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Aspects of Competitive Bureaus:
Lessons From Public Sector Schooling
in Ontario and British Columbia

by

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A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of
Doctor of Philosophy
Department of Economics

Carleton University

Ottawa, Ontario

September 20, 1985

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acceptance of the thesis,

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Abstract

The same public sector good is often supplied by organizations having different descriptive structures. In the literature of public choice the dominant view is that the behaviour and output of the public sector firm or bureau is influenced by the structure. Specifically, it is argued that the public sector firms will exploit their monopoly position to produce at above minimum cost and/or above optimal quantity and/or lower quality.

Rejecting differences in taste as a valid reason for the persistence of different structures, this thesis argues that the structure is irrelevant since the public sector firm or bureau is intrinsically competitive. The competition is motivated by the political sponsor who is argued to have similar preferences and face similar constraints (chiefly reelection) across different jurisdictions. The form of the competition depends on the particular characteristics of the institutions available to the political sponsor.

The central argument is that the public sector firms will be competitive in their behaviour. To test this argument the public school systems in Ontario and British Columbia are compared. These were chosen since they represent the widest difference in the descriptive structure across Canada. In British Columbia public sector schooling is provided by a single bureau enjoying

monopoly position. In Ontario the market for students is contested by two public sector school systems.

The traditional public choice view of bureau behaviour would suggest a systematic difference in output would result. Further, the difference would favour the residents of Ontario since cost would be lower and/or quality higher.

The empirical work presented in the thesis rejects the traditional argument. In doing so it supports the view that bureaus are intrinsically competitive in their behaviour. Specifically, the bureau in British Columbia is shown to exhibit greater use of internal competition for positions in the (informal) hierarchy while the bureau in Ontario is found to place greater emphasis on direct contestability of a subset of the market.

In both jurisdictions the competition is a result of intentional actions on the part of the political sponsor (the Minister of Education).

Acknowledgments

This thesis has taken me a long time to complete and I have run up many debts to friends, colleagues, and family. Citing all the people who have helped would materially increase the overall length of what is already an excessively long document. Citing the people I truly owe in an acknowledgement seems a poor compensation for the advice and encouragement I have received. Rest assured that I have found ways to make more meaningful gestures.

It is obvious that my committee members, Don McFetridge and Steve Ferris, have contributed to my work immeasurably. Both are careful readers and prevented some serious errors from remaining in the final version of my thesis. I sold Don a used car; I shall have to find something suitable to do for Steve.

My greatest debts are to my friend and colleague Edwin West. We go back a long way in time. That we work well together may be inferred from a string of co-authored articles in various journals. That we are friends may be inferred from the number of times we have been welcomed as guests at each other's home. When I thank Eddie I must also include his wife, Ann, and family, John, Sarah, and Caroline. My second son, Grant Edwin bears Eddie's name. It is a small enough tribute to someone who has influenced my life and career so significantly.

Finally, I must record my debt to my wife, Jane, and my sons, Garth and Grant. Jane owns this work as much as I do for I truly would not have been able to complete it without her. My sons gave up a lot of time with their father (some of it willingly since my humour was not always good). However, Garth has already noted that next summer we will have a real vacation since "Daddy won't have to work on his thesis". I promise him we will have that vacation and it will be just fine.

Table of Contents

Chapter 1: Introduction and Summary	page 1
Chapter 2: Background	page 35
Chapter 3: Competitive Bureaus: Internal Organization	page 69
Chapter 4: Competitive Bureaus: Market	page 111
Chapter 5: Conclusions	page 156
Appendix 1: Data Sources	page 162
References:	page 165
Statutes:	page 175

Tables

Table	Title	Page
1-1	Expenditures per pupil	6
2-1	Legal status of separate, confessional, and denominational public schools in Canada	37
2-2	Attitudes of parents, pupils, teachers, school principals towards various possible policy prescriptions in schools	60
3-1	Evidence of Parkinson's Law effect (Ontario, 1975-33)	84
3-2	Ministry expenditure by function (selected) for 1976-7	90
3-3	Proportion of total per pupil expenditures, various categories	93
3-4	Average years experience and average age, elementary school teachers	97
3-5	Experience elsewhere in the province	98
3-6	Structure of personnel within schools	99
3-7	Salary levels of teachers and administrators, Ontario and B.C.	100-1
3-8	Promotion and position changes	103
3-9	Mobility within and across boards	104
4-1	Expenditures and the effect of contested markets	144
4-2	Enrolment in RCSSB and Public schools (1960-1982)	148
4-3	Provincial grants to the RCSSB and Public (1960-1982)	149

Figures

Figure	Page
4-1	115
4-2	115
4-3	125

Chapter 1

Introduction and Summary

Introduction

The BNA Act [1867] assigned the provinces responsibility for the finance and provision of education (Section 93). Education is largely socialised in all provinces. Except for a few private elementary and secondary schools (and a few vocational schools) which constitute a very small component of total enrolment, schooling is publicly funded and provided.

The structure of the education organization is similar in each province. There is a Minister of Education (who may have other responsibilities also) and a Ministry of Education which constitutes the bureau reporting directly to the Minister. At the local level the province is divided into school boards or districts each having its own bureau (Board) and political sponsor (Trustees). Finally, there are the individual schools with their own administration (school principal, vice-principal, etc). For the purposes of the discussion to follow, the essential feature to keep in mind is that there is a strong vertical linkage in the organization since promotion from the junior levels is the traditional means used to fill the positions at the senior, or administrative (within the school, board, and provincial) level.

Within this uniformity there exists broad differences in the descriptive structure of the public school (henceforth I will be dealing only with elementary-level schooling) enterprises across provinces. I take up the actual differences in greater detail in the next chapter. For now I only wish to note that elementary schooling is provided by a range of institutional structures. From a single (monopoly) public sector bureau in P.C. through a pair of more or less rival bureaus in Ontario to the full confessional (all major religions) system of Newfoundland, the provinces offer considerable diversity of descriptive arrangements.

My first task in this thesis is to explain the persistence of these differences in schooling institutions across Canada. In doing this I shall address my second objective which is to show that the descriptive structure of the bureau does not matter in the following specific sense. The behaviour of the bureaucrats is independent of the descriptive structure of "the industry". If the structure did matter, we would require an explanation as to why the structural differences are allowed to persist.

The internal organisation of a bureau is essentially competitive and so long as the political sponsor (henceforth I shall refer to as the Minister) has the same preferences and faces the same constraints (chiefly reelection) in meeting them in each jurisdiction, the outcome will be the same. In other words, the behaviour

of the bureau will be the same regardless of the descriptive structure. That is not to say the outcome will be technically and allocatively efficient in the sense of price set equal to marginal cost and the use of least cost technology. What I am arguing is that the outcome will be technically efficient from the point of view of the Minister and what it is the Minister wants.

At this point it is useful to explicitly introduce the Minister and his environment. I argue he has a utility function of the form:

$$U^M = U^M(S, t, x)$$

where S is the quality of schooling

t is the level of tax to finance
schooling

x is the level of discretion of the
Minister

The Minister is an elected official. Based on Downs' [1957] Model of political choice I argue that $\partial U / \partial t < 0$. Further, I argue there is sufficient political competition that $\partial U / \partial S > 0$. Finally, it is clear that $\partial U / \partial x > 0$ since discretion is a good. Therefore the Minister may not be uniquely interested in efficiency of output but he does have some interest in this directly through his own desire for reelection and indirectly through his wish to incur the favour of the provincial Premier. More quality and lower taxes are desirable and the Minister will use available means to effect these results.

The resurgence of the "Chicago school" [Demsetz, 1968] in the literature on contested markets [extended by Baumol, 1982 and Baumol, Panzar, and Willig, 1981] confirms that structure is unimportant as a determinant of conduct in the minds of many economists. The literature on the behaviour of public sector bureaus, on the other hand, is dominated by arguments that structure does matter. Since Niskanen [1971], the bureau has been viewed as one side of a bilateral monopoly. For a variety of reasons such as relative security of tenure [Niskanen, 1971], asymmetric information [Spencer, 1982], and agenda control [Mackay and Weaver, 1979], the bureau has been argued to be in a position to win the bargaining game that is at the heart of the bilateral monopoly.

Niskanen [1971] argued that the bureau exploited its bargaining superiority by forcing the political sponsor to accept all-or-nothing offers effectively appropriating the entire consumer surplus of the political sponsor. Later versions of the Niskanen model [eg Niskanen, 1975; Migue and Belanger, 1974] demonstrated the utility maximizing bureaucrat would exploit the monopoly position by engaging in discretionary expenditure and by increasing staff size. The net result would be that the bureau would produce its output at above minimum cost.

Empirical evidence has been produced to support this conclusion. Borchertding [1983] provides a convenient summary of this empirical work which purports to

demonstrate that public sector bureaus produce at above minimum or efficient costs.

Recently, Toma [1983] and Megdal [1983] have provided arguments and evidence which seems to suggest that the cost of public schooling depends on the structure of the institution. Earlier there were arguments that the availability of geographic mobility would provide for competition in the public sector and this would lead to lower costs per unit of public sector goods [Courant et al, 1979]. This work is based on models of fiscally induced mobility derived from Tiebout [1956].

Thus, there is a persistent argument in the literature that structure does matter in the case of public sector production. This is primarily due to the institutional regularity that there is a limitation on the extent of external contestability. In most, if not all, cases the political sponsor is required to purchase the output or service from the bureau. This restriction generated the bilateral monopoly model of Niskanen. Where the institution permits some contestability of the market the result has been lower per unit costs as the monopoly power of the bureau is weakened.

Empirically, if the monopoly thesis is correct we will observe higher unit costs in those jurisdictions where the bureaus face less external competition from other bureaus (geographically or otherwise). In the case of elementary level schooling, this thesis would predict higher costs per pupil in B.C. than in, eg, Ontario.

Superficially, this is not the case. The data in Table 1-1 show the costs to be near equal.

TABLE 1-1

Expenditure Per Pupil For Various Categories, 1976-7

Expenditure Category	Ontario		B.C.	
	\$	%	\$	%
Administration	38	2.2	43	2.5
Instruction	1177	67.2	1121	65.6
Total	1741		1709	

Source: Statistics Canada, 81-250, Table b-4.

My basic proposition is that the structure does not matter. That is, the "Chicago school" is essentially correct in that competition does prevail even where the structure would suggest that it does not. Bureaus are intrinsically competitive and the bureaucrats are efficient at what they produce. If the structure did matter in the way represented in the literature then one would have to argue that the Minister (and by implication the residents) of B.C. has a greater taste for being exploited than do the residents of Ontario or other provinces where the Minister is able to exploit the competition between bureaus. This is not a promising line of inquiry [Stigler and Becker, 1977].

In the competitive view of the world it is the Minister who "wins" the bargaining game within the bilateral monopoly. The bureaucrats are forced to compete and produce the output desired by the Minister.

They do so efficiently. Later in this chapter I demonstrate that the monopoly view of the bureau is seriously deficient since the bureau can not be described as having monopoly power which it can exploit. It is evident in many ways that the bureau does not appropriate the rents which are due to monopoly position.

The Minister designs the institution in such a manner as to facilitate competition since such competition improves the position of the Minister by encouraging efficiency increasing selective behaviour on the part of the bureaucrats. Depending on the instruments available to the Minister, this competition may take the form of requiring the bureaus to compete for a share of the budget (competing bureaus), competing to move up in the hierarchy (internal organization), or facing the threat of private sector competition (contracting out). I will focus on the first two items in this thesis.

When I speak of competition in this thesis I am referring to competitive behaviour or process rather than necessarily competitive allocation of resources. This permits me to allow some competition which is not efficient allocatively. For example, competition in my models may include elements of rent seeking behaviour. This concept of competition has a wide usage in the literature thus I shall use the term without the artifice of quotation marks.

I do not argue that the Minister will rely exclusively on one instrument to promote competitive behaviour and thus the output he desires. For reasons which will be made more clear in Chapter 2, the greatest diversity, from the point of view of the Minister, exists between the positions of Ontario and B.C.. In Ontario the Minister has access to the greatest degree of inter-bureau competition as Roman Catholic parents may choose to send their children to either non-denominational schools or to the separate schools. In B.C. the Minister faces the single bureau situation. Where possible, the Minister will rely on more than one instrument to promote competition within the bureau. Thus Ontario and B.C. provide the maximum scope for empirical evaluation since they represent the poles of maximum and minimum external competition. In practice the Minister will rely on both the external competition for markets and on the use of hierarchy or internal organization.

Before going on with the discussion of my hypothesis I would like to digress momentarily to discuss an institutional innovation in B.C.. In 1977, the province passed the Aid to Independent Schools Act [1977] which provided for a voucher to be used by parents enrolling their children in private schools approved by the Ministry. My central hypothesis predicts that the internal organization of the B.C. Ministry will change as a result of the introduction of the voucher. Specifically, the B.C. Ministry will shift its internal

organization in the direction of that of Ontario since the voucher simulates the inter-bureau competition that has existed between the RCSSB and the Public in Ontario. The degree of competition is likely to be less in B.C.. Since one form of competition ~~is~~ a substitute for another, I would also predict the voucher will have no effect on the behaviour of the bureau from the perspective of providing what the Minister wants. However, there is insufficient data available to test my prediction at this time since the effect of the voucher will be delayed by the requirement that private schools must have been in existence for five years in order to qualify. In the remainder of my work I shall treat B.C. as if there is still a single public school bureau.

Returning to my thesis, I argue that the Minister in B.C. (Chapter 3) faces a monopoly bureau in the sense that there is but one public sector school system. As a result, he relies on an internal structure which places more emphasis on competition for positions in the hierarchy (formal and informal) than in Ontario. More recently, the B.C. Minister has introduced a new instrument in the form of the threat of external competition via the "Aid to Independent Schools Act" which provided for a voucher for parents who wished to send their children to an accredited private elementary or secondary school. This introduces an element of direct competition for the market although I suspect the

effect is limited.

In Chapter 4 I describe the results obtained in Ontario where the Minister is able to exploit the existence of a duopoly structure. The Minister does so by affecting the payoffs to the cooperative/non-cooperative strategies of the competing school boards. I also present arguments which suggest the Minister has maintained the payoff structure over a long period. As a result of the Minister's action (supported by the judiciary in several decisions involving the assignment of the local tax revenue), I show the school boards in Ontario to be competitive, at least, in a behavioural sense.

The Arguments

I turn now to a more detailed discussion of the arguments which I use to motivate the work I am presenting in the analytical chapters of this thesis.

The subject of the second aspect of my work may best be described as the study of a conflict that has been emerging between two opposing views of the economic nature of public sector bureaus. The two theses concerning bureau behaviour in the public sector are:

- 1) bureaus possess monopoly power which is exploited by commanding a budget that is too large and by shirking on effort and output;
- 2) bureaus compete amongst themselves for a share of the total budget and within themselves for access to promotion, security, etc. Such competition

suggests that bureaus can not exploit their monopoly position. As a result, bureaus are more likely to be technically efficient at least in the production of what it is that the Minister wants. Whether this is sufficient to induce the behaviour which would emerge under perfect competition is not a matter I consider. There is, no data which would test this hypothesis [Wintrobe, 1985].

My research into this question is motivated by my impression that there are some basic inconsistencies in the monopoly argument. If the bureaus do indeed have monopoly power it is of a very circumscribed kind. The technical inefficiency is argued to be due to the fact that bureaus are unable to appropriate the rents arising from the monopoly power in a pecuniary way. The bureaucrats are forced to take their rents in the form of "leisure on the job, pretty secretaries [male and female], and other assorted expenditures" [Crain and Zardkoohi, 1980]. Essentially, the bureaucrats are unable to capitalise the monopoly rents into pecuniary returns. These attenuated property rights are held to provide the basis for the stock of empirical studies which purport to demonstrate the cost inefficiency of public sector bureaus (firms) [ibid].

My argument is that if the bureaus are in fact monopolies they are not very successful in exploiting their position. Pecuniary rents are always superior to

non-pecuniary (the analysis is identical to that demonstrating the superiority of income vs. in-kind transfers). Therefore, if the bureaus are possessed of monopoly power, why do they not use this to get a better financial deal for themselves? I would argue that the monopoly model is likely not a very good representation of public sector firms or bureaus. In its place I propose to rely on a model in which the bureau is competitive and to demonstrate the scope of the competition.

My argument is similar to that used by Hall and Lindsay [1980] to motivate their analysis of medical school admissions policy. When I consider the public school "monopoly" I find that it has been unable to prevent the sort of inroads into its market that I would expect a monopoly to avoid. For example, in Ontario, the bureau has been unable to prevent the gradual erosion of Grade 13. In B.C. the bureau was unable to prevent the passage of the Aid to Independent Schools Act [1977] which provided for a voucher to be used by parents enrolling their children in private schools.

a) Monopoly Models

The economic analysis of the institution of the public sector bureau has a long history. Analysis of the behaviour of bureaus was generally based on anecdotes as is evident in the writing of Parkinson [1962] and, to a lesser extent, Weber [1947]. Niskanen [1971] elevated the study of public bureau behaviour to the level of a

science. Subsequent work owes a clear intellectual debt to his pioneering effort.

Niskanen began his analysis by postulating that the economic structure characterising the typical production of publicly provided goods and services is a bilateral monopoly. The supplier (monopoly) is the bureau which will provide the good or service in question. The demander (monopsony) is the political representative of the population to be served. Niskanen was quite explicit in taking as given the fact of the bilateral monopoly - the bureau was presumed to be unable to sell its output to any other potential buyer and the political sponsor was likewise unable to purchase output from other potential suppliers. Niskanen was primarily involved with the Defense Department (U.S.) at the time he was working on his research on bureaucracy and, of course, the bilateral monopoly model is empirically appropriate here. It also applies quite well to the institution of elementary schooling. The establishment of publicly funded schools confers the property right to the monopoly position on the public schools while the Education Act effectively precludes the widespread sale of schooling services outside the public sector by imposing serious costs on parents who wish to educate their children at home or enrol them in private schools.

The typical textbook depiction of the bilateral monopoly bargaining model shows it as having an

indeterminate solution. The final price and quantity is determined by the relative bargaining strengths of the parties. Niskanen argued that the bureau would enjoy superior bargaining strength here and the bargain would favour it. The bureau would be able to extract the consumer surplus of the political sponsor and, inter alia, its clients via the use of all-or-nothing offers (see Friedman [1962]). The all-or-nothing offer was later described by Mackay and Weaver [1978] and Romer and Rosenthal [1978] as the bureau's offering the sponsor a "zero-level reversionary budget". That is, if the political sponsor refused the budget or offer by the bureau the alternative (reversion) was a zero level of expenditure. Like the all-or-nothing offer the zero-level reversionary budget forces the sponsor to make an exchange on the basis of the total utility he derives from the program; in this way it permits the supplier to extract all of the consumer surplus of the buyer. In the case of schooling there is the alternative of the private school and this will, theoretically, limit the agenda control practiced by the bureau. Whether private schools constitute a realistic alternative is an empirical question.

Several sources of the bureau's superior bargaining position have been suggested. Niskanen [1971] argued the bureau would prevail due to the more secure tenure its members enjoyed vis-a-vis the political sponsor. This thesis can be supported by recent work on bargaining (eg.

Cooter, Marks and Mnookin [1983]). The costs of delaying agreement in a bargaining situation are the forgone gains from trade which could have been realised but for the delay. If there is some asymmetry in these costs we can expect the party facing the higher costs to acquiesce to the demands of the other. Niskanen's argument was that the political sponsor is in such position. The relatively short duration in office compels the political sponsor to reach an agreement quickly. To the political sponsor the cost of delay is the loss of votes the expenditure/program would have garnered. With a comparatively short period between elections the delay may result in the incumbent losing the next election. The tenure of the bureau, on the other hand, is generally contractually guaranteed for a much longer period and is independent of the political process. The delay in reaching an agreement thus imposes a much lower cost on the bureau. The bureau in this position is able to use delay to force the political sponsor to agree to its budget request. Implicit here is the assumption the bureau's budget for salaries, etc. continues to be met during the bargaining process. If this assumption is untrue the bureau's position is severely undermined.

Niskanen suggested a second explanation for the bureau's stronger position in the bargaining game. The bureau will have more complete information regarding the true cost of production and will not reveal this to the

political sponsor. This asymmetric information formed the core of Spencer's [1982] agency approach to the bureau. I am uneasy with this view of the world since it is incomplete. Presumably the politicians could hire another agent to provide the necessary cost information if they were being systematically exploited by the bureau. This seems particularly relevant in the case of education which seems far less complex than, say, national defense. Indeed, the widespread use of "contracting-out" of research activity to private agencies is indicative of the activity of this market.

One possible explanation of the bureau's ability to increase its budget beyond the allocatively optimal size has been proffered by Niskanen [1971] and developed by Hettich [1975]. They argue the bureau typically negotiates its budget with a subset of the legislature. Membership on this "review committee" facing the bureau may confer benefits to the respective politician. For example a politician representing a constituency which relies on defense contracting will wish to be on the review committee of the defense procurement bureau and will likely plump for greater expenditure. It is possible that a politician would attempt to be appointed to a review committee with the intention of working to reduce the budget but this is less likely. Based again on Downs' model of rational ignorance it is reasonable to expect those who do vote will be those who perceive a return from increased expenditure rather than those who

seek a reduction in expenditures to be shared by all taxpayers. This asymmetry of incentives will result in a review committee comprised of "high demand" representatives. Thus the bureau will face an ally rather than opposition in the bargaining process to determine its budget.

In the case of elementary and secondary schooling the local bureau (board) faces a single-function elected body (the school trustees) and thus could be said to be facing the entire legislature for part of its budget. However (see Chapter 2), the election of board trustees may be shown to approach the review committee selection process. Board elections are characterised by low participation rates of voters (generally less than 25% of eligible voters cast a ballot) with the result that a very few voters will hold sway. Theory would predict those who vote will be those who have an income interest rather than a consumption interest in the outcome. Thus the review committee (trustees) facing the school bureau at the board level will likely be comprised of high demand representatives. Downs [1957] argued that voters would obey the principle of rational ignorance. Since informed voting is costly, a voter will become informed about those policies affecting his income rather than his consumption. The premise was that any one voter has several sources of consumption activity but likely only one income earning activity. The return to information

on policies affecting income yields a much larger return than the same information concerning consumption related policies.

