

Administrative intensity in local government: Do administrative scale economies exist in New South Wales local government?

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Abstract

A vast empirical literature has investigated economies of scale in local service provision, especially in water and waste management. By contrast, the question of scale economies in local government administration has attracted much less attention, especially in Australian local government. To address this gap in the Australian empirical literature, we investigated administrative scale economies in the New South Wales (NSW) local government system for rural, regional, and urban local authorities over the period 2014/15 to 2017/18. We find that total municipal population and municipal staff exhibit a U-shaped relationship with the total administration costs of urban councils in NSW. However, we find no economies of scale for administrative intensity in rural and regional councils in NSW.

KEYWORDS

administrative intensity, Australia, economics/economic policy, local government, natural resource management, New South Wales, public administration and public management, regional policy/regionalization, resource management, scale economies

Related Articles

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The thorny question of optimum organizational size in public administration has long attracted the attention of public policy makers and scholars alike (see e.g., Narbón-Perpiñá & De Witte, 2018a, 2018b). In the local government realm, a voluminous empirical literature has investigated economies of scale in municipal service provision, both at the global level and in terms of specific local functions and local services, especially in urban transport, water, and waste management (Rogge et al., 2017). By contrast, much less effort has been directed at examining scale economies in municipal administration (see e.g., Andrews & Boyne, 2009; Elston & Dixon, 2020; Ting et al., 2014).

Following a pioneering paper by Andrews and Boyne (2009), empirical researchers have investigated the problem of economies of scale in local government (Ting et al., 2014). However, to date, no empirical work has been done on the problem in the Australian local government. Accordingly, the present article attempts to address this gap in the empirical literature on Australian local government by empirically examining administrative scale economies in the New South Wales (NSW) local government system over the four-year period 2014/15 to 2017/18.

The study itself has two main objectives. First, we seek to determine if administrative scale economies exist in local councils in NSW. Second, we investigate the linear and nonlinear effects of population and staff employed on the administrative costs of three groups of local authorities (rural, regional, and urban councils) in NSW.

The existence or otherwise of scale economies in administration has significant public policy ramifications. For instance, if administrative scale economies in municipal corporate centers are significant from the perspective of inducing cost savings, then public policy intervention aimed at increasing the size of local authorities through compulsory council consolidation may be warranted since it could increase the proportion of municipal resources available for front-line service delivery. Alternatively, policy makers could foster the establishment of joint board models where small local councils share a centralized administrative service center (Dollery & Johnson, 2007).

The article is divided into five main parts. We first briefly describe the NSW local government system by way of institutional background, and then provide a synoptic review of the scholarly literature on administrative scale economies and then develop testable hypotheses. The next section outlines the research methodology employed in the article, after which the results of the empirical modeling are presented. The study ends with some brief concluding remarks.

NSW LOCAL GOVERNMENT

In common with its counterparts in other Australian state and territory local government systems, NSW local councils have customarily focused mostly on "services to property," as

opposed to “services to people,” which are primarily the responsibility of the NSW government. “Services to property” typically include development approvals, local roads, and bridges, public recreational facilities, stormwater, as well as waste collection and disposal. Outside of metropolitan areas, sewage and water are provided by local authorities. However, over recent decades there has been a greater emphasis on “services to people” (Dollery et al., 2006), most notably aged care. For the fiscal year 2013/14, municipalities in NSW on average spent 17% of outlays on governance and administration. However, there are important differences in the expenditure of municipalities located in urban and rural areas. While metropolitan councils typically do not provide water and sewer services, all other municipalities, including those located in the metropolitan fringe areas, provide these services. Municipalities also provide human services such as aged care and childcare, as well as recreational and cultural services. Over 2013/14, community services accounted for 11% of aggregate expenditure while recreational and cultural services attracted 16% of total expenditure.

NSW local government is funded by a complex combination of property taxes, user fees and charges, fines, developer charges, and intergovernmental grants from the NSW and Commonwealth governments. NSW local government falls under the Local Government Act 1993 and the Crown Land Management Act 2016. Councils are overseen by the NSW Office of Local Government.

In 2016, a structural reform program in 2016 culminated in a reduction in the number of local authorities from 152 to the present 128 municipalities. Some regions of NSW (Lord Howe Island and the Far West Division)—known as “unincorporated areas”—do not fall under any local authorities and are instead administered directly by the NSW Government. The structural reform program merged all processes and services, including human resources, across the amalgamated municipalities involved. The compulsory council consolidation program resulted in disruptions to normal processes and the municipalities involved were given additional time to report their financial information. Some councils reported information for a longer time (e.g., 13 and half months), while others reported for shorter periods (for instance, nine-and-a-half months). Given these variations, the NSW Office of Local Government excluded the financial information reported by restructured municipalities in the comparative information compiled for the fiscal year 2016–17.

