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Local Government Size and Efficiency in Labour Intensive Public Services: Evidence from Local Educational Authorities in England

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Economic theory suggests that the size of units of local government has an important impact on the efficiency with which public services are provided. Conventional arguments about local government size assert that big is better, because larger units are able to capitalise on scale economies – though those economies may eventually turn negative as governments become plagued by bureaucratic congestion. This paper examines the potential sources of economies of scale in the production of labour intensive public services by local governments in England by estimating the relationship between district and school size and the average cost of producing educational output using a neoclassical cost function. To ensure that the estimates are not biased by omitted or unobserved variables, the empirical analysis uses panel data from English local educational authorities (LEAs), and incorporates numerous variables commonly utilised in education cost functions. The statistical estimates reveal a negative linear district size-costs relationship for primary education, though not for secondary education. U-shaped relationships between school size and the costs of both primary and secondary education are observed. Theoretical and practical implications are discussed.

1. Introduction

The optimum organizational size for the efficient delivery of public education is one of the most enduring questions in the study of public economics (see Lomax, 1943; 1952; Riew, 1966). At what level of client population can public organizations responsible for the provision of primary and secondary schooling function most efficiently? In particular, do local governments that coordinate public education benefit from economies of scale? Policy-makers across the world continually debate the merits of alternative local government structures in terms of their consequences for local service costs, often those associated with expensive labour-intensive services, such as primary and secondary schooling (e.g. Copus, Crowe and Clark, 2005; Council of Europe, 1995). Indeed, in recent times, central governments in several countries have enacted or considered programmes of local government consolidation on the grounds of efficiency. But what evidence is there to suggest that the efficiency of labour-intensive services provided by local governments will benefit from horizontal amalgamation or vertical consolidation? More specifically, what is the relationship between the size of the units in a local government system and expenditure on public education?

The aim of this paper is to examine whether district and school size make a difference to the costs and expenditure of English local education authorities (LEAs) – the units of government responsible for coordinating the delivery of primary and secondary schooling. Prior research on local government size and the costs of education has typically focused on the costs and expenditure of US school districts, which largely (though not unanimously, see, for example, Chakraborty, Biswas and Lewis, 2000) reveal the presence of a u-shaped education cost function (e.g. Duncombe, Miner and Ruggerio, 1995). However, these studies exhibit several methodological weaknesses, which undermine the wider validity and generaliseability of their findings. In an effort to avoid some of the common pitfalls in research on size and education costs in this paper, the cost and expenditure functions for primary and secondary schooling are estimated using a five-year panel data set, incorporating numerous output and input measures, drawing upon a large sample of English LEAs.

Does the relative level of education costs and expenditure rise or fall with the scale of the student population? This question is addressed through statistical analyses of the relationship between the number of primary and secondary students and schools within local education authorities and the expenditure per primary and secondary student. First, prior research is reviewed, which suggests that the relationship between local education authority size and the costs of primary and secondary schooling may take a variety of forms. Second, the cost function is described before the measures used for the analysis are introduced. The statistical estimates are then presented, before the statistically significant effects that emerge are discussed and theoretical and policy conclusions derived from the tests that are conducted.

2. Size and education costs

Debates on the appropriate structures for public service delivery often concentrate on the issue of scale, especially the optimum client population size in terms of its relationship with costs and effectiveness. The impact of this issue has been especially apparent at the local level. Indeed, in recent times, central governments in several countries have reorganized local government on the grounds of efficiency (see, especially *Local Government Studies*, 36, 2, 2010). In England, for example, the recent voluntary restructuring of parts of the two-tier system in rural areas was largely driven by the belief that larger local governments are more cost-effective (Andrews and Boyne, 2011). And it seems likely that the coming era of fiscal austerity in the public sector will increase the pressure towards further local government reorganizations in the UK and elsewhere. Nevertheless, several questions about the economic effects of such large-scale restructuring remain. Are bigger units of government really more cost-efficient? What are the implications of scale for labour-intensive public services, such as primary and secondary schooling? For public education expenditure, is small beautiful, big better or being in-the middle best?

