



PRODUCTIVE EFFICIENCY AND THE AUSTRALIAN LOCAL GOVERNMENT GRANTS PROCESS: AN EMPIRICAL ANALYSIS OF NEW SOUTH WALES LOCAL GOVERNMENT¹

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ABSTRACT This paper addresses the role of the Australian local government grants system in promoting efficiency, and examines whether or not the intergovernmental grants process, along with institutional, structural and environmental characteristics, exerts an influence on the efficient provision of local public services. Data envelopment analysis (DEA) is used to obtain measures of technical and scale efficiency across three local government functions; namely, library services, waste management services, and planning and regulatory services. When grant relativities are regressed against these efficiency indices using simultaneous equation tobit models, the results generally indicate that the desired objective of effort (or policy) neutrality is maintained. However, failure to address issues of optimal scale size, amongst others, may force local councils to provide an inappropriately funded scale of operations. The findings also suggest that deviations from the distribution of financial assistance solely on the basis of horizontal equalisation may be a further influence on inefficient outcomes in the local public sector.

1. INTRODUCTION

In common with all federal systems of government, the Australian Commonwealth is characterised by fiscal imbalance. In the context of a federation, it is possible to identify two kinds of fiscal imbalances. Firstly, vertical fiscal imbalances arise because different levels of government have differing capacities to raise revenues to finance expenditure. And secondly, horizontal fiscal imbalances occur since the various states and local governments that comprise a federation experience divergent costs in the provision of public goods and do not have equivalent revenue-raising capacities. Various institutional responses have been developed to deal with the problems posed by fiscal imbalances, involving either tax-sharing arrangements or fiscal equalisation

¹ The authors would like to thank two anonymous referees for helpful comments on an earlier version of this paper. The financial assistance of an Australian Research Council (ARC) grant is also gratefully acknowledged.

schemes. Whilst most federal countries have pursued formal or informal tax-sharing arrangements between different levels of government, Australia has established a policy of horizontal fiscal equalisation. Indeed, it has been cogently argued that "Australia has developed the most comprehensive, effective and equitable system of fiscal equalisation in the world" (Mathews, 1994: 16).

The process of fiscal equalisation in Australia is carried out by the Commonwealth Grants Commission (CGC) and several state-based Local Government Grants Commissions (LGGCs) under the so-called 'principle of fiscal equalisation'. Under this principle (CGC, 1990: 5):

[E]ach [state or local government] is entitled to receive a level of general revenue funding from the Commonwealth which would enable it to provide, without having to impose taxes and charges at levels appreciably higher than the levels imposed by the other [state or local governments], government services at standards which are not appreciably different from the standards provided by the other [state or local governments].

In the case of the local public sector, the calculations made using the principle of fiscal equalisation are used as the basis for 'financial assistance grants' (or FAGs) which form an important source of local government revenue.

The question naturally arises as to the relative importance of FAGs in the context of all revenue sources available to New South Wales' (NSW) local governments. Section 491 of the *NSW Local Government Act 1993* specifies the main sources of a given council's income as rates, charges, fees, FAGs, borrowing and investments. Table 1 (NSW Department of Local Government, 1997) shows how NSW local government in aggregate derived its income for the fiscal years 1994/95 and 1995/96: Although rates are obviously the major source of revenue in NSW local government, Table 1 also indicates that grant revenue is nevertheless significant at around a fifth of all income.

However, these general observations in the relative importance of FAGs in NSW should be qualified in at least two respects. Firstly, substantial differences exist in terms of the proportion of rates revenue to total revenue between the

Table 1. Percentage Sources of Revenue for NSW Local Government

	1994/95	1995/96
Rate Revenue	39.4	46.9
User Charges and Fees	20.0	18.5
Interest Revenue	3.3	3.9
Grant Revenue	18.1	18.2
Contributions and Donations	9.2	9.2
Other Operating Revenue	10.0	3.3
Total	100.0	100.0

various categories of local government in the Australian Classification of Local Government (ACLG). For example, the NSW Independent Pricing and Regulatory Tribunal (IPART) (1998: 10) has observed that "rural councils receive a larger proportion of their revenues in grants...a group of the smallest rural councils in NSW receives about 50 percent of its total income from grants. This compares with a group of Sydney metropolitan councils which receives approximately 11 percent of revenues from grants".

Secondly, the deregulation of NSW local governments under the *NSW Local Government Act 1993* and the introduction of 'rate-pegging' has generally led to an increasing reliance on fees and charges in comparison with other sources of finance. This has meant *inter alia* that grant revenue has decreased in significance over time. Put differently, "...Commonwealth funding of local councils has declined substantially in real term" (IPART, 1998: 10). Overall the significance of grant revenue is declining, however its relative importance varies substantially between different sources of income and the various categories of local governments.

Notwithstanding some of these qualifications, the Australian Urban and Regional Development Review (AURDR) (1994a: xv) has argued that "potentially, financial assistance grants exert a powerful influence over the rating and funding decisions of many councils". However, to date the Commonwealth has not required the LGGCs to pay explicit attention to a number of policy-related decisions by councils in grant allocation, one of which is the efficiency with which local councils operate. The reasons for this appear to be threefold. First, under the *Local Government (Financial Assistance) Act* horizontal equalisation has been the major policy goal. Second, the phrase 'by reasonable effort' in the legislation has largely been interpreted to refer solely to the rating effort of councils, and does not take into account any matters concerning reasonable efforts to ensure economic efficiency. Finally, the assumption of 'effort neutrality' which relates to policy decisions by councils has been interpreted to mean that councils should not be able to act in a manner which affects their grant (AURDR, 1994a: 13). Accordingly, grants to councils only reflect factors beyond their control, and therefore the LGGC grants process neither rewards nor penalises councils with differing levels of efficiency.

Despite this, it has been argued that LGGC methodologies *have* influenced the efficiency of local councils, irrespective of their lack of legislative mandate (AURDR, 1994a). On one hand, it has been argued that "by providing the highest per capita support to those councils with revenue raising difficulties and expenditure needs in regard to size, sparsity, location and cost disabilities, [the grants system] may not be conducive to an efficient allocation of resources" (AURDR, 1994a: 55). The NSW Independent Pricing and Regulatory Tribunal (IPART) (1998: 39) supported this argument as follows:

The Federal Assistance Grants Act 1995 provides a direct grant for local government against formulae determined by each state through the Grants Commission to equalise the effect of remoteness and size. This

formula actually creates and encourages inefficiency by retaining small institutions... [It has been proposed] that the grant formula should not fully and automatically compensate councils to the full extent of higher overhead costs associated with remoteness and size as it reduces the incentive to form larger organisations or to become more efficient.

By way of contrast, it has been observed that "councils which are cost effective may be rewarded through unit cost adjustments up to the standard if their operations are cost effective" (AURDR, 1994a: 14). For example, the NSW Local Government Grants Commission (NSWLGGC) (1994: 16) has argued that the grants process indirectly rewards efficient councils:

Because of the effort neutral approach a council's grant is assessed independent of policy decisions by councils, a council that provides a cost effective service still receives grant funding which it can allocate to its priorities. For example, two councils which were identical in every respect except efficiency would receive identical grants. The efficient council can use its grant funds to provide even better facilities for the ratepayers. The inefficient council of the two would need to apply the grant funds to prop up an inefficient operation.

