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**DO ECONOMIES OF SCALE EXIST IN AUSTRALIAN
LOCAL GOVERNMENT? A REVIEW OF THE
EMPIRICAL EVIDENCE**

by

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DO ECONOMIES OF SCALE EXIST IN AUSTRALIAN LOCAL GOVERNMENT? A REVIEW OF THE EMPIRICAL EVIDENCE

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Abstract

The 1990s witnessed a major era of structural reform in Australian local government. Amalgamation programs in all six states resulted in a substantial decrease in the number of local authorities in Australia. The chief rationale underlying local government mergers lay apparently in the belief that larger municipalities would exhibit greater economic efficiencies. Despite its widespread acceptance amongst policy elites, this argument did not derive from a solid empirical base. This paper seeks to evaluate available empirical evidence on the controversial question of economies of scale in Australian local government.

Key Words: amalgamation; economies of scale; local government

DO ECONOMIES OF SCALE EXIST IN AUSTRALIAN LOCAL GOVERNMENT? A REVIEW OF THE EMPIRICAL EVIDENCE

Introduction

Public sector reform over the past decade has affected all tiers of government in Australia, including local government. The major and most controversial dimension of municipal reform in Australia over this period has been the policy of restructuring through the amalgamation of small councils into larger local government authorities. The rationale for amalgamation seems to derive from the widespread belief that larger local government entities would inevitably be more economically efficient than their smaller constituent elements. This view ‘...appears to have been universally accepted across all states that local government consolidation will result in reduced costs’ (Marshall, Witherby and Dollery 1999: 41).

Claims that ‘bigger is better’ in local governance rest on the assumption that municipal service delivery is characterised by considerable economies of scale and scope associated with greater population size. Thus larger councils are supposed to enjoy lower administrative costs, smaller costs of representation, increased purchasing power, improved use of depots, plant and equipment, a more diverse funding base, amongst many other purported advantages (IPART, 1998: ix). In principle, claims of this kind are eminently amenable to empirical resolution. It is thus somewhat surprising that extant empirical evidence on economies of scale in local government is not only mixed, but also limited. Indeed, in the recent NSW Government Inquiry into the structure of local government in Sydney, Commissioner Kevin Sproats (2001: 6 and 36) was obliged to observe that ‘conclusive evidence is not available’ and existing evidence is ‘suggestive rather than conclusive’.

Given the pervasive belief amongst many policymakers in the Australian local government community that larger councils are indeed more efficient, and given the fact that amalgamation is still an important policy instrument in attempts to reform Australian local government, it would seem apposite to review available empirical evidence on the existence or otherwise of economies of scale in local government. This forms the subject of the present paper.

The paper itself is divided into four main parts. The first section provides a synopsis of the three major approaches employed to measure economies of scale in local government. Section two reviews the international evidence, focussing on the methodologies employed. The third part of the paper surveys a number of recent Australian studies. Finally, the paper ends with some brief concluding remarks.

Alternative Empirical Approaches to the Analysis of Economies of Scale

The general problem in measuring economies of scale is to estimate the long run average cost curve for plants and firms in each market. One can then identify the minimum

efficient scale (MES), the gradient of the cost curve and the output at which diseconomies begin, should they exist. Shepherd (1990: 180) identified three means of measuring economies of scale: namely, engineering estimates, survivor tests and existing size distribution tests.

Firstly, the technique for making engineering estimates of economies of scale involves the assembly of expert opinions regarding costs in a particular industry. Researchers approach managers and engineers working within industry and seek their opinion regarding the optimal size of a plant in the long run. Having taken a sufficiently large sample, the researcher determines the 'best-practice' capacity of a plant for a given point in time. The obvious advantage of this technique is that it draws on the experience and expertise of those working within the industry under the pressure of the least cost constraint. However, a number of problems also arise from this method. The opinions gathered are subjective, since managers may naturally claim their particular plant to be the most efficient. The technique is arduous, requiring a great deal of labour intensive work to collate the data. Furthermore, it is not applicable to industries in which only a few firms operate since a large enough sample cannot be collected.

No formal studies using the engineering estimates technique have been conducted to test for economies of scale in the provision of services by local governments. However, Boyne (1995: 215) argued that "the British reorganisations of the 1970s were heavily influenced by an informal version of this method." In the context of local government, a problem with this technique lies in the fact that municipal councillors may be unwilling to advocate a change in the current size of local government operations for fear of jeopardising their present positions. In particular, if re-organisation of local government areas is on the political agenda, councillors are especially unlikely to provide an unbiased opinion for fear of the implications of their views. As Boyne (1995: 215) has argued "engineering studies are likely to be most useful for identifying economies of scale in local government at times when the need for this information is least urgent - when there are no plans for reorganisation".