Missing from the Niskanen - Hettich story of the high-demand review committee is any notion of the competition that exists for these positions within the party in power. Such competition implies the review committee will serve the interests of the bureau only if these simultaneously serve the interests of the party head. This competition suggests the review committee at the Provincial level will not necessarily constitute a high-demand subset of the party in power.

In the case of the local school-board it is competition of a slightly different type. The relevant margins for competition are the desire of the trustees to move up in the political hierarchy and to secure the favour of the Minister who is able to affect the Provincial grants (income) to any one particular school board. The position of trustee commands little in the way of prestige or salary. Since the Minister is responsible for the behaviour of the trustees he will endeavour to have them serve the broader interests. The devices available to the Minister are explored more fully in Chapters 3 and 4.

Competition for the position of Minister within the party would ensure the rents would flow not to the Minister but to the Premier. The person selected as Minister will be the one who extracts the maximum rents

from the bureau and from the local school boards.

In his original exposition Niskanen argued the bureau would exploit its monopoly power solely to maximize its budget. This was based on a proposition that the utility function of the bureaucrat was an increasing function of the total budget. Cost minimizing behaviour necessarily follows since this will produce the largest total budget in most cases considered by Niskanen. The resulting technical efficiency makes the bureau interesting analytically since, as Niskanen noted, conventional auditing procedures would reveal the bureau to be operating efficiently. Allocative efficiency would be compromised by the excessively large output but this would be produced at minimum cost.

Later versions of the Niskanen model (see his 1975 paper), following from Migue and Belanger [1973], modified the budget maximizing hypothesis somewhat. Recognizing that discretionary expenditures would yield more utility than ordinary expenditures and that utility maximization was a more reasonable behavioural hypothesis these later versions predicted some oversupply along with the presence of "budgetary fat" in the form of technical inefficiency (higher costs per unit). This prediction is more satisfying as well as being consistent with the folklore of bureau behaviour.

But monopoly power alone cannot explain inefficient behavior. What is required is some notion that the

managers do not have the incentive to effectively monitor the allocation of resources within the organization. The "Virginia" school of thought argues that public bureaus and private firms differ significantly with respect to the incentives of their managers. In the case of public bureaus, property rights of managers are attenuated in that they cannot take home the fruits of their monitoring activity. Thus future market considerations are not capitalized into the property rights of the administrators of the public "firm" [Crain and Zardkoohi, 1980] and this implies that administrators of these enterprises will have an incentive to pursue nonpecuniary rewards since their monetary rewards will be independent of their productivity. Non-pecuniary rewards may involve the taking of leisure on the job as well as discretionary expenditures on items which do not contribute directly to output but which enhance the prestige or comfort of the administrator.

Even the foregoing argument is incomplete since it fails to explain how the managers can be expected to gain utility from the inefficient behaviour of their subordinates. That is, all rents should still accrue to the manager.

b) Competitive Model

The early literature on the modern corporation argued that the manager was able to exercise discretionary behaviour to maximize his own objective function which

need not yield profit maximizing behaviour [Berle and Means, 1935; Williamson, 1967]. In a sense, the public sector bureau may be argued to represent the ultimate in such separation of ownership and control.

Alchian [1969] however recognized the essential incompleteness in the argument. In the absence of effective entry barriers to the positions involving control, the managers will be in a competitive game. The result will be that the rents to the positions of control will be bid away. The exact nature of the competition is important since it may be efficiency-inducing or reducing depending on the objectives of the actor evaluating the competition.

Alchian's reasoning may be extended to cover all positions in the administrative hierarchy of the firm. All positions are competitive in that they are all susceptible to entry. Breton and Wintrobe [1982] extended this argument to the public sector bureau. They noted that the essential difference between public and private bureaus lay in the formal structure of the institutions. The private bureau is distinguished from the public bureau by the discretion afforded the manager over his subordinates. Whereas the private manager has some contractual control over the subordinates, since he can hire and fire with some degree of independence, the public bureau manager lacks such discretion. For whatever reason (B&W argue the control of patronage), the power to hire and fire (enforce contractual terms) has

been assigned to a third party (eg. the Public Service Commission in the case of the Federal Government in Canada). This formal structure would imply the levels of inefficiency associated with the monopoly school described above. Lacking discretionary power the manager is unable to rely on contractual means to enforce effort on the part of the subordinates in the bureau.

Breton and Wintrobe argue that an essential feature of bureaus is the hierarchical structure which implies that each position in the bureau is simultaneously a subordinate and a superior (except for those at the very top and bottom). Thus each agent must satisfy his superior and this requires the cooperation of the subordinate. That is, the agent supplies effort to his superior and would like to have effort from his subordinate. The formal structure of the bureau constrains the discretionary power of the agent *viz* his subordinate and this limits the extent to which he can command efficient behaviour of the subordinate. The formal structure limits the scope of exchanges by limiting the enforcement of contracts. However, within the bureau there is an informal structure which may have more control over the advancement and salary of the individual agent.

Within the informal structure trades (exchanges) will arise which cannot be contractually enforced. Thus both sides of the exchange must agree to trust the other to

carry out his side of the transaction. Enforcement is provided by the fact that trust is a capital good requiring considerable investment on the part of both sides of the exchange. The transactions in the informal network generally involve considerable lags in completing both sides and this ensures that trust will be an extremely important aspect of such exchanges. However, trust is likely to be an extremely fragile form of capital. If one party reneges on a trust bargain he will find that his reputation is severely weakened and future exchanges will be difficult to consummate.

Competition ensues in entering trust relations with one's superior. The payoff to being in such trust networks takes the form of promotions, better tasks, etc. The formation of trust requires an investment of effort in the supply of the type of behaviour desired by one's superior. The superior will always prefer the efficient provision (no shirking) of the output he desires. Since each superior, save the top, is also a subordinate the output of the trust relation will be the efficient provision of what the person at the top wants. Whether this output is efficient in the sense of price equals marginal cost (minimum cost) depends on the process of selection of the person at the top. Although I suggest this position is likely competitive itself, I do not address this issue in the thesis. I simply focus on the proposition that vertical trust networks are intrinsic to bureaus. In the case of Ontario, I show that the

Minister may exploit particular institutional features in addition to the creation of vertical trust networks in order to encourage efficient behaviour.

The Empirical Evidence in the Literature

The literature contains a great deal of empirical work comparing the behaviour of public bureaus and private firms engaged in similar activities. In general these studies find that public bureaus employ more resources per unit of (some defined) output. We have, for example, that the private airline is more efficient than the state airline in Australia (Davies [1971, 1977]); that state universities employ more capital per student than private universities (Orzechowski, 1977); and that state run electric power utilities are less efficient than private utilities (De Alessi, 1975). Some contrary findings have appeared. Caves and Christensen [1980] compared Canadian railways and found the state run railway (CNR) to be as efficient as the private (CPR) and the CNR has become relatively more efficient since 1960. On balance, the weight of the evidence clearly seems to favour the view that public sector firms systematically produce at higher cost than private firms.

Recently there has been a challenge to the body of empirical evidence purporting to show that public sector bureaus are inefficient. The challenge has come in two directions. First, the empirical work has been reevaluated with new data or methodology. Jordan [1980]

has shown that the results obtained by Davies are suspect, for example.

Second, the premise of the earlier empirical work has been challenged. Wintrobe [1985] has argued that the output desired of the public sector bureau differs from that of the private sector firm. In effect, the institutions serve different markets and cannot be evaluated on the same bases. Public sector bureaus serve political markets while private firms serve economic markets. It is likely that the products demanded are not the same in these markets and therefore the relative efficiencies cannot be compared. Essentially the same point was made by Acheson [c. 1973] when he argued that one cannot argue for replacement of public sector bureaus by private firms on the basis that the latter produce at a lower cost since the choice of the supply arrangement also determines the nature of the good or service being produced. Examples of the differences in output required by political and private markets are limited only by one's imagination. Trivially, we could argue the political market may be more interested in homogeneity of service across recipients than in cost reduction. The political demander may also prefer employment creation or discrimination to cost efficiency.

While, the latter argument may be used to demonstrate the ills associated with direct public provision (hardly anyone likes the form of socialised medicine in place in

Britain) it may also be used to support continued public provision (public schools versus a pure voucher system).

Why Bureaus?

In Canada the state funds and directly provides virtually all of the schooling produced. There are some privately funded and managed elementary and secondary schools as well as post-secondary vocational and trade schools but these account for a very small fraction of total enrolment.

The actual mode of provision can best be described as a "bureau". It is difficult to provide an exhaustive definition of a bureau but it is possible to list some general characteristics [Breton and Wintrobe, 1982, pp ix-x]. The bureau is organized as an hierarchy with a well defined structure of superiors and subordinates. Further, except for the very top and bottom positions, each element of the hierarchy is at once a superior and a subordinate. Rules rather than discretion define the behaviour of the elements of the bureau hierarchy.

A central feature of the bureau is that superiors lack contractual control over their subordinates since the former have limited discretion over hiring and firing. Staffing rules are beyond the control of the individual superior. That is, the formal structure of the bureau imposes limits on the rewards and sanctions available to the supervisor [B&W, p x]. I will examine the genesis and rationale of these restrictions shortly.

There are several features which do not describe bureaus. For example, it is not the case that senior bureaucrats (managers) have no proprietary interest in the output of their bureau as argued by Crain and Zardkoohi [1980]. For this to be true it must also be that bureaucrats are selected for their positions by lottery and cannot improve this position (obtain a promotion) by any type of behaviour after receiving this position. There can be no competition within the bureau whatever. I have discussed the competitive nature of bureaus above and I shall provide empirical evidence to that effect in Chapters 3 and 4. I maintain that the monopoly model does not conform to the situation faced by bureaucrats.

It is also not true that bureaus are used exclusively to supply certain types of public output as is implied by Borchherding [1983]. In explaining the wide variety of public sector supply arrangements Borchherding concentrates on the nature of the good or service in question and concludes this is the determinant of the supply choice. Two issues dominate: the allocative effects of the supply mechanism and the distributive effects with respect to factors of production and the recipients of the service. The salient attribute of the good or service is its measurability of either quality or quantity. When delivery of the good is easily verifiable (here Borchherding uses the example of refuse collection)

it may be contracted out to the private sector for provision. Otherwise, the good will be best provided via a public bureau.

Several arguments are implicitly contained in Borcharding's hypothesis. The first is that private sector firms are to be preferred unless some additional constraint is imposed. Measurability is one such constraint. There are others, such as whether the good or service is intended to form a part of the government's general program of income redistribution. Second, one particular institutional form is judged to be preferred in all instances. In other words, we should generally observe a government good being provided exclusively via a bureau or by contracts with or regulation of private market firms.

Casual observation suggests that the latter is not the case. Some municipalities (eg. Ottawa) contract out refuse collection while others (eg. London) have the collection performed by municipal employees. The same is true of elementary schooling (grades K through 8). Within a class of supply arrangements (public firms) we have a wide variation across the provinces. In British Columbia (prior to the Aid to Independent Schools Act, [1977]) a single "firm" (monopoly) supplied all of the publicly provided schooling. In Ontario, we have two public "firms" which compete for a portion of the market. Even within a particular jurisdiction the supply arrangement may not be static as British Columbia's Aid

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to Independent Schools Act shows. In a more recent example there has been an expansion of the scope of the Roman Catholic Separate Schools in Ontario with the spread of state finance through the full range of secondary school grade levels.

From the evidence I cite in the previous paragraph it is clear that Borchherding's argument is suspect. Not only do we find a particular public service being provided via alternate supply arrangements but the Borchherding argument has a fatal theoretical flaw. If one accepts his initial premise that public bureaus are the inferior choice why would we choose to have a good provided by a public bureau where measurement of the output is difficult?

Perhaps his thesis is merely simplistic; it fails to recognize the existence of alternate means of exchange within any given set of property rights [Cheung, 1969 and 1970]. The general class of organizations we classify as "a bureau" can actually comprise several different supply arrangements through different "contractual" forms embodied in the internal structure and rules of the organization. Thus, both B.C. and Ontario provide elementary schooling through a public firm (bureau). In Ontario the industry structure is nominally competitive since some parents (notably Roman Catholics) have a choice of public sector school to which they may send their children and direct their local tax payments. In

B.C. (prior to the 1977 Act and likely still so) the industry was a monopoly. Should we expect to observe different output (either qualitatively or quantitatively) in Ontario and B.C.? Only if we can simultaneously offer some convincing story to explain differences in the demand for schooling output in the two provinces. The point is, that so long as people (Minister) in B.C. and Ontario have similar tastes (also incomes and relative prices of non-education goods) concerning education (a matter I return to shortly) survival of different organizations of public supply in these provinces must imply substantially similar output from each. The same conclusion must apply concerning the different ways that refuse is collected in Ottawa and London. Alternatively we must conclude that the people of Ottawa require substantially different services in refuse collection from Londoners or that the residents of one city are systematically stupid. The former would be difficult to imagine while the latter would have disastrous implications for our discipline.

The Models: a final evaluation

It is worthwhile to return briefly to the published empirical studies of private and public firm behaviour. In all of these studies the public institution behaved differently than the private and in such a way as to produce at a higher per unit cost of output. There are several studies supporting this general conclusion as

well (see Porcherding [1983] for a survey) and it seems easy to see why some people have argued that public firms are inherently less efficient than their private sector counterparts. The "Virginia school" has coined a "rule of two" to describe the relation between the costs of these institutions based in part on the models of Niskanen [1971]. Crain and Zardkoobi [1980] have argued that the cost differentials can be explained by the attenuated property rights assigned to the manager of the public firm. The manager has no residual claim to the surplus generated by the firm and thus his incentive to monitor diligently is very weak and/or he derives utility from expenditures in excess of minimum cost.

There are two problems with this type of work. First, the model is incomplete since it fails to specify the entry restrictions which would enable managers and/or workers of public firms to earn the rents inherent in producing at above minimum cost. Second, the sort of cost differential information embodied in these studies has been widely known for many years and the stylized folklore (cf Parkinson [1962]) for years longer. What then is the mechanism which would permit this sort of institution to persist in the face of the mounting evidence that it is inefficient? It is asking much of the lottery-type models (eg Harris and Todaro [1970]) to argue that public firms persist because people who are outside hope to collect the rents if they can get in. Most important of all, this research fails to explain why

we would establish monopoly rights and then restrict the form in which the rents may be taken. If one accepts the initial allocation of property rights implied by the existence of the public bureau one must face the proposition that the restriction on the rent appropriation implies the rights lie not with the bureau. In effect, I am arguing that the restrictions are in place to encourage the bureau to supply a certain type of output.

The answer, thus, must lie in the nature of the market the supply mechanism is intended to serve. In this regard it must be recognized that political markets differ from economic markets and that the outputs must be substantively different. To compare public and private supply mechanisms without consideration of this point is bad analysis [Wintrobe, 1985].

Finally there is the recent study by Caves et al. [1980], I referred to earlier, comparing public and private railways in Canada. Their conclusion is that the public firm is as cost efficient as the private firm. At first blush this may appear to be only a single exception to the voluminous literature of the Borcharding-type. However, it is much more than that. The CP/CN comparison provides an illustration of the effect of Ministerial constraints on the behavior of the organization. CP, the private firm began diversifying into non-rail activities in the 1960's. CN asked permission of the

Minister of Transport to do the same. Permission was denied with the result that, if the bureau wished to increase its disposable budget it would have to become more efficient in the area of rail transport.

My view is that insights can be gained from a study of the internal organization of the institution. In the empirical analysis I have performed (see Chapters 3 and 4) I find considerable support that the organization of the bureau is competitive.

Synopsis

My work is organized as follows. In the next chapter I lay the groundwork by describing the institutions of public sector schooling in Canada. In particular I focus on the central feature motivating much of my analysis. The public sector school system in Ontario is characterised by some degree of market contestability through the choice afforded some parents of which school system their children may attend. In B.C. there is no such choice permitted (prior to the introduction of the Aid to Independent Schools Act (1977)). The substantial chapters of my thesis constitute two essays on the microeconomics of schooling provision. Within them I demonstrate there is support for treating the schooling bureaus as competitive and that supplying through a bureau has an effect on the nature of the output.

In Chapter 3 I demonstrate a variety of mechanisms employed by the minister in B.C. to ameliorate the monopoly position afforded public sector schools. I show that the internal organization of the Ministry and the local school boards (which is a policy instrument of the Minister) is conducive to the formation of vertical trust networks. These networks encourage the production of effort that enhances the efficiency of the production of schooling.

In Chapter 4 I evaluate the effects of competition for clients in the public sector schools. I find that the Minister is able to exploit the structure of the "industry" (duopoly) to generate a kind of prisoner's dilemma result which leads to competitive behaviour among the local school boards. I am unable to determine whether the resulting equilibrium is perfectly competitive but I am able to show that there is a behavioural tendency towards competition. This competition has the result that prices are lowered relative to the collusive outcome.

Finally, in Chapter 5 I provide a conclusion and in Appendix 1 a discussion of my sources of data.

Chapter 2

Background

The Institutions: Ontario and British Columbia

I intend this chapter to serve as a background to my thesis. In it I will present a description of the public sector schools across Canada paying particular attention to the devices available to the Minister to induce competition in the schooling bureau in each province. As well, I shall introduce some evidence on the objectives of parents concerning the education of their children.

Elementary schooling in Canada is under Provincial authority as prescribed by Section 93 of the British North America Act [1867]. There are certain common features across provinces: schooling is government provided and no tuition is charged; the local property tax is a major source of revenue; additional revenue is provided by Provincial grants to the local school boards on the basis of enrolment; administration is provided by local boards and Provincial Ministries; and the funding arrangements are similar across the provinces [Wilson and Lazerson, 1982].

While the similarities in the educational systems across provinces are considerable, there are some significant differences which provide the basis for the empirical work of Chapters 3, and 4. The central difference concerns the structure of the publicly funded school systems in each province. The individual provinces have historically chosen different ways to

address the issue of religion in the schools with the result that there now exists a broad spectrum of school systems in Canada and Table 2-1 shows the legal status of the various publicly funded school systems across the provinces.

There is more at issue here than religious freedom. The existence of denominational schools may permit the parent to exercise some choice of schooling type within the publicly provided schools. The actual extent of the choice available to the parent depends on the particular province. As Table 2-1 shows there is considerable diversity of provision of denominational alternatives across Canada. Even within categories there is considerable variation as I will demonstrate shortly. Parental choice is pivotal to my thesis since it affords the Minister an instrument to introduce competition within the public schooling bureau. The importance of this last point is borne out in my comparison of the institutions in Ontario and B.C. where I am able to demonstrate that the Minister does exploit the instruments available to force the bureau to supply the Minister with the output he desires.

It is immediately clear that British Columbia has the least diverse system of public schools. There is a single publicly funded (and managed) school system offering parents no alternative. (British Columbia introduced a voucher scheme involving private schools in

TABLE 2-1

Legal Status of Separate, Confessional, and Denominational
Public Schools in Canada

Nondenom- inational (Public)	Informal Arrangements	Separate School Systems	Dual Confessional Systems	True Denominational System
British Columbia	Nova Scotia New Brunswick Prince Edward Is. Manitoba	Ontario Saskat- chewan Northwest Territories Yukon Alberta	Quebec	Newfoundland

Source: Wilson and Lazerson [1982] p. 6

1977. I discussed this innovation in Chapter 1 and I will briefly return to it later in this chapter.)

Newfoundland would appear to be at the other pole with each major religious denomination represented in the public school system. When we consider the actual choices available to the parents the picture is somewhat different. Choice does not exist in Newfoundland. The parent here declares a religious denomination and this defines the school choice. Quebec's dual confessional system is very similar to Newfoundland's. The major difference is of degree: only the Roman Catholic faith is afforded a distinct system. Further, there is an implicit hierarchy in that the schools (R.C. or Protestant) serving the local minority are known as "dissentient" schools. Prior to the creation of a provincial ministry of education (1964) each confessional

section was responsible for its own curriculum, school inspection, and teacher training. Since 1964 the two branches share a common curriculum as well as the other features mentioned. [Wilson and Lazerson, 1982].

True separate school systems are found in Ontario, Saskatchewan, and Alberta and are based on Roman Catholic and non-denominational schools. The "separate school" designation generally applies to Catholic schools. Even within this group of provinces an important difference exists. The key question is whether a Protestant (Catholic) may assign his/her children and local tax liabilities to a Catholic (Protestant) school board. This right has been determined by the courts and it varies from province to province:

"In Ontario, a Catholic parent may elect the school system to which his or her taxes go. The children will then attend the system to which such taxes are paid. Although a Catholic may choose to be a public school [non-denominational] supporter, however, a non-Catholic may not elect to support a Catholic separate school. [A non-Catholic may send his children to a RC separate school if the school agrees but he will have to pay fees and his property tax will continue to be assigned to the Public board.]

"In Saskatchewan, if a separate school exists in a district, the taxpayer has no choice but to support the school operated by members of his or her denomination.

"In Alberta, once a Roman Catholic separate school district is established, all Catholic residents are separate school supporters and all noncatholic residents are public school supporters." [Wilson and Lazerson, 1982, p. 8]

Thus Ontario provides the broadest scope for parental choice of schooling although this choice is not equally

bilateral: Catholics have choice at lower cost than noncatholics. The range of parental choices places British Columbia (prior to the Aid to Independent Schools Act [1977]) and Ontario at opposite ends of the choice spectrum. For a sizeable fraction (approximately 30% in 1981) Ontario provides a free choice of school systems while B.C. provided no such choice.

Since 1978, B.C. has operated a de facto voucher scheme under the Aid to Independent Schools Act [1977]. Under this program a parent may elect to send his children to a private school whereupon he is provided with a voucher to be applied toward school fees. In 1978 the value of the voucher was set at \$500.00 which was approximately the average day-school tuition fee for one year at that time. This is an interesting experiment and has been the subject of considerable study (see Manley-Casimir (ed) [1982]). I will not explicitly examine any results of the voucher scheme although I note that the existence of this scheme is evidence of the weakness of the monopoly power of the bureau since the voucher increases competition for the bureau. For the reasons I gave in Chapter 1 I shall focus on a comparison of Ontario vs. British Columbia prior to 1978.

a) The Hierarchy

The public sector schooling bureau comprises a number of actors constituting the elements of the internal organization or hierarchy [Alchian and Demsetz, 1972; McManus, 1975]. Briefly these are:

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School administrators - these appear under the common titles of department heads, vice-principal, principal, and administrative staff.