ADMINISTRATIVE SCALE ECONOMIES AND HYPOTHESIS DEVELOPMENT

A long-established empirical literature has investigated administrative intensity in American school districts, which are single-purpose rather than multi-purpose local public entities (see, e.g., Meier et al., 2000; Terrien & Mills, 1955). Administrative intensity has typically been defined as the ratio of administrative staff to production staff (Melman, 1951). However, with the exception of Andrews and Boyne (2009), as well as some other researchers (Haneda et al., 2012; Kalseth & Rattsø, 1995, 1998; Lewis, 2003, 2006; Ting et al., 2014), very little empirical work has been conducted on administrative efficiency in local government.

With respect to administrative scale economies, Andrews and Boyne (2009) found that population size has a negative effect on the costs of central administration in local government in Britain. By contrast, Ting and others (2014) established that population size has no effect on the administrative intensity of small and large urban local governments in the Malaysian state of Sabah but found that the staff employed have a nonlinear (inverted U-shaped) effect on the percentage of back-office costs. While researchers investigating Australian local government have examined various dimensions of scale economies in municipal functions, such as Carvalho and others (2015) and Marques and others (2015), to date administrative scale economies have not been examined empirically.

Bearing in mind that municipal administration and governance extend beyond simply the efficiency of service provision, in the present article we test several variants of two main hypotheses:

Hypothesis 1 *Population size affects the administrative intensity of all local councils in NSW.*

Hypothesis 1a *Population size has an influence on the administrative intensity of rural councils in NSW.*

Hypothesis 1b *Population size has an influence on the administrative intensity of regional councils in NSW.*

Hypothesis 1c *Population size has influence on the administrative intensity of urban councils in NSW.*

Hypothesis 2 *The number of employees has an impact on the administrative intensity of all local councils in NSW.*

Hypothesis 2a *The number of employees has an influence on the administrative intensity of rural councils in NSW.*

Hypothesis 2b *The number of employees has an influence on the administrative intensity of regional councils in NSW.*

Hypothesis 2c *The number of employees has an influence on the administrative intensity of urban councils in NSW.*

EMPIRICAL STRATEGY

Study period and sample

We considered the four-year period covering the 2014/15 to 2017/18 financial years. The initial sample for this study consists of all local government councils in NSW. As of 2018, there are 128 councils in NSW. These councils include 22 newly established councils after the 2016 amalgamation program. Due to a lack of financial information, these 22 councils are excluded from this study. Similarly, two other councils—Gwydir Shire Council and Maitland Council—have gaps in their financial reports for the study period of 2015 to 2018 and are thus excluded. The final sample consists of 104 councils.

The NSW Office of Local Government classifies councils into urban and rural councils based on population, population density, and location. In this study, we further divide urban councils into two groups based on their location. Councils in Metropolitan Sydney and its fringe areas are classified as urban for the purposes of this study. There are 24 urban councils in the final sample. Regional town/city councils are considered as a distinct group given their location and demographic characteristics. There are 31 regional councils in our final sample. Rural councils consist of large rural shire councils and small rural shire councils. The remaining 49 councils fall in this group.

Variables employed

Administrative intensity is captured through the main dependent variable administration cost in this study. Municipalities in NSW provide a varying mix of services. For instance, municipalities in metropolitan areas do not provide water or sewage services, which are provided by public utilities, like Sydney Water which delivers drinking water and other services relating to recycled water, wastewater, and stormwater. Municipalities in other locations often provide water- and sewage-related services.



In recent years, there has been a change in the composition of services provided by municipalities as they are given more responsibilities for services that were earlier provided by state and federal governments. Given the varying mix of services, municipal expenditure on services differs and often costs are inappropriately allocated to various activities. The financial statements prepared by municipalities are audited by the NSW Audit Office. Each year the NSW Auditor-General prepares a report on statutory financial audits of local government for the NSW parliament. According to these reports, there is significant progress in terms of standardizing financial reporting across local jurisdictions in NSW.

Data on local government expenditure in NSW is published annually by the NSW Office of Local Government under seven main categories: “Governance and Administration Expenditure”; “Public Order, Safety, Health, Water, and Sewer Expenditure”; “Environmental Expenditure”; “Community Services, Education, and Housing Expenditure”; “Recreational and Cultural Expenditure”; “Roads, Bridges, and Footpaths Expenditure”; and “Other Services Expenditure.” In this study, we consider the expenditure classified as governance and administrative expenditure as a proxy for administrative intensity. The earlier empirical studies of scale economies in municipal administration by Andrews and Boyne (2009) and Ting and others (2014) both used broad definitions of administrative expenditure in their analyses.

