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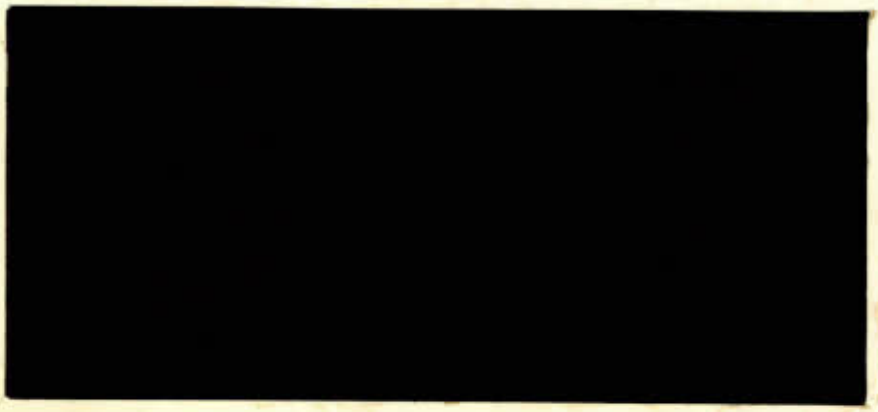

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WORKING PAPER NO. 30

THE TAXI INDUSTRY AND ITS REGULATION IN CANADA

by

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PREFACE

The purpose of this report is to conduct an economic analysis of the taxi industry and its regulation in Canada; this work forms part of the study of economic regulation at all levels of government, which was assigned to the Economic Council of Canada in the summer of 1978.

The report is modelled on a master's thesis completed under the direction of Professor Gérard Belanger of the Department of Economics at Laval University. The research project was developed under the guidance of W. T. Stanbury. In the course of my work, I benefited from the comments of Jac-André Boulet, Michel Boucher, Mario Gagné, Sylvester Damus, Robert Lévesque, Fred Thompson, and Michel Vastel. The many comments accompanying Jean-Luc Migué's revision of a first draft of this report were extremely useful. This report is essentially an abridged version of my previous study on the topic (see Papillon, 1981); the translation was made by Mark Villeneuve. Dawn Murphy, Bob Lyle, and Claudette Levac were responsible for editing and typing the final draft. I wish to express my deepest gratitude to all these people, as well as to all those in the taxi industry and municipal and provincial governments who provided me with documents and information on the issues studied. The co-operation received from the archives service of the city of Montreal and from Paul Morrow was particularly helpful. I take

full responsibility, however, for any errors that may have slipped into this report.

The staff of the Regulation Reference group provided a very stimulating research environment, and I am thankful to them for the opportunities made available to me.

Finally, I especially wish to thank my wife.

CONTENTS

RÉSUMÉ

L'objectif de l'auteur dans la présente étude a été d'effectuer une analyse économique du transport par taxi et de ses réglementations au Canada. Dans un premier temps l'auteur décrit le cadre juridique dans lequel s'inscrit la réglementation du taxi au Canada et étudie en détail le contenu de 47 réglementations canadiennes du taxi. Ces dernières comprenant celle d'au moins une ville - la plus importante - par province ou territoire, le règlement 6 québécois, la réglementation provinciale en vigueur à Winnipeg et les réglementations de toutes les villes canadiennes restantes de plus de 50,000 habitants, à quelques exceptions près. Cette première étape se termine par un bref survol historique de l'origine de la réglementation et une classification des justifications et objectifs de cette dernière; on y apprend, par exemple, que les règlements interdisant l'usage public collectif des taxis remontent au début du siècle, quant aux règlements limitant le nombre de taxis, ils semblent remonter pour la plupart aux années 30.

Dans un deuxième temps, l'auteur analyse les caractéristiques du transport par taxi: nature de la demande et types de clientèle, organisation et fonctionnement de l'industrie, coût du transport par taxi. Cette deuxième partie se termine par une discussion de la dynamique du marché et de ces contrôles par la règlementation. Il ressort de cette analyse des caractéristiques du transport par taxi que la concurrence constitue naturellement la composante

principale du mode d'organisation de la production dans cette industrie, le rôle résiduel de la réglementation étant déterminé par l'importance des coûts d'information.

Dans un troisième temps, l'efficacité de la réglementation est analysée, premièrement en regard des objectifs poursuivis et deuxièmement en regard de l'allocation des ressources. Du point de vue du bien-être de la clientèle et du maintien de l'ordre, une réglementation seulement de la conduite de véhicules-taxis peut être efficace dans certains cas. Quant aux objectifs d'équité, compte tenu de ses effets, une limitation du nombre de taxis peut difficilement être justifiée par de tels objectifs. Pour traiter de l'effet de la réglementation sur l'allocation des ressources, l'auteur estime la perte annuelle de bien-être résultant des formes particulièrement restrictives de réglementation pour neuf grandes villes canadiennes. Par la suite l'auteur entreprend une discussion du rôle du taxi dans les transports urbains.

Contrairement à ce qui a été souvent pris pour acquis jusqu'à maintenant, les transports en commun ne sont pas un mode de transport substitut à l'automobile privée. Il n'y a que le taxi, parce qu'il constitue un mode de transport public sans parcours ni horaire établi et pouvant offrir un service de porte à porte, qui puisse se substituer à l'automobile privée. Il semble bien qu'une utilisation plus efficace de l'ensemble des modes de transport passe par l'avènement d'un service de taxi combiné individuel et collectif.

Finalement, l'auteur conclut qu'une réglementation beaucoup plus discrète que les réglementations actuelles est souhaitable et dans aucun cas la limitation du nombre de taxis ou l'interdiction d'un usage public collectif des taxis ne sont justifiées. Ceci soulève la question du coût des changements à apporter aux réglementations actuelles, et tout particulièrement les compensations à offrir aux opérateurs de taxi ayant fait l'achat de permis de taxi dans les villes où ces derniers ont une valeur marchande élevée. Compte tenu de l'utilisation des subventions constituent la source de fonds toute désignée du point de vue de l'efficacité aussi bien que de l'équité pour couvrir les coûts des changements à apporter à la réglementation.

SUMMARY

The author's objective in this study is to conduct an economic analysis of the Canadian taxi industry and its regulation. The author begins by describing the legal framework of Canada's taxi regulation and studies in detail the content of 47 Canadian taxi regulations. These include at least one city - the largest - in each province or territory, Quebec's Regulation 6, the provincial regulation in force in Winnipeg, and the regulations of almost all remaining Canadian cities with over 50,000 population. This first chapter ends with a brief historical overview of the origin of regulation and a classification of the justifications and objectives for this regulation. We learn, for example, that the regulations prohibiting collective public use of taxis date back to the start of this century, while most regulations limiting the number of taxis appear to have been introduced in the 1930s.

The author then analyses the taxi industry's characteristics: the types of demand and clientele; organization and operation of the industry; and cost of taxi transportation. This second chapter is completed by a discussion of the dynamics of both the market and how it is controlled by regulation. This analysis of the taxi industry's characteristics reveals that competition naturally constitutes the primary component of the organization mode for production in this industry, with the residual role of regulation being determined by the extent of the information costs.

The third chapter analyses the effectiveness of regulation, first in terms of the objectives pursued and then in terms of resource allocation. From the standpoint of customer welfare and maintaining order, regulation of only the operation of taxicabs can in some cases prove effective. Due to the effects, limiting the number of taxis can hardly be justified by the objective of equity. To determine the effect of regulation on resource allocation, the author estimates the annual loss in well-being resulting from particularly restrictive forms of regulation for nine major Canadian cities. Following this, the taxi's role in urban transportation is discussed.

Contrary to popular belief up to now, mass transit is not a substitute for the private automobile. Only the taxi, which is a public mode of transportation without an established route or schedule, and providing door-to-door service, can serve as a substitute for the private automobile. More efficient utilization of all modes of transportation would seem to depend on the emergence of a combined individual and collective taxi service.

Finally, the author concludes that much more discreet regulation than that now in force is desirable and that in no case is limitation of the number of taxis or prohibition of collective public use of taxis justified. This raises the issue of the cost of changes to be made to the present regulations, particularly the compensation to be paid to taxi operators who have purchased taxi permits in cities where these permits have a high market value.

INTRODUCTION

In a market economy such as ours, politicians often find it appropriate to formally structure the relationships between buyers and sellers through legislative apparatus. The taxi industry provides a good example of this type of intervention, which here we set out to analyse from an economic point of view.

Since the markets for taxi services are clearly defined locally, they have always fallen under municipal jurisdiction or, at most, provincial jurisdiction. This has fostered the development of differing regulations across Canada, and we take full advantage of this diversity in our analysis. Chapter 1 briefly describes the content of 47 taxi regulations in Canada (see Appendix A for a list of these regulations), and then briefly discusses the origin and objectives of taxi regulation.

Chapter 2 follows the stages of the analytical procedure proposed for industrial organization by Scherer (1980), in which is studied, first, the supply and demand factors for taxi services within the urban transit system, second, the organization of the taxi industry and third, the incentives of the economic agents or, in other words, the dynamics of the market and its control by regulation.

The analysis of the efficiency of regulation conducted in Chapter 3 is based on this background, and constitutes to some

extent a fourth stage in Scherer's procedure. The efficiency of taxi regulation is measured, first, in relation to the achievement of the objectives and, second, in relation to resource allocation. The latter procedure examines how efficiently we use the taxi as a public transportation service with no established route or schedule; several authors (for example, Kirby and Miller, 1975) point out that the scope and variety of services offered by the taxi industry are severely limited by regulation. Finally, in conjunction with taxi regulation, we examine mass transit policies.

1 THE NATURE AND ORIGIN OF TAXI REGULATION

Legal Framework

Section 91, subsection 10, of the British North America Act, which grants provincial legislatures exclusive authority to pass laws in all matters relating to local works and undertakings, places taxi transport under provincial jurisdiction. In view of the local nature of taxi transport, all provincial governments, except Quebec (since 1973) and Manitoba (in the case of Winnipeg), have seen fit to transfer almost total jurisdiction to local governments. For this reason, the general Acts or individual charters that create city, municipal, urban community, and county governments and define the roles of these local governments -- such as Prince Edward Island's Town Act, Newfoundland's City of St. John's Act, or the Municipal Ordinances in the Yukon and Northwest Territories -- include a special section dealing with regulation of taxi transport specifically or local business generally, which includes taxi operations. However, provincial transport, road traffic, or motor vehicle Acts may also contain sections that provide greater detail on, or extend the responsibilities of, local governments in the field of taxi regulation, as in the case of the Nova Scotia and British Columbia Motor Vehicle Acts.

As in the case of other legislative decisions made by local governments, regulations passed under the regulatory powers

transferred to them are subject to final approval by the provincial minister responsible or by a provincial agency regulating motor traffic.

Within the limits of metropolitan Winnipeg, taxi regulation is the responsibility of the Taxicab Board, a provincial commission made up in part by local representatives, which was created under the Taxicab Act of 1935. In Quebec, a single taxi regulation -- Regulation 6, which took effect on November 1, 1973, after the Lieutenant-Governor in Council ordered passage on a proposal by the Quebec Minister of Transport -- covers the entire province and is enforced by the Quebec Transport Commission, in accordance with the 1972 Transport Act. Prior to this, taxi regulation in Quebec had been largely a local responsibility.

The province of Quebec and the city of Winnipeg are not the only cases where a provincial regulatory agency intervenes in the taxi industry. While provinces may retain residual regulatory powers not transferred to local governments,[1] as mentioned above, they may also intervene in cases where taxi transport escapes the authority of local governments because it takes place outside the limits of their jurisdictions. Four provincial regulatory agencies have been established to cover all or part of such taxi operations: the Newfoundland Public Utilities Board, the Prince Edward Island Public Utilities Commission, the Manitoba Motor Transport Board, and the British Columbia Motor Carrier Commission.[2] Because these bodies employ the same

legal framework and same basic procedure -- for issuing permits, for example -- as for trucking regulation, which has already been studied extensively elsewhere, and because of the limited size of the taxi operations with which they deal, they have been excluded from our analysis.

For the purposes of our research, we study in detail the content of 47 Canadian taxi regulations, including at least one city, the largest, in each province or territory, Quebec's Regulation 6, the provincial regulation in effect in Winnipeg, and the regulations in all remaining Canadian cities with over 50,000 inhabitants[3] with only a few exceptions.

Content and Application of the Regulations

Content of the Regulations

Taxicab regulation in Canada covers many aspects of the taxi transport business, which can be grouped into the following categories: description of vehicles used, conduct, ownership of vehicles, marketing of taxi services, number of taxis, and price of taxi services. Some examples are given below to illustrate the variety of topics covered in the 47 regulations examined in this study, but the reader must remember that every aspect is not necessarily specified in all of these regulations.

The sections of the regulation that describe the vehicles to be used as taxicabs may specify some or all of the following features: passenger capacity (usually five or six, but sometimes eight), height, number of doors, and so on; age of the vehicle; certain standards of mechanical and body condition, including compulsory equipment such as roof light, spare tire, radio, and so on; and the types of advertising displays allowed.

The second category includes the following: taxi chauffeur's licence, driver-customer relations, driving behaviour, and the types of taxi services. These aspects are regulated by imposing conditions for obtaining, renewing, and retaining a taxi chauffeur's licence (minimum knowledge of the city, for example) and by defining the taxi driver's responsibilities and rules of conduct, including the prohibition against collective use of taxis. The following section [s. 56(3), By-Law No. 2548, Township of Richmond] is typical:

> No driver of a taxicab shall convey any person or persons other than the person or persons first engaging the taxicab. The carrying of passengers for separate fares is prohibited.

Some regulations do, however, make exceptions to this rule when the first customer gives the taxi driver permission to pick up other customers en route.

The third category -- ownership -- includes taxi owner status, taxicab insurance, exchange and sale of taxicabs, employment of

drivers,[4] hours of operation, and routes covered by the taxicab. Elements in this third category are usually regulated by imposing conditions for obtaining, renewing, and maintaining a taxi owner's permit or licence. In some cities, taxi owners are required to keep their taxicabs in operation 24 hours a day [Guelph (s. 32), Burlington (s. 27)], or a specified number of hours and days in the week [Burnaby (s. 50), Vancouver (s. 51), Sudbury (s. 26(c))]. The regulations in nine Canadian cities require taxi owners to affiliate with a dispatch centre, which receives telephone calls from customers and can reach taxis by radio.[5]

The variation in fees charged by authorities for issuing or renewing a taxi licence is another aspect of this third category, and requires special attention. In 34 of the regulations studied, the fees were $100 or less while, in the remaining regulations, they varied between $100 and $2,500. In Toronto, for example, first issuance of a taxi licence costs $1,500 for someone who holds a taxi chauffeur's licence but is not yet a taxi owner, and $2,500 for someone who already owns one or more taxis. The authorities also collect $2,000 from the purchaser of a taxi already in operation for a taxi licence issued in his name, provided that the sale of the taxi is approved.

The fourth category in our list covers the means through which a taxi operator may offer his services to the public. The dispatch centre is the most important of these, and it is on this

that the regulations regarding affiliation of taxi owners focus. In Edmonton, for example, a dispatch centre must have at least three taxicab affiliates in order to provide adequate service 24 hours a day. Most of the other regulations simply issue licences at an annual cost of $5 to $500, and require the centres to maintain an account on taxi operators linked with the centres. Other means available to a taxi operator for reaching his clientele are taxi stands and cruising. Several regulations provide for the establishment of taxi stands, while some regulations in Ontario and British Columbia [for example, Vancouver (s. 55)] prohibit cruising.

The above four categories refer to what could be called the general sections of the regulations -- that is, those that establish the general conditions of eligibility for taxi driver or owner status, the standards of conduct and the means through which the authorities control them (for example, through fines or the suspension of a licence). Differences among various jurisdictions or cities in regulating these aspects usually do not involve basic differences in practices. Standards of conduct, for example, are intended to curb abuses,[6] but cities that do not impose such standards in a taxi regulation are no more tolerant of abuses, since law officers can refer to more general laws or regulations to fight them.

In contrast to these general sections, those sections dealing with the number of taxis and the price of taxi services are much

more specific, and usually have a much greater influence on the main characteristics of a local taxi service. Our analysis of the effects of taxi regulation concentrates on the specific sections, which we now describe.

Although not all authorities control the number of taxis operating within their jurisdictional limits, most do. Specifically, 28 of the 47 regulations studied, or 60 per cent, limit the number of taxis. Table 1-1 shows the number of taxis and the ratio of taxis per 1,000 inhabitants for selected cities. The first part of the list includes cities outside Canada, such as Washington, D.C., which is known for not limiting the number of taxis and for the important role played by taxis there. The table divides the list of Canadian cities into two parts, those limiting the number of taxis, and those not limiting them. A separate regulation is associated with each of these cities, except for those in Quebec, which are all subject to the same Regulation 6.

A quick comparison of the number of taxis per 1,000 inhabitants between the Canadian cities limiting the number of taxis and those not limiting them reveals that the latter tend to have a proportionally higher number of taxis; of the 17 cities in the list not limiting the number of taxis, 11 (64 per cent) have more than 1.5 taxis per 1,000 inhabitants and seven (41 per cent) have over two, while of the 26 cities in the list that do limit the number of taxis, only two (7.6 per cent) have more than 1.5 taxis

Table 1-1

Number of Taxis Registered in Various Cities,
Canada and Elsewhere, circa 1978

Cities	Population	Number of taxis registered	Taxis per 1,000 inhabitants
	(Thousands)		
Cities outside Canada			
Atlanta	497	1,900	3.8
Boston	641	1,575	2.5
Copenhagen	696	3,600	5.19
Chicago	3,367	4,600	1.4
Honolulu	325	1,400	4.3
London, England	8,100	10,100	1.25
New York	7,895	11,754	1.5
New Orleans	593	1,500	2.53
Phoenix	582	95	0.16
St. Louis	622	1,267	2.04
San Gabriel	525	52	0.10
Van Nuys	790	50	0.06
Washington	764	8,500	11.13
Canadian cities where the number of taxis is limited			
Montreal and area	2,434	6,431	2.64
Metro Toronto	2,154	2,491	1.16
Ottawa and area	693	719	1.04
Winnipeg	578	400	0.69
Quebec City and area	442	647	1.46
Vancouver	410	363	0.88
Regional Municipality of Niagara	362	246	0.68
Hamilton	312	220	0.71
Regional Municipality of Waterloo	297	214	0.72
Mississaugua	250	301	1.20
London	247	252	1.02
Regina	150	120	0.80
Saskatoon	134	135	1.01
Burnaby	132	77	0.58
Ste. Foy - Sillery	115	99	0.86
Thunder Bay	109	109	1.00
Oshawa	106	100	0.94
Trois-Rivières (A-40)	104	125	1.20
Sherbrooke (A-43)	83	76	0.92
Richmond	80	28	0.35
Oakville	68	35	0.51

Table 1-1 (Cont'd)

Cities	Population	Number of taxis registered	Taxis per 1,000 inhabitants
	(Thousands)		
Canadian cities where the number of taxis is limited (cont'd)			
Hull (A-34)	65	84	1.29
Victoria	63	130	2.06
Kamloops	58	75	1.29
Markham	56	80	1.43
Coquitlam	55	27	0.49
Canadian cities with no effective limits on the number of taxis			
Edmonton	554	910	1.64
Calgary	470	795	1.69
Windsor	197	300	1.52
Halifax	122	829	6.79
St. John's, Nfld.	87	340	3.91
Saint John, N.B.	86	340	3.95
Sault Ste. Marie	80	70	0.87
Guelph	70	57	0.81
Brantford	67	64	0.96
Dartmouth	65	334	5.14
Kingston	61	169	2.77
Peterborough	60	50	0.83
Moncton	56	144	2.57
Sarnia	55	25	0.45
North Bay	51	78	1.53
Fredericton	45	40	0.88
Charlottetown	17	106	6.24

NOTE We attempted to obtain the most recent figures for the Canadian cities, in most cases valid at the end of 1978 or start of 1979. Since no national census has been conducted recently, the population figures may date back to 1970, although in some cases more recent estimates were available. For cities in Quebec, except Montreal, the agglomerations defined in Regulation 6 were considered individually. Some of the regulations in Appendix A do not appear in this table since it was impossible to obtain enough information to include them in the table. Detailed analysis of their content did reveal, however, whether they controlled the number of taxis. See Papillon (1981, Chapter I).

