Journal of Public Economics 51 (1993) 309–327. North-Holland

The decline of organizations and the rise of administrators

Parkinson's Law in theory and practice

Michael McKee

University of New Mexico, Albuquerque, NM 87131, USA

Ronald Wintrobe

University of Western Ontario, London, Ontario N6A 5C2, Canada

Received January 1991, final version received February 1992

Parkinson reported observing substantial growth of administrators as organizations were declining. Such behavior has usually been considered proof of an inherent tendency for bureacracies to grow. In this paper we offer a different interpretation: expansion of administration during periods of decline is the result of promotions of line workers to administrative positions. Promotions are a means of protecting from layoff or dismissal those employees who have accumulated network capital with their superiors. All large organizations (private firms as well as public bureaus) can be expected to behave in this way and Parkinson's observations are simply evidence of the existence of implicit contracts within organizations. We report empirical tests which provide convincing evidence for Parkinson's Law in two very different organizations – a public sector bureau (education) and a private sector industry (steel).

1. Introduction

The most popular book ever written on the notoriously dull subject of public administration is undoubtedly C. Northcote Parkinson's *Parkinson's Law*. The fame of the book rests on the Law itself, the most popular version of which is:

L1. Work expands to fill the time available for its completion.

For many, this Law apparently captures an important feature of their experience in organizations and for more than a few, it sums it up. There are, however, at least two other versions of Parkinson's Law:

L2. Administrators are bound to multiply.

Correspondence to: M. McKee, Department of Economics, University of New Mexico, Albuquerque, NM 87131, USA.

L3. (strong version). Administrators multiply at the same time the organization's output and its direct labor force are declining.

The fundamental basis for the Law, in all of its versions, is Parkinson's observation that between 1914 and 1928 the number of ships in the British Navy declined by 67 percent and the number of officers and men by 31.5 percent; but, the Admiralty (the Navy administration) increased over this same period by 78 percent, providing as Parkinson notes, 'a magnificent navy on land' (1957, p. 7).

Later, in a series of lectures entitled *The Essential Parkinson*, Parkinson (1970) described another (so far as we know, fictitious) case of a German industrial group with a headquarters staff of 2,000 whose factories were destroyed by enemy action. However, he reports (p. 26), 'It was then discovered that the administrative staff were working just as hard as ever, even when there was nothing left to administer. Here was gratifying proof, in practice, of what I had described in theory.'

Parkinson explained these anomalies by bureaucratic expansionism. Divide all organizations into two components – an administrative component (A) and a direct labor component (L). The second version of the Law is sometimes put in the form that the A increase by a constant factor over time (5.75 percent per year, to be exact). Version 3 appears to follow from 2 in that, if administrators are bound to multiply, they will do so even when there is an exogenous decline in the size of the direct labor force. We would then observe an increase in A at the same time that both L and output decline. However, at other times, Parkinson suggests that the expansion of administrators is the cause of the organization's decline, a theme echoed by Friedman (1977).

The enormous popularity of Parkinson's Law among bureaucrats and businessmen suggests taking it seriously, and some economists have done so. Niskanen (1968, 1971), for example, explicitly acknowledges his debt to Parkinson. Niskanen's theory of the budget-maximizing bureaucrat (1971, p. 41) may be viewed, in part, as an effort to bring Parkinsonian ideas into the realm of economic theory and to make them testable. However, while the Niskanen model is undoubtedly a giant leap forward over the simple notion of empire building to be found in Parkinson and elsewhere, it is interesting that none of the versions of the Law itself can be satisfactorily derived from this model.[1]

[1]Niskanen's model contains no counterpart to A and L; he suggests that the analog to the strong version of Parkinson's Law in his model would be if a public organization's budget (B) were to expand at the same time its output (Q) declines. This can happen, but only if the elasticity of the bureau's services *decreases*. This is unlikely to happen as a response to or be a cause of an organization's decline. And, it cannot account for Parkinson's observations; one would not want to argue that the British elasticity of demand for the services of the navy was lower in 1928 than in 1914! For further discussion, see Breton and Wintrobe (1979).

Otherwise, economists have generally neglected the study of administrative behavior. The *Handbook of Labour Economics* [Ashenfelter and Layard (1986)] for example, contains virtually no reference to administrative personnel. Most scholarly work on the growth of administrators has been done by organization theorists and sociologists. The central focus of this literature has been on 'administrative intensity' (A/L) – the number of administrative employees (measured various ways) divided by the number of production workers. A/L may be interpreted as an index of the 'bureaucratization' of an organization.[2] A large number of hypotheses have been developed and tested with regard to this variable.[3] However, the strong version of Parkinson's Law, and the behavior of the British Navy still remain paradoxical.

In this paper we develop a simple theoretical explanation for the behavior of the British Navy, and hence for the third version of Parkinson's Law – arguably its most controversial and startling form. We show that all that is required to derive the Law in its most striking version is the existence of implicit contracts, or what we prefer to call *trust* [following Breton and Wintrobe (1979)] between line employees and their superiors, and that the organization is of reasonable size, so that its personnel practices are codified in formal procedures. These procedures act as constraints on the operation of implicit contracts, i.e. they limit the informal exchanges which can take place within the organization. Our work is also related to that of Milgrom and Roberts (1988) and Milgrom (1988), and to the 'new economics of organization' [Weingast and Marshall (1988)].