Board administrators - these are generally called supervisors, inspectors, and consultants, and are appointed by the Ministry of Education.

Ministry administrators - the various bureaucrats operating at the Provincial level.

Trustees - the local elected representatives acting as political sponsors to the Board.

Minister of Education - an elected Provincial representative; actually appointed to the position by the provincial Premier from among the elected members of the latter's party.

I will devote the next few paragraphs to an explanation of the interaction of these actors and their role in the schooling process as operated via the public bureau.

Although the responsibility for education was constitutionally assigned to the provinces (each of which has established a Ministry of Education or equivalent), in practice, "The legal process of the delegation of powers and duties has created a sub-organization, the school board [district in the case of B.C.], which has become distinct in its desire for sovereignty." (Fisher [1972], p 24). For day to day activities the local board is the predominant decision-making authority. The extent of local authority control differs between Ontario and B.C.. As well, the range of local control has varied over time.¹ Within a school board there are one or more schools each having an internal administrative structure.

Thus there exists an hierarchy of control with the Ministry at the top having delegated some control to the local boards who in turn delegate to the individual school and thence to the teacher. However such delegation is not irrevocable and therefore is subject to review by the Minister. With the individual, bureau member as the unit of analysis, the elements of the hierarchy, the review, and the competition may be argued to serve as the monitoring devices of the internal organization of the schooling process.

In the urban political structure of Canada many of the particular functions are served by "special purpose bodies" (Higgins [1977], pp 104-8). Education is one of these, with each municipality or county having one or more school boards or districts.² These school boards are largely independent of the local political bodies (municipal governments) decreed, in part, by provincial legislation.³ This is based on the belief that education was somehow unique and of such central importance that it must be independent of the local political structure [Cistone, 1972]. The local independence has carried over to the budgetary process where, "In most cases the city's education budget is drawn up entirely by the local board of education and presented to [the municipal] council which cannot alter the budget." [Higgins, 1977, p 106]. For instance, the Education Act [1974] of Ontario Section 208, paragraph 1 and 2 states, "... the council of each municipality in a

school division in each year shall levy and collect ... the amount that it is required by the divisional [Public and RCSSB] board to raise for public school purposes." However, under Section 521 of the Municipal Act [1974], the notices of taxes shall be given separately such that ratepayers may identify the extent of the taxes required for the school board. This process has been defended on the grounds that education should be exempt from short-sighted and penny-wise local politicians [Higgins, p 107].

School expenditures are funded by a mix of Provincial grants to local school boards and of local taxes (primarily on property). The grant structure is based on a foundation plan in Ontario [Cameron, 1972] and in B.C. with the result that the amounts required to be raised through local taxes varies considerably across municipalities. However, the proportion of expenditures to be financed through local taxes is significant in all municipalities.⁴

In Ontario the members of the boards of education (trustees) are elected at the same time as other municipal politicians (mayor, controllers, aldermen, etc.). Similar arrangements exist in B.C. with the exception that trustees in some of the sparsely populated interior districts are appointed by the Minister rather than elected. The number of such instances is small and declining as the population of these areas rises. In the

context of the Niskanen [1971, 1975] model of the bureau the trustees represent the political sponsor of the local bureau. Under the rather unique budgetary process described above, the trustees also comprise the review committee. The trustees are expected to have control over local administration of the schools [Wiles and Williams, 1972]. Any expenditure beyond the Provincial grants must be financed through local tax revenue and hence reviewed by the trustees.

The school board structure in Ontario was altered dramatically in 1969 under a revision to the education statutes (Bill 44 [January 1, 1969]). This Bill created new school board structures based on counties rather than townships. Since counties comprise several townships the change represented a major consolidation of school boards. At the same time city school boards had their boundaries drawn to conform to municipal boundaries. B.C. had undergone a similar consolidation in 1946. Trustees were generally elected on a city-wide (board-wide) basis rather than by ward.⁵ One could argue the effect of this latter provision to be a weakening of the representation of local issues. Further, each voter casts his ballot for the entire slate of the school board. A few voters acting in consort can have a significant effect on the outcome of the election.

This last point is very interesting. Teachers as well as board staff and other administrators are prevented from actually sitting on the board of education by which

they are employed [Education Act (Ont), 1974; Section 191] yet they may exercise considerable influence over the composition of the school board. Voter turnout for municipal elections is quite low (generally less than 35%) and an even smaller number actually submit ballots for particular positions such as school board trustees. Teachers and other staff are permitted to vote. With the low gross turnout, if teachers and other staff have a high propensity to vote relative to the remainder of the population they will have a substantial impact in deciding the successful candidates [Tullock, 1974; Frey and Pommerhne, 1982]. It is common for the teachers to publish a list of "recommended candidates" prior to the election. Where other voters are largely uninformed this type of information may prove to be very persuasive [Bartlett, 1973]. Certain pro-expenditure groups such as parent-teacher associations are also quite active during the election period.

In Chapter 1 I presented an argument that competition was a predominant force in the institutions of the public sector. The result of such competition was that the local trustees would not uniquely serve the interests of the bureau. The trustees are in a position of having to compete for the support of the Minister who controls a considerable part of the trustees' budget through the Provincial grant structure. The Minister will not yield rents to the local bureau when he can appropriate these

for himself.

The trustees constitute the political sponsor to the local bureau. The latter comprises several types of administration: school administration (principal, head of department, etc.), and board administration (superintendents, counsellors, administrative personnel, etc.). It is important to note, for the work that follows, that these administrative positions are generally filled by former teachers who have been promoted from classroom teaching. There is considerable upward mobility within the schooling system. I will demonstrate the importance of this upward mobility for my thesis in Chapter 3.

Teacher certification is a Provincial matter. Mobility within a province is technically unrestricted. Recently, declines in enrolment have resulted in some reduction of actual mobility of teachers since there are fewer new positions. To move between provinces a teacher will be required to be re-certified by the province he or she wishes to enter. This may involve considerable effort on the part of the teacher but inter-provincial migration is significantly greater than zero. The method of teacher evaluation and performance review differs between Ontario and B.C.. This difference forms the basis of a detailed discussion of the comparison between these provinces in Chapter 3.

b) Ontario: Public and RCSSB

Although the separate (hereafter RCSSB) and non-denominational (hereafter Public) schools of Ontario are both publicly funded there are some distinctions which are important to the arguments of Chapter 4 and I will describe these here:

1. The market served by the RCSSB is not exclusive to it while that of the Public is so assigned. Roman Catholic parents may elect to send their children (and assign their property tax) to the Public system but non-Roman Catholic must send their children to the Public [Education Act, 1974]. Some exceptions to the latter are permitted but they are not common.

2. The tax base available to the RCSSB is narrower than that of the Public. The RCSSB's share of the local tax base is restricted to the residential property tax of those R.C.'s who designate themselves as separate school supporters. To qualify as a separate school supporter at least one spouse must be a R.C. The Public share is the remainder: non-R.C. residential property tax, commercial property tax, and industrial property tax. R.C. families tend to be larger thus the residential property tax revenue per child is less than for the Public.

3. The property tax serves a price-like function to the RCSSB more so than the Public since R.C. parents may elect to transfer their children and the associated tax revenue to either the Public or RCSSB. It seems reasonable to expect the "price" (property tax rate) to affect this choice. For non-R.C.'s this choice is not available. In Hirschman's terminology [1970] the RCSSB is more subject to "exit" than is the Public. This exit is accompanied by a loss of revenue. While exit is an option for non-R.C.'s this is not accompanied by a fall in local tax revenue. The issue here is whether "exit" serves a credible threat to the school board. While both systems lose the per pupil grant when a student leaves, the Public retains its tax revenue. Since the grant accounts for less than 50% of per-pupil expenditure, the Public is less vulnerable to the cost of exit - the loss of revenue.

Pursuant to the last point is the fact that school boards receive sizeable revenues in the form of grants from the Province. These grants are based on enrolment.

As noted earlier the grants are based on a foundation plan - varying according to the tax capacity of each board to ensure equal tax effort in the provision of the basic level of schooling as defined by the Ministry. One result of this grant structure is that the share of basic expenditures grant-financed is much higher for the RCSSB than the Public. The local property tax is a less important source of revenue to the RCSSB. However, the Public is less sensitive to enrolment changes since approximately one-half of its revenue is independent of enrolment. The latter is the revenue deriving from the local property tax which is fixed to the Public boards. It should be noted here again that the grants from the Province in both Ontario and B.C. serve to cover basic educational expenditures in each board with identical local tax effort. Any discretionary expenditures (defined as being beyond the expenditures approved by the Ministry) will be financed solely from local taxes (property tax).

The history of the RCSSB is one of a struggle to attain financial parity with the Public. The growth of the RCSSB in the early 1800's prompted provincial authorities to try to limit the influence of the separate schools. Cameron [1972] notes, "Ryerson and the Provincial Government were determined that separate schools not be encouraged and were convinced that if sufficient barriers were placed in the way of their

development they would soon pass entirely from the Upper Canadian education scene." (p 40) The result was the education bill of 1850 prohibiting municipal support of separate schools. Separate school supporters paid property tax to support the public school system and ratebills to support the separate school system. Later amendments assigned the property tax of R.C.'s, who had declared their support of the separate school organization, to the RCSSB. This is pretty much as it now stands. One further issue concerned the assignment of the corporate property tax. In Chapter 4 I discuss the resolution of this debate as the courts decided it.

The net result of the current tax assignment is that the Public tax base consists of the residential, commercial, and industrial properties while the RCSSB tax base is comprised of those residential properties where the registered owner or tenant (or spouse thereof) is R.C. and elects to direct the education portion of the property tax to the RCSSB. In the absence of a specific assignment of residential property tax to the RCSSB the property is automatically assessed as supporting the Public. The "default value" for the residential property tax assignment is the Public system. I will show in Chapter 4 that this structure has important implications for the behaviour of the Minister in Ontario.

As I have noted, a considerable portion of the revenues of school boards derives from direct grants from the Provincial government. In a very real sense the local:

property tax is also a grant from the Provincial government since under the BNA Act [1867] the Province assigns the local tax bases for education. That is, the property rights to local tax bases for schooling rests with the Province.

Given that the provincial authorities have chosen to restrict the tax base available to the RCSSB (to the explicitly assigned residential property tax only) it would seem reasonable to expect similar treatment on the grant side. The evidence bears this out. The Provincial grants are derived on a per student basis but they vary across boards by virtue of a complicated formula which accounts for differences in costs (arising from program requirements and special expenditures such as transportation) and in local tax bases. The intention of the latter adjustment is to arrive at an equalised mill rate to meet "basic" expenditures [Cameron, 1972] making the grant program serve as a foundation plan. When the RCSSB grants are determined it is on the basis of an "allocated assessment" of the tax base presumed to be supporting the board. The problem faced by the RCSSB is that this includes the "allocated corporate assessment". Since in practice the RCSSB rarely receives tax revenue from the corporate base the procedure overstates the tax revenue actually accruing to the RCSSB and thereby understates the grant entitlements. To see this point consider that corporate property is taxed as a Public

supporter unless the majority of the shareholders are RC and they vote to assign their property tax to the local RCSSB (see Chapter 4). In practice the latter is a rare event since identification of the religion of the shareholders is very costly to the company and there is little return to the activity from the perspective of the company and share holders.

The adverse treatment of the RCSSB under the Provincial grant structure would not have a substantial effect on the ability of the RCSSB to raise revenue were it granted exclusive access to a particular market. If all R.C.'s were required to be separate school supporters the RCSSB would be able to cover shortfalls on the grant side by raising local property tax rates. However, setting high mill rates under the current regime may induce some R.C.'s to withdraw their support (and children) from the separate schools. In Chapter 4 I will show the effect of this structure is to induce more competitive behaviour on the part of the public sector schools.

School board budgets are set in April or May and a corresponding mill rate is announced. RCSSB supporters can choose to direct support to the Public prior to September thirtieth under the Education Act [1974], Section 116, paragraph 3. To the extent that exit is a function of relative tax prices it follows the RCSSB will respond by setting its tax price (mill rate) at or near that of the local Public board. The evidence shows this

to be the case (Chapter 4). Residential mill rates of the RCSSB are rarely above those of the Public.

Administrators of the RCSSB recognize their relative position: The Ottawa Separate School Board (OSSB) set its mill rates on March 31, 1980 ~~prior~~ to the approval of its 1980 budget. OSSB finance committee chairman, Paul Kelly, succinctly described the situation when he noted it would be "almost suicidal" to post separate school taxes above those of the Ottawa Board of Education (Public) which had set its mill rates the week previously [The Citizen, April 1, 1980]. I will show in Chapter 4 that the implied order of action here is not necessarily the true order. The Public may set its mill rate in anticipation of the action of the RCSSB.

The above story suggests there is little scope for the RCSSB to offer higher quality at a higher price. One explanation could be that consumers (parents) have a low elasticity of substitution for price and quality. Since higher quality presumably costs more to produce the elasticity conditions are such that any potential revenue from offering higher quality will be more than offset by higher costs. ~~From~~ the evidence I discuss later in this Chapter I do not think this a likely hypothesis. Parents do devote considerable resources to sending their children to private schools to gain quality. Further, the evidence shows that achievement (a measure of quality) is important to parents.

There may be a more compelling explanation for the RCSSB's inability to set its mill rates above those of the Public. Although there are no firm figures (I have not found anyone who collects such data), anecdotal evidence from several RCSSB officials indicates there is a large proportion of RCSSB ratepayers who no longer have children attending school. The suggested figures were that this proportion is in the range of 60%. Quality improvements will not be readily apparent to this group and it is reasonable to expect them to react adversely to rate increases. If there is a sizeable premium associated with support of the RCSSB it may be that these people will choose to support the Public system. Rate increases may induce a drop in revenues. However, the reason the RCSSB does not set its rate above that of the Public is that this strategy does not maximize its wellbeing.

Hall and Lindsay [1980] describe persons who contribute funds but who do not directly use a facility as "sponsors". To ensure continued financial support the preferences of the sponsors must be satisfied in the sense that sponsors must perceive a benefit to continued financial support. Here it is important to note that their presence imposes severe constraints on the ability of the RCSSB to raise revenues since the sponsors are quite free to exit should the price prove higher than the perceived benefit to the sponsor.

If the RCSSB is unable to set its mill rates above those of the Public is there any scope for setting the rates below those of the Public? The observed behaviour of the RCSSB would indicate that this is not a useful strategy. A tax rate reduction by the RCSSB cannot gain it non-RC support and it would seem that RC's prefer the RCSSB to the Public given identical mill rates.

The Provincial institutional arrangements place the RCSSB in an inferior position to the Public in terms of total revenue per pupil. With identical mill rates the RCSSB earns approximately 7% less revenue per pupil (grants plus taxes) than the Public [Bezeau, 1977]. Consequently, it must spend 7% less per pupil. Cost per pupil comparisons are not relevant here for this reason since the bureau will spend its budget. The Minister gains from movement of RC's to the RCSSB since total expenditure falls by 7% of the per pupil expenditure. This reduces the direct expenditures and permits more budget discretion. In Chapter 4 I show the means by which the Minister encourages the local bureaus to compete for pupils.

The Demand Side: what do the parents/taxpayers want?

Schooling is generally supplied through a public firm and, ordinarily, this would make it difficult to estimate demand. However, in most jurisdictions in the U.S. the school budget is voted as a separate issue and this feature has made the determination of the school

expenditure an attractive subject for median voter studies. As a result we have access to a considerable body of empirical work on what amounts to the demand for education. Further, there are some attitude survey observations provided from Gallup polls in the U.S.⁷.

There is also information provided by some irregular surveys. In the sections which follow I do not intend the discussion to be an exhaustive summary of the literature on the demand for schooling. I shall offer, instead, a story concerning the objectives of the various actors in the schooling process.

a) Demand for schooling: median voter studies

In Chapter 1 I introduced the Minister by describing his objective function and the constraints imposed by the political process of reelection. My discussion demonstrated that the Minister will, to some extent, reflect the interests of the parents (and of the taxpayers in general). To complete the description of the Minister I will devote the next few pages to a discussion of the available evidence on the nature of the demand for schooling. After briefly discussing the income and price elasticity estimates derived from median voter studies I will turn to the characteristics of schooling that parents have revealed as important through direct choice or through survey responses.

The conventional model of public choice in a representative democracy is based on a framework of

competition for votes by politicians who seek election as an end in itself. This thesis is usually credited to Downs [1957]. Following Hotelling [1929], Downs argued that the outcome of such political competition would appear to be "as if" the median voter were decisive. This result holds for those cases where preferences are single-peaked, voting is non-strategic, and there is no alienation effect (voting participation is 100%), and the vote is on a single issue. These characteristics are sufficiently general to be of broad interest. The median voter model is useful since it provides the economist with his analytical unit of account - the representative individual. It is useful to the problem at hand since school board budgets in the U.S. are generally single issue items. Accordingly, they have become the staple of of analysts wishing to investigate the median voter model. Thus I am provided, indirectly, with data on the preferences of the voting subset of the electorate.

Denzau [1975] surveyed a number of earlier empirical studies of the demand for school expenditures. He found that seven of the nine studies employing median income as an explanatory variable found it to be significant.

Income elasticities were reported to be in the range 0.207 to 0.560. Ladd [1975] reports the income elasticity to be 0.42 and the price elasticity (based on an imputed tax price) to be -0.653. Peterson [1975] using the results of referenda voting on school

expenditure bills derived an income elasticity of 0.84 to 1.23 and a price elasticity of -0.25 to -0.51. These results are not particularly surprising. They show schooling to be a normal good (positive income elasticity) with a fairly price-inelastic demand. Our prior sup-positions are confirmed. Of course, inherent in this work is the presumption that the voters perceive that increased expenditure implies greater output of schooling. The vast body of empirical work (see Cohn [1979]) has shown this presumption to be false in so far as output is measured in terms of gains in achievement levels of students. There may be other measures of output which are relevant to the voters and I shall take this up shortly.

Some authors, seeking more disaggregation, have utilized survey data to estimate demand functions for school expenditures. Rubinfeld [1977] polled voters in a Detroit suburb to determine their voting patterns and characteristics. He found the income elasticity to be near unity and the price elasticity to be approximately 0.60. Both results are roughly consistent with the aggregate results described above. Rubinfeld also found the demand for schooling to be positively correlated with the number of children in public schools and whether the person polled was a school teacher. The number of years residence in the area was negatively correlated while having children enrolled in private schools was insignificant.

Bergstrom et al [1982] also utilised survey data to estimate the demand for schooling expenditure. Rather than poll actual voters they posed two hypothetical questions:

i) would you wish an increase in school expenditure?

ii) would you wish this increase if it involved an increase in your taxes?

An affirmative answer to the second question was recorded as a demand for higher levels of school expenditure. Bergstrom et al found the income elasticity to be between 0.38 and 0.83 and the price elasticity to be between -0.39 and -0.57. These findings are consistent with the estimates derived in earlier studies. Other factors found to have an impact on the demand for school expenditures were the number of children in the household, the number of pupils in the school (some perception of the costs of crowding?), and whether the person polled was a school employee (all positive effects). Negatively correlated with the demand for school expenditures was having children enrolled in a private school.

The survey based studies reveal attitudes based on utility maximising behaviour and the perception that the level of expenditure on schooling is correlated with the quality and quantity of schooling. From the determinants of demand it appears people perceive schooling to be a

largely private good. Thus they demand greater expenditures if they have children in the schools. At the same time if they enrol their children in private schools they demand less expenditure. If there is an externality effect it is dominated by other considerations one of which may simply be the incentive to free ride.

The Gallup institution has polled public opinion (in the U.S.) concerning schooling for a number of years. The questions are phrased in terms of a perception of the problems in public schooling but the results can be used to infer the desired characteristics of a school system. Over the period 1969 to 1980 the major problems cited have been: discipline in the class, the use of drugs by pupils, the curriculum, the availability of finance, school and class size, and the availability of "good" teachers. These items are generally related to a desire for achievement oriented output. Discipline in the classroom is desired as an end in itself and is also regarded as conducive to pupil performance. The same is true of curriculum and of teacher availability. The complaint regarding the level of senior government finance may reflect a belief that more expenditure will produce a higher output as I noted above. It may also reflect the desire to avoid local taxes by transferring a share of the cost to a senior government. Large classes and schools are generally perceived as injurious to pupil performance. The literature [Cohn, 1979] suggests that

this concern may be largely misplaced as most of the empirical work has not demonstrated a link between any inputs and output (measured as pupil performance). Of course we must recall that the Gallup Poll results suggest there may be other outputs of interest to the voters and these may be reflected in larger use of inputs.

Before leaving the survey work on the demand for schooling it is interesting to compare the attitudes of some of the actors in the school process. Buttrick (1977) examined the attitudes of teachers, parents, pupils, and school principals with respect to several issues and the results are summarized in Table 2-2. We can see that attitudes on the various issues differed widely across the class of actors. Teachers and principals have markedly different views on the role of secondary schooling for example. Parents, perhaps, view schools as a place where their children can be supervised and/or taught skills of use in the workforce. The importance of the supervisory role is emphasised by the attitudes toward early school leaving ages. Parents are clearly less than interested in any changes which would reduce the time spent in school. Further, parents appear interested in items reflecting measurable output as indicated by their perception of the role of teachers (item 2) and homework.

TABLE 2-2

**Attitudes of Parents, Pupils, Teachers, School Principals
Toward Various Possible Policy Prescriptions in Schools
(Secondary Schools)**

PERCENT WHO SAID THEY AGREED				
ISSUES	PUPILS	PARENTS	TEACHERS	PRINCIPALS
1. Early school leaving age adopted	38	35	70	90
2. Primary function of teachers is to prepare pupils for higher education	75	84	57	56
3. Some homework every night in most courses	75	84	59	61
4. Secondary schools should have a community advisor to assess programs from perspective of parents	80	75	50	52

What emerges here is a systematic divergence of opinion as to the nature and role of schooling. From my earlier discussion of the essentially competitive market for the post of Minister of Education I predict the latter would introduce features of the institution which would curb the school's desire to act on their views. For example, providing funding on a per pupil basis (especially where average cost is greater than or equal to marginal cost) will discourage the schools from counselling early leaving ages. Homework will be required where the curriculum defines progress rates which exceed availability of class time. Similarly, the

design of the curriculum can be used to force the schools to devote greater effort to preparation of students for post-secondary schooling.