Secondly, the survivor technique, first advanced by Stigler in 1958, 'relies on actual trends in plant sizes rather than on opinions' (Shepherd, 1990: 181). The methodology is quite simple. If firms of a certain size survive in the long run, then the assumption is that they must be efficient. The technique can be applied to one industry over a number of decades, or to a number of industries over a shorter period of time. However, a number of problems exist. The method does not exclude pecuniary economies, implying that allocative efficiency cannot be measured. It does not attempt to measure the shape of the cost curve, since it is only interested in the optimal size of the plant in that industry. Finally, data collected by the government, in accordance with accounting standards, may not conform to economists' measure of cost.

This technique has not been applied to test for economies of scale in local government. In Australia and most other advanced democracies, constituents do not have the option of voting their council out of existence. The only means of abolishing a council in Australia is through periodical reorganisations carried out by state governments. Given the

perpetual life of councils, one could argue that a council's financial state could be used as a proxy for survival. That is, those councils which maintain a balanced budget are deemed efficient, whilst those running a budget deficit are deemed inefficient.

The final method of testing for economies of scale is to estimate the existing size distribution of plants, which may indicate an optimal size of a plant. The advantage of this technique is that it seeks to measure the distribution of plant sizes, rather than a single optimal size. Thus, the researcher is able to estimate the long run average cost curve. This method has formed the standard technique economists have employed for testing for scale economies in local government.

International Evidence on Economies of Scale in Local Government

Most empirical studies conducted in the United Kingdom and United States use a mixture of cross-sectional and panel data to estimate a statistical relationship between size and the average cost of service delivery. A selection of such studies is presented in Table 1. All the studies reviewed in Table 1 are multi-variate models of expenditure variation, taking into account factors such as local social and economic circumstances. Some analyses also control for variations in the quality of the service provided. Most studies use population as a measure of scale. However, a few measure scale in terms of 'client group' size for a service, such as the number of school children in a local government area. All measures of expenditure are expressed in per capita terms. Functional forms differ throughout the sample of empirical studies in Table 1. A number simply estimate linear functions, whereas the more sophisticated studies make use of quadratic functions, which allow for both economies and diseconomies of scale over a range of output.

Overall, 29 percent of the empirical papers find evidence of U-shaped cost curves, 39 percent find no statistical relationship between per capita expenditure and size, 8 percent find evidence of economies of scale, and 24 percent find diseconomies of scale. From this evidence alone we can conclude that there is a great deal of uncertainty about whether economies of scale exist in local government service provision. As Newton (1982: 193) has observed, "we can conclude with confidence that, under certain not well understood circumstances, it may, or may not, be more, or less, economical to have larger, or smaller, local authorities. In short, it is not possible to make out a case against large authorities on grounds of diseconomies of scale."

Table 1 International Empirical Evidence of Scale Economies in Local Government

Author(s)	Data	Dependent variable(s)	Measure of output	Functional form	Major findings
Ahlbrant, Jr (1973)	44 city and fire districts in the Seattle-King Country area, 1971	Fire fighting expenditure	Population	Linear	No evidence of scale economies over a relatively large output
Alt (1971)	44 County boroughs in England and Wales, 1958/9-67/8	Education expenditure; social services expenditure; housing expenditure; police expenditure; fire fighting expenditure	Population	Linear	No evidence of scale economies in education expenditure; economies and diseconomies of scale in social services expenditure; no evidence of scale economies in housing expenditure; economies and diseconomies of scale in police expenditure; economies and diseconomies in fire fighting expenditure
Ashford et al. (1976)	All British counties and boroughs, 1967	Total expenditure	Population	Quadratic	Diseconomies of scale over range of output
Boaden (1971)	All British County boroughs, 1965/6	Social services expenditure; police expenditure; fire fighting expenditure	Population	Linear	Diseconomies of scale across range of output; economies and diseconomies of scale; economies and diseconomies of scale
Chicone et al. (1989)	417 rural Illinois jurisdictions, 1982	Rural road expenditure	Gravel road equivalent mileage	Quadratic	Economies and diseconomies of scale
Danzinger (1978)	77 British boroughs, 1960-69	Social services expenditure; police expenditure; fire fighting expenditure	Population	Linear	No evidence of scale economies across range of output in social services expenditure; diseconomies of scale in police expenditure; diseconomies of scale in fire fighting expenditure

Author(s)	Data	Dependent variable(s)	Measure of output	Functional form	Major findings
Davies et al. (1971)		Total expenditure	Population	Linear	Diseconomies of scale over range of output
Davies et al. (1972)		Total expenditure; social services expenditure	Population	Linear	No evidence of scale economies in total expenditure; economies of scale in social services expenditure
Foster et al. (1980)	County Councils and boroughs, 1972/3	Total expenditure; education expenditure	Population; number of school children	Linear	No evidence of scale economies in total expenditure; diseconomies in education expenditure
Gupta and Hutton (1968)	All British counties and boroughs, 1964-66	Social services expenditure; housing expenditure; rural road expenditure	Social services expenditure: population and number of social service recipients. Housing expenditure: number of people in public housing and population Rural road expenditure: population	Social services expenditure: quadratic and linear. Housing expenditure: linear and population Rural road expenditure: quadratic	For social services both economies and diseconomies of scale in quadratic function, diseconomies in linear function For housing expenditure economies of scale in linear function and both economies and diseconomies of scale in quadratic function For rural road expenditure both economies and diseconomies of scale