In response to these uncertainties, the AURDR (1994a: 60) undertook a number of statistical analyses to test the hypothesis "that a council with a lower than standard unit expenditure would, after the application of a disability factor, invariably always be given a significantly higher standardised unit expenditure (and consequently a higher grant) and *vice versa*". The results indicated that a strong relationship did exist between actual unit expenditure and standardised expenditure per capita. The AURDR (1994a: 61) concluded that:

[T]he application of disability factors are serving to improve the grant outcome for councils with low unit expenditures on administration and worsen the grant outcome for councils with high unit expenditures ... there seems to be some support for the proposition that in the way the Commission apply their judgements on disability factors in order to determine standardised expenditures, that LGGCs are implicitly rewarding [efficient] councils and penalising [inefficient] councils.

However, the AURDR (1994a) study has a number of limitations. First, and foremost, the AURDR (1994a: 63) itself admits that the use of expenditure per capita as a proxy for technical efficiency "has been shown to be inadequate measure". A subsequent analysis found that the chosen measure of efficiency (ie. administration expense per capita) was totally unrelated to an alternative measure of efficiency (ie. administration expense as a percentage of total expenditure). Second, the study was based solely on the Victorian Grants Commission (VGC), and while the AURDR (1994a: 60) argued that the results "are illustrative of the likely outcomes in other states", this is unlikely to be the case given the variation in grants methodologies across state borders.

Finally, the VGC takes account of very few disability factors in its

allocations. For example, whereas in most states an increasing share of funds has been directed to councils with the highest index of socio-economic disadvantage, the reverse appears to hold in Victoria (AURDR, 1994b: xii). This suggests that the postulated association between efficiency (as measured by per capita administration costs) and grants may not be valid because efficient councils are implicitly being given more income by the grants process. Instead, the case may be that when the grants methodology fails to correctly account for all disability factors (ie. those that usually apply to high administration cost councils), all low administration costs per capita councils, whether efficient or not, are given larger grants than should be the case under horizontal equalisation.

In this paper, we examine the relationship between the productive efficiency of local governments in New South Wales and the allocative methodology employed by the state's Local Government Grants Commission. The purpose of this exercise is twofold. First, we calculate measures of technical efficiency using nonparametric methods for three local government functions, namely, library services, domestic waste management services, and planning and regulatory services. The indices thus obtained are then compared against the objective criteria used by the NSWLGGC in order to identify the impact of disabilities in councils' operating environment on measured efficiency. Second, we compare these efficiency measures against standardised unit expenditures using the methodology employed by the LGGC to see if grants to local governments are systematically related to council efficiency.

2. THE FUNCTIONS OF NSW LOCAL GOVERNMENT

In comparison with many other governance systems, Australian local government takes on substantially less functions. For example, in the United Kingdom local government authorities provide major services such as education, social services, housing, public transport and local amenities, and local governments in the U.S generally bear responsibility for any number of major social policy services, including social security, hospitals and health care, schools and police. However, apart from general public services, local governments in Australia do provide uniquely different services to those produced by both the States and Territories or the Commonwealth. In terms of those areas where local governments are disproportionately represented in outlays, especially housing and community services and recreation and culture, a wide range of activities are undertaken. Included in the former are housing for the general community and those with special needs, water supply, sanitation, waste management and protection of the environment, and functions relating to street-lighting, cemeteries, bus shelters and public conveniences. The latter function includes the provision of libraries and museums, community halls, outdoor recreation areas, footpaths, and walking and cycling paths.

Further, even where councils' contributions to public sector outlays are relatively minor, there are ways in which local governments in Australia can influence the nature and extent of local economic development. For example, local government's contribution to transport and communication outlays is

largely concentrated in the areas of municipal roads and bridges, with only highways and major roads accounted for by state authorities. Similarly, local governments' control over zoning, planning and development enables local government in Australia to exert considerable control over matters of regional development.

The IPART (1998: 5) report lists five primary functional areas in NSW local government: (i) *land management, planning and infrastructure provision*, including development and environmental planning, heritage conservation, building supervision, and roadworks; (ii) *community amenities*, including parks, gardens and sporting grounds, water and sewerage supplies, library services, street lighting and street cleaning; (iii) *community welfare services*, covering child care services, women's refuges, and aged and disability accommodation; (iv) *public health and safety*, including garbage collection/disposal and inspection of commercial premises; and (v) *corporate functions*, being strategic planning for the area, resource and service management, property management, and working with the community and state and federal governments on economic development, employment and tourism promotion.

Given the wide range of functions performed by NSW local government, in order to examine the productive efficiency of councils and their relationship to the allocative methodology employed by the NSWLGCC, it is necessary to be selective in the choice of the actual functions analysed. Various considerations are relevant. Firstly, data constraints are important. For example, the NSW Department of Local Government has published data on 24 key performance indicators across a broad spectrum of municipal activity. Accordingly, this delineated the kinds of functions that could be examined. Secondly, it was felt that only a subset of these functions could feasibly be handled in a single study. Correspondingly, those functions should be drawn from different areas of council activity to be representative of the diversity of functions. With these and other considerations in mind, three functions were selected: (i) library services, as an example of the *human services* delivered by NSW councils; (ii) domestic waste management services, representative of the *community services* provided by local governments; and (iii) planning and regulatory services, as an instance of the *economic services* supplied by municipalities.

Each of these services nevertheless has various idiosyncratic aspects to its production function, which inhibit the efficiency of performance indicators. We shall briefly evaluate the three functions employed in this study (library services, domestic waste management services, and planning and regulatory services) in terms of how well published performance indicator data employed here reflect actual performance. Firstly, and in common with many library systems elsewhere in the developed world, NSW public libraries provide a broad range of services beyond simply issuing books to borrowers. For example, libraries also allow clients to read newspapers and magazines, enjoy computing facilities and Internet access, conduct research and undertake a host of other activities. Moreover, libraries are used by both citizens and by people from other local government

jurisdictions. Accordingly, the two published key performance indicators, operating expenses per census resident and issues per capita, will not adequately reflect the full extent of library activity and thus may not provide satisfactory indicators of performance.

Secondly, in NSW local councils provide many domestic waste management services to their respective communities, including collection and recycling services, landfill disposal facilities, and waste minimisation strategies. Although probably less complex than library services, each service and its related performance indicator can be influenced by numerous variables. For instance, the size of garbage containers, frequency of collection, distance to disposal facilities, and many other factors affect average expenditure per property. Clearly published performance indicators used in this study, namely collection expenditure, total garbage collected, recyclables collected and the 'implied recycling rate', cannot precisely describe the efficiency of domestic waste management and recycling services.

Finally, five published performance indicators were available for planning and regulatory services in NSW at the time of this empirical study, namely, planning and regulatory expenditure, legal expenditure on planning, full-time equivalent planning staff, the number of building approvals (BAs) determined, and the number of development applications (DAs) decided. Given the obvious complexities inherent in the planning and regulatory function of NSW local government, it is clear that these indicators could never do full justice to this service. For example, BAs and DAs alone are influenced by a myriad of factors, not least the nature and complexity of applications, exemptions, public consultation, urban growth rates, litigation, 'fast-tracking' policies and zoning restrictions.

NSW local governments themselves have been consulted extensively on the application of performance indicators and their usefulness. In its final report *Benchmarking Local Government Performance in New South Wales*, IPART (1998: 67) notes that a general consensus exists for a future concentration on "a small range of effective indicators", including some "measure of customer satisfaction". Nevertheless, most councils supported the development of performance indicators *per se* even though they pinpointed numerous disadvantages and weaknesses in the current system.