In our NSW study, given the nature of the published data available, we were obliged to use “Governance and Administration Expenditure” as our measure of administrative outlays, even though it is a more restrictive measure of expenditure than those employed by Andrews and Boyne (2009) and Ting and others (2014). In NSW local government “Governance and Administration Expenditure” covers the cost of elections, fees, and expenses of council members, costs incurred in organizing meetings of councils and policy making committees, costs of area representation and public disclosure and compliance, the cost of corporate support and other support services, and the cost of other council policy compliance works. We provide a description of the variables employed in this study in [Table 1](#).

To understand the relative magnitude of administration costs, we also present descriptive statistics for other financial items, such as total expenses, total revenue, revenue sourced from own sources and revenue received in the form of federal and state grants in [Table 2](#). We also incorporate the proportion of rates and charges that are outstanding in our analysis. All this information was collected from the time series data published by the NSW Office of Local Government for the 2014–15, 2015–16, 2016–17, and 2017–18 financial years. The financial statements submitted by local councils are prepared on the basis of the Local Government Code of Accounting Practice and Financial Reporting.

The putative impact of economies of scope and scale suggest that the range of services provided, and the quantities of outputs produced, influence the administrative costs incurred. However, it is problematic to quantify many services produced as precise quantities of outputs or meaningfully combine them into a single index to arrive at a summary measure of output. In the empirical literature, the population size serviced by a local authority is frequently used as the most relevant proxy to capture total output produced. For instance, the NSW Local Government Boundaries Commission explicitly considered the effects of proposed council consolidations on the size of population in NSW in 2016 (The Local Government Boundaries Commission, 2016). It is also common to employ the number of employees as a measure of organizational size (Meier et al., 2000; Rutherford, 2016). Consistent with previous studies (Andrews & Boyne, 2009; Ting et al., 2014), we employed two alternative indicators of output: population size and the number of full-time equivalent staff employed in a local council in this study. We test both linear and nonlinear effects of population and full-time equivalent staff employed in separate models by including the logarithmic raw value and a quadratic series.

Consistent with previous literature (Andrews & Boyne, 2009), we also employed a number of variables to control for external constraints faced by local councils. Providing multiple services to people living in close proximity may generate scope economies and population density

is thus likely to have an impact on the administrative intensity of local councils. We employed population per square kilometer as a proxy for population density that was used in the 2020 Office of Local Government NSW report to measure the population density in local councils. The diversity of population in terms of age, ethnicity, family circumstances, and the like can influence municipal administrative intensity. For instance, the population aged below 19 years require local councils to provide for sporting and recreational facilities, parks, and libraries. Similarly, people over the age of 60 require additional services relating to leisure and other amenities.

Apart from these demographic and age measures, socio-economic characteristics can also affect administrative intensity. We thus include the proportion of Aboriginal and Torres Straight Islanders (ATSI) population and proportion of Non-English-Speaking Background (NESB) people, since they may require councils to provide additional services. Single-parent households, the unemployed, and disabled persons may also require additional support services from local councils and thus we include controls for these variables in the empirical analysis of administrative intensity. To control for the economic circumstances, we employ the average taxable income of local residents in a given local council as a proxy, in addition to the proportion of own-source revenue and grant revenue, as well as outstanding rates and annual charges.

We also specifically control for the general level of education and occupational skills of local residents. The Index of Education and Occupation (IEO) is computed by the Australian Bureau of Statistics (ABS) as part of the Socio-Economic Indexes for Areas (SEIFA) (ABS, 2016). It captures the educational and occupational background of people living in a Local Government Area (LGA). The index takes into account the formal qualifications and the skills needed to participate in different occupations. The IEO Decile identifies the decile in which each LGA belongs. A low decile indicates the presence of a high proportion of people without qualifications and without jobs and/or with low-skilled jobs. A high decile indicates that many people living in an LGA have high qualifications and/or in jobs that require high skills.

Univariate statistics

Table 1 provides univariate statistics for the variables employed in the study. Revenue and expense values are calculated at the household level to facilitate meaningful comparisons among items of revenues and expenses. The average per household total revenue for the study period is \$7 351 with considerable variations across different types of local councils. Own-source revenue on average constituted 60% while the grant revenue stood at about 40%. Total expenses accounted for an average of 86% of total revenue for councils in NSW. Administrative costs accounted for 15.5% of the sample period which is the main variable of interest in this study. There is a considerable amount of variation across local councils in terms of the proportion of administration cost to total cost, with Lithgow City Council recording the lowest proportion and Coonamble Shire Council the highest. On average, councils had approximately 6% of rates and charges outstanding during the study period.

