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1982-92**

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January 1995

UNE Working Papers in Economics No. 19

Editor John Pullen

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ISSN 1321-9081

ISBN 1 86389 240 0

The Dunleavy and Niskanen Models of Bureaucracy: The Case of the Australian Federal Budget Sector 1982-92

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Abstract: A substantial literature exists on the economic analysis of bureaucracy, which includes both the Niskanen (1971) and Dunleavy (1991) theories of bureaucratic behaviour. However, comparatively little effort has been expended on assessing the empirical validity of this theoretical literature. Economic models of bureaucracy yield testable predictions in terms of either allocative or productive efficiency. Direct tests of allocative efficiency using aggregate data have thus far failed to produce conclusive results. Best testing for allocative inefficiencies by examining the growth patterns of bureaus has the advantage of at least making it possible to exclude models which predict growth patterns that are not consistent with observed real-world outcomes. This is the approach adopted in the present paper which employs data drawn from the Australian federal budget sector for the period 1982 to 1992 to evaluate the Niskanen (1971) and Dunleavy (1991) theories of bureaucracy.

Social scientists have long been fascinated by the operation of public bureaucracies, and a vast research effort has been invested in an attempt to understand these complex organisations. Economists, who have only recently joined their colleagues from political science, public administration, social psychology and sociology in this exercise, have developed at least three interconnected approaches to the problem. Firstly, public choice theory represents a comprehensive attempt at explaining all collective or government behaviour by extending the methodology of *homo economicus* to the formulation and application of public policy (Mueller, 1990). Secondly, a derivative literature exists on the economic analysis of bureaucracy and the phenomenon of bureaucratic failure, which includes both Niskanen (1971) and Dunleavy (1991). And finally, explicit theories of government failure have been constructed by Wolf (1989), Le Grand (1991) and Vining and Weimer (1991). The present paper focuses on the second of these three economic approaches to public organisations, and more specifically, on the empirical validity of the Niskanen (1971) and Dunleavy (1991) theories of bureaucracy.

The paper itself is divided into five main areas. Section 1 briefly reviews the Niskanen and Dunleavy models of public bureaucracies, and seeks to identify empirically testable hypotheses. Section 2 examines previous attempts the empirical evaluation of economic theories of bureaucracy, and the nature of the difficulties experienced, and suggests an alternative approach. Cross-sectional data drawn from the explanatory notes to Appropriation

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Bills and the annual reports of bureaus in the Australian federal budget sector for the financial years 1982-83 and 1991-92 are scrutinised in section 3, whereas the empirical analysis of the Niskanen and Dunleavy models is undertaken in section 4. The paper ends with some brief concluding comments in section 5.

1. Economic Models of Bureaucracy

Attempts by economists to model the behaviour of public bureaucracies date back at least as far as Von Mises (1945), and include notable efforts by Borcharding (1977), Breton and Wintrobe (1982), Downs (1967), Dunleavy (1991), Migue' and Belanger (1974), Niskanen (1971) and Tullock (1974). But perhaps the first rigorous economic model of bureaucracy was developed by Niskanen (1968; 1971; 1975). Niskanen's work provoked much subsequent modelling activity (surveyed by Bendor [1990]) but the basic Niskanen model is probably still the mainstream position of American public choice theorists (Mueller 1990, pp. 250-258; Buchanan 1983, pp.20-21). Its institutional assumptions are primarily those of the US political system (possibly in important regards those of a former US system [Goodin 1982, p. 38]), leading at least one prominent European public choice theorist to bemoan the continued absence of convincing economic theory of bureaucracy outside the North American institutional framework (Schneider 1991, p.199). Dunleavy's (1985; 1989; 1991; 1992) work represents both a logical extension of the basic Niskanen model by weakening its heavy emphasis on budget maximisation, and simultaneously creates a theoretical framework more suitable for the analysis of Westminster-style bureaucracies, like those of Australia and the United Kingdom.

The Niskanen Model

In essence, Niskanen presents the relationship between a bureau and its sponsor (a government, government review group, or some other representative, collective body) as a bilateral monopoly. The bureau sells services only to the sponsor and the sponsor buys those services only from the bureau. Output is exchanged for a budget and not at a per unit price (Niskanen 1975, p.16). For the purpose of the model, there is one bureaucratic decision maker, the senior official in each bureau which has a separate, identifiable budget (Niskanen 1971, p.22). The bureau is funded by a single government review body which, in turn, is funded from taxes.

Demand for the bureau's output is first determined exogenously but at any level of demand bureaus will over-supply because the bureaucrats will seek to maximise the budget of their bureau. The total budget of the bureau is a logical maximand because budget size will be a positive monotonic function of what Niskanen assumed would be significant variables in the bureaucrat's utility function: salary, perquisites of the office, public reputation, power and

patronage. Other likely significant arguments in the bureaucrat's utility function, such as ease of managing the bureau and ease of making changes, while not positively correlated with total size of the budget, would be affected positively by increases in the budget (Niskanen 1968, p. 350; 1971, p. 38). Niskanen argued that it is not necessary for the bureaucrat's utility to depend strongly on each on these variables, merely that it be positively and continuously associated with the level of the budget (Niskanen 1971, p. 38).

Budget maximisation itself will be subject to the constraint of the level of output expected by the government when it set the bureau's budget. The full statement of the motivational assumption of Niskanen's theory then becomes:

"Bureaucrats maximise the total budget of their bureau during their tenure, subject to the constraint that the budget must be equal to or greater than the minimum total costs of supplying the output expected by the bureau's sponsor" (Niskanen 1971, p.42).

In a nutshell, the Niskanen model predicts that in representative democracies public bureaucracies will not only generate allocative inefficiency (by oversupplying public goods) but also x-inefficiency (by producing public goods inefficiently).