Hence, despite the manifest problems inherent in currently available published data on performance indicators collected by the NSW Department of Local Government (NSWDLG 1995; 1996), including those available for library services, domestic waste management, and planning and regulatory services, scarce research resources obliged us to employ this information. When they are collected and published, improved performance indicators of NSW local government should greatly assist future researchers.

3. MEASURES OF TECHNICAL AND SCALE EFFICIENCY

The first methodological requirement is to specify the models used for calculating local government efficiency. The deterministic, nonparametric methods, which originate from the seminal contribution of Farrell (1957), are based on piecewise linear frontiers calculated using mathematical programming techniques. These methods envelop the data as closely as possible subject to minimal assumptions regarding the structure of the production technology. The method itself is the data envelopment analysis (DEA) model developed by Charnes *et al.* (1978) and extended in Seiford and Thrall (1990), among others [the mathematical presentation below follows Coelli *et al.* (1998)]. The purpose of DEA is to construct a non-parametric envelopment frontier over the data points such that all observed points lie on or below the production frontier. The model formulation is constructed on the basis of an 'input-orientation' (indicating the desired minimisation of inputs to some given level of output). This orientation towards inputs (as against outputs) is used to reflect the fact that, at least in the short-run, local governments cannot readily control the demand for services as represented by their 'imposed' jurisdictional population. The appropriateness of an input orientation where providers must supply a universal service is also recognised by the London Economics' (1999) study of electricity distributors and several of the public sector analyses surveyed in SCRCSSP (1998).

Consider N local councils each producing M different outputs using K different inputs. The $K \times N$ input matrix, X , and the $M \times N$ output matrix, Y , represent the data of all N local councils, while for the individual council these are represented by the vectors x_i and y_i . The relative efficiency of each local council in ratio form (where for each local council we obtain a ratio of all outputs over all inputs) is specified as follows:

$$\begin{aligned} & \max_{u,v} (u' y_i / v' x_i) \\ & \text{s.t. } u' y_j / v' x_j \leq 1 \\ & \quad u, v \geq 0 \end{aligned} \tag{1}$$

where y_i is the vector of outputs produced by the i th local council, x_i is the vector of inputs used by the i th local council, u is a $M \times 1$ vector of output weights and v is a $K \times 1$ vector of input weights (the prime denotes a transposed vector), i runs from 1 to N , and j equals 1, 2, ..., N . The first inequality ensures that the efficiency ratios for all local councils cannot exceed one, whilst the second ensures that the weights are non-negative. The weights are determined such that each local council maximises its own efficiency ratio. A problem with this particular ratio formulation is that it has an infinite number of solutions. To avoid this the constraint $v' x_i = 1$ is imposed. This fractional linear program (1) can then be transformed into the following equivalent linear programming problem:

$$\begin{aligned}
 & \max_{\mu, v} (\mu' y_i) \\
 & \text{s.t. } v' x_i = 1 \\
 & \mu' y_j - v' x_j \leq 0 \\
 & \mu, v \geq 0
 \end{aligned} \tag{2}$$

where the notation change from u and v to μ and v reflects the transformation. Using the duality of linear programming, this multiplier form can then be used to derive an equivalent envelopment form of the problem:

$$\begin{aligned}
 & \min_{\theta, \lambda} \theta \\
 & \text{s.t. } -y_i + Y\lambda \geq 0 \\
 & \theta x_i - X\lambda \geq 0 \\
 & \lambda \geq 0
 \end{aligned} \tag{3}$$

where θ is a scalar and λ is a $N \times 1$ vector of constants. The value of θ will be the technical efficiency score for a particular local council. It will satisfy $\theta \leq 1$, with a value of 1 indicating a point on the frontier, and hence a technically efficient local council. The value of $\theta \leq 1$ identifies the amount of any inefficiencies that may be present.

The model specified in (3) has an assumption of constant returns-to-scale (CRS) and is only appropriate where all local councils are operating at an optimal scale. Where this assumption does not hold, scale effects will confound the measures of technical efficiency. Generally, regulatory, geographical and institutional constraints imply that most councils are not operating at an optimal scale. Following Banker *et al.* (1984) the linear programming problem can be modified to account for variable returns-to-scale (VRS) (that is, measures of technical efficiency without scale efficiency effects) by adding the convexity constraint $M'\lambda = 1$ to (3). This provides a measure of pure technical efficiency. Dividing overall technical efficiency by pure technical efficiency yields a measure of scale efficiency. A more detailed examination of DEA in public sector efficiency measurement may be found in SCRCSSP (1997) and Worthington and Dollery (1999).

4. LOCAL GOVERNMENT FUNCTIONS IN THE GRANTS PROCESS

The second methodological requirement is to specify the local government functions used to test the relationships between efficiency and grants. As we indicated earlier, three functions are selected (with function type in brackets): (i) library services (human); (ii) domestic waste management services (community); and (iii) planning and regulatory services (economic). Variables and selected descriptive statistics are provided in Table 2. For each function three groups of variables are listed. These are: (i) local council disability factors; (ii)

standardised unit expenditures; and (iii) discretionary inputs and outputs. The first two sets of variables are derived from the NSW Local Governments Grants Commission's relative grant calculations, whereas the third set of variables are collected by the NSW Department of Local Government for the purposes of comparative performance assessment.

4.1 Disability Factors

The first group of variables are the disabilities which the NSWLGGC has considered to be the most significant in influencing a council's expenditure on a particular function. These form a disability factor for each function which reflects the additional cost, expressed as percentage, of providing a standard service because of inherent disabilities which are beyond a council's control.

For example, the disability factors for library services are; (i) population distribution (*DIST*) (recognising the extra costs of providing library services in more than one urban centre); (ii) proportion of the population from a non-English speaking background (*NESB*) (additional costs of information provision); (iii) proportion of the population aged (*AGE*) (cost of special services to the aged such as large print books or home visiting); (iv) proportion of the population who are students (*STUD*) (recognising students as a major user group); and (v) proportion of non-residential borrowers (*NRES*) (additional costs involved in providing services to an extra-jurisdictional user group).

In waste management services the disability factors are: (i) occupancy rate (*OCC*) (input variation due to the higher level of service required in areas with a high number of persons per property); (ii) population density (*DENS*) (additional costs due to the constraints placed upon the use of machinery in urban areas); (iii) population distribution (*DIST*) (reflecting costs of staff travel and duplication of services in scattered populations), and (iv) an index of disposal cost (*DISP*) (a function of standardised tonnage of garbage collected, cartage distances to receiving depot and receiving charges at depot).

Finally, the disability factor for planning and regulatory services is a function of: (i) population growth rate (*GRO*) (indicating extra requirements for forward planning); (ii) a development index (*DEV*) (reflecting the need for additional development control); (iii) an index of heritage/environmental sensitivity (*HER*) (recognising additional complexities in plan preparation for sensitive areas); (iv) the proportion of non-residential building activity (*NRES*) (additional complexities in processing commercial and industrial plans); and (v) the proportion of the population from a NESB (*NESB*) (additional costs of information provision in languages other than English).