SOURCE Survey conducted by the author. See also Couture (1976, p. 6); and Weiner (1975, p. 361).

per 1,000 inhabitants. Nonetheless, it should be remembered that many supply and demand factors are at work here to help make each local market for taxi services unique.

On the demand side, a city's population density, commercial development, the role of its downtown core, and the proportion of pensioners and students are all factors to be considered. On the supply side, the proportion of unskilled workers in the work force and the unemployment rate are examples of factors to be considered in view of the nature of the taxi operator's work. Making, however, the assumption that all these factors cancel each other in each of the two subsets of Canadian cities considered in Table 1-1, we can perform a statistical test in order to determine whether the difference just observed in the number of taxis per 1,000 inhabitants between the two subsets are significant. The results of the test confirm that these differences are very significant.[7]

In examining the regulations, we find two ways of restricting the number of taxis: imposing a limit on the absolute number of taxis, and establishing a maximum ratio of taxis per 1,000 inhabitants, which is equivalent to the first in most cases. Once the authorities have established control over the number of taxis, the problem arises of who should hold the limited number of taxi licences among all those who wish to obtain them and meet the conditions for becoming taxi owners. Such controls are therefore often accompanied by other rules dealing with the

allocation of licences -- through a waiting list, for example,[8] or through governing the issuance and allocation of temporary licences for the winter, when the demand for taxi services is higher [as in the case of Saskatoon (s. 40(a)), Regina (s. 6), and Thompson (s. 6)].

Turning now to the last category -- the price of taxi services -- we find that all regulations studied except one -- Fredericton -- control the price of taxi services. This is regulated in two basic ways: first, by establishing taximeter rates (by far the most common method -- in 43 out of 47 regulations covered in our sample); and second, by setting zone rates (which were in effect in three cities in our sample -- Kingston, Saint John, N.B., and Charlottetown).[9] Taximeter rates set an initial amount covering a first standard distance, an amount for each additional standard distance covered, and an amount for each standard period of waiting.[10] Under the zone system, a city is divided into a certain number of zones, and rates are established for trips from one zone to another and within each zone.

Table 1-2 shows the price of a standard taxi trip of 3.6 miles with a total waiting time of two minutes during the trip,[11] based on the rates set by various regulations in 1978. Among cities using taximeters, prices at the time of our survey ranged between $3.18 (Halifax) and $4.44 (Peterborough), a variation of 40 per cent of the minimum price. A much larger spread separated

Table 1-2

Price of a Standard Taxi Trip in Selected Canadian Cities, Autumn 1978

Montreal[1]	$3.90	Sherbrooke	$4.00
Toronto[2]	3.36	* St. John's, Nfld.	3.95
Winnipeg	3.97	+* St. John, N.B.	2.50
* Edmonton	4.34	* Sault Ste. Marie	4.04
* Calgary	4.13	Richmond	4.13
Vancouver	4.12	* Guelph	4.24
Hamilton	3.68	Oakville	3.98
Ottawa	4.10	Brantford	4.05
London	4.19	Hull	4.00
Quebec City	4.00	* Dartmouth	3.25
* Windsor	3.83	Victoria	4.14
Regina	3.62	+* Kingston	1.50
Saskatoon	4.20	* Peterborough	4.44
Burnaby	3.75	Kamloops	3.95
* Halifax	3.18	* Moncton	3.19
Thunder Bay	4.05	Markham	3.36
Oshawa	4.05	* Sarnia	4.14
Trois-Rivières	4.00	+* Fredericton	2.00, 3.12
Subdbury	4.38	+* Charlottetown	2.50

1 A 20 per cent increase which took effect September 4, 1979, raised this price to $4.68. It is interesting to note that the last increase granted by the Quebec Transport Commission was on November 13, 1978. An almost equal increase (19.5 per cent) was also granted to taxis in the Quebec City region; the price of a standard trip rose on September 4, 1979, from $4.00 to $4.78.

2 A 14 per cent increase effective May 8, 1979, raised this price to $3.84.

* Indicates cities with no effective limits on the number of taxis.

\+ Indicates cities where taximeters are used little or not at all. Saint John, Kingston, and Charlottetown use a zone rate structure. Consequently, we chose the average fare charged for a standard trip. Fredericton had a zone structure until early 1973, but this structure had not been effective in recent years because the city decided to let prices be set freely by the market, based on the premise that competition between taxi companies is an adequate guarantee of consumer protection. Based on surveys and trips in this city, we estimated the average price of a standard trip (3.6 miles and 2 minutes of waiting) at about $2.00. Fortunately for us, in addition to the zone fare charged in Fredericton, there is a dispatch centre with taxis equipped with taximeters. At the time of our survey, the prices were 40 cents initial amount, 70 cents per mile travelled, and 10 cents per minute waiting, which brings the price of a standard trip to $3.12.

SOURCE Based on data listed in Appendix A and on a survey conducted by the author.

cities using zone rates from those using taximeters. For the three cities using the zone system, prices for the equivalent standard trip were $1.50 or $2.50.

Differences between any two cities are caused by various factors, including those relating to our measurement device of the standard trip used in computing the price. This standard trip is a Canadian average, and it therefore probably differs significantly between cities in terms of distance covered and/or waiting time. With taximeters, this can change the results of comparisons between two cities. For example, the price of our standard trip defined above was higher in Quebec City ($4.00) than in Regina ($3.62) but, if we use a 1.5 mile or 2.4 kilometre trip with half a minute waiting time, the price would have been lower in Quebec City ($2.05) than in Regina ($2.15).[12]

The larger price spreads between cities using taximeters and those using the zone system are less relative than above: regardless of the standard trip used to compute the price, the price is generally lower in cities using the zone system than in those using taximeters. This is because consumption habits for taxi services in cities using the zone system differ from those in cities using taximeters. In fact, zone rates are also a per capita rate when several independent customers use a taxi. It should be noted, however, that collective public use of taxis -- although frequent in Fredericton and Saint John, N.B. -- is always at the discretion of the first customer to hire the taxi, as set by regulation.

Aside from the fact that our unit of measurement of the standard trip is fairly arbitrary, the information given in Table 1-2 on the costs of taxi transport in various Canadian cities must be used with caution since, in addition to the money the consumer must pay, his time is also a cost factor. It is particularly important to consider this factor, since we should expect -- as shown in Chapter 2 -- an inverse relationship, ceteris paribus, between this cost and the cash fare.

Enforcement of Regulations

Depending on the various delegations of authority, regulation enforcement in Canadian cities may be the responsibility of the local police force, a licence bureau, or both, as is often the case: the licence bureau issues permits, while the police force ensures that taxis operate in accordance with the regulations.

In some Ontario and Maritime cities, for example, local police forces take full responsibility for enforcing the regulations, whereas Winnipeg and Calgary have taxi commissions that, in addition to issuing driver and owner licences, have inspectors in the field. In Quebec, regulation enforcement is primarily the responsibility of inspectors with the Quebec Department of Transport, although taxi owner licences are issued by the Quebec Transport Commission.

General Observations

In general, whether or not a regulation limits the number of taxis may be linked to two other aspects of the regulation -- permit fees and dispatch centre affiliation.

Our discussion of the sections of the regulations controlling the number of taxis refers also to other regulations dealing with the allocation of issuance, and transfer of permits. Support is found for the assumption (see note 8) that, where a particularly high price is charged for a taxi licence, the number of taxis is often limited by regulation. In this case, the licence cost may represent the regulators' attempt to share in the monopoly rent. Of the ten local governments[13] that collect high fees for issuing a taxi licence, eight also control the number of taxis; moreover, three cities with extraordinarily high fees -- Ottawa, Oakville, and Toronto -- all limit the number of taxis.

As for compulsory affiliation of taxi owners with a dispatch centre, of nine cities imposing this condition, eight[14] are among the 19 cities in our sample not controlling the number of taxis and only one -- Regina -- is among the 28 local or provincial governments that do control the number of taxis. Hence, about half of the regulations not controlling the number of taxis insist on taxi owner affilation with a dispatch centre, while all regulations except one that do control the number of taxis do not impose such affiliation.

Origins of the Regulation and Objectives or Official Justifications

Old Regulation

Following its emergence, the taxi was rapidly integrated into the classes of for-hire vehicles that were already regulated, and was subjected to the same sort of regulation.[15] A large part of current taxi regulation, which could be called "old" regulation, thus considerably predates the motorized taxicab.[16] Many of the aspects described in the preceding section under the categories of taxicab description, taxicab conduct, ownership, and price of taxi services date from this time.

On the other hand, bans on the collective use of taxis and limits on the number of taxis can be traced to the time when the automobile was first introduced in urban transport, although the hypothesis that such rules may have been in effect during various earlier periods appears quite plausible.[17]

Prohibiting Collective Public Use of Taxis

The origin of regulations forbidding collective public taxi use for all practical purposes goes back to the early 1920s, when the automobile was expanding rapidly. Beginning in 1914, a rapidly growing number of automobiles nicknamed "jitneys" took on an unprecedented role in public transport. These jitneys

provided both a collective and individual public transport service and in most cases, charged on a per capita basis. In the spring of 1915, when their popularity peaked -- before the introduction of legal restrictions on their operations -- their number in the United States was estimated at 62,000 (Eckert and Hilton, 1972). And it appears that jitneys were proportionally just as popular in Canada.[18] Faced with this threat to their monopoly, which had previously been safeguarded by the absence of substitute technologies, the members of the American Electric Railway Association (AERA) and Canadian streetcar companies launched a political offensive to eliminate this emerging form of public transport. Congestion on streets not designed for jitney traffic in such large numbers probably worked very strongly in the companies' favour. In only a few years,[19] the streetcar companies obtained the passage of regulations[20] preventing an automobile owner from using his vehicle to compete with streetcars to provide collective public transport services.

This type of conflict had never arisen between streetcars and hackneys or barouches, since these horse-drawn vehicles were of more limited use than the automobile[21] -- probably because of their slower speed, shorter range, and the specific nature of the care, such as stabling, required by horses and other draft animals.

Limiting the Number of Taxis

Following the disappearance of jitneys, the importance of taxis -- which had become a means of individual public transport -- continued to grow (although more slowly than at first) along with automobile use.[22] However, this growth did not last for long. Just as the acute unemployment of 1914 had brought on restrictions on automobile use in public transport, the surge in unemployment that began in 1930 heralded new restrictions.[23]

By 1934, according to Verkuil (1970, p. 688), an estimated 43 of the 93 cities in the United States having a population exceeding 100,000 had restricted entry into the taxi industry. Among Canadian cities limiting the number of taxis, we are able to trace the origin of regulations in two -- Winnipeg and Montreal.

The political pressures leading to the passage of these regulations did not come from the same quarters as those leading to the elimination of the jitney. The taxi operators themselves had an interest in limiting the number of taxis (although this certainly could not have displeased mass transit companies), since such limitation would give existing operators a cartel. A certain lack of understanding of the economic mechanisms and characteristics of taxi transport, which is quite different from those of streetcars or subways which are classed among natural monopolies, may also have been one of the factors leading taxi

operators to call for the erection of entry barriers and may have promoted acceptance of their request at the political level.

Verkuil (1970) harks back to economic theories in fashion during the Great Depression[24] in seeking an explanation for the introduction by many American cities of regulations limiting the number of taxis. These theories or ways of explaining the economic problems of the time led the cities to attribute the shortcomings in available taxi services to competition among taxi operators. Two of these shortcomings -- mentioned, for example, in the inquiry reports preceding the passage of such regulations in Montreal -- were the congestion resulting from an unnecessarily high number of taxis and the low incomes of taxi operators caused by excessive competition. It was believed that operators were thus forced to turn to illegal if not criminal activities and that they were unable to assume financial responsibility for damages caused by their vehicle.

The argument that taxi transport is a public service (like electricity, telephones, and mass transit) is used to this day to justify limiting the number of taxis. The Manitoba legislature used this argument when it passed the Taxicab Act of 1935, which limited the number of taxis allowed on the streets of Winnipeg (Stevens, 1972). Bossé (1970, p. 17) also referred to it in his inquiry into the problems of the taxi industry in the Montreal metropolitan region.

> Since the taxi industry is invested with an indisputable public interest because it forms an integral part of public mass transit facilities, it cannot be left to the vagaries of free competition but must be regulated through the number of car licences to be issued (translation).

Before Quebec's taxi regulation was made province-wide in 1973, the City of Montreal had limited the number of taxis through regulation on two occasions, once in 1937 and again in 1952. Between these dates, the city had decided in 1946 to accept a report by J.O. Asselin, the Chairman of the city's Executive Committee. The city had called for such a report in response to numerous complaints from the public "tired of being unable to obtain a taxi by telephone." The findings of the Asselin report were contrary to those of an earlier commission, appointed in 1940, which had deplored a surplus of taxis. But as Asselin (1946, p. 8) noted:

> The Commission also concluded that the number of taxis was excessive. It should be stressed that the complaints came primarily from those working in the industry itself and that the economic crisis facing the country explained the difficulties at the time (translation).

Consequently, the 1937 regulation was amended to allow the issuance of new permits. Aside from producing a notable increase in the number of taxi licences in circulation (from 765 to 4,280), this change reduced the market value of licences; the value of "rare" taxi licences, which had grown between 1937 and 1946 to an estimated 5,000[25] vanished overnight.

Classification of Justifications and Objectives

The official justifications or objectives for taxi regulation can be grouped into three categories: customer welfare and maintaining order, equity, and reducing congestion, pollution, and energy waste.

The first broad objective -- customer welfare and maintaining order -- is fairly explicitly mentioned in all of the regulations. The major objective officially pursued by the authorities when passing regulations specifically on the number of taxis, and in part when establishing taxi rates, is one of equity -- the desire to provide taxi operators with a decent income. The third objective constitutes an alternate justification for regulations that limit the number of taxis.

Aside from these official objectives mentioned when discussing and passing various regulations regarding the taxi industry, the regulation of taxi transport has sometimes been presented as a logical follow-up to government regulation of public and/or essential services.

We now turn to the characteristics of the taxi industry. This knowledge will assist us in more accurately determining the scope of taxi regulation, the value of the arguments used to justify it, and its effectiveness in meeting its objectives.

2 CHARACTERISTICS OF TAXI TRANSPORT

For the consumer of transport services, the taxi is an alternative to the private or rented automobile and to other such well-known forms of public transit as buses, subways, and streetcars. The taxi may be preferred for comfort, speed, health reasons (many people cannot travel in buses), or convenience (many places are not served by mass transit) (Paquette, 1970). The taxi industry is the only one in the public transport field to use the automobile as a transport vehicle, and this gives it great flexibility and unequalled quality of service. The labour force in this industry is generally unskilled and often includes casual or part-time workers.

Table 2-1 compares the importance of the taxi and mass transit industries for a few Canadian cities, based on their respective earnings. In the Quebec City area, for example, we find that the two industries are about the same size. Taxi firms are operated entirely by the private sector, unlike mass transit systems. The latter recover only a portion of total costs through fares paid by passengers as shown in column G, and so they must rely on direct subsidy from governments to make up for the shortfall.

If we extend the comparison in Table 2-1 to the automobile's other roles outside the taxi industry, we find that the role of mass transit is marginal; according to a Canadian study (Parkinson, 1971), mass transit handles only 11 per cent of all

Table 2-1

Relative Importance of Taxi Transport and Mass Transit, Selected Canadian Cities, 1976-77
(1976-1977)

	A	B	C	D	E	F	G	H
	Population	Total Number of taxis	Number of taxis per 1,000 inhabitants	Approximate total cost (or own-source earnings) of taxis transport[1]	Approximate total cost of mass transit[2]	Own-source revenues of mass transit	F/E	D/E
	(Thousands)			(Thousands of dollars)				
Halifax	122	837	6.86	15,720	4,735	3,774	.80	3.32
Montreal (including the five following agglomerations: A-2, A-5, A-8, A-11, A-12)	2,434	6,431	2.64	127,983	172,327	94,492	.54	0.74
Quebec (including the five following agglomerations: A-24, A-30, A-32, A-36, A-38)	442	647	1.46	13,148	13,702	6,586	.48	0.96
Metro Toronto	2,154	2,491	1.16	55,502	133,117	103,607	.78	0.42
Ottawa (including Nepean, Gloucester and Vanier)	693	719	1.04	14,510	41,788	17,810	.43	0.35
Winnipeg	578	400	0.69	8,352	26,183	12,889	.49	0.32
Calgary	470	606	1.29	11,381	18,236	12,549	.69	0.62
Edmonton	554	910	1.64	17,091	24,930	13,739	.55	0.69
Vancouver	410	363	0.88	8,342	20,008	8,774	.44	0.42

1 This figure is obtained by multiplying the gross average earnings of a taxi by the number of taxis. The gross earnings are computed as follows: $18,781 plus 14 per cent of the market value of permits when these are limited in number. In Montreal, Quebec City, Toronto, Ottawa, Winnipeg and Vancouver, the value of permits and the capital cost (14 per cent of this value), respectively, were: $8,000 ($1,120), $11,000 ($1,540), $25,000 ($3,500), $10,000 ($1,400), $15,000 ($2,100), $30,000 ($4,200). The figures in column D are probably very conservative because, first, the $18,781 figure itself is not very large, second, the market value of permits is more a minimum than an average value and, third, we failed to take into account the higher average level of utilization (over 40,000 miles a year) that may result from restrictions on the number of taxis.

2 This is the cost of mass transit for the same population as that included in the operating zone of the taxis studied. Wherever possible, we attempted to respect the operating zones of mass transit commissions; for cities such as Vancouver where we studied only part of this zone, we estimated the amounts in column E by using the per capita costs of mass transit multiplied by the population of the zone studied.

SOURCE Surveys by the author. See also Transport Canada (Nov./Dec. 1977), Comité des transports de la région de Montréal (1977), and Hamelin and Gagné (1977).

urban travel in Canada; the rest, almost 90 per cent, is handled by cars. This includes the taxi's share, which hovers around the same percentage as mass transit. As Chart 2-1 illustrates, this distribution among the various means is the result of stagnating mass transit patronage over the last few decades, while automobile use has risen steadily.

To be capable of fully assessing the scope and importance of taxi regulation, it is essential that we retrace the origin of the present taxi clientele by examining how all urban transport needs have changed over the years.