The next section develops the theory. Sections 3 and 4 test the strong version of Parkinson's Law for two organizations in periods of decline – the public sector school system in Ontario, Canada, during the 1970s and early 1980s (section 3) and the U.S. steel industry since the Second World War (in section 4). These tests provide considerable support for the strong version of Parkinson's Law, and show its relevance to organizational behavior in both the public and private sectors. Our tests do not provide any support for

[2]Wintrobe (1982) develops a simple model of the optimal level of bureaucratization of a firm as the outcome of rational choices by employers and employees. 'Bureaucratization' is defined as the extent to which employees respond according to rules and instructions from above rather than using their own discretion. This model yields a number of the implications mentioned in the text, if A/L is a satisfactory index of bureaucratization.

[3]For example, A/L tends to be positively related to the age of the organization [see Melman (1951) and Bendix (1956)], its technical structure complexity [Woodward (1965), McKinley (1987)], formalization [Hage and Aiken (1969)], and is (positively negatively) related to its size. Much of this work provides a relatively innocuous explanation for the second verson of Parkinson's Law. Thus, the number of administrators would expand if their productivity increased and this could be the natural consequence of increased technical or structural complexity, age, formalization, and so on. More recent work [Freeman and Hannan (1975), McKinley (1987)] shows that the response of A/L to these variables is affected by whether the organization is growing or declining.

Parkinson's theoretical framework or associated notions of budget maximization. Section 5 considers some alternative explanations for our results, and shows that there are solid empirical grounds for preferring the explanation offered here. Consequently, our results appear to provide one of the few empirical tests we know of for the existence of implicit contracts or trust within an organization.

2. Theoretical framework

To derive the strong verion of Parkinson's Law, divide the organization's employees into line workers (L) and administrators (A). Following Breton and Wintrobe (1979) or Wintrobe and Breton (1986) assume:

Assumption 1. At least some of the L are members of *vertical networks* with their superiors.

Vertical networks are lines of trust between superior and subordinate which allow them to trade in the absence of a full set of formal contracts. Gains from trade arise from the fact that so many contingencies arise within the firm that contractual specification of the employee's behavior under all possible circumstances is far too costly. Consequently, much behavior is left unspecified or implicit. This implies gains from trade: a superior can offer a subordinate a bonus, a better chance of promotion, or a bigger expense account in exchange for the subordinate's 'consummate' cooperation [to use Williamson's (1975) phrase], revelation of information, extra effort, and so on.

Typically, such exchanges will not be spot transactions, i.e. there will be a lag between the rendering of a service and the payment for it. Moreover, property rights within organizations (legally enforceable contracts or formal procedures) cannot act as a discipline against cheating or reneging on 'implicit' contracts. However, the prospect of future exchanges can be expected to loom large in the dealings between superiors and subordinates within a organization. This prospect may serve as a discipline against cheating [Telser (1980), Klein and Leffler (1981), and Shapiro (1983)]. Breton and Wintrobe (1979) and Wintrobe and Breton (1986) developed the concept of *trust* as a capital asset which must be accumulated before exchanges can take place. This concept is analogous to reputation or goodwill in the marketplace, as discussed by Shapiro (1983). The extent to which two parties in an organization trust each other is simply the degree to which each is confident the other will not cheat or renege on an exchange. The greater the trust, the lower are transaction costs of exchange between them. It seems reasonable to assume that employee productivity increases if transactions costs between superiors and subordinates fall, i.e.

Assumption 2. Vertical networks increase employee productivity.[4]

Our third assumption can be developed from the idea that administrators (the *A*'s) typically have one characteristic not remarked by Parkinson, namely that they possess skills that are organization-specific. The theory of specific human capital [Becker (1975)] implies that, in order to motivate employees to incur the costs of accumulating this capital, the organization will adopt personnel practices which ensure that such employees are less likely to be dismissed when demand for the organization's output falls. Considerable evidence supports this prediction [Parsons (1972), Pencavel (1972), Topel (1991)]. However, it has never before, to our knowledge, been tested for administrative personnel (perhaps because data are not usually available on this category of employee). We will utilize this proposition in strong form as

Assumption 3. Administrators cannot be dismissed.

Cuts in the workforce must therefore come from among the *L*'s. Our fourth assumption described how these reductions will be implemented.

Assumption 4. Cuts in personnel will be made according to formal criteria (explicit contractual provisions) such as seniority or rank.

The use of formal procedures specified by Assumption 4 is reasonable if the organization is large. Much evidence relating size to 'formalization' can be found in the literature on organizational behavior.[5] Wintrobe (1982) provides a theoretical justification for this relationship. Essentially, formalization of procedures is a way of providing a generalized instruction to subordinates. Generalizing instructions reduces costs of organizational control by economizing on the superiors' decision-making time, by allowing the use of sampling techniques in monitoring the activities of subordinates, and by reducing the likelihood of coordination problems between departments. Wintrobe shows that the cost saving from each of these sources is relatively larger, the larger the size of the organization. A related explanation can be derived from Milgrom (1988) or Milgrom and Roberts (1988), who suggest that formal rules will be implemented in organizations to curb unproductive internal rent-seeking.

[4]See Wintrobe and Breton (1986) for further justification. They also assume that horizontal networks *reduce* productivity. Such an assumption is consistent with the present argument, but not essential to it.

[5]See almost any textbook on organizational behavior, e.g. Daft and Steers (1986, p. 225) and references therein. One oft-cited study is Reimann (1973). Daft and Steers note that the relationship between size and bureaucracy is probably the most studied relationship in organization theory.