Table 2. Unit Expenditures, Disability Factors and Discretionary Inputs and Outputs

Description	Mean	Std Dev.	Min.	Max.
<i>I. DISABILITY FACTORS</i>				
<i>Library services</i>				
Population distribution	4.5566	5.8811	0.0000	25.3725
Proportion of population from NESB	0.0852	0.0950	0.0042	0.4378
Proportion of population aged	0.0598	0.1025	0.0000	0.6100
Proportion of population students	0.1677	0.0358	0.0761	0.2568
Proportion of non-residential borrowers	0.1907	0.0294	0.0000	0.3300
<i>Waste management services</i>				
Occupancy rate	0.0267	0.0053	0.0123	0.0434
Population density:	0.2696	0.2712	0.0126	1.8993
Population distribution	0.0965	0.1939	0.0000	1.0075
Cost of disposal index	0.2720	0.0879	0.1746	0.4972
<i>Planning and regulatory services</i>				
Population growth rate	0.0127	0.0136	0.0000	0.0466
Development index	13.0182	34.3487	4.7275	395.8696
Heritage/environmental sensitivity	2.0625	0.8762	1.0000	5.0000
Non-residential building activity	0.0231	0.0278	0.0000	0.3058
Population distribution	4.4533	5.6275	0.0000	21.6987
Non-English speaking background	0.1006	0.1021	0.0128	0.4378
<i>II. ACTUAL AND NOTIONAL EXPENDITURES</i>				
<i>Library services</i>				
Actual unit expenditures	\$17.39	\$28.82	\$2.38	\$366.24
Standardised unit expenditures	\$18.04	\$33.26	\$2.39	\$425.83
<i>Waste management services</i>				
Actual unit expenditures	\$68.37	\$36.79	\$46.37	\$137.92
Standardised unit expenditures	\$155.79	\$174.24	\$98.16	\$1812.15
<i>Planning and regulatory services</i>				
Actual unit expenditures	\$9.57	\$35.78	\$8.69	\$406.47
Standardised unit expenditures	\$15.88	\$42.83	\$5.33	\$489.09
<i>III. DISCRETIONARY INPUTS AND OUTPUTS</i>				
<i>Library services</i>				
Gross library expenditure	\$681.76	\$997.37	\$20.00	\$5050.96
Library issues	256.97	354.26	2.30	2069.87
<i>Waste management services</i>				
Collection expenditure	\$1211.17	\$1458.76	\$10.98	\$7429.65
Total garbage collected	17529	18592	110	74270
Total recyclables collected	2123	2561	1	12157
Implied recycling rate	0.1507	0.1514	0.0000	0.8100
<i>Planning and regulatory services</i>				
Planning and regulatory expenditure	\$825.75	\$1045.62	\$333.25	\$4533.40
Legal expenditure	67.45	109.14	0.00	567.00
Full-time equivalent staff	10.43	14.61	0.25	107.00
Number of BAs determined	903.39	1008.63	19.00	4683.00
Number of DAs determined	344.66	346.69	0.00	1760.00

4.2 Actual and Notional Unit Expenditures

The second group of variables in Table 2 indicates the expenditures for each function, both actual unit expenditures (*UNIT*) and standardised unit expenditures (*STD*), as calculated by the NSWLGGC. The unit basis is per capita in the case of library and planning services, and per urban property for waste management services. The general formula for the calculation of expenditure allowances is also based on the standard cost for the services (generally the state weighted average unit cost based upon actual expenditure) and the disability factor derived using the functional disabilities (expressed as a percentage above standard cost). In turn, each council's standardised unit expenditure is used as the basis for the distribution of financial assistance for each function. Although it is expected that a close correlation exists between standardised unit expenditures (notional grant) and actual unit expenditures (as the Commission and councils respond to many of the same environmental factors), the assumption of 'effort neutrality' is meant to ensure that a council's grant is assessed independently of council policy decisions. Similarly, effort neutrality has also been interpreted to mean that councils should not be able to act in a manner which affects their grant (AURDR, 1994a: 13). Using this institutional criteria, expenditures, both actual and notional, should be independent of each other.

One further point to note about the standardised unit expenditure is that whereas it is a direct reflection of the relative distribution of financial assistance grants for each function, it does not necessarily correspond to any absolute value of dollar funding. Three qualifying conditions have been suggested. First, the Commission's calculation of equalisation grants is made without reference to the funds available from the Commonwealth. Second, the relevant legislation requires that every local council receives at least a minimum amount; that is, an amount that would be allocated if 30 percent of available funds were distributed on a per capita basis. Accordingly, "the notional equalisation grants to each council must be re-scaled: firstly, to the available funds; and secondly, to bring those councils below the per capita minimum entitlement up to that level" (NSWLGGC, 1994). Finally, because the methodology excludes, as far as practicable, councils' policies and practices (effort neutrality), the grants, while calculated on the basis of several functions, are essentially untied. Thus, although councils are aware of both their own and the state's standardised unit cost for each function, there is no compulsion on the council's behalf to use grant funding for particular purposes.

4.3 Discretionary Inputs and Outputs

The final group of variables in Table 2 relate to the discretionary inputs and outputs employed by councils to provide each of the three selected services. For library services, the single input employed is total library expenditure (*EXP*), whilst the range of library outputs are proxied by the number of issues (*ISS*). In the case of waste management services, three outputs are specified; namely, the total tonnage of garbage collected (*GAR*), total tonnage of recyclable material collected (*REC*), and the rate of recycling as a proportion of total garbage

collection (*RATE*). The single input for waste management services is total collection costs (*COL*). The final function, for planning and regulatory services, combines the inputs of planning expenditure, both legal (*LGL*) and non-legal (*P&R*), and planning-related staff (*STA*) to produce outputs in the form of processed building (*BA*) and development (*DA*) applications. Whereas these inputs and outputs do suffer from a number of limitations, they are the only such data known to exist at a suitably disaggregated level.

One particular issue that arises in DEA is that the measured efficiencies are based on a comparison with the observed best-practice frontier and therefore can be susceptible to outliers. The London Economics (1999: 50) submission to the IPART inquiry into NSW electricity distribution suggests that potential outliers can be identified "...via a screening process prior to modelling" and if identified "...removed from the sample if there is some doubt as to the validity of the data that defines its performance". Further, "as a sensitivity, it is useful to remove potentially outlying distributions from the sample to determine if the absolute levels of efficiency alter substantially, indicating that a potential outlier, or potential outliers, have a large influence upon the efficient frontier" (London Economics 1999: 50). In that particular analysis, "...potential outliers were identified as being those observations that lie more than 3 standard deviations from the sample mean" (London Economics 1999: 31).

A more technical alternative used in this study is to test the output-input ratios for each function for normality (symmetry and mesokurtosis) using the Jarque-Bera Wald statistic. The test statistics for library services expenditure (1.0136), waste management services expenditure (0.5344) and planning and regulatory services (0.5933) fail to reject the null hypothesis of normality [$W = 5.9915 \sim \chi^2(2)$] and we may conclude that the output-input ratios are asymptotically normally distributed. This analysis suggests that potential outliers in the output-input data do not present too severe a problem, and that the efficient frontier is likely to be robust with respect to the specification of the sample set.