Conventional economic arguments on scale effects for public organizations, suggest that larger units can spread fixed central costs (e.g. senior management team, information technology, premises) across a wider range and higher quantity of service outputs (Stigler, 1958). Therefore, in the case of the provision of schooling, the average cost of education per student should be lower in larger schools and school districts. At the local government level, large school districts (or local education authorities (LEAs), as they are known in the UK) may be able to realize scale economies because they have greater central administrative capacity, which can enable them to more effectively coordinate the delivery of primary and secondary schooling to large or diverse client groups (King and Ma, 2000). By contrast, smaller LEAs may suffer from diseconomies of scale because they lack the capacity for developing and implementing innovative solutions to service problems (Nohria and Gulati, 1996). Similar arguments apply to the presence of scale economies within the schools managed by LEAs.

If economies of scale are present in education provision, then mergers of small LEAs (or small schools) should be associated with lower costs and therefore greater efficiency. Cost savings may result from the removal of administrative duplication (Lomax, 1952), from the 'pecuniary gain' of lower input prices as a result of greater purchasing power (Shepherd, 1990) or from greater scope for the acquisition and distribution of new and innovative teaching techniques and technologies when the appropriate scale threshold is reached.

Despite the intuitive appeal of conventional scale arguments, it is also conceivable that diseconomies of scale are present within public education, especially at the local government level. Small LEAs must seek to stave off 'fiscal migration' by potentially mobile residents, thereby placing pressure on them to drive costs down (Tiebout, 1956). In addition, local politicians may believe that their chances of re-election will improve if their LEA is perceived by local people as more efficient than other neighbouring ones (Salmon 1987). Thus, even in the absence of fiscal migration, smaller LEAs may achieve greater efficiency because of higher and more visible levels of 'benchmark competition'; something which was especially visible during the study period as English LEAs were publicly graded by the Audit Commission (a central government regulatory agency) on a scale of 1 (poor) to 4 (excellent). At the same time, public choice theorists assert that large public sector organizations are inefficient because they are monopolistic, driven by the self-interest of bureaucrats and therefore unresponsive to the needs of citizens and political principals (Downs 1967). Thus, the costs of producing primary and secondary schooling may be proportionately higher in large LEAs.

In addition to arguments that returns to scale are constant, it is possible to discern a third more nuanced perspective on scale economies in the provision of public services, which suggests that such economies may occur but eventually become negative. Buchanan's (1965) economic theory of clubs suggests that there is an optimally sized "sharing group" at which point the costs of sharing the consumption of goods with some element of publicness are equal to the benefits of sharing that consumption. Beyond that optimal point, the sharing of a good by ever larger numbers of group members becomes beset by congestion. This argument can be applied to the provision of labour intensive public services. Because big public organizations accumulate more numerous and complex administrative overheads, they may eventually suffer from bureaucratic congestion and overload (Boyne, 1996; King and Ma, 2000; Schofield, 1978; Williamson, 1967). Tullock (1965, p. 51), for example, argues that problems of co-ordination and control inevitably expand with organizational size, and eventually 'the declining "marginal efficiency" associated with increasing size would guarantee that a point would be attained at which further gains from expansion would be less than the added cost.' The relationship between district and school size and the costs of primary and secondary schooling may therefore follow a u-shaped trajectory rather than a simple positive or negative linear pattern.

There is a growing literature on size and the costs of education, which examines scale economies at both the school district and school levels, though most of this research has been conducted in the US (see Colegrave and Giles, 2008). Typically, studies of scale economies in US school districts uncover the presence of an optimum district size beyond which efficiency gains turn negative (Butler and Monks, 1985; Duncombe, Miner and Ruggerio, 1995). In a rare non-US example, Wales' (1973) study of costs in school districts in British Columbia too reveals that scale economies are reversed in the largest of districts. Indeed, Colegrave and Giles' (2008) meta-analysis of school cost functions suggests that the optimal secondary school size is a comparatively large one (about 1543 students), after which the cost of education increases. Despite the clarity of the research question that they seek to address, the current studies of this issue suffer from several methodological weaknesses.

First, although most research in the area has adopted an econometric approach, few existing studies of education costs control for the multiple dimensions of education production, which may influence expenditure. The output quality, input quality and price, as well as numerous exogenous inputs are all likely to make an important contribution to the cost of education, yet surprisingly few studies include measures of each of these elements (for a summary of this view, see Colegrave and Miles, 2008). Second, nearly all of the previous work relies upon cross-sectional data, which is more vulnerable to validity threats, such as the potential influence of unmeasured or unobserved variables that vary within and not just across cases (a notable exception is Chakraborty, Biswas and Lewis, 2000). Third, most prior studies neglect to compare scale economies for primary and secondary schooling within the same study (though see Wales, 1973). Finally, almost all that has been published in Anglophone books and journals about this issue is drawn from work carried out in the US, which may not be readily generaliseable to other settings with very different governance arrangements for the delivery of primary and secondary education. In particular, there is currently precious little evidence available on district and school size and the costs of primary and secondary schooling at the local government level in the UK. Evidence from this setting is not only important given the sparse research effort in non-US settings, but because of the UK government's predilection for centrally-mandated structural changes in response to the perceived inefficiency of smaller local governments (John, 2010).