The Role of Taxis

Changes in Transport Needs

With the large real increases in wages over the last fifty years, popular consumption of goods and services of all kinds -- education, health, recreation, single-family homes and lots, and so on -- has risen considerably. One of the effects has been an outward extension of city boundaries. While the relatively small number of goods and services consumed previously by the population allowed a fairly dense grouping of the population that was easy to serve in all respects with a frequent mass transit service, the proliferation of schools, recreational centres, supermarkets, and suburban homes led to a sharp drop in population density. Because of the variety of new needs and the

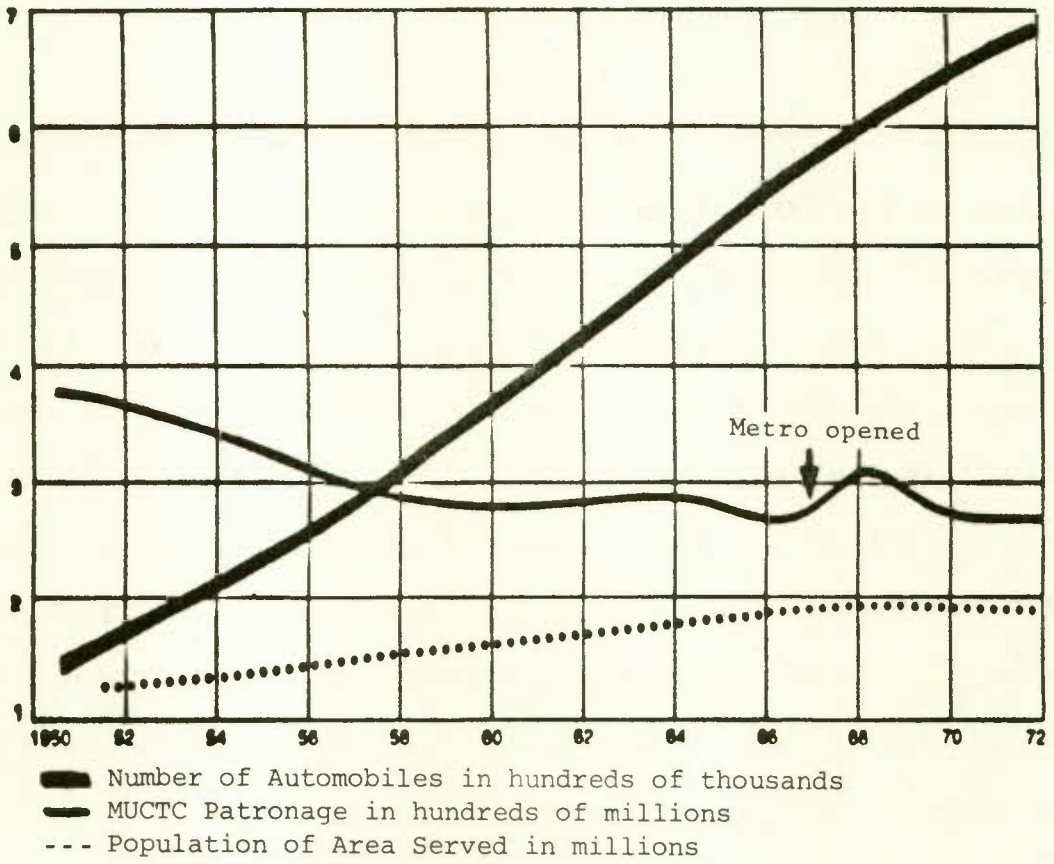
resulting extension of the city, a growing proportion of residents made longer and more frequent trips outside the main corridors. Mass transit companies operating large vehicles that required a large population travelling on a limited number of routes began losing their ability to meet all of the population's transport needs, and their share of total travel shrank steadily. The day had passed when mass transit could provide almost door-to-door service.

The initial use of automobiles in mass transit did not go smoothly, as we have seen. Strict regulation soon prohibited the collective public use of jitneys, which offered highly flexible, potential door-to-door service between any two points and very comfortable service to all.

Postwar economic growth, however, has brought the automobile within the reach of most North American households. Moreover, even though the city dweller may require an automobile to meet only part of his needs -- groceries, outings in the evening or in bad weather, family outings, and so on -- once he decides to take on the fixed costs of becoming his own transporter -- that is to become a motorist -- he can meet his other transportion needs as well, because the marginal cost of using his vehicle is minimal. This explains why mass transit services -- now a complementary means of transport to the automobile rather than a substitute -- even at a subsidized price, as is increasingly the case, have failed to keep pace with increasing automobile use, and will

Chart 2-1

Transport Trends in Montreal Within the Area Served by the Montreal Urban Community Transport Commission, 1950-72



SOURCE Migué, Bélanger, and Boucher (1978).

probably continue to fall behind (see Chart 2-1). A U.S. study (Moses and Williamson, 1963) reveals, for example, that if the full price of bus tickets were paid by the city, so that mass transit was free, only 13 per cent of all commuters would be persuaded to travel downtown by this means.

Present Taxi Clientele

With the automobile now the primary means of transport, owing to its great flexibility in meeting an increasingly specific demand for travel in terms of time and route, the primary substitute for the private automobile must obviously be the taxi. A large part of the taxi clientele therefore does not own an automobile. This is confirmed by many studies, which reveal that a large part of the taxi clientele belongs to the various categories of people who are physically or financially unable to drive themselves, such as the unemployed, residents of poor neighbourhoods, the elderly, the disabled, housewives, and students.

In Winnipeg, the elderly and the disabled represent one-third of the taxi industry's clientele (I.B.I. Group, 1975). Another survey conducted in small and medium-sized U.S. cities reveals that households with an annual income below $5,000 (in 1972 dollars) consumed more than half of all taxi trips, although they account for less than one-fourth of the population (Gilbert et al., 1976). The dependence of low-income households on taxis

also occurs in large cities, according to a study conducted in Brooklyn, New York (Central Brooklyn Model Cities Area), where households with annual earnings of less than $4,000 (in 1972 dollars) consumed 43.5 per cent of all taxi trips within the city, but represented only 39.7 per cent of the population (Lee et al., 1972).

We can assume that the taxi began originally as a luxury service. In Montreal, the first taxi appeared in 1909 (Montreal Archives), and there is reason to believe that the clientele for this new service was very similar to that for hackneys, which were still fairly common. Over the years, however, the taxi clientele evolved to include a growing number of low-income customers. This fact is partly explained by the modern development of cities, which, as already noted, underwent gradual geographic segregation based on such major activities as work, recreation, supply of consumer goods, and so on. Hence, each individual was required to make a greater number of trips. Mass transit, however, did not adequately meet the needs of the underprivileged who remained in the downtown areas and who often had no access to an automobile. Today, mass transit is even more inadequate for the needs of this underprivileged clientele, because these people are increasingly dependent on public transportation as cities expand and as public transportation firms cut back their operations in downtown areas in order to extend their routes in the suburbs to reach the entire population.[1]

Other users of taxis are professionals and administrators who choose the taxi for its efficiency in downtown travel in order to avoid the problem of finding parking, nonresidents of the region or city who are only visiting, and commuters going to or from bus and railway stations or airports.

Rosenbloom (Kirby et al., p. 79) compares the ratios of taxis per 1,000 population with indicators of economic growth in a number of U.S. cities, including both those that restrict numbers of taxis and those that allow free entry; he finds that the number of taxis increased in proportion with increases in economic activities in cities where taxi numbers are not limited.[2] Rosenbloom concludes therefore that an increase in economic activities leads to an increase in the demand for taxi services. Cities restricting the supply have been unable to meet these increases in demand, unlike those cities allowing free entry to the industry. These observations appear to apply to Canadian cities as well. In Calgary, for example, which has experienced a decade of rapid growth, the number of taxis, which is not limited by regulation, rose from 527 in 1975 to 795 in 1978 (Calgary, 1979). On the other hand, the numbers of taxis in Vancouver and Winnipeg, for example, have remained the same for the past twenty years, despite evidence of economic growth during that time.[3]

Comparing the demand for taxi services with the demand for other means of urban public transit reveals two major trends.

First, the demand for a public transport service that is comfortable and/or has flexible schedules and routes, as offered by taxis, has at least remained stable in recent decades; taxi operators are, in a sense, the exception that confirms the rule regarding the absolute decline in aggregate demand for transportation experienced by public carriers in urban areas since the Second World War (Wells et al., 1972; Parkinson, 1971; see also Chart 2-1). Second, subsidizing fares for mass transit reduces the demand for taxi services. This happens although several studies point to a complementarity between the two services in that their combined presence reduces a city dweller's overall dependence on the private automobile, and so each service benefits from the presence of the other.[4] This relationship notwithstanding, other studies show that government assistance to mass transit in effect masks the real costs to consumers by assessing part of the payment to taxpayers at large, while taxi users must pay the full cost of each trip on the spot, thus putting the two services into competition with each other.[5] This special treatment given to mass transit prevents, to some degree, the natural complementarity between the taxi and mass transit from reaching its optimum level.

Cost of Taxi Transport

The cost of taxi services -- like that of other transport services[6] -- includes two components: first, the cost of factors paid by the producer (in the case of taxi services, the

costs of owning and operating the taxicab and the cost of his labour) and, second, the cost of the factor provided by the consumer (the quantity of time that he must allot for a taxi trip).

The definition of a cost function for a given service or commodity reflects a specific definition of this service or commodity. To be of any use at all in analysing taxi regulation, our cost function must be based on a definition of taxi transport that takes account of any possibly restrictive regulation. Taxi transport is therefore defined as an individual or collective commercial transport service with no established route or schedule.

In view of the costs borne by the consumer and the producer, the average cost of a standard individual[7] ("i") and collective[8] ("c") taxi trip can be expressed through the following functions:

$$(1) \qquad AC_i = \left[\left(\frac{F}{N} + V \right) \times \frac{L^i}{t^i} \right] + \left[\left(T_1^i + T_2^i \right) \times H \right]$$

$$(2) \qquad AC_c = \left[\left(\frac{F}{N.n} + \frac{V}{n} \right) + \frac{L^c}{t^c} \right] + \left[\left(T_1^c + T_2^c \right) \times H \right]$$

where F represents the fixed annual cost of a taxi, including the cost of owning a vehicle in operation (depreciation, insurance, and so on);

N represents the total number of miles covered annually[9] by a typical taxi;

V represents the variable cost of producing a vehicle-mile and includes the cost of fuel, labour, and so on;

n represents the number of seats in a taxicab excluding the driver's;

L^i represents the average length of a standard taxi trip in individual taxi service;

L^c represents the average length of a standard taxi trip in collective service;

t^i represents the occupation rate of a taxi in individual service, or the number of miles covered by a taxi carrying a customer, divided by N;

t^c represents the occupation rate of a taxi in collective service, or the number of occupied seat-miles divided by N.n;

T_1^i represents the amount of time that a customer waits for a taxi from the moment he makes his request or decides to hail a taxi on the street;

T_2^i represents the amount of time that the customer spends in the taxi;

H represents the cost in dollars of an hour of the customer's time; and

T_1^c and T_2^c represent for collective taxis the variables equivalent to those defined for individual taxi service.

In addition, the variables T_1^i or T_1^c are functions of the occupation rate t^i or t^c and the level of consumption of taxi services (or density of consumption Q measured by the quantity of taxi services consumed in an hour within a given zone):

(3) $$T_1^i = f^i(t^i, Q) \text{ and } T_1^c = f^c(t^c, Q)$$

where $f'_{it^i}, f'_{ct^c} > 0$, and

$f'_{iQ}, f'_{cQ} < 0$.

Hence the higher the occupation rate of taxis in circulation, the longer the customer must wait before obtaining a taxi (for taxis in individual service) or before obtaining a seat in a taxi (for taxis in collective service). Moreover, the higher the level of consumption in a given area and for a given taxi occupation rate, the higher the available capacity and the shorter the waiting period for obtaining a taxi. This reduces the average cost of a taxi trip in individual or collective service. This form of economies of scale is linked to those already observed in the case of bus transport (Mohring, 1976, chap. 12), also known as economies of network. Because of the general absence of established routes or networks in the case of taxi services, we can call them "economies of density."

Price and Quality of Service

In view of the particular role that a customer's time plays in the production of transport services, we now introduce this factor into the determination of the equilibrium price in the taxi services market.

Because of the local nature of taxi services markets, let us examine a hypothetical Canadian city of average size. Given the demand factors, including the price of public transport other than taxis, the proportion of people with access to a private means of transportation, the proportion of disabled and elderly, the proximity of centres of public services, and so on, we can develop a total aggregate demand for taxi services. This total aggregate demand is represented by a set of price combinations taking into account the number of trips made in a given period of time and a given zone -- the level of consumption -- such that each combination gives the maximum level of consumption for a given price "P".

The number of trips demanded can be expressed by their equivalent in terms of standard trips as defined in Chapter 1, and the levels of consumption can be represented by the number of standard trips in a given period, say, one hour, and a given zone, say, commencing within a one-square-mile area. Furthermore, the price "P" referred to here is the cost borne by the consumer, including the money he pays out of his pocket plus the time he must allot based on the waiting period (T_1) and the time spent in a taxi (T_2). The total price "P" for taxi services can therefore be defined as follows:

$$(4) \qquad \text{"P"} = P + [(T_1 + T_2) \times H]$$

where P represents the amount paid out by the customer for a standard trip; and

H represents the cost in dollars of an hour of the customer's time.

Chart 2-2 plots two demand curves, DD' and DD", based on price "P". By definition, all demand factors other than the price are constant over a given demand curve, with changes in one or more of these factors resulting in shifts of the curves. For example, the curve DD" could represent the demand for taxi services in the presence of unsubsidized mass transit, while DD' could represent the demand for taxi services under existing conditions; or DD" could represent the demand for taxi services at rush hours, while DD' could represent the demand for taxi services in off hours.

Each demand curve plotted on Chart 2-2 can in turn be represented in terms of P, the amount paid out by the consumer for a standard trip (for example, the list of prices in Table 1-2), in a family of demand curves, with given values of T_1. In Chart 2-3, each of the two curves in Chart 2-2 is replaced by a set of curves corresponding to a few possible values for T_1:

$$DD' : D_0D_0', D_1D_1', D_2D_2', D_3D_3', D_4D_4', D_5D_5'$$

$$DD" : D_0D_0", D_1D_1", D_2D_2", D_3D_3", D_4D_4"$$

such that D_0D_0' or $D_0D_0"$ correspond to the conditions prevailing when T_1 has a value of zero; D_1D_1' or $D_1D_1"$ reflect a value for T_1 of one; and so on. A unit of T_1 could represent, for example, a period of five minutes. Thus a higher value for each

Chart 2-2

Demand for Taxi Services Based on a Total Price "P"

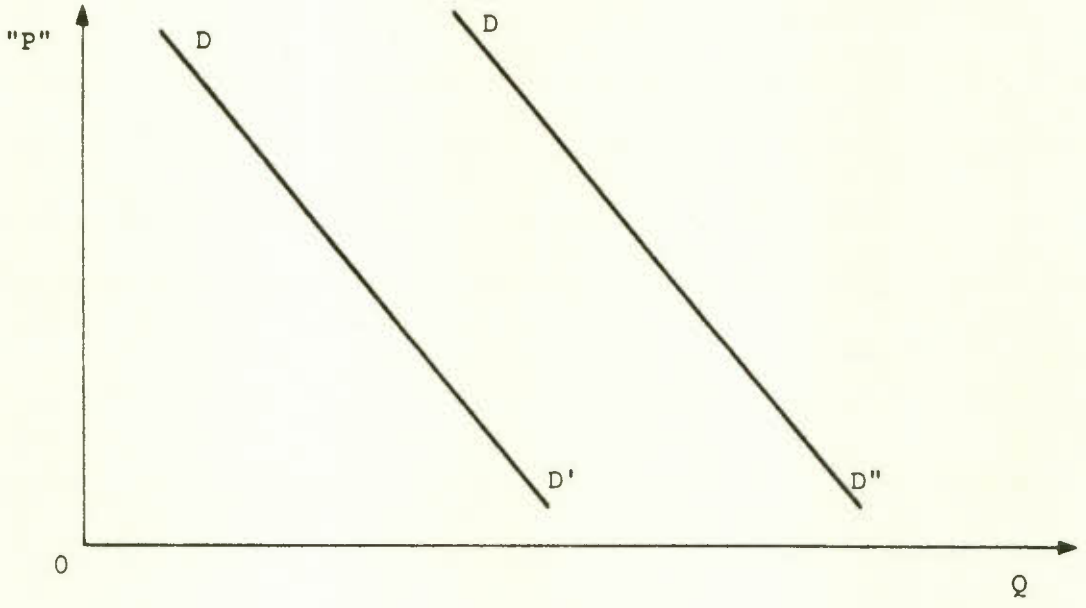
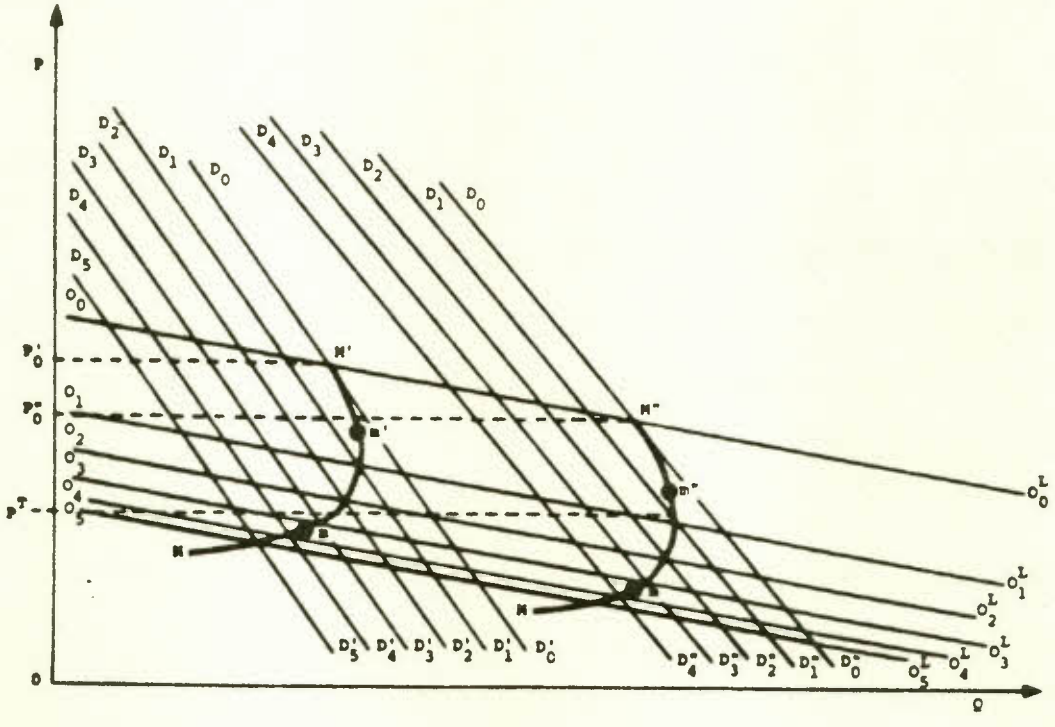


Chart 2-3

Equilibrium Prices in a Taxi Services Market



subscript associated with each of the demand curves in the two subsets indicates a longer waiting period for customers -- that is, a higher value for T_1. Moreover, each successive demand curve (that is, with a higher value for its subscript) in the two subsets is found to the left of the preceding one, because it is reasonable to assume that, for a longer waiting period expressed in T_1 units, which indicates a lower quality of service and a higher total price "P", the quantity of taxi services demanded would be lower.

On the supply side, given such supply factors as the number of unskilled workers living in our hypothetical city, the unemployment rate, the number of automobiles, the rewards gained from driving a taxi in this city, the number of students of driving age, the percentage of immigrants,[10] and so on, we can develop a total aggregate supply. This can be represented by a set of price combinations taking into account the capacity in vehicle-miles per hour. Chart 2-4 traces two supply curves, $O_L O_L^*$ and $O_C O_C^*$. Because of the importance of the labour factor in producing taxi services, the value of the price per vehicle-mile P_V may differ among cities, reflecting differences in the earnings of taxi operators from one city to the next or, more generally, differences in the earnings of unskilled labour.