Author(s)	Data	Dependent variable(s)	Measure of output	Functional form	Major findings
Hirsch (1959)	27 St. Louis school district, 1951-52 and 1954-55; 64 St Louis police departments, 1955-56; 32 U.S. city fire departments, 1952-56; 87 St. Louis communities, 1955-56	Education expenditure; police expenditure; fire fighting expenditure; refuse collection expenditure	Number of school children; night-time population; night-time population; night-time population	Quadratic for education, police and fire fighting expenditure; linear for refuse collection	No evidence of scale economies in education and police expenditure; economies and diseconomies of scale in fire fighting expenditure; no evidence of scale economies in refuse collection
Hirsch (1965)	24 St. Louis cities and municipalities, 1960	Refuse collection expenditure	Number of pick-up units	Quadratic	No evidence of scale economies
Jackman and Papadachi (1981)	104 primary and secondary education authorities in England and Wales, 1978/79	Education expenditure	Number of school children	Linear	No evidence of scale economies
Kleinman et al. (1990)	Variations in housing capital expenditure of English local authorities, 1981/82-86/87	Housing expenditure	Population	Linear	No evidence of scale economies

Author(s)	Data	Dependent variable(s)	Measure of output	Functional form	Major findings
Lamont (1982)	Scottish housing expenditure between 1977-82	Housing expenditure	Number of people in public housing	Linear	No evidence of scale economies
McDavid (2001)	327 Canadian local governments, 1996/97	Residential solid-waste collection cost	Households served per truck	Linear	Economies of scale
Nicholson and Topham (1975)	423 authorities in Great Britain, 1962-68	Housing expenditure	Population	Linear	Economies of scale
Ostrom and Parks (1973)	United States per capita police expenditure, 1965	Police expenditure	Population	Linear	Diseconomies of scale
Pinch (1978)	Greater London boroughs, 1966-73	Housing expenditure	Population	Linear	Diseconomies of scale
Pinch (1980)	Greater London boroughs, 1966-73	Social services expenditure	Population	Linear	Diseconomies of scale
Schofield (1978)		Social services expenditure; police expenditure	Population	Quadratic	No evidence of scale economies in social services; economies and diseconomies in police expenditure
Smet and Nonneman (1998)	1011 Flemish secondary schools, 1994-95	Education expenditure	Number of students	Translog cost function	Economies of scale

Ashford (1976), Davies (1971), Davies et al. (1972) and Foster et al. (1980) take a rather broad brush approach to the question at hand by testing the relationship between total expenditure and the population of a local government area in Britain. Ashford (1976) and Davies (1971) find evidence of diseconomies of scale, whilst Davies et al. (1972) and Foster et al. (1980) find no significant relationship size and total expenditure. Studies of housing expenditure reveal just how uncertain researchers are regarding economies of scale in local government. Of the six studies, Alt (1971), Kleinman et al. (1990) and Lamont (1982) find no relationship between size and housing expenditure, Gupta and Hutton (1968) find evidence of U-shaped cost curve, Nicholson and Topham (1975) observe economies of scale, and Pinch (1978) detects diseconomies of scale. This suggests that even where a relatively homogeneous good is being analysed, one cannot say with any certainty that economies of scale do or do not exist.

Analysis of fire fighting services reveals a similar pattern. Five studies have been undertaken within this field. Three suggest a U-shaped cost curve, whilst the remaining studies find, on the one hand, no relationship between size and expenditure, and on the other hand, diseconomies of scale. Even those studies of United Kingdom fire fighting services, which cover roughly the same period of time, generate conflicting results. Alt (1971) and Boaden (1971) find U-shaped costs curves, whilst Danzinger (1978) establishes evidence of diseconomies of scale.

Relatively little research has been undertaken regarding variations in the average cost of domestic waste collection. Hirsch (1959, 1965), who is somewhat of a pioneer in the field, studied waste collection in the American city of St. Louis, whereas McDavid (2001) investigated waste collection in Canada. In both studies Hirsch (1959; 1965) found no significant relationship between average cost and the number of bins collected, whereas McDavid (2001: 21) found that 'as households served per truck increase by one household, cost per household decreases by .66 cents'.