Given these four assumptions, suppose that there is an exogenous fall in the demand for the organization's output, leading to a reduction in its work force. Subordinates who are members of vertical networks will be aware that if they are dismissed, they will never be repaid for the trust they accumulated in the past and for any 'loans' that some of them will have extended. To avoid taking a capital loss on the investment and debts, *they will demand to be promoted, since this is the only way to make them safe from dismissal.*

Superiors who are in trust networks with these *L*'s will be aware that dismissal of *L*'s on any objective basis will not discriminate between *L*'s who are in their networkds and those who are not. Yet if they do not promote the *L*'s in their network, they suffer a double loss: (i) they lose the capital value of the *L*'s in their network and (ii) others who remain in the organization will observe that network membership did not, in the end, turn out to be worth much. Hence, the superiors' subsequent promises will be immediately discounted and their capacity to obtain services from their subordinates in the future will be permanently impaired, in the same way that a cheating firm will have difficulty selling high-quality goods in the future in the analysis of Klein and Leffler or Shapiro. So, *the superiors will also want to promote the L's in their networks.* The outcome is that while demand, output, and the *L*'s are declining, the absolute number of administrators will actually increase, just as Parkinson predicted.

From the superiors' point of view, it would obviously be simpler, and probably more efficient, to 'store' valued employees in production ranks rather than promoting them to administrative positions. However, the selective dismissal of employees which this would entail would violate Assumption 4. The problem, ultimately, is that implicit contracts or network links themselves are *invisible*, and therefore discriminating between network-linked and other employees cannot be done on the basis of formal procedures. If the typical large organization can only lay off or dismiss employees on some visible and formalizable criterion such as seniority, the only way to protect implicit contracts with valued employees is to switch the employees to a tenured category from which layoffs cannot be made. (This practice is perhaps not unknown in university departments, which sometimes promote assistant professors early to protect them from budget cuts.) On our analysis, then, Parkinson's Law is the outcome of the tension or discrepancy created between the desire to fulfill implicit contracts while maintaining explicit contracts (adherence to formal procedures).

Parkinson's own example of the British Navy is a particularly simple case. The number of ships and the number of officers and men declined between 1914 and 1928 because a large number of both were destroyed by enemy action during the First World War, and there was no need to replace all of them after the war had ended. The Admiralty increased as a large number of officers and men were promoted as a reward for loyal service during the war.

We would expect all military organizations to become 'top heavy' in this fashion after a major war.

While the simple analysis above implies that all large organizations exhibit Parkinson's Law when demand declines, it does not determine the magnitude of the expansion in administrators, nor how that magnitude varies with different types of organizations. To examine these issues, suppose first that the organization is a 100 percent owner-controlled, profit-maximizing firm. Suppose also that bankruptcy is impossible for this firm. A decline in demand means that the owner-manager faces an unpleasant tradeoff between increased costs due to the excessive expansion of administrators (relative to their marginal productivity), on the one hand, and increased costs due to the destruction of the organization's trust capital (to the extent he refuses to ratify the promotions demanded) on the other. Failure to ratify promotions reduces the efficiency of the firm in the short run by reducing the responsiveness of subordinates to the wishes of superiors, and further reduces the capacity of the firm to rebuild in the future if demand recovers, since vertical networks are efficiency-enhancing, and it will be more costly to re-establish trust networks if implicit promises are broken. Assuming diminishing marginal productivity for both networks and administrative personnel, it follows that the marginal costs of network destruction (as fewer L are promoted to A) are increasing, and the marginal costs of excessive expansion of administrative personnel are also increasing. The solution is straightforward. The owner-manager will minimize the increase in costs by ratifying some, but not all, of the promotions demanded, promoting L to A to the point where the marginal costs of excessive expansion are equal to the marginal 'revenue' from the preservation of network capital.

It should be emphasized that the promotions themselves are not necessarily efficiency-enhancing; the marginal productivity of these employees in their new jobs could easily be below their wage and other costs. What enhances efficiency is that the organization's reputation for repaying internal debts is maintained.

The reader might query why, if the operation of this Law might be efficient, as our analysis of the owner-manager's behavior suggests, the industries which exhibit this behavior appear to be better known for their inefficiencies than for their efficiency. Our theory does indeed suggest an association between inefficiency and Parkinson-type behavior. The reason is that Parkinsonian behavior is the result of a decline in the fortunes of an organization. However, in our model, the expansion of administrators is a *symptom* of organizational decline but not necessarily a cause of that decline. The two are associated because protecing employees from cuts is simply a management strategy which is more likely to be employed in inefficient industries than efficient ones. Nevertheless, the theory does not imply that all promotions made for this reason are efficient, nor that the right number of

promotions is necessarily made. To pursue this point, it is instructive to compare how the number of promotions varies under different conditions and for different kinds of organizations.

Firstly, we discuss how the solution outlined above for the 100 percent owner-managed firm is disturbed if there is some possibility of bankruptcy. To see why the solution changes, note that some of the 'revenue' from the preservation of networks will be gained only in the future, while all of the costs of an unnecessary expansion of A are felt immediately. The purpose of the latter is to preserve the organization's networks. However, if there is a non-trival probability of bankruptcy, promoting rather than firing workers can only hasten its prospect, and bankruptcy destroys all of the organization's networks. Consequently, the larger the prospect of bankruptcy, the smaller the number of promotions which will be made by the owner-manager for any given decline in demand and initial capital investment in networks.