The small number of published empirical studies of size and education costs at the local government level in the UK, suggest that scale economies may be present.

Travers et al.'s (1993) correlational analysis points towards the existence of straightforward positive linear scale economies in the production of education by English and Welsh LEAs. However, in their multivariate analysis of the production of secondary school education by English LEAs, Andrews et al (2006) observe an inverted u-shaped relationship between size and cost-effectiveness. Despite their relevance to the present research endeavour, both these previous studies exhibit the same weaknesses as those conducted in the US (and elsewhere). Moreover, the UK studies rely upon the total population served by the LEA as a measure of output quantity rather than the number of students (or schools). Thus, while there is some evidence of lower costs in large and medium-sized English LEAs, to date there has been no comprehensive statistical analysis of the costs of public education at the local government level which draws upon panel data, incorporates appropriate output and input measures and examines size effects in both primary and secondary schooling. The research reported in this study seeks to address this important gap in the current evidence base on size and costs in public education.

3. Research Context, Data and Measures

In England, upper-tier (county councils) and single-tier local governments (London boroughs, metropolitan districts and unitary authorities) are responsible for the provision of primary, secondary and tertiary schooling, as well social care services, environmental services, and leisure and cultural services. The provision of education by English local governments has traditionally led those governments to be regarded as Local Education Authorities (LEAs). LEAs were first established by the Education Act 1902, which enjoined that the county councils and municipal boroughs in existence at that time should set up a committee responsible for the provision of elementary and technical education within their jurisdiction. Currently, LEAs have at least some responsibility for all state education in their area, ranging from the distribution of schools' funding and student admissions policies to the direct employment of teaching staff and the management of estates.

LEAs represent an excellent setting for the investigation of scale economies in labour-intensive public services, since staffing costs (salaries, pensions, national insurance and so on) account for, on average, about 70 per cent of the expenditure of each LEA. At the same time, the teachers managed by LEAs are for the most part qualified professionals and highly unionised, and so require more sophisticated and correspondingly labour-intensive Human Resource Management support than staff in technical (or regulatory) local government services, such as waste management or highways maintenance.

The purpose of the analysis is to assess whether district and school size has a statistically significant impact on education costs and expenditure for both primary and secondary schooling. To what extent do the education costs of LEAs reflect scale effects associated with providing primary and secondary schooling to a territorially defined student and school population? In order to answer this question, it is necessary to identify relevant measures of costs and expenditure, district and school size, and a range of other relevant explanatory variables that may influence costs.

3.1 The cost function

The model developed below is based on a conventional (neo-classical) specification of the log-linear relation between total cost as the dependent variable, with district and school size, output and several endogenous and exogenous inputs as explanatory variables. This standard form of cost function has a dual cost and expenditure aspect.

The expenditure function is derived by substituting a measure of preferred output for that of actual output – in this case the average level of local property tax within the area served by each LEA. The cost function parameters are thus estimated both directly and indirectly (using the expenditure function), before being compared.

3.2 Dependent variables

Costs are measured by using revenue outturn figures for expenditure per student in primary school and in secondary school for 148 local education authorities between 2005 and 2009. The revenue outturn data are collected annually in accordance with the Chartered Institute for Public Finance and Accounting (CIPFA)'s Financial Reporting Standard 17. The figures are then independently verified by the Audit Commission prior to full publication by CIPFA. The published figures include specific lines detailing expenditure on primary and secondary schools, as well as on the strategic function of LEAs.

3.3 Independent variables

The analysis utilizes the number of primary and the number of secondary students schooled by a LEA as measures of *district size* for the analysis, because these provide a clear and transparent proxy for total educational output. Moreover, in the specific context of education, student population is the measure used in debates on reorganization, and is the variable that policy makers manipulate by redrawing both local government and school boundaries. For each dependent variable, both linear effects (raw size measure on its own) and non-linear scale effects (raw and quadratic terms in the model together) are tested. The number of primary and secondary schools managed by each LEA is also added to the cost function to examine the impact of *school size* on costs. If scale economies are present at the school level, when controlling for LEA size, education authorities managing more schools will have higher expenditure per student than those with fewer schools. The schools and students data are drawn from UK Department of Education sources.

