26 indicates that from 1971 to 1978 the number of private trucks increased to three-quarters of the total from about two-thirds. The number of private tractors, however, fell dramatically.

Table 26

Type of Vehicle by Type of Carrier[a]

	For-hire (%)		Private (%)	
	1971	1978	1971	1978
Truck	32.7	23.1	67.3	76.9
Tractor trailer	-	61.0	-	39.0
Tractor multiple trailers	-	55.3	-	44.7
Tractor only	24.0	54.4	76.0	45.6

[a]Based on the number of truck movements.

In conclusion, it may be argued not only that private trucking activity has increased in Ontario, but also that its commodity configuration appears to have shifted towards the general freight category. These data tend to confirm information supplied by industry sources about the important relative growth of intercity private carriage. One important conclusion to be drawn is that policy makers cannot ignore private carriage as a phenomenon unrelated to the state of for-hire motor carrier operations and regulation.

SUMMARY AND CONCLUSIONS

At the outset of this study it is noted that private trucking is worthy of analysis for several important reasons, not the least of which is its role as an indicator of the effect of for-hire trucking regulation.

Part I indicates that the definition of private trucking activity is a function of the legal description of for-hire trucking, and that the identification of private trucking activity for the purposes of comparative analysis is difficult -- a comparison of the size and rate of growth of private carriage operating within regulated and unregulated jurisdictions may not examine homogeneous groups of carriers. Notwithstanding the definitional problems, a common element which characterizes all private trucking activity is the fact that it represents the vertical integration of trucking activities by a nontransport firm. Framing an analysis of private trucking within the theory of vertical integration carries with it the advantage of isolating elemental factors which contribute to the understanding of private trucking; however, the theory itself must be modified to reflect the conditions within trucking markets.

Private trucking is examined in Part I within the framework of a theoretical analysis of factors leading to vertical integration in competitive markets. Using the Imperial Oil study as a reference point, mention is made of the fact that Imperial Oil moves 75 per cent of its output in regulated Ontario by private truck as opposed to 25 per cent in unregulated Alberta. It is argued that random demand and the prices of for-hire services influence the degree of vertical integration (private trucking) such that some private trucking will exist in an unregulated competitive market. Though it is not possible to determine the optimal degree of private trucking, it is suggested that regulation in Ontario induces greater private trucking activity than would exist in an unregulated market in that province. In addition, it is noted that the symbiotic relationship of for-hire and private trucking may be detrimental to social welfare to the extent that the degree of private trucking affects and is in turn affected by the risk experienced by for-hire carriers.

An analysis of the determinants of private trucking activity in the United States indicates that the decision to enter private trucking is primarily a function of the gap between for-hire rates and private costs for a given level of service. Fragmentary Canadian data support the hypothesis, though the level of confidence of these data must be considered as low.

Part II examines selected studies in order to determine the size and rate of growth of private trucking activity in Canada. It is suggested that while private trucking activity declined from 1945 to 1970, it increased markedly after 1970, the growth being most apparent in provinces which regulate for-hire trucking. Moreover, it is argued that not only has private trucking grown relative to for-hire trucking, but its present operational configuration reflects its emergence in market segments where private trucking was not assumed to have an inherent advantage. Specifically, private trucking has grown in the intercity general freight-type markets, in contrast to its earlier concentration in the intraurban delivery and resource-based markets. Private trucking is estimated to be the dominant transport mode in Canada, and its estimated share of the trucking market exceeds both rail and for-hire truck shares.

The analysis of the size and rate of growth of private trucking among the provinces indicates that the form of provincial regulation affects the private/for-hire mix. Private trucking in Ontario, which regulates entry but not rates, is shown to account for over 50 per cent of intercity vehicle trips. Private trucking in Alberta (with no interprovincial entry or rate regulation) and Saskatchewan (which regulates entry and engages in rate prescription) accounts for a much lower proportion of the traffic. In both cases the reduced proportion of private trucking may be explained by reference to the theory of vertical integration in competitive markets presented in Part I. Some private trucking will exist in an unregulated environment such as Alberta due to the random nature of demand, while regulation in Saskatchewan, which holds selected rates below those found in Alberta, reduces the for-hire/private cost gap. Moreover, the greater intercity distances experienced in those two provinces magnifies the cost disadvantage of regulatory-imposed empty backhauls of private carriers, thereby narrowing the for-hire/private cost gap.