The costs of bankruptcy to the manager are relatively smaller for non-owner-managed corporations. Such organizations also tend to be relatively large, and hence less likely to go bankrupt. Large organizations are also incapable of avoiding 'top-heaviness' by the simple retention of network employees at the L level by selectively firing only non-network personnel (something only the small, informally organized firm can do).

Consequently, for all three reasons – size, probability of bankruptcy, and the relative share of bankruptcy costs borne by the organization's manager – the relative expansion of the administration will tend to be larger in large, widely held corporations than in small, owner-managed firms. By the same reasoning, it will be larger in monopolies than in competitive organizations, larger in government corporations compared to private firms, and largest in government departments (bureaus).[6]

The permanent effects of the expansion of administrators are also of interest. These will differ, depending on whether the organization is in short-term (e.g. cyclical) or permanent decline. Unlike Parkinson's version, our model does not predict a continuous expansion in A, but rather a one-time increase, contemporaneous with the decline in L. If the organization is in short-term decline, the excessive expansion of administrators during the decline may be compensated for by making fewer promotions during periods of growth, so that the destructive long-term effects of Parkinson's Law can be minimized. Long-term decline, however, implies a continuous expansion in A, and the effect of this is clearly to increase the rate of decline of the organization as the continual contraction of demand will be accompanied by a continual increase in average costs. This provides a simple explanation of

[6]Note that a relatively large expansion of A signals neither efficiency nor inefficiency – only the organization's expected prospects of surviving the decline, and the magnitude of its internal vertical network capital.

the sudden and rapid decline of an industry (e.g. the U.S. textile industry) as described by Cassing and Hillman (1986).

We cannot test all of these implications here. However, we do have data on two rather different organizations in periods of decline. These are the public sector school system in Ontario, Canada, and the U.S. steel industry. The next two sections describe our tests which confirm the presence of Parkinson's Law in these two organizations, and provide some idea of its magnitude.

3. Parkinson's Law in the school system

Our first test for Parkinson's Law is performed on the Ontario (Canada) elementary level public sector school system. This system is organized into two institutions – a non-denominational system, which we label 'Public', and a Roman Catholic system, which we label 'Roman Catholic Separate Schools' (hereafter RCSS). Both are fully state funded; the latter is an option only for the children of Roman Catholic parents. This group is a sizable minority in Ontario.[7]

In the 1970s, enrollment in the two systems began to decline owing to lower birth rates in the mid-1960s. This decline continued through 1983 (the most recent year for which we have complete data) in the Public system, but had halted by 1979 in the RCSS system. The aggregate data are shown in table 1. By inspection, these data clearly suggest support for Parkinson's Law. The total number of administrators (all non-teacher categories in table 1) increases almost continuously throughout the periods of enrollment decline (1975 through 1983 in the Public and 1975 through 1979 in the RCSS). However, the time series is too short for an adequate test. We use disaggregated data for the individual school districts to derive samples for a more complete test.[8]

From the regulations, we have identified three categories of administrative positions that are at the discretion of the senior bureaucrat at the district level: consultants, teachers assigned to the central (district) office, and 'other professional staff'. The Ministry definitions for these positions are provided in table 1.

A fourth category, supervisory officers, is at the discretion of the senior (Provincial) government under the terms of the relevant legislation. We

[7]McKee (1989) and Bagnoli and McKee (1991) show that the RCSS and Public are in competition for pupils and resources.

[8]There are slightly more than 100 school boards in the Public system and 60 in the RCSS. In the Public system, the largest 24 of these boards account for more than 71 percent of the system enrollment. In the RCSS, the largest 20 boards account for over 80 percent of system enrollment. The empirical work which follows uses these samples. Administrative positions are filled in lumpy units and to reduce a potential bias in the results we avoid the use of small school boards in our analysis. The largest Public boards each have enrollments in excess of 10,000 pupils; the 20 largest RCSSS boards each have enrollments in excess of 6,000 pupils.

Table 1

Aggregate enrollment and staff data in public sector schools.

Year	Enrollment	Teachers	Super	Consult	Other	Center
Roman Catholic school board data: 1975–1983						
1975	427,853	19,704	145.2	510.8	156.7	217.2
1976	422,793	19,638	210.6	507.3	169.7	228.2
1977	421,619	19,762	220.0	508.6	180.7	228.2
1978	420,183	19,981	223.0	513.2	224.5	258.7
1979	420,820	20,127	227.3	522.0	241.3	318.4
1980	423,438	20,111	231.6	530.8	258.1	378.0
1981	425,713	20,449	236.6	542.6	232.0	267.6
1982	429,954	20,826	241.1	554.6	254.9	320.5
1983	433,511	21,159	250.1	520.5	307.4	325.1
'Public' school board data: 1975–1983						
1975	961,625	43,519	235.6	834.8	378.9	756.2
1976	937,292	43,318	282.0	836.2	404.6	733.5
1977	907,777	42,556	298.7	850.3	413.1	865.3
1978	870,154	41,137	307.2	789.8	587.7	785.0
1979	837,941	39,949	303.0	780.3	567.4	816.3
1980	816,836	39,436	299.0	770.7	547.1	847.6
1981	799,173	39,364	301.0	801.9	477.2	912.1
1982	787,469	39,480	300.4	835.7	553.8	1,089.5
1983	776,062	39,299	296.9	803.5	591.8	1,017.2

Super – Supervisory Officers: directors, superintendents, etc. appointed under provisions of Sections 250, 251, 252, and 254 of the Education Act [1981 rev].

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

Other – Other Professional Staff: professionals engaged in supplying educational services to schools and students, e.g. speech therapists and counselors. These individuals are often teachers with a specialist qualification.