Councils in NSW show significant variations in terms of demographic characteristics such as population density, growth, percentage of ATSI, and NESB population. Similarly, the full-time equivalent staff employed by local councils show significant variations from the NSW average of approximately 311. The smallest number of employees was at Central Darling Shire Council with 42 staff, while the highest number of employees was 1 803 at the City of Sydney.

The significant variations in certain demographic characteristics, as well as in administrative cost and the number of staff employed, demonstrate the pitfalls in investigating all local councils as a uniform group. Further, Dollery and others (2006) demonstrated significant variations in the provision of council services between metropolitan, regional and rural

TABLE 1 Descriptions for variables included in the study

Data items	Description
Total expenses	All expenses as reported by a local government council
Administration cost	Cost of governance and administration
Total revenue	Total revenue for each financial year
Own source revenue	Proportion of revenue raised through own sources
Grants of total revenue	Proportion of revenue received in the form of state and federal grants
Outstanding rates and annual charges	Proportion of rates and charges outstanding
Population	Total number of people
FTE staff	Full-time equivalent staff
Growth	Population change over 5 years
Density	Population per land area (km ²)
Population < 19	Proportion of people under the age of 19
Population > 60	Proportion of people over the age of 60
Single-parent households	Percentage of single-parent families with children less than 15 years of age and or with dependent students
ATSI	Proportion of people with aboriginal and Torres Strait Islanders background
NESB	Proportion of people with non-English speaking background
Disabled	Proportion of disabled
Unemployed	Proportion of unemployed
IEO Decile	Index of education and occupation decile
Average taxable income	Average taxable income of all tax payers in a local council

councils. Accordingly, we initially examine the variations in the important variables considered across these different groups of councils.

Table 3 presents the average values for all variables employed in this study separately for each category of councils and for the overall averages. All revenue and expense items are on a per household basis, and they unsurprisingly show high values for councils in the rural category compared to councils in regional and urban categories. There are significant variations in terms of sources of revenue for each category of councils. Rural councils have high grant revenue per household compared to regional and urban councils. The latter groups raise about 70% or more of their revenue. The percentage of total expenses are similar for rural and regional councils at 87%, compared to total expenses of 80% for urban councils. On a per household basis, rural administrative cost is twice as much as that of regional and urban councils on average. However, the relative share of administration cost is approximately 21% for urban councils compared to an approximate value of 14% for rural and regional councils. Significant differences exist in terms of outstanding rates and charges across council categories. Rural councils have higher outstanding rates and charges compared to regional and urban councils. Rural councils on average employ less staff compared to regional and urban councils.

Demographic characteristics show that size of population and population density is much smaller in rural councils on average and that population growth is often below zero in these councils. Population composition shows that the proportions of people aged over 60 and ATSI are high in rural councils. The proportions of single-parent households, disabled, and the unemployed are high in regional councils compared to other councils. Urban councils record

TABLE 2 Univariate statistics

Data items	Mean	Standard deviation	Minimum	Maximum
<i>Per household</i>				
Total revenue (\$)	7351.35	4425.08	2390.77	32,413.44
Own source revenue (\$)	4392.19	2026.41	1187.75	15,363.97
Grant revenue (\$)	2957.02	2699.87	224.88	17,049.60
Total expenses (\$)	6346.51	3902.79	2107.85	28,966.41
Administration cost (\$)	966.35	875.56	4.28	7700.54
Administration cost (%)	15.50	7.73	.08	38.22
Outstanding rates and charges (%)	5.76	3.91	.74	36.34
Population	48,448.20	63,521.48	1607	357,479
Full-time equivalent staff	310.72	305.05	42.00	1803.50
Density	682.11	1647.01	.03	8723.82
Growth (%)	3.32	6.09	-11.96	43.80
Population < 19 (%)	25.30	3.24	10.43	34.59
Population > 60 (%)	24.59	5.70	11.86	39.33
Single-parent households (%)	10.84	3.02	6.00	26.63
ATSI (%)	6.65	8.47	.10	61.20
NESB (%)	9.33	14.11	.80	70.80
Disabled (%)	5.53	1.39	2.10	8.70
Unemployed (%)	5.65	2.46	1.30	14.20
Average taxable income (\$)	53,263.23	16,874.4	31,483	143,856
IEO Decile	5.34	2.89	1.00	10.00

a considerably high proportion of NESB as well as high levels of average taxable income. Moreover, urban councils rank highly in terms of occupational skills and educational attainment. A multivariate test of means shows that these categories of councils differ significantly in terms of the variables employed in the study. Our causal analysis of the administrative intensity is thus conducted at the disaggregated level with aggregate analysis providing a baseline for comparison purposes.