The Dunleavy Model

It is evident that the Niskanen model is heavily reliant on an American institutional milieu. Peacock (1987, p.237) has made this observation in a British constitutional context:

"...[I]n the UK it would be entirely misleading to identify Niskanen's 'bureaucrat' with senior civil servants. The appropriate person is the Ministerial head of a Department of State who presents his annual estimates in the first and crucial instance to the Chancellor of the Exchequer for approval but with right of appeal to the Cabinet, a body of which he is normally a member".

Peacock (1987) notes further that it cannot be assumed that a minister will behave in the way expected of Niskanen's bureaucrat.

Patrick Dunleavy, a British political scientist who set out to demolish the public choice arguments on bureaucracy, came instead in the end to develop a public choice model of bureaucratic behaviour which combines elements of Peacock's insight with the original American model. The Dunleavy (1985, p.300) model of public bureaucracy is built on six basic assumptions. The first four are consistent with Niskanen's model: bureau policies are set by bureaucrats interacting with the government; governments largely depend on information from bureaus about the costs and value of producing within given ranges of output; and bureaucrats maximise their personal utilities (by satisfying "self-regarding, relatively hard-edged preferences") when making official decisions. Added to these are two

assumptions which greatly weaken the budget-maximising conclusion. These are that a bureau's aggregate policy behaviour is set by some combination of individual decisions made by its officials, although the actual combination that results may be an outcome desired by no bureau member; and that, within broad limits, officials' influence on bureau policy is always correlated with rank and those nearest the top of bureaus are the most influential.

Dunleavy therefore discards Niskanen's assumption that a bureau's behaviour will be wholly in line with the preferences of a single senior bureaucrat. In a bureau where no individual has complete hegemony, budget maximisation is a collective, not an individual good. Rational utility maximising individuals will thus tend to favour strategies that directly advance their personal interests ahead of strategies that advance the collective good. The interaction of the maximising activities of individuals within a bureau will not necessarily lead to budget maximising.

The conclusion gains force from the three institutional factors which will often make budget maximising a relatively low priority for individual bureaucrats. Firstly, the benefits of budget increases will flow disproportionately to the lower ranking bureaucrats while the costs of securing the increases will fall disproportionately on their seniors. Secondly, the senior bureaucrats, who have the greater prospect for influencing budget decisions, have attractive opportunities for pursuing their individual interests other than by budget maximising. Thirdly, some types of budgets will offer lower net benefits from maximising behaviour by individuals within bureaus than will others (Dunleavy 1991, pp. 191-199).

This necessarily implies that budget-maximising behaviour by bureaus will be less common than Niskanen's model predicts. Bureaus will instead display a range of patterns of budgetary behaviour, depending on the function of the bureau and the structure of its budget. Behaviour of a type Dunleavy calls "bureau-shaping" will be more significant than budget maximising in the bureaucracy as a whole.

Niskanen distinguished between total and discretionary budget in sophisticated versions of his model. In contrast, Dunleavy disaggregates the total budget further into three main categories. The *program budget* is all expenditure over which a bureau exercises control or supervision, including monies passed on to other bureaus for final disposal. The *bureau budget* is a subset of this, being those parts of the program budget for which the bureau is directly responsible. The *core budget* is a further level down and comprises those parts of the bureau budget which are spent on maintaining the bureau's own operations (Dunleavy 1985, pp. 306-7).

The core budget includes Niskanen's discretionary budget and Dunleavy notes that many of the reasons given in the public choice literature for a bureaucrat to favour budget

maximisation are associated with this element of budgets. But, for many bureaus, the core budget will only be a small part of the program budget. This introduces a further asymmetry between the costs of advocating higher budgets and the utility gains from budgetary expansion. The gains are mostly associated with the core or the bureau budget; the budgetary components which fund the salary and perquisites of bureaucrats. However, the costs of advocacy are largely connected with the program budget; the element most subject to public and government scrutiny and which, if increased, will impose additional effort on bureaucrats without necessarily providing much increase in salary or perquisites (Dunleavy 1991, pp. 192-193). It would be expected therefore that budget maximising behaviour would be more apparent in bureaus with a high ratio of core to program budget since these are the bureaus where an increase in budget could be expected to offer the greatest net benefit to the bureaucrats with most influence on the relevant decisions.

Dunleavy's model predicts that there will be differences between the behaviour of bureaus of different types according to a typology of bureaus established in terms of their budget structure. He identifies eight types of agency in this way. Delivery agencies are classic line bureaucracies, delivering services that they produce, with large core budgets which are large in relation to program budgets. Regulatory agencies limit or control the behaviour of individuals, firms, or bureaus, and often externalise many of the costs of the activities they regulate. Their core budgets represent most of their program budgets but can be relatively small because of the capacity to externalise costs. Taxing agencies resemble regulatory agencies in this classification. Transfer agencies administer payments to individuals or firms and their core budgets that are typically very small in comparison to their program budgets. Contracts agencies develop and administer contracts to be let to private sector firms with core budgets that are typically small in relation to program budgets. Control agencies channel funding to other bureaus, and hence have core budgets that are small in relation to program budgets. Trading agencies operate directly in markets in a fully or quasi-commercial mode. Their core budgets tend to comprise a large part of their program budgets but this can vary according to the levels of material or equipment costs. Servicing agencies provide facilities or services to other government bodies on a basis that does not involve re-charging. They otherwise resemble trading agencies.

Two main propositions emerge from the Dunleavy model. Firstly, budget maximising will be more likely in bureaus where the core budget makes up most or all of the program budget, i.e. in delivery, regulatory, taxing, trading and servicing bureaus. And secondly, other types of self-interested behaviour by senior bureaucrats will influence the activities of bureaus. The objects of self interest suggested by Dunleavy (1991, p.202) mostly concern proximity to policy and power, absence of routine management responsibilities, high levels of discretion and restricted hierarchy. Senior bureaucrats with these objects will seek to shape their

bureaus into small policy units by hiving off managerial or service delivery functions. For this reason, Dunleavy calls his model one of bureau shaping.