$O_L O_L^*$ represents the long-term supply curve; as its horizontal position suggests, we assume that constant costs

Chart 2-4

Long- and Short-Term Supply Curves for Taxi Services

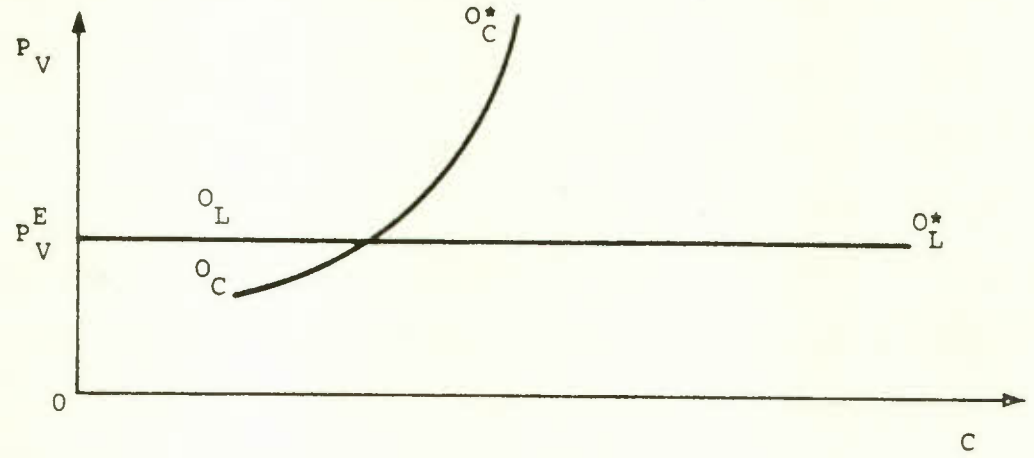


Chart 2-5

Relationship Between the Taxi Occupation Rate and the Waiting Period to Obtain a Taxi

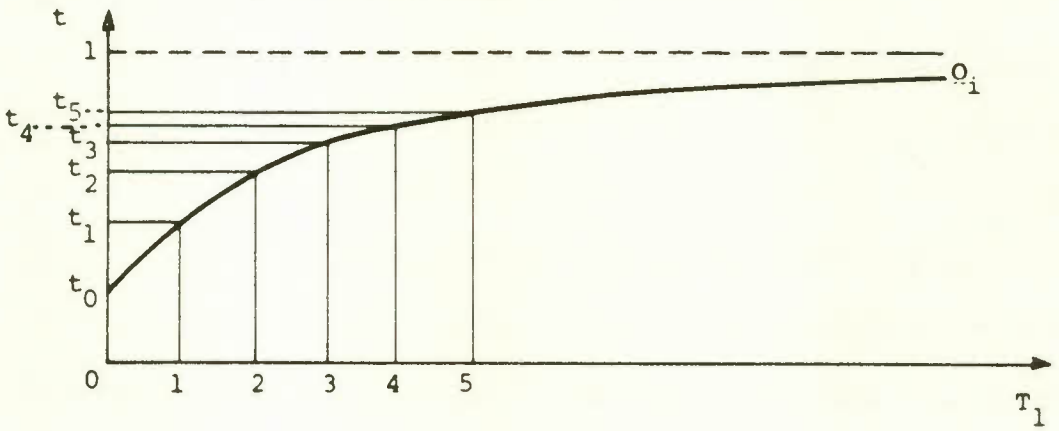
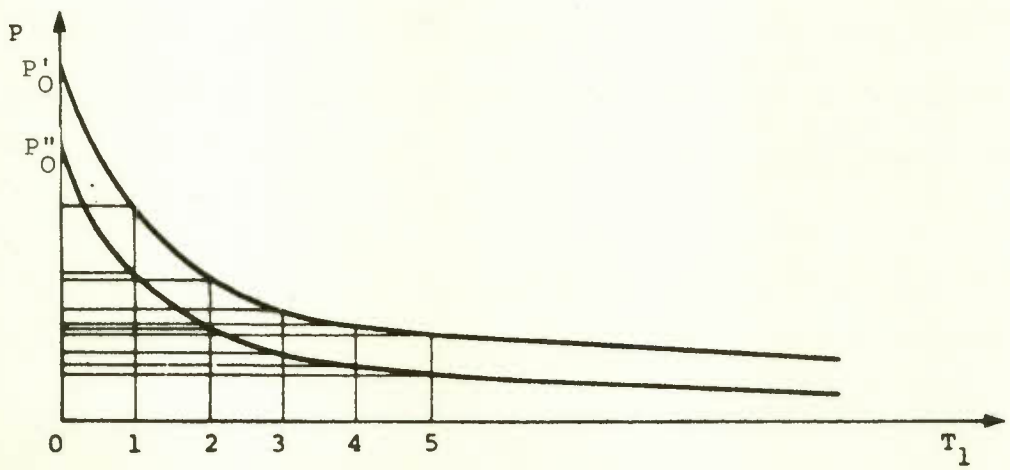


Chart 2-6

Relationship Between the Price of a Taxi Trip and the Waiting Period



characterize production in the taxi industry. For high capacities, this hypothesis cannot be defended but, given the very common factors of production used by the taxi industry and the overall marginal importance of quantities used in the industry, we find this hypothesis to be realistic for the vast majority of Canadian cities and for the variations in capacity that may be considered in our analysis. $O_C O\overset{*}{C}$ represents the short-term supply curve. Its positive slope reflects excessive earnings, temporarily required to increase the industry's capacity. These excessive earnings could be, for example, the amounts necessary to convince a certain number of private carriers -- in this case, drivers -- to market the excess capacities of their means of transport by offering, for example, collective taxi services.

The supply curves above are not expressed in terms of the amount paid by the consumer but rather in terms of the price per vehicle-mile (P_V) and the number of vehicle miles per hour (C). This is explained by the facts that the costs covered by producers are for generating a capacity and that the products consumed are taxi trips. To compare the supply with the demand in Chart 2-2, which is in terms of the posted price, a transformation of the supply curve (we deal only with the long-term supply curve) is necessary.

The supply function ($O_L O\overset{*}{L}$) takes the following form:

$$(5) \qquad P_V = P_V^E$$

In terms of standard trips, equation (5) takes the following form:

$$(6) \qquad P = k\left(\frac{P_V^E}{t}\right)$$

where P represents the price of a standard trip;

t represents the occupation rate; and

k is a constant that transforms occupied vehicle-miles per hour into standard trips per hour, given the characteristics of the standard trip.

The relationship between t and T_1 takes the following form:[11]

$$(7) \qquad T_1 = f(t, Q)$$

where $f_t' > 0$, and

$f_Q' < 0$.

Chart 2-5 illustrates the form of equation (7). It is reasonable to assume that the constant successive increases in waiting period, T_1, are accompanied by increasingly smaller rises in the occupation rate, t, as this variable approaches its maximum value, which is one. Furthermore, the waiting period,

T_1, may take the value zero for a minimum value of t, t_0, fairly close to zero. The curve Q_i in Chart 2-5 is higher or lower depending on the level of consumption, i (when $Q = Q_i$) is a higher curve being associated with a higher level of consumption. In other words, the higher the level of consumption in a given area, the higher the occupancy rate of taxis for a constant value of T_1, without affecting the quality of the service in respect of the waiting period.

Based on equation (6) and (7), supply curve $O_L O_L^*$ can be represented by a set of supply curves in terms of P (on Chart 2-3) corresponding to the six values for T_1 (0, 1, 3, 4, 5) already used to plot the demand curves. As can be seen from equation (7), for a given value of T_1, the higher Q is, the higher t can be. Given equation (6), this implies a negative slope for the supply curves in Chart 2-3. This negative slope is simply a geometrical representation of the economies of density mentioned earlier. The intersection in Chart 2-3 of the supply and demand curves corresponding to some value of T_1 produce for each level of demand a set of possible price combinations taking into account possible consumption levels: MM' in the case of DD', and MM" in the case of DD". Each of these sets, MM' and MM", can be used to reproduce a relationship between the possible fares and the corresponding waiting periods. Chart 2-6 illustrates the form of this relationship. For demand level DD', the relationship is represented by the curve originating from P_O' and for demand level DD" by the lower curve originating from P_O''.

We can make the assumption that the consumer seeks to minimize the total price "P" that taxi services cost him. The total price "P" is at its lowest when the waiting time is at its most reasonable. This can be determined mathematically by calculating the optimum trade-off between fast pickup service at a higher fare and a moderate fare with a longer waiting period. This point is reached when the marginal change at a given demand level in the amount paid out by the customer for a standard taxi trip, relative to the time a customer waits for a taxi, is equal to the value in dollars of an hour of the customer's waiting time ($\frac{dP}{dT_1} = H$). Since the value of a customer's time probably varies among individuals, it is difficult to identify a value for P that meets the above condition. So it would be more realistic to speak of a set of optimum combinations mm' (or mm"), a subset of MM' (or MM"), within which the possible values for P correspond to the dollar costs of customer time, taking account of the range of values most applicable for the clientele dominating the market.

Briefly, the price paid for a standard trip in a given city is determined by three factors: the cost and availability of unskilled labour, which determines P_V in the above model; the level of demand, which determines the importance of economies of density achieved; and the cost in dollars of a customer's time. If the taxi clientele in a city is largely made up of retired people or pensioners with advance knowledge of the trips that they must make, the value of the waiting time to them is lower, thus permitting a higher occupation rate for taxis and therefore

a lower price for a standard trip. Nonetheless, nothing dictates that the price P of taxi services in a given city must be uniform.

In all Canadian cities studied except Fredericton, the price of taxi services is uniform within each city but, in all of these cities except Fredericton, the price is regulated. As demonstrated by the taxi services market in Fredericton, a variety of taxi services with different prices is possible. Similarly, when the price of taxi services is not regulated, nothing rules out a different price for taxi services in the downtown area at rush hour, when the level of consumption of taxi services per square mile is very high, from the price for the same services in the suburbs. The ideal fare system should, in fact, establish such differences in prices, since a given price in a city with highly different levels of consumption at different times or in different areas creates waiting periods of varying lengths and a possible surplus of taxis in the downtown area. Chart 2-3 illustrates this point very well. Assuming that a given city has two different levels of consumption DD' and DD", a uniform rate P^T will create a waiting period of between zero and one (in T_1 units) for one level and between two and three for the other level. Optimally, given the relationship between P and T_1 and the condition for minimizing "P" ($\frac{dP}{dT_1} = H$), the economies of density realized from DD' to DD" should rather be used, partly to reduce T_1 and partly to increase t. This allows a reduction in price P, or a smaller increase in it, if

the taxi slowdown due to congestion calls for such, in order to keep the average revenue of taxis constant. These multiple adjustments following an increase in the level of demand bring not only a variation in T_1, but also a lesser increase in the number of taxicabs, thereby partially alleviating the congestion, rather than reinforcing it.

The model presented above is static in the sense that it does not indicate how the market will function. A static analysis of this type is fundamental, and it serves as a reference for estimating the costs of regulation associated with inadequate resource allocation. But the model does not inform us how consumers make their needs and preferences known, nor how taxi regulation by local or provincial governments changes the dynamics of this situation. This is covered in the next section.

Dynamics of the Market and Control Through Regulation

The absence of natural barriers to entry into the taxi industry and the optimun size of a taxi firm (with one self-employed operator) gives the taxi industry a very fragmented structure, and leads to an industry consisting of a multitude of small operators. These two factors, combined with the relatively homogenous character of the product supplied (the taxi trip), make the taxi industry an "almost" typically competitive industry.[12] It is not perfectly competitive because the

consumer in the taxi services market must purchase a mobility that he does not possess, which therefore severely limits his ability to shop around or to choose between various producers. But this factor has become much less important, and in some cases negligible, with the development of modern communications. For the taxi industry, the most likely method of organizing production for the purpose of efficient resource allocation is through competition, with regulation being assigned a residual role based on the extent of information in the taxi services market.

This characterization is based, among other things, on the impossibility of having a truly destructive competition within the taxi services market. "The chief prerequisites for destructive competition are substantial excess capacity and rigidities that retard the reallocation of capital and labour" (Economic Council, 1979, p. 47). None of these conditions occur in the taxi services market because of the absence of natural barriers to both entry and exit, and because of the relatively unskilled labour found in the industry. Of course, this does not rule out abusive practices between competitors but, as we will see, this has nothing to do with destructive competition. Hence, it is inefficient to use taxi regulation[13] to redistribute income among various categories of consumers; because of its fragmented character, the cost of controlling producers in the taxi industry is exhorbitant. For example, regulating the number of taxis to ensure better average earnings for taxi operators

does not guarantee better service in off hours. Rather, it may subject some customers, at certain times and/or in certain parts of the city, to a degree of discrimination, as drivers operating within the cartel created by such regulation choose the hours and zones of operation that interest them, leaving customers at other hours and in other areas practically without service.

Introducing a regulation may strengthen or weaken the power of a taxi customer over the quantity, nature, and price of taxi services, or it may leave it unchanged. The counterpart of this on the taxi operator's side is his incentive to meet the customer's needs at minimum cost. Here again, introducing a regulation may multiply these incentives, reduce them, or leave them unchanged.

The consumer exercises his power by choosing which operator or group of operators shall serve him, and at the same time avoiding being served by those who, according to his personal evaluation of past experiences, do not meet his needs. The effective use of this power by all consumers means that, from among those qualified and willing to operate a taxi, those who lack the concern and ability to better serve their clientele will be eliminated in favour of those who do have these concerns, thus stabilizing the latter's long-term position in the industry.

In a city that limits the number of taxis, taxi operators with a given dispatch centre providing superior taxi service or

diversified services are not able to meet the needs of new consumers[14] unless competing taxi operators decide to switch to their centre. Since the industry is unable to use outside resources, the consumer is placed completely at the mercy of established taxi operators. Because of the restrictions on the number of taxis, the market therefore generates no incentive for operators to provide adequate or improved service to the public. And what regulation prevents the market from doing, it should therefore attempt to do itself, which would require even more regulation.[15]

In addition to the limits on taxi numbers, regulation can be used to control the supply of taxi services through the fare structure imposed on taxicabs, which may affect both the behaviour of taxi operators and customer habits. Regulation of taxi fares can be characterized with respect to four elements: the hour of the day, the number of miles covered in each trip and/or the time required for each trip, the number of passengers, and before the taxi is engaged, passenger uncertainty about the fare to be charged for a given trip. How regulations deal with these elements partially determines the quantities of taxi services supplied and demanded. Thus, the way in which the regulatory agency handles these first two elements determines whether consumers suffer, for example, from a lack of taxis at rush hours, when taxi operators may lack sufficient incentive to enter traffic at this time of the day. Regulation dealing with the third element may result in incentives favouring individual

use, as opposed to collective use, of taxis. The fourth element touches on the choice between the zone rate and taximeter methods of determining fares.

One advantage of zone rates is that the customer can easily know in advance the exact price of a given taxi trip, since the prices for all possible trips are reduced to a limited number of rates. For the same reason, the zone rate is also much more adaptable to collective taxi service. The only advantage of taximeter rates appears to be that they take into account the two main components of the taxi operator's costs, distance and time, thus automatically adjusting the price to account for any detours necessary or slowness of traffic in a congested downtown area. Zone rates that do not provide a slight supplement in such circumstances may lead to a relative scarcity of taxis.

Another consequence of rate regulation is that the rate structure, whether based on zone rates or taximeters, may hide a real shortage of taxis (itself the result of entry control and even create the illusion of a surplus of taxis.

A closed market faced with an increasing demand for taxi services normally undergoes a reduction in the quality of services provided as the shortage of available taxis mounts. Taxi operators, as the only organized pressure group likely to confront the authorities responsible for setting rates, may therefore request rate increases in keeping with the increasing

demand. Once the rate increases are approved by the authorities, the quantity of taxi services demanded falls in response, thus bringing the occupation rate of taxicabs and the waiting periods required of customers for service back to the levels prevailing prior to the increase in demand.[16] Thus, the rate approval procedure indirectly forestalls the drop in the quality of service normally characteristic of such a supply shortage, and heads off widespread complaints before they begin.

On the other hand, if the approved increases in the rate structure exceed the real increases in cost of operating taxis, then operators must accept a lower occupation rate. The sight of taxis circulating without passengers then becomes more common, thus creating the illusion of a surplus of taxis. This second case may result whether or not there is a regulated limit on the number of taxi permits. Taxi operators themselves therefore have a strong argument ("unnecessary congestion by taxis") for seeking a limit on the number of taxis in free-entry jurisdictions, or stricter limits where one already exists.

An illusion of a surplus of taxis can also arise from a uniform rate structure in a large city, such as Toronto or Montreal, that has a much higher level of consumption in the downtown area. This time, the illusion of a surplus of taxis results, not from a lower occupation rate for taxis, but from a greater number of taxis with a constant occupation rate operating in a given area (see discussion at the end of the preceding section).

A final aspect of the dynamics of current regulation of fares is its effect on the diversity of taxi services offered. The strict fare structures generally in force help to standardize the quality of taxi services, and limit the automobile to very specific uses in public transport, since dispatch centres are deprived of the necessary latitude to develop a diversity of taxi services at various prices. Fredericton is an exception in this respect, since it has allowed development of a local public transport industry based on the automobile that gives residents a choice between individual use of taxis and a slightly cheaper collective use.

An interesting parallel can be drawn here between the effects of taxi rates and those of railway freight rates. In both cases, the rate structure prevents or has prevented the particular means of transportation from profiting from its comparative advantages. The rapid development of the unit train after passage of the 1967 National Transport Act clearly illustrates how unnecessarily high costs of overly restrictive rate structures for a means of transport oppose their rather efficient use.

Now let us summarize. In a production system made up of competing firms, producers have no other choice but to use the available resources to meet the needs of consumers; since the taxi industry fits the characteristics of this system fairly well, competition in the taxi services market is likely to result in the efficient commercial use of a means of urban transport

with no fixed route or schedule. One implication of this competition is that dissatisfied customers can simply turn to another producer, which is a much less costly mechanism for controlling output than asking political authorities to intervene on their behalf through regulation. For competition to play its proper role, however, the consumer must have a minimum amount of information about the various producers offering the same commodity. The expense of informing economic agents is one of the inherent costs of operating a market. Besides preventing unethical practices between competitors, regulation sometimes has an information role to play.

Competition and regulation are, to some extent, both complementary and substitute means for controlling the production of taxi services. The next chapter attempts to determine the optimum combination or optimum method of reaching established objectives. Following this, we assess the restrictive effects of existing regulations.

3 REGULATORY EFFICIENCY

In Terms of Established Objectives

The first category of objectives for taxi regulation, as described in Chapter 1, relates to regulation in general, while the second and third categories relate usually to the more specific sections of the regulations.

Customer Welfare and Maintaining Order

The regulations drawn up to achieve the objectives of customer welfare and maintaining order include most of the sections relating to the taxicab, conduct of taxis, number of taxis, taxi ownership, and the fare structure. Passage and implementation of these obviously requires resources. A taximeter fare structure, for example, requires the operator to purchase or rent a taximeter, inspectors to conduct regular or spot checks of taximeters, public servants and commissioners to grant increases and, finally, the operator's time and money to adjust his taximeter to the new rates. Application of regulations covering taxicabs, their conduct, and ownership, as well as the number of taxicabs, also requires inspectors (specially appointed officers or police officers assigned this task) to conduct checks in the field and civil servants to issue permits, handle complaints, publish regulations, and so on. Besides these direct costs, there are also indirect ones, in terms of economic efficiency,

which result from the restrictions imposed by regulation on the uses of taxis, their number, and the price of taxi services.

In view of the competitive nature of taxi services, in order to determine the optimum role of regulation, we must balance the direct and indirect costs of regulation against the costs of obtaining information on which the consumer can make his selection of the taxi services best meeting his needs.

In a city where a large majority of taxi trips are booked by telephone through a dispatch centre, the market left to itself disseminates enough information through repeat purchases and the reputation of various taxi operators and dispatch centres to maintain the price and quality of taxi services at their optimum levels. There is no distinction, in fact, between the taxi market in such a city and the market for meals home-delivered, for example. In each case, we have an industry with a competitive structure that, in conjunction with the information available to the consumer, invests consumers with an actual power of selection among competing producers, which implies that consumer needs will be met at minimum cost.