Another source of information regarding parents' desired school characteristics are studies of the determinants of school choice. In the context of the existing institutions this choice usually involves a decision between public and private schools.⁸

In a recent study West [1985] regressed the ratio of private to public enrolment against a set of explanatory variables. The data were cross-sectional at the state level for the U.S. and he found the following to be positive determinants of private school enrollment: proportion of Roman Catholics in the population, percentage of metropolitan population in the state, pupil/teacher ratio, and the extent of teacher work stoppage activity (days lost due to strikes). Negatively correlated were: percent of the population that is non-white, proportion of the school budget devoted to administration, and the proportion of the teachers in the state who are members of the National Education Association (a professional association). These findings indicate that parents value achievement (pupil/teacher ratio) and continuity (absence of strike activity). The findings for Roman Catholics and non-whites reflect the religious affiliation of private schools and the income effect respectively. West's study contributes the information regarding strike activity to the survey and

Gallup data.

Schooling is a complex good and we can enrich the model considerably by defining it in terms of a set of characteristics. From the Gallup results it appears that people place a high value on pupil achievement, discipline, and the nature of the curriculum. The West study shows that parents (who generally make the choices with respect to the school system their children will attend) desire small class sizes and are particularly concerned with interruptions in schooling arising from strike activity. The utility parents place on time in school (which may merely reflect a desire for subsidized baby sitting service) can be deduced from anecdotal evidence concerning the objections raised by parents when the schools propose shortening of daily hours in the classroom or the introduction of additional "conference" or "professional development" days into the academic year.⁹ The same point is borne out in the results reported by Buttrick (Table 2-2 above) where we can see that the pupils and parents are considerably less favourably disposed to an earlier schooling leaving age than are teachers and school principals. The latter actors may merely wish to be rid of potentially troublesome students and this can be accomplished by allowing them to leave school at a younger age. In the analysis I assume that parents of school children in Ontario demand the same output attributes and levels as

their counterparts in B.C.. Since there is no evidence to the contrary this seems a reasonable assumption.

c) Parents as choosers

Since public provision of schooling is the dominant mode in Canada and the U.S., parental choice is generally quite limited. Typically if parents wish their child to change schools the family must move. Due to the rather limited choice historically there has been little evidence of the determinants of parental choice in schooling. The West [1985] study discussed above is a notable exception. Evidence from choice of residential location is understandably ambiguous since there are several reasons to choose a particular location. The issue of parental choice has received some attention recently [Coons and Sugarman, 1978; Manley-Casimir, 1982] and some interesting empirical work has been published.

Nault and Uchitelle [1982] have explored the question of parental choice in elementary level schooling. They studied choice in a small metropolitan area in the U.S. where parents are given the right to place their children in one of two adjacent school districts. They found that parents in these "optional zones" (permitted to choose) were significantly better informed about potential schools than were parents living in "designated zones" (no choice permitted). The parents who were permitted to choose invested considerably more resources in learning about the public schools in the area than did parents who

were not permitted to choose. Search activity involved such high cost activities as : visiting the classroom while the class was in session, speaking with teachers and principals, making repeated visits to the school, and attending planned school functions prior to registration [Nault and Uchitelle, p. 93]. These parents learned a number of things such as the level of strictness of the teacher, the general level of school discipline, the reporting system in use, and the type of administrator the principal was.

The factors important to the parent are also of interest. The general atmosphere (level of discipline or order, demeanor of the pupils and teachers) of the school was frequently cited. Also mentioned frequently were: the curriculum and pupil achievement, the principal's general philosophy toward schooling, and the teacher's "style". Conspicuous amongst the unimportant factors were the nature of the physical facilities and convenience to transportation. Parents are clearly willing to incur some transaction costs in selecting their children's schools and they seem to be aware the physical plant is not important to achievement. The accuracy of this perception is supported by the available empirical work (see Cohn [1979]). The Nault and Uchitelle study demonstrates the intensity of parental preferences with respect to schooling. It also confirms the results of attitude surveys of educational issues. Finally, it demonstrates the interest level of the parent

in his child's schooling when this interest can to be translated into direct action. This behaviour has a bearing on the work I present in Chapter 4 concerning the choice available in Ontario.

Conclusions

In this chapter I have reviewed the structural differences in the public sector schooling across the provinces. I have shown that B.C. and Ontario represent the poles as far as the choice available to parents is concerned. The Minister is interested in the level of parental choice since this provides him with a convenient measure (market share) of the efficiency of the production of the competing bureaus.

I have also discussed the elements of the demand for education or, more correctly, schooling. The evidence derived from the studies of the demand for public schooling, based on the results of studies of the median voter confirm our expectations. Schooling is a normal good having a price inelastic demand schedule. Parents appear to desire achievement, discipline, and continuity of time in instruction (absence of strikes or work stoppages). To the extent the Minister reflects the wishes of the parents he will encourage the bureau to be efficient in the production of these things.

Finally, I have presented a discussion of the institutional setting of the selection of the Minister and the other political sponsors. I demonstrated the

competitive nature of the process to show that the Minister will have an interest in technical efficiency in the production of what the parents/taxpayers want as well as what he wants.

Footnotes

1. This has been accomplished by an increasing division of labour between the Province and the local authority. Over time the Provincial Ministry has tended to focus on general policy issues and the local boards have concentrated on the day-to-day administration. (Ianaccone [1972]). However the division of responsibility differs between Ontario and B.C..

These differences are discussed in Chapter 3.

2. An important part of the recent history of schooling in Ontario and B.C. has been the consolidation of local school boards and districts into larger units.

3. See, for example, the Municipal Act of Ontario [1974].

4. For example, in 1978 the proportion of expenditure financed through local taxes varied from 20% to 50% for Public boards and from 12% to 25% for RCSSB boards.

5. This has altered somewhat in recent years with a move to having larger municipalities divided into zones (larger than the wards used to elect aldermen). Each zone elects its own subset of the school trustees or board members. This seems, at first, to contradict the model I have presented. However, the recent phenomenon of school closures may have motivated this change in representation. Election by zone provides the trustee with a geographical constituency which will focus on local issues of which school closure is paramount. The

gains (tax savings) to closing a school are spread over the city while the costs (direct to parents and through the reduction in property values) are concentrated in the particular area. Based on Downs' [1957] rational ignorance assumption local representation will lead to fewer school closings than will board-wide representation.

6. The history of the RCSSB's attempt to gain access to a pro-rated share of the commercial tax base is an interesting topic for further work. The interested reader is referred to Cameron [1972].

7. See Phi Delta Kappan for reports of "Annual Gallup Poll of the Public's Attitude Toward the Public Schools". These reports appear each year.

8. In most cases pupils must attend the public school in their geographic area or attend a private school. Choice among public schools is usually quite restricted.

9. Conference or professional development days are non-teaching days devoted to seminars, etc for school teachers. Pupils do not attend school on these days.

Chapter 3

Competitive Bureaus: Internal Organization

Introduction

It is in the political sponsor's (Minister) interest to foster competition within the bureau and/or among bureaus supplying similar services or output. The Minister benefits directly from such competition insofar as it encourages provision of the output desired by him. Where competition for the Minister's position exists, as I described in Chapter 1, he will encourage that type of competition that leads to reelection (by the ~~electorate~~) and to his selection by the Premier. Competition within the general bureaucratic structure will, in any case, lead to more efficient production of the output desired by the Minister (reduction in the rents accruing to the bureaucrats). That is, any rents must accrue to the non-contested position within the organization.

In Chapter 2 I demonstrated descriptive differences by Province in the structure of public sector schooling. B.C.'s may be described as a monopoly while Ontario's may be described as a duopoly over the Roman Catholic portion of the population.

I shall show in the next chapter that the Ontario Minister is able to exploit the duopoly structure by designing the two-party game, constituting the duopoly interaction, such that the parties are encouraged to reach the non-cooperative solution. While the resulting

outcome is not necessarily allocatively perfectly competitive it is clearly behaviourally competitive. In achieving this result the Minister meets his objective: the bureau is more competitive. The Minister's utility increases as competition transfers the rents to the Minister directly and in the form of increased probability of reelection. Given the political competition I ascribe to the electoral process and to the selection of the Minister, the taxpayers and parents of school children also benefit from the competition.

In B.C. the Minister does not have the duopoly structure available to foster direct competition and must rely on other instruments. I shall demonstrate, however, that the Minister generates competition for positions within the hierarchy of the bureau. While this competition is characteristic of all bureaus I shall show that it is utilised to a much greater degree in B.C. than in Ontario. My hypothesis can be explicitly stated: the Minister in B.C. has employed substitutes to inter-bureau competition (for a share of the market) in the design of the public schooling bureau. The first section of this chapter is devoted to the theoretical description of the competition.

In subsequent sections I develop the theory of the informal structure of the bureau, describe the formal structure of the B.C. public sector schooling bureau, and demonstrate that this formal structure is used to foster competition through the informal structure.

1) Trust Networks: Informal Structure

In an important and innovative work Breton and Wintrobe [1982] (hereafter B&W) argued that the crucial difference between bureaus in the public sector and those in the private sector lies in the lack of discretionary pecuniary authority of managers in the former. This characteristic is particularly true as discretion pertains to the hiring and firing of staff. Regardless of the genesis of this restriction (B&W argue it was intended to reduce patronage in public sector appointments) the effect is to limit the formal control of the manager over the workers or subordinates in the bureau. The manager is unable to replace those workers who are not performing acceptably since he cannot hire at will.

This view, B&W note, derives from the usual depiction of the actors in the bureau as either a superior or subordinate. Such classification omits the essence of the institution - it is a complex hierarchy. Thus, except for the very top and bottom positions everyone in the bureau is simultaneously a subordinate and a superior. What makes this an interesting observation is that every bureaucrat has the capacity for selective behaviour. That is, the bureaucrat is not compelled to follow strict rules. He may deviate from these in ways which increase output or in ways which decrease output. The choice depends on the rewards and sanctions within

the bureau.

As a subordinate, each member is required to generate an output to the satisfaction of his superior and for this relies on the output of his own subordinates. Lacking formal control over his subordinates (i.e. the ability to issue orders which will be carried out with certainty) the bureaucrat is in an exchange relationship with them. The subordinate will perform the superiors' wishes in anticipation of a reward (the quid pro quo). Thus they exchange. The superior will offer promotions or perks (more attractive jobs, for example) for work done to his satisfaction. Conversely, he will deny these rewards to those whose performance is substandard. Promotion may confer security of tenure as well as salary and prestige.

The intertemporal nature of the transactions in this exchange relation requires that each party trust the other to carry out his end of the bargain. Thus we have the essence of the B&W model of the bureau as a series of networks of informal exchange relationships involving trust. Why should anyone wish to join such networks? In part, the answer has been given - membership may imply greater likelihood of promotion or other "perks".

Promotion may involve more than merely a modest raise in salary. As I will show shortly, promotion may also be used to protect a bureaucrat from being laid off during a period of declining demand for the bureau's product.

Entry to the network is bought through the establishment of trust relations within the organization. A trust relation is the equivalent of a market quid pro quo transaction except the bargain is contractually unenforceable (it may be viewed as an implicit contract). Both sides agree to trust each other to perform certain functions. The penalty for malfeasance is ejection from the network with the attendant loss of payoffs. The network behaves as a sort of "super game" where the repeated plays correspond to the on-going nature of the trust relation. Where the network involves a relation between a superior and subordinate the latter will provide effort in the areas desired by the superior while trusting the superior to reward this effort at some future date. The timing of the transaction make clear the nature of the trust required of the network. Even in the absence of formal control over the salary and tenure prospects of the subordinate the superior can command the desired behaviour.

The above is not the whole story, however. B&W define two categories of trust relation with self-explanatory titles: vertical trust (superior-subordinate network) and horizontal trust ("equals" network). The nature of the trust relation affects the level and nature of effort and therefore the level of output. Specifically, it is argued that workers may engage in "selective" effort. Effort may be directly productive (constructive) or it may be counter-productive (destructive). The worker's

choice of effort mix will depend on the extent to which he depends on horizontal or vertical trust.

To continue, adverse selective effort involves shirking on activities desired by the superior. In an institution where horizontal trust is relatively more important shirking is predicted to be more prevalent than where vertical trust is paramount. The argument is as follows. Constructive effort yields disutility to the worker since it involves effort to produce the output desired by the superior. Unless this output provides utility directly to the worker, constructive effort must be coerced. Collective shirking is harder to detect than individual shirking and the horizontal trust network will discourage the signalling-on-the-job associated with constructive effort.

Vertical trust encourages positive effort since the quid expected by the superior in the exchange will involve some form of output which that superior may take, in turn, to his superior. The subordinate engaging in selective effort involving shirking can expect to be ejected from the trust network and, further, to find his entry to other trust networks is effectively curtailed by his reputation. Trust is a fragile form of capital.

As an aside here, I should like to emphasise that the vertical trust relation must lead to greater output of whatever it is the supervisor desires. Since the trust network is a component of the informal structure the

superior is free to determine the type of output that he will reward. It seems reasonable that the superior would choose to reward output that is objectively measurable by himself rather than rely on information generated by the subordinate. This structure will also reduce any tendency of a subordinate to engage in the provision of "disinformation" regarding the output of any competing subordinate of the same superior. I do not argue that such rent seeking activity will be driven to zero but, where the property rights are well defined as here, it will be limited by the rational behaviour of the superior.

The authority who desires to increase output or efficiency in the production of the desired output, as I argue the Ministry to be, will increase competition for positions in vertical networks where the external competition for formal positions is weak. B&W note, "Imperfections in one form of competition may be compensated for by competition in other ways." (p. 9) I do not treat vertical trust and external competition as mutually exclusive. Where external competition for positions or (in the case of a fixed size market) market share, is prevalent, there will be less reliance on informal arrangements or trust relationships. The latter are likely more costly to establish and to police and will be used where other forms of competition are weak.

Introducing the trust element directly into the production function for schooling yields

$$A = A(e, T_V, T_H) \quad (3-1)$$

where A denotes achievement (output)

e denotes teacher effort which I define to be either constructive or destructive (e^c, e^d respectively),

T_V denotes the level of vertical trust in the hierarchy,

T_H denotes the level of horizontal trust.

Since e may be either constructive or destructive it follows that $A \geq 0$ depending on the type of effort.

Constructive effort will involve less shirking on the job and more attention to the output desired by the superior.

Destructive effort will involve shirking on the job and little attention to the desires of the superior.

Let me begin by analysing the determinants of constructive effort. It is reasonable to expect competition to encourage greater effort (less shirking) thus I can write

$$e = e(c), \quad \partial e / \partial c > 0$$

where c denotes the level of competition for clients, territory, budgets, or positions in the informal hierarchy.

Alchian [1969] and; later, Jensen and Meckling [1976] postulate a world where competition, c , is at a maximal in the following sense. There is free entry and exit to management positions and information regarding relative

productivity is freely known. Constructive effort, e^C , is maximal and all rents are driven to zero. There are no non-compensating wage differentials and managers pursue profit maximization with the resulting technical efficiency in operations. Any residual rents to managers are due to limits in the competitive process arising from the general class of transactions costs. Essentially, competition for positions in the informal hierarchy serves the same function as competition for the formal positions.

If competition for management positions were restricted below the maximal for some reason, say institutional impediments to mobility, the Alchian-type model predicts increased rents to managers. Where the rents cannot be taken as salaries or cash the result will be shirking on the part of the managers (selective behaviour) [Crain and Zardkoobi, 1980]. This explains some of the observed differences between public and private sector bureaus [Borcherding, 1983].

The B&W framework [pp 61-88] describes trust as a form of organizational "capital" representing an investment by both parties to the trust network. Cheating (renege) reduces the value of the capital and the custom market nature of the organization implies that cheating will impose costs on future trust formation. We can formally present their model in the form of two-person game theory. With Nash [1950] behaviour assumed it can be

shown that the resulting outcome of the game will maximise the joint payoff (see also Raiffa [1953]). In some experimental work Harrison and McKee [1985] have shown such behaviour indeed leads to the joint maximum while the question of the division of the surplus rests on the relative bargaining abilities of the players. At the very least this work demonstrates the players are individually rational. They will play only where their utility is at least as great as the autarky situation.

Now consider the case for destructive effort. In general, this will involve shirking on the job and the concealment of such from the supervisor. For the shirking to be successful (not detected or not punished) either there must be no competition for positions in the hierarchy or the superior must be unable to observe effort differentials across all subordinates.

One means by which the subordinates can achieve the desired level of shirking is by obtaining an agreement to shirk equally among all those at the same level in the formal hierarchy. That is, no subordinate will engage in any on-the-job signalling [Spence, 1974]. Since any such "contract" will not be legally enforceable the subordinates at a particular level must trust each other to honour the agreement. Such trust relations define the horizontal networks of the informal structure of the bureau.

To complete the game theory representation begun above, we must only note that the payoff to the exchange

here is not output or constructive effort, but the lack of these. Horizontal trust promotes shirking (doing nothing) or even frustration of the supervisor's aims (obstruction). Maximization of the joint payoff here implies zero constructive effort.

B&W argue that horizontal trust induces destructive effort and that competition to enter horizontal networks reduces efficiency of the organization in the production of the director's objectives. Vertical trust, on the other hand, induces constructive effort and promotes such efficiency of the organization. It is important to note that T_v is not a perfect substitute for free entry and exit (competition for positions) within the hierarchy. T_v is characterised by an asymmetry. Once promoted or otherwise rewarded, institutional rigidities often prevent a supervisor from sanctioning a subordinate for periodic shirking. Thus the payoff to the subordinate tends to be ongoing. As well, the vertical trust relation will span several levels of the hierarchy. If a supervisor imposes a sanction at a particular level of the hierarchy it may appear he is reneging on the agreement. The trust capital is vulnerable to such action. Finally, the deferred payoffs characteristic of trust relations are fraught with uncertainty. The removal of a superior (say he dies) may wipe out trust capital years in the making. Trust is less reliable than formal competition because trust involves more uncertainties.

Ceteris paribus, increasing T_V will lead to more constructive effort on the part of subordinates. T_V can be increased by introducing more levels in the formal hierarchy (increasing promotion prospects as rewards within the network), by reducing the range of outside opportunities of the subordinates, and so on. Higher levels of T_V , by inducing competition through constructive effort, can substitute for open competition for positions in the formal hierarchy. The market for personnel in the public sector is constrained by a variety of public service regulations concerning hiring and firing rules. These are ostensibly in place to limit the extent of patronage in the public sector by defining objective conditions for hiring and firing. Thus we have the relation

$$(e^C/e^D) \propto (T_V/T_H) \quad (3-2)$$

While e rises generally as networks are more critical, unless 3-2 holds it does not follow that increasing T_V relative to T_H will lead to greater efficiency. Finally, with the level of market competition restricted, the return to increasing T_V is greater than if competition were not so restricted. Thus

where c is the level of competition and c_m the maximal level of competition for formal positions.

The model I have presented here would predict that the Minister in B.C. who is unable to rely on inter-bureau competition to discipline the bureaucrats would increase the level of vertical trust in the organization and, simultaneously, reduce the level of horizontal trust. I have noted that vertical trust can be established by creating more steps in the hierarchy (promotion possibilities), reducing the range of alternate employment, and increasing the returns to seniority within the existing organization.

Evidence of the type required to test the existence of networks is very difficult to obtain. A complete understanding would require prolonged presence in the bureau since the networks are, by definition, informal. However, the conditions conducive to network formation may be inferred from organization charts, promotion requirements, actual mobility, and so on. In other words, the formal structure provides some evidence of the nature and extent of the informal structure.

Some indirect evidence of the existence of vertical trust can be found in the observation of the behaviour described in Parkinson's Law. Breton and Wintrobe have demonstrated that the integrity of the trust network requires managers to protect the members of the network during periods of decline of the organization. This is best accomplished by promoting the members of the network to positions of responsibility since these are less

vulnerable to layoffs. Such behaviour yields the typical Parkinson's Law observations of the absolute growth of administration during periods of decline of bureaus.

I find considerable support for the existence of a "Parkinson's Law" phenomenon in public sector schooling in Ontario. Parkinson's Law can be expressed by the hypothesis that administration and supervisory personnel will experience an absolute increase in their numbers while line personnel (in this case teachers) actually decline in absolute numbers. From 1975 through 1983 enrolment in the Public system declined while that of the RCSSB remained nearly constant. During this period the number of full time equivalent teachers fell yet the absolute number of supervisors and administration staff actually increased. This is, of course, consistent with Parkinson's observation that the number of administrators in the British Admiralty rose after World War I while the actual number of men in uniform declined. As originally formulated Parkinson's Law merely represented an empirical regularity. There is now some theoretical support for the law [Breton and Wintrobe, 1975].

To reiterate, when the demand for the services of a bureau falls, there is a tendency to lay off some of the line staff (teachers). Those teachers in the trust networks with the administrators will ~~desire~~ be promoted to protect their tenure. The superiors recognize they must promote those in the trust network. Since layoffs on purely objective grounds (such as the

seniority rules I found in all of the teacher collective agreements I examined) will not be able to discriminate in favour of those in the networks the only recourse of the administrator/superior is to promote those in the network [B&W, pp 158-160].

My observations are supported by the results of a series of regressions performed on the data for Ontario over the period 1975 through 1983. With the few observations available (18) I decided to pool the data for the RCSSB and Public and introduce a dummy variable to account for the systematic differences in behaviour of the two systems ($D=1$ for the RCSSB). Various measures of bureau "excess" were regressed against enrolment and the dummy. The first three of the dependent variables represent categories of administrative personnel that are filled by promotion of teachers. The last dependent variable shows the result for teachers. The overall results are reported in Table 3-1.

The striking feature of the reported results is the marked negative sign on the coefficient for enrolment in the equations covering administration positions. Over the period total enrolment declined while the absolute number of administrative personnel increased. The inverse correlation is, of course, significant at the 95% confidence level for all dependent variables. For the dependent variables which are measured in absolute terms I have computed the following elasticities with respect

to changes in enrolment. For Teachers at the Central Office: -1.53; for Administrators: -0.85; for Administrators plus Supervisory: -0.80; for Teachers: +1.05. From the evidence I am unable to refute the hypothesis of the existence of a Parkinson's Law effect in Ontario.