Consult – Consultants: formally qualified teachers who are engaged in consulting practices with classroom teachers and school principals, e.g. consultants, coordinators, supervisors, and other qualified teachers employed in a similar capacity.

Teachers – educators engaged primarily in classroom instruction.

include this category in our analysis since evidence of Parkinson's Law at this level would suggest that the lines of vertical trust (networks) extend upward through the senior bureau at the provincial level.

We estimate the 'constant slope coefficients and an intercept that varies over individuals' model as described in Judge et al. (1985, pp. 519–521) using the dummy variable approach. That is, we estimate the following equation:

$$Y = \beta_{0i} + \beta_1 \text{ (enrollment)},$$

where the dependent variable is one of our categories of A, each board has a unique intercept term β_{0i}, and the slope term, β_1, is constant across all boards. The results for the Public and the RCSS are reported in table 2.

For the Public system, our behavioral hypothesis is that β_1 is less than

Table 2

Results for pooled data – Public system.

Period of enrollment decline (1975–1983)

Dependent variable	Enrollment coefficient β_1	t-statistics (191 degrees of freedom)	R^2	Enrollment elasticity	D.W.
Administrators	−0.001688	5.35	0.96	−0.59	1.75
Center	−0.000933	3.37	0.86	−0.85	1.62
Teachers	0.031745	29.83	0.99	0.71	1.42
Subgroup	−0.001080	3.98	0.95	−0.44	1.67

Results for pooled data – Roman Catholic separate system.

(a) Period of enrollment decline (1975–1979)

Dependent variable	Enrollment coefficient β_1	t-statistics (79 degrees of freedom)	R^2	Enrollment elasticity	D.W.
Administrators	−0.003414	3.05	0.98	−1.27	2.07
Center	−0.006410	1.90	0.92	−0.97	2.05
Teachers	0.031215	8.48	0.99	0.67	1.80
Subgroup	−0.002970	3.08	0.98	−1.30	2.03

(b) Period of enrollment increase (1980–1983)

Dependent variable	Enrollment coefficient β_1	t-statistics (79 degrees of freedom)	R^2	Enrollment elasticity	D.W.
Administrators	−0.001334	1.72	0.99	0.45	1.93
Center	−0.006120	1.19	0.96	0.90	2.44
Teachers	0.657903	11.31	0.99	1.21	1.81
Subgroup	0.007610	1.22	0.95	0.31	2.22

Definitions:
Administrators – sum of Consult, Super, Other, and Center from table 1.
Subgroup – Administrators minus Other.

zero. The first line of table 2 reports the estimates for all administrators. We find a significant (at the 0.01 level) negative correlation between enrollment and the number of administrators. Line two of the table provides the results for 'teachers at the central office'. Conversations with school board officials confirmed that this particular position has the most scope for discretionary appointments since it has a particularly wide array of possible functions. This explains the relatively high elasticity for the 'center' classification (−0.85 compared with −0.59 for all administrators). The third line of table 2 reports that the number of classroom teachers is positively and significantly (at the 0.01 level) correlated with enrollment. The results in table 2 provide considerable support for the strong version of Parkinson's Law: output declines, line staff (teachers) declines, but the absolute number of administrators increases.

We separate the RCSS data into two periods; when enrollment declines (1975–1979) and when enrollment increases (1980–1983). The results for the period of decline again corroborate the strong version of Parkinson's Law. There is a highly significant (at the 0.01 level) positive correlation between enrollment and line staff (teachers). For the period of enrollment increase the theory is silent. Normally we would expect A to expand as L expands, but if the expansion in A is already in place as a result of a prior decline in L, as in the present case, further increases may not be warranted. The results in table 2 suggest a further expansion in A along with the increase in enrollment during 1980–1983, but the coefficients are not significant at conventional confidence levels.

4. Parkinson's Law in the steel industry

By market share, the U.S. steel industry has probably been in decline since the turn of the century. For the whole period over which we have data (1940–1982) output has in fact risen, but from 1955 to 1982 output has been approximately constant (*Annual Reports*, American Iron and Steel Institute). Employment has shown a marked downward trend: employment of line staff fell from 453,990 in 1940 to 198,477 in 1982 (286,219 in 1981). A significant portion of the decline in employment has been due to a shift in technology away from the open hearth process (97.5 percent of output in 1940, 8.2 percent in 1982) towards the newer basic oxygen process (0 percent as late as 1954, 60.8 percent by 1982) and electric mini-mills (2.5 percent in 1940, 31 percent in 1982). The newer technologies on average require less line staff per unit of output.

Our theoretical framework, used to derive the strong versions of Parkinson's Law, should apply whether the decline in demand for line employees is due to a technological change or a decline in output. In either case, the organization has the same incentive to protect its network capital by promoting line employees to administrative positions. Consequently, we predict an increase in the absolute number of administrators (salaried) when the number of line employees (hourly wage) falls. In the steel industry there is considerable scope for promotion from line to administration. Time-keepers, foremen, safety control officers, and quality control checkers are all administrative positions staffed from line personnel.[9]

In the steel case, the decline in line employment has not been continuous. From 1940 through 1982 there were 16 years in which line employment grew

[9]That promotions are partly based on seniority does not obviate our argument. Unless seniority is defined in extremely fine time units, we would expect that, in large organizations, there would always be several individuals with comparable levels of seniority, in which case there will be scope for discretionary promotion behavior. We wish to express our appreciation to John Erkilla for providing this and much other institutional information on the steel industry.