The primary criticism that can be levelled at the studies reviewed in Table 1 relates to their proxy for output. The economic theory of economies of scale holds that the average cost of providing a service or good is influenced by the output of that service or good. Thus, in order to determine whether scale economies exist in local government service provision, it is necessary to correctly measure cost and output. Most of the studies in Table 1 use population as a proxy for output. However, this is only a valid approach if it can be correctly assumed that population and output are positively correlated. Boyne (1996: 219) has argued that "population is probably a very poor proxy for service outputs". Most studies, according to Boyne, assume that service output is responsive to need and that population is an accurate indicator of total need for a local government's services. However, needs might be quite diverse across local government areas with similar populations. Consider, for example, two councils with identical populations, one in metropolitan Sydney, the other in regional NSW. If we accept that the median age of the population is higher in regional NSW than metropolitan NSW, it might be expected that aged care services are more important in the regional council than its metropolitan counterpart. Similarly, one might expect that the need for childcare is higher in metropolitan Sydney than in regional NSW.

Following this line of logic, Boyne (1996: 21) argued that:

service demands may also be positively correlated with population because large authorities tend to be 'central places' which are visited by shoppers, tourists and commuters. These visitors place extra demands on service provision, above and beyond those of the local inhabitants. This inflates the apparent level of expenditure per head of resident population in large authorities. If the denominator in expenditure per capita were adjusted to take account of non-residents' service demands, the positive correlation with population might disappear.

A second criticism relates to the measurement of cost. Although it may be valid to assume that total expenditure can be equated with total service cost, measuring total cost for a particular service is much less straightforward, especially the vexing problem of allocating overhead and administrative expenses to particular services. Shepherd (1990: 214) has put this argument as follows:

true overhead costs often cannot be assigned by objective economic criteria. Some sort of arbitrary rules can be used, but a fundamentally 'correct' allocation of costs often cannot be determined. Therefore specific cost assignments to specific products are often debatable.

A third criticism of the studies presented in Table 1 is that they do not differentiate between plant-level and firm-level economies of scale. The fact that a local government area has a large population says little about the size of the various capital inputs being used to produce goods and services. It may well be, for instance, that a large council uses many relatively small graders to maintain its rural road network. The fact that diseconomies of scale are found could simply reflect a situation in which the council employs an inappropriately small capital stock. Thus by examining the relationship between per capita expenditure and population it is difficult to establish the cause of changes in per capita expenditure.

Finally, with the exception of Gupta and Hutton (1968), none of the studies in Table 1 make mention of the long run. In order for the tests to adequately measure economies of scale, the period of time must be sufficiently long to allow for all inputs to be variable. Whereas this may be the case in a number of the studies, almost no mention is made of this important point and, as a result, we cannot be certain that economies of scale are being measured, rather than returns to scale.

Australian Evidence on Economies of Scale in Local Government

Despite the broad range of functions carried out by local government in Australia, and the considerable expenditure dedicated to these functions, empirical research on economies of scale is scarce. Table 2 lists nine published studies to date. We will examine this body of empirical work in terms of the estimation technique employed, either regression analysis or comparison of partial indicators.

Regression Analysis

Of the seven studies in this category, five employ ordinary least squares as a means of determining whether the size of a local government explains variation in the cost of providing a range of services.

South Australian Department of Local Government (1988)

In 1988, the South Australian Department of Local Government prepared a report entitled 'Scale Economies in South Australian Local Government' with the stated aim of estimating 'the scale economies of a range of expenditure functions of South Australian Local Government and to assess the relationship between the size of Local Government, the number of functions it performs, and the support it receives from Commonwealth and State Governments through grants and subsidies' (SADLG, 1988: 3). The Department made use of data pertaining to various lines of expenditure in 123 South Australian councils, excluding that of the City of Adelaide. The data is limited to the financial year 1984/85.

In essence, the authors sought to determine whether 'scale economies' existed in a range of local government functions. For the functions of administration, household garbage, drainage, road construction and maintenance and recreation and culture, the measure of scale employed was population. The study also regressed overhead expenditure against population. For drainage and recreation and culture, the authors also used the area in square kilometres as a measure of scale. Finally, for road maintenance and construction, total road length was employed as a proxy for output. If the average expenditure of a function fell as the measure of scale increased, then the authors concluded that scale economies existed within that function. Based on this definition the following functions showed evidence of scale economies: administration, overheads, drainage and road construction and maintenance.

The primary criticism that could be made of this study is that the authors ran bi-variate, rather than multi-variate, tests of the relationship between size and per capita expenditure. The study did not attempt to control for environmental factors brought about by the diversity that exists between local governments. As a result the effect of size upon per capita expenditure may have been overstated. Without controlling for other variables that may have a significant relationship to the dependent variable there is no way of determining if this is indeed the case.

Local Government Commission (1986)

A similar, although somewhat more robust, study of economies of scale in local government service provision was conducted by the Local Government Commission (LGC) of Victoria in 1986. It used data on administrative costs, excluding overheads, for 175 Victorian councils in the financial year 1983/84.