In conclusion, it is hoped that this study will provide a useful reference point for other researchers. An activity as important as private trucking cannot be ignored, for whatever the shortcomings in definition or data it does affect and is in turn affected by for-hire trucking. The continuing growth of private trucking, coupled with existing regulations with respect to the prohibition on the solicitation of backhaul traffic, suggests that the energy implications are substantial. In the absence of regulatory reform designed to lower the for-hire rate/private cost gap (that is, to reduce the size of private trucking by fostering greater efficiency and price competition within the for-hire sector), policy makers should consider the removal of cost-increasing regulations on private carriage.

Appendix A

CANADIAN TRUCKING DATA

Within the last five years there has been a significant improvement in the quality and quantity of statistical data relating to motor carrier operations as the result of continuing efforts by Statistics Canada to upgrade the quality of its surveys. Upon completion of a comprehensive review and assessment of its earlier motor carrier publications, Statistics Canada concluded that these publications were flawed in terms of the design and implementation of the surveys which produced them.

> Survey concepts were poorly defined in terms of coverage, objectives, definitions, and type of statistics collected; the survey universe...was incomplete, obsolete and varied in concept to an extent which made province-to-province comparisons virtually impossible; the response rate was low.[1]

Statistics Canada therefore suspended publication of these motor carrier surveys. After a number of years of intensive effort, including federal-provincial cooperation and liaison on data requirements, two new publications emerged: "Motor Carriers -- Freight" and the "For-Hire Trucking Survey." For the purposes of this study, it is not necessary to describe these publications in detail, other than to state that they presently form the basis of statistical information on Canadian trucking. The quality of data allows researchers to explore issues that could not be examined previously.

In contrast, private trucking has never been surveyed in an satisfactory manner in Canada. Data on private trucking are available from the Statistics Canada publication, "Motor Transport Traffic 1957-1967." However, the deficiencies inherent in the earlier for-hire trucking statistics apply to private trucking as well. Both federal and provincial governments have recognized the desirability of measuring accurately the size and importance of private trucking, this recognition being based on indications of the

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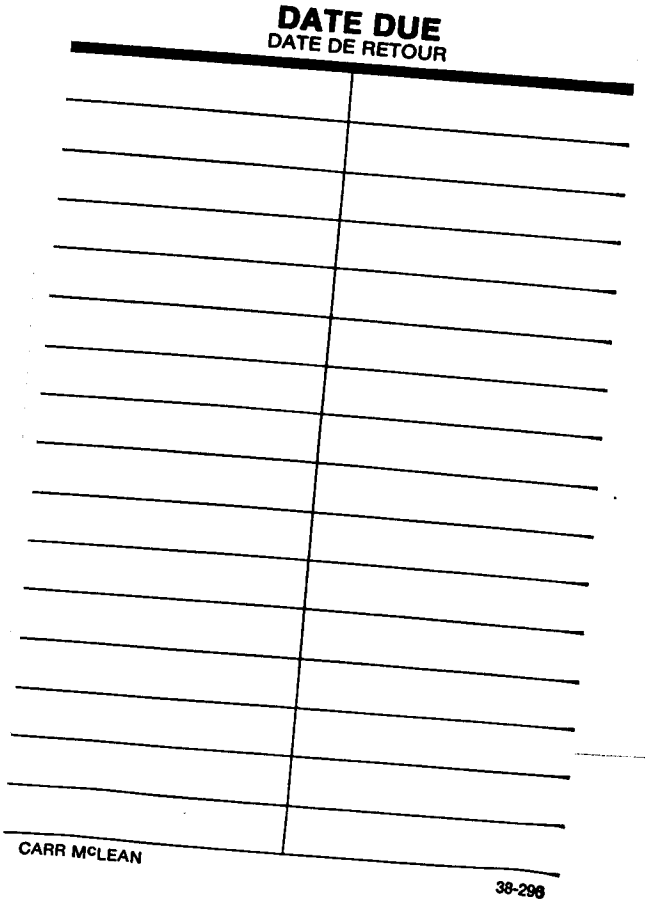
1. See Statistics Canada, Transportation and Communications Division, "Private Trucking Report -- January 1978," mimeographed (Ottawa, 1978), p. 2.

size of private trucking and its apparent relationship with the regulaton of for-hire carriers.

Recently, a Federal-Provincial Working Group on Transportation Statistics has proposed that a pilot survey of private trucking activity be undertaken with a view to expanding the data base on private trucking to include not only the number of such carriers, but their operational configurations as well.

Despite the fact that there is no systematic collection of private trucking data in Canada, fragmentary data are available on both a national and provincial basis, though the collection methodologies vary widely in terms of coverage, and do not approach the quality of data available for the for-hire sector.



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