But in a city where large numbers of taxi users are from out-of-town or wish to hail taxis on the street in order to reduce the waiting period, regulating the conduct of taxicabs (through the issuance of drivers' permits, for example) provides <u>a priori</u> information to clients. In such circumstances, this

minimum amount of information can be provided to the consumer at a lower cost through regulation than through the market. Drawing up such a regulation, however, means setting some minimum standard of quality and entailing some given minimum costs, which would restrict the diversity of taxi services available. It is impossible to provide a priori information by regulating taxi conduct without also standardizing taxi services to some degree. The rigidity involved, however, would escalate costs rapidly in proportion to the severity of the regulation, as the quality and cost of service became more and more superfluous to the needs of the clientele. Even so, under this type of regulation, the purpose is not to provide the consumer with a taxi driver, security agent, tourist guide, and driving ace all in one, but rather with a minimum of skill and safety that all customers desire.

Along the same lines, giving the consumer the right to require the taxi operator to quote a total price in advance for a given trip would be a desirable and possibly sufficient form, in many cases, of regulating the price of taxi services. Customer welfare and maintaining order do not justify a taximeter rate structure or a limit to the number of taxis. Nor do these objectives justify regulation of the condition of taxicabs, given the high costs of discretionary yet strict application of such regulation,[1] and given the driver's interest in having a taxicab in good mechanical condition and appearance in a competitive market where a good portion of his earnings may depend on it.

With regard to unethical practices between competitors and/or abusive behaviour by taxi operators behind the wheel, competition and/or traffic laws vigorously applied are much more adequate forms of intervention than regulations limiting the number of taxis, which in themselves do little to put an end to this type of practice or behaviour.[2]

Objectives of Equity

Regulation of rate structures and, especially, of taxi numbers is demanded and implemented in the name of fairer distribution of earnings. Debate over taxi regulation for the purposes of achieving a fairer distribution of resources usually refers to only one social group, taxi operators. Our discussion of regulatory efficiency in meeting objectives of equity must obviously look at taxi operators, but we should also discuss the situation of taxi consumers.

We have already stated that competition and regulation are two complementary and/or substitute components of the taxi industry. We do not attempt to demonstrate that, under one or the other of these components, taxi operators' earnings are sufficient, since this issue would lead us far off the path of our research. To provide an answer from the standpoint of equity, we would have to examine the situation of all unskilled workers in our society. We instead attempt to determine how regulations limiting the

number of taxis affect the earnings of taxi operators and at what cost to consumers of taxi services.

By limiting the number of taxi licences, political authorities give taxi operators already holding a permit a monopoly over the production of taxi services. Hence, the supply curve for taxi services becomes vertical beyond a certain level of consumption. Any increase in demand triggers a shift in price and quantity along this vertical portion of the supply curve. The new equilibrium point corresponds to a higher price and a lesser quantity of service consumed than those prevailing in the absence of limitations on the number of taxis. The higher price then produces excess earnings, further confirming the monopoly powers of the established operators.[3]

Through limitations on the number of taxis, the earnings of established taxi operators are thus immediately increased. But these legal constraints do not affect what are called the supply factors. A legal barrier limiting the number of taxi operators is never a natural one. In other words, limiting the number of taxi licences does not change the nature of the taxi operator's work, or the level of skill or training required for this type of work which remains the same. While, under such regulation, not everyone qualified to be a taxi operator retains the right to engage in this type of work, the work itself may remain potentially accessible to just as many people as before. But limiting the number of taxi licences creates a privileged group

among all those who are qualified to work as taxi operators and only those who obtain a taxi licence before such regulation is introduced are entitled to operate a taxi. Those without a licence must obtain one from those with one, under conditions imposed by the latter.

With a limited number of taxi licences, along with an increasing demand for taxi services, there arises an earnings disparity between taxi operators and other workers who could be taxi operators. These disparities create a demand for taxi licences and push up their price, which was nil (aside from issuing fees) before. The new price of the licences is based on both the higher earnings expectations of nontaxi operators wishing to enter the field and on the nonpecuniary advantages and disadvantages inherent in a taxi operator's work. Specifically, the price of a taxi permit is equal to the capitalized value of the net differences (plus or minus the nonpecuniary advantages and disadvantages) in earnings between the two groups of workers. In addition to the disparities or excess earnings enjoyed by taxi operators who enter the industry before the number of licences is limited, a large capital gain can also be realized by selling the licence. Table 3-1 presents the estimated market value of permits in six Canadian cities (column A) and computes the differences in earnings facing taxi operators who have entered the field before or after the restrictions on the number of taxis (column C).

Table 3-1

Direct Cost of Limitations on the Number of Taxis,
Selected Canadian Cities, 1978

	A	B	C	D	E
	Market value of licences	Capital stock tied up in licences[1]	Differences in earnings due to restrictions on the number of taxis[2]	Transfer of earnings from consumers to taxi operators[3]	Transfer in D expressed as a percentage of the price of a standard trip[4]
					(Per cent)
Quebec City	$12,000	$ 7,764,000	$1,680	$1,086,960	7.5
Montreal	8,000	51,448,000	1,120	7,202,720	5.1
Ottawa	11,000	7,909,000	1,540	1,107,260	6.8
Toronto	25,000	62,275,000	3,500	8,718,500	14.3
Winnipeg	15,000	6,000,000	2,100	840,000	9.1
Vancouver	40,000	14,520,000	5,600	2,032,800	21.1

1 These amounts were obtained by multiplying A by the number of licences (Table 2-1).

2 These amounts were obtained by making the conservative assumption that the annual capital cost in this market is approximately 14 per cent, and therefore taking 14 per cent of the market value of licences.

3 These amounts were obtained by multiplying C by the number of licences (Table 2-1).

4 These amounts were obtained by dividing C by the annual average number of standard trips for a taxi, and expressing the result as a percentage of the price of a standard trip. The number of standard trips was first obtained by dividing the average gross annual earnings of a taxi (see Lea and Associates Ltd., 1974) plus the cost of capital tied up in licences by the price of a standard trip. The average gross annual earnings of a taxi and the price of a standard trip in the various cities were $22,447 ($20,767 + $1,680) and $4.00 in Quebec City, $21,887 and $3.90 in Montreal, $22,307 and $4.10 in Ottawa, $24,267 and $3.36 in Toronto, $22,867 and $3.97 in Winnipeg, $26,367 and $4.12 in Vancouver; the average annual number of standard trips deduced is 5,612 for Quebec City, 5,612 for Montreal, 5,441 for Ottawa, 7,222 for Toronto, 5,760 for Winnipeg and 6,400 for Vancouver. The amounts in column C divided by these numbers give us 30 cents for Quebec City, 20 cents for Montreal, 28 cents for Ottawa, 48 cents for Toronto, 36 cents for Winnipeg, and 87 cents for Vancouver. The average gross annual earnings estimated in the survey of the taxi industry in Canada (Lea and Associates 1974) had to be indexed. The details of this operation and the estimation of the taxi occupation rate and the number of standard trips are presented in Papillon (1981, Appendix 2).

SOURCE Table 2-1.

Thus, veteran drivers fully or partially benefit from excess revenues without having to pay a high price for their licence. But, for a novice taxi operator, the situation is not improved by limiting the number of licences. Someone who wishes to enter the industry must compete with all potential taxi operators and, to obtain a licence, he must agree to pass on all excess earnings resulting from the limitation to the person selling the licence by paying him a price equal to the capitalized value of these excess earnings. In order for the new entrant to gain access to these net excess earnings, there must be new increases in demand and/or increases in fares with little or no drop in demand as a result of the higher fares. Since the demand for taxi services cannot be expected to grow indefinitely in a given area, we can predict that, in time, the increases in earnings will cease or result solely from fare hikes with little or no drop in demand as a result of the higher fares.

Greater stability of taxi operators' earnings is an argument sometimes used to justify limiting the number of taxis. Since demand may be greater than supply after such regulation is introduced, it follows that the taxi operator may be less sensitive to the fluctuations in the demand for taxi services that occur in certain seasons and days of the week, but his annual earnings are no more stable. This pseudo-stability means primarily that the taxi operator has more latitude in setting his working hours while still achieving the level of earnings he has set as a goal.[4] Limiting the number of taxis in this context

only eliminates or cushions the nonpecuniary disadvantage in taxi driving of working split shifts, but does not stabilize a taxi operator's earnings. In fact, such limitations may actually amplify the effects of normal instability[5] in the taxi services market for an owner/operator. Since he owns his taxi, the excess fares that he collects following a favourable change in the market (increase in demand and/or increase in fare with little or no change in demand) are a net gain for him. But just as the market can shift in his favour, it can also turn against him. Should there be a decrease in demand and/or an increase in fares that in turn reduces demand, the excess earnings that he collects as a taxi owner would not cover the cost of the capital tied up in purchasing a licence, in which case the net excess earnings would be negative, and his earnings would drop accordingly.

Limiting the number of taxis is therefore no remedy for possible instability in the taxi services market. Quite the contrary, by increasing the fixed costs, especially the cost of capital tied up in the purchase of a licence, such limitations amplify the instability of earnings of a taxi owner, whether he operates his cab himself or not.

We must now consider the equity in limiting the number of taxis from the consumer's point of view. Whether the excess earnings of a taxi owner are partially or totally absorbed by the cost of capital tied up in the purchase of his licence, they still

constitute an additional cost to the consumer, once regulations limiting the number of taxis are introduced. This cost may be borne by the consumer directly through higher fares and/or indirectly through a longer average waiting time. The transfer of earnings from consumers to taxi owners as a result of the cost imposed by limits on taxi numbers is given for six Canadian cities in column D of Table 3-1. Column E of the same table shows the portion of the price of a standard trip represented by this transfer of earnings or excess earnings to taxi owners, which is nothing more nor less than a tax imposed on consumers.

This transfer of earnings is difficult to reconcile with the objective of equity. Those who pay this transfer are those who are most dependent on taxis -- in other words, those least able to reduce their use of taxis in response to higher fares. The majority are people with low incomes who cannot afford their own car.

Such regulation is doubly difficult to justify on grounds of equity when one considers that the other primary method of public intervention in urban transport -- the practice of subsidizing the local monopoly for bus (and sometimes subway) transit -- leaves only 45 to 80 per cent of the real costs of providing transportation to be paid by passengers (see Table 2-1). Taxi customers, however, must pay the full cost of providing the transportation, plus a supplement of 7.5 to 21.1 per cent (see Table 3-1) over and above these costs in areas where licences are limited. Yet there is no proof that mass transit generally

serves a lower-income clientele than taxis. It would even appear in recent decades that mass transit has met the needs of the underprivileged to a decreasing extent, while taxis have increasingly fulfilled this role (see Chapter 2).

Reducing Congestion and Pollution and Energy Conservation

Since taxis are often accused of impeding traffic, an additional objective in limiting the number of taxis is to reduce congestion and, implicitly, pollution, and energy waste. As most vehicles are guilty of these three evils or costs, the discrimination through regulation against one type of vehicle in particular can hardly produce effective results. An overall view of the costs of each means of transport, both public and private, is necessary when approaching these issues.

To effectively fight pollution, congestion, and energy waste, all economic agents must have incentives to do their fair share in proportion to their contribution to them. Since all means of transport impede the flow of traffic, pollute, and use energy, any necessary restrictions must be imposed on all. If we wish to fight pollution or save energy, it is obviously not efficient to limit only one class of automobiles, namely taxis, or even to restrict the urban use of only automobiles, whether private or public, and not other means of transportation. One must suffer from a serious prejudice to believe that the automobile is the sole cause of all our cities' problems and that mass transit is

the panacea. If we examine just the issue of energy use, the subway with its present occupation rate uses more energy per passenger-mile than the new U.S. automobiles are expected to use over the next few model years, given the present occupation rate for automobiles (Transport Canada, March/April 1977, p. 21). Moreover, by adapting more efficient technology such as the diesel engine, to automobiles as well as to buses, the automobile would probably use less energy per passenger-mile than buses, again given present occupation rates. Given the current very low occupation rate for cars,[6] even a slight increase would give the automobile just as bright a future as buses and subways, if our concern for cleaner air and more livable cities continues to grow.

In Terms of Resource Allocation

Inefficiency of Restrictive Forms of Regulation

We refer above to the indirect costs of regulation, which represent the welfare loss resulting from inadequate resource allocation to meet the needs of the public. In view of the influence of regulation on resource allocation, a measurement of the costs of regulation must include this loss as well as the more direct costs of administration discussed earlier.

It is quite possible to imagine a regulation that is fully effective in achieving certain objectives at very minimal direct costs, and yet is completely ineffective economically. One example would be a regulation intended to ensure that operators are honest and well-qualified, but which imposes such strict criteria that only a handful of highly recommended individuals are accepted in a city of several hundred thousand inhabitants. This regulation would be very effective in terms of its objectives, which would be achieved at very low direct costs, but it would be completely ineffective economically, since it would reduce the taxi industry to a fiftieth or perhaps even a hundredth of its optimum size. Given the essential role that this industry plays in public transport, such suboptimum utilization of taxis would lead to a welfare loss and an enormous waste for the community. Citizens very dependent on taxis (who are often unable to obtain an automobile) would in the majority of cases no longer have access to such essentials as supply centres for food and health. The welfare loss is quite obvious here. Citizens less dependent on taxis but still consuming a large quantity of taxi services under normal circumstances would have to turn to more costly means to meet these needs. For example, they would have to rely more on a private automobile, which they would have to purchase or rent. This would require more parking in the downtown area, and create excessive and even more inefficient use of the private automobile, since its marginal cost of utilization is extremely low once it has been purchased.

Although the above example is an extreme case, it is a good illustration of the nature of indirect costs of an unnecessarily and inefficiently restrictive regulation, as is the case for regulations that limit the number of taxis or fix rates to prevent the less costly collective use of taxis. The quantities of taxi services consumed and produced are among the many determinants of the population's level of well-being. Since an inefficient regulation raises the utilization cost for taxis (that is, the fare paid and the waiting period), the population consumes fewer taxi services than would be possible under efficient regulation with a lower utilization cost. Thus, inefficient regulation forces people to opt for poorer secondary choices to compensate for the loss of taxi services and so to suffer a drop in their well-being.

Economic theory has developed a concept of the consumer surplus, which helps us to calculate the collective decline or welfare loss. Using this concept and the knowledge acquired in Chapter 2 on the demand and supply of taxi services, we can produce an estimation of the welfare loss for nine Canadian cities or, in other words, of the real waste of resources resulting from restrictive regulations that limit the number of taxis or prevent collective use of taxis. Appendix B presents our estimation method in detail and the assumptions made in the process, while Table 3-2 gives the results of that estimation.

Table 3-2

Annual Welfare Loss Resulting from Restrictive Forms of Regulation, Selected Canadian Cities, 1978.

	A	B	C	D	E	F
	Welfare Loss resulting from limiting the number of taxis	Increase in number of taxis in absence of "A"[1]	Welfare loss resulting from noncollective use of taxis	Increase in number of taxis in absence of "C"[2]	Total increase in number of taxis: (B + D)[3]	Estimated optimum number of taxis per 1,000 inhabitants[4]
Halifax	--	--	$1,005,708	189	189 (23 %)	8.34
Montreal	$184,062	328	$8,629,935	1,534	1,862 (29 %)	3.41
Quebec	$ 40,759	48	$ 887,825	158	206 (32 %)	1.93
Toronto	$617,417	356	$3,634,434	648	1,004 (40 %)	1.62
Ottawa	$ 37,243	49	$ 979,764	175	224 (31 %)	1.36
Winnipeg	$ 37,739	36	$ 554,263	100	136 (34 %)	.93
Calgary	--	--	$1,014,305	180	180 (23 %)	2.07
Edmonton	--	--	$1,158,256	207	207 (23 %)	2.02
Vancouver	$213,235	77	$ 561,272	100	177 (49 %)	1.32

1 Limiting the number of taxis leads to an increase in the price of taxi services, which in turn reduces the demand for taxi services. The number of taxis estimated in column B represents the number of additional taxis required in the absence of this drop in demand.

2 A rate structure preventing the collective use of taxis represents an increase in the price of taxi services, which in turn reduces the demand for taxi services. The number of taxis estimated in column D represents the number of additional taxis required in the absence of this drop in demand.

3 The figures in parentheses represent the total percentage increase over the present number of taxis.

4 The values in column E were added to the present number of taxis (see Table 1-2) and divided by the population in thousands.

SOURCE See Appendix B.

The estimated annual welfare loss resulting from regulation limiting the number of taxis in cities where such regulation is in force is shown in column A of Table 3-2. Based on this first estimate, we can compute the optimum or efficient number of taxis in these various cities, temporarily excluding the inefficiencies resulting from regulatory restrictions on the collective use of taxis. Column B of Table 3-2 shows the increase in the number of taxis indicated.

Repeating this operation for restrictions on the collective use of taxis requires assumptions of a much more general nature (see Appendix B). The general size of the amounts estimated, as shown in columns C and D, is nonetheless interesting. Comparison of columns C and A also clearly indicates the value of the major inefficiencies to be eliminated by lifting prohibitions on the collective use of taxis in conjunction with the abolition of limits on the number of taxis.

Column E indicates the total approximate increases in the numbers of taxis required for efficient utilization of taxis in urban transport, temporarily excluding the inefficiencies that may result from policies regarding other means of urban transport that are complements or substitutes for the taxi. These increased numbers of taxis would produce no drop in the net average earnings of taxi drivers. They are merely the result of increases in the demand for taxi services resulting from the abolition of certain restrictions imposed by regulation. The last column in Table 3-2 gives the approximate optimum ratio of

taxis per 1,000 inhabitants, and these amounts can be compared to the corresponding amounts in Table 1-1 indicating the present ratios.

Finally, the calculations leading to the estimates in Table 3-2 do not take into account the economies of density. As Chapter 2 shows, economies of density characterized a growing consumption of taxi services. Hence, our estimates here are quite probably conservative, in view of the large increases in the level of consumption of taxi services that would accompany abolition of the restrictions imposed by regulation.