The LGC chose population as their proxy for output. The Commission split councils into two groups: metropolitan municipalities and rural shires. In both cases the statistical technique involved regressing per capita administration expenditure against the log of

population. In the case of metropolitan municipalities, a significant negative relationship was found to exist between per capita administrative expenditure and population with a coefficient of determination of 0.57. For rural shires, a negative relationship was also found to exist, with a coefficient of determination of 0.44. When analysing the data for the whole state, a similar negative relationship was established, with a coefficient of determination of 0.52. Based on these results, the Commission concluded that ‘there is clear proof that such economies do exist in relation to administration expenses; and the evidence indicates that the economies are significant, especially at the lower end of the scale’ (LGC, 1986: 22).

A major criticism that can be made of this study is that it failed to control for factors that may contribute to the relationship between population and the variability in administrative expenditure per capita. The Commission did, however, attempt to control for diversity in population density by splitting the log of population into five equal parts and also by taking the range within one standard deviation of the mean log population density. The Commission found that ‘in every category there was a statistically significant relationship between administration expenses per head and size’ (LGC, 1986: 24).

Victorian Grants Commission (1985)

The Local Government Commission study discussed above was pre-dated by the Victorian Grants Commission (VGC) study of scale effects in 1985. The impetus for the study was a request by the then Minister for Local Government, the Hon. Frank Wilkies, who took the view “that for local government to truly develop and advance in this state, its structure must change” (VGC, 1985: 3).

Table 2 Australian Empirical Evidence of Economies of Scale in Local Government

Author(s)	Data	Estimation Technique	Dependent variable (s)	Explanatory variable(s)	Major findings
Abelson (1981)	36 local government authorities in metropolitan Sydney, 1976	Multiple regression analysis	Total expenditure per household	Median household income; dependants as a proportion of LGA population; political affiliation; rate of growth of LGA; number of households; household density; Federal grants per household.	No evidence of scale economies
Institute of Public Affairs (1993)	210 Victorian councils, 1991	Comparison of partial indicators	Total expenditure	Population	Possibility of scale economies
KPMG (1998)	177 local governments in NSW, 1995/96	Comparison of partial indicators	Total expenditure	Population	Potentially large 'cost savings' from wholesale amalgamation.
Local Government Commission (1986)	175 Victorian councils, excluding City of Melbourne, Shire of Flinders and Shire of Phillip Island, 1983/84	Simple regression analysis	Per capita administrative costs, excluding overheads	Population	Economies of scale found in administrative expenditure.
Musgrave et al. (1985)	24 NSW small, rural shires, 1979-80	Simple regression analysis	Total expenditure per capita excluding new fixed capital expenditure	Population	Limited evidence of 'economies of size'
Office of Local Government (1993)	All Victorian councils, excluding City of Melbourne, 1991-92	Simple regression analysis	Total expenditure per capita	Population	Evidence of economies of scale in metropolitan, provincial and rural shires

Author(s)	Data	Estimation Technique	Dependent variable (s)	Explanatory variable(s)	Major findings
S.A. Dep't of Local Government (1988)	123 councils in S.A., excluding City of Adelaide, 1984/85	Simple regression analysis	Total Expenditure upon Administration; overheads; household garbage; road construction and maintenance; recreation and cultural and level of outside grants and subsidies received	Population; area and total road length	Scale economies found in the following areas of expenditure: administrative; overhead ; drainage ; road and grants and subsidies received.
Soul (2000)	177 NSW local government areas, 1995/96	Simple regression analysis	Gross expenditure per capita and expenditure per capita on economic services	Population	Evidence of economies and diseconomies of scale
Victorian Grants Commission (1985)	All Victorian councils, 1982-83	Simple regression analysis	Per capita expenditure on; administration; street cleaning; community and regional development; recreation and culture; debt servicing and capital equipment	Population	Economies of scale found in all functions.

Part of this request was for the Commission to determine whether ‘any clear trends (were evident) which indicate financial savings in administration costs or the provision of economic services’ (VCG, 1985: 21). In order to answer this question, the authors regressed actual administration expenditure per capita, including overheads, against population for all Victorian local governments. They found a negative relationship, the absolute value of the coefficient of correlation being 0.7705, significant at 0.01 probability level.

The Commission considered that smaller municipalities might have higher administration costs as a result of performing proportionately more functions than their larger neighbours. To control for this, the number of functions for these councils was restricted. However, a similar relationship was detected.

The Commission then sought to determine whether the provision of economic services became more efficient as the size of a council increased. They chose as their dependent variables: expenditure on street cleaning; community and regional development; recreation and culture; and debt servicing. Each was regressed against population. Per capita expenditure was found to have a negative relationship to population with the Commission concluding that ‘the costs of a number of significant services provided by metropolitan municipalities decrease significantly with increases in size’ (VGC, 1985: 28).

It would seem that the Commission chose rather inappropriate proxies for output for at least two of the ‘economic services’. In particular, it is difficult to imagine that the population of a given council is a good proxy for output in street cleaning services. Perhaps total kilometres of road length would be a better indicator. Furthermore, the amount of debris that accumulates on streets may have little to do with the permanent population of a council. To the contrary, it is conceivable that a so-called transitory population may be at least a contributing factor. The use of population to measure output is also questionable when considering expenditure on community and regional development. Although this category is not defined by the Commission, one would imagine that a better proxy might be the rate of growth in population, since a growing council is more likely to invest in development than a council in which population is declining.