In addition to the above measures of economies of scale, a variable capturing the number of pupils per square kilometre is included in the statistical estimates to control for the potential presence of economies of density in the production of education by LEAs. In theory, the cost of a standard unit of education output will decrease with student population density, in particular, because school transportation vehicles do not need to travel as far between premises (Kenny, 1982). However, it is also sometimes the case that such density economies (in transport, in particular) are lost due to higher congestion and input prices in densely populated areas.

3.4 Control variables

Colegrave and Giles' (2008) meta-analysis of school cost functions suggests that several key dimensions of education production are likely to influence costs and expenditure. Firstly, *output quality*, which for the primary schooling cost function is measured as the percentage of students achieving the required standards of English and Maths in their final year, and for the secondary schooling cost function is measured as the percentage of graduating students achieving 5 or more good passes (A*-C) in their General Certificate in Secondary Education examinations (including for English and Maths). In theory, output quality would imply a positive relationship with costs – though it could also be related to lower costs, as schooling able students may be less resource-intensive. For the expenditure function, the education quality measures are dropped and median preferred output quality is measured using the average property (council) tax in each area served by an LEA. Following median voter theory, it is anticipated that this captures demand for education within a LEAs' jurisdiction, and so might be expected to exhibit a positive connection with cost (see Downes and Pogue, 1994). Similar results to those presented below were found when a variable measuring the median income in the area served by each LEA was substituted for the property tax measure.

Secondly, *input quality* is incorporated in both the cost and expenditure functions by using measures of the average size of one teacher classes and the average student-teacher ratio for each LEA. Both of these measures are anticipated to display a negative association with cost. Third, *input prices* are measured as the average teacher salary in each LEA. Although the salary structure of the teaching profession is determined centrally in England, LEA and school administrators exercise some discretion over salary starting-points and performance-related pay, so there is some variation in average pay across organizations. Higher input prices in terms of salary costs, in theory, will result in higher costs.

Finally, additional *exogenous inputs*, were controlled in the analysis by including five time varying variables likely to influence education production: the percentage of students eligible for free school meals; the percentage of students with Special Educational Needs (SENs); the percentage of students for whom English is a second language; the average degree of ethnic diversity present within the schools run by each local education authority; and, the percentage of working age adults educated to degree level as a proxy for the average level of parental education within the area served by each LEA. The datasets from which the first four control variables are constructed are held by the Department of Education, the adult education data are drawn from UK Labour Force Survey estimates for the areas served by LEAs.

Ethnic diversity was measured by first calculating the proportions of students belonging to each of the sixteen ethnic sub-groups identified in the UK census (e.g. White, Black African and Chinese) for the primary and then the secondary schools within each local education authority. These figures were then squared and summed before being subtracted from 10,000, with a high score reflecting a high level of diversity. This is equivalent to the Hehrfindahl index used to measure market concentration (see Trawick and Howsen, 2006). Free school meal eligibility, the percentage of SENs, English second language and ethnic diversity are all hypothesised to result in higher costs as each education authorities, as each requires the allocation of additional resources to maintain levels of output quality. By contrast, a higher proportion of degree-educated adults within the LEAs jurisdiction is anticipated to result in lower costs, as the potential for the co-production of educational outcomes to reduce resource burdens is much stronger.

In addition to the time varying exogenous inputs, three time invariant variables are included in the model to control for the effects of alternative local government structures and additional urban pricing effects in London, which are beyond the purview of managers in LEAs. This was accomplished by adding three dichotomous variables coded 1 for London boroughs, metropolitan boroughs and county councils and 0 for unitary authorities to the model. The descriptive statistics for all the variables included in the cost and expenditure functions are shown in Table 1.