TABLE 3-1

Evidence of a Parkinson's Law Effect (Ontario, 1975-83)

Dependent Variable	Independent Variables			R ²
	Constant	Enrolment	Dummy	
Teachers at Central Off.	2049.15	-1.38 (3.77)	-1174.38 (7.30)	.96
Admin (non-supervisory)	4002.64	-2.138 (3.76)	-2061.42 (8.30)	.97
Admin + Supervisory	4480.24	-2.346 (3.65)	-2225.89 (7.88)	.97
Teachers	-1.7885	0.04826 (7.47)	0.47186 (0.17)	.98

Definitions:

Supervisory Officers - directors, superintendents, etc appointed under provisions of Sections 250, 251, 252, & 254 of the Education Act [1981 revision].

Teachers at the Central Office - teachers, vice-principals, and principals at the central (School Board) office. These positions do not involve teaching.

Administrators - consultants and other professional staff excluding supervisory officers.

Source: Education Statistics, Ministry of Education, Ontario

This Parkinson's Law phenomenon is asymmetric - the bureau expands at the top as demand falls for the output but it does not shrink as demand rises. This is due to

institutional rigidities, specifically those which prevent demotion or assignment to a lower ranked position. Thus the increased demand must be met by hiring new staff and the absolute size of the top of the hierarchy does not decline.

My demonstration of Parkinson's Law for Ontario supports the existence of vertical trust relations (networks) in this jurisdiction. I was unable to locate sufficiently disaggregate data to test for Parkinson's Law in B.C.. The theory I have presented predicts the greater use of vertical trust in B.C. to overcome the lack of direct competition that is present in Ontario. I shall show in Chapter 4 that the Ontario Minister is able to exploit the contestability of a subset of the market (Roman Catholic families) directly to obtain lower tax levels and/or higher quality and quantity of schooling. In effect, given the fixed size of the market (by fiat) coupled with redundancy of teachers when enrolments decline in a particular board, the contestability of the market simulates the direct competition for the positions in the formal hierarchy.

In effect, the Ontario Minister rewards the successful bureau (increasing relative enrolment) with more resources through per pupil grants. In the present chapter I show that, in comparison with the Ontario Minister, the B.C. Minister makes relatively greater use of vertical trust relations.

While accepting that vertical trust increases the internal competition in the bureau, some have questioned whether it affects the bureau's exploitation of the Minister (sponsor) via the use of agenda control or the enforcement of all-or-nothing offers [Niskanen, 1971]. That is, why doesn't the senior bureaucrat reap all the benefits of the competition created via the vertical trust networks? I argue the vertical trust relation extends to the interaction between the senior bureaucrat and the Minister. The senior bureaucrat (I exclude those positions which are outside the realm of civil service appointment procedures) arrives at his position via promotion within the bureau. Promotion, as we have seen, is the outcome of the subordinate supplying the demands of the superior and, thus, being a member of the network. In order for the senior bureaucrat to retain his trust relation with his subordinates it is necessary that the senior bureaucrat be able to deliver rewards in the form of promotion and perks. To do so he must rely on the Minister to win the "budget battle" in the cabinet. The ammunition the Minister requires is evidence of the productivity of his bureau (see Chapter 1).

While a senior bureaucrat who is not successful in satisfying the Minister cannot be fired he can be pushed to one side and displaced in the network by a more successful senior bureaucrat. The displaced bureaucrat will find he is no longer in the trust network and cannot obtain the output he wishes from his subordinates.

school boards in Ontario and 76.4% cited the professional qualifications as the single most important criterion for evaluation of teachers. Professional qualification is defined as university courses or degrees and Board of Education courses. Since the Minister has established the evaluation procedures he must derive some utility from such criteria.

Further evidence of the extent of the Ministry monitoring procedure is the fact that B.C. spends a much larger fraction of its budget on supervision and inspection activities (Table 3-2).

The evidence presented in this section is that the B.C. Ministry exerts more control over the day to day activities of the schools than does its counterpart in Ontario.

TABLE 3-3

Proportion of Total Per Pupil Expenditure
Various Categories (Average 1970 - 1977)

	Ontario	B.C.
Teacher Salaries	68.4% (1.0)	69.8% (2.4)
Administration	4.5% (1.5)	3.8% (1.1)

Source: Statistics Canada, 81-250, Table B. 7 and B. 8.

There is also an indication that B.C. has larger class sizes than Ontario. I infer this from two pieces of data. As I have indicated earlier, teacher salaries are higher in B.C. than in Ontario; yet the fraction of total per pupil expenditure consumed in teacher salaries (Table 3-3) is statistically identical ($t = 0.27$). Thus B.C.

Although he will continue to collect his salary, the perks of the office will be taken away. The senior bureaucrats compete for the favour of the Minister because through this they can obtain the constructive effort of their subordinates.

Casual observation of most bureaus reveals that they are characterised by the presence of two or more senior bureaucrats with shared responsibility for the same output or program. Breton and Wintrobe [1984] described the situation strikingly when they noted that Adolf Hitler had assigned several senior bureaucrats to the task of finding a solution to the "Jewish problem". Each of these bureaucrats was aware of the importance Hitler attached to the Jewish solution and each competed vigorously to be efficient in the extermination of the Jews [Breton and Wintrobe, 1984]. In the case of schooling, the Ministry provides for several instances of shared responsibility in the form of study groups for curriculum reform and so on.

ii) Formal Structure

Although the theory is defined to apply to the informal structure (networks) of the bureau the evaluation of these is very difficult without direct experience in the bureau. However, the existence of and patterns of the networks can be inferred from the formal structure of the bureau. The formal structure defines the bounds or constraints on the informal structure by

setting up the paths for reward. In the next few pages I discuss the differences between the formal structure of the public education bureau Ontario and B.C.. The main results can be summarised briefly. The B.C. Ministry is more involved in the daily operation of the boards and schools. Involvement takes the form of direct controls by the Ministry of curriculum, texts, and pupil evaluation. Also, the B.C. Ministry takes a more active role in teacher and school evaluation. The implication is that the Ministry undertakes many of the functions left to the local schools and boards in Ontario. The further implication is that personnel associated with boards and schools in Ontario will be associated with the Ministry in B.C.. Both provinces rely on promotion of board and school staff (teachers) to fill senior positions. Finally, there is some evidence that class sizes are larger in B.C..

The most striking indications of the extent of relative control exercised by the Ministry over the local school boards in B.C. are the presence of two institutions unique to B.C.. First, when we compare the extent of Ministry control of the curriculum we find that B.C. exerts much greater control here.¹ The Ontario Ministry issues general guidelines for the objectives of the school program at each grade level but leaves the actual curriculum and choice of texts and materials to the local boards. Prominent examples of such guidelines

appear in periodic publications of the Ministry.² In a memo to the school boards dated January 19, 1977 the Ontario Minister of Education (Tom Wells) reported the curriculum changes under way with the following: "It would be an error ... for any school board or individual to conclude that the Ministry is reverting to a situation where definitive, lock-step curriculum is to be presented at the Provincial level. We are definitely not doing this." The message is that curriculum will continue to come from the boards themselves.

The B.C. Ministry issued a curriculum guideline to the boards under the cover of The Administrative Handbook. The 1980 guidelines are still generally in effect. The notable feature of this document is the precise manner in which it sets out the curriculum to be followed by the boards. The school week is defined to be 1,500 minutes. Of this time each school may allocate up to 100 minutes (20 minutes per day) to opening and closing exercises and a further 100 minutes for locally developed programs. The remaining 1,300 minutes are to be devoted entirely to the curriculum as set down by the Ministry. This is more stringent than the general guidelines issued by the Ministry in Ontario.

To enforce its curriculum program the B.C. Ministry provides some texts directly to the school boards. By contrast the Ontario Ministry sets guidelines in the form of a list of approved texts and materials and requires that a specified minimum fraction of the board's budget

be spent on texts and course materials. The boards are censured for failing to meet the latter but they have considerable discretion over the texts and materials actually selected.

TABLE 3-2

Ministry Expenditure by Function (Selected) for 1976-7.

	Ontario \$000	% of total	B.C. \$000	% of total
Grants to Boards	1,693,777	85.1	509,204	88.5
Supervision and Inspection	665	0.03	1,935	0.34
Audio-visual Equipment	18,952	0.95	1,368	0.24
Curriculum Development	7,397	0.37	311	0.05
Exams	-	-	2,366	0.41
Texts	-	-	8,173	1.42
Total	1,991,126		575,025	

Source: Statistics Canada: 81-250, Table b. 5 (last year this data is available.)

The most direct instrument of monitoring from the top is unique to B.C. at this time. Through the Learning Assessment Branch [see Annual Reports of the Ministry of Education, B.C.] the Ministry has established a program of province wide testing of pupils at various stages of elementary and secondary schooling (G4, G8, and G12) in the basic skills of reading and maths. The tests were implemented in 1975-6 and run on a two-year cycle. Other subjects are tested but less frequently. The uniformity

of the testing program also enforces the curriculum to the individual boards and monitors their output directly. The extent of this program may be inferred from the data in Table 3-2. The B.C. Ministry devoted \$2.3 million to the provision of testing. I will show later that the activities of the Branch may be demonstrated to offer opportunities for the formation of vertical trust as well as control from the top.

The Learning Assessment Branch (LAB) is also responsible for accrediting all schools in B.C.. At the secondary school level there is a two-step procedure whereby the school is first self-assessed by school staff and then subject to an external evaluation. Under the current rules a school may be accredited for from one to six years (period until next review) depending on the LAB's findings or it may be classified as not accredited. Longer accreditation is preferable from the point of view of the school manager (principal) and staff. Further, all schools are required to submit supplementary reports to ensure that the recommendations of the LAB are met. To judge the impact of the accreditation process I have some data for 1978/9 (on the old system: full accreditation (five years), provisional (subject to further review), or not accredited. Forty-four schools were assessed by the LAB. Twenty-nine received complete accreditation (five years), nine received provisional, two were not accredited, two deferred decisions (I could

find no follow up), and two were required to resubmit.

While only two schools were actually denied accreditation in the 1978-9 review the procedure clearly has a demonstration effect. Under the new system the LAB has more flexibility and may be more willing to discipline schools with a short term accreditation rather than impose the heavy penalty of no accreditation. I predict the new system will make the process a more effective monitor. The schools have two incentives to pass the accreditation process. First there is the reward of a few years of quiet life that I mentioned above. Potentially far more important is the provision in the B.C. school act for the Minister to reduce the size of the provincial grants to any school board not meeting the standards set down by the Ministry [see The British Columbia Public School Act, Statutes of British Columbia, para 18]. The accreditation process carries the threat of reducing the budget of the bureau much as competition for clients would do.

By way of contrast, in Ontario the review process of the teachers' work is largely left to the school principal. The Board Superintendent is not generally called upon except in cases of teacher promotion, transfer, or certification (a once and for all procedure in Ontario) [Duhamel et. al., 1979]. In general teacher evaluation in Ontario is based on professional qualifications rather than direct observation of the output or in-class performance. Duhamel et al polled 55

school boards in Ontario and 76.4% cited the professional qualifications as the single most important criterion for evaluation of teachers. Professional qualification is defined as university courses or degrees and Board of Education courses. Since the Minister has established the evaluation procedures he must derive some utility from such criteria.

Further evidence of the extent of the Ministry monitoring procedure is the fact that B.C. spends a much larger fraction of its budget on supervision and inspection activities (Table 3-2).

The evidence presented in this section is that the B.C. Ministry exerts more control over the day to day activities of the schools than does its counterpart in Ontario.

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There is also an indication that B.C. has larger class sizes than Ontario. I infer this from two pieces of data. As I have indicated earlier, teacher salaries are higher in B.C. than in Ontario; yet the fraction of total per pupil expenditure consumed in teacher salaries (Table 3-3) is statistically identical ($t = 0.27$). Thus B.C.

employs larger class sizes than Ontario. I argue this procedure provides a more reliable measure than reported pupil-teacher ratios (PTR) since the former captures the resources actually expended. The PTR figures are not always reported consistently. Some jurisdictions include the vice-principal, for example, if they teach part-time while other jurisdictions do not.

Empirical Evidence

My predictions concerning the informal structure (networks) behaviour of the B.C. public sector schools may be expressed as a set of hypotheses derived from the theoretical discussion set out at the beginning of the chapter:

Hypothesis 1: There will be more levels to the hierarchy in B.C. than in Ontario and more promotion activity. Vertical trust implies the use of promotions as rewards for supplying constructive effort on behalf of the supervisor. Bureaus which place greater reliance on vertical trust will offer greater promotion prospects by having more intervals within the formal structure of the hierarchy. To an outsider, some of the promotions may appear meaningless in the sense of offering no real change in status or salary. Within the organization, however, these promotions serve to differentiate those within the network.

Hypothesis 2: There will be less mobility across boards/districts at the same level in B.C. as compared with Ontario. Vertical trust requires the individual invest time in the organization since the transactions in the network are deferred over time. From the perspective of the individual bureaucrat, reliance on vertical trust in B.C. implies an unwillingness to move at the same level from one board to another.

Hypothesis 3: Conversely, I predict there will be greater across-board mobility, associated with promotions, in B.C.. The B.C. Minister will establish channels of vertical trust which transcend board lines. First, this will ensure loyalty to the Ministry rather than the board as the vertical trust networks run from the Ministry into each school board/district and even into the individual school. Second, it will weaken the horizontal trust networks which may establish themselves within a board or district. Finally, there are more subtle promotions available within the Ministry than within the school. That is, there is a richer superior-subordinate hierarchy in the Ministry than in the school.

Hypothesis 4: The Ministry in B.C. will have more direct intervention in day-to-day school activities than its counterpart in Ontario. This may appear counterintuitive since imposing control will defeat the trust relationship. In fact, it will likely work to the opposite effect. The additional activity of the Ministry will require personnel and thus will provide scope for

promotion to the functions required while also providing an opportunity for the vertical network to extend upward into the Ministry. The positions created by the Ministry involvement in the day-to-day activities of the board are generally filled by former teachers. As well, more levels in the hierarchy imply more opportunities for exchanges and the establishment of vertical trust.

Hypothesis 5: There will be more teachers assigned to the central (board) office in B.C. since this offers a promotion via the movement of the teacher out of the classroom and into a position with administrative duties. Also there will be more positions of responsibility (department heads, consultants, etc) in B.C. for similar reasons.

Hypothesis 6: B.C. is likely to consolidate its school boards at an earlier date than Ontario. Consolidation of local school boards will serve to reduce horizontal trust, T_H , by permitting greater flexibility in assignment of subordinates. This will disrupt horizontal networks and reduce the return to capital invested here. At the same time consolidation will offer opportunities for vertical trust, T_V , to increase since there will be more purely administrative positions for teachers to be promoted into. Consolidation is the Minister's response to the behaviour predicted in Hypothesis 1.

The evidence here is somewhat mixed but there is

qualified support for the existence of some greater degree of vertical trust in B.C. than in Ontario. The reader will recall that the Parkinson's Law phenomenon I demonstrated above referred to Ontario and indicated the presence of vertical trust there. In the discussions which follow I will show a greater degree of vertical trust in B.C.. I begin by noting that B.C. teachers have the same median age as Ontario teachers but less overall experience (Table 3-4). Further, Ontario teachers

TABLE 3-4

Average Years Experience and Average Age
Elementary School Teachers (1980-1)

	Ontario	B.C.
Average Experience (years)	9.2	8.0
Average Age (years)	37	37

Source: Statistics Canada, supplementary data to 81-202

have had significantly greater experience with other than their current boards (Table 3-5). This finding provides some support for Hypothesis 1, B.C. teachers have less mobility at a given rank, since, ceteris paribus, it indicates weaker attachment to the current hierarchy and implies a weaker T_v in Ontario. The custom market aspect of the trust relation requires a long term interaction in order to establish a reputation.

• TABLE 3-5

Experience Elsewhere in the Province (Years)
(Average 1974-82)

	Ontario R.C.	Ontario Public	B.C.
mean	2.28	2.17	2.08
standard deviation	4.04	3.42	3.12

t-statistic Ontario Public vs B.C. = 3.03

Source: Statistics Canada, supplementary data to B1-202.

Promotion opportunities are represented by levels of positions in the organization such that a hierarchy with more steps and a less steep progression (more positions available to be promoted into) will generate more vertical trust. The data in Table 3-6 indicate B.C. has more scope for promotion (reward) within the schools than does Ontario. While there is little difference in the traditional positions of responsibility (principal, vice-principal, and department head) B.C. makes extensive use of teaching personnel in the "other" category. These teachers are not assigned regular classroom duties and, in many cases, constitute teachers who do not have regular "home room" duties. While there is no salary increase accompanying these positions the workload is less and the position does result in an increase in utility. This provides some evidence of vertical trust within the school since the school manager (principal) has some discretion over the allocation of these positions.

TABLE 3-6

Structure of Personnel Within Schools (1976-7)

	Regular Teacher (classroom)	%	Principal	%	V-P	%	Dept Head	%	Other* Instr	%
Ontario R.C.	15705	81.0	1257	6.5	315	1.6	84	0.4	1962	10.2
Ontario Public	34599	81.0	2587	6.1	1140	2.7	426	1.0	3966	9.2
B.C.	12861	73.2	1140	6.5	456	2.6	147	0.8	2975	16.9

* not assigned to regular class teaching

Source: Statistics Canada, 81-250 (last year available)

The establishment of vertical trust implies asymmetric response on the part of the managers (school principals or board supervisors) to the performance of teachers.

The use of sanctions will be less than in the absence of the trust relation since their use depreciates the capital of the organization (networks) while promotion will be utilized as much as possible to enhance the trust relation. Those within the network will clearly be promoted more readily than those outside.

Evidence of the importance of the vertical trust be found by examining the salary levels in B.C. and Ontario for teachers and administrators. These are presented in Table 3-7. There are three points to be noted here.

First, the B.C. salaries are greater than Ontario at all levels. Second, the distribution of teachers by experience and salary is identical in Ontario and B.C. as

(are the distributions for administrators (on the basis of the Kolmogorov-Smirnov statistics reported in Table 3-7).

It seems that B.C. does not rely on salary differences

Table 3-7

Salary Levels of Teachers and Administrators
Ontario and B.C.
By Years of Experience: 1982-83

Teachers Experience (years)	(a) Ontario \$	(b) Number	(c) B.C. \$	(d) Number
<1	20,540	1078	23,293	230
1-3	23,365	4410	24,589	1983
4-6	26,935	5270	27,977	2040
7-9	29,856	6963	31,607	2132
10-14	31,267	14641	34,373	2794
15-24	31,660	14557	34,141	2883
25-34	31,095	3564	33,648	966
>35	30,739	233	33,068	105
NR	-	1542	-	-
Mean/Total	29,919	52258	31,171	13133

Kolmogorov-Smirnov Statistics:

i) Column (a) vs Column (c),
D = 0.00487, unable to refute 99%

ii) Column (b) vs Column (d),
D = 0.13676, unable to refute 99%

Table 3-7 (continued) Administrators

Experience (years)	(a) Ontario \$	(b) Number	(c) B.C. \$	(d) Number
<1	18,888	3	-	-
1-3	36,085	44	32,336	18
4-6	32,402	43	35,055	54
7-9	37,789	117	40,209	110
10-14	40,402	756	45,012	321
15-24	43,520	3132	47,447	670
25-34	45,081	1417	49,105	364
>35	44,270	141	50,239	25
NR	-	8	-	-
Mean/Total	43,235	5661	46,266	1562

Kolmogorov-Smirnov Statistics:

i) Column (a) vs Column (c) $D = 0.07620$, as aboveii) Column (b) vs Column (d) $D = 0.151671$, as above

Source: Statistics Canada, 81-202

within a category to support the trust relation. I will shortly describe the teacher evaluation process and it will be clear from that why I do not find a systematic difference in Table 3-7. We must look elsewhere for evidence of vertical trust within the hierarchy. This brings me to the third point evident in Table 3-7 and that is that the salaries of administrative positions are considerably (a factor of up to 1.49) above those of teachers. Since administrators are typically drawn from the teacher ranks, the incentives (and returns to

efficient behaviour) are clear. I infer there is a greater probability of promotion in B.C. from the evidence in Table 3-2 that B.C. spends a larger fraction of its budget on inspection (school inspectors) and testing. These functions require personnel in the form of classroom teachers who have been promoted.

A more direct indication of the role of vertical trust may be found by analysing the mobility of teachers. For Ontario and B.C. I have data on mobility both within and across school boards. The mobility data is classified by position and reveals promotion patterns to give an indication of movements within the hierarchy. The data in Tables 3-8 and 3-9 demonstrate several interesting points concerning mobility and promotion in Ontario and B.C.. First, the overwhelming majority of educators do not move from year to year. The proportion who do move is statistically identical in Ontario and B.C. (t statistic = 0.97).

From Table 3-8 we see that there is lower incidence of position changes in B.C. than in Ontario and that fewer of these changes can be defined unambiguously as promotions in B.C.. The actual data reported a great many changes involving a movement of educator from board staff to school staff and, in the absence of supporting evidence, I included those which were clearly a promotion. Since I employed consistent criteria, this would introduce a bias only where the reporting technique

differs between Ontario and B.C.. I have no evidence that there is such a bias. The data in Table 3-8 refute my hypothesis that there is a greater reliance on vertical trust in B.C..

TABLE 3-8

Promotion and Position Changes (1975-6 to 1980-81)

	Ontario	B.C.
Position Changes as % of total educators	3.4%	2.2%
Considered Promotions as % of position changes	78.8%	74.6%

Source: Statistics Canada: Supplementary Tables to 81-202

However, when promotion activity is analysed in more detail a different picture emerges. Specifically, I shall examine movement from school to board staff which generally involves a promotion. The exception (and it is empirically small) occur where such a move converts a school teacher to an itinerant relieving teacher. Table 3-9 provides an interesting observation here. In both B.C. and Ontario more school to board moves occur where the educator changes boards than where the educator remains with his current board. Since these are promotions and promotions engender vertical trust the data in Table 3-9 support the existence of vertical trust as created by the Ministry in both Ontario and B.C.. Promotion activity involving mobility across boards will tend to foster the vertical network within the Ministry rather than in the local board or the school.