Abelson (1981)

Abelson (1981) was the first to construct a multi-variate model in order to test for evidence of economies of scale in local government expenditure. He chose as his dependent variable total council expenditure per household and regressed this against the following explanatory variables: median household income; dependants as a proportion of Local Government Area (LGA) population; political affiliation; rate of growth of LGA; number of households; household density and the amount of Federal grants per household. The data set encompassed 36 LGA’s in metropolitan Sydney in 1976.

Using the number of households as the measure for scale, the statistical model did not find any evidence of a relationship between total expenditure per household and the size of an LGA. Although Abelson (1981) did include a number of variables in the model in order to accommodate diversity among LGA's, the primary weakness of his study is that total expenditure cannot be seen in any sense to be a homogeneous entity. The finding that no relationship was detected between the size of a council and total expenditure per household may be due to the likelihood that the expenditure per household on some services may increase as a council increases in size, whilst average expenditure on others may decline. Perhaps a better approach would have been to desegregate total expenditure and then determine how expenditure on particular services varies with size.

Office of Local Government (1993)

The Office of Local Government (OLG) in Victoria published a report entitled 'Structure and Efficiency: Improving Local Government Efficiency' in 1993. One of the areas the report sought to address was the long running debate regarding the relationship between the size of a council and its economic efficiency. In an attempt to settle the issue, the OLG undertook a statistical analysis similar to those carried out by the VGC (1985) and LGC (1986). The technique employed was simple regression analysis of total expenditure per capita against population. The authors split all Victorian councils into three groups: metropolitan, provincial and rural. This was done in order to compare council performance where a roughly similar range of functions is carried out. Total expenditure per capita was shown to have a significant negative relationship to population in all three categories.

The OLG (1993) Report is susceptible to the same criticism as its predecessors. That is, the analysis did not include explanatory variables that might be correlated with population and, as a result, it is not possible to be confident that an increase in population alone is responsible for a lower per capita expenditure. A further criticism that can be made of the Report's methodology is that the authors did not assume a range of functional forms. By simply assuming a linear relationship between average total expenditure and population, this does not allow for the possibility of diseconomies of scale. One means of addressing this weakness is to assume a parabolic relationship, which might reveal an increase in average total expenditure beyond some population level.

Musgrave et al. (1985)

Musgrave et al. (1985) sought to address the limited argument that smaller rural shires in NSW were less efficient in their delivery of services than their larger counterparts. Consequently, the data set was confined to 24 small NSW rural shires which the authors thought might be prime targets for amalgamation. Their analysis spans the financial year 1979-80.

One particularly interesting aspect of this research was the attempt to select *ex ante* statistically plausible proxies for output. The relevant variables were found to be: total

population; population density; area of council; altitude; ratio of outdoor staff to total staff and ratio of road expenditure to the value of plant (Musgrave et al., 1985: 56). The authors concluded that total population was the best proxy for size and made use of this variable when constructing their statistical model.

Rather than using total expenditure per capita as their dependant variable, Musgrave et al. (1985) disaggregated total expenditure in order to exclude new fixed capital expenditure since this may be an indicator of a council experiencing growth, rather than some underlying inefficiency. The technique employed then was simple regression analysis of total expenditure per capita, excluding new fixed capital expenditure, against total population. The authors made use of three functional forms: quadratic, logarithmic and reciprocal, and found that regardless of which form is chosen, evidence of economies of size did exist within the sample over a range of output. A caveat noted, however, that the relatively low R-squared scores indicated that 'while the results do not indicate rejection of the hypothesis of economies of scale they do not provide strong support for it either' (Musgrave et al., 1985: 60).

Soul (2000)

Soul (2000) attempted to analyse the effect of size, measured by population, on two broad cost related categories; gross expenditure per capita and expenditure per capita on economic services. Soul (2000) included all 177 NSW councils in his data set, which spanned the financial year 1995/96. Making use of a logarithmic transformation of population, Soul (2000: 233) found that increasing population yields a lower level of gross expenditure per capita up to a council size somewhere between 100,000 and 316,000 people, at which point increasing expenditure per capita is experienced. Turning to per capita expenditure on economic services, Soul (2000: 246) once again found that increasing population yields a lower level of expenditure on economic services. However, once population reaches a point somewhere between 100,000 and 316,000 people, a higher level of per capita expenditure will be experienced.

Whilst both research efforts related to NSW have made use of more appropriate functional forms, the use of only one explanatory variable (population) leaves their conclusions open to a similar vein of criticism as their Victorian counterparts.