Specification of Associational Models

The final methodological requirement is to specify the technique for explaining variation in efficiency and grants on the basis of the vector of objective disability factors. A regression-based approach is used for this purpose. As we have seen, since the measure of efficiency calculated and standardised unit expenditures (grants) are both limited dependent variables, tobit estimation is appropriate. Grant relativities are therefore examined as a function of imposed disabilities for each council, and corresponding to the hypothesis that the grants process violates effort neutrality, a measure of efficiency. However, it is also hypothesised that grant relativities may exert an influence on the efficiency of local councils (calculated on the basis of discretionary factors only). Accordingly, the tobit model may be embedded in a recursive simultaneous equations model as follows:

$$\begin{aligned} y_1^* &= \beta_1' x_1 + \gamma y_2 + \varepsilon_1 \text{ where } y_1 = \max(y_1^*, 0) \\ y_2^* &= \pi_2' x_2 + \varepsilon_2 \text{ where } y_2 = \min(y_2^*, 1) \text{ in which } \text{Corr}[\varepsilon_1, \varepsilon_2] = \rho_{12} \end{aligned} \quad (4)$$

where y_1 is the measure of relative grant funding for each council, y_2 is a measure of technical efficiency for each council, x_1 and x_2 are vectors of explanatory variables posited to influence y_1 and y_2 respectively, ε_1 and ε_2 are error terms, and β and π are parameters to be estimated. This approach follows the procedures detailed in Greene (1995), and incorporates tests for exogeneity based on Blundell and Smith (1986).

5. EMPIRICAL RESULTS

Table 3 provides descriptive statistics of the results of the nonparametric approach to efficiency measurement outlined above. Since the focus in the current section is on the relationships in local government between discretionary inputs/outputs, relative grants and disability factors, these efficiency indices have been computed solely on the basis of inputs and outputs over which managerial control is exercised. That is, no account is taken of the imposed environment in which local governments operate.

5.1 Technical and Scale Efficiency and Returns-to-Scale

The first set of summary statistics in Table 3 concern the efficiency indices and the nature of returns-to-scale in library services for 166 New South Wales local governments. On the basis of discretionary inputs and outputs only, less than one percent of councils are overall technically efficient, slightly more than two percent are pure technically efficient, and less than two percent are scale efficient.

Given that one particular focus of attention is the role of intergovernmental grants in supporting scale inefficient councils, the role of scale effects is examined in detail. As shown in Table 3, local government libraries in New South Wales were, on average, 74 percent scale efficient. However, if councils could adjust their library services to their optimal scale, inputs could be proportionately reduced, on average, by 26 percent. The results also indicate that the majority of councils are equally divided between inefficiencies derived from a smaller than optimal scale of operations (increasing returns-to-scale), and a larger than optimal scale (decreasing returns-to-scale). Descriptive statistics for these sub-groups of councils on the basis of library expenditures (in thousands) are also provided. On average, councils with an appropriate scale of operations for local government library services have an expenditure of \$386,000 and a population of 18,882. on the other hand, councils with a smaller than optimal scale have a mean library expenditure of \$94,000 and an average population of 6,657, whereas those with decreasing returns-to-scale have a mean expenditure of \$1,420,000 and a population average of 70,630.

Table 3. Efficiency Indices and Returns-to-Scale

Description	No.	Mean	Std Dev.	Min.	Max.	
Library Services						
Technical	All Councils	166	0.1751	0.1330	0.0270	1.0000
	Inefficient Councils	165	0.1701	0.1168	0.0270	0.9860
Pure Technical	All Councils	166	0.2794	0.2001	0.0560	1.0000
	Inefficient Councils	162	0.2616	0.1668	0.0560	0.9350
Scale	All Councils	166	0.7438	0.2979	0.0440	1.0000
	Inefficient Councils	164	0.7407	0.2984	0.0440	0.9990
Returns-to-Scale	Increasing	87	\$94.36	\$78.64	\$20.00	\$407.00
	Constant	7	\$386.52	\$237.19	\$44.46	\$703.00
	Decreasing	72	\$1420.25	\$1146.76	\$186.70	\$5050.96
Waste Management Services						
Technical	All Councils	103	0.2199	0.1813	0.0390	1.0000
	Inefficient Councils	100	0.1965	0.1219	0.0390	0.5300
Pure Technical	All councils	103	0.4360	0.2799	0.0500	1.0000
	Inefficient Councils	90	0.3545	0.1913	0.0500	0.9510
Scale	All Councils	103	0.5298	0.2005	0.0760	1.0000
	Inefficient Councils	100	0.5157	0.1857	0.0760	0.9950
Returns-to-Scale	Increasing	19	\$63.07	\$69.80	\$19.75	\$320.00
	Constant	3	\$26.85	\$19.07	\$10.98	\$48.00
	Decreasing	81	\$1524.33	\$1499.04	\$68.00	\$7429.65
Planning and Regulatory Services						
Technical	All Councils	128	0.4229	0.2307	0.0490	1.0000
	Inefficient Councils	123	0.3994	0.2029	0.0490	0.9580
Pure Technical	All Councils	128	0.6317	0.2706	0.1050	1.0000
	Inefficient Councils	98	0.5190	0.2027	0.1050	0.9620
Scale	All Councils	128	0.6780	0.2015	0.2460	1.0000
	Inefficient Councils	123	0.6649	0.1945	0.2460	0.9890
Returns-to-Scale	Increasing	9	\$34.52	\$40.98	\$30.00	\$112.19
	Constant	5	\$839.80	\$1807.07	\$250.12	\$4072.00
	Decreasing	114	\$887.60	\$1029.24	\$756.00	\$4533.40

Table 3 presents a similar descriptive analysis for domestic waste management services in 103 New South Wales local governments. Here, councils were conceptualised as minimising the input of gross collection expenditure for some given level of garbage and recyclable material collected and the ratio of recyclable material to non-recyclable material. Once again, based on the vector of discretionary inputs and outputs only, very few council's waste management

services are either technically or scale efficient. Only three councils are overall technically efficient (assuming constant returns-to-scale), thirteen councils are purely technically efficient (assuming variable returns-to-scale), and three councils are scale efficient.

However, the source of scale inefficiencies appears to be largely derived from councils with a larger than optimal scale of operations, with 81 councils (or 79 percent) experiencing decreasing returns-to-scale. Councils subject to decreasing returns-to-scale in waste management services had, on average, 17,338 serviced properties, whereas those with increasing returns-to-scale averaged 698 properties, and constant returns-to-scale councils averaged 984 properties. Based on state average occupancy rates these would equate to council populations of 46,273, 1,863 and 2,626 persons respectively. However, despite the finding of a large number of scale inefficient councils, and similar to the analysis of library services, the results indicate that pure technical inefficiency, rather than scale inefficiency, was the main source of technical inefficiency in waste management services.

A descriptive analysis for planning and regulatory services in 128 New South Wales local governments is also presented in Table 3. The indices calculated indicate the maximal equiproportionate reduction of inputs: namely, planning expenditure (both legal and non-legal) and full-time equivalent staff, consistent with a given level of outputs in the form of building and development approvals. Once again, the main source of scale inefficiency in planning and regulator services flows from maintaining operations at a larger than optimal scale: the average level of planning expenditure suggests that scale inefficiencies increase after a mean expenditure level of \$839,000. On average, councils subject to decreasing returns-to-scale had a population of 45,040, those with constant returns-to-scale a population of 35,040, and those with increasing returns-to-scale a population of 3,134. However, in contrast to both library and waste management services, the sources of overall technical efficiency appear to be equally composed of purely technical inefficiency and scale inefficiency.

One final analysis is made to examine the relationships between these three sets of separately computed efficiency measures across local governments. Because the normality assumptions of the Pearson (product moment) correlation coefficient are unlikely to hold, Spearman (rank) correlation coefficients are employed. The only significant correlations (positive) are between library service efficiency and waste management service efficiency. This would appear sensible in that human and community services are more closely aligned than economic services,

However, since the efficiency improvements calculated are based solely on discretionary factors, these descriptive analyses must be interpreted with caution. In particular, and in common with the preceding discussion, a large number of contextual or environmental factors are thought to influence the production correspondence relating inputs to outputs in local public services. These are likely to bias the productivity improvements possible through greater managerial efficiency. Similarly, there are, at least in the case of scale diseconomies, a large

number of social, demographic and geographic barriers in local public services which may prevent efforts to improve efficiency through amalgamations or separation of functions.