TABLE 3-9

Mobility Within and Across Boards
(Averages for 1978-9 through 1982-3)
(Figures show percent of total educators with standard deviation in brackets)

Mobility Classification	Ontario	B.C.
Same Board/Same School	89.2 (1.4)	88.4 (1.2)
Same Board/Different School	9.5 (0.8)	8.7 (0.6)
Different Board	0.64 (0.05)	1.56 (0.06)
Same Board/School Staff to Board Staff [P]	0.16 (0.01)	0.30 (0.02)
Different Board/School Staff to Board Staff [P]	0.52 (0.02)	1.51 (0.06)

Source: Statistics Canada, Supplementary Tables to 81-202

Recall, the argument I used to initiate the present discussion was that the Minister in B.C. had established various elements of the structure of public schooling in an effort to mitigate the lack of external competition. Thus it is more consistent to argue the Minister has established promotion guidelines which encourage mobility by making the search procedure more competitive with respect to supervisory (board) personnel. And the evidence does bear this out. It is interesting that the Field Services Branch of the B.C. Ministry is responsible for "the selection and assignment of able career educators for the position of district [board] superintendent of pupils". [B.C. Ministry, Annual

Report, 1978/9, p33.] The promotion ladder appears to be intended to transcend board boundaries and to ensure the hierarchy lies within the Ministry. I note further, that this promotion process weakens horizontal trust by limiting the discretion at the individual board level.

In Table 3-9 I have indicated those categories almost certainly constituting promotion by [P]. Except for assignment as itinerant supply teacher all moves from school to board involve a promotion. For the categories indicated, B.C. has a greater incidence of activity than Ontario (t-statistic in both cases is significant at 99%). As well, B.C. shows a greater incidence of position changes involving changing boards (third item in Table 3-9).

Finally, Hypothesis 6 is superficially supported by the data. B.C. consolidated its school boards in 1946 while Ontario did so in 1969. In both provinces the geographic design of school boards has been essentially unchanged since these major consolidations.

The evidence in this section indicates there is significant support for the hypothesis that the B.C. Ministry is utilizing vertical trust to substitute for the discipline of inter-bureau competition. However, I accept there is some ambiguity in the results I have presented. The problem is due, in part, to the data available for the empirical work. It is doubtful whether any data would ever be perfectly satisfactory for reasons I discussed earlier. Nevertheless, my work has suggested

that the trust relation is worthy of further study in this area.

As a dividend, the B&W model offers an excellent theoretical explanation for the existence of rents accruing to the teachers. It has often been argued that the residual returns in an organization can only accrue to the top position in the hierarchy. All other positions are subject to contest and thus the rents will be bid away either through the wages being bid down or through the non-pecuniary benefits being bid away. By their nature (custom or reputation) trust networks imply some entry restrictions and, further, that the quid pro quo requires that some rents be transferred to lower positions in the hierarchy. Thus my qualified support for the presence of some degree of vertical trust provides a justification for my continued focus on the teacher as the unit of analysis in my empirical work. Although it is the actions of the Minister that I am attempting to deduce I have used data on the behaviour of the teachers. The actions of the Minister should manifest themselves in the behaviour of the teachers.

Conclusions

A Minister (political sponsor) or bureau head wishing to foster competition for positions within the bureau will promote the development of networks based on vertical trust. The use of vertical trust relations will be revealed by a formal structure (the official

hierarchy) comprised of several steps to the hierarchy and considerable "promotion" activity within the formal structure.

In this chapter I have reported evidence of Parkinson's Law behaviour in Ontario. This supports the hypothesis that vertical trust exists within the local schooling bureaus in Ontario. The theory predicts greater use of such networks in B.C. both before and after the introduction of the voucher scheme. The evidence offers qualified support for this hypothesis.

The B.C. Minister has created an institution featuring vertical trust networks which reach from the school level, through the boards, and into the Ministry. Competition exists among teachers for promotion out of the regular teaching ranks and into the administration at the board and the Ministry levels. The value of such promotions is enhanced by the use of larger class sizes in B.C. as compared to Ontario and by the fact that salary progression within the teacher ranks is no more rapid in B.C. than in Ontario.

The formal structure in B.C. is such that, compared with Ontario, the Ministry plays a much larger role in the daily activity of the local board. This facet of the B.C. Ministry offers scope for vertical trust formation since the local boards interact more directly and frequently with the Ministry than is the case in Ontario. As well, positions which would be associated with the

board in Ontario are within the Ministry in B.C..

Promotion ladders involve the Ministry to a greater extent in B.C. than in Ontario.

The results of the B.C. Minister's strategy are predicted by the theory. Teachers supply more constructive effort than otherwise. Per pupil costs are lower than otherwise and quality is higher. There is some support for these predictions. I noted in Chapter 1 that per pupil costs in B.C. were very similar to those in Ontario. As well, B.C. pupils score well on the General Educational Development tests.³ Although the evidence of the results is thin due to the lack of data, the observed behaviour of the Minister in the design of the institutions supports the hypothesis advanced at the beginning of the chapter: the B.C. schools have employed substitutes for the inter-bureau competition that exists in Ontario. That the B.C. Minister has done this confirms the general argument of my thesis that bureaus are inherently competitive institutions.

I should address an alternate hypothesis to the one I have examined in this chapter. That is, that the situation in B.C. is not one of vertical trust but of monitoring and control from the top via the use of rules [see Wintrobe, 1982]. I reject this hypothesis on the grounds that compliance with rules is a decision of the teachers and other educators. In general, a worker will decide to abide by the rules when any deviation will likely result in a sanction being applied to the worker.

The likelihood of a sanction is greater where the worker has less ability since he will be less able to utilise the deviation to produce greater output or to justify a failed deviation. To argue that B.C. places greater reliance on rules than does Ontario one would have to argue that teachers in B.C. have less ability than those in Ontario.

Footnotes

1. The material which follows has been derived from a variety of sources. A primary source was interviews with officials of the Ministry in Ontario (Mrs. A. Skillings, Eastern Ontario Regional Office) and B.C. (Ms. C. Clark, Educational Data Services). In addition to interviews these people provided me with memos from the Ministry to the school boards as well as various Ministry manuals. I would direct the reader to: The Administrative Handbook, B.C. Ministry of Education (current edition) and The Formative Years [1975] and Education in the Primary and Junior Divisions [1975], Ministry of Education, Ontario.
2. See, for example, The Formative Years which covers K-66. This document describes the general objectives of this level of schooling in terms of end goals. For example, the arithmetic curriculum in the primary (K-63) division is described as having the objective of the pupil being able to, "count, group, and use notation for recording; acquire an understanding of the concepts of simple fractions" and so on (p. 6). There is no mention of a timetable for such development nor how it is to be achieved.
3. B.C. students tend to lead the rest of Canada on General Educational Development (GED) tests [Annual Report of the Ministry of Education, 1978/9, p. 6].

Chapter 4

Competitive Bureaus: Market

Introduction

In this chapter I describe the responses taken by the Minister of Education in Ontario who is faced with a (previously created) duopoly. The issue that is germane to my thesis is whether he exploits the duopoly structure to generate a non-cooperative solution. I show in this chapter that he does indeed do this by designing the form of the payoff matrix which defines the game played by the duopolists. The result of this action of the Minister is that taxes are lower in those jurisdictions where the game is most competitive in the sense of the fraction of the market that is contestable. From my earlier discussion of the motivation of the Minister it follows that the Minister derives utility from the lower property tax rates. I also remind the reader that the institutional structure (fixed market and the number of teachers tied to enrolment) transforms competition for market share into competition for entry to the formal hierarchy. Further, the duopoly structure is due to fiat rather than to economic barriers to entry. As I noted earlier, when I refer to competition I am speaking of a behavioural sense rather than a competitive allocation of resources.

The Parkinson's Law results I presented in Chapter 3 demonstrated the existence of vertical trust within both the RCSSB and the Public at the board level. The task

facing the Ontario Minister of Education is to prevent the RCSSB and the Public from forming an horizontal trust network to exploit the Ministry. He does this by creating the game I describe in the present chapter. Other means are clearly available. The Minister could establish the type of vertical trust networks I described in Chapter 3. Alternatively, he could merely "count bodies" and reward the bureau which increases its enrolment. (See Breton and Wintrobe [1984] for an analysis of the use of such a mechanism to foster competition in the extermination of the Jews in Nazi Germany.) The reasons for not adopting such a scheme in the case of elementary schooling are beyond the purpose of my thesis. My purpose is to determine whether the mechanism chosen does "work" rather than to find the optimal scheme.

The structure of public sector schooling in Ontario can be described in one sense as a duopoly - RCSSB vs Public - within each school district or board area. Since the Minister derives utility from the competition of the junior bureaus it follows that he will design the institution in such a fashion as to promote a non-cooperative outcome.

It is well known that the collusive solution will, in general, maximize the joint profits compared to the competitive (Nash-Cournot-Bertrand) solution in duopoly where the game is nonzero-sum [Varian, 1978, pp. 72-74].

Potentially, the Public and the RCSSB may collude to raise local taxes and/or to reduce quantity of output. The Minister must overcome this problem if the schooling duopoly is to move toward the competitive allocation which would maximize the welfare of the parents/taxpayers.

In the discussion which follows I show that the Public and RCSSB do compete rather than collude and that this favours the parents/taxpayers as well as the Minister. In essence, the game is structured such that the payoff to defection from the collusive agreement is very high to one of the players in the duopoly.

The intensity of the competition between the RCSSB and the Public has likely been increased through the historical development of the Ministry in Ontario. First, the Ministry and the courts have restricted the tax base available to the RCSSB to include only the residential property of those who choose to support the RCSSB [Cameron, 1972, pp 60-3]. This eliminates the commercial and the industrial property from the tax base. Secondly, the Ministry has refused all requests from the RCSSB (or representatives) to assign the tax revenues of all RC's to the RCSSB. Even for RC's, support of the RCSSB is a matter of choice. Ontario is unique in this regard (see Chapter 2). Thirdly, the consolidation of 1969 reduced the ability of parents to choose a new school board within the RCSSB or Public (the new school boards were geographically quite large). Thus a parent

who was unhappy with his child (ren's schooling would be more likely to contemplate a switch of institution (RCSSB to Public or vice versa).

In Chapter 1 I presented an argument that the Minister is essentially in a competitive position and I supported this on the basis that the election process is competitive as is the environment within the winning party. That is, the position of Minister is contested directly at the ballot box and from within the party. The historical evolution in Ontario of the position of Minister and the structure of the Ministry offer some further confirmation. From 1846 to 1876 responsibility for education matters in Ontario rested with Egerton Ryerson who held the position of Chief Inspector. This was an appointed position reporting to the Treasurer and the Prime Minister. It was not until 1876 and Ryerson's retirement that a Ministry was established and the education portfolio was treated in the usual fashion.

Until 1965 the hierarchy within the Ministry was as shown in Figure 4-1. It is interesting to note that this structure was unique in that the political aspects were so weak. The Minister dealt directly with the chief director (bureaucrat) rather than his deputy minister. In 1965, at the time the consolidation was being plumped by the Ministry, there was a reorganization to that shown in Figure 4-2. This is pretty much as it stands now. It is interesting to note the relative rise in the

importance of the more political actors. The deputy minister now has a more direct link to the minister. The Policy and Development Council serves a largely advisory role [Fleming, 1972b].

Figure 4-1

Figure 4-2

An interesting indicator of the importance of the position of Minister of Education in Ontario is that three of the last four Premiers of Ontario (and leaders of the Progressive Conservative party) have held the post of Minister of Education prior to being elected premier. These are Drew, Robarts, and Davis. The PC party clearly regards this position as important viz the voters. I would also note that Robarts and Davis would hardly have been unknown by the voters since both had precipitated

major changes in the structure of schooling in Ontario.

Along with the reorganization, the Ministry also delegated more responsibility to the local boards. The latter were made responsible for curriculum and other daily activities. The mode of teacher inspection also changed, "As of December 31, 1968, provincial inspection [of teachers] had ceased entirely ..." (Fleming, 1972b, p. 451). The responsibility for evaluation of teacher productivity passed to the school principal. The local boards became more responsible for their actions.

Finally, I should note that the bureau in Ontario does exhibit some degree of vertical trust. The evidence supporting the Parkinson's Law phenomenon that I reported in Chapter 3 is evidence itself of the existence of vertical trust. The essential point is that the Minister in Ontario has more instruments available and will make less use of vertical trust than his counterpart in B.C. The empirical results reported in Chapter 3 confirm this conjecture. Now I will demonstrate that the Minister in Ontario does indeed utilise the instruments made available by the historical fact of the existence of Roman Catholic Separate Schools and the, unique to Ontario, right of the RC's to choose between the Public and the RCSSB school board in their district.

The Model

The modern treatment of behaviour in duopoly involves modelling the interaction as a two person nonzero-sum game (see eg. Hirshleifer [1983] and Quirk [1982]). Some important insights emerge from this analysis as I will show here. In particular, I shall demonstrate that the structure of the game between the RCSSB and Public induces non-cooperative behaviour despite the potential for a joint maximum payoff to such cooperation.

In Chapter 2 I described the respective public sector schooling institutions in Ontario. I will briefly summarize the key features of the RCSSB and Public in Ontario. Funding is provided from a mix of local property tax and provincial grants. The proportions for the Public are approximately 50% tax and 50% grant while the figures for the RCSSB are 20% and 80% respectively. There is some variability across districts since the grants are based on a "foundation plan" which accounts for difference in local tax bases.

Parents who are RC may move their children and their local tax liabilities between the Public and the RCSSB. The net result to the gaining system is an increase in revenue from the per pupil grant and the local tax bill.

Through its budget the school board determines the local property tax rate (mill rate) and this information is communicated to the ratepayers through their assessment notice which itemizes the tax bill between general municipal services and education. The latter

accounts for approximately one-half of the local property tax bill for residential property.

Since the RC's are mobile by choice, the property tax rate may be said to represent a price in that the RC's may respond to relative tax rates just as consumers respond to relative prices - i.e. by choosing a school system on the basis of relative tax price.

In addition to setting the "price" the school authorities are able to alter the quantity of output within fairly narrow limits. The Education Act specifies the length of the school day, the length of the school year (days), and the age range of compulsory schooling. However, there is still some latitude left to the local board. Most significant are the offering of four-year old kindergarten, smaller classes, and enriched programs. These increase the availability of resources to the parents and the pupils. Other means of doing this are to provide transportation to the pupils who live more than a short walk to the school and the provision of enriched or complementary courses. The latter is not empirically as relevant at the elementary level of schooling.

I conclude from this that some fraction of the market is contestable between the Public and the RCSSB and that these can compete on the basis of price and quantity.

It is useful for me to assume identical products across the RCSSB and the Public. This will simplify the

analysis of the duopoly game I use to explore their interaction [see Shubik, 1980]. In any case, I have no good reason for assuming otherwise. From my discussion of parents' demands in Chapter 2 I found they value:

- achievement
- continuity (lack of strikes or work stoppages)
- duration (length of school day or year).

I argued, in Chapter 1, that the political market for the position of the Minister is sufficiently competitive that the Minister will, to some extent, reflect the objectives of the parents (the constituency he represents) with respect to schooling. Therefore, unless RC parents have systematically different preferences with respect to the above attributes of schooling the Minister will require the Public and the RCSSB to produce essentially the same product. I now take the above attributes in turn.

There is virtually no systematic data on pupil achievement scores in the public sector schools in Ontario. The studies I have found must be classified as pilot studies¹ but they confirm my intuition: there are no systematic differences between the Public and the RCSSB as measured in achievement test scores.

In terms of the interruptions due to strikes there does appear to be some difference across systems. From 1975-6 through 1979-80 there were twenty-five work "disruptions" (range from work to rule to strike) involving elementary and secondary schools in Ontario [Ontario, Collective Negotiation Commission, 1980]. Of these, four involved

RCSSB boards, eight involved Public boards, and the remainder involved secondary schools. The Public schools did experience more work disruptions (average duration 23.9 days) than the RCSSB (average duration 20.25 days) over the duration of the period. However, the proportion of school days (the probability of any one school day being lost) was near identical (Public, 0.48%; RCSSB, 0.41%).

Finally, the length of the school day and year are essentially standardized by the provincial formula which pays grants to school boards on the basis of average daily enrolment times the number of days in session.

Returning to a discussion of the duopoly game, let me consider, first, the conditions which would be conducive to cooperation in a two person nonzero-sum game. Axelrod [1984] has demonstrated the general conditions which encourage cooperation in the context of his tournament of game strategies. On-going relationships and the certainty that defection will be punished will promote cooperative strategies. Of course, since the non-cooperative solution is always available to the parties who decide to cooperate, cooperation must dominate in the aggregate. The cooperating parties can do no worse than the noncooperative solution and will, in general be able to do better. The joint maximum payoff will be at least as great as the sum of the individual payoffs in autarky. This brings me to the last point: cooperation requires

transferable utilities or, in more conventional language, the gainers must be able to compensate the losers with some form of side payment. Cooperation would enable the public sector schools to set higher tax prices and/or to produce a lower level of output for the same total budget, the net effect being monopoly rents accruing to the bureau. I discuss the measurement of these rents shortly.

Clearly the Minister must avoid these conditions if cooperation is to be discouraged. One problem is immediately apparent for we have a game of repeated plays with no clearly defined end-period and with the parties obviously identified. It is well known that such a situation will engender cooperation, particularly where discount rates attached to future payoffs are not very high [Axelrod, 1984]. Price (tax or mill rate) decisions are made once each year and decisions to adjust quantity are also periodic. Thus one year may be taken as one period of the game and the game is played for many periods with the same two participants - the local RCSSB and the Public. The issue now is whether there are other institutional features which work to reduce the incentive to cooperate.

Within the usual representation of the duopoly, the actors may adopt one of two pure strategies: cooperation or defection (from the cooperative strategy). If the cooperation takes the form of reducing output one possibility is the abandonment of four-year old

kindergarten which is far more prevalent in the RCSSB than in the Public. Since the total number of ratepayers is fixed the only effect will be a reduction in the grants (offset by a more than proportionate fall in costs) paid to the school boards. The RCSSB earns a relatively larger share of per pupil revenues from these grants (80% vs 50%) thus the fall in revenues will be much greater than for the Public. With a similar fall in total costs the RCSSB is a loser from this cooperation. In the absence of side payments (it is difficult to imagine how these might be made in this particular instance) the RCSSB will prefer the non-cooperative solution and will cheat on any collusive arrangement to restrict quantity in this way.

Alternatively, the cooperation may involve raising local taxes in concert. On the surface it seems the RCSSB could only stand to gain from this sort of cooperation. However, this need not be the case. From my discussion of the institutions we must recall two points. First, at identical mill rates the RCSSB earns approximately seven percent less revenue per pupil than does the Public. Second, the RCSSB earns approximately 80% of revenue from Provincial grants and only 20% from local taxes. The proportions for the Public are 50% each. The reason for this is that the RCSSB has a much smaller tax base per pupil (recall the essential feature of the foundation grant plan) than does the Public.

Specifically, the RCSSB tax base is approximately two-fifths of the Public tax base. It is important to note that these institutional features are at the discretion of the Minister. Through the grants the Minister may reduce the share of total revenue from local tax for the Public as well. That is, the institution I describe here is the result of a conscious policy decision.

If we set the tax base per pupil of the Public equal to X then that of the RCSSB may be written as $.4X$. With equal mill rate increases, say $\Delta t = 3$ (representing a three percent increase based on 1980 average mill rate levels), then

$$\Delta TR_P = 3X \quad \text{and} \quad \Delta TR_{RC} = 1.2X$$

Clearly, the return to the RCSSB is positive here but not so great as to the Public. Envy is not an acceptable motive for defection [Rapoport, 1962, p 130] since it is inconsistent with the basic assumption of individual rationality. But, we can compare the returns to alternate strategies to determine whether the RCSSB may have a superior strategy.

If the RCSSB does not play the cooperative strategy and cuts the mill rate (or does not follow increases of the Public) it may gain revenue from two sources:

a) what I will call "sponsors" (see Hall and Lindsay [1980]) - RC's who do not currently have children in school but who could support the RCSSB under the terms of the Act (they can assign their property tax levy to

the local RCSSB). Some of these people may be supporting the Public school system for historic reasons and would be persuaded to switch allegiance in the presence of a mill rate differential. From anecdotal observations that I report below these persons appear to be numerous;

b) transfer students from the Public. That is, RC pupils currently enrolled in the Public system and whose parents would transfer them to the RCSSB in response to the fall in relative price.

The respective returns are:

a) from the ~~sponsors~~ the tax base rises, reflecting the larger number of residential properties with taxes assigned to the RCSSB. If the mobility of the ~~sponsors~~ is elastic with respect to the mill rate then total revenue will rise following a tax cut relative to the Public.

b) the tax base rises again. In addition there is the gain in total revenue arising from the increase in the number of pupils which leads to the grant revenue transfer from the Province.

Defining total revenue as TR, per pupil expenditures as E, total tax base as B, number of pupils or sponsors as n (I treat both categories identically to simplify the analytics), and tax (mill) rate as t I can write the gain in total revenue to the RCSSB from defection as:

$$\Delta TR_{RC} = .8E\Delta n + \Delta Bt$$

Whether this dominates the gain from collusion depends on the elasticity of enrolment and sponsor response to the

reduction in the mill rate.

It is instructive to write a payoff matrix to the nonzero-sum collusion game I have described here. Such a matrix is shown in Figure 4-3.

Figure 4-3

Public (B)

		Cooperate	Defect
RCSSB (A)	C	$a_{11} \quad [\Delta tXn].4$ $b_{11} \quad \Delta tXn$	$a_{12} \quad -[1.0 \ E\Delta n]$ $b_{12} \quad [1.5E\Delta n]$
	D	$a_{21} \quad [1.8E\Delta n + \Delta Bt]$ $b_{21} \quad -[1.5E\Delta n + \Delta Bt]$	$a_{22} \quad 0$ $b_{22} \quad 0$

While such a representation of the problem cannot directly provide an answer as to the best strategy on the part of the RCSSB (we need some estimate of the elasticity of the response of the sponsors and transfer students) it does suggest where to look in the data for evidence of competition or cooperation.

Mutual defection yields the status quo (no tax increase) and I take this to be the competitive position for now. Thus overt action is required to generate the collusive outcome. If the game is negotiable (sidepayments are feasible) and any agreement is binding

on the parties, the only outcome predicted by all of the generally accepted methods (see, for example, Rapoport [1962] Chapter 8) is cooperative collusion. The only question at stake is how to divide the spoils and it is here that the methods differ.