2. Previous Approaches to Empirical Testing

Economic models of bureaucracy have proliferated since Niskanen's (1971) first attempt but there has been relatively little empirical testing of the outcomes they anticipate (Rowley and Elgin 1985, p.49). The models predict various effects on allocative efficiency and x-efficiency, and such empirical work as has been undertaken has generally focussed on one or the other of these effects, and has followed two broad approaches. Attempts to test the overspending-allocative inefficiency hypothesis have relied on highly aggregated data about whole bureaucratic systems, while testing for x-efficiency effects has compared the productive efficiency of particular publicly and privately owned organisations.

The productive inefficiency hypothesis has been the more widely tested, and there is now a substantial body of comparative analysis of the efficiency of public and private service provision in particular industries and by specific organisations. A survey of this work by Spann (1977) found that, for the majority of activities surveyed, public producers were less efficient than private producers (Spann 1977, p.88). Although this study is widely cited in the literature on bureaucracy, many of the public organisations on which it reports were not bureaus, being funded by sale of products at a per-unit price rather than by grant or appropriation. In any case, a further review of the same studies by Millward (1982) found that the significant factor in explaining the observed efficiency differences was the presence of absence of competition rather than the type of ownership¹.

Domberger (1993), reporting on studies of pre-and post-privatisation performance of organisations in Britain and Australia, similarly argued that the two crucial factors affecting performance were the level of competition and the extent to which there existed a commercial managerial culture in the organisation. The latter factor appeared to have been influenced by the credibility of any threat of competition; that is, by the extent of contestability (Domberger 1993, p.67). The greater importance of competition relative to ownership has also been highlighted in recent surveys of the relevant literature (EPAC 1987, p.18; Hartley *et al.* 1991). The results of tests of the productive efficiency hypothesis thus have not unequivocally supported the predictions of any of the economic models of bureaucracy.

¹ Forsyth and Hocking (1980) revisited one of the better-known cases in the Spann survey, that of the two Australian airlines, and found that the significance of the results of the earlier survey disappeared when more extensive data sets were used. Differences in public and private sector accounting standards similarly can reverse the findings of such comparisons (Walker 1992-93).

Tests of the allocative efficiency hypotheses by analysing aggregate data for a whole system have yet to produce conclusive results. Use of aggregate data fails to take account of differences between types of bureaus, analogous to inter-industry differences in the economics of the firm. It also requires a high level of econometric ingenuity to estimate demand functions for government services. Niskanen (1975, pp. 630-635), who has adopted this approach himself, surveys the early literature in the area and finds it suggestive, but not conclusive evidence that conditions which increase the monopoly power of governments and bureaus lead to an increase in government expenditure (p. 635). It is by no means obvious that this correlation, if it exists, necessarily implies over-production.

The difficulty of testing directly for allocative efficiency effects is obvious. However, the public choice models of bureaucracy provide scope for indirect testing. As well as their predictions on various types of efficiency effect, the models postulate particular growth patterns as typical of bureaucracies. Niskanen's model predicts steady growth of each bureau. Dunleavy's model predicts a tendency for line or service delivery functions to be separated from policy development, and hence a proliferation of small policy-advising bureaus in each bureaucracy. The dynamic patterns predicted by both models are linked to the static predictions on allocative and productive efficiency, but can be observed separately from the static efficiency effects.

This allows for an indirect test of the models. Efficiency effects are the crucial postulated outcomes but growth patterns may be more easily observed and, since they are integral to the postulated efficiency effects, permit at least a partial judgement on the validity of the models' predictions on efficiency. If bureaus do grow generally in the way predicted by either Niskanen or Dunleavy, then the model which has best predicted the pattern of growth might also have useful things to say about efficiency. However, if the observed growth patterns of bureaus do not follow the path predicted by a model, then that model's predictions on efficiency may not be more valid than its predictions on growth because of the close causal link between the postulated outcomes.

Testing for growth rather than for efficiency offers particular promise in the case of allocative efficiency. X-efficiency can be tested by bench-marking current bureau performance against past standards in the same bureau, against performance standards in other organisations, or against verifiable data on inputs and outputs. But a convincing direct test for allocative inefficiency requires a method for revealing demand. This is extremely difficult to do in the absence of per-unit prices for output². Testing for allocative inefficiency indirectly by examining the growth patterns of bureaus has the advantage of at least making it possible to

² Survey-based techniques to assess willingness to pay and hedonic pricing are used in benefit-cost analysis to deal with this problem but the survey techniques suffer from the free-rider problem and various types of biases while hedonic prices cannot be estimated for many public goods (Johansson (1987).

exclude models which predict growth patterns that are not consistent with empirically-established reality. This is the approach adopted in the present paper which employs data taken from the Australian federal budget sector.

3. Data Considerations

Bureaus at the Australian federal level are those organisations wholly or largely funded by appropriation from the budget. For more than a decade the budget papers and annual reports of these bodies have provided detailed information on the staff levels and input costs of all such bureaus. The budget sector is the bureaucracy proper at the federal level in Australia. Other extensive government activities are conducted by organisations which raise most or all of their revenue by sale of goods or services, but these are not standard public bureaus as defined in the economic literature on bureaucracy.

The main documentary sources on the budget sector are the explanatory notes to the Appropriation Bills and the annual reports of bureaus. The explanatory notes were retitled program performance statements in 1991. These documents provide information on budgets, staff numbers, functions and activities of every budget-sector bureau. The budgetary data are also summarised in the papers associated with the Treasurer's annual budget speech, often called the budget papers.