Maximizing Efficiency

Faced with the rapid growth of the automobile with its low occupancy rate, governments have increasingly supported mass transit over the last two decades, despite major difficulties, either in the hope of reversing this trend or because they consider it to be a panacea for the problems of our modern cities.[7] This political orientation is based primarily on the assumption that the automobile and mass transit are substitute means of transport. When the irreversible growth of the automobile failed to fit this assumption, various refinements were tacked on, such as the favourable treatment given drivers by the construction of road systems[8] -- as if one need only construct freeways to get people out in their cars -- or the

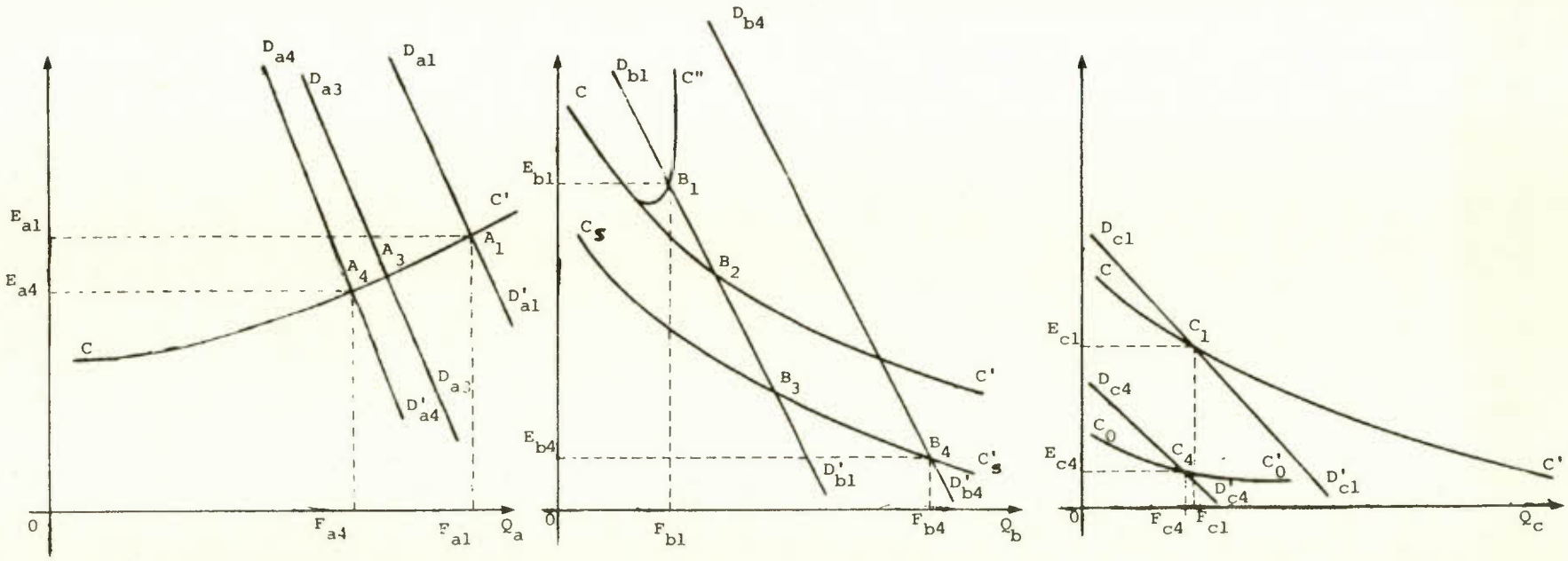
North American's mysterious attachment to his car. The prevailing view was that such irrational behaviour called for corrective government intervention.[9]

Following our discussion in Chapter 2, it becomes apparent that the political orientation described above is based primarily on a flagrant lack of historical perspective. The city dweller's parting with mass transit is intimately linked with the gradual change in his lifestyle and with the limited choices open to him to develop an effective means of transport adapted to that change. Hence, the hypothesis that mass transit is a substitute for the automobile is utterly incorrect. On the contrary, in modern cities, these means of transport complement each other. Given the ways in which taxi regulation is used by authorities to ensure the survival of conservative mass transit (see Chapter 1), reform of taxi regulation cannot be considered without looking at the policies applied to other means of urban transport, especially mass transit.

Chart 3-1 presents, for a given transport infrastructure, the cost curves of the three major means of urban transport -- mass transit, taxis, and the private automobile -- and shows the consumption levels for each. Each curve represents the total cost, not just the cost paid by the consumer. For mass transit, the total cost includes the price of a bus ticket, the average amount of subsidies paid for each ticket sold, the time the consumer spends in travelling (waiting time plus time aboard the

Chart 3-1

Cost Curves for Major Means of Urban Transport



vehicle) and, finally, the time and energy provided by the consumer to complete his trip, from his point of origin (his home, for example) to the boarding point for a mass transit vehicle and from the point where he leaves the mass transit vehicle for his final destination. Economies of network and density for mass transit mean shorter waiting times because the frequency of service is higher, and so an increasingly smaller amount of time and energy is required to complete the trip, because of the larger number of places served by mass transit. These factors explain why cost curve CC' in panel C of this table has a negative slope, indicating that the average total cost of a standard trip decreases as the level of consumption increases in a given area. The variance in the total cost of a trip may be high, if mass transit serves the suburbs and the downtown area outside rush hours, when customer density is very low throughout the network.

Panel B shows three cost curves for taxi trips. Curve CC" represents the cost of a taxi trip when regulation limits the number of taxis and prohibits collective use. Curve CC' represents the cost of a taxi trip when regulation does not limit the number of taxis but prohibits collective use of taxis. Curve C_SC_S' represents the cost of a taxi trip when taxis can be used both individually and collectively. Taxis in individual or collective service are lumped together here because their first characteristic is the lack of an established route or schedule, so individual or collective service is a secondary variant that

is sometimes overlooked by the market (as in Fredericton). Once again, the total cost is shown, including the amount paid by the consumer plus the time that he must contribute. Because economies of density reduce the waiting period, the three cost curves have negative slopes except for CC" in the portion where regulations limiting the number of taxis are in effect.

Panel A shows the cost curve for a standard trip in a private automobile. There are no economies of density in this case, since the driver, being both producer and consumer does not have to wait, while traffic congestion at some times and places causes the total average cost of a standard trip in a private automobile to rise, giving the cost curve a positive slope, as the level of utilization increases.

Let us now consider these three means of transport in a city of average size where N number of trips per hour are made by residents or visitors for various reasons, including commuting to work, cultural recreation, tourism, and so on. N is a function of the price paid and the means used to make these trips. Since unproductive means of transport require a much larger quantity of infrastructures, they can actually disperse and compartmentalize a city, thus increasing the number and length of trips that the population must make. Given the quality of service and the price to be paid by the user for each of these means (which does not directly appear in the various parts of Chart 3-1), we can derive

a demand for each means. The three demand curves shown in Chart 3-1 -- $D_{a1}D'_{a1}$, $D_{b1}D'_{b1}$, and $D_{c1}D'_{c1}$) -- represent roughly the demand for each of these means in a Canadian city that prohibits collective taxi use and limits the number of taxis.

Abolishing regulations that limit the number of taxis and prohibit collective use of taxis shifts the equilibrium point from point B_1 to point B_3 in panel B. Such a large reduction in the cost of a public tranport service with no fixed schedule or route causes a reduction in the demand for the private automobile as the substitute means of transport -- that is, private transport with no established route or schedule. In light of the reasons leading a city dweller to purchase a car, outlined in Chapter 2, a reasonably priced public transport service with no established route or schedule may convince many single people, couples without children, or people living near the downtown area to forgo owning a car, and may convince many suburban families to forgo a second or third car. This effect is portrayed in panel A by a shift to the left in the demand curve from $D_{a1}D'_{a1}$ to $D_{a3}D'_{a3}$.

The effect on the demand for mass transit services of abolishing restrictive taxi regulations depends on many factors, primarily the roles played by mass transit. If this system serves low-density markets in which collective taxis have comparative advantages, the appearance of the latter may reduce the demand for mass transit services, depending on the price

charged to users of these services. If mass transit is highly subsidized in these markets, the appearance of collective taxis has a more limited effect.

The recent case in Fredericton clearly illustrates the restrictive effect that mass transit subsidies can have on the role of the individual and collective taxi. In this city, as far back as we can trace, both collective and individual taxis have always been allowed and, up to 1975, mass transit was not subsidized, although a private company had a monopoly on service over the routes for which it could cover its expenses.[10] In 1975, the city took over the mass transit, which was highly subsidized by various levels of government, thus reducing the number of taxis by almost 40 per cent. This harmful effect on the taxi industry was not caused by the subsidies themselves, but rather by the fact that they were used primarily to extend mass transit services into markets, such as downtown outside of rush hours or suburbs, for which the combined individual and collective taxi was a less costly means of transport, instead of using these subsidies solely to lower fares on routes that would not have run a deficit in any case.

Since it appears that the use made of these mass transit subsidies in Fredericton is fairly characteristic of the use generally made elsewhere, to extend services into markets where customer density is insufficient in all cases to cover all costs, we can make the following rough assumption: mass transit

subsidies can generally be expected to reduce the size of the individual and collective taxi industry by at least as much as half the ratio of these subsidies to the total cost of the mass transit services. This assumption can then be used to re-estimate the optimum number of taxis per 1,000 inhabitants shown in Table 3-2, this time taking into account the increase due to removal of the restrictive effects of mass transit subsidies on the size of the taxi industry.

The results appear in Table 3-3. Column A shows the absolute number of taxis, while columns B and C correspond respectively to columns F and E (figures in parenthesis) of Table 3-2. These estimates reveal that the present size of the taxi industry is well below its optimum level. In Montreal, for example, the optimum number of taxis is almost 70 per cent more than the current number while, in Vancouver, the optimum number is more than double the present one. Obviously, these are only very rough estimates, but their magnitude is significant and probably conservative in light of the number of taxis per 1,000 inhabitants in Washington (see Table 1-1), where use of the automobile in public transport appears to have been subjected to far fewer restrictive policies.

Since Chart 3-1 is intended to apply to a typical Canadian city, the demand curve originally plotted $D_{c1}D'_{c1}$, assumes that mass transit fares are subsidized. Moreover, the demand curves plotted for the other means of transportation take this

Table 3-3

Estimated Optimum Number of Taxis in the Absence of Restrictive Subsidization of Mass Transit, Selected Canadian Cities, 1978

	Optimum number of taxis	Optimum number of taxis per 1,000 population	Increase over present number
			(Per cent)
Halifax	1,131	9.27	36
Montreal	10,770	4.42	67
Quebec	1,153	2.61	78
Toronto	3,927	1.82	58
Ottawa	1,319	1.90	83
Winnipeg	719	1.24	80
Calgary	1,154	2.46	45
Edmonton	1,441	2.60	58
Vancouver	750	1.83	107

SOURCE See Appendix B.

into account. The problem now is to incorporate into Chart 3-1 the changes resulting from abolition of mass transit subsidies.

Mass transit ideally would operate only on routes where costs can be recovered, whereas mass transit subsidies are now used primarily to extend service to low-density markets (thus increasing the total average cost for a trip by mass transit). Hence, the new cost and demand curves for mass transit in this ideal situation, $C_OC'_O$ and $D_{c4}D'_{c4}$ in panel C of Chart 3-1, are below and to the left of the preceding curves. In panel B of Chart 3-1, the new demand curve, $D_{b4}D'_{b4}$, is located to the right of the demand curve incorporating the presence of subsidies, since subsidized mass transit operates in a market that would otherwise be supplied by individual and collective combined taxis. For the demand curve in panel A of Chart 3-1, no observation can be made in a specific case, as in Fredericton, but it is reasonable to assume that a new demand curve, $D_{a4}D'_{a4}$, would be located to the left of the preceding curve, because economies of density achieved in taxi transport following abolition of subsidies to mass transit would make it even cheaper than the private automobile, for which it is a substitute.

The entire discussion above raises the question of how abolition of the restrictive regulation of taxi services would alter the allocation of trips by city dwellers among the various

means of transportation. An attempt to justify reform or maintenance of the status quo by examining only the means of transportation directly affected by this regulation -- namely taxis -- would be just as partial and insufficient as an attempt to justify mass transit subsidies through the objective of minimizing its operating costs and supporting a marginal cost rate structure.[11] Seeking economies of network or density through a subsidy for one given means of transportation precludes achieving them for another, so our prime objective should be to determine what transport services can meet all of the city dweller's transit needs at a minimum total cost.[12]

According to Chart 3-1, the total cost of transport services by private automobile, taxi, and mass transit, including the restrictive regulation of taxis and the subsidies for mass transit, is represented by the sum of the areas $OE_{a1}A_1F_{a1}$, $OE_{b1}B_1F_{b1}$, and $OE_{c1}C_1F_{c1}$. A new allocation of residents' trips would result from the abolition of the restrictive regulation of taxis and the rationalization of mass transit services, such that subsidies are abolished or used strictly to reduce fares on routes where customer density is normally sufficient to cover costs. The total cost of transport services produced by the three means would then be represented by the sum of the areas $OE_{a4}A_4F_{a4}$, $OE_{b4}B_4F_{b4}$, and $OE_{c4}C_4F_{c4}$. We have no estimate for the reduction in the total cost represented by the difference between these two total areas, but we can estimate the welfare loss (column A plus column C of Table 3-2) resulting from the

restrictive regulation of taxis. Although this amount partially excludes the rationalization of taxi transport services that would follow a change in mass transit subsidy policies, it represents a lower limit for the size of the reduction in the total cost of transportation, which is obviously by no means negligible.

The optimum allocation among the various means is, among other things, a function of N, the number of trips per hour made by the population of a specific city. Prices that reflect costs, in our opinion, are still the best guide for seeking this optimum combination of the various means. Nonetheless, payment of subsidies to one particular means is not ruled out, but care must be taken to ensure that such subsidies are not used by the system receiving them to extend its services to markets where it is not efficient. Furthermore, if subsidies must be paid to a specific means of transport in the name of fairness, it is not at all evident that mass transit would be the one selected.

The poor, with no access to an automobile, primarily require a transport service that is a low-cost substitute for the private automobile, and the combined individual and collective taxi is exactly this substitute means. As in indication of this basic need of the poor, even when expensive taxis in individual service are the only form of door-to-door public transport available, the poor continue to comprise a major portion of this clientele, as discussed in Chapter 2. On the other hand, mass transit used

efficiently links suburban neighbourhoods, bringing the middle or upper classes to the downtown area, where it serves the main thoroughfares. If subsidies must be paid to one means of transport in the name of social justice, it appears that taxis serving the poor would be the primary candidate.

Price notwithstanding, it may prove necessary to grant an exclusive monopoly to mass transit during some hours and on some major downtown streets -- thus restricting taxis -- in order to ensure effective operation of its large transport vehicles. Otherwise, there may be a risk of having two collective transport services competing for the same clientele on streets that are already congested.

Finally, establishing the relationships between the various means of transport raises the issue of which level of government is to be responsible. In view of the local nature of transport services provided by the three means considered above, local governments, in our opinion, are naturally the authorities best suited to provide an adequate legal framework. In this context, the mass transit subsidy policies implemented by the federal and provincial governments over the last decade or more have, in most cases, ignored the complementary or substitute means of transport -- Fredericton being a typical case -- and have generally transformed local governments into milch cows for a transport system condemned to a perpetual deficit. This has reduced them to even greater dependence on the senior levels of

government. Such practices by Ottawa and the provinces are an example of policies that are utterly incompatible with local responsibility for urban transport.

4 CONCLUSIONS

The taxi is, above all, a means of transportation without a fixed route or schedule, which makes it flexible, rapid, and comfortable -- a substitute for the private automobile and a complement to mass transit. These characteristics explain the large proportion of taxi customers who have no access to an automobile, especially the retired, the disabled, students, housewives, and the poor. A city's floating population, comprising tourists, businessmen, and so on, also makes up an important share of the taxi industry's clientele. Nonetheless, the taxi's present role in urban transport remains very limited in view of its enormous potential, primarily because it is very strictly regulated.

Approximately 60 per cent of the regulations studied here limit the number of taxis, and all regulations, except a few, such as that in effect in Fredericton, prohibit public collective use of taxis and set the price of taxi services. This effectively pushes up the cost of taxi services in the Canadian cities studied by 30 to 50 per cent. These restrictions are also accompanied by an imposing number of other regulations regarding the condition of taxicabs, taxi conduct, ownership, and, occasionally, the marketing of taxi services. And yet none of the declared objectives of these regulations justify their present, very costly form.

Based on our study of the taxi industry's characteristics, it appears that competition constitutes -- as is the case for many other industries -- the main component of the organization of production most likely to achieve efficient resource allocation. Regulation then takes a residual role regarding information costs in the taxi services market. In small or medium-sized cities, the information costs do not justify the use of regulation because the market can produce the necessary information at a lower cost than can regulation. In larger cities, however, with a large floating population and where hailing of taxis on the street significantly reduces the consumer's waiting time, regulating taxi conduct to guarantee a minimum level of skill among taxi drivers and to exclude individuals with little to recommend them is justified to the extent that it can produce the information that all consumers seek at a lower cost than the market, a priori. It should be noted, however, that beyond the minimum criteria for skill, regulation becomes economically inefficient, because the inevitable standardization of taxi services accompanying it imposes unnecessary costs on an increasingly large proportion of consumers. The only form of price regulation that seems to be justified is the requirement to display on the outside of taxis the fares charged by operators or the requirement for operators to quote in advance the total price for a trip for any customer making such a request. For someone unfamiliar with the geography of a city, posting the price per mile covered or per minute (as currently established

through taximeters) gives little information on the cost of the service that he is intending to use and thus leaves him at the mercy of the operator.

The recommended level of regulation from the point of view of economic efficiency should therefore be much less than that now in force. From the viewpoint of fairness, regulations limiting the number of taxis and setting prices have an illusory if not a distorting effect. In fact, limiting the number of taxis does not change the supply factors in the economy. The excess earnings that may result from an increase in demand when the number of taxis is limited is capitalized in the market value of licences. When a former owner retires after pocketing such capital gains, the net earnings of his successor will return to their previous level. But for a driver renting his vehicle, such limitation may only have a negative effect, since the rent is retained by the licence holder, who now is a member of a cartel. Furthermore, the rise in the cost of taxi services resulting from such limitation will particularly affect poor customers who rely on taxi services for their transportation needs.

Mass transit subsidies also can prevent taxis from playing an optimum role in urban transport. When these subsidies are used -- as most often appears to be the case -- to extend the transit network into markets where the combined individual and collective taxi is best suited to serve at the lowest cost, the role of the latter is restricted, and potential economies of density are not achieved.

Therefore, to achieve more efficient utilization of taxis in urban transport, changes are necessary in their regulation as well as in some mass transit policies. This raises the issue of the cost of such changes. The most notable cost is the loss, following abolition of limits on the number of taxis, suffered by operators holding taxi licences in a city where such licences have a high market value. One solution may be to ignore this cost, as was done in 1946, when the City of Montreal decided to issue new licences at a time when those already issued had a market value of about $5,000. For obvious reasons, we find such a solution unacceptable in the present context. In buying back the taxi licences from taxi operators at the current market value, all or part of mass transit subsidies, in our opinion, are an excellent source of funds.

In the case of the City of Montreal, for example, the amount of subsidies paid to mass transit in a single year are more than adequate to buy back all licences in the Montreal region. In some cities such as Toronto, it may be necessary to use subsidies covering more than one year while, in Ottawa, subsidies for just six months are fully adequate. This temporary transfer of funds from mass transit to taxi transport can be justified in terms of both efficiency and equity. First, these subsidies are used to support mass transit in markets where it is an inefficient means of transport, which the combined individual and collective taxi can better replace, once the restrictions governing it are abolished. Second, this transfer would make it possible to give

taxi operators fair compensation. At the same time, abolition of the restrictions on taxis would permit a reduction in taxi fares, while the transfer would ensure that savings are passed on to the poor, whose needs are met more specifically through taxis than through mass transit.

Introducing collective taxi service, however, may require regulation of the use of major arteries during rush hours. It may be desirable to give large mass transit vehicles exclusive rights to serve collective transport customers there, in order to ensure their efficient use. This particular aspect raises the more general problem of optimum determination of the role of each means. There is no miracle solution for organizing all the technical details inherent in the co-existence of various means of transport but, in our opinion, price reflecting costs should be the governing principle. This does not rule out, for reasons of equity or external effects, subsidies for a specific means, so long as they do not lead a subsidized system to take on inefficient roles. Moreover, because a subsidy financed through taxation prepays part of the fare for the selected means, city residents who opt for a cheaper mode of transportation, such as walking or bicycling, cannot pocket the entire amount of the fare saved, and so their incentive to be cost-conscious, by reducing their consumption of transport services or by choosing to live downtown rather than in the suburbs, is reduced.

In general, the reform proposed above requires a change in attitudes. As K. W. Studnicki-Gizbert (1975b) points out so well, the general public and planners and lawmakers in particular must learn to give more consideration to the efficiency of small independent carriers, which has been too often and too long ignored.

APPENDIX A: SOURCES OF INFORMATION

List of Regulations Analysed[1]

Yukon -- By-Law 617, City of Whitehorse.

Northwest Territories -- By-Law 2137, City of Yellowknife.

British Columbia -- By-Law 3102, District of Burnaby; By-Law 38, District of Coquitlam; By-Law 28-3, 1975, City of Kamloops; By-Law 2548, Township of Richmond; Taxi By-Law, 1976, City of Victoria; and By-Law 4299, City of Vancouver.

Alberta -- Taxi Commission Regulation 1/78, City of Calgary[2]; and By-Law 1285, City of Edmonton.