and 26 years in which it declined. Parkinson's original thesis was expressed in terms of *levels* of A and L. We test for the predicted behavior by seeing if declines in line employment levels are correlated with increases in administrative personnel. We wish, of course, to allow for the effects of technological change on the employment of administrators so we have estimated the following equation (using a Box–Cox transformation) as a test of Parkinson's Law:

$$Admin = \beta_0 + \beta_1\, Output + \beta_2\, Q_{\text{elec}} + \beta_3\, Q_{\text{bop}} + \beta_4 D + \beta_5\, Trend,$$

where

$Admin$ = administrative staff (salaried),
$Output$ = total output of raw steel,
Q_{bop} = output of steel produced by the basic oxygen process,
Q_{elec} = output of steel produced by electric mills,
D = a dummy variable; equals 1 when line employment falls and 0 otherwise,
$Trend$ = a time trend term.

Our prediction is that the coefficient β_4 will be positive since D equals 1 when line employment falls in the current year. Within the period of our data (1940–1982) we estimated the above equation over several different periods and with alternative specifications.[10] Omitting the 1981–1982 recession years had some minor impact, but all other adjustments to the sample period yield essentially the same results. Table 3 presents our major results and some tests of alternative specifications. Additional tests are reported in McKee and Wintrobe (1991).

In eq. (1), table 3, the sign on D (the dummy variable) is positive and significant (at the 0.05 level). This result supports our explanation of Parkinson's Law since D is equal to one when line staff declines. Ceteris paribus, administrative employment increases when line employment declines.

It is interesting to investigate the sign of the relationship between A and Q, i.e. $\partial A/\partial Q$. Most theories would predict this relation to be positive (a larger organization needs a larger component of A due to factor complementarity, for example). Our model suggests that A expands as the organization declines, but makes no prediction about the behavior of A during periods of organizational expansion. It is possible, however, especially for organizations in secular decline, that the expansion in A during periods of decline necessitates a reduction in A during expansions in order to keep A from

[10]Space constraints prevent our reporting all of our results in this paper. Our basic results are robust to changes in functional form, time period, and other specification changes. A fuller account is provided in our working paper [McKee and Wintrobe (1991)]. We report our results for a fairly general non-linear specification: a Box–Cox transformation [Maddala (1977, pp. 314–317)].

Table 3

Steel industry estimations – Box–Cox regressions.

Period: 1940–1982

Dependent variable: *Admin*

Independent variables	Equation (1)	(2)	(3)	(4)
Intercept	118.1	565.62	344.72	116.95
	(6.62)	(6.39)	(6.11)	(4.32)
Output	0.6889	0.5884	0.6658	0.7415
	(12.54)	(8.06)	(11.59)	(10.89)
Q_{elec}	−0.8765	−1.2825	−1.2419	−0.9280
	(5.92)	(5.71)	(6.13)	(5.91)
Q_{bop}	−0.0002	−0.0005	−0.0002	−0.0005
	(0.15)	(0.05)	(0.40)	(0.32)
D	6.5460	n/a	n/a	n/a
	(2.46)			
D (lag 1)	n/a	−5.2030	n/a	n/a
		(0.37)		
D (lag 2)	n/a	n/a	3.3385	n/a
			(0.38)	
Trend	17.907	74.983	50.099	21.02
	(11.71)	(12.79)	(11.27)	(11.06)
ΔQ	n/a	n/a	n/a	−0.0031
				(2.26)
Statistics				
R^2	0.94	0.93	0.91	0.95
$F(5, 36)$	128.77	109.06	86.75	154.27
D.W.	1.41	1.39	1.49	1.26
Box–Cox λ	0.44	0.59	0.55	0.46

Definitions:
Admin – administrative staff positions.
Output – quantity of steel production (000's) tons.
Q_{elec} – production of steel from electrical mills.
Q_{bop} – production of steel from basic oxygen process.
D – dummy = 1 when line staff declines and 0 otherwise.
D (lag 1) – dummy lagged one year.
D (lag 2) – dummy lagged two years.
ΔQ – change in quantity.
Trend – a time trend term.

becoming too large overall. Thus, our model suggests that it is possible (although not necessary) that $\partial A/\partial Q < 0$. Our results are presented in table 3, and demonstrate a positive relation between A and Q for all specifications.

It is also interesting to study the contemporaneous relation between A and the change in output, ΔQ. Eq. (4), table 3, reports the results of our investigation of this relationship for the steel industry. The dummy variable (D) is replaced by the change term (ΔQ). The sign on ΔQ is negative, indicating there is a negative (and significant) relationship between A and ΔQ

over the 40-year period in question. We emphasize that this is not a necessary result of our model, but a theoretical possibility which is consistent with it but not with any other model of administrative growth of which we are aware.

In the next section we explicitly consider the leading alternative explanations of administrative growth, and present some further (and to our minds) even more striking evidence in favor of the simple theory suggested here.