Statistical information on which the present study is based involved a review of the full sets of explanatory notes and annual reports for the 1982-83 and 1991-92 financial years, supplemented by the budget papers for the two years. These were the first and the tenth full budget years of the Hawke-Keating Labor governments. Data were collected from the documents on the core budget and program element, the capital expenditure, the revenue and the staff numbers of every bureau in the budget sector (other than statutory marketing authorities) in the two financial years under review. The core budget for this purpose was defined as the own-purpose expenditure on salaries and administration by the bureau. The program element was defined as monies, other than capital expenditure, transferred by the bureau to other organisations or to individuals. In a few cases where the purpose of a bureau was to undertake capital investment for other areas of government, its capital expenditure was classified as program element. In all other cases, the expenditure classified as capital expenditure in the explanatory notes was so classified in this study.

The explanatory notes provide annual average staffing figures for all but a few bureaus. These were the average for the year of the bureau's staff levels at the end of each month. In a few cases where the average staffing figure was not provided, the staff levels reported in

annual reports as at the end of the preceding year and the end of the year under review were averaged.

In a limited number of cases, core budget expenditure data were estimated where the explanatory notes had aggregated the data in respect of more than one bureau. This approach was taken where the bureau existed in both years, but separate budget data was only provided for 1991-92. Estimation was necessary in such cases because the budget documentation for 1982-83 occasionally adopted different aggregation rules to those followed in the 1991-92 documents. Where estimation of this data was essential, it was done by extracting those data which were separately reported, and allocating the remainder in proportion to staff numbers. This approach was necessary in only seven cases, and involved mostly salary and related expenditure.

Bureaus were defined as bodies with separate identity wholly or largely funded through the federal budget. All ministerial portfolios comprise more than one bureau and, in many cases, several bureaus draw their administrative support from a common source, or answer to government through a common line of authority. Because both Niskanen and Dunleavy postulate bureaucrats with independent power, the characteristics used to judge whether a body should be classed as a separate bureau were separate enabling legislation, a separate line in Appropriation Bill No. 1, a separate program or sub-program number in the explanatory notes, a title including one of the markers of independence in Australian public sector usage ("department", "service", "bureau", or "office"), and direct access by the head of the bureau to the relevant minister. Bodies meeting most or all of these criteria were classified as bureaus.

The bureaus identified in this way and the data collected in relation to them are set out in Appendix I. This appendix also classifies bureaus according to Dunleavy's typology of budget structure and according to functional type³.

The list of bureaus in Appendix I differs significantly from the list used by Dunleavy *et al* (1992) in a previous Australian Study. That list splits organisations that are administered as single bureaus, omits many separate bureaus because they fall outside Dunleavy's definition of "central government", and includes some bodies which clearly are not bureaus (the blood transfusion programs, for example). The present study pays more regard to formal organisational boundaries in its definition of bureaus. It therefore classifies as "mixed" several bodies which Dunleavy was able to fit more neatly into his taxonomy by treating their components as separate bureaus. Even with these differences, however, Dunleavy's

³ There is scope for argument as to whether a few small agencies should be included or excluded from the study. The question of classification of budget-sector bodies is the subject of some controversy (SSCFPA 1993). However, the staff and budget levels of the bodies in question in this case represent a very small proportion of the total data and are unlikely to affect the results of the study.

taxonomy proved very robust and the classification of bureau type in Appendix I closely matches that of Dunleavy *et al* (1922) in cases where the same bureau appears in both lists.

Statutory marketing authorities were excluded from the study. A changing population of twelve of these existed throughout the period under review. Some were funded by legislatively imposed levies on the industries they serve, and hence were bureaus. Others funded their activities from part of the proceeds of the sale of products acquired by legislative compulsion. These do not meet the strict definition of a bureau. Although established under legislation and exercising what amounts to a power of taxation, the statutory marketing authorities are largely governed by the industries in which they operate and their relationship to the state differs from that of other bureaus. It was decided that this difference might introduce distortions and that inclusion of these authorities in the study would offer no compensating advantage. However, at an aggregate level, it appears that trends in the statutory marketing authority sector matched those in the budget sector during the period covered by the study.

The data show considerable change in the Australian federal budget sector over the period from 1982-83 to 1991-92. Three broad areas of change stand out. Firstly, the 1982-83 data shown the winding down of some bureaus associated with policies favoured by the government which had held office from 1975 to 1982 and the establishment of others in areas of interest to the new Labor government. The Independent Airfares Committee and the Advisory Council for Intergovernmental Relations, for example, ceased to exist while the Resource Assessment Commission and the Economic Planning and Advisory Council were established. Secondly, the effects of large machinery of government changes in 1987 show in the merger of 27 departments of state into 18. Thirdly, a trend towards commercialisation and corporatisation is apparent in the structure of the budget sector overall. Several service-providing bureaus were transformed into trading bureaus, while some functions, notably those carried out by the Department of Defence Support and the Department of Aviation, were removed from the budget sector altogether.

Overall, the study identified 142 bureaus in 1982-83 and 163 in 1991-92 while there was relatively little change in the overall number of organisations, there was considerable churning within the total. These changes occurred within aggregate levels of staffing and core budget which barely changed over the ten-year period.

The published data on Australian Government bureaus are in reasonably consistent format for the fiscal years 1982-83 to 1991-92. However, two major factors have to be taken into account in comparing the budgetary data. The first, of course, is inflation. The 1982-83 data presented in Appendix I and used in the analysis have been converted to 1991-92 dollars by use of the implicit price deflator for non-farm product. The second and less tractable problem

of comparison results from the increased use of internal pricing within the bureaucracy over the ten-year period. Some important administrative services, notably accommodation, workers' compensation insurance, and the provision of many types of stores and supplies and legal advice were supplied free to bureaus by specialised central agencies in 1982-83. By 1991-92, these services were either being supplied on a priced basis by successor organisations to the former service bureaus or, in some cases, were being purchased on the open market by the bureaus which required them. Telecommunications costs were charged to the accounts of particular bureaus in a confusing and inconsistent way in 1982-83; the largest user in any multi-bureau workplace met the full telecommunications cost for that workplace. By 1991-92, each bureau was meeting its own telephone costs. A component of the remuneration of some bureaucrats began to be paid in the form of fringe benefits during the period, creating a liability of fringe benefits tax on the part of bureaus which was, in effect, a discount to the whole-of-government salary cost.