Saskatchewan -- By-Law 5628, City of Regina; and By-Law 5049, City of Saskatoon.

Manitoba -- Revised Regulation T10-R1 (Winnipeg);[3] By-Law 2393, City of Brandon; and By-Law 902-77, City of Thompson.

Ontario -- By-Law 22 of the Board of Police Commissioners, City of Brantford; By-Law 52 of the Board of Police Commissioners, City of Guelph; By-Law 2(1978) of the Board of Police Commissioners, City of Kingston; By-Law 1/69 of the Board of Police Commissioners, City of North Bay; By-Law 45 of the Board of Police Commissioners, City of Peterborough; By-Law 43 of the

Board of Police Commissioners, City of Sarnia; By-Law 29 of the Board of Police Commissioners, City of Sault Ste Marie; By-Law 2-72 of the Board of Police Commissioners, Regional Muncipality of Niagara; By-Law 20-1971 of the Board of Police Commissioners, City of Thunder Bay; By-Law 73-342, City of Hamilton; By-Law L. 87-328, City of London; By-Law 411-74, City of Mississauga; By-Law 29-74, City of Oshawa; By-Law L-6 (Schedule No. 19), City of Ottawa; By-Law 78-100, City of Sudbury; By-Law 24-75, Regional Municipality of Waterloo; By-Law 5900 (Schedule No. 26), City of Windsor; By-Law 107-78 (Schedules Nos. 8, 29), Municipality of Metropolitan Toronto; By-Law 120-1974 (Schedules A-A, A), Town of Burlington; By-Law 96(1973), Township of Gloucester; By-Law 45-74, Town of Markham; By-Law 34-73, Township of Nepean; and By-Law 1973-179, Town of Oakville.

Quebec -- Regulation 6 on taxi transport.

New Brunswick -- By-Law 110, City of Fredericton: A By-Law respecting the regulating and licensing of owners and operators of taxicabs in the City of Saint John; and By-Law 241, City of Moncton.

Nova Scotia -- Ordinance Number 116, City of Halifax; and By-Law C-278, City of Dartmouth.

Prince Edward Island -- By-Law respecting taxicabs and the licensing thereof, City of Charlottetown.

Newfoundland -- The Taxi By-Law, City of St. John's; and The Taxi By-Law, City of Corner Brook.

List Of Persons Interviewed[4]

Alberta

Edmonton

H. Wilson	City Soliciter
A. Maurer	Director, Traffic Operations
R. Berghuys	Licence Inspector
W. Robinson	Manager, City Cab
K. Atterbury	Manager, Co-op Taxi
Several taxi operators	

Calgary

F.L. Byrne	City Clerk
F. Shaw	General Manager, Taxi Commission
A. Enders	Owner-Manager, Shamrock Taxi
Mr. Gregory	Manager, Yellow Cab
Several taxi operators	

Saskatchewan

Saskatoon

D. Trail	Licence Inspector
Mr. Swan	Owner-Manager, United Cab
J. Waters	Owner-Manager, Radio Cab
Several taxi operators	

Manitoba

Winnipeg

L. Olijnek	Former Manager, Taxicab Board
H. Boyd	Office Manager, Taxicab Board
Mr. Kapoosta	Manager, Duffy's Taxi
K. Chadwell	Manager, Unicity Taxi
Serveral taxi operators	

Ontario

Ottawa

R. Pepper	Assistant City Clerk
W. French	Blue Line Taxi
Several taxi operators	

Vanier

G. Riendeau	Owner, Beacon Taxi
Several taxi operators	

Quebec

Montreal

P. Jourdenais	"Secretary," Conférence du Taxi de Montréal
G. Brunet	"President," Taxis Lasalle (1964) Inc.
J.P. Ste-Marie	"General Manager," Ligue nouvelle des propriétaires de taxi de Montréal
Several taxi operators	

New Brunswick

Fredericton

S.R. Thornburn	City Clerk
A. Cuthbertson	Transit Manager
F. Sullivan	Owner-Manager, Sullivan Taxi
G. Wheatney	Owner-Manager, Trius Taxi
Several Taxi operators	

Saint John

D.H. Gary	City Clerk
J. McCarthy	Taxicab Inspector, Police Department
L.D. Ecker	Transit Manager
Mr. Swan	Owner-Manager, Bill's Taxi
Several taxi operators	

Nova Scotia

Halifax

B. Smith	Executive Assistant, City of Halifax
G. Haley	Inspector, Police Department
T. Herritt	Owner-Manager, Casino Taxi
Mrs. Lowness	Manager, "Y" Taxi
B. Murphy	Manager, Yellow Cab
Several taxi operators	

Dartmouth

N.C. Cohoon	City Clerk-Treasurer
Mr. Wright	Inspector, Police Department
P. Morrow	Owner-Manager, Crown Taxi
B. Frank	Owner-Manager, Blue Bells Taxi
Several taxi operators	

APPENDIX B: ESTIMATING THE WELFARE LOSS RESULTING FROM RESTRICTIVE FORMS OF REGULATION

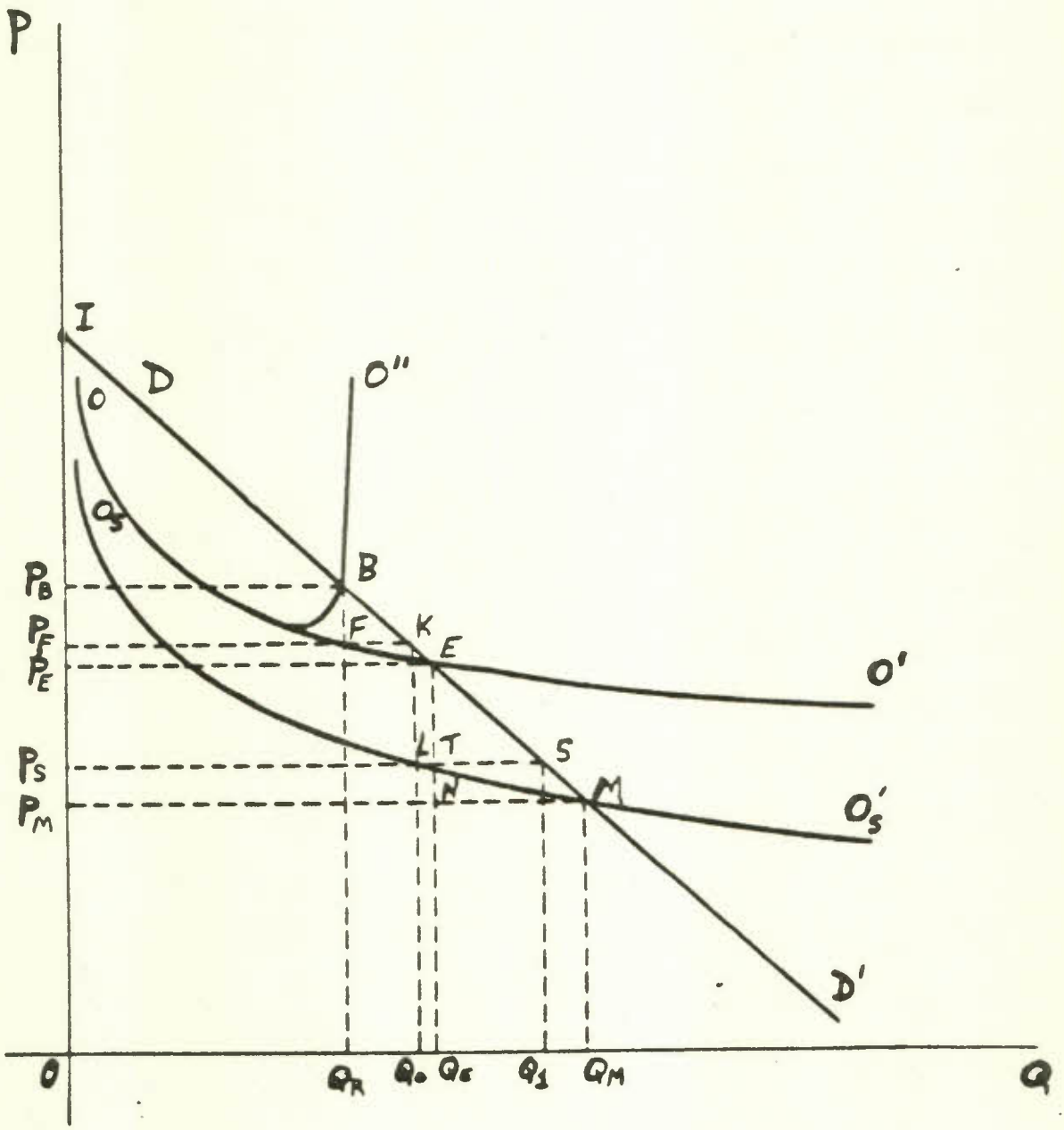
Chart B-1 plots a demand curve for taxi services having no fixed route or schedule. It also shows three supply curves, OO', OO" and O_SO_S'. The latter curve represents the supply of taxi services in the absence of regulations limiting the number of taxis or prohibiting collective use. Curve OO' represents the supply of taxi services when the regulation prohibits the collective use of taxis, but does not limit their number. And curve OO" represents the supply of taxi services under regulations both limiting the number of taxis and prohibiting collective use.

Price P_E represents the price of taxi services for a given level of quality in a market with no effective limit on the number of taxis. We should normally refer to this price P_E in our estimation of the welfare loss resulting from limitations on the number of taxis but, since we have no way of measuring the economies of density associated with greater consumption of taxi services, we refer instead to price P_F. This underestimates the resource waste or welfare loss but, since a conservative estimate is preferable, there can be no objection to this procedure.

Economic theory states that total customer satisfaction is given by area OQ_OKI. Rectangle OQ_OKP_F represents the amount consumers must pay to obtain this satisfaction, and area KP_FI represents the surplus to consumers. When the number of

Chart B-1

Market Equilibrium and Effects of
Regulatory Restraints on Supply of
Taxi Services



taxis is limited, the quantity of taxi services consumed is reduced to OQ_R and the satisfaction that taxi users obtain from consuming taxi services is represented by area OQ_RBI. Comparing this with the previous situation in which the number of taxis is not limited, we find a decrease in the satisfaction equal to area Q_RQ_OKB. The part Q_RQ_OKF of this area represents the money not spent by consumers to purchase taxi services following restrictions on supply; this money can be used to purchase goods and/or services providing equivalent satisfaction. On the other hand, the part KFB of area Q_RQ_OKB represents an irrecoverable loss in satisfaction or welfare, and thus a waste of resources.

Area P_FKBP_B represents the loss of surplus to consumers following the transfer of earnings from consumers to producers forming a cartel due to limits on the number of taxis; the amounts in column D of Table 3-1 correspond to this area. This explains why only part of KFB of the surplus P_FKFBP_B lost by the consumer constitutes a welfare loss for the community.

Estimating the welfare loss or waste of resources resulting from limits on the number of taxis thus boils down to estimating the area of triangle KFB:

$$KFB = \frac{(BF \times FK)}{2}$$

Although demand elasticity for taxi services appears to be about one, as suggested in Chapter 2, we wish to simplify Chart B-1 by drawing the demand curve as a straight line. Table 3-1, column E, already gives us as a percentage figure an estimate for BF, the excess portion of a standard trip transferred to taxi operators to cover the capital cost of their licence in cities where licences are limited, while note 4 in Table 3-1 shows the amount represented by this percentage. Assuming demand elasticity to be equal to one, a drop in price from P_B to P_F, which is equal to B_F, results in an equal percentage increase in quantities of taxi services demanded. Since we know the estimated average number of standard trips made by each taxi in the various cities (see note 4, Table 3-1) and the number of taxis operating in each city (see Table 2-1), we know the value of OQ_R, the total quantity of taxi services in each city. Multiplying this by the same percentage as applies to BF gives us Q_RQ_O, which is equal to FK. Hence we know the area of triangle KFB, or the welfare loss. This is how we estimate the values shown in column A of Table 3-2. No amount is shown for the cities of Halifax, Calgary, and Edmonton, because they do not limit the number of taxis.

The figures in Table 3-2, column B are obtained by dividing the values derived for Q_RQ_O by the average number of standard trips per taxi. The presence of these additional taxis does not reduce the average earnings of each operator, which still remains at $20,767, because the transfer of earnings from consumers to

producers resulting from limitation of the number of taxis is used to cover the cost of capital tied up in purchasing a licence and adds nothing over the long term to the net average earnings per operator. Freeing this capital and reducing the fare for each standard trip by a proportional amount would lead to increased consumption of taxi services and so attract new taxis to the industry, with no change in average net earnings.

The values obtained for $Q_R Q_O$ for the various cities are: 271,728 for Quebec; 1,840,629 for Montreal; 266,021 for Ottawa; 2,572,570 for Toronto; 209,664 for Winnipeg; and 490,195 for Vancouver.

The welfare loss resulting from regulations prohibiting collective taxis is represented by the triangle MNE in Chart B-1, where the difference in price $P_E P_M$ is the drop in price resulting from collective use of taxis through a per capita rate structure and/or a zone rate structure for taxi services. Since no measure for economies of density is available, we are forced to estimate the area of triangle SLK rather than that of triangle MNE. This procedure probably underestimates the real welfare loss, since it does not include economies of density over the increase in quantity consumed, $Q_E Q_M$, and since the quadrilateral TLKE that we are forced to include in our estimation of welfare loss (since we know point K but not point E) is much smaller than the quadrilateral MNTS, which we have set aside. In effect, we are continuing to assume that demand

elasticity is equal to one and also that the price reduction P_BP_F, is no greater than the 21.1 per cent calculated for Vancouver (see Table 3-1, column E). Moreover, we assume that introducing collective taxis results in a 35 per cent drop in price, since this is roughly the difference between the price of a standard trip in an individual taxi and that in a collective taxi in Fredericton, which was recorded at $3.12 and $2.50, respectively (see Table 1-2); therefore, price reduction P_FP_S is equal to 35 per cent of OP_F. It follows that the increase in quantities consumed, Q_EQ_M, caused by allowing collective taxi use, is much larger than the increase, Q_RQ_E, due to ending limitations on taxi numbers; thus TN is longer than TL, and thus MNTS is larger than TLKE.

The area of triangle SLK representing our estimation of welfare loss resulting from the ban on collective taxis is provided by:

$$SLK = \frac{(KL \times LS)}{2}$$

It is quite easy to compute KL and LS (or Q_OQ_1) based on what we already have:

$$KL = P_FP_S = (.35)\ OP_F$$

$$LS = Q_OQ_1 = (.35)\ OQ_O = (.35) \times (OQ_R + Q_RQ_O)$$

Table B-1 gives the values of the various variables for different cities, which allows us to estimate the area of SLK given in column C of Table 3-2.

To obtain the figures in Table 3-2, column D, we divide the new earnings of the taxi industry ($Q_0Q_1 \times OP_S$) by $20,767, which is the average annual gross earings of a taxi in Canada in 1978.[1] These increases in the number of taxis, as for the preceeding increases in Table 3-2, column B, therefore assume no reduction in the average earnings per taxi. It is also assumed that these new taxis are all to operate essentially on a full-time basis, which corresponds to the calculation of $20,767 for average annual gross earnings. If some of the new taxis are operated part-time, the real increase in taxis could be larger than that shown in columns B, D, or E in Table 3-2.

Before presenting the basic calculations for Table 3-3, we must consider the method used to estimate the welfare loss resulting from the ban on collective taxis, which involves only a drop in price of 35 per cent, while retaining our assumption that demand elasticity is equal to one. One major objection to this procedure is the different nature of the industry once it switches to collective taxi service. This objection loses much of its weight, however, when we refer to a practical case, such as the market for taxi services in Fredericton; for most of the taxi services consumed, there is only one price, whether the customer requests individual or collective service. In view of

Table B-1

Estimates of the Cost of a Standard Taxi Trip in the Absence of Limitations on Numbers (OP_F), the Price of a Standard Taxi Trip in the Absence of both Limitations on Numbers and a Ban on Collective Use (OP_S), the Total Number of Taxi Services in a City (OQ_O), and the Additional Number of Taxi Services in the Absence of a Ban on Collective Use (Q_OQ_1), Selected Canadian Cities, 1978

	OP_F	OP_S	OQ_O	Q_OQ_1
Halifax	$3.18	$2.07	5,414,199	1,894,970
Montreal	3.70	2.40	37,931,401	13,275,990
Quebec	3.70	2.40	3,902,530	1,365,885
Toronto	2.88	1.87	20,562,572	7,196,900
Ottawa	3.82	2.48	4,178,100	1,462,335
Winnipeg	3.61	2.35	2,513,664	879,782
Calgary	4.13	2.68	3,997,260	1,399,041
Edmonton	4.34	2.82	4,354,350	1,524,022
Vancouver	3.25	2.11	2,813,395	984,688

SOURCE Tables 1-2, 2-1, 3-1 (note 4), and calculations by the author.

the current low occupation rate of taxis[2] and the economies of density that can be achieved, the 35 per cent price drop assumed here does not involve an excessive drop in the quality of service in terms of sharing or not sharing taxis; in addition, this probably represents the lower limit[3] of the size of the welfare loss resulting from the ban on collective use of taxis and the limitation on their numbers.

Table 3-3 projects the optimum number of taxis, taking into account the restrictive effects of both regulation and mass transit subsidies, which allow mass transit to enter new markets and to force out more efficient means of collective transport, namely taxis. This is accomplished by adding the increased number of taxis, N_E, presented in column E in Table 3-2, to the current number of taxis, N, in column B of Table 2-1, and by solving for X:

$$(A) \quad N + N_E = X - cX$$

where c represents half of the percentage of subsidies received by mass transit relative to their total costs, and

X is the optimum number of taxis.

In Vancouver, for example, the present number of taxis is 363, and the estimated increase due to removal of restrictions is 177, for a total of 540 taxis. Since mass transit in Vancouver is subsidized at a rate of 56 per cent, the difference between the

total cost of mass transit and the proportion of own-source earnings as listed in column G of Table 2-1, we obtain the optimum numbers of taxis, X, in the absence of subsidies as follows:

$$540 = X - (.28)X$$

$$540 = (.72)X$$

$$X = 750 \text{ taxis.}$$

Since Vancouver's population is 410,000, the optimum number of taxis per 1,000 inhabitants therefore is:

$$750/410 = 1.83$$

which represents a total increase of 107 per cent over the present number of taxis.

Equation (A) is used to make the projections in Table 3-3, following the effect of mass transit subsidies on the number of taxis, as observed in Fredericton (Papillon, 1981, p. 186, note 45).

NOTES

Chapter 1

1 In British Columbia, for example, regulation of taxi fares in some cities issuing taxi licences is the responsibility of a provincial regulatory agency, the Motor Carrier Commission.

2 One type of taxi transport subject to the authority of one of these provincial agencies is the service linking the Prince Edward Island airport with communities outside the city limits of Charlottetown.

3 We choose this lower limit so as to be exhaustive for a certain category of cities, and also because taxi regulation in Canadian cities of less than 50,000 population has already been covered in a survey whose results have been made public (Lea and Associates, 1978).

4 Section 6.48 of Quebec's Regulation 6 sets the rate of pay for a driver on commission at no less than 35 and no more than 50 per cent of gross receipts.

5 Edmonton represents an extreme case among these nine cities, since holders of taxi licenses are individuals and firms providing taxi services, including those considered as such in practice, are owners of dispatch centres.

6 One case of abuse being given special treatment in some regulations is section 14 of Burlington's regulation: "A driver or an owner who drives a taxicab shall not obstruct traffic while writing up his trip record, but each trip shall be completely recorded prior to the commencement of the next following trip." Such directives may be completely ignored in other regulations, however.