Analyzing administrative intensity of local councils

To examine the influence of population size on the administrative intensity of local councils in NSW, we estimated the following models:

$$\log AI = \alpha + \beta_1 \log Pop + \beta_2 [\log Density] + \beta_3 Growth + \beta_{4i} Z + \mu \text{ (Model 1)}$$

$$\log AI = \alpha + \beta_1 \log Pop + \beta_2 [\log Pop]^2 + \beta_3 [\log Density] + \beta_4 Growth + \beta_{5i} Z + \mu \text{ (Model 2)}$$

AI is administrative intensity. LogPop is log of population, Growth is measured as population change over a five-year period, logDensity is log of population density, Z is a vector of exogenous control variables (log of proportion of population below 19 years old, log of

TABLE 3 Local government area level averages

	Rural	Regional	Urban	All LGA
Per household items				
Total revenue (\$)	10,164.76	5656.62	3796.33	7351.35
Own source revenue (\$)	5479.69	3936.26	2760.77	4392.19
Grant revenue (\$)	4687.96	1715.98	1026.03	2957.02
Total expenses (\$)	8884.35	4904.23	3028.02	6346.51
Administration cost (\$)	1311.06	668.06	647.88	966.35
Administration cost (%)	13.81	13.94	20.96	15.50
Outstanding rates and charges (%)	7.21	5.50	3.12	5.76
Population	8100.12	60,929.05	114,704.45	48,448.2
Full-time equivalent staff	113.32	444.93	540.36	310.72
Full-time equivalent staff per 1 000 people	13.99	7.30	4.71	6.41
Density	2.11	98.49	2824.29	682.11
Growth (%)	−.12	3.90	9.60	3.32
Population < 19 (%)	26.17	24.88	24.05	25.30
Population > 60 (%)	26.32	26.40	18.72	24.59
Single-parent households (%)	11.36	11.74	8.61	10.84
ATSI (%)	10.58	4.62	1.23	6.65
NESB (%)	2.48	5.10	28.77	9.33
Disabled (%)	5.56	6.34	4.40	5.53
Unemployed (%)	5.94	6.36	4.15	5.65
Average taxable income (\$)	46,001.18	49,789.94	72,576.24	53,263.23
IEO Decile	4.22	4.84	8.25	5.34

Notes: The null hypothesis of no difference in the means of different groups of LGAs is rejected (based on the results of multivariate tests of means). The relevant statistics from multivariate tests are available from the authors on request.

proportion of population over 60 years old, log of proportion of ATSI, log of proportion of NESB, log of proportion of single-parent families, log of proportion of disabled persons, log of proportion of unemployed people, log of average income, log of proportion of own revenue, and log of proportion of grant revenue), the IEO Decile and μ is the error term.

To examine the influence of number of employees on the administrative intensity of local councils in NSW, we estimated the following models:

$$\log AI = \alpha + \beta_1 \log Emp + \beta_2 [\log Density] + \beta_3 Growth + \beta_4 Z + \mu \text{ (Model 3)}$$

$$\log AI = \alpha + \beta_1 \log Emp + \beta_2 [\log Emp]^2 + \beta_3 [\log Density] + \beta_4 Growth + \beta_5 Z + \mu \text{ (Model 4)}$$

where $\log Emp$ is the log of number of full-time equivalent employees of a local council.

We estimated the above four models separately for the three categories of councils as well as for the aggregate set of councils in NSW.

DISCUSSION OF RESULTS

Effects of size of population

Table 4 presents the results of Model (1) for the different categories of councils and the results of the aggregate set of councils. The estimates contained in the four columns present results for the set of aggregate councils, rural councils, regional councils, and urban councils. We first examine the base case of all councils. The estimated coefficients indicate that population size has a significant negative influence on administrative costs for the aggregate set of local councils in NSW. This result is in line with the findings of Andrews and Boyne (2009) that provide support for economies of scale at the aggregate level for all councils. However, the coefficients of population size for rural and urban councils are negative, but not statistically significant. The coefficient for regional council is positive and statistically significant, implying diseconomies of scale. Overall, the effects of population size on administrative intensity are not uniform across individual categories of councils, even though there is evidence of scale economies at the aggregate level. The results presented in **Table 4** do not include the nonlinear effects of population size on administrative intensity. We thus turn to consideration of nonlinear effects in **Table 5**.

The results presented in **Table 5** show that population size and administrative intensity bear a “U” shaped relationship for the aggregate set of councils and for urban councils. This finding accords with the results of Andrews and Boyne (2014) in terms of the size of public organizations relating to the resources devoted to administration. Our results show that large local councils by population size experience a decline in administrative costs until a threshold level of population is reached. Beyond this threshold population size (60,211 for all NSW councils and 83,380 for urban councils), administrative costs increase (i.e., diseconomies of scale occur). The results presented in **Table 5** show that there is no evidence for economies of scale in administrative intensity for the rural and regional council groups.