As a result of these changes, the appropriations to individual bureaus for their core budgets were increased and those other program element of the budgets of central service bureaus were reduced. By the end of the period the service bureaus were largely funded by prices that they charged for goods supplied to other bureaus. Because of the inconsistent approach to internal pricing that existed in 1982-83, the pattern of changes in core budget appropriations over the ten-year period is also inconsistent. Some bureaus, for example, received increases in appropriations to cover internal prices they had not previously been required to meet. Others continued to pay for services for which they had previously been charged, or even experienced reductions in charges for services like telecommunications where they had been meeting the costs of other bureaus. Detailed input data for 1991-92 has not been published and it is impossible to standardise the core budget data for the two years under review for this factor. The effect of changes in internal pricing across the whole bureaucracy is a change from appropriation to pricing of the order of 20 per cent of the core budget. This is sufficiently large to affect comparisons of core budget data⁴.

4. Empirical Results

The data on changes in the budget and staffing levels of bureaus over a ten-year span should permit comparison of the two models. If all or most bureaus are larger, or at least not smaller, at the end of the period than they were at the beginning, Niskanen's model would have

⁴ Demography, technology and economic growth are other factors which could be expected to influence changes in the size and structure of the state bureaucracy over a ten-year period. No attempt was made in this study to control for these factors. Comparison of trends in the state bureaucracy with those in employment in large private sector organisations, with various possible proxies for technological change, or with indicators of economic growth or change in the size and composition of the work-force might be a useful extension of the project. It became apparent, however, that trends relevant to the predictions of the Niskanen and Dunleavy models were clear without these complex adjustments to the data.

significant support. However, if Dunleavy is right, this pattern should only apply to delivery, taxing and regulatory bureaus, together with a few contract and transfer bureaus. According to Dunleavy, that pattern might not even apply to these types of bureau. The main prediction of the Dunleavy model is that the whole bureaucracy will comprise a more complex, decentralised network at the end of the period than at the beginning (Dunleavy 1989, p. 252). This will have resulted from the creation of additional small staff agencies without delivery responsibilities, and the contracting out or delegation to specialised bodies of line functions, sometimes by means of commercialisation, corporatisation and privatisation.

The data available on bureau budgets are not strictly comparable over time for the reasons outlined earlier. These changes in budgetary and accounting practices over the period could be expected to inflate the 1991-92 core budget figures relative to those of 1982-83. The data in Appendix I include 92 bureaus for which core budgets were available for both years. The average core budget per employee in these bureaus increased from about \$48,000 to about \$60,000 in constant dollars over the period (see Appendix I). However, increased revenue collected by trading bureaus which sell mostly to other bureaus, together with fringe benefits tax receipts from budget sector bureaus, averaged about \$12,000 per employee. It thus appears that there was little real change in core budget per employee across the bureaucracy, although almost every bureau showed a substantial increase in the dollar value of its core budget. There was, however, some variation in the extents to which the core budget/per employee increased in particular bureaus.

This is to be expected because of the types of accounting inconsistencies described in section 3. It is also possible that some of the variation reflects differential improvements in efficiency or changes in the labour-capital ratio across the range of bureaus. However, regression analysis of the core budget per employee at the end of the period against core budget per employee at the beginning shows a reasonable correlation between core budget and staff level ($r^2 = .47$; $p = .99$). Since staff levels were reported in a comparable way for the two years under review, and since they are correlated with core budgets, these statistics can be used as an indicator of change in bureau size. This especially the case in relation to Dunleavy's model, which is built on bureau size and function rather than budget. However, these figures are also compatible with Niskanen's model because many of the uses to which bureaucrats could be expected to put the "discretionary budget" that they are expected to maximise should be related to staff numbers. The first round of analysis therefore took staff numbers as an indicator of size and a proxy for discretionary budget.

Bureaus and Staff numbers

The most striking feature of the data on bureaus was the extent of the change over the ten-year span. Of the 163 bureaus which existed at the end of the period, only 96 (58%) had existed at the beginning. Many of these had undergone some structural or functional change.

Forty-six bureaus had ceased to exist while 67 had been created. Table 1 shows the changes in numbers of bureau by type, and Table 2 shows the changes in staff numbers by bureau type.

Of the 67 bureaus created in the period, only 15 fall clearly into the pattern of separate staff or delivery bureaus shaped from previously integrated bodies. Another 17 were formed out of 10 existing bureaus in the process of commercialisation of internal government service provision. Twenty-three of the new bureaus were established to carry out wholly or largely new functions, and 12 were associated with rearrangements of functions between bureaus not involving any systematic separation between staff and line functions.

Table 1. Changes in numbers of bureaus by type

Type of Bureau	1982-83	1991-92
Contract/Control	13	13
Delivery	72	70
Regulatory/Tax	15	27
Service/Trading	28	37
Transfer	8	6
Mixed	6	10
Total	142	163

While structural change of this order might appear to be in the line with Dunleavy's central prediction, the pattern of change in terms of bureau type was not. Only a relatively small part of the change involved the re-shaping of bureaus into small staff or policy-making units. Overall the budget sector began the period as a complex network of bureaus of differing sizes and types. It was not notably more complex at the end of the period, and there had been relatively little separation of previously co-located policy and administration functions. There was no increase in the number of contract or control bodies and little change in the number of delivery bureaus, although these are the areas in which Dunleavy predicts greatest change. The largest increases in fact occurred in the number and cost of regulatory and taxing bureaus, and the size but not the number of transfer bureaus.