One obvious limitation is that the optimal scale of operations for any one function, say library services, may not correspond to the optimal scale for other

5.2 EFFICIENCY AND INTERGOVERNMENTAL GRANTS

Notwithstanding these results, the main focus here falls on the hypothesised relationships between local government efficiency and relative grants. The estimated coefficients and standard errors of the simultaneous equations tobit models for library, waste management and planning services are detailed in Table 4. The first three columns of results relate to a two equation regression model for library services: the first equation is where grant relativities are regressed on actual unit expenditures, disability factors and technical efficiency (assuming variable returns-to-scale); and the second equation is where efficiency is regressed on nondiscretionary disability factors. The estimator is full information maximum likelihood. A likelihood ratio test with the restriction that all the parameters are equal to zero with chi-square distribution [$LR = 15.0100 \sim \chi^2(7)$] is rejected at the .05 level.

In terms of the individual coefficients in the first equation, only *UNIT* (actual unit expenditure) is significant and conforms to the hypothesised sign. As expected, there is a strong correlation between actual unit expenditures in library services and the standardised unit expenditures calculated by the NSWLGGC. Pearson's (product-moment) and Spearman's (rank) correlation are found to be positively significant at the .01 level, the results of an ANOVA table [$(SSB/K-1)/(SSW/N-K) = 0.034 \sim F(1, 330)$] fail to reject the null hypothesis of equal means, and Bartlett's homogeneity of variance test ($B = 3.3611 \sim \chi^2(1)$) fails to reject the null hypotheses of equal variances at the .05 level.

The coefficient on the efficiency score is also insignificant, thereby offering no support for the proposition that the NSWLGGC funding methodology, either explicitly or implicitly, rewards or penalises local government library service efficiency (put differently, that grants are *not* determined by efficiency). The exogeneity of efficiency is tested using a *t*-test of the hypothesis that $\rho[\varepsilon_1, \varepsilon_2] = 0$. The null hypothesis is rejected at the .01 level and we may conclude that local government efficiency is influenced by the present local government funding methodology (that is, that efficiency *is* determined by grants). The second equation also supports the argument that library service efficiency, as calculated on the basis of discretionary factors alone, is adversely influenced by imposed factors reflecting the population distribution (*DIST*), the proportion of non-residential borrowers (*NRES*), and the proportion of the population that are aged (*AGE*), students (*STUD*), or from a non-English speaking background (*NESB*). These results reinforce the need to incorporate contextual factors into microeconomic efficiency analyses.

Accordingly, a single equation tobit model is used to examine grant relativities

and disabilities as determinants of library service technical efficiency. This is technically necessary because the focus in the simultaneous equations tobit model is on the tobit model (equation for grant relativities), not the regression model functions, such as waste management services (Jones, 1993). Another is that the productivity gains made possible by attaining an optimal scale of operations are generally found to be less significant than those that could result from an improvement in managerial efficiency. Yet another is that the entire issue of economies of scope in local public sector services is ignored. (equation for efficiency). Further, an additional focus in the single equation regression is the relative importance of grant relativities (as represented by standardised unit expenditures) as compared to physical disabilities as a determinant of efficiency.

Estimated coefficients, standard errors and elasticities (calculated at the means) are presented in Table 5. Over the 166 local government library services, the level of grants (*STD*), population distribution (*DIST*), and the proportion of non-residential (*NRES*) and student (*STUD*) borrowers are found to be a negative, though insignificant influence on relative efficiency. The proportion of borrowers who are aged (*AGE*) is also insignificant and does not conform to the *a priori* sign, and only the coefficient on the proportion of users from a non-English speaking background is significant and conforms to the hypothesised sign. However, a Wald test statistic [$W = 25.4057 \sim \chi^2(5)$] with chi-square distribution rejects the null hypothesis of the joint insignificance of the disability factors at the .01 level.

Table 5 also presents the results of separate tobit regressions where local governments are divided into two groups. The first group consists of those councils with standardised unit costs (relative grant) lower than the state standard, while the second consists of those with a relative grant higher than the state standard. All other things being equal, it is hypothesised that the statutory requirements of awarding a minimum grant, and the practice of the NSWLGCC of not allowing for negative disability factors, implies that councils with a low standardised unit cost will receive a grant in excess of disability requirements. It is suggested that most of the councils in this category will receive a grant either at or slightly above the statutory minimum, and that this overcompensation may have an adverse affect on incentives to minimise input usage.

The main difference in this regression is that the coefficient on financial assistance grants is significantly different from zero at the .01 level. The calculated elasticities also suggest that, at the margin, the grant system may exert a greater negative influence on technical efficiency (-0.558) than the disabilities posed by a council having a high proportion of NESB users (-0.129), or having a sparsely distributed population (-0.086). As anticipated, the influence of the grant systems is not significant for those councils with a higher than state standard unit cost, where the grant system may only partially, if at all, cover the imposed disabilities in councils' operating environments. Despite the low individual levels

Table 4. Estimates of Simultaneous Equations Tobit Models

Library Services			Waste Management Services			Planning and Regulatory Services		
Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
<i>Equation for Grant Relativities</i>			<i>Equation for Grant Relativities</i>			<i>Equation for Grant Relativities</i>		
Constant	-0.3581	1.6899	Constant	0.7996	104.1500	Constant	-0.1600	0.7854
UNIT	***0.2428	0.0027	UNIT	-0.0064	0.2919	UNIT	***0.4164	0.0418
DIST	0.0012	0.1885	OCC	-41.7966	6441.0000	GRO	34.6684	23.1800
NESB	3.6160	53.2530	DENS	1.0748	236.4100	DEV	0.0035	0.0543
NRES	1.8785	24.0310	DIST	-1.0730	179.3200	HER	0.5374	0.3332
AGE	3.8227	58.3320	DISP	-1.8571	439.2400	NRES	7.2945	30.5920
STUD	13.1101	135.2000	EFF	-3.1302	299.2200	DIST	0.0581	0.0491
EFF	5.1770	58.8670				NESB	3.6426	4.1351
						EFF	1.7613	2.3758
<i>Equation for Efficiency</i>			<i>Equation for Efficiency</i>			<i>Equation for Efficiency</i>		
DIST	***-0.0012	0.0003	OCC	***-38.4520	4.6387	GRO	2.7248	3.4551
NESB	***-4.6865	0.3729	DENS	***-0.9155	0.3466	DEV	0.0011	0.0121
NRES	***-1.9029	0.3296	DIST	***-1.2597	0.3070	HER	***-0.1394	0.0375
AGE	***-4.6169	0.4620	DISP	** -1.3603	0.5828	NRES	** -5.6633	2.8721
STUD	***-12.1560	0.3948				DIST	***-0.0026	0.0006
						NESB	***-3.4642	0.4498
<i>Disturbances/Correlation</i>			<i>Disturbance/Correlation</i>			<i>Disturbance/Correlation</i>		
σ_1	***0.2094	10.8940	σ_1	0.0042	75.8040	σ_1	0.3809	0.4148
σ_2	5.1236	0.0104	σ_2	***3.2272	0.0312	σ_2	***2.9487	0.0386
$\rho[\varepsilon_1, \varepsilon_2]$	***0.9522	0.2230	$\rho[\varepsilon_1, \varepsilon_2]$	***-0.8767	0.0902	$\rho[\varepsilon_1, \varepsilon_2]$	***0.6359	0.1639
<i>Log-Likelihood</i>			<i>Log-Likelihood</i>			<i>Log-Likelihood</i>		
	-270.8715			-670.6213			-336.3636	

of significance for the disability coefficients, Wald chi-square tests likewise reject the null hypotheses of joint insignificance; at the .05 level for lower than standard unit cost councils [$W = 14.2913 \sim \chi^2(5)$], and at the .01 level for councils above the state standard [$W = 16.7177 \sim \chi^2(5)$].