The findings of this study relating to urban councils are similar to the findings of Andrews and Boyne (2009) for larger British local authorities. However, our findings for smaller councils—such as rural and regional councils in NSW—contrast with the Andrews and Boyne (2009) finding that there is a consistent negative effect of population on the administrative costs of local councils in England. We find no evidence of economies of scale operating in rural and regional local councils in NSW.

Effects of number of staff employed

The results presented in **Table 6** show that the number of full-time equivalent staff employed has a negative influence on administrative costs for all NSW councils considered together. The number of staff employed has a negative influence on the administrative cost of both rural and urban councils, but the impact is not statistically significant. In the case of regional councils, our evidence points to higher costs for councils with a larger number of employees, thereby showing no scale economies. The results presented in **Table 6** for the number of staff employed are consistent with the population results in **Table 4**.

When nonlinear effects of staff are taken into consideration, the results in **Table 7** show evidence of a “U” shaped relationship between the number of staff members and administrative intensity in urban councils and for the whole sample. These findings are consistent with the findings of Ting et al. (2014). For councils with a larger number of staff members, there is evidence of scale economies up to a threshold level of 323 staff members for urban councils and 334 staff members for all councils. Councils with larger staff numbers beyond these threshold levels experience diseconomies of scale.

TABLE 4 Determinants of proportion of administration cost—role of population size

	All	Rural	Regional	Urban
Population (ln)	-.139** (-2.28)	-.221 (-1.62)	.440* (1.91)	-.023 (-.31)
Density (ln)	.106** (2.36)	-.124 (-1.50)	.208** (2.27)	.178** (2.03)
Growth	-1.343 (-1.45)	-.032 (-.02)	1.068 (.29)	-.024 (-.02)
Population < 19 (ln)	.535 (1.60)	1.988*** (2.71)	3.315 (1.51)	-.752* (-1.82)
Population > 60 (ln)	-1.011*** (-3.18)	-.816* (-1.68)	.033 (.02)	-.168 (-.29)
Single-parent households (ln)	-.352 (-1.33)	-.428 (-1.31)	-.742 (-.83)	.128 (.24)
ATSI (ln)	.085 (1.01)	.097 (.84)	-.255 (-.78)	-.260** (-2.47)
NESB (ln)	-.016 (-.22)	-.226* (-1.97)	-.404* (-1.83)	-.467*** (-2.71)
Disabled (ln)	.411 (1.44)	1.601*** (4.26)	-.683 (-.51)	.769* (1.72)
Unemployed (ln)	-.135 (-1.17)	-.077 (-.56)	-1.090*** (-3.09)	.194 (1.03)
Outstanding rates and charges (ln)	-.085 (-.97)	.073 (.66)	.013 (.05)	.098 (.67)
Average taxable income (ln)	.078 (.28)	-.257 (-.55)	-.961 (-1.15)	.353 (.91)
Own source revenue (ln)	-.972** (-2.20)	-.676 (-.94)	-3.709 (-1.64)	-1.253* (-1.70)
Grant revenue (ln)	-.435* (-1.70)	-.780 (-1.31)	-2.080* (-1.87)	-.044 (-.16)
IEO Decile	-.003 (-.16)	-.010 (-.38)	-.168** (-2.22)	-.050 (-1.12)
Intercept	-3.409 (-1.22)	6.199 (1.33)	-4.465 (-.53)	-6.245 (-1.51)
Observations	416	196	124	96
Adjusted R^2	.137	.205	.214	.239
F -value	5.400	4.347	3.229	2.994
p -Value	.000	.000	.000	.001

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. Values in parenthesis are t -values.

Our finding of a “U” shaped relationship between the number of staff members employed and administrative costs for urban councils contrasts with the finding of no relationship for all urban local councils and an inverted “U” shaped relationship for small urban councils in the Malaysian study by Ting and others (2014).