Comparison of partial indicators

Two studies of local government efficiency have made use of partial indicators to determine whether the size of a local government area, measured by population, has an impact on the cost of delivering good and services. In essence, this approach involves determining a benchmark against which all councils within a sample can be compared. The first of these studies was undertaken by the Institute of Public Affairs (IPA) in Victoria. KPMG Consulting undertook the second study, investigating NSW council efficiency.

Institute of Public Affairs (1993)

The IPA study makes use of partial indicators to compare and contrast per capita expenditure between all councils in Victoria during 1991-92. It found that the inner Melbourne council of Essendon had the lowest expenditure and rates per capita. The IPA then argued that if all inner city councils were as “efficient” as Essendon, and by extension reduced per capita expenditure to that level achieved by Essendon, then significant cost savings could be achieved. An implicit assumption of their approach is that Essendon’s efficiency arises from the fact that it has the largest population of all inner Melbourne councils. The IPA estimates that total expenditure for all inner Melbourne councils could be reduced by \$96m, or a 38 percent reduction in total spending per year (IPA, 1993: 13).

Moreover, the IPA study extended this principle to all councils in Victoria by repeating the process for subsets of councils. For example, all councils in Victoria were grouped into regional zones and within each zone an efficient peer was identified. If all councils within each of those groups reduced expenditure to that achieved by its efficient peer, then the total savings to be generated from reform were estimated at \$441m for the entire state.

The first criticism that can be made of this study is that it ignores the great diversity in functions performed by councils throughout Victoria. To assume that smaller rural shires perform exactly the same functions as their city counterparts is somewhat surprising. Furthermore, simply presuming that a lower per capita expenditure is a function of size alone discounts the possibility that larger councils may simply have more efficient means of delivering services. They may employ more appropriately skilled staff than smaller councils. The IPA does not investigate any other aspects apart from size and, as result, cannot say with any certainty that increasing the size of councils throughout Victoria will deliver lower per capita expenditure. One must also be mindful of the difference in the quality of the services delivered. Lower per capita expenditure may be a function of lower quality services. Perhaps a better approach would have been to compare a number of partial indicators alongside total expenditure per capita, in order to determine what role quality of service had to play in lowering expenditure.

The authors claimed that ‘considerable savings (might be made) from reduced administrative expenditure’ (IPA, 1993: 14). However, this rationale ignores the fact that by no means all of expenditure goes toward administration. Consequently, a first step in calculating potential savings is to discount the results for the proportion of expenditure that contributes to functions other than administration.

Finally, the IPA makes no reference to the costs associated with staff retrenchments or the opportunity cost of leaving fixed capital idle. These potential costs must be subtracted from the potential savings in order to calculate the net potential savings to be made from increasing the size of local government areas in Victoria.

KPMG Consulting (1998)

The Property Council of Australia (NSW Division) commissioned the second study. The KPMG (1998) Report sought to establish “benchmarks” in service delivery by councils throughout NSW and then determine the “cost savings” that could be made if all NSW councils met these benchmarks. Table 3 is an example of the methodology employed in this Report.

Table 3 Cost savings from amalgamation

Regional Organisations of Councils	Population	Expenditure (Exp.)((\$m))	Exp. per capita	Exp. savings per capita	Exp. reduction (\$m)	Exp. reduced (%)
Albury Wodonga	51,810	45.40	876.28	36.45	1.89	4.16
Central Coast	268,850	207.19	770.65	94.47	25.40	12.26
Central West	187,920	191.43	1018.68	209.34	39.34	20.55
Hunter	565,400	325.66	575.98	174.31	98.56	30.26
Illawarra	374,500	249.47	666.14	252.52	94.57	37.91
Inner Metro	380,600	272.23	715.27	130.54	49.68	18.25
Macarthur	215,200	94.98	441.36	51.95	11.18	11.77
Mid North Coast	101,810	65.73	645.61	53.96	5.49	8.36
Murray	33,340	39.26	1177.56	381.77	12.73	32.42
New England	75,350	73.72	978.37	255.98	19.29	26.16
Northern Area	118,530	153.17	1292.25	658.84	78.09	50.98
Northern Rivers	254,090	199.24	784.13	153.95	39.12	19.63
Northern Sydney	535,500	244.75	457.05	72.04	38.12	15.76
Orana	120,210	163.97	1364.03	541.89	65.14	39.73
Riverina Eastern	130,420	135.76	1040.94	263.53	34.37	25.32
Riverina	51,900	55.84	1075.92	300.05	15.57	27.89
Shore	246,520	128.25	520.81	69.73	17.17	13.39
South East	78,890	89.15	1130.05	221.43	17.47	19.59
Southern Sydney	1,124,900	509.08	452.56	127.38	143.30	28.15
Sydney Coastal	1,055,800	649.71	615.37	198.14	209.2	32.20
Western Sydney	1,191,550	486.86	408.59	65.11	77.58	15.93
Total	7,162,820	4,380.85	611.61	152.69	1,093.70	24.97

Source: KPMG (1998: 98), *Re-inventing Local Government In NSW*.