5. Alternative explanations

One alternative explanation for our results is that provided by Parkinson himself. He suggested that the growth of administrative staff was an inexorable process associated with the maturation of an organization. This is simply what we have called L2 above – the second version of Parkinson's Law. Early work by Melman (1951), Bendix (1956), and others provided evidence that A has been increasing over time in the organizations studied. That is, the level of administrative staff will increase over time independently of external forces confronting the organization. The results for the steel industry (table 3) appear to bear this out. The coefficient on the *Trend* term in the equations is positive, as predicted by Parkinson. However, even with this term included, the coefficient on the dummy variable for line staff declines (D) is significant and positive as the strong version (L3) of Parkinson's Law predicts. *In other words, a decline in the fortunes of an organization results in a rise in its administrative staff, and this increase is separate from, and not attributable to, the long-run trend for A to increase over time.*

However, a number of other possible explanations remain for the rise in administration in the steel industry, including increasing technical or structural complexity, formalization, or even the possibility that the product itself is changing over time. For example, it has been alleged that high-cost American steel manufacturers attempt to compete with cheaper imports by packaging chemical engineering services with their steel products. These other factors could produce an increase in A aparts from time trends.

While we do not have data on all these variables, we can offer a test of our explanation against these and other possibilities. The reason is that the implicit contract or trust theory advanced here has a unique implication: it implies that the growth in administrators in a given year depends on the decline in line employment in that year. The other variables mentioned – complexity, formalization, and changes in the nature of the product – are equally consistent with a lagged relationship between changes in A and L.[11]

[11]We should note that the results of the present study cannot always be compared directly with previous results in the organization literature because the measures of A used are not always comparable. The measure of A used here is a comprehensive one which is appropriate to

Indeed, on most theories of decision-making, a lagged relationship would appear to fit these models better than a contemporaneous one.

We have estimated the equations for the steel industry with a one- and a two-year lag applied to the dummy variable for line employment changes [see eqs. (2) and (3) in table 3]. For both lags, the coefficients on *Output*, *Trend*, and technical change remain significant. However, the coefficient on *D* becomes insignificant when *D* is introduced with either lag. Combined with the results in eq. (1), this suggests that *the increase in A and the decline in L are strictly contemporaneous.* We know of no other model of administrative growth which yields this implication.

Turning to schooling, the time series of our data is too short (the period of decline itself is too short) to replicate the identification of trends and the presence or absence of lags in the rise of the administrative staff during the period of line staff decline. On the other hand, the period is sufficiently short that some other possible hypotheses for the rise in administration there can be examined directly. Changes in technology can be ruled out in schooling. However, schooling is also exceptional in that each 'firm' (school) is subject to the behavior of a senior government (States or, in Canada, Provinces). Hannaway (1978) argued that programs initiated by the senior government and carried out by the local school board or district contributed to the observed growth in administration. The hypothesis is worthy of consideration as an alternative explanation for results in table 2.[12]

Public sector schooling in Ontario experienced several organizational changes during the 1960s. However, there were very few changes to the programs that were mandated by the senior government for the period under study. A major school board (district) consolidation took place in 1969 but the structure that emerged at that time has remained essentially intact until the present.[13] It is unlikely that administration growth through the period 1975–1983 could arise from consolidation activity some 6 years earlier.

French 'immersion' programs (where Anglophone students are taught entirely in French) are a comparatively recent addition to the public sector schooling scene in Ontario and reflect the bilingual nature of Canada. Both

test the theory developed here. Other measures used have been less comprehensive. McKinley (1987), for example, excludes administrators at the headquarters level while these should obviously be included in testing the present hypothesis.

[12]The analysis which follows is based on data provided in various publications of the Ministry of Education in Ontario (see references) and in memos we were provided by Ministry officials.

[13]The following data illustrate this point:

	Year			
	1968	1969	1975	1980
RCSS Boards (number)	455	63	60	58
Public Boards (number)	721	127	117	112

the Federal and Provincial governments have provided school boards with additional funding for such programs. It is conceivable that the advent of such progams would necessitate additional administrative personnel. The numbers of such personnel would be a function of the number of schools offering the immersion program. In 1975 the RCSS offered immersion programs in 295 schools and in 1983 the number was 294. The Public system offered immersion programs in 10 schools in 1975 and 13 in 1983. Overall the growth of this program was modest during the period under study so it is very unlikely that the growth in administrative personnel could be due to French immersion programs.

Another possible area of expansion is 'special education' – the term used by the Ontario Ministry to refer to schooling provided to mentally or physically disadvantaged students. However, expansion of such programs would also necessitate some administrative expansion. Enrollment in these programs has remained nearly constant from 1975 through 1983 [see *Education Statistics* (various years)]. With the shift in philosophy that developmentally and physically handicapped children should be educated among their peers, as far as possible, there has been a rise in interest in the design of programs, the provision of counselling, and the availability of consultants to individual teachers for this category of schooling. The personnel supplying these services fall mainly in the 'Other Professional Staff' category presented in table 1. It is interesting that this classification grew most rapidly during the period and that it is the only category that cannot be filled universally from the ranks of teachers. In table 2 we report the results for the 'subgroup' category: 'Administrators' with the 'Other' category netted out. This provides a test of Hannaway's hypothesis. If she is correct, this equation should fit more poorly than the equation including the category of personnel. However, this equation yields almost identical results to the one which includes 'Other' in the dependent variable.[14]

5. Conclusions

C. Northcote Parkinson was the first student of public administration to draw attention to a peculiarity in the behavior of bureaucrats – that their

[14]Given the federal structure of government in Canada it is conceivable that the growth in schooling administration is due to increases in the level of federal funding that is tied to new programs. This is unlikley given the funding arrangements in Canada. Perry (1989) notes, 'Education in Canada,..., is clearly and indisputably a provincial responsibility. There have been efforts over many years to have the federal government intervene more directly, but there is no reason to suppose from past attitudes that it would welcome a change in present arrangements' (p. 449).

numbers expand even when the organization they are administering is declining. In this paper we have developed a simple theoretical rationale for this phenomenon – which we call the 'strong version' of Parkinson's Law. The rationale is a straightforward application of the proposition that implicit contracts, or trust, are a prominent feature of organization life. We have tested the strong version of Parkinson's Law in two very different industries – the public sector school system in Ontario, Canada, and the U.S. steel industry. The tests appear to lend considerable support to Parkinson's striking hypothesis. For the steel industry in particular, for which we have a reasonably long time series, the tests show that not only does the number of administrators increase as direct labor declines, but the expansion in administration and the decline in labor are strictly contemporaneous. We know of no other model of organization which would explain this evidence.