Table 2. Changes in staffing of bureaus by type

Type of Bureau	1982-83	1991-92
Contract/Control	3,751	2,084
Delivery	162,154	130,282
Regulatory/Tax	16,755	25,456
Service/Trading	31,946	15,505
Transfer	22,874	27,389
Mixed	10,638	29,314
Total	248,138	230,030

There is support, however, for one prediction of Dunleavy's model: that commercialisation or corporatisation of bureaus might not be effectively resisted by the bureaucracy. One of the most striking features other data on size of bureaus is the effect which the commercialising or corporatising of service delivery had on the overall size of the bureaucracy during the period. Two large bureaus within the budget sector were wholly replaced by three smaller off-budget corporations which collectively employed 10,000 fewer people - a 43 per cent reduction in staff size. Ten bureaus providing internal services to government, mostly on a non-charge basis, were replaced by 17 commercialised trading bureaus, still within the budget sector but employing 39,000 fewer people - a reduction of 27 per cent in staffing. These reductions, together with cutbacks in the defence bureaus, accounted for most of the reductions in bureaus size which appear in the data.

The pattern of staff reductions also supports Niskanen in one important way. Their scale leaves little doubt that there was both over-provision and productive inefficiency in the parts of the bureaucracy supplying internal services at the beginning of the period. Both these forms of inefficiency appear to have been reduced by the introduction of market or market simulating disciplines. But the consequent staff reductions were almost entirely offset by increases in the size of other bureaus. Most notably, employment in taxing, regulatory, and transfer agencies grew by 13,000 or 33 per cent. Overall employment in the budget sector changed from 248,138 to 230,030 but 13,415 of the difference is accounted for by continuing employment in the three off-budget corporations which replaced bureaus in civil aviation and defence supply.

Dunleavy's modification of the budget-maximising hypothesis holds that budget-maximising will occur, if at all, in bureaus where the ratio of core budget to program budget is high. These are the bureaus in which the largest proportion of the budget is potentially available for appropriation by bureaucrats. An argument with opposite implications for policy, and not apparently considered by Dunleavy, is that appropriation of part of the bureau's budget for the benefit of bureaucrats might be easier where the core budget is small relative to the total

budget. this might be the case because increments to the core budget would be less noticeable in such bureaus. Dunleavy's hypothesis and the alternative both imply a correlation between the ratios of core to program budget and changes in size of bureaus over time. The sign of the correlation coefficient would be expected to be positive if Dunleavy's hypothesis is supported and negative if the alternative has support. In fact, regression of the log of the core budget program budget ratio against the log of the change in staff numbers of bureaus shows no correlation, both on the full sample and on a sample which excludes the data at both extremes. There is thus no support for a relationship between types of bureau defined as Dunleavy proposes and changes in bureau size over time.

Evidence exists for a tendency towards growth in size of those bureaus which remained in existence for the whole period. The average staff level of the 92 continuing bureaus for which staff figures were available increased from 1955 to 1964, but these averages are affected by great disparities in bureau size and, in particular, are dominated by changes in the defence area. When the largest and smallest ten bureaus are excluded, the average staffing levels in the middle 72 agencies show an increase from 317 to 371 or 17 per cent. Paired *t* tests indicate that the difference between these means is statistically significant at the 95 per cent confidence level. There is, however, no significant difference between the average change in size of the delivery and non-delivery bureaus, defined in Dunleavy's terms.

This might be consistent with the Niskanen hypothesis of a tendency towards growth in discretionary budgets over time but it has occurred within an overall environment of no growth in such budgets. At best it could be argued that the budgets of bureaus which are not subject to exogenous shocks will tend to grow. This is a potentially useful conclusion for policy but, if set alongside the fact that the Australian federal bureaucracy has been subject to such shocks, it no longer supports the small-government arguments that Niskanen set out to make.

Perhaps the most important point of agreement between Niskanen and Dunleavy is the assumption that bureaucrats have the power to secure increases in the budget of their bureau or changes in the structure of the bureaucracy. But the data suggest that both models overstate the extent of that power. If bureaucrats all have the same power, as Niskanen argues, there is no explanation for the failure of some bureaucrats to exercise it which is evident in these data. Dunleavy's model does accommodate differentials in power and could explain the observed pattern but only if the objectives of the postulated bureau shapers are varied from those first proposed. Dunleavy, in effect, proposes a special type of movement of resources from lower-status to higher-status functions, as perceived by bureaucrats. He assumes further that service delivery and transfer activities will be the lowest status functions and that provision of policy advice direct to government the highest. There is no support in the data for Dunleavy's hypothesised low status activities. The data could be consistent with

an alternative low status group: the internal service providers. If that were the case, the internal supply of services could be the area from which resources first flow when an overall limit is applied to public sector growth. But the flow of resources in this case has not been to small policy units as predicted by the model. It has been predominantly to regulatory, taxation and transfer bureaus. Little is left of the Dunleavy model if both the source and direction of its predicted flows have to be varied.

The patterns of change better fit the possibility that the government may have had more influence over bureaucratic structures and budgets than is allowed for by either Niskanen or Dunleavy. Labor governments held power at the federal level in Australia for the whole of the ten years under review. A shift in resources towards regulation, taxing and transfers over a decade of centre-left government should not be surprising. Given that the shift was made during a decade of overall fiscal restraint, some other part of the bureaucracy had to lose resources, and internal service provision might to be expected to have a relatively low priority for an interventionist government.

The impression that government preferences influenced changes in the size and structure of the bureaucracy is strengthened by the pattern of shifts in resources between functional as opposed to structural areas. These changes are shown in Tables 3 and 4. Employment associated with social infrastructure increased from about 43,000 to about 58,000 or 35 per cent, although these services were delivered through two fewer bureaus. The number of bureaus concerned with culture, recreation and the environment increased from 18 to 22, and employment in them from 8,700 to 9,600 or around 10 per cent. Employment in bureaus concerned with economic infrastructure, justice, law and order barely changed over the period, while defence, intelligence and foreign affairs staffing declined by about 21,500 or 19 per cent in total, mostly in the defence category.