The second three columns in Table 4 present the coefficients and standard errors where waste management disability factors and waste management technical efficiency are included as explanatory variables for waste management grant relativities, and where efficiency is assumed to be endogenously determined by grants and an identical vector of waste management disabilities. A log-likelihood ratio test of the restriction that all the slope coefficients are jointly zero [$LR = 2.1226 \sim \chi^2(5)$] is not significant at any conventional level. Unlike the earlier results, no individual coefficients in the grant relativities equation are significant. Technical efficiency in waste management service is also insignificant. Moreover, there is no significant relationship between the actual unit costs of waste management services in local government, and the notional costs calculated by the grants commission. Scrutiny of the correlation coefficients reveals that though unit costs are positively rank correlated (0.6351), there is a negative product-moment correlation (-0.3608). Standard tests for the homogeneity of mean and variance for these variables are also rejected [(SSB/K-1)/(SSW/N-K) = 24.049 $\sim F(1, 206)$, $B = 185.48 \sim \chi^2(1)$]. Analysis of the means of these two measures confirms that the standardised unit costs calculated for the purpose of grants (\$154.29) is almost twice as high as actual unit costs (\$68.37). Whilst it is not possible to speculate on the actual distribution of grants for this purpose, it can be argued that the grants methodology may overly compensate councils for imposed disabilities in what is ostensibly a highly competitive local government service.

Furthermore, despite the Commission's stated methodology for calculating disability factors in waste management services, the vector of explanatory variables appears to be virtually unrelated to actual calculated outcomes. One possible source of this lack of association may be that negative disability factors are not calculated for a large number of councils and that this serves to reduce the explanatory power of the model as a whole. Another source could well be the lack of correlation between actual and notional costs in waste management services as discussed above.

The estimated coefficients, standard errors and elasticities (at the means) for the second single-stage tobit regression are presented in Table 5. Over the entire sample, neither grants nor the disability factors are individually significant. It is only in the case of councils with lower than state standard unit costs that the disability factors influence the level of technical efficiency. The estimated coefficients on population density (*DENS*) and distribution (*DIST*) are both negative and significant, with the marginal effect on efficiency being higher for population density (-0.365) than population distribution (-0.106). These elasticities conform with the relative weightings of these factors in the NSWLGCC calculations. However, in councils with a higher than state standard unit cost there is no significant influence on efficiency in waste management

services from the hypothesised disability factors, either individually or jointly [$W = 1.9313 \sim \chi^2(6)$]). Although the LGGC bears no regard to the impact of disability factors on technical efficiency in councils, it could be inferred that the hypothesised disability factors may be overemphasised in grant relativities based on standard unit costs.

The final three columns in Table 4 relate to the simultaneous equations tobit regression results for planning and regulatory services in 104 New South Wales local governments. In the first equation, standardised unit costs (grants) for the planning and regulatory function are regressed upon the notional unit costs (*UNIT*), population growth rate (*GRO*), an index of development activity (*DEV*), a measures of heritage/environmental sensitivity (*HER*), the proportion of non-residential building activity (*NRES*), population distribution (*DIST*), and the proportion of the population from a non-English speaking background (*NESB*). Of these variables, only the coefficients on unit costs and heritage/environmental sensitivity are significant and conform to the *ex ante* sign.

A log-likelihood ratio test with chi-square distribution [$LR = 13.808 \sim \chi^2(8)$] rejects the null hypothesis of joint insignificance of the slope coefficients at the .10 level. Once again, the coefficient on technical efficiency is negative, though insignificant. The value of rho ($\rho \sim t_{N2}$) is significant at the .01 level, thereby rejecting the null hypothesis of exogeneity and suggesting that technical efficiency is endogenously determined by the level of grants. However, unlike the previous two functions, not all the coefficients in the second equation are significant. In particular, the measures of population growth (*GRO*) and development activity (*DEV*) are an insignificant influence on the level of efficiency.

With this in mind, the second single equation tobit model is constructed with technical efficiency regressed upon grants and imposed disability factors. The estimated coefficients, standard errors and elasticities (at the means) are contained in Table 5. A Wald test statistic [$W = 16.7189 \sim \chi^2(6)$] rejects the null hypothesis of the joint insignificance of the disability factors at the .05 level, although only the proportion of residents from a NESB is individually significant. The sign on grants is significant and negative suggesting that the grants methodology employed promotes inefficiency in planning and regulatory services. This effect would appear to hold whether councils are above or below the state standard unit cost. However, only in the case of councils receiving close to the minimum grant is the proportion of the population from a NESB a significant negative influence on efficiency: Wald tests of the joint insignificance of the disability factors on measured efficiency are rejected at the .01 level for councils with a lower than state standard unit cost (grant) [$W = 17.7034 \sim \chi^2(6)$] and fails to be rejected for councils with a higher than state standard unit cost [$W = 4.4361 \sim \chi^2(6)$].

Table 5. Grants and Disabilities as Efficiency Determinants

<u>Library Services</u>									
	All Councils (<i>n</i> = 166)			Councils with Lower than State Standard Unit Cost (<i>n</i> = 118)			Councils with Higher than State Standard Unit Cost (<i>n</i> = 48)		
	Coefficient	Standard Error	Elasticity	Coefficient	Standard Error	Elasticity	Coefficient	Standard Error	Elasticity
Constant	*1.6869	0.9525		**2.8426	1.3491			1.5331	
STD	-0.0001	0.0027	-0.0014	***-0.0916	0.0303	-0.5581	0.0001	0.0030	0.0032
DIST	-0.0024	0.0137	-0.0073	*-0.0300	0.0154	-0.0862	***-0.1091	0.0344	0.2917
NESB	***-4.0749	1.0484	-0.2311	** -4.0734	1.8590	-0.1299	-2.0961	1.4718	-0.2669
NRES	-0.8114	1.1118	-0.0323	-0.8123	1.8442	-0.0168	0.0601	1.4602	0.0057
AGE	2.0630	2.4316	0.2301	3.1601	3.0233	0.2985	0.7267	4.8076	0.1006
STUD	-0.6325	3.4092	-0.0802	-1.0807	4.7722	-0.1182	1.4876	5.2002	0.2238
	Log-likelihood 34.7103; Wald chi-square statistic for disability factors 25.4057.			Log-likelihood 33.7926; Wald chi-square statistic for disability factors 14.2913.			Log-likelihood 12.4904; Wald chi-square statistic for disability factors 16.7177.		
<u>Waste Management Services</u>									
	All Councils (<i>n</i> = 104)			Councils with Lower than State Standard Unit Cost (<i>n</i> = 66)			Councils with Higher than State Standard Unit Cost (<i>n</i> = 38)		
	Coefficient	Standard Error	Elasticity	Coefficient	Standard Error	Elasticity	Coefficient	Standard Error	Elasticity
Constant	***1.5440	0.5582		0.7069	0.7124		**3.3530	1.5475	
STD	0.0002	0.0008	0.0212	0.0024	0.0040	0.1610	-0.0005	0.0011	-0.0838
OCC	2.7138	18.6420	0.0482	15.5790	25.2060	0.2509	-43.7370	45.8450	-0.8424
DENS	-1.0102	0.6604	-0.1812	** -2.5483	1.0897	-0.3657	-0.6461	0.9849	-0.1476
DIST	-0.6090	0.5628	-0.0391	*-1.2802	0.7037	-0.1063	0.1655	1.0203	0.0043
DISP	0.4773	1.5840	0.0864	3.4896	2.5269	0.5749	-0.8448	2.1616	-0.1648
	Log-likelihood -39.4109; Wald chi-square statistic for disability factors 3.4368.			Log-likelihood -24.5954; Wald chi-square statistic for disability factors 6.9682.			Log-likelihood -11.6530; Wald chi-square statistic for disability factors 1.9313.		