Table 1. Descriptive statistics for a sample of English local education authorities

	Primary schools		Secondary schools	
	Mean	S.D.	Mean	S.D.
Expenditure per student (£)	3490.0	610.8	4639.5	872.6
Output quantity				
Number of students	29435.6	21736.0	23634.8	18391.5
Number of schools	127.5	108.3	24.1	19.8
Pupils per km^2	165.6	180.3	117.7	118.7
Output quality				
Key Stage 2 English level 4+	80.1	3.6		
Key Stage 2 Maths level 4+	77.1	3.8		
5+ GCSEs (A*-C, incl. English and Maths)			45.4	7.8
Average property tax (£)	1169.6	170.6	1169.6	170.6
Input quality				
Average class size	26.2	.9	21.3	1.0
Student-teacher ratio	22.0	1.0	16.3	.9
Input prices				
Average teacher salary (£)	34804.8	2167.4	34804.8	2167.4
Exogenous inputs				
% Students eligible for free school meals	16.3	8.4	14.6	8.4
% Students with Special Educational Needs	18.9	3.0	18.9	4.2
% Students with English as a second language	12.6	15.6	10.3	13.5
Ethnic diversity	3201.3	2344.5	3027.1	2327.8
% working population with a degree	18.2	8.0	18.2	8.0

4. Statistical Results

The pooled time-series used for the analysis is a balanced, though incomplete (due to missing salary figures for some LEAs) panel data set for five years (2005-2009). The cross-sectional dominance, shortness of the panel and inclusion of dummy variables for each year of the analysis (minus one) minimize the threat of serial correlation (Stimpson 1985). Aside from the size of the student population and the number of schools (which are inescapably collinear) the average VIF score for the independent variables is about 6. The results are therefore unlikely to be seriously distorted by multicollinearity (Bowerman and O'Connell, 1990).

Hausman-Taylor (HT) estimates for the cost and expenditure functions for primary and secondary schooling are presented below in Tables 2 and 3. The Hausman and Taylor (1981) estimator is a kind of hybrid of the fixed effects and random effects panel estimators. Like the fixed effects estimator, it permits the independent variables to be correlated with unobserved individual effects, however, it does not permit all explanatory variables to be so correlated. Thus, like a random effects estimator, the HT estimator permits the inclusion of time invariant variables. This is possible because it utilizes information from the time-varying exogenous variables to instrument for the time-invariant ones. Although some scholars question the efficiency of the HT approach to estimation of fixed effects using time-invariant variables (Plümper and Troeger, 2011), several others point to its continued validity (e.g. Breusch, Qard, Nguyne and Kompass, 2011; Greene, 2011).

Before applying the HT estimator, it is important to establish its efficiency as an estimator in comparison with alternative panel data estimators (Halaby, 2004). Using the Hausman (1978) test, fixed and random effects estimates were first compared. The null hypothesis of no systematic differences between these estimates was rejected for primary schooling (though not for secondary schooling), indicating that HT estimates should be compared with fixed effects ones. Systematic differences were not observed between the HT and fixed effects estimates. As a result, the Hausman-Taylor estimates presented in Tables 2 and 3 are more efficient than fixed effects estimates.

Table 2. Hausman-Taylor estimates of scale economies in primary education

Independent variable	Cost function			Expenditure function		
	linear	nonlinear	optimal	linear	nonlinear	(
Ln (students)	-.6072***	-.9609	-.6316***	-.5905***	-.7095	-.(
Ln (students) ^{2}		-.0174			.0075	
Ln (schools)	.1469	-1.4946	-1.7602**	.1459	-1.4328	-
Ln (schools) ^{2}		.1873*	.2223***		.1823*	.2
Ln (pupil density)	.0768	.0614	.0815	.0760	.0672	
Output quality						
Ln (KS 2 English)	-.1155	-.1507	-.1512			
Ln (KS2 Maths)	-.1721	-.1595	-.1561			
Ln (5+ GCSEs A*-C)						
Ln (property tax)				.0068	.0123	
Input quality						
Ln (av. class size)	-.2719	-.3523	-.3662	-.2930	-.3884	
Ln (student-teacher ratio)	.2704	.2575	.2601	.2894	.2849	
Input prices						
Ln (teacher salary)	-.3940	-.4559	-.4493	-.3594	-.4049	
London borough	.4568*	.5171*	.4819**	.4219**	.4487*	
Metropolitan borough	.3188	.3758*	.3497*	.3034	.3190	
County council	.5980*	.3594	.3211	.5785	.2873	
Exogenous inputs						
Ln (free school meals)	-.03669	-.0478	-.0488	-.0293	-.0386	
Ln (students with SENs)	-.0411	-.0342	-.0356	-.0420	-.0339	
Ln (English 2nd lang)	-.0725***	-.0692***	-.0650***	-.0666***	-.0604***	-.(
Ln (ethnic diversity)	-.0451**	-.0431**	-.0426**	-.0413*	-.0386*	-
Ln (degree educated)	-.0069	-.0123	-.0130	-.0018	-.0064	
Wald Chi^2	3077.47***	3115.57***	3100.75***	3057.10***	3076.64***	30

N = 548. Significance levels: *p ≤ 0.10; **p ≤ 0.05; ***p ≤ 0.01 (two-tailed test). Coefficients for year dummies not shown.