Table 3. Changes in numbers of bureaus by function

Type of Bureau	1982-83	1991-92
Culture/Recreation/ Environment	18	22
Economic/Justice/Science	54	65
Defence/Foreign Affairs/ Intelligence	9	10
Government	37	45
Revenue	2	2
Social	22	19
Total	142	163

An overall decline of almost 3,000 in general government (13 per cent) resulted from a decrease of about 6,000 from the commercialisation of internal service provision being offset by increases in most other areas of this category. A notable component of the offsetting increase was in parliamentary and political services, where staffing increased by more than 1,000 (75 per cent). About half of this increase appears to have been associated with the need to operate a larger Parliament in a new and vastly larger Parliament House. The other half is linked to increases in the personal staff of a larger number of ministers and members of parliament. All of these changes are more consistent with the likely objective function of the Australian Labor Party than with any representative bureaucratic objective function.

Table 4. Changes in staffing of bureaus by function

Type of Bureau	1982-83	1991-92
Culture/Recreation/ Environment	8,569	9,120
Economic/Justice/Science	27,188	25,822*
Defence/Foreign Affairs/ Intelligence	114,963	87,715*
Government	20,993	18,283
Revenue	18,401	23,156
Social	42,800	57,677
Total	248,892	236,871*

Note: Figures marked by an asterisk include for comparison staff of the Federal Airports Corporation (1380), the Civil Aviation Authority (6282), and Australian Defence Industries Ltd (5753) which are no longer in the budget sector and not bureaus as defined in this paper. The first two are included above in the economic category and the third in the Defence category.

Bureaus and budget changes

We have seen the average core budget per employee for the whole budget sector barely changed over the ten years when allowance is made for changes to internal charging practices. There were, however, substantial variations in this statistic for particular bureaus. Some of these undoubtedly reflected changes to accounting practices and are not real effects. Moreover, it is likely that others flowed from changes in productive efficiency or from technological advances. Nevertheless, for the bureaucracy as a whole, the picture is one of relative stability in the relationship between labour costs and other input costs.

The program elements of budgets were also relatively stable in aggregate. In constant 1992 dollars, the average program element per bureau changed from \$467,125 to \$442,992 over the period, corresponding to total program element expenditure in the range of \$90 to \$100 billion at both the beginning and the end of the decade. The change over the ten years could all be accounted for by changes in budget classification from program element to core budget.

To the extent that there are other factors at work, they are trivial in comparison to the overall scale of expenditure.

In terms of Dunleavy's typology, most of the program expenditure (93 per cent in 1991-92) was incurred, as would be expected, by control and transfer agencies (including in this study those classified as "mixed"). About 94.5 per cent of this type of expenditure had been undertaken by these types of agencies in 1982-83. The change does not appear significant in terms of Dunleavy's classifications, where the difference is spread across other categories and a small overall reduction in expenditure classified as program element.

In functional terms, 83 per cent of the program element is accounted for by the combination of social infrastructure spending and payments transferred from the federal Treasury to state governments. An interesting feature of the functional classification of program spending which is consistent with the employment statistics is a marked increase, from an admittedly small base, in program spending in the cultural and environmental categories. The increase in this area over the ten years amounted to about one per cent of the total program expenditure at the end of the period. The aggregate budget data by type of bureau are summarised in Tables 5 and 6 below:

Table 5. Changes in budgets of bureaus by Dunleavy type

Type of Bureau	Core Budget		Program Budget	
	1982-83 \$'000	1991-92 (1992)	1982-83 \$'000	1991-92 (1992)
Contract/Control	225,638	193,125	1,989,232	22,111,034
Delivery	8,076,251	7,825,347	2,251,686	5,921,653
Regulatory/Tax	675,812	1,571,058	17,693	42,766
Service/Trading	915,063	4,082,528	2,932,526	628,730
Transfer	930,159	1,533,135	28,738,471	41,423,954
Mixed	577,153	1,895,419	55,830,886	23,786,265
Total	11,400,076	17,100,612	99,030,594	93,914,402

The budget data are less amenable to detailed analysis than the data on employment numbers reviewed in the previous section. However, to the extent that these data can be analysed, the results are consistent with those obtained from review of staff numbers. The central result, which bodes poorly for the Niskanen model, is that no significant growth is apparent in the real aggregate spending or staffing of a whole bureaucracy over a ten year period. This is as true of program spending as it is of bureaus' own-purpose spending. Within this result, and again consistently in both budget and employment terms, there are considerable variations up and down in the case of particular bureaus. Most of these variations are not of the type predicted by Dunleavy.

Table 6. Changes in budgets of bureaus by functional type

Type of Bureau	Core Budget		Program Budget	
	1982-83 \$'000	1991-92 (1992)	1982-83 \$'000	1991-92 (1992)
Culture/Recreation	656,742	631,073	192,884	1,086,673
Environment	7,816	31,628	4,753	44,226
Economic Infrastructure	1,452,999	2,504,771	3,875,703	4,099,659
Government	312,163	519,148	1,659,395	24,027,854
Defence/Foreign Affairs/Intelligence	5,055,459	4,908,319	1,920,602	5,894,078
Law and Justice	310,774	416,325	110,236	179,275
Revenue	709,746	1,344,997	39,660	927,752
Social infrastructure	1,763,350	3,253,392	88,518,921	57,267,943
Science	725,089	779,044	34,996	28,377
Total	11,465,182	16,907,237	99,030,595	93,700,402

5. Concluding Remarks

The present study has sought to determine the extent to which recent statistical trends in the Australian federal budget sector can be explained by economic models based on budget-maximising and bureau-shaping behaviour. Although the best available data proved to be on staffing levels rather than budgetary changes, the staffing data nevertheless appeared to be consistent with variations in budgetary aggregates. If the use of staff numbers as a proxy for bureau size and growth is valid, then neither Niskanen's nor Dunleavy's model can adequately explain the main trends in the Australian federal budget sector between 1982-83 and 1991-92. After all, the bureaucracy did not grow in real aggregate terms over a period when the Australian economy as a whole grew by around 30 per cent, the labour force by 19 per cent, and the population by 13 per cent.