By virtue of the institutional framework we know that sidepayments cannot be effected here (between the Public and the RCSSB) therefore no binding agreements are possible. The game in Figure 4-3 is non-negotiable.

The Coase Theorem [Coase, 1960] is an example of a two person negotiable game where the essential feature is the existence of feasible sidepayments. Where the sidepayments are unenforceable the joint maximum is not generally attained. In a series of experiments reported elsewhere [Harrison and McKee, 1985], Glenn Harrison and I established a game which possessed one Pareto optimal allocation involving a joint maximum but unequal payoffs to the parties and another Pareto optimal allocation involving equal payoffs but not a joint maximum. Sidepayments were unenforceable. In one hundred percent of the cases the parties failed to reach the joint maximum. All cases reached the payoff yielding equal splits - deviation from the joint maximum. This outcome is individually rational where sidepayments are unenforceable since each party received the best he could under an agreement outcome. The disagreement outcome yielded a zero payoff to both parties.

Taking the payoff labels shown in Figure 4-3 the key question is whether (a_{11}, b_{11}) is a solution to the game. It is clear that if $a_{21} > a_{11}$ then the RCSSB defects on the collusive outcome and, if $b_{12} > b_{11}$, the Public defects. The game is a Prisoners' dilemma if either party has an incentive to defect on the collusive outcome. The equilibrium solution (saddle point in the Minimax game) is then (a_{22}, b_{22}) . By the definitions of the problem posed this outcome is the competitive solution. I should back track somewhat here. Empirically I have no means to demonstrate whether the outcome (a_{22}, b_{22}) is the competitive solution to the duopoly. However, I am only interested in whether the duopolists behave competitively rather than collusively and for this I need show a tendency to move toward the (a_{22}, b_{22}) solution.

There are, thus, two possible equilibria to the game depicted in Figure 4-3. The collusive outcome (a_{11}, b_{11}) yields the joint maximum payoff and implies high mill (tax) rates and/or low levels of output. The "competitive" outcome (a_{22}, b_{22}) yields a payoff less than the joint maximum and implies lower tax rates and/or larger levels of output.

In the next few pages I shall discuss the theoretical solution to the game presented in Figure 4-3 and then describe the empirical evidence that is available to describe the behaviour of the RCSSB and the Public. The theoretical analysis is buttressed by a simple numerical example. The results demonstrate the magnitude of the

elasticities of mobility required of the RCSSB to encourage defection (the non-cooperative solution). The empirical analysis permits me to deduce the RCSSB's perception of the elasticity of the mobility between the Public and the RCSSB in response to relative tax rates. As the evidence shows, the RCSSB clearly behaves as if it defects from the collusive outcome.

To fully represent the theoretical or numerical solution would be work intensive but it is conceptually quite straightforward and can be set out very simply. From the structure of the payoff matrix there are two classes of variables which are of interest. The first is the response of the parents/sponsors to the mill rate increases. The second is the weights in the payoffs that the Minister has under his control, that is, the shares of revenue accruing from taxes and from grants.

Taking the first class, I assume these to be exogenous to the decisions of the Public and the RCSSB. I can write the responses of interest as:

$\partial n_{RC} / \partial t_{RC}$ and $\partial n_{RC} / \partial t_P$ for the RCSSB parents/sponsors
 $\partial n_P / \partial t_P$ and $\partial n_P / \partial t_{RC}$ for the Public

Since only the relative tax rates are relevant (I assume that the only choices are the Public and the RCSSB) I can assume that

$-(\partial n_{RC} / \partial t_{RC}) = (\partial n_{RC} / \partial t_P)$ and similarly for the n_P term

In the second class of variables I take the tax

base, X , to be fixed in total and only the shares to the Public and the RCSSB are to be determined from the game. Collusion involves setting tax rate increases at equal levels thus

$$\Delta t_{RC} = \Delta t_P.$$

And the payoffs are, of course, in terms of total revenue.

The Minister may set the parameters concerning relative shares of grant and tax revenue to the Public and the RCSSB. The numerical solution strategy requires solving the game for equilibrium with different values of the mobility partials (equivalent to elasticities) and the Ministry established payoff parameters.

The nonzero-sum game plays like a zero-sum game even if potentially positive sum outcomes are available [Rapoport, 1962, pp 136-7]. I note that without side payments the joint maximum may not be attainable. The optimal strategy for the players is minimax [Rapoport, 1962, pp 123-144] (I deal with the repeated plays or dynamic implications shortly). It is well-known (see Luce and Raiffa [1957], Appendix A.2 and Rapoport [1962], pp 128-129) that all games have a solution. The proof is due to Nash [1951] and involves an application of Brouwer's fixed point theorem. The required mapping is explained in Luce and Raiffa [1957] in Appendix A.2 and I reproduce a part of it in the appendix to this chapter.

Rather than going into the detail required to solve the above game explicitly I can perform some simple

numerical exercises which determine whether the game is likely to generate a competitive outcome. Let me postulate an hypothetical school district and assign values to the elements in the payoff matrix. Thus:

$$E = \$1600.00$$

$$X = \$8000.00$$

$$t = 0.100 \text{ (corresponds to 100 mills)}$$

$$\Delta t = .005 \text{ (a 5\% tax increase)}$$

$$n_{RC} = 5000$$

$$n_P = 10000$$

Further, $\Delta B = X \cdot \Delta n$ by definition. The game yields a competitive outcome where $a_{21} > a_{11}$ or where $b_{12} > b_{11}$.

I will solve for the elasticity of mobility for each school board (Public and RCSSB) of the hypothetical district such that the competitive solution emerges.

First, for $a_{21} > a_{11}$:

$$[.8E\Delta n + \Delta B t] > [\Delta t X n].4$$

$$[.8E\Delta n + (X \Delta n t).4] > [\Delta t X n].4$$

Substituting the parameters for the hypothetical school board we get $\Delta n > 50$ as the required movement necessary to make (a_{22}, b_{22}) the equilibrium solution. This implies a required elasticity of mobility with respect to tax rate changes of 0.20, which seems quite within reasonable limits, to encourage defection. The actual elasticities are likely much higher.

For the Public school board in this district the condition for $b_{12} > b_{11}$ is $\Delta n > 500$ which implies a required elasticity of 1. As expected from the discussion of the institutions, the conditions for

defection on the part of the RCSSB are less stringent than for the Public.

These elasticities are invariant with respect to the absolute size of the enrolments in the Public and the RCSSB. Intuitively, the actual level of mobility can be expected to be greater where the proportion of the RC's in the population is greater. I will utilize this argument in the empirical work I present later.

The dynamic aspect of the game will pose no problems here. I take it up in detail later but it will be useful to summarize the argument here. If the static solution is defection (competition) the dynamic solution is likely to be also. My argument is that there is a long run return to defection to the RCSSB. Enrolments may be thought of as votes (potential). Taking students from the Public increases the current budget of the RCSSB but, more importantly perhaps, it increases its political strength [Stigler, 1972; Becker, 1958]. With increasing enrolments the RCSSB should be able to negotiate more attractive funding although the Minister will wish to maintain the asymmetry embodied in the payoff matrix of Figure 4-3 to promote competition.

As I describe it, the duopoly game is Bertrand (i.e. Cournot in prices rather than quantities). The predicted equilibrium of such a game has price equal to marginal cost where the goods are homogenous [Shubik, 1980, pp 63-4]. Is this the same solution that would obtain under competitive private schools? Not likely since the

marginal cost schedule depends on the output produced and the inputs usage. In the public schools the input and output decisions are determined by the Minister and, as I have noted earlier, there is no reason to argue his preferences are identical to those of the parents. The latter preferences may presumably be more closely met in private schools.

The actual behaviour of the Public and the RCSSB reveals the participants' views of the game that has been set down by the Minister. My argument is that if the RCSSB perceives the elasticity of mobility to be sufficiently high it will defect on the collusive agreement. In the next few pages I describe the behavioural hypotheses which follow from the theoretical discussion above.

Hypotheses

My central hypothesis of the present chapter is: the Ontario Minister has designed the payoff structure to the game between the RCSSB and the Public so as to discourage the cooperative equilibrium. The theoretical discussion and the numerical example I presented above offer some support for my hypothesis. However, I wish to test the hypothesis behaviourally, i.e. empirically. In the next few pages I translate my theoretical discussion into a set of specific hypotheses which I then test with data for Ontario.

Under the Bertrand game the price tends toward marginal cost (price equals marginal cost if the products are identical and price tends toward marginal cost if the products are differentiated [Shubik, 1980]). The "price" term in the case at hand is the local property tax or mill rate, t . Recall, the provincial grants are intended to cover basic expenditure with a given level of local tax burden. Any additional expenditures must be financed through local tax levies.

I have argued that the propensity to adopt the defection strategy will depend on the expected increase in market share due to the defection. Changes in enrolment will be an increasing function of the fraction of RC's in the school board area. The 1969 consolidation rendered the RCSSB and the Public boundaries congruent in all but a few cases. Therefore, the fraction of RC's in the area represents the portion of the market which is contested between the RCSSB and the Public. I demonstrated that the elasticity of mobility was independent of the absolute size of the board population but the magnitude of the movement will not be. Thus I argue that t , the tax rate, will vary inversely with the proportion of RC's, $\%RC$, in the board area.

Unfortunately data on t are not available in any way which would permit me to test this hypothesis in the form just stated. Mill rate data are available and I shall use it later in a different test. The problem is that mill rates are not comparable across jurisdictions due to

differences in property assessment practice. In place of the mill rates, I will use the fraction of per pupil expenditure that is financed out of local taxes, $\%L_{tax}$. Thus, I restate my above hypothesis as:

H1: The proportion of revenue financed from local taxes will be lower in those jurisdictions where the proportion of R.C.'s is higher.

It is moot whether the operative measure of the mobile population is the proportion of RC's in the total population or the proportion of enrollment of schoolage children in the RCSSB since these figures are highly correlated. Recall that I mentioned the existence of "sponsors", RC's who do not have children currently enrolled in elementary school and who may be supporting the Public for historical reasons. These people are potentially available to the RCSSB. I will address this issue in the empirical evaluation of the hypothesis.

If the players adopt elements of a Cournot strategy we can expect to observe quantity varying directly with the proportion of RC's. In practice there is little scope for quantity variations since the Ministry regulations determine the length of a school day and year. However, the board has the option of offering four year old kindergarten (4yrk), smaller classes, and some "enriched" programs. As well, the Ministry sets out regulations for providing pupil transport and the board may optionally

exceed the minimum. Thus I state my second hypothesis as:

H2: Where the proportion of RC's is higher we will find a greater incidence of four year kindergarten and non-required transportation. We will also find smaller class sizes.

The equilibrium in the Bertrand game with identical firms is characterized by price equal to marginal cost and, thus, prices are identical for both firms. I state my third hypothesis as:

H3: The mill rates will be identical for the Public and RCSSB in each school board area.

The local school boards are public sector bureaus. Within the boards there is evidence of vertical trust networks as I demonstrated in Chapter 3 with my results of the tests of Parkinson's Law. Thus we can expect the school boards to produce efficiently the output desired by the senior bureaucrat. Recall that Ontario and B.C. differ in the extent of the vertical trust relation between the local boards and the Ministry (Chapter 3) and it is this relation the duopoly game is to substitute for. Since the internal workings of each local board are subject to the competition engendered by the vertical trust relation I expect each to produce approximately equally efficiently. Since I am dealing with public sector bureaus any rents which may accrue must be taken in the form of expenditures above the minimum (technical efficient) marginal cost [Crain and Zardkoobi, 1980;

Wintrobe, 1985]. Specifically, I predict there is no systematic variation in the level of expenditure per pupil for the categories of expenditure made at the school level. Thus:

H4: The level of expenditure per pupil (various categories of expenditure) will not be systematically related to the proportion of RC's in the board area.

Hypothesis 1 stated that the %Ltax will vary inversely with the proportion of RC's. This implies higher revenues per pupil and, therefore, higher expenditures per pupil (zero profits in public sector bureau). My discussion leading up to Hypothesis 4 explains why I do not expect to find systematic variation, across boards, in per pupil expenditure. The additional expenditure must occur at the level of the board office rather than the schools themselves. Thus a corollary of H4 is:

H5: Expenditures undertaken at the board level will vary inversely with the proportion of RC's in the population in the board area.

Empirics

In the work that follows my sample consists of 56 elementary school boards in Ontario (27 RCSSB) with enrolments generally greater than 3,000 pupils (I did use a few smaller boards to increase the sample sizes). The data are described in Appendix 1 but I note here that I used observations for the year 1978/9 since I was able to derive local tax levels for only a very few years and the

chosen year was the most complete in terms of data.

From the model I derived Hypothesis 1 which is essentially that discretionary behaviour is reduced where a larger fraction of the market is contested.

Discretionary expenditures will appear in certain expenditure categories (from my discussion of the institutional arrangements in Chapter 2) but most directly in the proportion of revenue obtained through local taxation. The empirics bear this out. In equation 4-1 I have regressed the percentage of total expenditure financed from local taxation on the fraction of Roman Catholics in the population of the district and other variables. The results cannot reject H1; the coefficient is negative and significant at 99% (t-statistics are in parentheses).

$$\%Ltax = -1.157 - 0.2569 \%RC + 0.000021 Ave Y \quad (4-1)$$

(2.30) (5.28)

$$-0.2565 Dummy + 1.0668 Grant Wt$$

(9.40) (2.63)

$$R^2 = 0.765 \quad F_{4,51} = 41.62$$

where $\%Ltax$ = the fraction of total revenue from local property tax

$\%RC$ = the fraction of total population in the school district that is Roman Catholic

Ave Y = the average family income in the school district

Dummy = dummy variable: D=1 for RCSSB,
D=0 for Public

Grant Wt = the weighting factor assigned to the school board to determine the grant allocations.

As the proportion of R.C.'s rises the fraction of revenues raised through local taxation falls. That is, the larger the share of the market that is contested the smaller the share of the revenue that is collected locally. The other variables included in the equation are the Dummy to correct for systematic differences between the Public and the RCSSB; Average Income as a measure of the willingness to pay (schooling is a normal good); Grant Weighting Factor to capture the ability to pay and also a measure of need arising from capital projects, French language classes, etc..

Empirically the issue of whether it is the proportion of RC's in the population at large or the schoolage pupils is not critical since the correlation between these variables is 0.89 across counties, based on the 1981 census. From the theoretical discussion of the game it is not clear to me which should be more relevant. The RCSSB's at large have approximately 60% of their rate payers who do not have schoolage children. This would suggest it is the proportion of RC's in the population that matters. On the other hand, only 20% of total revenue to the RCSSB comes from local taxes and this would suggest that pupils are the critical consideration to the RCSSB.

Since the issue is not resolved by appeal to reasoning I include the results for the regression in Equation 4-1 when the fraction of RC enrolment is used as an

independent variable.

$$\%Ltax = -1.102 - 0.2292 \%RC(Enrol) + 0.0000226 Ave Y$$

(2.06) (5.47)

$$-0.2664 Dummy + 0.9669 Grant Wt$$

(9.37) (2.29)

$$R^2 = 0.761$$

$$F_{4,51} = 40.53$$

As expected, the results are virtually identical to those obtained when the independent variable was the %RC in the population.

School boards can increase the quantity by offering four year old kindergarten, smaller class sizes, and discretionary transportation. The results for class size are encouraging. I regressed pupil teacher ratios (PTR) against the percent of RC's (%RC), average income (Ave Y), the system dummy (D), the grant weighting factor (Grant Wt), and enrolment (Enrol). The results are reported in equation 4.2. The coefficient for %RC has the predicted sign and is significant at 90%. Whether smaller classes do, in fact, contribute to achievement is not relevant here since the parents perceive them to be beneficial (see Chapter 2).

$$PTR = 39.51 - 2.296 \%RC + 0.000025 Ave Y - 0.502 Dummy$$

(1.61) (0.40) (1.44)

(4-2)

$$- 17.092 Grant Wt + 0.000016 Enrol$$

(3.14) (1.21)

$$R^2 = 0.39$$

$$F_{5,50} = 6.402$$

As I noted above, school boards are required to provide transportation for pupils residing more than a specified distance from the school. However, the board

may provide transportation for pupils at lesser distances if it wishes. In effect, such transportation represents a quantity increase since it provides the affected parents with greater resources. I regressed transportation expenditure per pupil against %RC, Ave Y, D, and Grant Wt. The results, reported in equation 4-3, cannot reject the hypothesis. The coefficient on the %RC term has the correct sign and it is significant at 90%.

$$\begin{array}{rcl} \text{Transport Expenditure/} & = & 739.523 + 62.24 \%RC \\ \text{Pupil} & & (1.13) \end{array} \quad (4-3)$$

$$\begin{array}{rcl} -0.00559 \text{ Ave Y} & + & 11.581 \text{ Dummy} - 486.79 \text{ Grant Wt} \\ (2.87) & & (0.86) \quad (2.43) \end{array}$$

$$R^2 = 0.241$$

$$F_{4,51} = 4.05$$

The evidence for the offering of four year old kindergarten is interesting. Four year kindergarten is offered by both the RCSSB and the Public. However, the Public provides this only in board areas where the RCSSB offers it. The RCSSB provides four year old kindergarten with much greater frequency than the Public. One explanation of this behaviour on the part of the RCSSB is that it serves to capture a part of the market. Parents with several children and who wish to make use of four year kindergarten must, of course, send their older children to the RCSSB. Further, the RCSSB gains a sizeable grant per pupil while the per pupil grant to the Public is smaller.

To test the relation between the %RC and the incidence of four year kindergarten I performed two

tests. In the first instance, I sorted my sample of boards by whether or not they offered four year kindergarten. I then used a non-parametric Mann-Whitney test [Conover, 1982, pp 216-227] to test the hypothesis that boards with a higher fraction of RC's would be more likely to offer this service. The test does not reject the hypothesis. The z-statistic is 14.37 (significant at 99%).

The Mann-Whitney test is somewhat limited since it is restricted to a single variate. I performed a probit analysis on four year kindergarten and the results are reported in equation 4-4.

$$\begin{aligned}
 P(4yrk) = & -16.543 - 0.147 \%RC + 1.351 D + 14.643 Grant Wt \\
 & \quad (0.09) \quad (2.29) \quad (2.33) \\
 & + 0.000025 Enrol \\
 & \quad (1.43)
 \end{aligned}
 \tag{4-4}$$

$$Likelihood\ ratio = 16.963 \text{ (95\%)}$$

This result refutes my hypothesis regarding 4yrk. The coefficient on %RC is clearly not significant. However, the RCSSB itself clearly utilizes four year kindergarten to compete with the local Public board.

In sum then, I find some support for the existence of a quantity response to the interdependence of the duopoly structure. On balance, however, the empirics lend stronger support to a Bertrand game since the price term was far more dependent on the %RC than any of the quantity items.

Hypothesis 3, in conjunction with my other results, states that the market will approach the competitive,

solution as a result of the defection of the RCSSB from the cooperative solution. For evidence of this I have compared the residential property tax (mill rates) charged by the Public and the RCSSB within each jurisdiction. I have data for the years 1975-1980. My statistical tests show:

1. the means of the mill rates charged by the Public and RCSSB are not statistically different at 95%.

2. on the basis of the following regression on pairwise observations from the same jurisdictions (i.e. RCSSB and Public school boards) the mill rates are found to be identical.

$$\text{Public Mill Rate} = \alpha + \beta \text{ RCSSB Mill Rate}$$

$$\beta = 1.022 \quad t = 120.9 \quad R^2 = .997$$

$\beta \neq 1$ rejected at 99%

3. on the basis of a Wilcoxon paired t-test the T statistic is 42.5. (well below the critical value of 435 for the 95% confidence level).

These results in conjunction with the earlier statistics support the existence of Nash behaviour here. Recall the statement of the Ottawa Separate School Board trustee, Paul Kelly, which I reported in Chapter 2. He noted that it "would be suicidal" for the RCSSB to set its mill rates above those of the Public. It is important to note that there is no sequence of action implied here. In terms of the game described in the model above it is irrelevant which party posts its price

first so long as the equilibrium has been reached. The strong support for identical mill rates over the period 1975-1980 confirms the existence of an equilibrium (at least in the behavioural sense).

Hypotheses 4 and 5 were motivated by my observation that local tax levels are higher where there is less competition, i.e., a smaller fraction of the market is contested. Since I am dealing with a public sector bureau the increased revenue must be matched by increased expenditure (the zero profit requirement). Yet, I can find no evidence of a correlation between expenditure per pupil, among the usual categories of expenditure made at the school level, and the proportion of RC's in the district (see Table 4-1). Thus, my results cannot refute H4. This suggests my arguments regarding the effect of vertical trust are correct. It also suggests we must look to expenditures at the board level to observe where the additional revenues are assigned.

Unfortunately I could find no detailed data on expenditures at the board level so I am unable to test H5 at this time.

Finally. I would like to note that instruction expenditures per pupil do not vary with the proportion of RC's while the class size does (inversely). Smaller class sizes with identical per pupil instruction costs imply lower real salaries to teachers. The competition I have described in this chapter reduces the rents to the teachers.

The empirical evidence in this section is quite strong in support of the general hypothesis of competition between the Public and the RCSSB in each school district. There is some further anecdotal evidence of this competition. In an interview an official of the Ottawa RCSSB informed me that they periodically search the property assessment roll and send letters to R.C.'s who are listed as Public School supporters. These letters inform the recipient of the fact that RCSSB mill rates

TABLE 4-1

Expenditures and the Effect of Contested Markets

Dependant Variables	Independent Variables						
	Constant	%RC	Ave Y	D	Grant Wt	Enrol	R ²
Total \$/ Pupil	-3184.11	+124.49 (0.83)	+0.018 (3.38)	+25.15 (0.68)	+4046.13 (7.44)	-	0.67
Instr \$/ Pupil	-1942.77	+84.76 (1.02)	+0.011 (3.35)	-16.14 (0.76)	+3618.16 (8.32)	-	0.73
Admin \$/ Pupil	-63.62	-7.67 (0.83)	-	+16.23 (6.67)	+89.95 (2.53)	-0.00065 (0.87)	0.50

are identical to those of the Public and that the RCSSB needs the support of all R.C.'s. This is the sort of overt action usually described in the texts as indicative of the collapse of the cartel. The behaviour concerning four year kindergarten is also indicative of overt defection from the cartel. It is interesting to note that some RCSSB's have attempted to offer kindergarten on

a full day basis but the Ministry has refused to extend the grants to cover this. It appears the Minister feels some competition is not beneficial.