The estimates presented in table 2 illustrate that few of the control variables are statistically significant and that only one of these behaves in the expected manner. The coefficient for London is positive, suggesting that the provision of primary schooling is more costly in the capital's LEAs. At the same time, two of the control variables confound expectations. A higher proportion of English second language students and a higher level of ethnic diversity are both associated with lower rather than higher primary education costs. On possible explanation for this apparently counter-intuitive finding is that as the proportion of native English speaking and white students falls within a given LEA, so the median voter's demand for high levels of education expenditure by the authority recedes (Poterba, 1997). Table 2 shows that the substitution of the property tax measure for the education performance variable makes no different to the explanatory power of the estimates. Thus, further research is required to tease out the dynamics of the connection between the preferences of the local population and the demographic composition of its primary schools.

Turning to the variables used to gauge the presence of scale economies, table 2 indicates that there is a linear negative relationship between the size of student population and expenditure per primary school student observed in the models incorporating only the raw district size measure. The coefficient for the number of primary schools in the first model suggests that for a 10% increase the number of primary pupils there would be about a 6% decrease in the costs of primary education. This indicates that considerable savings could potentially be achieved through the amalgamation of LEAs – at least in primary education. At the same time, when quadratic terms are included in the estimates there appears to be a u-shaped relationship between the number of primary schools and costs. This latter finding implies, in line with much of the extant literature, that medium-sized schools are the most cost-efficient. In fact, calculation of the tipping-point revealed that the optimum number of primary schools per LEA was about 52 – over half a standard deviation below the mean number of such schools (127). In 2009, only 20% of LEAs had fewer than this number, while more than 40% operated over 100 primary schools. Thus, one conclusion that could be drawn from this result might be that there is likely to be more scope for those LEAs with a large number of small schools to realise economies of scale through school amalgamations than for their counterparts seeking to break-up a smaller number of large schools.

Table 3. Hausman-Taylor estimates of scale economies in secondary education

Independent variable	Cost function			Expenditure function		
	linear	nonlinear	optimal	linear	nonlinear	optimal
Ln (students)	.0100	1.3235	.0155	.0093	1.2631	.0155
Ln (students) ^{2}		-.0670			-.0640	
Ln (schools)	-.0435	-.6145	-.2384**	-.0426	-.5967	-.2381**
Ln (schools) ^{2}		.0963	.0326**		.0937	.0326**
Ln (pupil density)	-.0129	-.0167	-.0139	-.0129	-.0165	-.0140
Output quality						
Ln (KS 2 English)						
Ln (KS2 Maths)						
Ln (5+ GCSEs A*-C)	.0146	.0158	.0064			
Ln (property tax)				-.0176	-.0145	-.0151
Input quality						
Ln (av. class size)	-.0392	-.0709	-.0432	-.0406	-.0720	-.0438
Ln (student-teacher ratio)	-.0685	-.0504	-.0630	-.0792	-.0592	-.0712
Input prices						
Ln (teacher salary)	.3120	.3359	.3051	.2967	.3219	.2934
London borough	.0153	.0184	.0243	.0201	.0238	.0273
Metropolitan borough	-.0295	-.0153	-.0206	-.0293	-.0149	-.0205
County council	.0166	.0004	-.0038	.0129	-.0025	-.0070
Exogenous inputs						
Ln (free school meals)	.1170***	.1103***	.1140***	.1137***	.1068***	.1124***
Ln (students with SENs)	.0156	.0072	.0134	.0139	.0057	.0122
Ln (English 2nd lang)	.0030	.0033	.0035	.0033	.0035	.0038
Ln (ethnic diversity)	.0406**	.0479***	.0400**	.0398**	.0470***	.0396**
Ln (degree educated)	-.0069	-.0179	-.0116	-.0061	-.0174	-.0116
Wald Chi^2	1986.55***	2055.33***	2013.01***	1985.63***	2055.75***	2013.85***

N = 548. Significance levels: *p ≤ 0.10; **p ≤ 0.05; ***p ≤ 0.01 (two-tailed test). Coefficients for year dummies not shown.