There were changes in the internal composition of the bureaucracy over the period. The apparent efficiency gains from one major change, the commercialisation and corporatisation of internal service provision, is consistent with Niskanen's conclusion that bureaucracy will always involve some combination of allocative inefficiency and x-inefficiency. A move from bureaucratic to market or quasi-market decision-making in this area appears to have significantly reduced both over-production and x-inefficiency. However, Niskanen's model does not explain why one area of the bureaucracy should have experienced this change while others did not. More generally, it does not explain a pattern of extensive differences in

growth and decline within the bureaucracy. Although Dunleavy's model does seek to explain such patterns, the developments it predicts are not those which occurred.

At least two plausible reasons can be advanced to account for the variance between the predictions of these public choice models and observed real-world outcomes. Firstly, the maximands imputed to bureaucrats by Dunleavy and Niskanen may not reflect actual behaviour. And secondly, both models are predicated on a relatively high level of bureaucratic power to influence bureau outcomes. If bureaucrats have somewhat less power than these models assume, even if the behavioural motives ascribed to bureaucrats accurately described *homo bureaucrat*, they may nonetheless have less impact on outcomes than other factors excluded from the models.

In the first instance, assuming that bureaucrats are self-interested, the nature of their objective functions will vary according to the arguments in their utility functions. The divergences in the predicted outcomes of the Niskanen and Dunleavy models rest on such differences. Two other plausible objectives include mission commitment and "on-the-job leisure". Mission commitment implies outcomes similar to those of the Niskanen model. In the absence of fairly definitive measures of results, bureaucrats will be inclined to overproduce if they are committed to their missions. "On-the-job leisure" implies much more stability since the effort and risk associated with any change, including growth in the bureau, would work against the presumed objective. Neither of these objectives appears any more consistent with the observed patterns than does budget-maximising or bureau-shaping. It is difficult to suggest other objectives that would be any more plausible and *ad hoc* searching for objectives to match observed outcomes is not a desirable modelling technique.

Arguments developed by Goodin (1992), Mueller (1986), and Frank (1988) around the theme of adaptive rather than rational egoism could explain the failure of any single objective function to support a valid and reliable model. These arguments lead to the further question of what factors influence adaptation - of how to "motivate political morality" - in Goodin's terms. Although adaptive behaviour can be modelled, the problem of measuring the types of qualities likely to be influential in adaptive bureaucratic behaviour would be formidable. Such an approach to modelling would represent a radical change of direction to that taken in the public choice models examined here. If such drastic change is necessary the bureaucrat's objective function is not the only issue to be brought into question.

Secondly, the limits to bureaucratic power may be more effective than the Dunleavy and Niskanen models of public bureaucracy allow. Tullock (1993, p.181) concludes his review of Dunleavy (1991) with the observation that neither Dunleavy's theory of bureaucracy nor the more traditional approaches appear to be complete. He made this point largely because, as this study also found, the predictions of the models have little empirical support. Tullock

suggests that both Niskanen and Dunleavy assume that bureaus are more powerful than they really are. The outside environment can impose shrinkage or restriction on bureaus and can terminate bureau shaping just as readily as it can budget maximising.

The present data from the Australian federal budget sector strongly support this conclusion. They also suggest that politics plays a crucial role in the relevant bureaucratic environment. Niskanen's assumption of government passivity in the face of budget maximising by bureaucrats may have been valid in the case of the bureaucracy he knew best, the US Department of Defence in the 1960s. The war in Vietnam, occurring at the peak of enthusiasm for Keynesian policy, produced conditions in the defence bureaucracy which were extraordinary favourable for bureaucratic budget maximising. Dunleavy's model, which seeks to explain bureaucratic behaviour under the first impact of fiscal restraint, may be equally time- and culture-bound in the Britain of Margaret Thatcher and the Civil Service of Sir Humphrey Appleby.

There are important differences between the British and Australian central government bureaucracies. Australia has long had a complex collection of many specialised agencies while the British Civil Service has by tradition comprised a relatively few, highly centralised agencies (Dunleavy *et al* 1992, pp. 20-22). Policy advising has traditionally been given greater primacy over management in the British Civil Service than has been the case in Australia (SSCFPA 1990, pp.6-8). The nature of change within the British Civil Service might therefore be closer than that in Australia to the pattern predicted by Dunleavy's model. This would greatly weaken the model's claim to generality.

The concentration on bureaucratic objective functions embodied in both the Niskanen and Dunleavy models abstracts from the government's preferences and the rules which govern their interaction with those of bureaus. A general model of bureaucratic behaviour requires the specification of all of these factors. In many circumstances, the opportunities available to bureaucrats to maximise whatever objective function they choose will depend significantly on the objective function of the government which employs them, and the rules of the game in which they play. For these sorts of reasons, Rowley and Elgin (1985) concluded that the principal-agent approach might have the most offer in future attempts by economists to model bureaucratic behaviour.

The data reviewed in this study are consistent with that conclusion. They suggest that the principal, in this case the Hawke-Keating Labor governments, exercised significant influence on the size and structure of the bureaucracy. However, they are not inconsistent with the possibility that individual bureaucrats were able to influence the outcome in their own interests, within the limits of the government's objectives, and in competition with other bureaucrats.

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