I note that my results do not and cannot determine whether the allocation of resources in Ontario public schools is that which would obtain under perfect competition (private) schools. The equilibrium I observe is behaviourally competitive in the sense that it is not collusive. The tax levels are lower than would obtain under collusion and the rents accruing to teachers are lower by implication.

As a final note to my discussion of the duopoly game I would like to stress the role of the Minister in the structure of the game. It is within the discretion of the Minister and the courts to alter the structure. The courts have ruled several times since 1900 on the issue of the RCSSB access to the tax base comprised of commercial and industrial property owned by widely held corporations. In each case the rulings have affirmed the position taken by the Minister: in order to assign tax payments to the RCSSB (whole or in part) the corporation must demonstrate the appropriate fraction of its shareholders are RC and wish the taxes to go to the RCSSB. The corporation has little incentive to incur the transactions costs necessary to meet the Ministry requirement and the property taxes are paid to the Public [Cameron, 1972].

Further, the Minister could increase the grants to the Public with the result that the share of revenues from local taxes was the same for the Public and the RCSSB. Finally, and trivially, the Minister has not established a mechanism to permit the Public and RCSSB to make sidepayments to overcome the prisoners' dilemma game and to collude.

The historical development I described earlier ties with the expansion of the role of competition between the RCSSB and the Public for territory (pupils). Prior to 1876 there was no elected official whose sole responsibility was education. Ryerson was appointed to his position as Chief Superintendent. Interestingly, Ryerson wished to eliminate the RCSSB. He regarded its existence as an unfortunate historical accident due only to the widespread religious intolerance in Ontario at that time.

With the rise of education as a political matter the worth of the RCSSB became apparent. From 1876 the resources devoted to the RCSSB have increased enabling it to compete with the Public on a more equal footing. The reorganization of the Ministry in 1965 and the consolidation in 1969 (coupled with granting local boards more discretion) coincided with a period when enrollments in the Public began to decline while those of the RCSSB continued to grow. Both of these institutional changes increased the scope of competition between the Public and the RCSSB.

The most recent change occurred in June, 1984 when then Premier Davis announced the extension of Provincial funding the RCSSB secondary schools through Grade 13. Thus the current elementary structure will be extended to the secondary schools. My results would predict that this will lead to lower tax rates for secondary schooling, etc. In the next section I will discuss this expansion of the RCSSB as an outcome of the process of political competition [Stigler, 1972].

The Multi-period Game

Now I wish to consider the implications of the repeated-play aspect of the game I have represented between the RCSSB and the Public. The question to be addressed is: will the dynamic game have the cooperative outcome as its solution? The empirical evidence I have presented earlier suggests the answer is "no". The data are observations from many plays of the game. I now turn to a theoretical argument which supports the non-cooperative outcome in the dynamic game.

In the static game (Figure 4-3) the RCSSB had an incentive to defect since the mobility elasticity required to make defection profitable was quite low. In the dynamic game, the RCSSB has an incentive to defect but for a different reason.

In the static game, the payoff to defection to the RCSSB was an increase in its budget as enrolment and sponsorship increased in response to the lower tax rate.

In the dynamic game (multi-period) the payoff to defection to the RCSSB takes the form of increased support from the Minister. This support may take the

TABLE 4-2
Enrolment in RCSSB and Public Schools (1960-1982)

Year	RCSSB	Public	RCSSB/Public
1960	282,651	843,737	0.335
1961	301,388	861,715	0.350
1962	316,831	880,198	0.360
1963	331,334	901,830	0.367
1964	353,405	925,068	0.382
1965	370,669	949,374	0.390
1966	387,971	976,900	0.397
1967	402,497	1,002,555	0.401
1968	408,914	1,021,676	0.400
1969	413,556	1,042,561	0.397
1970	418,433	1,047,055	0.400
1971	422,137	1,034,703	0.408
1972	422,166	1,022,935	0.413
1973	424,217	998,668	0.425
1974	427,294	977,545	0.437
1975	427,853	961,625	0.445
1976	422,793	937,292	0.451
1977	421,619	907,777	0.464
1978	420,183	870,154	0.483
1979	420,820	837,941	0.502
1980	423,438	816,836	0.518
1981	425,706	799,174	0.532
1982	429,946	787,466	0.546

Source: Education Statistics, Ministry of Education, Ontario, various years.

form of a change in the rules which will favour the RCSSB. Alternatively, it may take the form of an increase in the financial resources flowing to the RCSSB. For reasons I discussed earlier, the additional financing will likely be in the form of grants rather than access to a broader tax base.

The democratic political process is not a winner-take-all game. A minority faction may still capture gains if

it is sufficiently substantial and is characterised by a uniform objective [Stigler, 1972]. In the case of the Roman Catholics in Ontario, rising enrolments in the RCSSB is a signal to the Minister that the issue of

TABLE 4-3
Provincial Grants to the RCSSB and Public (1960-1982)

Year	RCSSB		Public		a/b
	Total \$ (a) (000)	% of Expend- iture	Total \$ (b) (000)	% of Expend- iture	
1960	29,251	n/a	78,390	n/a	.373
1961	33,604	n/a	83,519	n/a	.402
1962	37,238	n/a	86,313	n/a	.431
1963	42,364	n/a	90,046	n/a	.470
1964	66,806	n/a	120,342	n/a	.555
1965	75,626	n/a	131,301	n/a	.553
1966	88,009	n/a	147,836	n/a	.595
1967	121,757	n/a	179,133	n/a	.680
1968	147,589	n/a	216,186	n/a	.683
1969	171,917	75.58	254,892	40.59	.674
1970	207,510	79.92	303,930	42.97	.683
1971	235,632	82.44	366,052	48.22	.644
1972	262,743	83.48	424,615	51.93	.619
1973	278,650	85.12	438,584	52.38	.635
1974	320,983	84.09	475,101	51.48	.676
1975	407,851	84.89	592,514	53.39	.688
1976	464,507	82.78	617,873	48.15	.752
1977	514,917	83.38	669,027	48.06	.770
1978	561,182	81.27	677,120	45.91	.829
1979	612,343	81.86	687,638	44.27	.891
1980	680,154	81.22	734,701	43.18	.926
1981	773,029	80.71	816,471	43.12	.947
1982	888,989	80.33	891,394	41.09	.997

Source: See Table 4-2

separate schools is salient to the RC's. That is, the RC's demonstrate their interest in the separate schools by enrolling their children here. The Minister may infer from the enrolment that, RC's will vote for a Minister who transfers resources to the RCSSB.

The data in Tables 4-2 and 4-3 provide interesting

evidence of the response of the Minister to changes in relative enrolment. Table 4-2 reveals that RCSSB enrolments have increased relative to the Public. Although the RCSSB continues to constitute a minority its enrolment has risen from approximately one-third of the Public enrolment to over one-half from 1960 to 1980. This rise has been only partly due to the decline in total enrolment. Table 4-3 shows a marked increase in the share of provincial schooling grants going to the RCSSB over the same period. The reaction of the Minister is borne out in the equation:

$$\begin{aligned} E_{RC}/E_P &= 0.214 + 0.312 G_{RC}/G_P \\ &\quad (13.58) \\ R^2 &= 0.91 \qquad F = 184.34 \end{aligned}$$

where E refers to enrolment and G to grants.

The coefficient on the grants variable is less than one indicating that the Minister has increased the grants to the RCSSB faster than the share of enrolment has grown. There are clear gains to the RCSSB of pursuing increased enrolment.

Most significant is the recent decision, announced by then Premier Davis, of the Minister of Education to extend full funding (on a per pupil basis) to the RCSSB through secondary schooling. Previously, the RCSSB received Provincial monies (and tax access) only for pupils through grade 10. In fact, the funding for G9 and G10 was at the per pupil rate for elementary pupils and not the (higher) rate for secondary pupils. My

prediction is that the new financing will come from provincial grants and not access to a larger tax base. That is, the structure of the game depicted in Figure 4-3 will be maintained.

In terms of the discussion earlier in this chapter it is interesting that the arrangements for Provincial funding of secondary level pupils in the RCSSB preserves the status quo regarding the grants and the local tax shares. Thus, the RCSSB continues to face the historical incentive to defect from any collusive arrangement involving tax hikes etc.. In fact, the need to encourage RC pupils to transfer from the Public secondary schools may induce the RCSSB to compete more vigorously than previously.

Thus, it appears the RCSSB has an incentive to defect on a collusive or cooperative outcome in both the static and the dynamic game. The Minister has structured the game in such a manner to promote the non-cooperative outcome as the solution to the game.

Conclusions

In this chapter I have examined the scope for the Minister to induce competition in the schooling bureau when two bureaus are assigned the task of providing schooling to a subset of the population. I have found that the competition introduced by the existence of the RCSSB does lead to more competitive behaviour on the part of the public sector schools. With the RCSSB and the

Public competing for a share of the Minister's attention (and rewards) the public sector schools provide an output that is consistent with the objectives of the Minister. Costs are lower as are rents accruing to the teachers.

The Minister has structured the institution such that the RCSSB will have an incentive to defect on any collusive arrangement the Public may wish to adopt. The threat of such defection is credible to the Public since there are no sidepayments that can be effected nor are there any sanctions which can be employed by the Public to discipline defection of the RCSSB. Thus the Public must respond to the threat of defection and adopt Nash behaviour as well. The only equilibrium which can be sustained is the non-cooperative solution to the duopoly problem. While not necessarily perfectly competitive, the resulting outcome is at least behaviourally competitive.

Political competition, as provided by the growth of the RC's as a share of the enrolment in Ontario, has resulted in the growth of the RCSSB share of the revenues from grants. However, the Minister has maintained the structure of the game, the mix of tax and grant, which has been in place for some time. I showed that it was the structure which promoted defection on the part of the RCSSB and produced an equilibrium which is behaviourally competitive. I found that the non-cooperative solution dominates in both the static and the dynamic game.

Footnotes

1. Mark Holmes of OISE provided me with some unpublished results of a field study he undertook involving tests of basic skills (math, reading, and composition) in the early 1980's in Ontario. Essentially the finding was that there is no systematic difference between RCSSB and Public schools. Geographic differences dominated by a considerable extent any other differences. I should stress that the study was very much a pilot effort and that the schools participating did so voluntarily.

Dawson and Dancey [1973] utilized the Carnegie data on test scores in Ontario. Their objective was to determine the impact of school and board size on achievement. However, there are a few results reported for RCSSB and Public school boards. Where identification of a system is possible the results are the same as those found by Holmes. These results were confirmed in private conversation with Dawson.

Appendix

Nash's Solution to the Bargaining Game

Source: Luce and Raiffa [1957]

Nash's solution is 'constructive' in that it provides numerical solutions to games with mixed strategies. The solution is (x^*, y^*) such that $T(x, y) = (x^*, y^*)$ where T is the mapping from the set of strategies onto itself. The strategies are defined as

$$x = (x_1 a_1, x_2 a_2, \dots, x_m a_m)$$

$$y = (y_1 b_1, y_2 b_2, \dots, y_n b_n)$$

where a_i represents the pure strategy i for A

x_i represents the probability of choosing i

b_j represents the pure strategy j for B

y_j represents the probability of choosing j

The payoff to the randomized pair of strategies (x, y) is given by

$$M(x, y) = \sum_i \sum_j x_i r_{ij} y_j$$

$$\text{where } r_{ij} = M(a_i, b_j)$$

The payoff to A when he uses the pure strategy a_i and B uses y can be written as

$$M(a_i, y) = \sum_j r_{ij} y_j$$

and for B using b_j we have

$$M(x, b_j) = \sum_i r_{ij} x_i$$

The mapping is defined generally as:

$$T(x, y) = (x', y')$$

where

$$x'_i = \frac{x_i + c_i(x, y)}{1 + \sum_k c_k(x, y)}, \quad \text{for } i = 1, \dots, m$$

and

$$y_j = \frac{y_i + d_j(x, y)}{1 + \sum_k d_k(x, y)}, \text{ for } j = 1, \dots, n$$

and further

$$c_i(x, y) = \begin{cases} M(a_i, y) - M(x, y) & \text{if this is positive} \\ 0 & \text{otherwise} \end{cases}$$

$$d_j(x, y) = \begin{cases} M(x, y) - M(x, b_j) & \text{if this is positive} \\ 0 & \text{otherwise} \end{cases}$$

The mapping described above is the operational part of the numerical computation. Brouwer's fixed point mapping can be solved numerically using Scarf's [1973] algorithm.

Conclusions

I began this thesis with an observation that descriptively the structure of public sector schooling differs across the provinces. For example, B.C.'s public schooling appears to be a monopoly while Ontario's is a duopoly with a large subset of the market (the children of Roman Catholic parents) contested by the Roman Catholic Separate Schools (RCSSB) and the non-denominational schools (Public).

There are two schools of thought concerning the behaviour of public sector bureaus. The first, following from Niskanen [1971], argues that public bureaus enjoy monopoly power which they exploit to expand their total budgets and, in particular, their discretionary budgets or budgetary "fat" [Niskanen, 1975]. The vehicle for such exploitation is usually argued to be agenda control in the form of all-or-nothing offers. A facet of the monopoly view is that public sector bureaus differ from private firms. Public sector bureaus are non-competitive institutions and the result is they operate inefficiently. The individual bureaucrats engage in wholesale shirking resulting in per unit costs of production well in excess of private firms in the same market [Borcherding, 1983].

The monopoly school moderates its conclusions where there is evidence of external competition for budget, clients, territory, etc. Fiscal mobility (the Tiebout

[1956] process) is also often presented as a device to discipline cost inefficient and monopolistic bureaus. Others argue that the same effects occur in overlapping jurisdictions [Wagner and Weber, 1975].

If the arguments of the monopoly school are correct there should be some significant behavioural differences between the bureaus of Ontario and B.C.. Specifically, we should expect to see lower per pupil costs, higher quality, and other measures of greater effort (less shirking) in Ontario than in B.C.. If that were the case the monopoly school would then be required to explain why the B.C. Minister (and perhaps the residents) is resigned to monopolistic exploitation when the solution is clear and at hand: create competition by setting up another bureau to compete with the first. Indeed, if the monopoly model is a good representation of reality why would Ontario establish competition only within a subset of the market?

Partly as a response to these, unanswered, questions some researchers have begun to argue that bureaus are inherently competitive institutions in a very specific sense. Extending the work of Alchian [1969], Jensen and Meckling [1976], and Fama [1981], Breton and Wipfrobe [1982] have shown that the internal organization of the public sector bureau has characteristics which promote competition by providing a return to competitive behaviour. If the "competitive school" is correct,

differences in the descriptive structure will not affect the nature of the output, the intensity of effort, or the costs per unit. Thus there is no need to explain the persistence of different descriptive structures. The structure does not matter to the Minister (or, very likely, to the consumers of the bureau output) in the specific sense that the bureau will produce what the Minister wants irrespective of the descriptive structure. Any such differences in structure can then be explained as an "historical accident".

What does require investigation is the implicit conclusion of the competitive school argument that the nature of the internal organization will differ under different descriptive structures. The bureau is intrinsically competitive with competition for positions in the informal hierarchy (networks) of the bureau [B&W, 1982]. Therefore, differences in descriptive structure would be expected to be compensated by differences in internal organization. The networks necessary to achieve internal competition (of the Alchian type) require resources to establish and monitor. Errors are costly since the failure to promote or reward a productive worker will reduce the capital value of the trust embodied in the exchange. Conversely, the promotion of a non-productive worker is costly to rescind. The rules of the formal structure in the public sector make it very difficult to demote even an employee who is demonstrably shirking. Therefore the Minister will adopt any

available technique which reduces error in conferring rewards in the network. It is conceivable that some features of the formal hierarchy offer opportunities to exploit superior metering devices. Where those are not available the Minister will substitute other devices.

I argued in Chapter 3 that the networks are likely to be discernable from the formal structure since the rewards that are part of the network must be a part of the formal hierarchy. Thus, B.C. exhibits a formal hierarchy with more definable steps or stages, and with a more pronounced linkage up through the senior bureau (Ministry). That is, B.C.'s formal hierarchy is more able to support the network necessary to induce constructive effort from the teachers (bureaucrats).

The competitive school model subsumes the competing bureau situation as a particular case. Here the bureaus are competing for the favour of the Minister and the index of success by which the Minister gauges their performance is the share of the market captured. The Minister will design the game representing the rivalry among the competing bureaus such that non-cooperation will be encouraged. The result will be competitive behaviour on the part of the rival bureaus in the following specific sense. The bureaus will produce the output desired by the Minister and do so efficiently.

The elements of my thesis were developed in Chapters 3 and 4. I investigated the means used by the Minister of

Education in Ontario and B.C. in solving the problem of generating competition in the public sector school bureaus. In Ontario I showed the Minister does exploit the inter-bureau competition between the RCSSB and Public. The duopoly is vulnerable to a collusive outcome. This may be construed as a horizontal trust network since monetary sidepayments are ruled out by the constraints imposed on the institution. The Minister is able to sabotage a potential horizontal trust relation by constructing the payoff matrix so that defection is a dominant strategy. The results of the Minister's actions are lower price (measured as the percent of expenditure financed through local taxes), greater quantity (offering four old kindergarten), and fewer rents accruing to the teachers (bureaucrats).

The B.C. Minister does not have access to inter-bureau competition and must design the institutions to promote competition internally. Compared to Ontario, the B.C. public school bureau is characterised by a formal structure which has more levels to the hierarchy and more explicit links between the Ministry and local school boards (the hierarchy runs directly from the local boards through the Ministry).

The effects of the B.C. Minister's actions are the observations on the internal structure I have recorded above. The theory (see B&W [1982]) predicts the results of the Minister's activity will be a more efficient production than if the competition for position in the

networks was not generated. In Chapter 1 I suggested there was no good reason for Ontario to be any more efficient than B.C. and I noted that the per pupil cost figures suggest very little difference on this score. In Chapter 3 I noted there is no systematic evidence that the B.C. schools produce an inferior education compared to those of Ontario.

Finally, I come to the crux of my analysis. Bureaus are potentially competitive and will be made to behave so by the Minister (political sponsor) who has no good reason not to do so.

Appendix 1: Data Sources

Part 1: Published Data

Statistics Canada, Survey of Education Finance, Cat No 81-208, annual, Various Years.

-----, Survey of Elementary and Secondary Education, Cat No 81-210, annual, Various Years.

-----, Salaries and Qualifications of Teachers in Public Elementary and Secondary Schools, Cat No 81-202, annual, Various Years.

-----, Elementary and Secondary Education Financial Statistics, Cat No 81-250, annual, (discontinued with the 1976-77 issue).

-----, A Century of Education in B.C., Cat No 81-550, occasional, 1971.

-----, Census of Canada, 1981.

Ontario, Education Statistics, Ministry of Education, Toronto, annual, years 1975-82.

-----, Enrolment and Staff Ratios, Ministry of Education, Toronto, annual, years, 1971-82. This item and the next provided most of the numerical data used to test the hypotheses I presented in Chapter 4.

-----, Survey of School Board Per Pupil Expenditure, Ministry of Education, Toronto, annual, years, 1971-82.

-----, Education in the Primary and Junior Divisions, Ministry of Education, Toronto, 1975. This item and the next provided the institutional information I used to infer the nature of the curriculum and the discretion available to the local boards in Ontario.

-----, The Formative Years, Ministry of Education, Toronto, 1975.

-----, Public Accounts, Ministry of Treasury and Intergovernmental Affairs, Toronto, Various Years. The chapter on the Ministry of Education provided detailed expenditures by category and, for some years, the grants to the local school boards.

-----, "Report of a Commission to Review the Collective Negotiation Process Between Teachers and School Boards", Ministry of Education, Toronto, June, 1980. Includes an appendix reporting the work stoppages in Ontario for 1975-80.

-----, Regulation 108/78, made under The Education Act. Provides the Grant Weighting factor to be used for adjusting the general legislative grants to school boards for 1978-9 school year. This provided the Grant Wt data used in Chapter 4.

-----, Regulation 169, made under the Education Act, titled "Ontario Teachers' Qualifications", describes the qualifications required to teach in public sector schools in Ontario.

-----, memo from Tom Wells, Minister of Education, addressed to school principals et al regarding curriculum development at the local level. Dated January 19, 1977. Stated the Ministry position on the independence of local school boards in the matter of curriculum choice.

British Columbia, Annual Report of the Minister of Education, Ministry of Education, Various Years. Provided numerical data and also the discussion of the institutional details such as the activities of the Learning Assessment Branch and the Ministry testing program.

-----, The Administrative Handbook, Ministry of Education, Victoria. Outlines the curriculum to be followed and programs to be used in the public schools.

-----, Public Accounts, Ministry of Treasury, 1963-4 through 1979-80. Provides numerical data on the expenditures of the Ministry.

-----, Regulation 2934, made under the Schools Act, provides for teacher qualifications. Dated 1979.

-----, "Teacher Certification in British Columbia", Ministry of Education, Teacher Certification Branch, describes teacher qualification required from within the province and from other provinces, dated 1982.

Part 2: Unpublished Data

Statistics Canada, Several tables of background data to Cat No 81-202. Provided by Michelle Vidger and James Seidle at Statistics Canada. This data is cited in Chapter 3 as it provided most of the information required for the comparison of Ontario and B.C..

Ontario, Local Mill Rates, 1975-80. Generated by the Ministry of Municipal Affairs, Toronto. Used in Chapter 4 to test the hypothesis that the RCSSB and Public have reached an equilibrium with identical mill rates.

-----, Collective Agreements, various school boards,
1973-80.

Provided information on the form of the contract with the teacher. Particular interest in clauses relating to the treatment of redundancies.

Part C: Data Generated

%Ltax:

The percent of expenditure financed through local taxes, Ontario. This data is not reported explicitly. To compute this number I took the per pupil total expenditure (Survey of School Board Expenditures) and multiplied this by the enrolment (Enrolment and Staff Ratios) to get total expenditure. For certain years the Public Accounts provided the grants to each school board. Subtracting the grants from the total expenditure gave the total local tax levy for the years available. School boards must, in general, finance their expenditures from taxes or grants.

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