Table 3 shows the results for the estimates of the presence of scale economies in the secondary education provided by LEAs. Only two of the control variables are statistically significant – though in this case both behave as theory would predict. The coefficient for the proportion of children eligible for free school meals suggests that if an LEA were to experience a 10% increase in pupil eligibility for free school meals, there would be a corresponding rise in secondary education costs of about one per cent. Similarly, a 10% increase in the ethnic diversity of secondary school pupils, would likely result in about a .4% rise in costs. As for the primary education estimates, the substitution of the property tax measure for the education performance variable makes no different to the explanatory power of the models.

Unlike primary education, no straightforward linear scale economies are observed for the number of secondary students. However, like the primary education estimates, the HT estimates of non-linear size effects uncover evidence of a u-shaped relationship between school size and the costs of secondary education. The tipping point for the optimum number of secondary schools was found to be about thirty-nine – nearly a full standard deviation above the mean number. Thus, in contrast to the primary education context, most LEAs have fewer secondary schools than the optimum number. For example, more than 60% of LEAs have below 20 secondary schools, but about only 10% have more than 50. Thus, in this instance, it would seem that there is more scope for realising scale economies by disbanding large schools and creating smaller new ones than by amalgamating existing small ones.

5. Conclusions

The statistical results indicate that scale economies are present within the provision of primary and secondary schooling in English local government. The relationship between district size and primary education costs and expenditure in LEAs is negative, indicating the presence of substantial scale economies. Although no such relationship was observed for secondary education, in both secondary and primary scholling there was evidence of a u-shaped relationship between school size and costs. These latter findings, in particular, are largely consistent with the preponderance of existing evidence also uncovering a u-shaped size-costs relationship for public education. As such, the evidence on scale economies in the English local government system therefore represents an important addition to the growing body of research on scale economies in the public sector.

The emerging pattern of evidence suggests that across the population of LEAs larger ones are the most efficient providers of primary education, but that those with fewer primary schools and more secondary schools, on the whole, are also more efficient providers of education. One possible implication of the scale economies observed in primary schooling is that there should be reductions in the large number of primary schools which LEAs typically manage. Or, put differently, that the average size of primary schools should increase. At the same time, when the number of schools is held constant, scale economies emerge from an increase in the student population. So, for small LEAs, mergers (or shared service arrangements) with other LEAs might also result in valuable cost-savings in primary schooling. By contrast, it would seem that the best way to realise efficiencies in secondary schooling would be by disaggregating the largest schools.

The analysis presented here indicates that size effects in labour-intensive public services should not be ignored in decisions on local government reorganization, or indeed on debates about the potential for restructuring the services provided within a local government's jurisdiction. It is important to remember, however, that this analysis examines the effects of size on costs and expenditure alone. The disruption caused by any ensuing reorganization is likely to add significant costs which should be accounted for in the strategic planning of local and national policy-makers. Walter's (2001) case study of local government reorganization in England, for instance, points to lower education efficiency in the period immediately following reform. And numerous other studies point towards the costly disruptive effects of organizational change (e.g. Andrews and Boyne, 2011; Greve, 1999; Vojnovic, 2000). Further work therefore needs to be conducted on the consequences of large-scale restructuring for the costs of education using longitudinal quantitative datasets that are able to incorporate instances of structural reform, as well as variations in district and school size. It would also be important to explore the effects of alternative management strategies and practices on costs, especially the extent to which shared service arrangements between LEAs might prompt efficiency gains. Moreover, subsequent research could build on this study by investigating scale effects using multi-level modelling, which incorporates data at the school level.

In addition to extending the research into scale economies in education production in England, there is a clear need for comparative studies exploring the varying effects of scale and structure across multiple local government systems. Few systems have such large units or are as centralised as the English one, and many, like the US, have a long tradition of voluntary rather than forced amalgamation or disaggregation. Evidence on cross-country convergence and divergence would cast valuable light on the extent to which lessons about the optimum size for efficient education production can be applied in different countries. Finally, decisions on the optimum district and school size for the provision of public education must take account of other important technical and democratic considerations, such as education performance, policy formulation and implementation capacity, local autonomy and the degree of political representation (see, for example, Copus, Crowe and Clark, 2005). Empirical investigation of all these issues will allow wider judgements to be reached on the relative merits of scale for the provision of labour-intensive services.

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