7 By distributing these two groups of cities on the basis of the number of taxis per 1,000 inhabitants over an interval of four categories, A, B, C, and D, defined as follows:

0		1		1.5		2	
	A		B		C		D

we obtained the following frequency distributions X and Y respectively, for cities limiting and not limiting the number of taxis:

X :	14	10	0	2
Y :	6	0	4	7

We computed the value of chi-squared to see if the difference between the proportion of taxis in cities limiting and those not

limiting the number of taxis was significant, and we obtained a value of 19.048 which, with 3 degrees of liberty, is significant to less than one-half of one per cent, although the number of observations (43) is not very large.

8 Regulations establishing an exorbitant price for issuing or renewing a taxi licence, such as Toronto's, might also be classified in this list of rules accompanying the sections limiting the number of taxis. In effect, this high price is perhaps the regulatory agency's share of the monopoly rent that producers in the industry, acting, as a cartel by virtue of the limitations on their numbers, can collect.

9 Mississauga, which requires taximeters, has nonetheless divided its jurisdiction into zones, and imposes a zone rate structure for service to Toronto International Airport. On the other hand, Saint John also provides rates for operators who wish to use a taximeter, even though the zone rate structure is generally used.

10 When a taxi carrying a customer travels below a certain speed, when waiting for traffic lights or in a congested street, for example, the taximeter rate structure introduces into the calculation of the total price for the trip the time that the customer has spent in the vehicle, in addition to the distance covered. This explains the reference to the amount for each standard waiting period in the rate structure.

11 We developed this definition of the average or standard taxi trip on the basis of surveys on the consumption of taxi services in various Canadian and U.S. cities.

12 This is due to the fact that, by shortening the length of the trip, more weight is given to the initial amount (drop fare) in the total price of the trip; the drop fare is lower in Quebec City than in Regina. In addition, by shortening the waiting period, a similar effect occurs on the relative price between two cities since a charge of 15 cents per minute of waiting after the first minute is collected in Quebec City, while in Regina no waiting charge applies until the fifth minute.

13 These are Toronto, Ottawa, Oakville, Sault Ste. Marie, Niagara Falls, London, Mississauga, Sudbury, Burlington, and Markham. Sault Ste. Marie and Burlington are the only two among these ten not controlling the number of taxis.

14 These eight cities are Edmonton, Calgary, Guelph, Burlington, Halifax, Dartmouth, St. John's, Nfld., and Corner Brook. It is also interesting to note that these eight cities include the largest cities among the 19 not controlling the number of taxis.

15 For example, a single regulation (No. 1451) passed by the Council of the City of Montreal on August 24, 1937, applied to "taxicabs, rental cars and hackneys." Another indication is the

definition of the term "hack" in Section 504 of the Charter of the City of Halifax, dated February 28, 1931: " ...the expression "hack" includes every vehicle of any description whatever for the conveyance of passengers for hire, other than a tram car." Furthermore, Section 509, which lists certain regulatory powers of the Halifax City Council, makes no distinction in referring to the term "hack" between taxis and horse-drawn vehicles.

16 Hughes (1977) mentions the regulations covering public carriers in force in the American colonies, and this would be a continuation of English tradition. There is no indication that Canada was not also covered by this centuries-old European or English tradition.

17 As Hughes (1977, p. 49) so well observes: "Thus we see that during the colonial era virtually every aspect of economic life was subject to non-market controls ... The colonial background was like an institutional gene pool. Most of the colonial institutions and practices live on today in some form, and there is very little in the way of non-market control of the economy that does not have a colonial or English forerunner."

18 According to Collins (1973), most large Canadian cities witnessed a boom in jitneys around 1915.

19 This streetcar war against the jitney could not have been more effective. As Eckert and Hilton (1972, p. 319), point out: "By the end of 1915, only 18 months after jitneys had first appeared in Los Angeles, regulatory ordinances that were favorable to the trolleys had been passed in 125 of the 175 cities that had experienced jitney competition, and most major municipalities followed suit within another year." In another place, (p. 307) these same authors observe: "Although legislation to put down the jitneys was enacted at the state and local levels with variation from city to city, the effects were almost as if the policy had been federal, for it was absolutely ubiquitous."

20 It is interesting to note that the reasons given for abolishing the jitney -- congestion, criminal activities, instability, and so on -- are basically the same as those cited to justify limiting the number of taxis some 20 years later.

21 An indication of this is the rates and their evolution, as noted by Verkuil (1970, p. 686): "Moreover taxicab rates were regulated at a lower level than carriage rates, which indicates the expanded market the taxicab served."

22 In New York City, for example, from 1918 to 1928, the number of taxis rose from 4,700 to 15,000 and exceeded 20,000 in 1929 before the depression (Shreiber, 1978, pp. 43, 74). In Montreal, the number of taxis rose from 500 to 3,000 between 1922 and 1929 (Point de Mire, 1971). This figure of 3,000 appears slightly

high compared with another source (Schubert, 1940, p. 11), which estimates this number at between 1,400 and 1,500.

23 "Before the enactment of the Taxicab Act in 1935, taxicab operations in the City of Winnipeg were in a chaotic condition. The depression had set in. Taxicabs were in poor condition; various operators defied many local municipal regulations; wages were low, hours were long. Bootlegging and prostitution were prevalent and often connected with the taxicab industry" (Stevens, 1972, p. 8).

24 Verkuil (1979, p. 688) comments on a situation in the United States at the time: "The fear of 'destructive' or 'ruinous' competition permeated government regulation during the depression period on both the state and national levels ... The National Recovery Act expressed the idea that competition had to be restrained ... the economic thinking of the period strongly distrusted the competitive system."

25 La Patrie, Montreal, January 20, 1946.

Chapter 2

1 From 1956 to 1966, the length of the routes covered by Montreal Urban Community Transport Commission vehicles increased by about 60 per cent, while the number of vehicles increased by barely 12 per cent over the same period (Montreal Urban Community Transport Commission, 1975).

2 We found very few quantitative models of the demand for taxi services in literature on the subject. One of the rare works in this area was conducted in Washington, D.C. in 1970 (Wong, 1971). Wong's estimations of demand elasticity in relation to price, which used various models, are all lower than minus one or greater than one, if we consider the absolute value of the elasticity. Given the zone rate system in effect in Washington, one could be skeptical about the universality of such results, but to the best of our knowledge, three other studies have confirmed these estimations: two separate studies on taxis in London, England, one in 1953 and another in 1971, and a study of taxis in Chicago. In all three cases, the estimations of demand elasticity are around minus one or less (Kirby et al., 1974). Although no estimate has been made of demand for taxi services in Canada, except for studies covering special areas such as airport service, the thoughts of those in the taxi field following fare increases granted by the Quebec Transport Commission or by city councils outside Quebec, under which the earnings of taxi operators would rise very little or not at all, lead us to believe that the results obtained elsewhere apply to Canada as well. Unfortunately, no information is available on demand elasticity for taxi services in relation to the quality of service or any element of this quality such as the average waiting period.

3 As we shall see later, an indication of the increase in demand for taxi services in cities limiting the number of taxis following economic growth is provided by the market value of taxi licences, when these are transferable. The City of Montreal provides a good illustration of this. The current freeze on the number of taxis in Montreal dates back to 1952; licences, which had no market value at that time were selling for $8,000 to $9,000 in 1978. In Toronto, taxi licences are worth over $25,000; it would appear that restrictions there turned out to be even stricter than in Montreal because of the respective growth in demand for taxi services in each city.

4 Based on a sample of 28 U.S. cities, Shreiber (1973) calculates the correlation between the number of taxi drivers or number of taxicabs and certain utilization factors. Among these factors are the number of visitors a city can draw and the number of workers who use mass transit. These two factors give a positive correlation. In the second case, the correlation is computed between the number of taxicabs and the percentage of workers using mass transit to travel to work, and a value of .622 is obtained. This relationship between the degree of mass transit patronage and the number of taxis, which could justify co-ordination of all public transport systems with special attention paid to taxis, is also discussed by Weiner (1975). He observes that cities with well-developed mass transit systems -- New York, Chicago, Boston, St. Louis and New Orleans -- are also those that have the highest proportion of taxicabs. On the other hand, cities in which residents are highly dependent on the private automobile for travel -- Phoenix, San Gabriel, Van Nuys, and Los Angeles -- are also those with the fewest taxis in proportion to population.

5 After studying the effect of mass transit assistance policies over several years in four major urban regions, one American researcher reached the following conclusion: (Black, 1974, p. 631) "The history of transportation development in the United States suggests that massive federal involvement in the provision of capital for urban public transit systems has a detrimental impact on taxi operations in the urban areas. At the present time taxi operations in several cities find that they must compete with bus operations that have been equipped through federal grants and are subsidized by local government."

The table on the next page reproduces the observations made by Black in four U.S. cities. To the best of our knowledge, no study of this type has yet been conducted in Canada. On the other hand, we are able to obtain very revealing information on this matter for one city. In the early 1970s, the city of Fredericton registered more than 60 taxis a year (1971 - 63 taxis, 1972 - 62 taxis) and, since 1937, mass transit had been provided by a single unsubsidized private firm. In 1975, the city took over the mass transit system, and in less than three years the number of buses rose from nine to 17. This expansion plan was accompanied for the corresponding years by a subsidy of

Table to Note 5, Chapter 2.

Effects on the Taxi Industry of Large Federal Grants to Mass Transit, Selected U.S. Cities, Various Years 1965-68.

Urban region	Year of grant	Number of buses acquired through grant	Number of taxi companies			Labour force employed		
			Year of grant	1972	Percentage change	Year of grant	1972	Percentage change
San Diego, CA (San Diego Co.)	1967	100	20	12	-40	1,069	847	-21
Detroit, MI (Wayne Co.)	1966	151	310	253	-18	3,417	3,354	- 2
Providence, RI (Providence Co.)	1965	147	64	32	-50	529	387	-27
Seattle, WA	1968	70	32	24	-25	992	684	-31

SOURCE Remak (1973).

over $1 million, $854,000 of which was paid by the federal government in addition to annual subsidies from the local and provincial governments to cover the annual operating deficit ($470,000 in 1978). The effect of all this government assistance had a swift impact on local demand for taxi services. Since 1977, the number of taxis has hovered between 30 and 40 depending on the seasons, which translates into a reduction of over 40 per cent in the number of taxis as a result of government assistance. In addition, collective use of taxis had been a common practice, with the occupation rate of taxis remaining about three before the introduction of subsidized mass transit; today, it is less than two according to those in the industry with whom we met.

6 Mohring (1976, p. 15) notes: "Transportation is unusual (although by no means unique) among economic activities in that those who use transportation services play both a consuming and a producing role. To take a trip or to ship goods involves not only the purchase of a service but also the provision of at least one input vital to its production: the time of the traveller or that of his goods."

7 This is the only form of taxi transport generally permitted in Canada, with the exception of a few cities.

8 The former jitney services are just one form of collective taxis.

9 This number includes the miles covered with a paying customer in the vehicle, the miles covered without a customer in the vehicle but when the taxi is en route to pick up a customer, the miles covered by the taxi when it is seeking a customer (commonly known as cruising), and finally the equivalent in miles of the time that an available taxi waits at a taxi stand.

10 In a large city, this supply factor can prove to be important, because immigrants are quite often unskilled workers, and also because the job of driving a taxi requires little basic training.

11 We are dealing implicitly with the individual taxi, but the case of the collective taxi can be deduced in the same manner by changing only one constant.

12 Analysis of the costs of producing taxi services reveals no economies of scale in terms of the number of taxis operated by a given owner. This is linked to several factors. First, the basic technique (the taxicab) has a very low maximum rate of production in relation to the level of consumption in any taxi services market. Since each individual taxi operator determines to a large part the efficiency with which the industry's productive means (taxis) are used, the employer-employee relationship within a firm of several taxis cannot help but create an inefficiency X; in effect, the share of the risk an employee assumes is completely disproportionate to his degree of

control over the production process as a taxi operator. Second, the vertical integration that may be made possible through operation by a given owner of a fleet of taxis -- repair and body shop or gas station operated jointly with a fleet of taxis -- is not justified because the automobile is so common that its maintenance is handled by a highly developed industry that probably offers services at the lowest cost. The cost of operating a dispatch centre, with modern communication techniques, also presents no economies of scale. The existence of large dispatch centres such as Diamond in Montreal is partly explained by the existence of a clientele seeking mobility within a large territory, rather than by a particular structure of production costs for a dispatch centre.

13 In public services such as telephones and electricity, regulation appears to be very well suited to operating compensatory financing between various categories of consumers, such as those in remote regions and those in major urban centres.

14 In effect, if a dispatch centre cannot place new taxis on the road, each customer must wait a little longer as the clientele increases, and this will quickly turn any supplementary clientele to other dispatch centres following an initial increase.

15 We are careful to say "attempt" because it is a matter of substituting new regulations -- and new civil servants and police officers to ensure enforcement -- for the effective power of consumers as a group to select the operator best meeting their needs, for purposes of shaping the industry towards the community's needs and supervising the behaviour of each of its members. This observation leads us to make the hypothesis that the origin of regulation may in part be regulation itself.

16 In all probability, the Asselin report (see Chapter 1) was able to obtain sufficient popular support because of the insufficient number of fare increases granted during the war, during which the demand for taxi services had risen considerably; the real shortage of taxis could therefore not be hidden, and this made a reform possible. When we look at fare increases recently obtained by taxi operators (in Montreal, for example, an increase of almost 20 per cent took effect on September 4, 1979, even though the previous increase was not even a year old), it is highly improbable that a new reform would take the same route as that resulting from the Asselin report.

Chapter 3

1 These costs are high because they require the establishment of criteria and large police forces to ensure that all taxis meet these standards. Furthermore, the general character of such criteria (for example, maximum number of years a taxi may be used) will force authorities to pay special attention to apply

them with discretion, as demonstrated by the following request submitted to the Mississauga Taxicab Authority on December 28, 1977: "Mr. Hajjar being the owner and sole driver of a 1973 Dodge Provincial License Plate BZC 907 serial no. D54163D191676 requests permission to operate this vehicle for one more year under section 38, sub-section (c) of By-law 411-74. The above vehicle was inspected on December 13, 1977, by Inspector S.W. Rose. The exterior and interior condition of the vehicle were found to be very good."

These costs are so high that, regardless of the resources invested by cities eliminating competition (for example, by limiting the number of taxis), the condition of taxicabs in these cities is always poor and sometimes much worse than the condition of taxis in cities allowing competition, based on the sample of cities that we visited.

2 Near a railway station or hotel, for example, taxi operators will show little regard for traffic laws when fighting for the next open spot in line.

3 Given a fairly inelastic demand, limiting the number of taxis can also allow established operators to subtract a monopoly rent with no increase in demand. However, given the very long periods over which the restrictions on supply usually have been in force (in Montreal, for example, a continuous freeze on the number of taxis dates back to 1952, while that in Winnipeg or Vancouver is even older), most jurisdictions probably have experienced increases in demand and it is to these we are especially referring.

4 This greater latitude explains why the shortage of taxis at times when most people are not interested in working (Sunday afternoon, for example) is more noticeable in cities limiting the number of taxis than in those not limiting them.

5 A multitude of circumstances can create this type of instability, such as a review of mass transit assistance policy or a mass transit strike. The development of public assistance for personalized urban transport (taxi substitutes) aimed at specific groups (students, the disabled, the chronically ill, the retired, and so on) is another example of such circumstances. Special events in the economic life of a city, such as Expo 67 in Montreal, also come to mind; following this event, the market value of taxi licences in Montreal dropped by over 20 per cent according to one report (Dimanche/Dernière Heure, 1971).

6 The occupation rate for private automobiles is 1.22 passengers (Transport Canada, February 1976), while that for taxis is 1.37 passengers per paid trip, which gives them an overall occupation rate of about .25 (Papillon, 1981, p. 65).

7 Altshuler (1979, p. 36) explains the change in priorities in U.S. urban transport policies from building freeways to

supporting mass transit as follows: "The explanation, we judge, lies in the fact that transit proved to be a policy for all perspectives on the urban problem. Though its direct constituency was relatively small, its ideological appeal proved to be extremely broad. Whether one's concern was the economic vitality of cities, protecting the environment, stopping highways, energy conservation, assisting the elderly and handicapped and poor, or simply getting other people off the road so as to be able to drive faster, transit was a policy that could be embraced. This is not to say that transit was an effective way of serving all these objectives, simply that it was widely believed to be so."

8 This special treatment has been explained in some circles as a secret plot between the large U.S. automakers and politicians.

9 Sowel (1980, p. 185) criticizes this type of argument: "The rush-hour traffic congestion caused by thousands of people going to work separately in individual automobiles has been denounced by social critics as 'irrational' and explained as some mysterious psychological attraction of Americans to automobiles. It is, however, a perfectly rational response to the incentives and constraints conveyed. The actual costs and benefits of automobile-sharing are forcibly prevented from being conveyed by prices. As in other areas, claims of public irrationality are a prelude to arguments for a government-imposed rational 'solution' to the 'problem.'"

10 See above Chapter 2, note 5.

11 Mohring (1976), for example, estimates the amounts of subsidies necessary for various levels of patronage in order to meet this objective. Many other authors have dealt with mass transit subsidies in the same context.

12 Seneca (1973, p. 953) reaches the same conclusions following a discussion of the various means of freight transport: "Consider first the problem of cost. From the models presented above it is clear that where a fixed amount of transportation service is to be allocated between two modes, it is total cost and not marginal cost which must be the basis of rational allocation. Moreover any change in total demand means that the optimal share of commodity to be carried by each mode will change, since a change in demand involves a whole new solution to the cost-minimization problem. It is possible that small changes in demand could be dealt with by comparing marginal costs and allocating the extra commodity to the mode with the lowest marginal cost at the point of the previous solution. Also it would be possible to discover a misallocation of resources if differences were observed in marginal costs. However, if there were substantial changes in demand a simple comparison of marginal costs would not lead to the correct solution."

Appendix A

1 This list makes no mention of the often numerous amendments that accompany these regulations. Nor does it include the general regulations on trade that cities issue in addition to the specific regulation on taxi transport. The city of Kelowna (By-Law 4151), for example, charges $80 to taxis and other road carriers using its streets; By-Law 3149 of the City of Saanich, British Columbia, also deals with general trade and charges an annual fee to dispatch centres (taxi stands) of between $300 and $600 per centre, based on the number of affiliated taxi operators.

2 The taxi commission issuing regulations on taxi transport was created under By-Law 91/77 "By-Law dealing with the taxi business" of the City of Calgary, which transfers the city's powers to the commission.

3 These regulations are issued by a Commission under provincial jurisdiction, the Taxicab Board, created under the Taxicab Act, an Act to provide for the regulation of taxicabs in Greater Winnipeg, (c.c.s.m., c. T10).

4 This list includes only those individuals interviewed in person, not those contacted by phone in each of the jurisdictions mentioned above. The taxi industry and its regulations in Quebec are the subject of previous work, thus explaining the small number of interviews conducted in that province. In the course of this earlier work, a representative from each of the agglomerations defined in Regulation 6 was interviewed by phone. The following persons were interviewed as well: Mario Gagné, Claude Rodrigue, Jean-Jacques Milot, and Lois Lachapelle from the Quebec Ministry of Transport Commission, and R.-Henri Paquette and Robert Poirier, from the taxi industry.

Appendix B

1 This method makes the initial assumption that, by giving taxi consumers the new opportunity of choosing a lower-cost collective service, the industry's earnings generated by the original clientele, given by the area of rectangle OQ_{OKPF} in Chart A-1 does not decrease, and thus the new earnings given by rectangle Q_{OQ1SL} are net additions to the original earnings. We make this assumption because the current occupation rate of taxis per paid trip, 1.37, leaves little possibility for a drop in earnings generated by the original clientele.

2 It has been estimated that the average proportion of miles covered by a taxi with one or more passengers is .559. This, combined with the fact that the current occupation rate of taxis

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