TABLE 5 Evidence of the economies of scale—the role of population size

	All	Rural	Regional	Urban
Population (ln)	−1.959*** (−3.69)	−.354 (−.16)	2.452 (.49)	−5.235** (−2.54)
Population Squared (ln)	.089*** (3.45)	.008 (.06)	−.091 (−.40)	.231** (2.53)
Density (ln)	.120*** (2.68)	−.124 (−1.49)	.217** (2.29)	.102 (1.14)
Growth	−.496 (−.53)	−.037 (−.03)	.837 (.23)	1.227 (.97)
Population < 19 (ln)	.653** (1.97)	1.993*** (2.70)	2.900 (1.19)	−.709* (−1.77)
Population > 60 (ln)	−.802** (−2.51)	−.812 (−1.65)	−.144 (−.10)	.122 (.21)
Single-parent households (ln)	−.316 (−1.21)	−.432 (−1.29)	−.894 (−.91)	.650 (1.16)
ATSI (ln)	.044 (.52)	.097 (.84)	−.251 (−.76)	−.367*** (−3.32)
NESB (ln)	−.084 (−1.13)	−.227* (−1.95)	−.411* (−1.85)	−.409** (−2.43)
Disabled (ln)	.369 (1.31)	1.605*** (4.21)	−.681 (−.51)	.159 (.32)
Unemployed (ln)	−.128 (−1.13)	−.077 (−.56)	−1.089*** (−3.07)	.103 (.56)
Outstanding rates and charges (ln)	−.064 (−.74)	.073 (.66)	.040 (.16)	.115 (.81)
Average taxable income (ln)	.180 (.64)	−.255 (−.54)	−.909 (−1.07)	−.127 (−.30)
Own source revenue (ln)	−.457 (−1.00)	−.665 (−.89)	−3.593 (−1.57)	−.816 (−1.11)
Grant revenue (ln)	−.287 (−1.12)	−.771 (−1.26)	−1.989* (−1.75)	−.026 (−.10)
IEO Decile	−.017 (−.84)	−.010 (−.38)	−.173** (−2.24)	−.044 (−1.02)
Intercept	5.215 (1.40)	6.790 (.63)	−16.953 (−.52)	28.158* (1.99)
Observations	416	196	124	96
Adjusted R^2	.160	.200	.208	.288
F -value	5.947	4.053	3.013	3.396
p -Value	.000	.000	.000	.000

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. Values in parenthesis are t -values.

TABLE 6 Determinants of proportion of administration cost—the role of FTE staff

	All	Rural	Regional	Urban
FTE staff (ln)	-.072** (-2.16)	-.219 (-1.56)	.590* (1.91)	.067 (.95)
Density (ln)	.069* (1.66)	-.193*** (-2.89)	.235** (2.56)	.155* (1.76)
Growth	-1.683* (-1.84)	-.448 (-.34)	1.211 (.33)	.061 (.05)
Population < 19 (ln)	.441 (1.32)	2.013*** (2.73)	3.384 (1.54)	-.815** (-2.03)
Population > 60 (ln)	-1.023*** (-3.20)	-.869* (-1.80)	-.046 (-.03)	-.284 (-.50)
Single-parent households (ln)	-.330 (-1.24)	-.441 (-1.34)	-.389 (-.41)	.125 (.23)
ATSI (ln)	.063 (.73)	.098 (.84)	-.365 (-1.06)	-.308*** (-3.08)
NESB (ln)	-.025 (-.34)	-.239** (-2.13)	-.416* (-1.87)	-.482*** (-2.88)
Disabled (ln)	.352 (1.23)	1.704*** (4.35)	-.578 (-1.44)	.980** (2.30)
Unemployed (ln)	-.153 (-1.33)	-.111 (-.84)	-1.132*** (-3.15)	.191 (1.03)
Outstanding rates and charges (ln)	-.091 (-1.03)	.029 (.26)	-.048 (-.20)	.094 (.65)
Average taxable income (ln)	.065 (.23)	-.297 (-.64)	-.854 (-1.04)	.485 (1.26)
Own source revenue (ln)	-1.117** (-2.53)	-.670 (-.93)	-3.506 (-1.56)	-1.272* (-1.74)
Grant revenue (ln)	-.499* (-1.95)	-.853 (-1.44)	-1.956* (-1.76)	-.060 (-.22)
IEO Decile	-.004 (-.21)	-.010 (-.41)	-.186** (-2.26)	-.039 (-.89)
Intercept	-4.725* (-1.72)	5.615 (1.21)	-3.829 (-1.46)	-8.244** (-2.16)
Observations	416	196	124	96
Adjusted R ²	.128	.204	.214	.247
F-value	5.078	4.331	3.228	3.078
p-Value	.000	.000	.000	.001

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. Values in parenthesis are *t*-values.

Effects of other demographic factors

Given the evidence of the nonlinear effects of population and staff employed, we examined the effects of demographic factors. Evidence presented in Table 5 and Table 7 shows that population density has a significant positive influence on the administrative intensity in general for