With reference to Table 3 the authors (KPMG, 1998: 98) observed that:

we have taken each individual [Regional Organisation of Councils] ROC and isolated the council with the lowest expenditure per capita as a potential gauge of efficiency. Based on this we have then identified the expenditure savings other councils within the ROC could potentially obtain in an amalgamated council. A total expenditure saving is then determined for each ROC. Based on this model for reform total savings across NSW local government could be as high as \$845 million out of a total cost of \$3,821 million.

McNiell (2000: 13) argued that this is a rather simplistic approach to calculating such savings. By way of example, McNiell (2000) disaggregated the New England ROC. The results are reproduced in Table 4.

Table 4 New England Regional organisation of Councils

New England ROC	Area (Sq. km)	Population Density 1977 (pop/area)	Population Growth % (5 year average)	Road length (Km)	LGGC Grant per capita (\$)	Operating Expenditure \$Per capita
Armidale	33.65	635.1	-1.09	170	73.45	850
Dumaresq	4,168.36	0.92	-0.08	799	214.65	2,130
Glen Innes	68.65	89.56	-0.91	104	152.55	1,290
Guyra	4,370.69	1.00	-2.39	865	276.95	1,560
Severn	5,826.08	0.52	-0.62	974	378.86	2,200
Tenterfield	7,123.52	0.93	-0.81	1,381	309.23	2,160
Uralla	3,214.51	1.85	-0.92	814	208.92	1,190
Walcha	6,409.91	0.52	-2.06	765	268.76	1,930

Source: McNiell (2000: 13), *'To Amalgamate or Not To Amalgamate'*.

McNiell (2000: 13) argued that:

the most glaring deficiency in this method of estimation is omission of any investigation of factors (other than “inefficiency”) which might explain why the per capita expenditures are higher in some councils. In the example, Dumaresq Shire is assumed to be two and a half times less efficient than Armidale, despite the fact that its population density is 0.92 persons per square kilometre and road length is 799 kilometre compared to Armidale’s 170 kilometres. As local government grants commissions in each State have been demonstrating since 1974, there are some very good reasons why per capita expenditures are higher in some areas than others, and “diseconomies of scale” is only one of them ... It is also unreasonable to create expectations within proposed amalgamation areas that, say, Armidale can continue to supply services at \$850 per head once amalgamated with Dumaresq.

Three generic criticisms can be made of the nine studies presented in Table 2. Firstly, all but one study considered factors that may be co-linear with population in explaining variations in the cost of providing services by local government. It could well be that a variable such as income changes with population and thus has a role in explaining variations in average cost or expenditure. Without including such variables in the model, the relative importance of population may be overstated.

Second, all except two of the studies assumed that total expenditure is an homogeneous entity across the relevant sample. This ignores the vast diversity in functions carried out by local government and thus makes comparisons between councils a risky exercise.

Finally, none of the studies addressed the issue of measuring economies of scale. All of the studies cited in Table 2 used data sets that span one year. In order for a study to examine economies of scale, the data set should cover a length of time sufficient for all factors of production to be varied. For the studies that used total expenditure per capita as their dependent variable, one could argue that a service, such as sewerage, which would be included under that heading, requires a longer period of time for capital to be a flexible input. Indeed, if council employees are hired on fixed term contracts of one year or more, even labour would become a fixed factor of production. It seems then that the nine studies cited above are not measuring economies of scale, but rather determining

how population affects short run costs. It could thus be argued that a correctly specified study of economies of scale in local government service provision has not been undertaken in Australia.

Concluding Remarks

This paper has sought to review the empirical evidence relating to economies of scale in the provision of local government services, both internationally and in the Australian context. Given the mixed results which emerge from the international evidence, it seems reasonable to conclude that considerable uncertainty exists as to whether economies of scale do or do not exist. A somewhat more detailed review of the Australian evidence was carried out. It was argued that Australian empirical studies to date have not attempted to measure economies of scale in so far as the data sets employed do not encompass a sufficiently prolonged period of time to allow for all factors of production to be flexible. Moreover, various other problems were identified in the studies.

The paucity of empirical evidence on the existence of significant economies of scale in municipal service provision casts considerable doubt on the wisdom of the widespread policy of local government restructuring in Australia. Advocates of amalgamation have premised their arguments on the proposition that substantial efficiency gains would flow from the formation of larger local authorities. It seems clear that the extant literature on economies of scale in municipal governance does not support this proposition.

Concerns have been expressed over the loss of democratic representation and accountability as a consequence larger amalgamated councils (Vince, 1997). These “equity” arguments have often been countered by “efficiency” arguments that are based on the purported economic benefits derived from restructuring. If economies of scale are not amongst the efficiency gains derived from amalgamation, then this severely weakens the case for local government restructuring in Australia. Proponents of amalgamation are thus obliged to rely on economies of scope and other factors in their advocacy of the efficiency-enhancing characteristics of restructuring.

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