Table 5. Grants and Disabilities as Efficiency Determinants (contd)

Planning and Regulatory Services									
	All Councils ($n = 128$)			Councils with Lower than State Standard Unit Cost ($n = 98$)			Councils with Higher than State Standard Unit Cost ($n = 30$)		
	Coefficient	Standard Error	Elasticity	Coefficient	Standard Error	Elasticity	Coefficient	Standard Error	Elasticity
Constant	***2.0365	0.3267		***1.7373	0.4503		***2.5765	0.9823	
STD	-0.0229	0.0136	-0.1484	-0.0013	0.0331	-0.0043	0.0237	0.0387	0.4341
GRO	13.0630	8.0610	0.0677	14.2930	11.9750	0.0540	10.1600	19.9250	0.1029
DEV	0.0193	0.0182	0.1028	0.0276	0.0368	0.0964	-0.0368	0.0499	-0.4410
HER	0.1192	0.1150	0.1005	0.1906	0.1389	0.1429	-0.3620	0.2767	-0.3980
NRES	7.5717	8.3506	0.0717	9.2918	10.2550	0.0744	9.0275	18.3360	0.1264
DIST	-0.0139	0.0175	-0.0254	-0.0131	0.0216	-0.0203	0.0153	0.0338	0.0406
NESB	***-2.8534	1.0193	-0.1174	***-3.3085	1.0918	-0.1254	-3.1131	4.9091	-0.1503
	Log-likelihood -54.9952; Wald chi-square statistic for disability factors 16.7189.			Log-likelihood -39.6514; Wald chi-square statistic for disability factors 17.7403.			Log-likelihood -12.1213; Wald chi-square statistic for disability factors 4.4361.		

6. CONCLUDING REMARKS

The results emerging from the current analysis are threefold. First, the hypothesis that the NSWLGGC's grant methodology, either explicitly or implicitly, rewards efficient or inefficient councils has not been supported. While relative grants to councils do vary according to certain factors relevant to microeconomic efficiency measurement, these same factors are generally categorised as 'nondiscretionary' or 'contextual' and thereby reflect conditions that are imposed upon local governments' operating environments. Therefore specific allowances to accommodate these factors are entirely consistent with the NSWLGGC's stated objective of horizontal fiscal equalisation, and the absence of any systematic influence of council policy-related decisions on grants vis-à-vis efficiency, maintains the assumption of effort neutrality.

Second, and irrespective of the finding of effort neutrality, grants appear to exert a negative influence upon efficiency. However, contrary to the grant illusion literature where inefficiency is thought to arise in councils relatively dependent on grant income, inefficiency in the NSWLGGC grants system appears to arise from restrictions on the process of horizontal fiscal equalisation; namely, minimum grant requirements and the failure to calculate non-positive disabilities. Put simply, councils with a high standardised unit cost (grant) flowing from a broad range of disability factors appear to be given appropriate fiscal allowances under the present grants system, whereas councils with a low standardised unit cost (grant) derived from a small number of disabilities tend to be either under or over-funded. For example, the statutory requirement of a minimum per capita grant implies that some councils are receiving expenditure allowances in excess of notional requirements, thus promoting inefficient behaviour.

Equivalently, the failure of the grants system to calculate negative disabilities for councils with disability levels lower than the state standard (ie. proportion of aged, children, NESBs, etc.) implies that the goal of full horizontal equalisation is not being realised. Moreover, inefficiency may also arise from a council only having a small number of individual disabilities, implying a relatively low grant. For instance, the weighting system used for individual disabilities, and the process of averaging used to calculate an overall disability factor, limits the positive effect of individual disabilities on grant income. However, the influence of grants upon measured efficiency varies significantly across councils and council functions, suggesting that other factors are at play.

These findings are particularly important because it provides evidence concerning the interplay between the productive performance of local governments and the revenue-raising system under which they operate. While this paper has only addressed the issue of intergovernmental grants, it is possible that other revenue-raising devices may also exert an influence on local government efficiency. For example, while rate revenue is subject to rate-pegging and other controls, fewer restrictions are placed on local governments' use of user charges and fees and contributions. Ease of access and the growing importance of these

alternative sources of revenue means that local governments may be able to prop up inefficient operations from sources other than grants. Alternatively, the use of user pays systems such as these may actively promote efficient outcomes in local government services. Whether the level and composition of own-source non-rate revenue has a systematic influence on productive efficiency is an empirical question that needs to be addressed.

Finally, one factor that the grants methodology may need to take account of lies the nature of scale economies in local public services. Notwithstanding the social, geographic, political and institutional barriers that may prevent structural reform, there is still the requirement that the grants system take account of these factors and ensure that the objective of horizontal fiscal equalisation is fully realised. A significant issue is that some local government functions are subject to increasing returns-to-scale, and therefore experience a falling average cost. Another interesting question resides in the fact that some councils may be 'forced' to operate at a larger than optimal scale in order to provide a prescribed level of service. Issues of scale should therefore be incorporated into the NSWLGGC's grant methodology, in order to appropriately compensate for these effects. However, there is also the suspicion that the current grants system's failure to allocate grants in a manner consistent with full horizontal fiscal equalisation may require some councils to operate at a smaller than optimal scale of operations, or may assist others in sustaining a larger than optimal scale. These questions are equally deserving of attention.

At least three caveats should be added to these general conclusions. First, given the diminishing magnitude of grants as a proportion of total revenue in NSW local government, and the concomitant growing significance of other factors, especially 'rate-pegging', the scope for the grants mechanism to enhance the efficiency of service delivery in NSW local government may be limited. Secondly, our results were derived from performance indicator data collected and published prior to the IPART (1998) Final Report. If the recommendations advanced by IPART are followed in the compilation of future performance indicators which more accurately reflect the behaviour of councils, then this materially affect the outcomes of empirical investigations exemplified by this study. Finally, the results obtained differ in some respects from those of an earlier, but similar, study of NSW local government libraries by Worthington (1999). In that study [also used in IPART's (1998) final report] the nondiscretionary factors used in the analysis of library services were incorporated *directly* into the DEA program itself, rather than by using a second-stage regression. While the two approaches are theoretically consistent, the emphasis in the present paper on quantifying the relative impact of physical disabilities on efficiency necessitated the latter approach, and thereby accounts for some variation in results.

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