References

Ashenfelter, O.C. and R. Layard, 1986, Handbook of labour economics (North-Holland, Amsterdam).
Bagnoli, M. and M. McKee, 1991, Controlling the game: Political sponsors and bureaus, Journal of Law, Economics and Organizations 7, 229–247.
Becker, G., 1975, Human capital, 2nd edn. (National Bureau of Economic Research, New York).
Bendix, R., 1956, Work and authority in industry (Wiley, New York).
Breton, A. and R. Wintrobe, 1979, Bureaucracy and state intervention: Parkinson's law?, Canadian Journal of Public Administration 2, 208–225.
Cassing, J.H. and A.L. Hillman, 1986, Shifting comparative advantage and senescent industry collapse, American Economic Review 76, 516–523.
Daft, R.L. and R.M. Steers, 1986, Organizations: A micro/macro approach (Scott, Foresman and Company, Glenview, IL).
Freeman, J. and M.T. Hannan, 1975, Growth and decline processes in organizations, American Sociological Review 40, 215–228.
Friedman, M., 1977, Gammon's black holes, Newsweek, 7 Nov.
Hage, J. and M. Aiken, 1969, Routine technology, social structure, and organization goals, Administrative Science Quarterly 16, 366–376.
Hannaway, J., 1978, Administrative stuctures: Why do they grow?, Teachers College Record 80, 413–436.
Judge, G.C., W.E. Griffiths, R.C. Hill, H. Lutkepohl and T.C. Lee, 1985, The theory and practice of econometrics, 2nd edn. (Wiley, New York).
Klein, B. and K. Leffler, 1981, The role of market forces in assuring contractual performance, Journal of Political Economy 89, 615–641.
Maddala, G.S., 1977, Econometrics (McGraw-Hill, New York).
McKee, M., 1989, Political competition and the Roman Catholic schools: Ontario, Canada, Public Choice 56, 57–67.
McKee, M. and R. Wintrobe, 1991, The decline of organizations and the rise of administrators: Parkinson's Law in theory and practice, Department of Economics Working Paper (University of New Mexico).
McKinley, W., 1987, Complexity and administrative intensity: The case of declining organizations, Administrative Science Quarterly 32, 87–105.
Melman, S., 1951, The rise of administrative overhead in the manufacturing industries of the United States, 1889–1947, Oxford Economic Papers 3 (ns), 62–97.
Milgrom, P., 1988, Employment contracts, influence activities, and efficient organization design, Journal of Political Economy 96, 42–60.
Milgrom, P. and J. Roberts, 1988, An economic approach to influence activities in organizations, American Journal of Sociology 94, S154–S179.

Niskanen, W., 1968, The peculiar economies of bureaucracy, American Economic Review, Papers and Proceedings 58, 293–305.
Niskanen, W., 1971, Bureaucracy and representative government (Aldine, Chicago, IL).
Parkinson, C.N., 1957, Parkinson's law and other studies in administration (Ballantine, New York).
Parkinson, C.N., 1970, The essential Parkinson (Federation House, New Delhi).
Parsons, D.O., 1972, Specific human capital: An application to quit rates and layoff rates, Journal of Political Economy 80, 1120–1143.
Pencavel, J.H., 1972, Wages, specific training, and labor turnover in U.S. manufacturing industries, International Economic Review 13, 53–64.
Perry, J.H., 1989, A fiscal history of Canada – the postwar years (Canadian Tax Foundation, Toronto).
Reimann, B., 1973, On the dimensions of bureaucratic structure: An empirical reappraisal, Administrative Science Quarterly 18, 462–476.
Shapiro, C., 1983, Premiums for high quality products as returns to reputations, Quarterly Journal of Economics 98, 650–679.
Telser, L., 1980, A theory of self-enforcing agreements, Journal of Business 53, 27–40.
Topel, R., 1991, Specific capital, mobility and wages: Wages rise with job seniority, Journal of Political Economy 99, 145–176.
Weingast, B. and W. Marshall, 1988, The industrial organization of congress; or, why legislatures, like firms, are not organized as markets, Journal of Political Economy 96, 132–163.
Williamson, O., 1975, Markets and hierarchies (Free Press, Glencoe, IL).
Wintrobe, R., 1982, The optimal level of bureaucratization within a firm, Canadian Journal of Economics 15, 649–668.
Wintrobe, R. and A. Breton, 1986, Organizational structure and productivity, American Economic Review 76, 530–537.
Wittman, D., 1990, Why government bureaucracies are efficient and not too large: The endogeneity of institutional design, in: Papers in Political Economy 8 (University of Western Ontario, London, Canada).
Woodward, J., 1965, Industrial organization: Theory and practice (Oxford University Press, London).

Data sources

Annual Report of the American Iron and Steel Institute, Washington, D.C. (various years)
Ministry of Education, Province of Ontario, Education Statistics (various years)