TABLE 7 Evidence of the economies of scale—role of FTE staff

	All	Rural	Regional	Urban
FTE staff (ln)	-1.313** (-2.38)	-1.743 (-.72)	2.400 (.46)	-3.305*** (-4.42)
FTE staff squared (ln)	.113** (2.27)	.164 (.63)	-.149 (-.35)	.286*** (4.52)
Density (ln)	.061 (1.46)	-.186*** (-2.73)	.240** (2.57)	.037 (.45)
Growth	-1.345 (-1.46)	-.473 (-.36)	.983 (.27)	1.626 (1.44)
Population < 19 (ln)	.598* (1.76)	1.995*** (2.69)	2.910 (1.12)	-.395 (-1.06)
Population > 60 (ln)	-.888*** (-2.74)	-.854* (-1.76)	-.233 (-.16)	.522 (.97)
Single-parent households (ln)	-.239 (-.90)	-.473 (-1.42)	-.452 (-.46)	.966* (1.89)
ATSI (ln)	.029 (.34)	.112 (.94)	-.364 (-1.06)	-.455*** (-4.78)
NESB (ln)	-.030 (-.41)	-.228** (-2.00)	-.420* (-1.88)	-.284* (-1.82)
Disabled (ln)	.286 (1.00)	1.712*** (4.37)	-.541 (-.41)	-.195 (-.42)
Unemployed (ln)	-.172 (-1.49)	-.108 (-.82)	-1.128*** (-3.12)	.076 (.45)
Outstanding rates and charges (ln)	-.100 (-1.14)	.018 (.16)	-.027 (-.11)	.116 (.89)
Average taxable income (ln)	.095 (.33)	-.299 (-.64)	-.742 (-.83)	-.281 (-.73)
Own source revenue (ln)	-.807* (-1.76)	-.514 (-.67)	-3.350 (-1.45)	-.959 (-1.45)
Grant revenue (ln)	-.406 (-1.58)	-.729 (-1.17)	-1.857 (-1.61)	-.129 (-.52)
IEO Decile	-.011 (-.57)	-.008 (-.30)	-.190** (-2.28)	-.043 (-1.10)
Intercept	-1.224 (-.39)	9.340 (1.25)	-11.207 (-.49)	10.401* (1.94)
Observations	416	196	124	96
Adjusted R^2	.137	.201	.207	.394
F -value	5.132	4.072	3.009	4.866
Probability	.000	.000	.000	.000

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. Values in parenthesis are t -values.

all councils. However, the effect is not consistent across all categories of councils. The positive effect of population density is felt in regional councils while no effect is observed in rural and urban councils. Population growth and single-parent households have no significant effect on

administrative costs in any council category. These results are in line with the findings in the literature where the influence of population density was mixed depending on types of expenditure and categories of local councils (see e.g., Drew et al., 2016; Tran & Dollery, 2019).

Effects of socio-economic and human endowment characteristics

The effects of age characteristics are mixed. While population below 19 years of age increases administrative costs in rural councils, it leads to a reduction in administration costs in urban councils. The ATSI population has no effect on administrative costs in rural and regional councils, while its impact is negative in urban councils. However, Tran and others (2018) showed that the ATSI population had no impact on expenditures in South Australian local councils.

The NESB population has a negative effect on administrative costs in all categories of councils. Disabled persons have a positive effect on administrative cost in rural councils, although no impact in regional and urban councils. Unemployed persons have a negative impact on administrative costs in regional councils, while they have no effect in rural and urban councils.

Outstanding rates and charges, average taxable income, and own-source revenue have no influence on administrative costs in any council group. Grant revenue and occupational and educational levels have a negative effect on administrative costs in regional councils, but no impact in rural and urban councils. These demographical variables have different impacts on the various categories of expenditure as shown in the literature (see e.g., Drew et al., 2016; Tran et al., 2018; Tran & Dollery, 2019).

CONCLUSION

In this study, we examined the impact of population size and the number of full-time equivalent staff employed on the administrative intensity of an aggregate of all NSW councils as well separately for the rural, regional, and urban council groups. Our findings suggest that Hypotheses 1 and 2 were valid, implying that population size and staff significantly affect administrative intensity for the whole sample. With respect to the different categories of local councils, population size and staff significantly influence administrative intensity in regional local councils, rather than urban and rural councils. Accordingly, only Hypotheses 1b and 2b were confirmed. In addition, our results established that population size and staff employed bear a “U” shaped relationship to the administration costs of local councils in urban NSW, but they exhibit no evidence for the existence of economies of scale in administrative intensity in rural and regional councils.

In sum, our findings support the following conclusions: (1) an increase in the size of local councils by population generates the employment of more staff to meet the greater demand for local public services and hence these councils devote a larger proportion of outlays to administration; (2) the different environmental characteristics of local councils generate differential administrative requirements and hence lead to varying proportions of expenditure devoted to administrative overheads; and (3) full-time staff increases are associated with higher administrative overheads.

In terms of their public policy significance, our findings suggest that public policy makers should be cautious about intervening in any local government system to generate scale economies in administration. This is based on the differential nature of administrative scale economies in different categories of local government. It is thus unlikely that a “one size fits all” approach would succeed.

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